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Office of Pollution Prevention and Toxics
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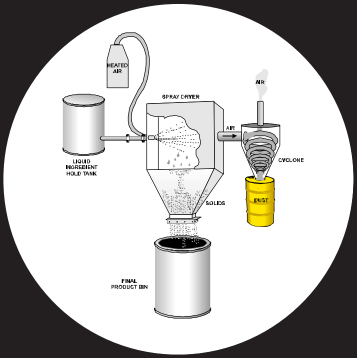
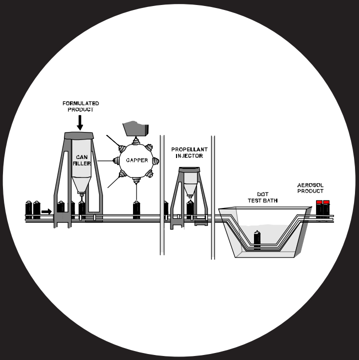
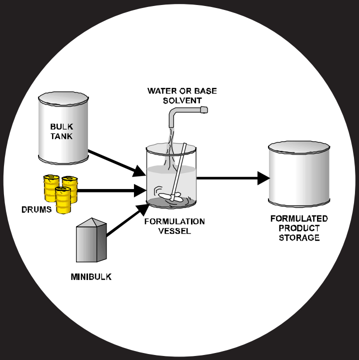
Final

Pollution Prevention (P2) Guidance Manual for the Pesticide Formulating, Packaging, and Repackaging Industry: Implementing the P2 Alternative







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Notice

This manual was made available in draft form to regulators and members of the regulated community. Comments received on the draft manual have been incorporated into this final manual. Mention of trade names or commercial products does not constitute endorsement or recommendation for use. The policies set forth in this manual are not final Agency actions but are intended solely as guidance. The manual does not substitute for the Clean Water Act or EPA's regulations; nor is it a regulation itself. Thus, it cannot impose legally-binding requirements on EPA, States, or the regulated community, and may not apply to a particular situation based upon the circumstances. EPA and local decisionmakers retain the discretion to adopt approaches on a case-by-case basis that differ from this guidance where appropriate. EPA may change this guidance in the future.

Foreword

This Pollution Prevention (P2) manual discusses the applicability and implementation of effluent limitations guidelines and standards covering the pesticide formulating, packaging, and repackaging (PFPR) industry. The main purpose of the manual is to provide guidance to industry and permitters in the process of complying with this rule, in particular, complying with the P2 Alternative Option. EPA has received numerous requests from refilling establishments questioning how the final rule applies to them. This foreword is an aid to facilities in determining if the information contained in this manual is applicable to them.

The final rule is applicable to two subcategories of new and existing PFPR operations as discussed in the box to the right. In general, because refilling establishments covered under Subcategory E must achieve zero discharge, the P2 alternative guidance provided in this manual is not applicable. However, if a refilling establishment also performs PFPR operations covered under Subcategory C, for which the P2 alternative is an option,that facility may be interested in obtaining a copy of this manual, as they could commingle their Subcategory E wastewater with their Subcategory C wastewater and choose to follow the Subcategory C regulations (i.e., zero discharge or the Pollution Prevention Alternative).

PFPR Subcategories

Subcategory C: Pesticide formulating, packaging, and repackaging (PFPR), including pesticide formulating, packaging, and repackaging occurring at pesticide manufacturing facilities (PFPR/Manufacturers) and at stand-alone PFPR facilities (does not include research and development operations).

Subcategory E: Repackaging of agricultural pesticide products at refilling establishments. Refilling establishments are defined as establishments where the pesticide product is repackaged into refillable containers. The limitations and standards of the rule covered under Subcategory E apply only to the repackaging of pesticide products performed by refilling establishments: (a) that repackage agricultural pesticides; (b) whose primary business is wholesale or retail sales; and (c) where no pesticide manufacturing, formulating, or packaging occurs. Custom application and custom blending operations are not covered under Subcategory E.

More specifically, the final rule for Subcategory C facilities requires either zero discharge of pollutants or the P2 alternative, which allows a discharge of pollutants if certain P2 practices are implemented, followed by treatment as necessary. Facilities can choose the P2 alternative on a facility-wide basis or by product family/process line/process unit.

The final rule for Subcategory E facilities requires zero discharge of pollutants; there is no option for an allowable discharge after implemeting approved P2 practices. The zero discharge limitation is based on collection and storage of process wastewaters, including rinsates from cleaning minibulk containers and their ancillary equipment and wastewaters from secondary containment and loading pads, with the exception of contaminated storm water. In most cases, refilling establishments hold wastewater until it can be applied as pesticide in accordance with the product label or reused as make-up water in an application of pesticide chemical to an appropriate site. Data collected by EPA show that 98% of all refilling establishments already achieve zero discharge, primarily by holding contaminated wastewater and reusing it as make-up water.

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Acknowledgments

Shari Zuskin of the U.S. Environmental Protection Agency (EPA), Office of Water, Engineering and Analysis Division, was the work assignment manager responsible for the preparation and review of this guide. Holly Elwood of EPA's Office of Pollution Prevention and Toxics, Pollution Prevention Division, also contributed heavily to the preparation and review of this manual. This manual was prepared with the support of Eastern Research Group (Contract No. 68-C5-0023) under the direction and review of the Office of Science and Technology.

CHAPTER 1

Introduction

This manual is designed to provide guidance on how to assess pollution prevention (P2) opportunities at pesticide formulating, packaging, and repackaging (PFPR) facilities and to assess compliance with the P2 Alternative Option of the effluent limitations guidelines and standards for the PFPR industry (61 FR 57517). The opportunities and compliance methodologies discussed in this manual specifically relate to water use and reuse, wastewater generation, and wastewater treatment and disposal. The manual is intended for use by PFPR facility managers, publicly owned treatment works (POTWs), permit writers and other regulatory agency representatives, federal and state auditors, and consultants.

Why Implement P2?

Effective P2 programs offer several benefits, summarized in Table 1-1, when incorporated as part of facility operations. Although this manual concentrates on water management practices, a P2 assessment and the resulting operation changes often lead to overall improvements in the efficiency of PFPR process operations through decreasing the loss of raw materials and minimizing waste disposal costs.

Table 1-1
Examples of Benefits of Pollution Prevention

Cost Benefits of Pollution Prevention

- Cost savings from recovery of active ingredients
- Cost savings from recovery of water
- Reduction in cost of waste disposal
- Reduction in permitting costs

Other Advantages of Pollution Prevention

- Improved corporate image
- Improved worker and community safety
- Compliance with effluent guidelines
- Assistance with environmental programs

Information contained in the manual is not meant to represent an exhaustive list of P2 opportunities that may exist or should be put to use at any one facility; rather, it is intended to identify P2 practices currently in use in the industry and to provide additional information on how to implement these and other practices as well as aid in compliance with the PFPR effluent guidelines and standards. The Environmental Protection Agency's (EPA's) Office of Research and Development previously published P2 guides for the pesticide formulating industry and for nonagricultural pesticide users. These guides evaluated waste minimization options for formulating facilities, and were not specifically focused on water management practices.

In addition, many states have developed P2 guidance applicable to PFPR facilities. Members of the PFPR industry and their trade associations have also spent time and money evaluating the incorporation of P2 into facility operations and have developed effective tools to assist that process.

What is P2?

The Pollution Prevention Act of 1990 established a national policy to prevent or reduce pollution at the source whenever feasible as the first and preferred choice for environmental management. This policy is referred to as pollution prevention, or source reduction, and may include in-process recycling practices. Table 1-2 shows EPA's preferred hierarchy of environmental management options, of which pollution prevention is the first choice. Table 1-2 also presents a definition of source reduction/pollution prevention as it pertains to the environmental hierarchy.

Table 1-2
Environmental Management Hierarchy

1. Pollution should be prevented or reduced at the source whenever feasible ("source reduction");
2. Pollution that cannot be prevented should be recycled in an environmentally safe manner whenever feasible;
3. Pollution that cannot be prevented or recycled should be treated in an environmentally safe manner whenever feasible; and
4. Disposal or other release into the environment should be employed only as a last resort and should be conducted in an environmentally safe manner.

Source Reduction

- Any practice that reduces the amount of any hazardous substance, pollutant, or contaminant entering any waste stream or otherwise released into the environment prior to recycling, treatment, or disposal;
- Any practice that reduces the hazards to public health and the environment associated with the release of such substances, pollutants, or contaminants; and
- Equipment or technology modifications, process or procedure modifications, reformulation or redesign of products, substitution of raw materials, and improvements in housekeeping, maintenance, training, or inventory control.

EPA is required by the Pollution Prevention Act of 1990 to incorporate P2 into all of EPA's activities, including rulemaking and implementation. The Source Reduction Review Project was established in 1992 to instill the tenets of the Pollution Prevention Act into every phase of EPA's rulemaking process. As a part of this effort, EPA has focused on incorporating P2 practices, specifically the reuse and recycle of process wastewaters, into effluent limitations guidelines and standards for the PFPR industry.

PFPR Pollution Prevention Alternative

On September 30, 1996, EPA promulgated effluent limitations guidelines and standards for the PFPR industry. A copy of the final rule is contained in Appendix A. The final rule covers process wastewater discharges from PFPR operations occurring at facilities in two subcategories, as defined in Table 1-3. The formulation, packaging, and/or repackaging of all pesticide products fall within the rule's applicability, with the exception of the six groups of products listed in Table 1-4. (The regulatory definitions of these excluded pesticide products can be found starting on page 57548 of the final rule FR notice, in Appendix A of this manual.)

Table 1-3
PFPR Industry Definitions

Subcategories

Subcategory C:	Pesticide formulating, packaging, and repackaging (PFPR), including PFPR operations at pesticide manufacturing facilities and at stand-alone PFPR facilities (Note: does not include research and development operations).
Subcategory E:	Repackaging of agricultural pesticide products at refilling establishments (Note: does not include custom application).

PFPR Operations

Formulating:	The process of mixing, blending, or diluting one or more pesticide active ingredients with one or more active ingredients, without an intended chemical reaction, to obtain a manufacturing use product or end use product.
Packaging:	The process of enclosing or placing formulated pesticide product into a marketable container.
Repackaging:	The direct transference of a pesticide active ingredient or formulated product from any marketable container into another marketable container, without a change in composition of the formulation or the labeling content, for sale or distribution.

A flow chart depicting the process to determine whether a facility is subject to the PFPR effluent guidelines or pretreatment standards is shown in Figure 1-1. The first step is to determine if the facility formulates, packages, and/or repackages pesticide products based on the industry definitions presented in Table 1-3. If the answer is no, the facility is not subject to this rule. If the answer to any of these questions is yes, the next step is to determine whether the pesticide products contain active ingredients that are within the scope of the rule based on the exemptions listed in Table 1-4. If they do, the facility must operate in compliance with the PFPR effluent guidelines.

Table 1-4
Excluded Pesticide Products

- Sanitizer products;
- Microorganisms;
- Group 1 and Group 2 mixtures;
- Inorganic wastewater treatment chemicals;
- Chemicals that do not pass through POTWs; and
- Certain liquid chemical sterilants.

The final rule requires facilities to meet zero discharge of process wastewater pollutants. The rule also offers the option of a Pollution Prevention Alternative to Subcategory C facilities that agree to implement certain P2, reuse, and recycle practices (and treatment when necessary). These facilities receive a discharge allowance referred to as the P2 allowable discharge (see Appendix A for the definition of allowable discharge). As shown in Figure 1-1, if the facility does not generate any wastewater from their PFPR operations, they are not covered by the rule (no potential to discharge). If they generate a pesticide-containing wastewater, a determination must be made of whether the wastewater is covered under the final rule; the rule does exempt from regulation certain wastewater sources, which are discussed in Chapter 4.

If it is determined that the facility generates a wastewater covered under the rule and does not discharge this wastewater, but has the potential to discharge, they are covered and are in compliance with zero discharge. If they wish to discharge that wastewater, they must comply with the P2 alternative.

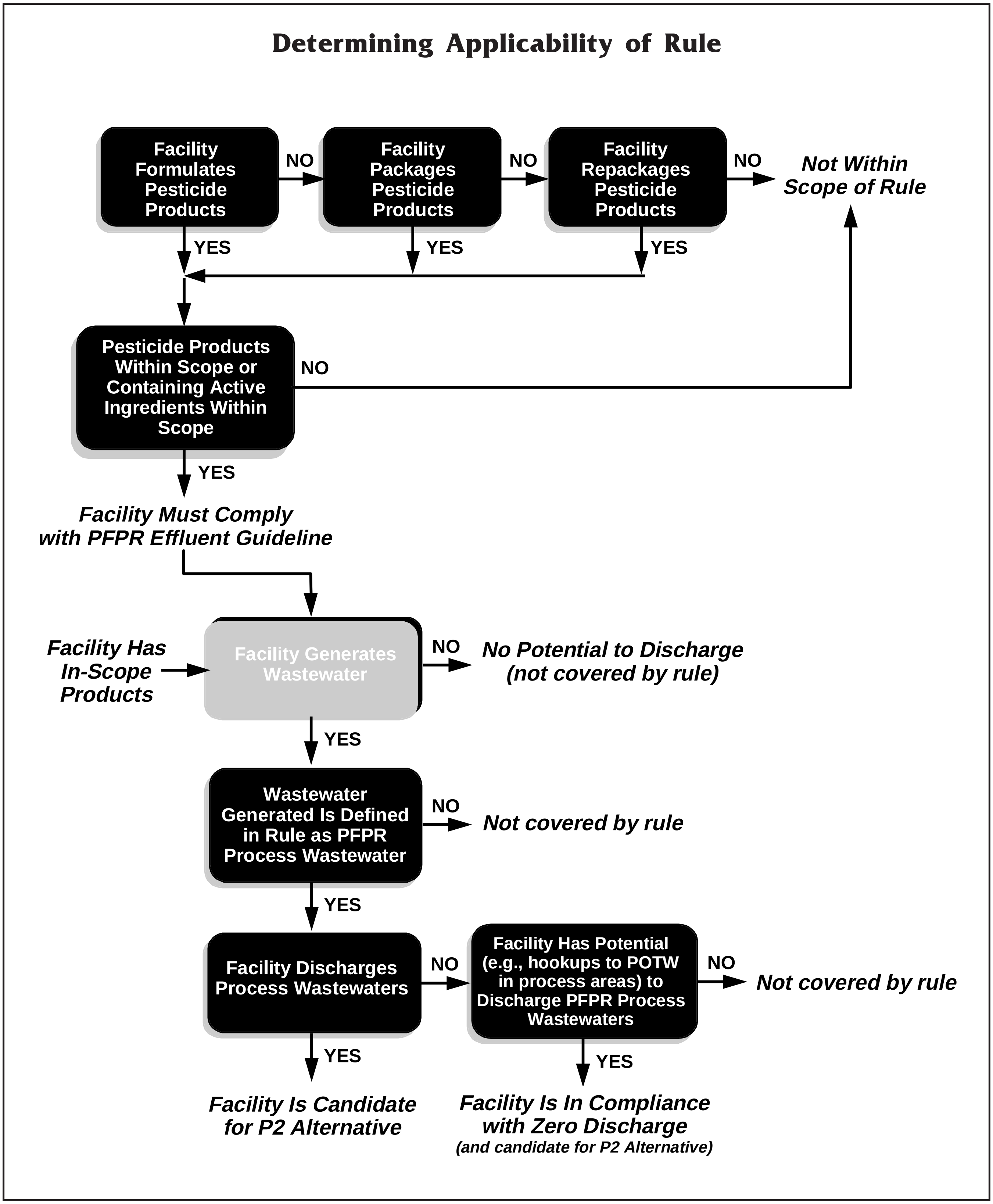


Figure 1-1. Determining Applicability of Rule

Each facility subject to the final PFPR rule will need to make an initial choice of how to comply with the regulation. They will need to choose to either comply with the zero discharge effluent limitation/pretreatment standard or agree to conduct the P2 practices listed in Table 8 of the rule (and conduct treatment where necessary). The facility can also use a variation of a listed practice based on modifications listed in Table 8 of the final rule or those agreed to by the permitting/control authority. Facilities will also need to agree to make the practices and the P2 discharge allowance enforceable; for example, the facility would agree to include them in their NPDES permit for direct discharges or in an individual control mechanism with the control authority for indirect discharges. This choice can be made either on a facility-wide basis or on a process basis (i.e., product family/process line/process unit). Each of the P2 practices listed in Table 8 of the rule is described more fully in Chapter 3 of this manual.

EPA's Office of Water and Office of Pollution Prevention and Toxics have created this guidance manual to facilitate compliance with this rule. P2 practices that are required as part of compliance with the P2 alternative form the basis of the manual; however, other nonrequired P2 opportunities that a facility may choose to implement are also presented. Because the manual focuses on water use and wastewater generation, it is not intended to offer guidance on the development of state P2 plans; however, P2 opportunities discussed here may also be incorporated into PFPR facility state P2 plans. The manual does not include an exhaustive list of all possible P2 opportunities, but provides a framework for an initial assessment of PFPR operations as they pertain to water use and wastewater generation and to compliance with the P2 alternative.

How to Use This Manual

This manual is organized into 10 chapters and six appendices:

- **Chapter 2** provides basic descriptions of PFPR operations (e.g., dry formulating, aerosol packaging, and drum rinsing) for those readers unfamiliar with this industry;
- **Chapter 3** provides a glossary of the specific P2 practices and equipment required to implement the P2 alternative, as well as other P2 practices and equipment found in the industry, including illustrations and benefits of use;
- **Chapter 4** presents instructions and an example for conducting P2 audits to evaluate water management practices at PFPR facilities and to aid in making compliance decisions;
- **Chapter 5** discusses wastewater treatment technologies;
- **Chapter 6** presents information on how to conduct a treatability test;
- **Chapter 7** discusses evaluation of wastewater treatment system performance, compliance with the PFPR effluent guidelines rule, and certification paperwork;
- **Chapter 8** presents case studies to provide guidance to the user in complying with the PFPR regulation;

- **Chapter 9** provides a list of resources for additional help in complying with the regulation;
- **Chapter 10** presents questions asked at the five workshops EPA conducted on the PFPR rule in July through September 1997 and EPA's responses to those questions, which are grouped by topic;
- **Appendix A** presents the final rule for the PFPR industry;
- **Appendix B** presents tables that can be used to document the results of P2 audits, wastewater treatment tests, and compliance decisions related to the final PFPR rule;
- **Appendix C** lists the pesticide active ingredients presented in Table 10 to Part 455 (in Appendix A) together with their Shaughnessy codes and CAS numbers;
- **Appendix D** provides an excerpt on test procedures for an EPA-sponsored treatability test.
- **Appendix E** presents guidance on requirements of the Baseline Monitoring Report (BMR) and the applicability of categorical pretreatment standards to industrial users, including zero discharge facilities; and
- **Appendix F** presents a list of terms, and their definitions, commonly used in the PFPR industry (regulatory definitions are included in the final rule).

This is the first time that EPA has written a P2 Guidance Manual in conjunction with a rule, and we would like your valuable input on how useful this document is to you. On page 159, you will find a short survey requesting your input. Please take a moment to evaluate the manual's usefulness in describing P2 opportunities for the PFPR industry and evaluating compliance with the PFPR effluent guidelines rule, and whether you thought the manual was "user friendly."

CHAPTER 2

PFPR Operations

This chapter describes seven types of basic operations, shown in Table 2-1, used in the PFPR industry. The descriptions presented are simplified and will be most useful for those readers unfamiliar with the industry. They are intended to be used in conjunction with the P2 glossary located in Chapter 3 to help identify and implement specific P2 opportunities.

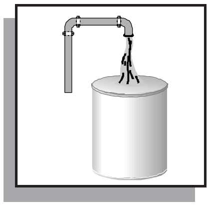
Facilities in the PFPR industry formulate, package, and repackage a variety of pesticide products, including herbicides, insecticides, and fungicides. These facilities typically have physical divisions between formulating and packaging operations, and between dry and liquid operations.

Because of the large number of pesticide products a facility may handle, most PFPR facilities operate on the principle of "just-in-time" production. This principle basically dictates that products are made on customer demand to reduce the space needed to keep large inventories on hand. However, because production is tied to customer orders, the specific products that are formulated, packaged, or repackaged can vary from day to day and hour to hour. Therefore, facilities often use an equipment line (e.g., a liquid formulating line) to make multiple products over the course of a day, or week, or month.

Table 2-1
PFPR Operations

- Liquid Formulating
- Dry Formulating
- Liquid Packaging
- Dry Packaging
- Aerosol Packaging
- Pressurized Gas Formulating and Packaging
- Repackaging

Facilities typically formulate, package, or repackage these products in batches. They also usually have the flexibility to "mix and match" equipment as needed. For example, a facility may have two formulation mix tanks, Tank A with a capacity of 100 gallons and Tank B with a capacity if 500 gallons. Both mix tanks have piping connections to a product storage tank (Tank C) with a capacity of 500 gallons. The facility can configure these tanks two ways, depending on the amount of product to be formulated. If 100 gallons of product or less are scheduled to be made, the facility connects Tank A with Tank C and uses Tank A to formulate the product. If more than 100 gallons of product are scheduled to be made, the facility connects Tank B with Tank C and uses Tank B to formulate the product. In both cases, the facility is attempting to maximize their production while minimizing the amount of equipment that will need to be cleaned prior to formulating a new product.



Liquid Formulating

Liquid formulations contain mixtures of several raw materials, including pesticide active ingredients, inert ingredients, and a base solvent, and may also contain emulsifiers or surfactants. The solvent may be water or an organic chemical, such as isopropyl alcohol or petroleum distillate. In some cases, the formulation is an emulsion and contains both water and an organic solvent. Solid materials, such as powders or granules, may also be used as part of a liquid formulation by being dissolved or emulsified in the solvent to form a liquid or suspension. The formulated product may be in a concentrated form requiring dilution before application, or may be ready to apply.

An example of a liquid-based formulating line is shown in Figure 2-1. Typical liquid formulating lines consist of storage tanks or containers to hold active and inert raw materials, and a mixing tank for formulating the pesticide product. A storage tank may also be used on the formulating line to hold the formulated pesticide product, prior to a packaging step. Facilities may receive their raw materials in bulk and store them in bulk storage tanks, or they may receive the raw materials in smaller quantities, such as 55-gallon drums, 50-pound bags, or 250-gallon minibulk containers or "totes" (smaller, refillable containers). These raw materials are either piped to the formulation vessel from bulk storage tanks, or added directly to the vessel from drums, bags, or minibulks. Typically, water or the base solvent is added to the formulation vessel in bulk quantities.

The formulating line may also include piping and pumps for moving the raw material from the storage tanks to the mixing tank, and for moving formulated pesticide product to the packaging line. Other items that may be part of the line are premixing tanks, stirrers, heaters, bottle washers, and air pollution control equipment. Some lines may also contain refrigeration units for formulation, storage units, scales, and other equipment.

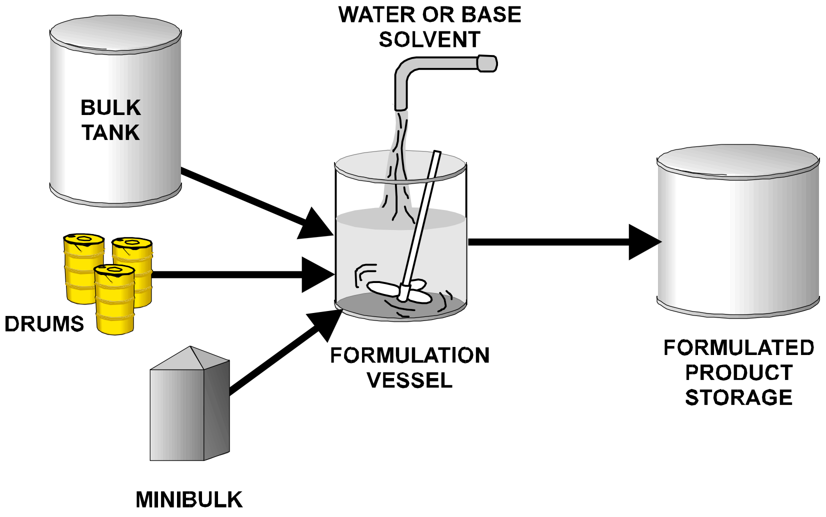
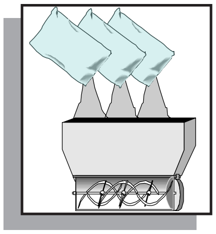


Figure 2-1. Liquid-Based Formulation Line



Dry Formulating

Dry formulations contain active and inert ingredients; the final product may be in many different forms, such as powders, dusts, granules, blocks, solid objects impregnated with pesticide (e.g., flea collars), pesticides formed into a solid shape (e.g., pressed tablets), or microencapsulated dusts or granules. They are formulated in various ways, including mixing powdered or granular actives with dry inert carriers, spraying or mixing a liquid active ingredient onto a dry carrier, soaking or using pressure and heat to force active ingredients into a solid matrix, mixing active ingredients with a monomer and allowing the mixture to polymerize into a solid, and drying or hardening an active ingredient solution into a solid form. These dry pesticide products may be designed for application in solid form or to be dissolved or emulsified in water or solvent prior to application.

Because of the many types of dry pesticide products, dry pesticide formulating lines can vary considerably. Figures 2-2 and 2-3 are examples of granular and dry spray-coated formulation lines. Dry formulating lines typically have tanks or containers to hold the active ingredients and inert raw materials, and may include mixing tanks, ribbon blenders, extruding equipment, high-pressure and temperature tanks for impregnating solids with active ingredient, a vacuum or other type of drying equipment, tanks or bins for storage of the formulated pesticide product, pelletizers, presses, milling equipment, sieves, and sifters.

Raw materials for dry pesticide products may be liquid or solid. Liquid raw materials may be stored in rail tank cars, tank trucks, minibulks, drums, or bottles. Dry raw materials may be stored in silos, rail cars, tank trucks, minibulks, supersacks, metal drums, fiber drums, bags, or boxes. Liquid raw materials may be pumped, poured, or sprayed into formulation vessels, while dry raw materials are frequently transferred to formulation equipment by screw conveyors (consisting of a helix mounted on a shaft and turning in a trough), through elevators, or by pouring.

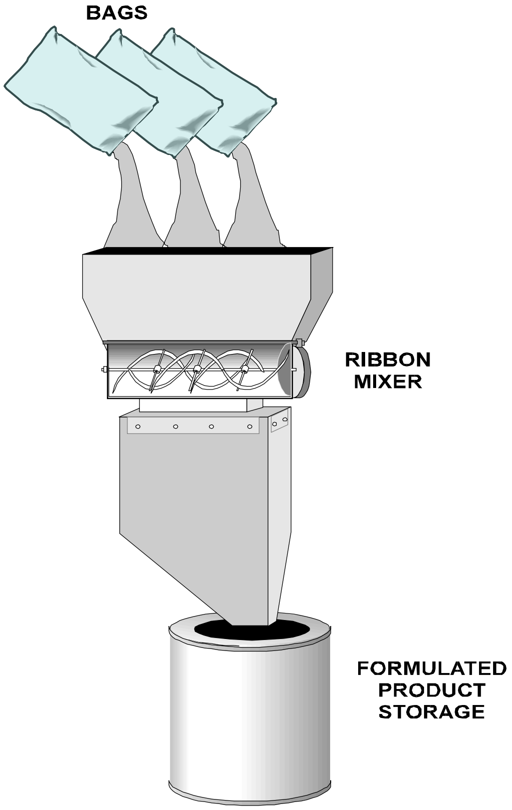


Figure 2-2. Granular Formulation Line

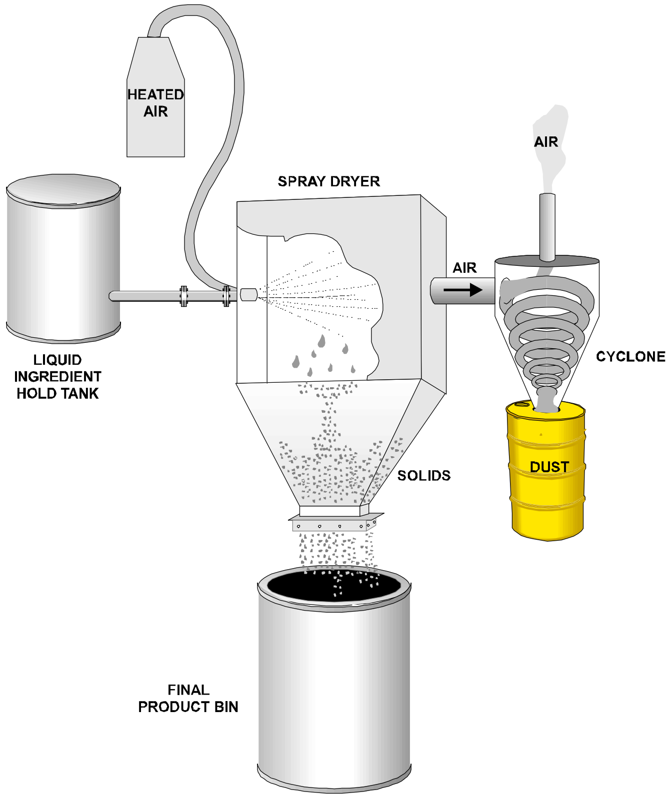


Figure 2-3. Dry Spray-Coated Formulation Line

Dry formulating lines may also include piping and pumps for moving raw materials from storage tanks to the formulation equipment, and for moving formulated pesticide product to the packaging equipment. Other items that may be included in the dry pesticide formulating line are premixing tanks, tanks for storing formulated product prior to packaging, stirrers, heaters, refrigeration units on formulation and storage equipment, scales, and air pollution control equipment (e.g., cyclones, filters, or baghouses). Dry pesticide products may be packaged into rail tank cars, tank trucks, totes, minibulks, and water-soluble packaging, but are typically packaged into bags, boxes, or drums.

Liquid Packaging

Many liquid formulations are packaged by simply transferring the final product into containers. Figure 2-4 depicts a liquid packaging line. Small quantities of product are often manually packaged by gravity feeding the product directly from the formulation tank into the product container. For larger quantities, the process is often automated. Formulated product is transferred to the packaging line through pipes or hoses, or is received from a separate formulating facility, and placed in a filler tank. A conveyor belt is used to carry product containers, such as jugs, bottles, cans, or drums, through the filling unit, where nozzles dispense the appropriate volume of product. The belt then carries the containers to a capper, which may be automated or manual, and then to a labeling unit. Finally, the containers are packed into shipping cases.

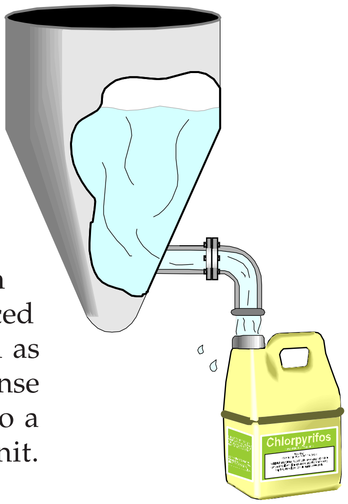
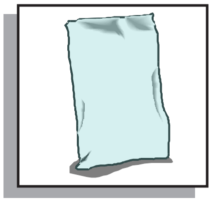


Figure 2-4. Liquid Packaging Line



Dry Packaging

Dry formulations are also packaged by simply transferring the final product into boxes, drums, jugs, or bags. Figure 2-5 depicts a dry packaging line. Again, small quantities or bags are typically packaged manually using a gravity feed to carry the product from the formulating unit into the containers or bags. Larger quantities may be packaged on an automated line, similar to liquid packaging lines.

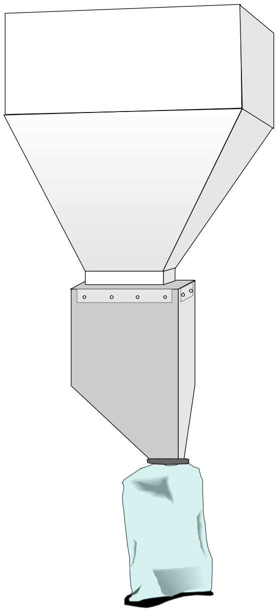


Figure 2-5. Dry Packaging Line

Aerosol Packaging

Some water- or solvent-based liquid pesticide products are packaged as aerosols. Figure 2-6 is an example of an aerosol packaging line. The product is placed in spray cans that are put under pressure, and a propellant is added. When the end user sprays the aerosol, the propellent forces the product out of the can and allows the product to be applied to surfaces or to be dispersed in the air. An aerosol packaging line typically includes a filler, a capper, a propellant injector, and a U.S. Department of Transportation (DOT) test bath. In the filler, formulated pesticide product is dispensed into empty aerosol cans, in much the same way that the liquid packaging lines fill containers. The cans are then sent to the capper, where a cap with nozzle is placed on the can. The can enters a separate room, where the propellent is injected into the can, a vacuum is pulled, and the cap is crimped to make the can airtight. In order to comply with DOT regulations on the transport of pressurized containers, each can must then be tested for leaks and rupturing in a DOT test bath. The DOT test bath is a 130°F hot water bath into which cans are submerged and observed for leaks or ruptures. The aerosol packaging line may also include a can washer to remove residue from can exteriors prior to entering the test bath (to reduce contaminant buildup in the bath), a dryer to dry can exteriors, and machinery to package aerosol cans into boxes for shipment.

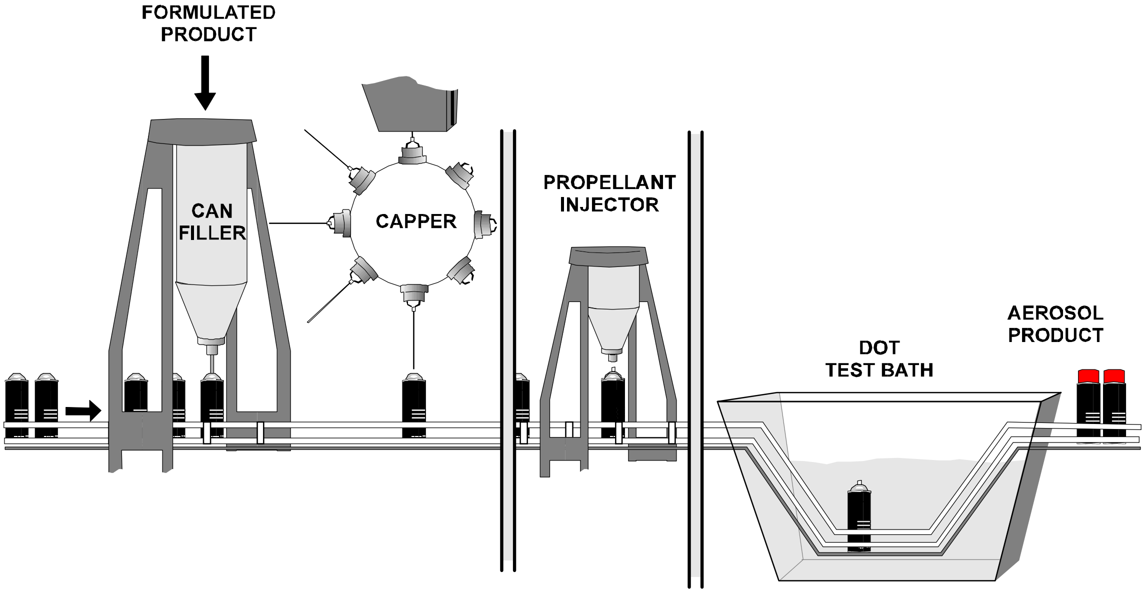
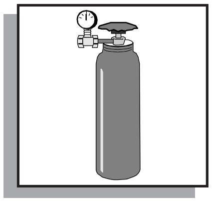


Figure 2-6. Aerosol Packaging Line



Pressurized Gas Formulating and Packaging

Some pesticide products are formulated and packaged as pressurized gases. Figure 2-7 depicts a pressurized gas production line. The active and inert ingredients are received as liquids, pressurized liquids, or gases, and are stored in tanks, tank trucks, rail cars, or minibulk storage containers. Liquid ingredients are placed in a holding tank prior to formulation. Formulating and packaging operations for these products typically occur in one

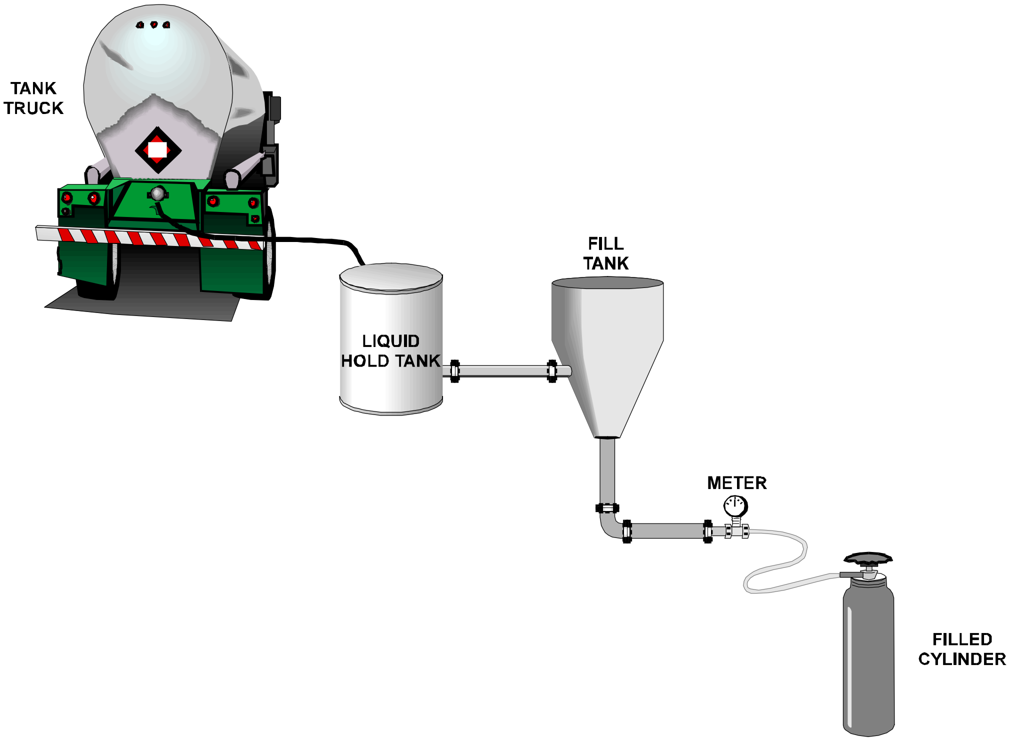
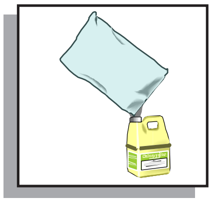


Figure 2-7. Pressurized Gas Formulating and Packaging Line

step in a closed-loop system. The ingredients are metered by weight through pressurized transfer lines into DOT-approved steel application cylinders. Other equipment that may be included in a pressurized gas line includes pumps, piping, and heating and refrigerating units to maintain gas pressures and temperatures in storage.

The cylinders may be refilled at a later date, after they have been tested to ensure that they are still capable of containing pressurized fluids. DOT requires hydrostatic pressure testing, as well as visual examination of the cylinder. Hydrostatic pressure testing involves filling the tank with water to a specified pressure and volume. If more water can be held in the cylinder than its original volume, or if the cylinder weighs less than 10% of its original weight, it is possible the cylinder walls are deformed, and the cylinder fails the test. Visual inspection entails purging the cylinder of its vapors using an inert gas such as nitrogen, and inspecting the inside for pitting and other defects with a fiber optic probe. The cylinder is then rinsed with water and dried.

Repackaging



Repackaging operations are similar to packaging operations, except the “raw material” is an already formulated product that has been packaged for sale. Repackagers often purchase formulated pesticide products, transfer the product to new containers with customer-specific labeling, and sell them to distributors.

A separate type of repackaging, called refilling, is usually performed by agrichemical facilities that transfer pesticide products from bulk storage tanks into minibulks. These refillable containers are constructed of plastic and typically have capacities ranging from 100 to 500 gallons. Minibulks may be owned by the refilling establishment, the pesticide registrant, or by the end user. Production lines usually consist of a bulk storage tank, a minibulk tank into which the product is repackaged, and any interconnecting hoses or piping. The bulk storage tanks are usually dedicated by product and clustered together in a diked area. The products are dispensed to the minibulks either manually or by using a computer-regulated system of pumps and meters. The minibulks are typically reused by farmers or custom applicators and returned to the refilling establishment.

CHAPTER 3

Pollution Prevention Glossary

Many PFPR facilities use P2 practices that conserve water, reduce the amount of pollutants in wastewater, or eliminate wastewater generation altogether. This chapter presents alphabetic glossaries for two basic types of P2 techniques: (1) implementation of P2 practices; and (2) use of P2 equipment. For the P2 practices, a description of the practice and its benefits and an icon representing the practice are provided. For the P2 equipment, a picture or illustration and description of the equipment is provided. Throughout the manual, terms defined in this glossary will be shown in ***italicized bold*** print.

The techniques presented in this chapter have been identified through site visits to almost 60 PFPR facilities, where EPA observed the techniques in use. By implementing these P2 techniques (e.g., use of ***flow reduction equipment***), many PFPR facilities generate less wastewater volume. By controlling the volume of wastewater generated, facilities can often reuse a larger overall percentage of their wastewater. Additionally, facilities can achieve optimal P2 benefits by combining P2 techniques (e.g., use of ***flow reduction equipment***, ***dedication of equipment***, and ***interior storage and reuse***) to reduce or eliminate wastewater generation and to increase the level of reuse and recycle. **[Note: This P2 glossary presents not only those practices listed in Table 8 of the final PFPR rule, but also other P2 techniques that were observed in the industry.]**

P2 Practices

These practices reduce the amount of active ingredients and other raw materials lost in wastewater discharges, and may also decrease the volume of PFPR process wastewater generated.

Pollution Prevention Practices

Dedication of Equipment

PFPR facilities use production lines to formulate, package, and repackage a wide range of products. When switching a production line from one product to another (i.e., product changeover), the facility cleans the equipment (typically with water) to prevent cross-contamination of products. Dedicating equipment on formulating and/or packaging lines to the production of one product or product type can reduce or eliminate the need to clean that piece of equipment for product changeover. In addition, because of the elimination of cross-contamination concerns, routine cleaning typically uses less water.

Some facilities dedicate just their formulation tanks, thereby eliminating one of the most highly concentrated wastewater streams generated at their facility. Other facilities have dedicated storage tanks or entire formulating, packaging, or repackaging lines, if they produce large quantities of that product over long periods of time. Still other facilities dedicate transfer hoses, pumps, and other miscellaneous equipment. These PFPR facilities have implemented this practice by using equipment that is:

- **Dedicated to one product**—a piece of equipment, or an entire formulating or packaging line, that is used to produce only one specific product. This type of dedication eliminates product changeover cleaning, and significantly reduces routine cleaning. In addition, most cleaning rinsates can be reused directly into the process (see ***Interior Rinsate Storage and Reuse***).
- **Dedicated to a product family**—a piece of equipment, or an entire formulating or packaging line, that is used to make products that have common ingredients (such as s-triazine pesticides) or similar uses (such as herbicides used on corn crops). This type of dedication can significantly reduce product changeover cleaning and routine cleaning. In addition, most cleaning rinsates can be reused directly into the process (see ***Interior Rinsate Storage and Reuse***).
- **Dedicated to solvent-based versus water-based products**—a piece of equipment, or an entire formulating or packaging line, that is used for products that have a common base solvent (e.g., water, isopropyl alcohol). This type of dedication eliminates water-contaminated solvent rinses and solvent-contaminated water rinses that are generated during product changeover from water-based to solvent-based products and solvent-based to water-based products. Dedicating equipment to a common base can eliminate solvent-water rinsates, which typically cannot be reused, and can significantly reduce product changeover cleaning and routine cleaning. In addition, most cleaning rinsates from common-base-dedicated equipment can be reused directly into the process for future formulation of the same or compatible product (see ***Interior Rinsate Storage and Reuse***).

Direct Reuse of Drum Rinsate

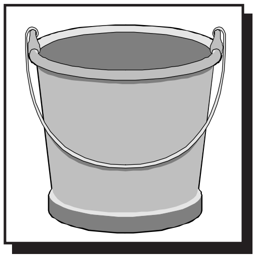
PFPR facilities frequently receive raw materials in drums, such as 55-gallon steel or 30-gallon fiber drums. Empty drums may be returned to the supplier, or the facility may by responsible for disposal. To prepare the drums for reuse, facilities "triple rinse" the drum (i.e., rinse out the inside of the drum with water three times) or pressure rinse the drum according to procedures provided in 40 CFR, Part 165. A "triple rinse" is defined in Part 165 as flushing the container three times, using a volume of the diluent equal to approximately 10% of the container's capacity. When preparing drums for disposal that contained nonhazardous materials, facilities should consult 40 CFR, Part 165.9 to determine if a triple rinse is required.

If the drum contained a material that is a listed hazardous waste, facilities must also follow procedures provided in 40 CFR, Part 261.7(b) to empty the container and dispose of or recycle it as nonhazardous. For example, "U" listed wastes (40 CFR, Part 261.33(f)) must be removed so that no more than 2.5 centimeters (or one inch) of residue remains on the bottom of the container, no more than 3% by weight of the container capacity remains in containers less than or equal to 110 gallons, and no more than 0.3% by weight of the container capacity remains in containers larger than 110 gallons. It may not be necessary to rinse the container if the material can be sufficiently removed by draining, pouring, pumping, or aspirating, unless rinsing is required by 40 CFR, Part 165. Other wastes, such as "P" listed wastes (40 CFR, Part 261.33(e)), must be removed by triple rinsing the container using a solvent capable of removing the material.

The simplest, most cost-effective method of handling the subsequent rinsate is to reuse it directly in the product formulation at the time of formulation. This method eliminates the water from the facility's waste stream and recovers the remaining raw material in the drum without the costs and space needed for storage of the rinsate. If the product is a solvent-based product, the drums can be rinsed with the base solvent of the product instead of water to prevent creating a rinsate that cannot be added directly to the formulation.

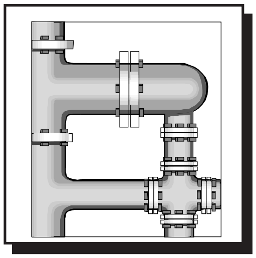
In addition to reusing rinsate, some PFPR facilities use ***flow reduction equipment***, such as high-pressure washers, to effectively clean drums, while minimizing the amount of rinsate generated (generally 5 to 15 gallons of rinsate per drum).

Formulating and Packaging Small Batches in Containers



Facilities that generate small quantities of product may formulate that product directly in the final shipping container (e.g., 55-gallon drum or minibulk tank) to eliminate the use of a separate formulation tank. Facilities may also package products directly from the formulation tank or blender into the final shipping container to eliminate using interim storage tanks, packaging tanks, and transfer hoses. These practices eliminate the need to use and clean certain formulating and packaging equipment, thereby reducing the amount of rinsates generated during cleaning.

Good Housekeeping Practices



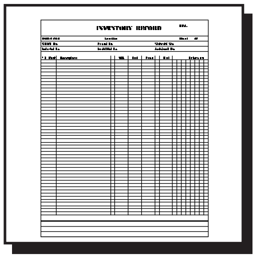
Good housekeeping practices are simple, straightforward operating practices that can significantly reduce wastes. These practices include performing preventive maintenance on all valves, fittings, and pumps; placing drip pans under valves and fittings where hoses or lines are routinely connected and disconnected; and cleaning up spills and leaks in outdoor bulk storage and process areas to prevent contamination of stormwater or exterior rinsewaters. Other good housekeeping practices include repairing leaky valves and fittings in a timely manner and reusing the material collected in drip pans.

Interior Rinsate Storage and Reuse

PFPR facilities use production lines to formulate, package, or repackage a wide range of products. When switching a production line from one product to another, the facility cleans the equipment (typically with water) to ensure product quality. This interior equipment rinsate (either water or base solvent) can be collected and stored in 55-gallon drums or small tanks for reuse as make-up water in the next batch of that formulation or a compatible formulation (e.g., product with same ingredients but at varying concentrations). In some cases, the rinsate can be reused immediately in the product if additional water or solvent is needed for the final product (e.g., refilling establishments preparing the product for application on fields).

When facilities combine this practice with the use of ***flow reduction equipment, dedication of equipment,*** and other production practices, they can minimize the volume of rinsates generated during production of pesticide products and are often able to reuse all interior equipment cleaning rinsates. Benefits from these practices include reduced costs for raw materials and waste disposal or treatment.

Inventory Management

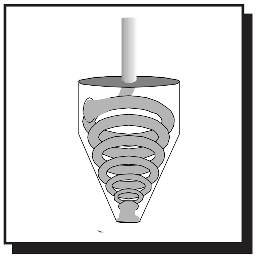


Many PFPR facilities operate inventory management systems to track raw materials, finished products, and waste products. These systems are also useful for tracking cleaning rinsates that can be reused at a later date in product formulations. Some facilities log these rinsates into their inventory as raw materials to ensure reuse as soon as possible and to eliminate the possibility of forgetting about them once they are stored. In addition, quick reuse can reduce shelf-life expiration problems. These inventory systems may be manual (for smaller operations) or computerized (for larger operations), and may also contain other environmental data, such as waste disposal information.

Non-Water Interior Equipment Cleaning

PFPR facilities can use several cleaning techniques in addition to ***dry process cleaning equipment*** to reduce or eliminate wastewater generation. After formulating or packaging, dry carriers used in the final product (e.g., clay) are often used to initially clean the equipment. These materials are run through the equipment to absorb residual product that may be present and stored for use in a future batch of that product. A production line may also be "blown" clean by forcing air through the equipment and collecting the material that exits the system for reuse. Hoses and transfer piping may be cleaned in this manner. A water rinse may follow this procedure. Cleaning a line with dry materials increases recovery of raw materials and reduces the amount of water used during cleaning operations.

Operation of Air Pollution Control Devices



Air pollution control devices, including baghouses, cyclones, filters, and wet scrubbers, are sometimes installed on formulating or packaging lines to control the release of volatile or dust emissions.

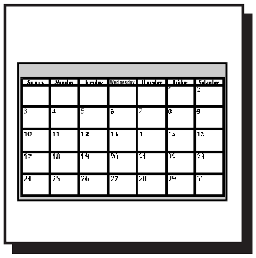
- *"Dry" Devices*—Baghouses, filters, or cyclones reduce air pollution without the use of water by collecting dust and other particles generated during production, particularly on dry product lines. Some facilities are able to reuse the solid materials collected from those devices in the pesticide production process.
- *"Wet" Devices*—Wet scrubbers also reduce air pollution by simultaneously removing soluble and wettable particulates and soluble gases from an air stream. To minimize wastewater generation from wet scrubbers, facilities can either operate them with continuously recycled water until replacement of the contaminated water is necessary, or with a bleed stream

(blowdown) on a continuous basis. However, facilities should not reduce their flow to the point where it hinders their ability to meet Clean Air Act or other requirements. In some cases, if a wet scrubber is dedicated to a line that formulates a water-based product, the blowdown from the scrubber can be reused in that formulation.

Operation of Department of Transportation (DOT) Test Baths

DOT test baths are used to test aerosol cans for leaks or weaknesses under pressure. The cans are visually examined for leaks while in the test bath. Because drips on the outside of cans, or occasionally exploding cans, can contaminate the water bath, the water in batch baths must be changed periodically to ensure visibility and to reduce the presence of residues that may adhere to cans leaving the bath. Facilities operating DOT test baths with continuous overflow can recirculate the water for reuse. If necessary for visual clarity, PFPR facilities can recirculate the water through a filter (e.g., diatomaceous earth or activated carbon) to remove dirt and oils. The use of filters allows water to be recirculated for longer periods of time before changeout is necessary.

Production Scheduling



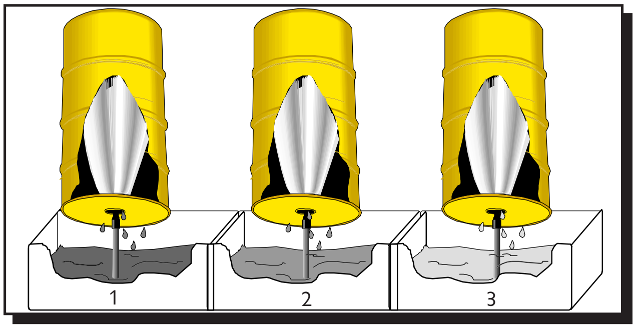
If a facility is not able to practice ***dedication of equipment***, they often can manage their production schedules to minimize product changeover cleaning operations. To do so, facility personnel can develop cleaning procedures specific to each potential changeover. They can examine which products can be formulated in succession without the need for cleaning (e.g., they contain the same ingredients but in varying concentrations) or with a minimal cleaning. On any given day, production can be scheduled to minimize the cleaning efforts and therefore the wastes that are generated during cleaning. In some cases, facilities are able to schedule production so that the cleaning rinsates generated are able to be reused in subsequent processes.

Training and Written Standard Operating Procedures

Employee training and well-written standard operating procedures (SOPs) are an integral part of any pollution prevention program. Training will ensure that all employees are aware of the goals of current pollution prevention initiatives and how the initiatives will improve operations. Written SOPs will reinforce operator training and ensure that all functions are performed efficiently. It is important to obtain both management and employee buy-in to the program, and to view pollution prevention as a way of doing business. Some PFPR facilities have formed pollution prevention teams or coordinators to develop SOPs for cleaning procedures and for reuse of cleaning rinsates into formulations. Some facilities have also integrated an evaluation of an employee's adoption of P2 practices into performance reviews or provided awards or incentives for innovative P2 ideas.

Pollution Prevention Equipment

Drum Rinsing Station



A drum rinsing station consists of a series of three cells that are used to triple rinse drums. A typical station uses a spray nozzle to shoot water at high pressure into a drum that is inverted over the cell. The rinsate flows out of the drum into the cell, the drum is moved to the next cell, and the process is repeated. The first cell is used for the first rinse, which results in the most removal of pollutants and the most contaminated rinsewater. The second cell is used for the second rinse, which removes additional pollutants, but the rinsewater is not as contaminated as the first cell. The third cell is used for the final rinse, at which point most of the pollutants have been removed by prior rinses and the rinsewater is the least polluted of the three cells.

By rinsing the drum in stages (i.e., cells), the volume of rinsewater is reduced. The rinse water in the first cell is reused until it is visibly too contaminated to be used further. At that time, it is removed from the cell and treated or disposed of. The cleaner rinsewater from the second cell is transferred into the first cell and the cleanest rinsewater from the third cell is moved to the second cell. Fresh water is added only to the third cell. As a result, two cells of water are recycled, only one cell is filled with new water, and the quantity of water used is reduced by about two thirds. Some PFPR facilities using a drum rinsing station with 100-gallon water cells have cleaned as many as 70 drums before changing water.

Dry Process Cleaning Equipment

Dry process formulating and packaging lines, which do not generate wastewater, are often cleaned using equipment such as brushes, scrapers, and vacuums. This cleaning equipment will physically remove solids that have adhered to process equipment during the formulating or packaging step. Examples of dry process cleaning equipment include the following:

- *Brushes/Scrapers*—Wire brushes and scrapers are used to remove packed or dried materials from the equipment that would not be removed with vacuuming alone. This material can then be vacuumed or swept up for reuse.

- *Vacuums*—A standard industrial shop vacuum (with appropriate electrical classification and exhaust filtration) can be used to collect solids and dusts that have settled on dry formulating and packaging equipment during processing. It can also be used to clean floors in the dry process area and to collect spilled product. The collected material can often be reused in the formulating process.

Cleaning the equipment with brushes, scrapers, or vacuums may result in recovery of dry product that can be reused in the process, and significantly reduce or eliminate the need for water washes and the subsequent water rinsates that cannot be directly reused. For example, a facility may initially scrape off dried material from the process line equipment, vacuum loosened materials, and finally perform a quick water rinse. The rinsate will contain significantly less contaminants than if the facility had relied upon only water to clean the equipment.

Floor Scrubbers

Floor scrubbers are mechanical devices that continually recirculate cleaning water to clean flat, smooth surfaces with circulating brushes. They come in a variety of shapes and sizes. During operation, the scrubber collects the cleaning water in a collection tank, which is easily emptied after the cleaning process, or at a later date.

Cleaning floors by other methods, such as a mop and bucket or garden hose, requires larger amounts of water. Floor scrubbers will significantly reduce the amount of water used for floor cleaning while increasing the effectiveness of the cleaning operation. A typical floor scrubber can clean large processing areas in one hour but use only 10 to 20 gallons of water. The use of floor scrubbers also reduces labor costs and water costs.

Flow Reduction Equipment

Flow reduction equipment includes simple mechanical devices that control how water is sprayed during cleaning operations. The use of flow reduction equipment reduces the volume of water generated during cleaning operations, as well as increases efficiency in the cleaning process. Examples of flow reduction equipment are:

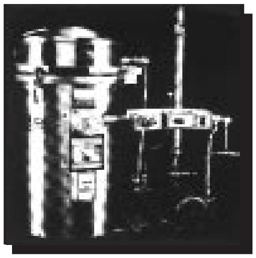
- *Spray Nozzles*—Nozzles are the most common form of flow reduction equipment used in the PFPR industry. Spray nozzles are used to regulate the amount of water used to clean both the interior and exterior of process equipment. They also direct the water at a higher pressure than from an unequipped hose, resulting in a more effective cleaning stream.
- *High-pressure, low-volume washers*—These washers provide a higher degree of cleaning than a spray nozzle. Typical pressures range from 500 to 3,000 pounds per square inch (psi).

- *Spray balls*—These balls direct water through multiple nozzles or drilled holes to efficiently clean the inner surfaces of closed or open tanks or trucks. Typical water pressures range from 45 to 75 psi; flow rates range from 10 to 48 gallons per minute (gpm), depending on the size of the spray ball and the size of the tank to be cleaned.

- *Hot water/steam cleaners*—These cleaners are similar to high-pressure, low-volume washers except they use steam or hot water. They are useful for hard-to-clean products, such as emulsified formulations or highly viscous materials. Typical operating pressures range from 230 to 3,000 psi; flow rates range from 1 to 6 gpm.

Without the use of this equipment, facilities may generate more wastewater, particularly interior equipment rinsates, during the cleaning process than can possibly be reused in product formulation. Other benefits to the use of flow reduction equipment include lower water costs, increased cleanliness, and reduced storage, treatment, or disposal costs. In addition, use of flow reduction equipment aids in avoiding free flow of water from unattended hoses.

Solvent Recovery Equipment



Solvent recovery equipment primarily consists of flash distillation units, which use the difference in boiling points to physically separate organic solvent from wastewaters. Some facilities may generate solvent-contaminated wastewaters during cleaning operations that are unable to be reused in water-based products; other facilities generate water-contaminated solvent wastes that are unable to be reused in solvent-based products. These wastes are fed through the distillation unit at a temperature where the solvent is vaporized from the waste stream. The solvent vapor is then condensed to liquid. These efficient units recover high yields of spent solvent for reuse in later formulations.

The use of solvent recovery equipment can reduce raw material (i.e., solvent) usage and cost. In addition, this equipment can reduce disposal costs by recovering solvent for reuse and reducing the quantity of solvent-aqueous changeover water that is disposed of as waste.

CHAPTER 4

Conducting the P2 Audit

One way facilities subject to the final PFPR rule can determine which compliance option to choose is to use a four-part process: (1) conduct a P2 audit, (2) make preliminary compliance decisions, (3) evaluate wastewater treatment technologies, and (4) make and document final compliance decisions. This chapter discusses the P2 audit and how a facility can use that tool to make preliminary decisions on which compliance strategy to choose. Chapters 5 and 6 present the ways in which a facility can treat the wastewater remaining after the P2 practices have been implemented and evaluate the economic impacts of wastewater treatment compared to contract hauling. Chapter 7 presents ways for facilities to make and document their final compliance decisions.

A comprehensive P2 opportunities assessment (or audit) is the first step in implementing an effective P2 program and in determining compliance with the final rule. **However, this P2 audit is not required by the rule and is not mandatory.** The P2 audit described in this chapter focuses on water use and wastewater generation. This audit is not designed to be a comprehensive P2 audit, as it does not fully evaluate solid waste and air emissions; however, it will assist users in identifying PFPR wastewater sources and P2, recycle, and reuse practices and in making compliance decisions for the PFPR effluent guidelines and standards. For information on P2 audit tools that will help you analyze your solid waste and air emissions, see the resources listed in Chapter 9.

Each PFPR facility will need to make an initial choice of how to comply with the regulation. A facility may choose to either comply with the zero discharge effluent limitation/pretreatment standard *or* implement the P2 alternative (practices listed in Table 8 of the final rule plus wastewater treatment when necessary). The choice of zero discharge or the P2 alternative can be made on either a facility-wide basis or on a process

The P2 Audit

Completing a P2 audit is not mandatory, but may be helpful to:

- Decide whether to comply with the P2 alternative or the zero-discharge option;
- Assess whether a facility is in compliance with the P2 alternative;
- Identify production changes that could result in cost savings;
- Identify P2, recycle, and reuse opportunities for wastewater discharges; and
- Organize paperwork documenting compliance with the P2 alternative.

P2 Alternative

The P2 alternative permits a “P2 allowable discharge” as an alternative to zero discharge of process wastewater when facilities implement the specific P2 practices listed in Table 8 of Appendix A of this manual and wastewater treatment when necessary. These practices reduce the amount of active ingredients and other raw materials lost in wastewater discharges, and may also decrease the volume of PFPR process wastewater generated.

basis (i.e., product family/process line/process unit). Facilities that implement the P2 alternative will also need to agree to make the practices and the P2 discharge allowance enforceable.

The tools presented in this chapter to conduct a P2 audit are based on the practices included in the effluent limitations guidelines and standards for the PFPR industry as well as other P2 practices that are in use in the PFPR industry. The audit may be used to identify waste sources at the point of generation and to match each source with applicable P2, recycle, and reuse practices. Identifying these P2 opportunities can help facilities reduce costs even when not choosing to comply with the P2 alternative.

The P2 audit tables discussed in this chapter (Tables A through C) and the wastewater treatment tables presented in Chapter 6 (Tables D and E) are offered as one way to conduct an audit and/or to demonstrate compliance with the P2 alternative. **It is not required that facilities, permitters, or other auditors use these tables.** However, the tables discussed in this chapter summarize the types of information that are useful in conducting a P2 opportunities assessment. Since it is very difficult to construct one table or checklist with a format useful for all PFPR facilities, EPA hopes that the tables presented in this manual are a useful tool as they are, or can be adapted in whatever way the user feels is appropriate. P2 audit tables are available in an electronic format in Excel 5.0 and may be requested from Shari Zuskin of EPA's Engineering and Analysis Division (see Chapter 9 for fax, E-mail, and/or mailing address).

The information necessary to complete the tables may be collected in a variety of ways. Much of the information may already be available in production records, state P2 plans, stormwater plans, ***inventory management systems***, or facility permits. In addition, the information gathered for the checklist may also be used to help complete other types of plans (e.g., stormwater or state P2 plans) in the future.

P2 Audit Tables

Table	Title	Purpose
Table A	Identification of Wastewater Sources	Helps users summarize in detail potential wastewater sources through review of process operations.
Table B	Evaluation of PFPR P2, Recycle, and Reuse Practices	Helps users summarize in detail P2, recycle, and reuse practices, and evaluate their current use, whether they can be implemented by the facility, and any required modifications.
Table C	Summary of PFPR Compliance Decisions	Helps users summarize the compliance decision for each wastewater source identified in Table A. The completion of the P2 audit results in a *preliminary* compliance decision for each source.

Nonpesticide Operations and Industries

A P2 audit is also useful in identifying wastewater P2 opportunities in other industries, such as those industries listed to the right. In fact, many PFPR facilities also engage in formulating and packaging of these nonpesticide products. Although the P2 audit tables are designed specifically for the PFPR industry, the P2 opportunities listed may be advantageous for other operations and industries.

- Other chemicals formulating, packaging, and repackaging;
- Pharmaceuticals;
- Animal feed products;
- Cosmetics; and
- Fertilizers.

The P2 audit tables are designed for use by PFPR facility managers, POTWs, permit writers and other regulatory agency representatives, federal and state auditors, and consultants (referred to as the "user" throughout this chapter).

Example pages of the audit tables (completed for a fictitious facility) are shown throughout this chapter to illustrate the types of information captured on the tables. The blank tables are presented in their entirety in Appendix B. Specific P2 equipment and practices listed on the table instructions in ***italicized, bold*** print are defined in the P2 glossary in Chapter 3.

Conducting The Audit

In order to thoroughly assess P2, recycle, and reuse opportunities, detailed information pertaining to all source identification and P2, recycle, and reuse practices must be available to the user. This information is best obtained through interviews with facility personnel, review of facility records, and first-hand observation via a plant tour. The user can also incorporate, where applicable, any personal knowledge of or experience with the facility. It is helpful to review all information with facility personnel so that data gaps may be filled, and to discuss facility-specific benefits or problems associated with implementation of different P2, recycle, and reuse practices. Some of the information, such as wastewater generation volumes and frequency, may not be readily available the first time such an audit is completed; however, over time a facility may implement systems to track these types of data to facilitate future P2 assessments.

Each page of the P2 audit tables has space to enter the name and location of the facility, the name of the user, and the date the audit is completed.

Table A: Identification of Wastewater Sources

Table A

Table A of the P2 audit is not only the starting point but also the focal point of the P2 audit. The wastewater streams and sources identified on Table A will be linked to potential P2 opportunities on Table B and waste management options in Chapter 6. Completing this table will enable facility personnel to begin assessing whether to choose to comply with the P2 alternative, and if so, whether to comply on a facility-wide basis or on a product family/process line/process unit basis.

Table A is used to identify all PFPR wastewater sources at the facility and to gather general operations and treatment information (e.g., frequency of wastewater generation) about each source. The table includes a comprehensive list of the wastewater streams and sources found in the PFPR industry; however, space is also included for additional wastewater streams that may be identified for a specific facility. Three steps that can be used to complete Table A are detailed below.

Step 1: Identify Wastewater Stream Types and Sources

The user should take time to accurately and completely identify all PFPR wastewater stream types and sources at the facility. Figure 4-1 presents an example of the types of information collected while completing Step 1. In particular, the unshaded columns "**Stream Type**", "**Source**", and "**Comments**" illustrate this example.

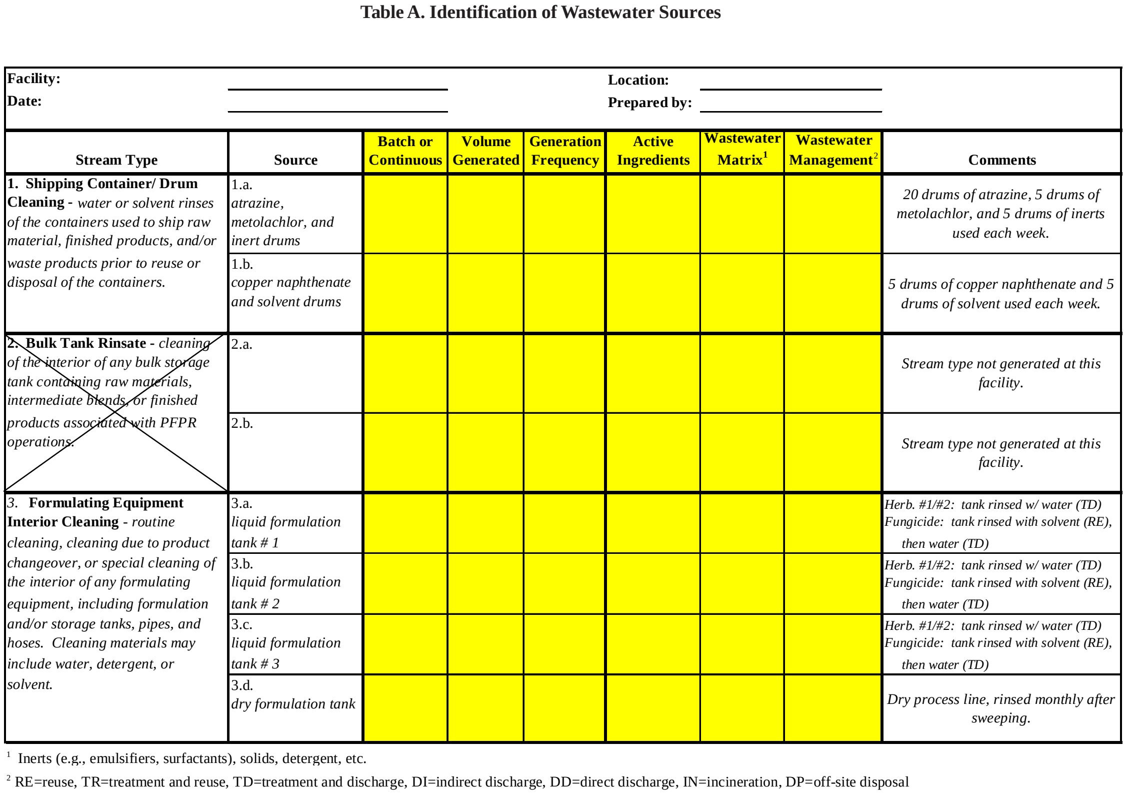


Table A. Identification of Wastewater Sources

Facility: ____________ **Location:** ____________

Date: ____________ **Prepared by:** ____________

Stream Type	Source	Batch or Continuous	Volume Generated	Generation Frequency	Active Ingredients	Wastewater Matrix[1]	Wastewater Management[2]	Comments
1. Shipping Container/ Drum Cleaning - *water or solvent rinses of the containers used to ship raw material, finished products, and/or waste products prior to reuse or disposal of the containers.*	1.a. *atrazine, metolachlor, and inert drums*							*20 drums of atrazine, 5 drums of metolachlor, and 5 drums of inerts used each week.*
	1.b. *copper naphthenate and solvent drums*							*5 drums of copper naphthenate and 5 drums of solvent used each week.*
~~**2. Bulk Tank Rinsate** - *cleaning of the interior of any bulk storage tank containing raw materials, intermediate blends, or finished products associated with PFPR operations.*~~	2.a.							*Stream type not generated at this facility.*
	2.b.							*Stream type not generated at this facility.*
3. **Formulating Equipment Interior Cleaning** - *routine cleaning, cleaning due to product changeover, or special cleaning of the interior of any formulating equipment, including formulation and/or storage tanks, pipes, and hoses. Cleaning materials may include water, detergent, or solvent.*	3.a. *liquid formulation tank # 1*							*Herb. #1/#2: tank rinsed w/ water (TD)* *Fungicide: tank rinsed with solvent (RE), then water (TD)*
	3.b. *liquid formulation tank # 2*							*Herb. #1/#2: tank rinsed w/ water (TD)* *Fungicide: tank rinsed with solvent (RE), then water (TD)*
	3.c. *liquid formulation tank # 3*							*Herb. #1/#2: tank rinsed w/ water (TD)* *Fungicide: tank rinsed with solvent (RE), then water (TD)*
	3.d. *dry formulation tank*							*Dry process line, rinsed monthly after sweeping.*

[1] Inerts (e.g., emulsifiers, surfactants), solids, detergent, etc.

[2] RE=reuse, TR=treatment and reuse, TD=treatment and discharge, DI=indirect discharge, DD=direct discharge, IN=incineration, DP=off-site disposal

Figure 4-1. Identifying Wastewater Stream Types and Sources

Table A

The **"Stream Type"** column lists potential wastewater stream types. An entry of "Other" is also provided at the end of Table A for facility-specific waste stream types. It is most useful for the user and facility personnel to discuss each stream type to decide whether it exists at the facility. After consideration, if it is determined that a wastewater stream does not exist at the facility, the user can draw an "X" through the box in the **"Stream Type"** column. Any pertinent information (e.g., stream type not generated at facility, operation not performed at facility) can be noted in the **"Comments**" column. In the example shown in Figure 4-1, the facility does not have bulk tanks; therefore, bulk tank rinsate has been crossed off as a source.

If it is determined that the stream type does exist at the facility, the source of each stream type can be noted in the **"Sources"** column. In the example in Figure 4-1, it is noted in Box 3a that one source of wastewater from formulating equipment interior cleaning is a liquid formulation tank identified as Tank #1. In the **"Comments"** column, the user has also provided details on the number of times the tank is used in production and some details on the cleaning process.

Space is provided on Table A to include multiple sources of a single wastewater stream type. For example, Figure 4-1 presents information on two types of shipping container and drum rinsing operations that occur at the facility. If the checklist or similar form is being used to demonstrate compliance with the P2 alternative, the user should be as clear as possible when identifying sources of wastewater stream types. If abbreviations, process line numbers, production line codes, or other notations are used on the form to designate sources, the user should ensure that supporting information (e.g., process diagrams, process line names or products, and a key to the abbreviations) is attached to the table.

The **"Stream Type"** and **"Sources"** columns can be initially completed in the office prior to a plant tour by using prior knowledge of the facility and its operations. The stream types and sources listed can then be refined through discussions with facility personnel during a plant tour.

Step 2: Collect Operations Data

Table A

Operations information (e.g., how a wastewater is generated) should be weighed heavily when evaluating potential P2 opportunities. For example, if a waste stream is only generated in small volumes one time per year at the facility, then examining P2 practices for that waste stream may be a lower priority than a waste stream that is generated every day. Figure 4-2 presents an example of the types of information collected when completing Step 2. The unshaded portions of columns "**Batch or Continuous**", "**Volume Generated**", and "**Generation Frequency**" illustrate this example.

For each stream type and source identified, enter operations data on Table A. Indicate whether the waste stream is generated from a batch or continuous process by entering either a "B" for batch or a "C" for continuous in the **"Batch or Continuous"** column. Enter the volume (either batch volume or daily volume), including measurement units, generated in the **"Volume Generated"** column. Enter how often the wastewater is produced (e.g., once per day, once per year) in the **"Generation Frequency"** column. For example, in Figure 4-2, the user noted that the facility has a wastewater stream generated from a batch cleaning process for 55-gallon drums that contained atrazine. Five gallons of wastewater are generated per drum and 20 drums are cleaned weekly.

The accuracy of the operations information may vary from source to source. Many times, facility personnel may only have approximate waste stream volumes available. Through continued use of the P2 audit, however, the waste stream data should become more accurate, since operations data play an important role in deciding the most cost-effective compliance strategy.

Record pertinent information regarding operations data in the **"Comments"** column and, if necessary, attach to the form the key to any abbreviations or notations.

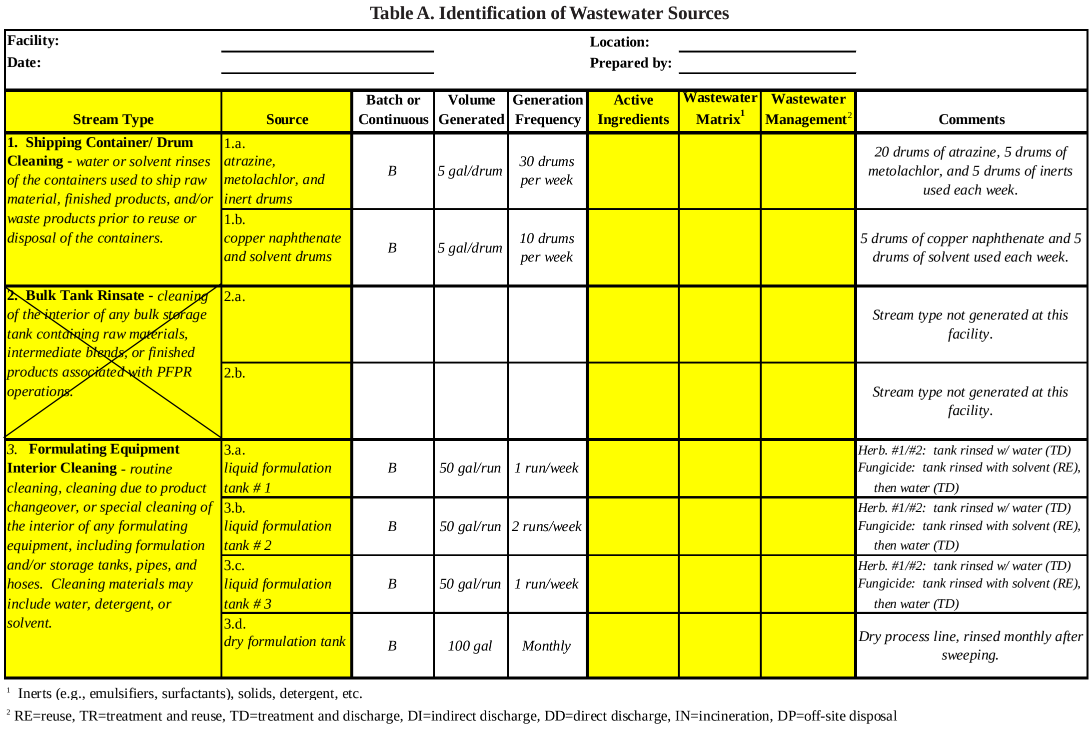


Table A. Identification of Wastewater Sources

Facility: ____________ **Location:** ____________
Date: ____________ **Prepared by:** ____________

Stream Type	Source	Batch or Continuous	Volume Generated	Generation Frequency	Active Ingredients	Wastewater Matrix[1]	Wastewater Management[2]	Comments
1. Shipping Container/ Drum Cleaning - *water or solvent rinses of the containers used to ship raw material, finished products, and/or waste products prior to reuse or disposal of the containers.*	1.a. *atrazine, metolachlor, and inert drums*	*B*	*5 gal/drum*	*30 drums per week*				*20 drums of atrazine, 5 drums of metolachlor, and 5 drums of inerts used each week.*
	1.b. *copper naphthenate and solvent drums*	*B*	*5 gal/drum*	*10 drums per week*				*5 drums of copper naphthenate and 5 drums of solvent used each week.*
~~**2. Bulk Tank Rinsate** - *cleaning of the interior of any bulk storage tank containing raw materials, intermediate blends, or finished products associated with PFPR operations.*~~	2.a.							*Stream type not generated at this facility.*
	2.b.							*Stream type not generated at this facility.*
3. **Formulating Equipment Interior Cleaning** - *routine cleaning, cleaning due to product changeover, or special cleaning of the interior of any formulating equipment, including formulation and/or storage tanks, pipes, and hoses. Cleaning materials may include water, detergent, or solvent.*	3.a. *liquid formulation tank # 1*	*B*	*50 gal/run*	*1 run/week*				*Herb. #1/#2: tank rinsed w/ water (TD)* *Fungicide: tank rinsed with solvent (RE), then water (TD)*
	3.b. *liquid formulation tank # 2*	*B*	*50 gal/run*	*2 runs/week*				*Herb. #1/#2: tank rinsed w/ water (TD)* *Fungicide: tank rinsed with solvent (RE), then water (TD)*
	3.c. *liquid formulation tank # 3*	*B*	*50 gal/run*	*1 run/week*				*Herb. #1/#2: tank rinsed w/ water (TD)* *Fungicide: tank rinsed with solvent (RE), then water (TD)*
	3.d. *dry formulation tank*	*B*	*100 gal*	*Monthly*				*Dry process line, rinsed monthly after sweeping.*

[1] Inerts (e.g., emulsifiers, surfactants), solids, detergent, etc.

[2] RE=reuse, TR=treatment and reuse, TD=treatment and discharge, DI=indirect discharge, DD=direct discharge, IN=incineration, DP=off-site disposal

Figure 4-2. Collecting Operations Data

Step 3: Collect Waste Characterization Data

The quality and composition of the waste stream is directly related to the potential P2, recycle, and reuse practices that may be implemented by the facility. Therefore, the next step of a P2 audit is to collect waste characterization information (e.g., the constituents in the wastewater). This information may also be useful when exploring wastewater treatment technologies, as described in Chapter 5. As shown in Figure 4-3, the facility generates an interior equipment cleaning rinsate containing carbaryl, listed in Box 3d, from rinsing a dry formulation tank with water once per month. The facility is unable to reuse this wastewater in the formulation because the product is dry. However, they do sweep out the equipment prior to the water rinse to minimize the presence of pesticide in the wastewater.

The user should try to identify waste characterization data for each stream type and source identified on Table A. Enter the name or abbreviation for the active ingredients present in the waste stream in the **"Active Ingredients"** column. In some instances, the facility may use more active ingredients than can be listed in the space provided. In those cases, the user can attach a separate sheet listing additional active ingredients present in the waste stream. Next, record the other constituents (e.g., solids, solvents, detergents, emulsifiers) in the wastewater that may affect reuse or implementation of a P2 initiative under the **"Wastewater Matrix"** column. Finally, enter wastewater management and treatment information using the codes provided in the footnote in the **"Wastewater Management"** column. As shown in Figure 4-3, the facility discharges the carbaryl wastewater to a POTW without pretreatment.

Again, record any pertinent information regarding operations data in the **"Comments"** column and attach the key to any abbreviations or notations used on the table. The **"Comments"** column may also be used to note any unique aspects in the generation or handling of each source, including multiple discharge practices for the same source.

Table A. Identification of Wastewater Sources

Facility: ____________________ **Location:** ____________________

Date: ____________________ **Prepared by:** ____________________

Stream Type	Source	Batch or Continuous	Volume Generated	Generation Frequency	Active Ingredients	Wastewater Matrix[1]	Wastewater Management[2]	Comments
1. Shipping Container/ Drum Cleaning - *water or solvent rinses of the containers used to ship raw material, finished products, and/or waste products prior to reuse or disposal of the containers.*	1.a. *atrazine, metolachlor, and inert drums*	*B*	*5 gal/drum*	*25 drums per week*	*atrazine, metolachlor*	*water, inerts*	*RE*	*20 drums of atrazine, 5 drums of metolachlor, and 5 drums of inerts used each week.*
	1.b. *copper naphthenate and solvent drums*	*B*	*5 gal/drum*	*10 drums per week*	*copper naphthenate*	*water, solvent*	*DI*	*5 drums of copper naphthenate and 5 drums of solvent used each week.*
~~**2. Bulk Tank Rinsate -** *cleaning of the interior of any bulk storage tank containing raw materials, intermediate blends, or finished products associated with PFPR operations.*~~	2.a.							*Stream type not generated at this facility.*
	2.b.							*Stream type not generated at this facility.*
3. **Formulating Equipment Interior Cleaning -** *routine cleaning, cleaning due to product changeover, or special cleaning of the interior of any formulating equipment, including formulation and/or storage tanks, pipes, and hoses. Cleaning materials may include water, detergent, or solvent.*	3.a. *liquid formulation tank # 1*	*B*	*50 gal/run*	*1 run/week*	*atrazine, metolachlor, copper naphthenate*	*solvent, water, inerts*	*RE, TD*	*Herb. #1/#2: tank rinsed w/ water (TD)* *Fungicide: tank rinsed with solvent (RE), then water (TD)*
	3.b. *liquid formulation tank # 2*	*B*	*50 gal/run*	*2 runs/week*	*atrazine, metolachlor, copper naphthenate*	*solvent, water, inerts*	*RE, TD*	*Herb. #1/#2: tank rinsed w/ water (TD)* *Fungicide: tank rinsed with solvent (RE), then water (TD)*
	3.c. *liquid formulation tank # 3*	*B*	*50 gal/run*	*1 run/week*	*atrazine, metolachlor, copper naphthenate*	*solvent, water, inerts*	*RE, TD*	*Herb. #1/#2: tank rinsed w/ water (TD)* *Fungicide: tank rinsed with solvent (RE), then water (TD)*
	3.d. *dry formulation tank*	*B*	*100 gal*	*Monthly*	*carbaryl*	*water, solids*	*DI*	*Dry process line, rinsed monthly after sweeping.*

[1] Inerts (e.g., emulsifiers, surfactants), solids, detergent, etc.

[2] RE=reuse, TR=treatment and reuse, TD=treatment and discharge, DI=indirect discharge, DD=direct discharge, IN=incineration, DP=off-site disposal

Figure 4-3. Collecting Waste Characterization Data

Table B: Evaluation of PFPR P2, Recycle, and Reuse Practices

Table B

Table B of the P2 audit is used to evaluate the P2, recycle, and reuse practices in place at the facility and to consider the feasibility of implementing additional P2, recycle, and reuse practices at the facility. Each facility subject to the final PFPR rule will have three options in choosing how to comply with the regulation: (1) comply with the zero discharge effluent limitation/pretreatment standard, (2) incorporate the P2 practices listed in Table 8 of the final rule with wastewater treatment when necessary, or, (3) if the facility has an approved justification, incorporate the P2 practices with modifications and wastewater treatment when necessary. The column **"Table 8 Listed Practice"** lists the P2, recycle, and reuse practices found in the final rule (see Appendix A). A facility that wishes to discharge wastewater must incorporate these P2, recycle, and reuse practices into their process. The column entitled **"Practice"** describes recycle and reuse practices that are demonstrated in the PFPR industry. These practices include P2, recycle, and reuse practices from Table 8 of the final regulation and other recycle and reuse practices that PFPR facilities can choose to incorporate. The **"Comments"** column should be used to note any unique circumstances surrounding the facility-specific application of a particular P2 practice.

It is helpful if the person(s) conducting the P2 audit and completing Table B reads and understands the instructions for the intended use of Table B, and is familiar with the available P2 equipment and practices presented in Chapter 3. Table B will not only aid in deciding whether to choose the P2 alternative and in documenting current practices at the facility, but will also be a guide to implementing successful P2 practices. Four steps that can be used to complete Table B are detailed below.

Step 1: Identify Practices Reported by Facility

Figure 4-4 presents an example of the types of information recorded when completing Step 1. Page 3 of Table B is shown so that the P2 practices match the source codes from Page 1 of Table A (shown in Figures 4-1 through 4-3). The unshaded columns "**Practice,**" "**Does Facility Use This Practice?,**" and **"Source Code from Table A"** illustrate this example.

The "Table 8 Listed Practice" column cross-references the practices listed in Table B with the corresponding practices listed in Table 8 of the final regulation. If there is no corresponding practice in the final regulation, "NA" appears in the **"Table 8 Listed Practice"** column. The P2, recycle, and reuse practices listed in the **"Practice"** column in Table B should be discussed with plant personnel to identify if they are utilized by the facility. For each P2 practice the facility uses, note which facility operation implements the practice by transferring the source code from Table A into the **"Source Code"** column. In the **"Does Facility Use this Practice?"** column, answer "Yes" or "No."

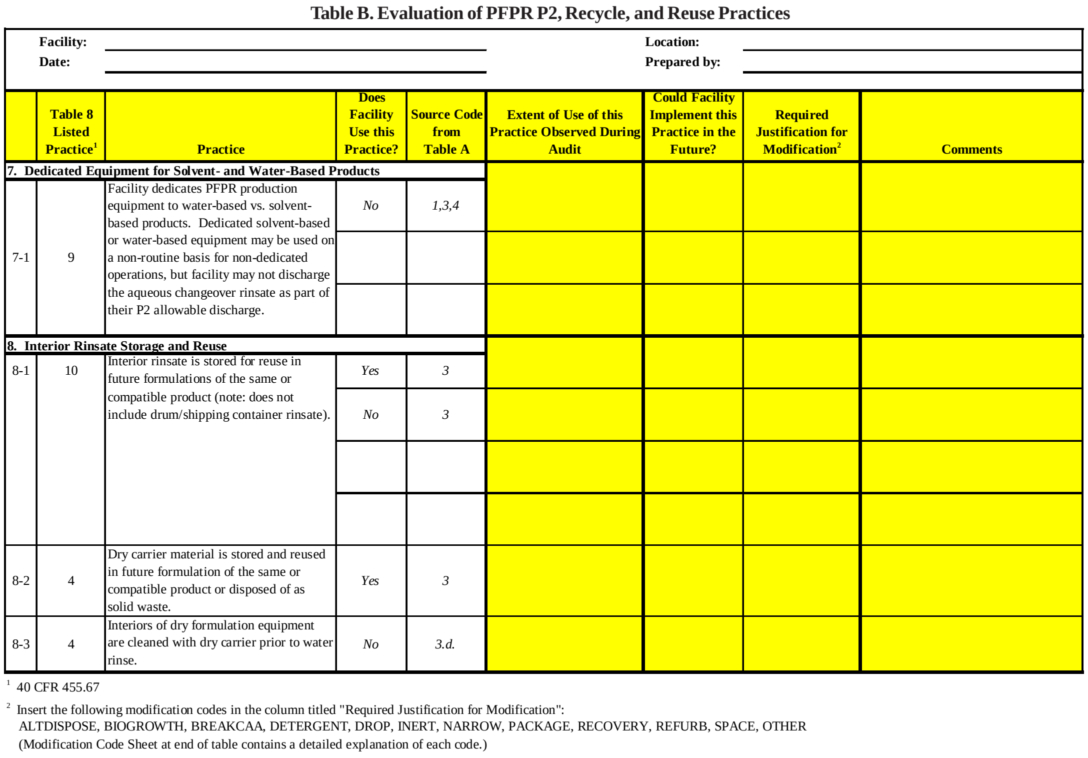


Table B. Evaluation of PFPR P2, Recycle, and Reuse Practices

Facility: ______________________ **Location:** ______________________

Date: ______________________ **Prepared by:** ______________________

	Table 8 Listed Practice[1]	Practice	Does Facility Use this Practice?	Source Code from Table A	Extent of Use of this Practice Observed During Audit	Could Facility Implement this Practice in the Future?	Required Justification for Modification[2]	Comments
7. Dedicated Equipment for Solvent- and Water-Based Products								
7-1	9	Facility dedicates PFPR production equipment to water-based vs. solvent-based products. Dedicated solvent-based or water-based equipment may be used on a non-routine basis for non-dedicated operations, but facility may not discharge the aqueous changeover rinsate as part of their P2 allowable discharge.	*No*	*1,3,4*				
8. Interior Rinsate Storage and Reuse								
8-1	10	Interior rinsate is stored for reuse in future formulations of the same or compatible product (note: does not include drum/shipping container rinsate).	*Yes*	*3*				
			No	*3*				
8-2	4	Dry carrier material is stored and reused in future formulation of the same or compatible product or disposed of as solid waste.	*Yes*	*3*				
8-3	4	Interiors of dry formulation equipment are cleaned with dry carrier prior to water rinse.	*No*	*3.d.*				

[1] 40 CFR 455.67

[2] Insert the following modification codes in the column titled "Required Justification for Modification":
ALTDISPOSE, BIOGROWTH, BREAKCAA, DETERGENT, DROP, INERT, NARROW, PACKAGE, RECOVERY, REFURB, SPACE, OTHER
(Modification Code Sheet at end of table contains a detailed explanation of each code.)

Figure 4-4. Identifying P2 Practices

Step 2: Identify Practices In Use

Table B

During the plant tour, note in the column entitled **"Extent of Use of this Practice Observed During Audit"** the locations and operations where each practice has been implemented. Figure 4-5 presents an example of the types of information a user may note while touring a facility. If a particular practice is not used (such as low-volume/high-pressure rinsing equipment or other flow reduction devices), answer "NA" in the **"Extent of Use of this Practice Observed During Audit"** column.

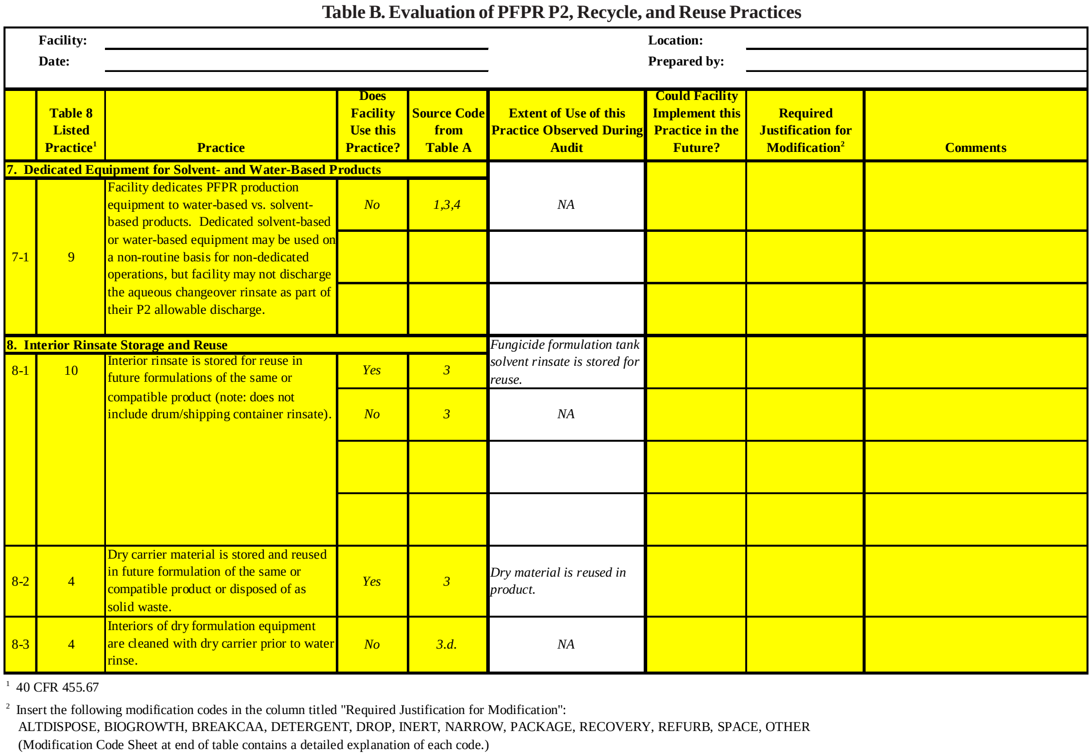


Table B. Evaluation of PFPR P2, Recycle, and Reuse Practices

Facility: ______________________ **Location:** ______________________
Date: ______________________ **Prepared by:** ______________________

	Table 8 Listed Practice[1]	Practice	Does Facility Use this Practice?	Source Code from Table A	Extent of Use of this Practice Observed During Audit	Could Facility Implement this Practice in the Future?	Required Justification for Modification[2]	Comments
7. Dedicated Equipment for Solvent- and Water-Based Products								
7-1	9	Facility dedicates PFPR production equipment to water-based vs. solvent-based products. Dedicated solvent-based or water-based equipment may be used on a non-routine basis for non-dedicated operations, but facility may not discharge the aqueous changeover rinsate as part of their P2 allowable discharge.	*No*	*1,3,4*	*NA*			
8. Interior Rinsate Storage and Reuse					*Fungicide formulation tank solvent rinsate is stored for reuse.*			
8-1	10	Interior rinsate is stored for reuse in future formulations of the same or compatible product (note: does not include drum/shipping container rinsate).	*Yes*	*3*				
			No	*3*	*NA*			
8-2	4	Dry carrier material is stored and reused in future formulation of the same or compatible product or disposed of as solid waste.	*Yes*	*3*	*Dry material is reused in product.*			
8-3	4	Interiors of dry formulation equipment are cleaned with dry carrier prior to water rinse.	*No*	*3.d.*	*NA*			

[1] 40 CFR 455.67

[2] Insert the following modification codes in the column titled "Required Justification for Modification":
ALTDISPOSE, BIOGROWTH, BREAKCAA, DETERGENT, DROP, INERT, NARROW, PACKAGE, RECOVERY, REFURB, SPACE, OTHER
(Modification Code Sheet at end of table contains a detailed explanation of each code.)

Figure 4-5. Identifying Use of P2 Practices

Step 3: Identify Practices That Could Be Implemented In The Future

During the plant tour, identify locations and operations where each practice could be implemented. Indicate "Yes" or "No" for each practice in the column entitled **"Could Facility Implement this Practice in the Future?"** If a particular practice is already in use at the facility, answer "NA" in this column. A facility may choose to implement a modification to a P2 practice listed in Table 8 of the final rule. In this case, the facility must write in the **"Required Justification for Modification"** column the appropriate code for the modification from Footnote 2. The list of codes and their explanations appears at the end of Table B. Use the "OTHER" code if the modification is not one that is listed in the final rule and describe the modification in the **"Comments"** column. Note that if the selected modification is not listed in the final rule, a facility must submit a request to the control authority or permitting authority for the modification and have it approved prior to implementing the modification. Figure 4-6 presents an example of the types of information recorded when completing Step 3.

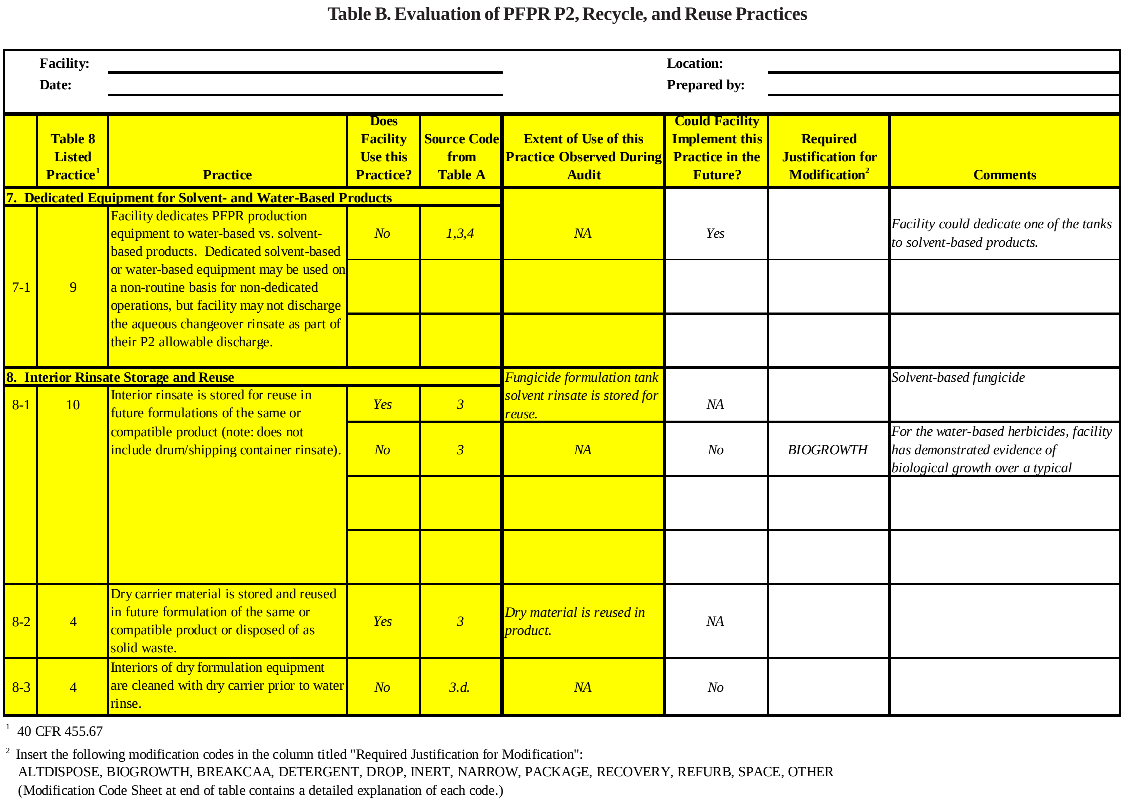


Table B. Evaluation of PFPR P2, Recycle, and Reuse Practices

Facility: ______________________ **Location:** ______________________
Date: ______________________ **Prepared by:** ______________________

	Table 8 Listed Practice[1]	Practice	Does Facility Use this Practice?	Source Code from Table A	Extent of Use of this Practice Observed During Audit	Could Facility Implement this Practice in the Future?	Required Justification for Modification[2]	Comments
7. Dedicated Equipment for Solvent- and Water-Based Products								
7-1	9	Facility dedicates PFPR production equipment to water-based vs. solvent-based products. Dedicated solvent-based or water-based equipment may be used on a non-routine basis for non-dedicated operations, but facility may not discharge the aqueous changeover rinsate as part of their P2 allowable discharge.	*No*	*1,3,4*	*NA*	*Yes*		*Facility could dedicate one of the tanks to solvent-based products.*
8. Interior Rinsate Storage and Reuse								
8-1	10	Interior rinsate is stored for reuse in future formulations of the same or compatible product (note: does not include drum/shipping container rinsate).	*Yes*	*3*	*Fungicide formulation tank solvent rinsate is stored for reuse.*	*NA*		*Solvent-based fungicide*
			No	*3*	*NA*	*No*	*BIOGROWTH*	*For the water-based herbicides, facility has demonstrated evidence of biological growth over a typical*
8-2	4	Dry carrier material is stored and reused in future formulation of the same or compatible product or disposed of as solid waste.	*Yes*	*3*	*Dry material is reused in product.*	*NA*		
8-3	4	Interiors of dry formulation equipment are cleaned with dry carrier prior to water rinse.	*No*	*3.d.*	*NA*	*No*		

[1] 40 CFR 455.67

[2] Insert the following modification codes in the column titled "Required Justification for Modification":
ALTDISPOSE, BIOGROWTH, BREAKCAA, DETERGENT, DROP, INERT, NARROW, PACKAGE, RECOVERY, REFURB, SPACE, OTHER
(Modification Code Sheet at end of table contains a detailed explanation of each code.)

Figure 4-6. Identifying Future Use of P2 Practices

Step 4: Identify Information for the "Comments" Column

Table B

For each practice listed on Table B, additional information may be collected by the user to further evaluate implementing P2 at the facility.

Information for the Comments Column

- Suggest practice-specific implementation and compliance demonstration methodologies;
- Differentiate between similar practices within the same general heading (such as under "Reuse of Drum Rinsate") in place at the facility;
- Discuss modification justifications; and
- Provide additional information for specific practices.

The following instructions contain suggested ways to use Table B, special items or information that can be sought out by the user, and important follow-up ideas, such as review of facility documentation. Where a P2 term has been defined and/or described in Chapter 3, the term is in ***italicized bold*** print.

1. Water Conservation

Examine how all rinsing operations are conducted at the facility, and determine whether the facility is taking any measures to minimize rinse-water flow.

- **1-1: Interior Equipment Rinsing**—Note the use of ***spray nozzles*** or other ***flow reduction equipment*** (***high-pressure/low-volume washers, spray balls,*** or ***steam cleaners***) that are used to rinse PFPR equipment interiors. Identify and note cases in which the facility would not be able to reuse rinsate, and if the facility has a wastewater treatment system that can treat small-volume interior rinsate discharges.

P2 Alternative Compliance

A modification to this practice is allowed if the facility is rinsing narrow transfer lines or piping where cleaning is better achieved by a water flush.

- **1-2: Floor Cleaning**—Identify the facility's floor-washing procedures (e.g., if a ***floor scrubber*** is used) and identify and record the chemicals used to clean floors (e.g., water, detergent) in the **"Comments"** column.
- **1-3: Dry Process Cleaning Equipment**—Identify how dry production areas are cleaned. In particular, note the type of ***dry process cleaning equipment*** used, whether the production areas are swept or vacuumed prior to rinsing with water, or if the dry production areas are cleaned with water at all.

Table B

2. Good Housekeeping Practices

Identify and record all preventive maintenance, leak control, spill cleanup, and other *good housekeeping practices* used at the facility.

- **2-1: Preventive Maintenance**—Identify if the facility has written procedures regarding the maintenance schedule for each major valve and fitting, and whether they have documented the performance of the maintenance checks.

- **2-2: Valves/Fittings**—Identify if valves and leaky fittings have some form of containment (e.g., drip pans) to enable the reuse or disposal of collected product or wastewater.

- **2-3: Spill Cleanup**—Identify if the facility has prepared ***training and written standard operating procedures*** for cleanup of leaks and spills, and if the facility has records demonstrating quick cleanup of actual leaks and spills in outdoor bulk storage or process areas.

P2 Alternative Compliance

All records documenting training programs and preventive maintenance schedules should be attached to the completed P2 audit form.

3. Department of Transportation (DOT) Test Bath

If the facility produces aerosols that require the ***operation of DOT test baths***, identify how the bath is operated. Note in the **"Comments"** column if the DOT test bath is operated as batch discharge. If the DOT test bath is operated in a continuous overflow mode, identify and note if the facility recirculates water back to the bath.

4. Air Pollution Controls

Identify if wet air scrubbers are operated with recirculation. Note the percent blowdown of the system in the **"Comments"** column.

5. Reuse of Drum Rinsate of Water-Based Products

Identify how empty drums or shipping containers are cleaned and handled at the facility. Note the ultimate disposal of the drums in the **"Comments"** column.

- **5-1: Direct Reuse of Drum Rinsate**—Note if the facility has implemented ***direct reuse of drum rinsate*** into product formulations from the triple rinsing of drums.

- **5-2: Storage and Reuse of Drum Rinsate**—Note if the facility collected drum and/or shipping container rinsate for reuse in subsequent formulations.

Table B

P2 Alternative Compliance

A modification to practices 5-1 and 5-2 is allowed if the facility is using a staged ***drum rinsing station*** that minimizes wastewater volume required for drum cleaning (typically 100 gallons for every 70 drums).

A modification is also allowed in a case where the drum/shipping container holds an inert ingredient(s) only, and 1) the facility can demonstrate that, even after using water conservation practices, there is more volume of water generated from rinsing the drums than can be reused in the formulation, or 2) the facility can demonstrate that the concentration of the inert ingredient in the formulation is so small (e.g., perfume) that the amount of inert ingredient in the rinsate is more than can be reused in the formulation without exceeding the ranges allowed in the Confidential Statement of Formula (CSF) (40 CFR 158.155). Note whether the facility reused as much rinsate as possible and whether the documentation on the formulation ingredients substantiates this modification.

- **5-3: Staged Drum Rinsing Station**—If the facility is using a staged drum rinsing station, briefly describe the system, including the amount of water contained in each cell and the frequency with which the water is changed.

The facility may use more than one drum rinsate P2 practice; discuss these practices in the **"Comments"** column.

6. Drum Rinsing for Formulation of Solvent-Based Products

This practice is similar to the practices detailed in Section 5 above, but it applies to the rinsing of drums or shipping containers containing solvents or solvent-based materials. Note the ultimate disposal of the drums or shipping containers in the **"Comments"** column.

- **6-1: Direct Reuse of Drum Solvent Rinsate**—Note if the facility has implemented ***direct reuse of drum rinsate*** into solvent-based product formulations.

P2 Alternative Compliance

A modification to these practices is allowed if the facility sends the drums and/or shipping containers to a refurbisher or recycler that only accepts drums triple rinsed with water. Note whether the facility has documentation from the drum recycler to substantiate this modification.

A modification is also allowed in a case where the drum/shipping container holds an inert ingredient(s) only, and 1) the facility can demonstrate that, even after using water conservation practices, there is more volume of base solvent generated from rinsing the drums than can be reused in the formulation, or 2) the facility can demonstrate that the concentration of the inert ingredient in the formulation is so small (e.g., perfume) that the amount of inert ingredient in the rinsate is more than can be reused in the formulation without exceeding the ranges allowed in the Confidential Statement of Formula (CSF) (40 CFR 158.155). Note whether the facility reused as much rinsate as possible and whether the documentation on the formulation ingredients substantiates this modification.

Table B

- **6-2: Cleaning Material**—Note the material used to clean the drums and if the material is the base solvent in one of the facility's formulations.
- **6-3: Storage and Reuse of Drum Solvent Rinsate**—Note if the facility collected drum solvent rinsate for reuse in subsequent formulations.

It is possible that the facility uses several different drum rinsate practices. Note each of these practices in the **"Comments"** column.

7. Dedicated Equipment for Solvent- and Water-Based Products

Determine if water-based and solvent-based products are formulated and packaged using ***process equipment*** dedicated by water-based and solvent-based production.

> **P2 Alternative Compliance**
>
> A modification to this practice is allowed if the product is only sporadically produced, such that the expense of dedicated equipment outweighs the P2 benefit. The facility should be able to demonstrate sporadic production through the use of production records. Note in the **"Comments"** column whether the documentation supports any claims of sporadic production. Another modification to this practice is allowed if the facility has installed and is operating a ***solvent recovery system.***

8. Interior Rinsate Storage and Reuse

Identify if the facility uses ***interior rinsate storage and reuse***, specifically noting if the rinsate is reused immediately in the next batch or is reused after being stored while other products are formulated and packaged.

> **P2 Alternative Compliance**
>
> Several modifications to the practice of storing and reusing interior rinsate are listed by code in Footnote 2 on Table B. List all reasons why the facility would not be able to reuse interior rinsate, and obtain documentation supporting these claims. Examples of this documentation include data demonstrating biological growth in stored rinsate, site plans illustrating space limitations precluding storage containers, manufacturer or original formulator directions requiring a specific form of disposal, or facility plans to drop the registration or production of a particular formulation. Document other reasons in the **"Comments"** column.

9. Dedicated Process Equipment (non-Table 8 practice)

If the facility is unable to reuse all interior rinsate (as identified by the user in Section 8 of the **"Practices"** column), indicate if the facility has used ***dedication of process equipment*** and ***production scheduling*** practices.

- **9-1: Equipment Dedication**—Identify if the facility has dedicated some equipment (e.g., mix tank or agitator) to (1) the top production formulation, (2) products that are hard to clean up after production, or (3) product families. Identify and record in the **"Comments"** column what pieces of process equipment are dedicated.

Table B

- **9-2: Production Sequencing**—Review production records to identify whether production sequencing is implemented and whether it reduces or eliminates the generation of equipment cleaning rinsates.

10. Inventory Management (non-Table 8 practice)

Inventory management systems for raw materials, finished products, and waste products typically include centralized sheltered storage, access controls (e.g., locked storage areas), and, in some cases, computerized inventory control. These systems increase wastewater reuse opportunities. Most, if not all, PFPR facilities have some degree of inventory management, although the increased use of "just-in-time" production may have decreased the need for inventory management at some facilities. However, an inventory management system is a key to using the P2 practice of ***interior rinsate storage and reuse***.

- **10-1: Inventory Management System**—Identify if an inventory management system is in place at the facility.

- **10-2: System Control**—Identify which of the system controls listed in Section 10 of the **"Practices"** column are in place at the facility, and how these controls have benefited P2 at the facility. Also identify potential applications of inventory management to facilitate additional wastewater reuse.

11. Training and Written Standard Operating Procedures (non-Table 8 practice)

Employee ***training and written standard operating procedures*** and incentive programs have been shown to be useful tools in identifying and implementing P2 opportunities.

- **11-1: Training**—Identify if the facility has a formal P2 training program. The facility should be able to provide training materials and records of attendance to document that the program is operational.
- **11-2: Incentive Program**—Identify if the facility has employee incentive programs in place that encourage P2.
- **11-3: Implementation of P2**—Note if the facility has documentation of the implementation of the P2 practices summarized on Table B.

12. Other P2 Practices/Equipment

List and describe innovative or otherwise unique P2 techniques in the **"Comments"** column when these practices are not claimed as confidential. When the user is a permitting official or a facility with multiple locations, provide enough detail to determine if these practices could be used by other PFPR facilities.

Table C: Summary of PFPR Compliance Decisions

After completing Tables A and B, the user has the information necessary to make a preliminary compliance decision for each waste stream identified in Table A. The compliance options include zero discharge, P2 alternative, and P2 alternative with modification. Wastewater that is completely reused or recycled on or off site or is contract hauled for off-site disposal is considered zero discharge.[1] Waste streams that will be discharged to a POTW or receiving stream must comply with either the P2 alternative or the P2 alternative with modification.

The user should copy all of the sources for all stream types from Table A to Table C (**"Source"** column). Based on the information in Table A, the user can make the preliminary decision on whether the source is zero discharge. If the source is not zero discharge, then the user should evaluate the information in Table B to decide whether the P2 alternative can be implemented, with or without modification. In the column entitled **"Preliminary Compliance Decision"**, write "P2 alternative", "P2 alternative with mod", or "Zero discharge."[1] If "P2 alternative with mod" is selected, write the applicable modification code in the **"Comments"** column. Figure 4-7 presents an example of the preliminary compliance decisions for the example sources presented previously in Table A.

Table C: Summary of PFPR Compliance Decisions

Facility: ____________ **Location:** ____________
Date: ____________ **Prepared by:** ____________

Stream Type	Source	Preliminary Compliance Decision	Comments[1]	Wastewater to be Treated?	Final Compliance Decision	Approval Date for Nonlisted Modifications
1. Shipping Container/ Drum Cleaning - *water or solvent rinses of the containers used to ship raw material, finished products, and/or waste products prior to reuse or disposal of the containers.*	1.a. *atrazine, metolachlor, and inert drums*	*Zero discharge*				
	1.b. *copper naphthenate and solvent drums*	*P2 alternative with modification*	*REFURB - Drum refurbisher will not accept solvent-rinsed drums*			
~~**2. Bulk Tank Rinsate** - *cleaning of the interior of any bulk storage tank containing raw materials, intermediate blends, or finished products associated with PFPR operations.*~~	2.a.					
	2.b.					
3. Formulating Equipment Interior Cleaning - *routine cleaning, cleaning due to product changeover, or special cleaning of the interior of any formulating equipment, including formulation and/or storage tanks, pipes, and hoses. Cleaning materials may include water, detergent, or solvent.*	3.a. *liquid formulation tank # 1*	*Zero discharge*	*Dedicate Tank # 1 to solvent-based fungicide production*			
	3.b. *liquid formulation tank # 2*	*P2 alternative with mod*	*BIOGROWTH* *Dedicate Tank # 2 and # 3 to herbicide production*			
	3.c. *liquid formulation tank # 3*	*P2 alternative with mod*	*BIOGROWTH* *Dedicate Tank # 2 and # 3 to herbicide production*			
	3.d. *dry formulation tank*	*P2 alternative*				

[1] Insert the following modification codes in the column titled "Comments":
ALTDISPOSE, BIOGROWTH, BREAKCAA, DETERGENT, DROP, INERT, NARROW, PACKAGE, RECOVERY, REFURB, SPACE, OTHER
(Modification Code Sheet at end of table contains a detailed explanation of each code.)

Figure 4-7. Making Preliminary Compliance Decisions

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[1] Note: In the example in Figure 4-7, "Zero Discharge" rather than "P2 Alternative" is entered for any stream that is completely reused. This convention was chosen to differentiate between streams that are not discharged and streams that may be discharged and, therefore, may require treatment. Alternatively, wastewater that is completely recycled or reused could be recorded as "P2 Alternative."

If the preliminary compliance decision is zero discharge for all waste streams at the facility, and the facility is not interested in implementing the P2 alternative, the user can skip to Chapter 7 for the discussion on compliance paperwork. If the facility decides to implement the P2 alternative or P2 alternative with modification for any of its waste streams, the user should continue to Chapters 5 and 6 to evaluate treatment technologies appropriate for the allowable discharge. The remaining columns are discussed in Chapters 6 and 7, as facilities should assess their need for treatment and the associated costs prior to making their final compliance decision.

CHAPTER 5

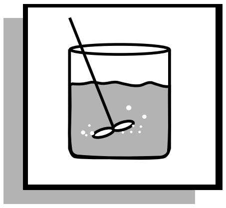
Wastewater Treatment Technologies

Wastewater treatment technologies are used by PFPR facilities to remove or destroy pesticide active ingredients and other pollutants in facility wastewater. The treated effluent may be reused in PFPR operations or may be discharged to a receiving stream or treatment facility (such as a publicly owned treatment works (POTW)). This chapter describes five cost-effective technologies that remove or destroy pesticide active ingredients and priority pollutants, and references other technologies that also effectively treat PFPR wastewaters. A list of documents that contain more detailed information on these technologies is included at the end of this chapter.

The technologies presented in this chapter have been identified through sampling visits to PFPR and pesticide manufacturing facilities and through EPA-sponsored treatability tests. The implementation of these, or equivalent, technologies has allowed PFPR facilities to reuse a greater percentage of wastewater in their operations without risking the quality of their final products. Additionally, by implementing these technologies, these facilities are able to discharge effluents that might otherwise require disposal.

Pretreatment Technologies

Emulsion Breaking



Many pesticide products are formulated by mixing pesticide active ingredients with inert materials (e.g., surfactants, emulsifiers, petroleum hydrocarbons) to achieve specific application characteristics. When these "inerts" mix with water, emulsions may form. These emulsions reduce the performance efficiency of many treatment unit operations, such as chemical oxidation and activated carbon adsorption. In many situations, emulsion breaking is a necessary pretreatment step to facilitate the removal of pollutants from PFPR wastewaters. Although emulsion breaking is a pretreatment step, its importance in the treatment of PFPR wastewaters can make it a major part of the technology train for treating PFPR wastewaters.

Types of Emulsions

- O/W Emulsion - a hydrophobic solvent, such as oil, dispersed in an aqueous medium
- W/O Emulsion - an aqueous medium dispersed in a hydrophobic solvent, such as oil.

Facilities can break these emulsions through several methods. Temperature control and acid addition are common in the PFPR industry and are discussed in more detail below. Other methods of emulsion breaking, such as chemically assisted clarification, are not discussed in this manual. Additional information on these methods may be found in the Final PFPR Technical Development Document (EPA 821-R-96-019).

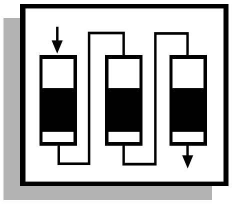
Temperature control and acid addition are simple, inexpensive methods of breaking emulsions in a variety of PFPR wastewaters. Acid (e.g., sulfuric acid) added to emulsified wastewater dissolves the solid materials that hold the emulsions together. The demulsified oil floats because of its lower specific gravity and can be skimmed off the surface, leaving the wastewater ready for subsequent treatment. The demulsification also causes suspended solids with a higher specific gravity to settle out of the wastewater. Heating the emulsion lowers the viscosities of the oil and water and increases their apparent specific gravity differential. The oil, with a significantly lower apparent specific gravity, rises to the surface of the wastewater. Heating the wastewater also increases the kinetic energy of the individual molecules in the wastewater, causing the molecules to collide with each other more frequently. The increased number of molecule collisions aids in breaking the film present between the oil and the water. Once freed from the water, the oil rises, where it can be skimmed from the surface of the wastewater. Emulsion breaking on PFPR wastewater has been effective in EPA-sponsored treatability tests when conducted at pH 2 and 60°C.

Other Pretreatment Technologies

In addition to emulsion breaking, a variety of other technologies effectively pretreat PFPR wastewater, including membrane filtration (ultrafiltration), chemically assisted clarification, and settling. Although these technologies are not discussed here, additional information on the treatment tests conducted by EPA using these technologies can be found in the Final PFPR Technical Development Document (EPA 821-R-96-019) and in the administrative record supporting the final PFPR rulemaking.

Treatment Technologies

Activated Carbon Adsorption



Activated carbon effectively removes organic constituents from wastewater through the process of adsorption. The term “activated carbon” refers to carbon materials, such as coal or wood, that are processed through dehydration, carbonization, and oxidation to yield a material that is highly adsorbent due to a large surface area and high number of internal pores per unit mass. As wastewater flows through a bed of carbon materials, molecules that are dissolved in the water may become trapped in these pores.

In general, organic constituents (including many pesticide active ingredients) with certain chemical structures (such as aromatic functional groups), high molecular weights, and low water solubilities are amenable to activated carbon adsorption. These constituents adhere to the stationary carbon material, so the wastewater leaving the carbon bed has a lower concentration of pesticide than the wastewater entering the carbon bed. Eventually, as the pore spaces in the carbon become filled, the carbon becomes exhausted and ceases to adsorb contaminants. Spent carbon may be regenerated or disposed of; the choice is generally determined by cost and/or other regulatory factors (e.g., RCRA).

Carbon adsorption depends on process conditions such as temperature and pH and process design factors such as carbon/wastewater contact time and the number of the carbon columns. If performed under the right conditions, activated carbon adsorption can be an effective treatment technology for PFPR industry wastewaters. Carbon adsorption capacity depends on the characteristics of the adsorbed compounds, the types of compounds competing for adsorption, and characteristics of the carbon itself. If several constituents that are amenable to activated carbon adsorption are present in the wastewater, they may compete with each other for carbon adsorption capacity. This competition may result in low adsorption or even desorption of some constituents.

Activated carbon comes in two sizes: powdered carbon has a diameter of less than 200 mesh, while granular carbon has a diameter greater than 0.1 millimeter. Granular carbon is more commonly used in wastewater treatment; powdered carbon is used less frequently because the small particle size creates regeneration and design problems. Activated carbon is obtained from vendors in bulk or in a variety of container sizes. At smaller facilities, the container in which the carbon is sold is intended to be used as the carbon bed, with influent wastewater passing into one end of the container and treated effluent water passing out of the opposite end. At larger facilities, carbon is purchased and added to a column that is installed at the facility.

Carbon is regenerated by removing the adsorbed organic compounds through steam, thermal, or physical/chemical methods. Thermal and steam regeneration are the most common methods to regenerate carbon used for wastewater treatment. These methods volatilize the organic compounds that have adsorbed onto the carbon. Afterburners are required to ensure destruction of the organic vapors; a scrubber may also be necessary to remove particulates from the air stream. Physical/chemical regeneration uses a solvent, which can be a water solution, to remove the organic compounds. Carbon is usually shipped back to the vendor for regeneration, although some facilities with larger carbon beds may find it economical to regenerate carbon on site.

Chemical Oxidation

Chemical oxidation modifies the structure of pollutants in wastewater to similar, but less harmful, compounds through the addition of an oxidizing agent. During chemical oxidation, one or more electrons transfer from the oxidant to the targeted pollutant, causing its destruction.

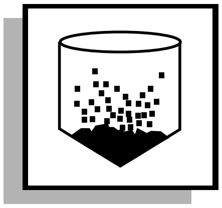
Cl^-

One common method of chemical oxidation, referred to as alkaline chlorination, uses chlorine (usually in the form of sodium hypochlorite) under alkaline conditions to destroy pollutants such as cyanide and some pesticide active ingredients. However, facilities treating wastewater using alkaline chlorination should be aware that the chemical oxidation reaction may generate toxic chlorinated organic compounds, including chloroform, bromodichloromethane, and dibromochloromethane, as byproducts.

Adjustments to the design and operating parameters may alleviate this problem, or an additional treatment step (e.g., steam stripping, air stripping, or activated carbon adsorption) may be required to remove these byproducts.

Chemical oxidation can also be performed with other oxidants (e.g., hydrogen peroxide, ozone, and potassium permanganate) or with the use of ultraviolet light. Although these other methods of chemical oxidation can effectively treat PFPR wastewaters, they typically entail higher capital and/or operating and maintenance costs, greater operator expertise, and/or more extensive wastewater pretreatment than alkaline chlorination. Additional information about these other methods can be found in the Final PFPR Technical Development Document (EPA 821-R-96-019).

Chemical Precipitation



Chemical precipitation is a treatment technology in which chemicals (e.g., sulfides, hydroxides, and carbonates) react with organic and inorganic pollutants present in wastewater to form insoluble precipitates. This separation treatment technology is generally carried out in the following four phases:

1. Addition of the chemical to the wastewater;
2. Rapid (flash) mixing to distribute the chemical homogeneously throughout the wastewater;
3. Slow mixing to encourage flocculation (formation of the insoluble solid precipitate); and
4. Filtration, settling, or decanting to remove the flocculated solid particles.

These four steps can be performed at ambient conditions and are well suited to automatic control.

Hydrogen sulfide or soluble sulfide salts (e.g., sodium sulfate) are chemicals commonly used in the PFPR industry during chemical precipitation. These sulfides are particularly effective in removing complexed metals and heavy metals (e.g., mercury, lead, and silver) from industrial wastewaters. Hydroxide and carbonate precipitation can also be used to remove metals from PFPR wastewaters, but these technologies tend to be effective on a narrower range of contaminants.

Hydrolysis

OH^-

Hydrolysis is a chemical reaction in which organic constituents react with water and break into smaller (and less toxic) compounds. Basically, hydrolysis is a destructive technology in which the original molecule forms two or more new molecules. In some cases, the reaction continues and other products are formed. Because some pesticide active ingredients react through this mechanism, hydrolysis can be an effective treatment technology for PFPR wastewater.

The primary design parameter considered for hydrolysis is the half-life, which is the time required to react 50% of the original compound. The half-life of a reaction generally depends on the reaction pH and temperature and the reactant molecule (e.g., the pesticide active ingredient). Hydrolysis reactions can be catalyzed at low pH, high pH, or both, depending on the reactant molecule. In general, increasing the temperature increases the rate of hydrolysis.

Identifying the best conditions for the hydrolysis reaction results in a shorter half-life, thereby reducing both the size of the reaction vessel required and the treatment time required. A more thorough discussion of hydrolysis of pesticide active ingredients can be found in the *Final Pesticides Formulators, Packagers, and Repackagers Treatability Database Report* (DCN F7185) or the Final Pesticide Manufacturing Technical Development Document (EPA-821-R-93-016 or DCN F6442).

Other Treatment Technologies

In addition to the technologies listed above, a variety of other technologies effectively treat PFPR wastewater, including reverse osmosis and ultraviolet light assisted ozonation. Although these technologies are not discussed here, additional information on the treatment tests conducted by EPA can be found in the Final PFPR Technical Development Document (EPA 821-R-96-019) and in the administrative record supporting the final PFPR rulemaking.

Additional Treatability Documents (available through EPA's Office of Water)

General References

Development Document for Best Available Technology, Pretreatment Technology, and New Source Performance Technology for the Pesticide Formulating, Packaging, and Repackaging Industry—Final, EPA 821-R-96-019, September 1996

Development Document for Effluent Limitations Guidelines, Pretreatment Standards, and New Source Performance Standards for the Pesticide Chemicals Manufacturing Point Source Category, EPA 821-R-93-016, September 1993 (DCN F6442)

Final Pesticides Formulators, Packagers, and Repackagers Treatability Database Report, March 1994 (DCN F7185)

Pesticide Formulators, Packagers, and Repackagers Treatability Database Report Addendum, September 1995 (DCN F7700)

Pilot-Scale Tests of the Universal Treatment System for the Pesticides Formulating, Packaging, and Repackaging Industry, September 1996 (DCN F7938)

Evaluation of the Universal Treatment System of Pesticide Formulator/Packager Wastewater, September 1993 (DCN F6446)

Membrane Technologies

Membrane Filtration Treatability Study, July 1991 (DCN F5541)

Membrane Separation Study for the Pesticide Formulator Packager Project, January 1994 (DCN F6445)

Final Pilot-Scale Membrane Separation Study, August 1996 (DCN F7939) Hydrolysis

Hydrolysis

Treatability of PAIs by Hydrolysis - Bench-Scale Tests, November 1990 (DCN F5544)

Hydrolysis Treatability Field Study, September 1990 (DCN F5546)

Pyrethrin Wastewater Treatability Report, June 1993 (DCN F6167)

Activated Carbon

Activated Carbon Isotherms for Pesticides, October 1989 (DCN F5885)

Accelerated Column Testing - Pesticide Manufacturing Wastewaters - Phase 2, September 1991 (DCN F5884)

Carbon Adsorption Isotherms for Toxic Organics, April 1980 (DCN F5786)

Emulsion Breaking

Emulsion Breaking Performance Study - Final Report, August 1996 (DCN F7937)

Note: These documents can be found in the administrative record supporting the final PFPR rulemaking, which can be accessed through EPA's Office of Water. The EPA Water Docket is open from 9 a.m. to 3:30 p.m. and can be reached at (202)260-3027. The document control number (DCN) is included in parentheses at the end of the reference. Reasonable fees may be charged for copying.

See Chapter 9 for a list of contacts.

CHAPTER 6

Conducting the Treatability Test

The final PFPR rule allows facilities the choice of achieving zero discharge or complying with the P2 alternative. Zero discharge can be achieved through reuse, off-site disposal of wastewater, or discharge of treated wastewater with pesticide active ingredients at levels below detection.[1] The P2 alternative allows PFPR facilities to discharge their wastewater after implementing listed P2 practices and, in some cases, wastewater treatment. Facilities that treat wastewater to comply with the P2 alternative or to reuse their wastewater must use a technology that provides effective wastewater treatment.

Treatability Test Components

- Identification of Wastewater Sources and Treatment Technologies;
- Preparing the Test Plan; and
- Summary and Evaluation of Test Results.

Chapter 4 describes how facilities can use the P2 audit to identify wastewater sources and applicable P2 practices, and make an initial compliance decision for each wastewater source. Chapter 5 describes the most cost-effective wastewater treatment technologies that are demonstrated to reduce the pesticide active ingredients present in PFPR wastewater. Chapter 6 describes the three components of a treatability test and provides guidance to facilities on selecting and testing appropriate wastewater treatment technologies to determine if they are effective for a facility's specific wastewater streams.

The first component of a treatability test is identifying the wastewater streams that remain after implementation of the P2 practices and require treatment prior to discharge. As discussed in Chapter 4, the facility can use the results of the P2 audit as documented on Table C to identify the sources that will be zero discharge or that will comply with the P2 alternative. As part of this first component, the facility also needs to identify the wastewater technologies appropriate to treat the constituents present in the waste streams requiring treatment (including characteristics that may hinder treatment of the waste streams), and then construct potential treatment trains. Table D, which is described later in this chapter, can be used by facilities to identify the sources that require treatment under the P2 alternative, the constituents in those wastewater sources, and appropriate treatment technology(ies).

Based on this information, the facility can decide whether a treatability test is necessary. A treatability test may be used by a facility to determine whether a particular technology can treat the wastewater, identify analytical or design

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[1] If a facility chooses to meet zero discharge through discharge of wastewater with pesticide active ingredients below detection, all pesticide active ingredients that are formulated, packaged, or repackaged at the facility must have analytical methods for use in wastewater.

and operating parameters to act as surrogates for pesticide active ingredient analyses, comply with permitting requirements, or optimize treatment performance.

If a test is warranted, the second component is preparing the test plan. The facility's first step in writing a test plan is determining the size and scope of the test and the sequence of treatment steps. The test plan also specifies the written procedures of how to conduct the test, discusses the design and operating parameters to be evaluated for the specific treatment technologies, determines the equipment and chemicals necessary to conduct the test, and describes the samples to be collected and analyzed (including a discussion of the quality assurance/quality control procedures).

The final component is evaluating the test results, which consists of calculating performance measures, comparing technology results, and evaluating the cost-effectiveness of the individual treatment technologies.

The guidance presented in this chapter for conducting a wastewater treatability test is based on EPA's procedures used during the development of the PFPR effluent limitations guidelines and standards. The treatability test tables discussed in this chapter (Tables D and E) are offered as one way to conduct the test and/or document the test results. It is not required that facilities, permitters, or other auditors use Tables D and E; however, these tables summarize the types of information that are useful in conducting a treatability test. Since it is very difficult to construct one table or checklist with a format useful for all PFPR facilities, EPA considers the tables presented in this manual as a tool to be adapted in whatever way the user feels is appropriate. Example pages of the treatability test tables are shown throughout this chapter to illustrate the types of information captured on the tables. The blank tables are presented in their entirety in Appendix B.

Treatability Test Tables

Table	Title	Purpose
Table D	Identification of Wastewater Sources and Technologies	Helps users list wastewater sources requiring treatment, the potential constituents, and the appropriate treatment technologies.
Table E	Summary and Evaluation of Test Results	Helps users summarize and evaluate the test results for each technology and the final treatment train.

Table D: Identification of Wastewater Sources and Treatment Technologies

Table D

Before a treatability test is undertaken, the facility should identify the wastewater sources that require treatment. These sources may include wastewater to be reused in PFPR operations or wastewater to be discharged under the P2 alternative. Table D is the starting point for identifying these sources and the potential treatment technologies to effectively treat them. Completing this table will enable facility personnel to begin identifying the wastewater sources

Table D

Wastewater Sources Requiring Treatment Prior to a P2 Allowable Discharge

Direct Discharge

- All process wastewater.

Indirect Discharge[1]

- Interior equipment rinsate, including drum, bulk tank, and shipping container rinsate;
- Leak and spill cleanup water; and
- Floor wash water.

[1] In individual cases, the requirement of wastewater pretreatment prior to indirect discharge may be removed for floor wash or the final rinse of non-reusable triple rinse by the control authority when pollutant levels are too low to be effectively pretreated and those pollutants do not pass through or interfere with POTW operations.

to include and potential treatment technologies to evaluate in a treatability test. Five steps that can be used to complete Table D and decide whether to conduct a treatability test are detailed below.

Step 1: Identify Wastewater Sources

The user should transfer from Table C to Table D all wastewater sources that will potentially require treatment, prior to either reuse or discharge. In addition, the user should transfer from Table A to Table D a list of the pesticide active ingredients or other constituents present in those wastewater sources. Figure 6-1 presents an example of the types of information transferred while completing this step. The unshaded columns "**Stream Type**", "**Source**", and "**Potential Pollutants**" to illustrate this example.

Table D. Identification of Wastewater Sources and Treatment Technologies

Facility: ____________________ **Location:** ____________________

Date: ____________________ **Prepared by:** ____________________

		Potential Pollutants		Wastewater Treatment Information			
Stream Type	**Source**	**Active Ingredients**	**Other Pollutants**	**Table 10 Technology[1]**	**Alternate Treatment Technology[1]**	**Source for Alternative Technology**	**Characteristics That Hinder Treatment**
1. Shipping Container/ Drum Cleaning - *water or solvent rinses of the containers used to ship raw material, finished products, and/or waste products prior to reuse or disposal of the containers.*	1.a.						
	1.b.						
2. Bulk Tank Rinsate - *cleaning of the interior of any bulk storage tank containing raw materials, intermediate blends, or finished products associated with PFPR operations.*	2.a.						
	2.b.						
3. Formulating Equipment Interior Cleaning - *routine cleaning, cleaning due to product changeover, or special cleaning of the interior of any formulating equipment, including formulation and/or storage tanks, pipes, and hoses. Cleaning materials may include water, detergent, or solvent.*	3.a. *liquid formulation tank # 2*	*Metolachlor* *Pendimethalin* *Pyrethrin II*	*BOD_5, TOC, TSS*				
	3.b. *liquid formulation tank # 3*	*Metolachlor* *Pendimethalin* *Pyrethrin II*	*BOD_5, TOC, TSS*				
	3.c. *dry formulation tank*	*Linalool* *Pendimethalin*	*BOD_5, TOC, TSS*				
	3.d.						

[1] HD = hydrolysis, AC = activated carbon, PT = precipitation, CO = chemical oxidation, P2 = pollution prevention, OT = other________________________________

Figure 6-1. Identifying Wastewater Sources

Step 2: Identify Wastewater Treatment Technologies

Table D

The user should identify treatment technologies that could effectively treat each potential pollutant listed in Step 1. Pollution control technologies for many pesticide active ingredients are presented in Table 10 to Part 455 of the final rule (located in Appendix A). A list of the pesticide active ingredients from Table 10 with their corresponding Shaughnessy codes and CAS numbers is also included in Appendix C. These control technologies include activated carbon adsorption, chemical oxidation, chemical precipitation, hydrolysis, and pollution prevention. EPA selected these technologies based on their applicability to a broad spectrum of pesticides and their relative cost and availability. The user should list the technology for each pesticide active ingredient present in their wastewater in the "**Table 10 Technology**" column.

Appropriate Technologies

- Table 10 listed technology [§455.10(g)]
- Equivalent system [§455.10(h)]
- Pesticide manufacturer treatment system.

Alternate technologies, such as membrane filtration, may also effectively treat pesticide active ingredients present in the facility's wastewater. In specific cases, these other technologies may be more cost-effective than the technologies listed in Table 10 of the rule. Facilities may choose to evaluate these other technologies in a treatability test to determine whether they are equivalent in performance to the Table 10 technologies (Chapter 7 of this manual discusses equivalent technologies in more detail). Facilities may also need to identify treatment technologies for pollutants other than pesticide active ingredients. For example, wastewaters that contain emulsions may require an emulsion breaking pretreatment step before using another technology (e.g., activated carbon adsorption or hydrolysis) to remove pesticide active ingredients. Other wastewaters may require activated carbon adsorption to remove organic priority pollutants in addition to pesticide active ingredients.

If information is not available for a particular pollutant, it may be necessary for the facility to identify a treatment technology based on their knowledge of the pollutant. For example, a technology that is effective on one pesticide active ingredient is often effective on other pesticide active ingredients with similar chemical properties and structures. However, treatment effectiveness should be verified through a treatability test. Table 6-1 provides sources of information on identifying treatment technologies using similarities in chemical properties and structures.

Treatment technologies can be identified from a variety of sources, including technical literature, treatability databases, and treatment vendors. A review of technical literature may reveal information that is not contained in the sources listed in Table 6-1. Treatability testing conducted on similar wastewaters in the PFPR industry or in other industries may provide clues on how to treat a particular wastewater. And treatment technology vendors should have information on the capabilities of their treatment systems. A facility should use all available information as well as knowledge of the various technologies and wastewater to be treated to identify appropriate treatment technologies.

Alternate technologies to treat pesticide active ingredients or other pollutants can be listed in the "**Alternate Wastewater Technology**" column. The source for identification of those alternative technologies (e.g., literature, treatability tests, or other sources) can be specified in the "**Source for Alternative Tech-**

Table 6-1
Sources of Treatment Technology Information

EPA Treatability Database[1]

The U.S. EPA National Risk Management Research Engineering Laboratory in Cincinnati, Ohio maintains a Pesticide Treatability Database that contains information on over 1,600 pesticides that are currently in use in the United States or have been removed from the market in the past 20 years. For each compound, the database contains the following information (where available):

- physical and chemical property data;
- treatability data; and
- Fruendlich isotherm (carbon adsorption) data.

EPA/EAD Treatability Database Report and Addendum[2]

During the development of the PFPR rule, EPA conducted extensive research into the treatment of PAIs, including gathering information from technical literature, analyzing data on treatability tests conducted by PFPR and pesticide manufacturing facilities, sampling existing treatment trains at PFPR and pesticide manufacturing facilities, and conducting bench- and pilot-scale treatability tests. These documents summarize the treatability data collected and describe how treatability data can be transferred to other pesticide active ingredients.

[1] U.S. EPA, Risk Reduction Engineering Laboratory, 26 West Martin Luther King Drive, Cincinnati, OH, 45268

[2] *Final Pesticides Formulators, Packagers, and Repackagers Treatability Database Report* (DCN F7185) and the *Pesticide Formulators, Packagers, and Repackagers Treatability Database Report Addendum* (DCN F7700)

Table D

Table D. Identification of Wastewater Sources and Treatment Technologies

Facility: ____________________ **Location:** ____________________
Date: ____________________ **Prepared by:** ____________________

Stream Type	Source	Potential Pollutants		Wastewater Treatment Information			Characteristics That Hinder Treatment
		Active Ingredients	Other Pollutants	Table 10 Technology[1]	Alternate Treatment Technology[1]	Source for Alternative Technology	
1. Shipping Container/ Drum Cleaning - *water or solvent rinses of the containers used to ship raw material, finished products, and/or waste products prior to reuse or disposal of the containers.*	1.a.						
	1.b.						
2. Bulk Tank Rinsate - *cleaning of the interior of any bulk storage tank containing raw materials, intermediate blends, or finished products associated with PFPR operations.*	2.a.						
	2.b.						
3. Formulating Equipment Interior Cleaning - *routine cleaning, cleaning due to product changeover, or special cleaning of the interior of any formulating equipment, including formulation and/or storage tanks, pipes, and hoses. Cleaning materials may include water, detergent, or solvent.*	3.a. *liquid formulation tank # 2*	*Metolachlor* *Pendimethalin* *Pyrethrin II*	*BOD_5, TOC, TSS*	*AC* *AC* *HD*	*HD*	*Treatability testing, Literature*	
	3.b. *liquid formulation tank # 3*	*Metolachlor* *Pendimethalin* *Pyrethrin II*	*BOD_5, TOC, TSS*	*AC* *AC* *HD*	*HD*	*Treatability testing, Literature*	
	3.c. *dry formulation tank*	*Linalool* *Pendimethalin*	*BOD_5, TOC, TSS*	*AC* *AC*	*HD*	*Treatability testing, Literature*	
	3.d.						

1 HD = hydrolysis, AC = activated carbon, PT = precipitation, CO = chemical oxidation, P2 = pollution prevention, OT = other______________________________

Figure 6-2. Identifying Wastewater Treatment Technologies

nology" column. Figure 6-2 presents an example of the types of information collected when completing Step 2. The unshaded columns under **"Wastewater Treatment Information"** illustrate this example.

Table D

Step 3: Identify Characteristics That Hinder Treatment

Throughout the pesticide industry, many products may be formulated, packaged, or repackaged using different types of equipment. This variety in products and equipment results in variable wastewater characteristics, which in turn affects the treatability of those wastewaters. For example, a wastewater with a high amount of organic compounds may be difficult to treat with chemical oxidation, as the organic compounds may compete with the pesticide active ingredients for the available oxidizing agent.

The application of treatment technologies to variable PFPR wastewater must be tailored to the specific characteristics of the wastewater. Table 6-2 presents some wastewater characteristics that may interfere with emulsion breaking, activated carbon adsorption, hydrolysis, chemical oxidation, and chemical precipitation technologies; however, these characteristics do not necessarily preclude use of the technology. The degree to which a wastewater exhibits a characteristic will affect the degree to which the technology is adversely affected. In many cases, a wastewater displaying an adverse characteristic can still be effectively treated through modifications of the treatment technology or the addition of a pretreatment step. For example, a wastewater may be difficult to treat using activated carbon adsorption if it has a high suspended solids content, because the suspended solids may plug the carbon column. However, it may be possible to remove the suspended solids through settling or filtration before activated carbon treatment.

Table 6-2
Wastewater Characteristics That Adversely Impact Treatment Effectiveness

	Technology				
Wastewater Characteristic	**Emulsion Breaking**	**Activated Carbon Adsorption**	**Hydrolysis**	**Chemical Oxidation**	**Chemical Precipitation**
Organics				✔	
Suspended Solids		✔		✔	
Buffered Solution	✔ ✔		✔		
Temperature		✔			✔
pH		✔		✔	
Detergents/ Surfactants	✔	✔		✔	✔
Oil and Grease		✔		✔	

The most common pretreatment technologies used for PFPR wastewaters are settling, filtration, emulsion breaking, chemically assisted clarification, neutralization, and ultrafiltration. Table 6-3 lists the types of wastewater characteristics that can be effectively treated by these pretreatment methods. EPA conducted treatability tests to evaluate emulsion breaking, chemically assisted clarification, and ultrafiltration as part of the development of the PFPR rule. See Chapter 5 for more information on these technologies.

Table 6-3
Pretreatment Technologies for Adverse Wastewater Characteristics

Wastewater Characteristic	**Technology** **Settling**	**Filtration**	**Emulsion Breaking**	**Neutralization or pH Adjustment**	**Chemical Assisted Clarification**	**Ultrafiltration**
Organics			✔		✔	✔
Suspended Soli✔ds		✔ ✔			✔	✔
Buffered Solution				✔		
pH				✔		
Detergents/ Surfactants			✔		✔	✔
Oil and Grease			✔		✔	✔

Wastewater characteristics that hinder treatment can be listed in the "**Characteristics That Hinder Treatment**" column of Table D. Figure 6-3 presents an example of the types of information that may be documented during the completion of Step 3.

Table D

Table D. Identification of Wastewater Sources and Treatment Technologies

Facility: ______________________ **Location:** ______________________
Date: ______________________ **Prepared by:** ______________________

		Potential Pollutants		**Wastewater Treatment Information**			
Stream Type	**Source**	**Active Ingredients**	**Other Pollutants**	**Table 10 Technology**[1]	**Alternate Treatment Technology**[1]	**Source for Alternative Technology**	**Characteristics That Hinder Treatment**
1. Shipping Container/ Drum Cleaning - *water or solvent rinses of the containers used to ship raw material, finished products, and/or waste products prior to reuse or disposal of the containers.*	1.a.						
	1.b.						
2. Bulk Tank Rinsate - *cleaning of the interior of any bulk storage tank containing raw materials, intermediate blends, or finished products associated with PFPR operations.*	2.a.						
	2.b.						
3. Formulating Equipment Interior Cleaning - *routine cleaning, cleaning due to product changeover, or special cleaning of the interior of any formulating equipment, including formulation and/or storage tanks, pipes, and hoses. Cleaning materials may include water, detergent, or solvent.*	3.a. *liquid formulation tank # 2*	*Metolachlor* *Pendimethalin* *Pyrethrin II*	BOD_5, *TOC, TSS*	*AC* *AC* *HD*	*HD*	*Treatability testing, Literature*	
	3.b. *liquid formulation tank # 3*	*Metolachlor* *Pendimethalin* *Pyrethrin II*	BOD_5, *TOC, TSS*	*AC* *AC* *HD*	*HD*	*Treatability testing, Literature*	
	3.c. *dry formulation tank*	*Linalool* *Pendimethalin*	BOD_5, *TOC, TSS*	*AC* *AC*	*HD*	*Treatability testing, Literature*	*High solids content*
	3.d.						

[1] HD = hydrolysis, AC = activated carbon, PT = precipitation, CO = chemical oxidation, P2 = pollution prevention, OT = other______________________________

Figure 6-3. Identifying Characteristics That Hinder Treatment

Step 4: Construct Potential Treatment Trains

Table D

Often the wastewater at a PFPR facility contains more than one pesticide active ingredient and may also have characteristics that require a pretreatment step. In these situations, several technologies may be necessary to completely treat the wastewater. These technologies can be used in series in what is called a treatment train.

For example, a facility generates wastewater from floor washing that contains several pesticide active ingredients, including atrazine, metolachlor, and copper naphthanate. In order to effectively treat this wastewater, the facility may construct a treatment train, shown in Figure 6-4, which consists of emulsion breaking to remove oil and grease and suspended solids picked up from the floor during floor washing, chemical precipitation to remove the copper naphthanate, hydrolysis to treat the atrazine, and activated carbon adsorption to remove the metolachlor and other priority pollutants contained in the wastewater.

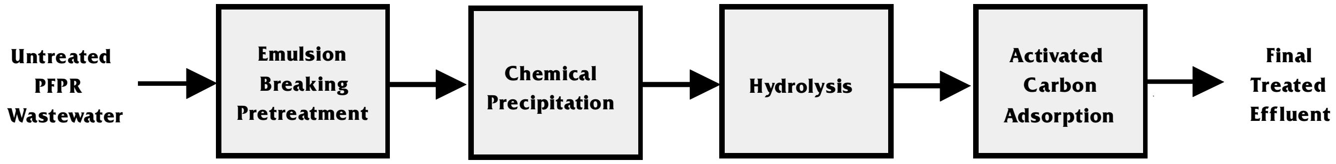


Figure 6-4. Example Treatment Train

When conducting a treatability test, facilities may only test the individual unit operations. However, if a facility intends to implement the entire treatment train, testing the entire train may reveal important information about how the wastewater characteristics change with each treatment step. Testing the wastewater through the entire treatment train can help troubleshoot the system and determine whether pretreatment steps are adequate to prevent malfunctioning of other unit operations in the treatment train.

Step 5: Determine Whether to Conduct a Treatability Test

After identifying wastewater streams that require treatment and the appropriate technologies for the constituents in those streams, a facility should determine whether a test is warranted for their circumstances. Several factors should be considered in making this determination. A treatability test can help a facility to evaluate whether the selected technologies effectively treat their wastewater and whether additional treatment steps are necessary. If a facility chooses technologies different from the ones listed in Table 10 of the final rule for the treatment or removal of pesticide active ingredients, a treatability test can be used to demonstrate that treatment is equivalent (demonstration of equivalent treatment is discussed more fully in Chapter 7). The test can also be used to determine the optimum treatment conditions, or may be required by permit writers or control authorities to evaluate treatment effectiveness before they allow PFPR wastewater to be discharged.

WHY CONDUCT A TREATABILITY TEST?

- Find out what technologies work best for your wastewater and optimize treatment performance.
- Show that an alternative technology is equivalent to a technology listed in Table 10 to Part 455.
- Meet the requirements of your NPDES permit writer or control authority prior to discharging PFPR wastewater.
- Identify surrogate parameters as an alternative to traditional laboratory analysis.

A treatability test may also allow a facility to identify surrogate parameters (e.g., total organic carbon) that will indicate the treatment effectiveness of their system without analyzing the wastewater for each individual constituent. Because of the number of pesticide active ingredients handled by some facilities, surrogate parameters can reduce the analytical costs associated with compliance. In addition, EPA-approved methods do not exist for all pesticide active ingredients, while other chemicals may be difficult to quantify because contaminants in the wastewater interfere with the analysis; in these cases, surrogate parameters allow some measure of treatment effectiveness to be quantified. To use surrogate parameters for any of these reasons, a facility may be required to perform a treatability test to establish the relationship between the surrogate parameter and the constituents it is meant to represent. The use of surrogates is not required by the rule.

Preparing The Test Plan

Once the decision to conduct a treatability test is made, the facility should prepare a written test plan. A test plan contains a set of predetermined procedures designed to ensure the test's success. The test plan helps facility personnel organize and prepare for the test, ensure that the test is conducted properly, provide documentation of the test, and troubleshoot treatment systems and procedures.

The test plan should have sufficiently detailed and clearly written instructions so that treatment system operators can easily conduct the test as specified. The plan should first of all clearly state the goals that are to be accomplished through performing the treatability test and the technologies to be evaluated. The plan should then delineate the size of the test, the target design and operating parameters for each treatment step, detailed instructions on how to perform each treatment step (including who is to perform the action, when the action should be performed, and the equipment and materials to be used), and sampling and analysis procedures.

Components of the Treatability Test Plan

- Goals of test and the treatment technologies to be evaluated (including the sequence of treatment steps);
- Size of the test;
- Target design and operating parameters;
- Written instructions for each step of the test, including the date, time, location, and personnel involved in the test;
- Equipment and materials required for the test; and
- Sampling plan specifying sample points, times, and procedures, sample analyses, sample preservation and shipping, and quality assurance/quality control procedures.

After the goals of the test are set, the facility can follow the following five steps in preparing a test plan for conducting a treatability test.

Step 1: Determine the Size of the Test

Full-scale treatment systems at PFPR facilities vary in size from very small systems (treating 100 gallons or less per year) to very large systems (treating millions of gallons per year). When performing a treatability test, it is not always necessary to treat a large volume of wastewater, and often valuable information can be acquired from smaller scale tests. Treatability tests are typically categorized based on size as bench-, pilot-, and full-scale tests.

A bench-scale test is useful to screen treatment technologies or determine initial design and operating parameters, and is typically conducted on one gallon or less of wastewater. Bench-scale tests use laboratory equipment (e.g., beakers, hot plates, and stirring rods), and may be conducted on synthetic wastewater (i.e., distilled water spiked with a known concentration of contaminant). A bench-scale test requires less cost and effort because of the smaller volume of wastewater tested and the basic equipment used. In addition, a bench-scale treatability test may involve less sophisticated sampling and analysis, and may use indicator parameters (e.g., turbidity) or visual appearance of the wastewater instead of laboratory analysis to gauge test results.

A pilot-scale test is conducted on actual wastewater, and is used to optimize design and operating parameters and to troubleshoot treatment problems before constructing a full-scale treatment system. Actual wastewater may contain surfactants, inerts, solvents, or other impurities that may interfere with treatment. The test is intermediate in size, although for many PFPR facilities that generate small volumes of wastewater, a pilot-scale system is equivalent in size to a full-scale system. Pilot-scale tests typically use smaller and simpler equipment than would be found in a full-scale system, such as buckets or drums instead of treatment tanks; portable mixers and pumps instead of built-in mixers and pumps; and flexible hoses instead of hard piping. These systems may also use temporary equipment that can be placed in storage or disposed of after the test instead of permanently installed equipment.

A full-scale treatability test is conducted on actual wastewater using the actual size and type of equipment to be used for routine treatment.

Step 2: Determine the Design and Operating Parameters

The effectiveness of a treatment step is related to certain design and operating parameters that determine how well the treatment system functions. The specific design and operating parameters differ for each type of technology. Table 6-4 presents a list of common parameters used for wastewater treatment technologies. For the treatment of PFPR wastewater, design and operating parameters typically include the amount of chemicals and/or materials used, temperature, pH, and wastewater flow rates.

Usually, a treatment technology will operate within a range of design and operating parameters. The point within that range at which the treatment system performance and cost are optimized will depend on site-specific factors such as wastewater characteristics and volume.

Table 6-4
Common Design and Operating Parameters

- Temperature
- pH
- Pressure
- Treatment time
- Flow rate
- Amount of treatment chemicals/materials
- Mixing
- Visual appearance of wastewater

Prior to the treatment test, target design and operating parameters appropriate for each treatment technology should be identified in the test plan. Because it is difficult to control some parameters precisely, a range of values (e.g., pH 2 to 12) to be evaluated during the test should also be identified. During the treatability test, treatment system operators should record the actual design and operating parameter values to identify at what values the optimum treatment performance of the system was achieved.

➡ Identify relevant design and operating parameters

Treatment technologies for PFPR wastewaters use a variety of mechanisms to achieve treatment. These mechanisms include physical separation of contaminants from wastewater, chemical reactions, phase separations, or a combination. With each technology, a unique set of design and operating parameters relevant to that technology needs to be monitored to ensure that the treatment technology is functioning properly. In some cases, the relevant design and operating parameters to be monitored may depend upon the specific characteristics of the wastewater to be treated as well as the treatment technology.

Table 6-5 presents the design and operating parameters that are typically monitored for the five technologies used by EPA in developing industry compliance costs for the PFPR rule. These technologies are described more fully in Chapter 5. Design and operating parameters are listed for these technologies because they are the technologies that are most frequently used in on-site

Table 6-5
Treatment Technology Design and Operating Parameters

Activated Carbon Adsorption Parameters

- Wastewater flow rate
- Type and amount of carbon used
- Saturation loading
- Temperature
- pH
- Carbon bed dimensions

Chemical Oxidation Parameters

- Temperature
- pH
- Amount and type of chemicals added
- Free chlorine, peroxide, or other chlorinating agent concentration
- Treatment time or wastewater flow rate

Precipitation Parameters

- Temperature
- pH
- Amount and type of chemicals added
- Mixing
- Treatment time or wastewater flow rate

Emulsion Breaking Parameters

- Temperature
- pH
- Mixing
- Amount and type of chemicals added
- Turbidity

Hydrolysis Parameters

- pH
- Temperature
- Mixing
- Amount and type of chemicals added
- Treatment time or wastewater flow rate

treatment of PFPR wastewaters and are the technologies for which EPA has the greatest amount of information. Note that these are not the only treatment technologies that can be successfully applied to PFPR wastewaters. In some cases, facilities may wish to monitor other design and operating parameters in addition to the ones listed in Table 6-5. Technical literature on the selected technology to be tested and previous wastewater treatability tests can help in identifying relevant operating parameters.

➟ Select design and operating parameter values

After identifying the appropriate design and operating parameters, facilities should set a range of values to be evaluated during the test. These values can be estimated from several sources:

- Previous treatment tests on the same or similar chemicals or wastewaters;
- Technical literature on the treatment technology; and
- Technology vendors.

The first time a wastewater is treated through a particular technology, PFPR facilities may wish to set the target design and operating parameter values at conservative levels that will overtreat the wastewater. Because PFPR wastewaters tend to be highly variable, and equipment and procedures may also vary from test to test, a parameter value that proved to be effective in previous tests on different wastewaters may not be an appropriate value for a specific facility's wastewater. By setting conservative parameter values during an initial test, facilities will not wrongly conclude that a particular treatment technology is ineffective when all that is necessary to achieve effective treatment is to adjust the design and operating parameter values.

For example, if technical literature indicates that a chemical oxidation time of six hours will effectively treat a chemical, a PFPR facility conducting an initial treatability test may wish to perform chemical oxidation for 8 or 12 hours. By sampling the wastewater at one- or two-hour intervals, the facility can ensure that effective treatment occurs during the test while also identifying how much treatment time is needed for their particular wastewater.

➟ Optimize treatment performance through design and operating parameters

Once a facility has performed a treatability test and identified an effective technology, the design and operating parameters used in that test can be used as a basis for future testing, provided the wastewater characteristics do not significantly change. However, facilities may wish to increase treatment performance, decrease treatment time, and reduce the cost of treatment. By optimizing design and operating parameters, facilities can achieve these objectives.

A properly run and well-documented treatability test will give indicators as to how to optimize treatment system performance. By reviewing the design and operating parameters achieved during treatability testing in conjunction with treatment system operator observations and laboratory analyses, facilities can determine what changes are likely to result in treatment system optimization.

By reviewing the design and operating parameter measurements, adjustments can be made either during the treatability test or in subsequent tests to optimize performance. In some cases, facilities can monitor design and operating parameters instead of using costly laboratory analyses to verify treatment effectiveness. For example, facilities can monitor the pH, temperature, and treatment time for a hydrolysis unit instead of having the treated wastewater analyzed to verify that hydrolyzable chemicals are removed. However, substituting laboratory analyses with design and operating parameter monitoring to demonstrate compliance will ultimately need to be approved by the control authority. Occasional laboratory analyses may be required to confirm that design and operating parameter monitoring accurately predicts treatment effectiveness.

If one of the goals of a treatability test is to optimize the treatment system, the facility may choose to monitor design and operating parameters and sample the system for laboratory analyses more frequently than is necessary to determine treatment system performance. For example, during an emulsion breaking pretest, the facility may collect samples under both acidic and alkaline conditions or at various temperatures to determine what conditions result in the greatest degree of separation. Facilities may also optimize treatment system performance by changing wastewater management methods. For example, by segregating certain wastewaters with characteristics that make them hard to treat, treatment system performance can be improved. In some cases, exterior equipment cleaning or floor wash water may contribute large amounts of suspended solids to a wastewater. By segregating the floor wash and exterior cleaning waters from other wastewaters, the facility may eliminate the need for emulsion breaking or other pretreatment for nonexterior waters, thereby reducing the cost of pretreatment by reducing the volume of wastewater requiring pretreatment. Alternatively, the facility may find that it is less expensive to dispose of some wastewaters than to treat them. For example, off-site disposal of floor wash water may cost less for some facilities than adding an emulsion breaking step to a treatment train.

As discussed in Chapter 7, the final PFPR rule requires that facilities choosing the P2 alternative must demonstrate, as part of their on-site compliance paperwork, that the treatment technologies they are choosing are well-operated and maintained. By documenting the optimal design and operating parameters that reflect the appropriate level of treatment for each treatment technology, a facility can demonstrate that its treatment system is well-operated and maintained. The section of this chapter on evaluation of test results and Chapter 7 discuss how Tables D and E can provide the documentation for demonstrated effectiveness of a facility’s treatment system.

Step 3: Prepare Detailed Instructions

Clear and detailed written procedures will not only help ensure that treatability testing is successful, but can also help in troubleshooting treatment systems that are not performing as well as expected and in optimizing treatment performance. See the references listed at the end of Chapter 5 and/or the example in Appendix D for descriptions of treatability test procedures used for EPA-sponsored tests.

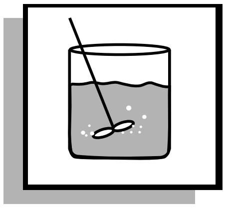
If a treatability test shows poor results, a review of the test plan, deviations from the test plan, and observations made during the treatability test may help identify whether the poor results are due to test procedures or whether the selected treatment technology is not appropriate for the wastewater being treated. This review can also help facilities determine whether additional pretreatment is necessary to allow treatment technologies to function properly.

Step 4: Identify Equipment and Chemicals

Equipment and chemicals are necessary in conducting the treatability test, collecting and analyzing the samples, and monitoring the design and operating parameters. When performing a treatability test, the equipment used should be cleaned to avoid introducing outside contaminants that may skew test results. Facilities should also use equipment constructed of materials that are compatible with the wastewater, contaminants, and treatment chemicals to be used in the test.

The types and sizes of equipment and chemicals needed to perform treatability tests to evaluate emulsion breaking, hydrolysis, activated carbon adsorption, chemical oxidation, and chemical precipitation are discussed below. These technologies, described in Chapter 5, are the most cost-effective technologies that remove or destroy pesticide active ingredients and priority pollutants in PFPR wastewater.

➡ Emulsion Breaking



Facilities performing an emulsion breaking test should use a tank sized for the volume of wastewater to be tested. If the tank has an open top, the facility should cover the tank to minimize evaporative and heat losses. If the tank does not have graduated markings, an additional container may be necessary to measure the volume of the wastewater. A pump may also be required to transfer the wastewater to and from the tank.

Acid lowers the pH of the wastewater and encourages emulsion breaking. A variety of acids can be used for this purpose, including sulfuric and hydrochloric acid. To further encourage emulsion breaking, the facility may heat the wastewater in the tank. Heating equipment includes hot plates, electric band heaters, immersion heaters, and steam jackets.

Emulsion breaking also requires stirring to mix treatment chemicals and to encourage the breaking of the emulsion. Rapid and turbulent mixing may be used initially to mix the treatment chemicals, but may cause contaminants to remain emulsified in the wastewater if used throughout the test. It is recommended that the facility use low-speed mixing and low-shear mixers such as paddle mixers.

The pH of the wastewater can be determined with disposable pH strips or with an electronic pH meter. The temperature of the wastewater can be determined with a thermometer or with a thermocouple. The facility may also wish to neutralize the pH of the wastewater after emulsion breaking if other portions of the treatment train are not compatible with a low pH.

➡ Hydrolysis

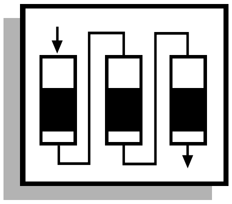
OH^-

Facilities performing a hydrolysis test should use a tank sized for the volume of wastewater to be tested. If the tank has an open top, the facility may cover the tank to minimize evaporative and heat losses. If the tank does not have graduated markings, an additional container may be necessary to measure the volume of the wastewater. A pump may be required to transfer the wastewater to and from the tank, and a mixer is typically used during hydrolysis to homogenize the wastewater.

Hydrolysis reactions typically occur more rapidly in acidic or basic environments. A variety of bases and acids are acceptable to raise or lower the pH of the wastewater. To further encourage the hydrolysis reaction, the facility may heat the wastewater in the tank. Heating equipment includes hot plates, electric band heaters, immersion heaters, and steam jackets.

The pH of the wastewater can be determined with disposable pH strips or with an electronic pH meter. The temperature of the wastewater can be determined with a thermometer or with a thermocouple. The facility may choose to neutralize the wastewater after the treatability test; a variety of acids and bases can be used for this purpose.

➡ Activated Carbon Adsorption



Facilities performing an activated carbon adsorption test must use a carbon bed or column sized for the volume of wastewater to be tested. Flexible tubing or hard piping may be used to convey water to the column and remove treated wastewater. The facility will need a pump to move the wastewater through the bed or column. Many carbon treatment systems use several beds in series. As the first bed becomes saturated, it is removed from the system. The influent is then directed to the second bed in the series, and an additional bed is added to the end of the series to replace the saturated bed that was removed.

The facility may use prefilled carbon beds from a vendor or prepare its own bed or column. If the facility is packing a carbon bed or column itself, it will be necessary to prepare the carbon. A scale should be used to weigh the carbon used to pack the column. It may also be necessary to rinse the carbon to remove fines and to deaerate the carbon.

The pH of the wastewater can be determined with disposable pH strips or with an electronic pH meter. The temperature of the wastewater can be determined with a thermometer or with a thermocouple.

➡ Chemical Oxidation (Alkaline Chlorination)

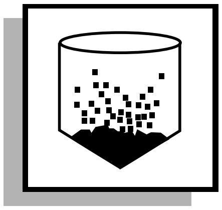
Cl^-

Facilities performing a chemical oxidation test via alkaline chlorination should use a tank sized for the volume of wastewater to be tested. If the tank has an open top, the facility may cover the tank to minimize evaporative and heat losses. If the tank does not have graduated markings, an additional container may be necessary to measure the volume of the wastewater. A pump may be required to transfer the wastewater to and from the tank. An electric mixer or a magnetic stirring bar is typically used to mix the wastewater during chemical oxidation.

Chemical oxidation occurs more readily in an alkaline environment. While a variety of bases are acceptable, sodium hydroxide is most commonly used to raise the pH of the wastewater. A variety of chlorine-containing chemicals are available to initiate chlorination; sodium hypochlorite is commonly used during chemical oxidation. A facility may choose to neutralize the wastewater with an acid following treatment, or add sodium thiosulfate or other free chlorine scavenger following treatment to reduce residual free chlorine in the wastewater.

The pH of the wastewater can be determined with disposable pH strips or with an electronic pH meter. The temperature of the wastewater can be determined with a thermometer or with a thermocouple. The level of free chlorine or other oxidant can be determined using readily available test kits. Facilities should contact laboratory equipment vendors for information on such test kits.

➡ Chemical Precipitation (Sulfide Precipitation)



Facilities performing a chemical precipitation test should use a tank sized for the volume of wastewater to be tested. If the tank does not have graduated markings, an additional container may be necessary to measure the volume of the wastewater. A pump may be required to transfer the wastewater to and from the tank.

A facility can use a variety of chemicals to initiate sulfide precipitation, including sodium sulfate. Mixing the wastewater will encourage flocculation of the metal precipitates. Although rapid and turbulent mixing may be used initially to mix the treatment chemicals, such mixing may cause precipitates to deflocculate. It is recommended that the facility use low-speed mixing and low-shear mixers such as paddle mixers. A filter or vacuum pump may be used to remove the flocculated solid particles from the wastewater, or the facility may decant the wastewater.

The pH of the wastewater can be determined with disposable pH strips or with an electronic pH meter. The temperature of the wastewater can be determined with a thermometer or with a thermocouple.

Step 5: Prepare the Sampling Plan

During and after the test, the facility will need to sample the wastewater to ensure that the technology selected to treat the wastewater is performing adequately. Prior to the start of the test, the facility should prepare a sampling plan to describe the planned data collection, field measurements, and sample analyses. Table 6-6 lists the main components of a comprehensive sampling plan.

Table 6-6
Components of a Sampling Plan

- Selection of sampling points;
- Field measurements and operating parameters;
- Sample analyses;
- Sample preservation and shipping; and
- Quality assurance/quality control.

➡ Select Sampling Points

Facility-specific sampling points should be identified so that the samples collected will represent the following types of streams:

- Influent to the treatment system (e.g., commingled wastewater from PFPR operations and pretreatment steps);
- Influent to the individual treatment units;

- Effluent from individual treatment units (e.g., hydrolysis effluent); and
- Final effluent from the treatment system.

Sample point selection should be designed for the specific system. Typically, wastewater samples are collected from the influent and effluent of each treatment unit operation to evaluate the performance of the individual unit. The initial influent and final effluent samples from the whole treatment system are collected to evaluate the system's overall performance.

If the facility chooses to investigate whether individual wastewater streams (e.g., floor wash) require pretreatment, the selected sampling points should include those individual raw wastewater streams. The commingled influent to the treatment system would then consist of the pretreatment unit effluent and the raw wastewater streams that do not require pretreatment.

The facility may also wish to collect multiple samples during a treatment step to better calculate technology-specific performance measures (described in the Evaluation of Test Results section). Table 6-7 presents examples of the sampling frequency and analysis that might be performed for various technologies on a pilot scale. Sample frequency should account for the variability of the wastewater generated from the various processes at the facility.

Table 6-7
Example Sample Collection for Pilot-Scale Study

Technology	Performance Measure	Sampling Frequency	Typical Sample Analyses
Any technology	Destruction and removal efficiency	Collect influent and final effluent samples	Any constituent
Activated Carbon	Carbon breakthrough curve	Collect effluent samples after every 60 liters has passed through the carbon bed	Pesticides Organics Total organic carbon
Activated Carbon	Saturation loading/carbon isotherm	Treat a set volume (e.g., one liter) of wastewater through varying amounts of carbon and collect effluent samples	Pesticides Organics Total organic carbon
Emulsion Breaking	Time for phase separation	Visually inspect samples hourly for phase separation	Turbidity Total suspended solids Oil and grease
Hydrolysis	Half-life calculation	Collect effluent samples every 2-6 hours of treatment	Pesticides

➡ Field Measurements and Operating Parameters

As part of the test documentation, facilities should prepare field logs for each sample point. Typically, these logs will contain the types of information listed in Table 6-8 and be included in the report documenting the test results.

Typical field sampling equipment includes pH meters or indicator paper, thermometers, scoops or shovels, and bottle dippers. Noncontaminating pH indicator papers are often used during sampling and preservation; however, if a more precise pH determination is required, a pH meter, calibrated each day in the field, can be used. The pH electrode should be decontaminated prior to sampling by rinsing the probe in deionized water. Temperature can be measured from either an aliquot collection jar or from the process stream after sample collection to ensure that the thermometers do not contaminate samples. Other sampling equipment that directly contacts the sample, such as scoops, shovels, and bottle dippers, should be precleaned and dedicated to each sample point or cleaned prior to reuse. Table 6-9 lists the typical decontamination procedures for sample collection containers.

Table 6-8
Typical Field Log Data

- Sampling point description;
- Date and time of sample collection;
- Name or initials of sampler;
- Deviations from the sampling plans or test plan;
- Field measurements;
- Flow data;
- Production data;
- Observations; and
- Other comments.

➡ Sample Analyses

Wastewater samples may be analyzed for conventional and selected nonconventional parameters, priority pollutants, and nonpriority organic and metal pollutants. For the PFPR industry, the notable nonconventional pollutants expected to contribute a significant toxic loading to PFPR facility wastewaters are the pesticide active ingredients used in formulating, packaging, or repackaging operations. PFPR wastewater may also contain specific organic and metal pollutants used in the facility's pesticide formulations or high levels of oils or solids.

At a minimum, samples should be analyzed for the facility's pesticide active ingredients (if a method is available) and for priority pollutants. A number of pesticide active ingredient methods can be found in the *Methods for the Determination of Nonconventional Pesticides in Municipal and Industrial Wastewater* (EPA 821-R-93-010). It is also helpful to analyze the samples for the classical wet chemistry parameters listed in Table 6-10. These parameters can sometimes be correlated to the level of treatment achieved during a particular unit operation. For example, total organic carbon (TOC) is often used as an indicator for activated carbon adsorption. During a treatability test or during an initial monitoring period for a full-scale treatment system, the samples should be analyzed for both TOC and the specific pesticide active ingredients. If the test results show a correlation between the two, then TOC can be used as a surrogate monitoring parameter during normal treatment operations. If metals are not used in the facility's operations, samples for metals analyses may be collected only at the treatment system influent and the final effluent to evaluate the overall system removals for those constituents.

Table 6-9
Decontamination Procedures

For samples in which inorganic constituents are to be analyzed, the following decontamination procedures are effective:

- Wash in a nonphosphate detergent and water solution;
- Rinse with dilute hydrochloric acid;
- Rinse with tap water; and
- Rinse with Type II reagent grade water.

For samples in which organic constituents are to be analyzed, the following decontamination procedures are effective:

- Wash with detergent;
- Rinse with tap water;
- Rinse with distilled water;
- Rinse with acetone; and
- Rinse with laboratory-grade hexane.

Equipment blanks should be collected as necessary to verify adequate decontamination procedures.

Facilities may also wish to analyze the samples for other parameters that may affect the performance of the selected treatment technologies. For example, a treatability test for activated carbon might include analysis of total suspended solids, since solids can plug the carbon bed and reduce overall performance of the system.

Different types of analyses are conducted using separate analytical methods that have specific preservation methods. These analyses may also be conducted by separate laboratories. As a result, wastewater collected at each sample point is separated into one or more containers, called a sample "fraction," for each analysis or set of similar analyses. A comprehensive water sample set typically consists of the eight fractions listed in Table 6-11. The pesticide active ingredients analyzed will be facility-specific. Some pesticides are analyzed by the same method; a separate pesticide fraction is required for each analytical method. As mentioned previously, it may not be necessary for the facility to analyze the wastewater for all parameters.

➟ Sample Preservation

Individual sample fractions must be preserved according to the appropriate analytical method. Table 6-12 lists the typical analytical fractions, along with the typical sample volume, sample container, and on-site preservation for each fraction.

Sample volume, container type, preservation, and storage requirements for each analytical method are specified in the *Handbook for Sampling and Sample Preservation of Water and Wastewater* (EPA-600/4-82-029). During sample collection, facilities should follow good housekeeping and health and safety practices by avoiding cross-contamination of samples and leaks and spills.

Table 6-10
Classical Wet Chemistry Parameters

- Ammonia as nitrogen;
- Biochemical oxygen demand (BOD);
- Chemical oxygen demand (COD);
- Cyanide, total;
- Fluoride;
- Hexane extractable material (HEM);
- Nitrate/nitrite nitrogen;
- pH;
- Total dissolved solids (TDS);
- Total organic carbon (TOC); and
- Total suspended solids (TSS).

Table 6-11
Typical Sample Fractions

- Specific pesticide active ingredient(s);
- Volatile organic pollutants;
- Semi-volatile organic pollutants;
- Metals;
- Group I classical parameters (BOD, TSS, TDS, pH, and fluoride);
- Group II classical parameters (TOC, COD, ammonia nitrogen, nitrate/nitrite nitrogen);
- Hexane extractable material; and
- Total cyanide.

Table 6-12
Typical Sample Fractions and Preservation

Sample Fraction	Sample Volume	Sample Container	On-Site Preservation
Typical Pesticide Method	2 Liters	1 Liter Amber Narrow-Mouth Glass	4°C; pH 5-7 with NaOH or HCl
Volatile Organics	80 mL	40 mL VOA Vial	4°C
Semivolatile Organics	2 Liters	1 Liter Amber Narrow-Mouth Glass	4°C
Metals	1 Liter	1 Liter Narrow-Mouth Plastic	pH 2 with HNO_3
Group I Parameters[1]	1 Liter	1 Liter Narrow-Mouth Plastic	4°C
Group II Parameters[2]	1 Liter	1 Liter Narrow-Mouth Glass	4°C; pH 2 with H_2SO_4
Total Cyanide	1 Liter	1 Liter Narrow-Mouth Plastic	4°C; pH 12 with NaOH
Hexane Extractable Material	1 Liter	1 Liter Wide-Mouth Glass	4°C; pH 2 with HCl

[1] Group I parameters include BOD_5, pH, fluoride, TDS, and TSS.

[2] Group II parameters include ammonia nitrogen, nitrate/nitrite nitrogen, COD, and TOC.

➡ Quality Assurance/Quality Control

To ensure the accuracy of the data collected during the treatability test, it is critical that proper quality assurance/quality control (QA/QC) procedures be followed throughout the entire treatability test and during sampling and analysis. The sample plan should identify the following three components of the facility's QA/QC plan:

(1) Specify procedures to ensure that data quality is within prescribed limits of acceptability;

(2) Provide QC data that may be used to assess data quality in terms of precision and accuracy; and

(3) List analytical methods to be used.

Appropriate QA/QC procedures should be followed by the facility and the laboratory that the facility selects to analyze the samples.

For example, when collecting samples, the facility should also collect QA/QC samples, including field duplicate samples, field blanks, equipment blanks, and trip blanks.

- Field duplicate samples are two successive samples from the same sampling point. Results of the field duplicate analyses are used to evaluate overall precision and cover all sources of data variability, including sample collection, handling, preparation, and analysis. Field duplicates are submitted to the laboratory as blind duplicates.
- Field blanks are samples of an analyte-free matrix (e.g., HPLC water), which are prepared at the sampling site by pouring the HPLC water directly into the sample bottles. Results are used to evaluate potential volatile organics contamination from the ambient air arising during sample collection.
- Equipment blanks are samples of an analyte-free matrix that have been used to rinse sampling equipment prior to sampling. The results are used to evaluate contamination arising from contact with sampling equipment, and to verify the effectiveness of equipment decontamination procedures.
- Trip blanks are samples of an analyte-free matrix that have been transported unopened from a controlled area to the sampling site and finally to the laboratory. Trip blanks are used to monitor volatile organics contamination of samples during transport, field handling, and storage.

Duplicate samples are typically collected at a frequency of 10%, or at least once per sampled media. Duplicate samples are best collected at sample points with very high or very low pollutant concentrations. The various blank samples are also typically collected with a combined frequency of approximately 10 percent.

The primary objective of establishing QA/QC procedures is to ensure that data are of the quality necessary to demonstrate that the treatment technologies selected and tested comply with the PFPR rule. Table 6-13 lists the

Table 6-13
Overall Quality Objectives

- Obtain all the critical data necessary to support decision-making;
- Collect representative samples according to the procedures established in the sampling and analysis plan;
- Ensure data comparability by using standard methods and controlled systems to collect and analyze samples; and
- Provide analytical results of known and acceptable precision and accuracy.

overall quality objectives that should be met. Both the facility and the laboratory performing the analyses are responsible for ensuring that the data quality objectives are met.

Table E: Summary and Evaluation of Test Results

Following the treatability test, the facility should summarize and evaluate the results to determine whether the test goals were achieved. The facility can use Table E as the starting point for compiling and evaluating the test results, including all analytical data, records of design and operating parameters achieved during the test, and treatability test operator observations. Completing this table will enable facility personnel to assess which treatment technologies were effective in reducing specific constituents in the wastewater, and determine the optimum operating parameters for each treatment unit. Four steps that can be used to evaluate the treatability test results are detailed below.

Treatability Test Goals

- Determine treatment effectiveness;
- Identify analytical parameters to act as surrogates for pesticide active ingredient analyses;
- Identify design and operating parameters to act as indicators for treatment effectiveness;
- Comply with permitting requirements; and
- Optimize treatment performance.

Step 1: Document Test Results

The purpose of the treatment system is to reduce contaminant levels in PFPR wastewaters. The primary constituents of concern for the PFPR industry are the pesticide active ingredients used in the facility's products. Other constituents, such as solvents or inert ingredients, may also be a concern, depending on site-specific criteria.

To evaluate the effectiveness of the treatment system, a facility should first document all test results on Table E. Figure 6-5 is an example of a completed Table E that presents the types of data collected during the treatability test. The unshaded "**Technology**", "**Primary Constituents**", "**Design and Operating Parameters**", and "**Constituent Concentration**" columns illustrate this example. Note that test results can be documented for each technology, as well as for the entire treatment system.

Step 2: Calculate Performance Measures

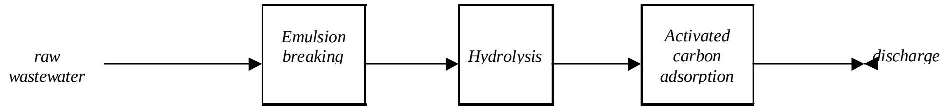
The effectiveness of a treatment step can be evaluated through performance measures that look at how much contaminant is removed from the wastewater, the amount of other waste generated by the treatment step, and the cost of the treatment. The most common measure of treatment effectiveness is the destruction and removal efficiency (DRE), also known as percent removal, which measures the amount of contaminant removed from the waste stream. In addition to DREs, treatment effectiveness may be measured with technology-specific measures, such as a hydrolysis half-life. These measures are often useful in comparing the results of different treatment tests using the same technology.

As shown in Figure 6-6, facilities can use the **"Performance Measures"** columns on Table E to document these measures. Once the treatment performance is calculated, facilities can determine whether that technology was successful in removing or destroying that constituent and document the re-

Table E: Summary and Evaluation of Test Results

Facility: ____________________
Location: ____________________
Date: ____________________
Prepared by: ____________________

Insert your optimal treatment train and operating parameters in the space provided below:



Emulsion breaking: pH = 2; T = 60° C; slow mix; 24 hour settling time
Hydrolysis: pH = 12; T = 60° C; slow mix; 24 hour settling time
Activated carbon adsorption: pH = 7; T = 25° C; flow rate = 87 mL/min; empty bed residence time = 15 min

		Design and Operating Parameters					Constituent Concentration		Performance Measures[1]		
Technology	**Primary Constituents**	**pH**	**Temperature (C)**	**Other *Treatment Time***	**Other *Settling Time***	**Other *Reaction Time***	**Influent (ug/L)**	**Effluent (ug/L)**	**Percent Removal**	**Other *Hydrolysis Half-Life***	**Effectively Treated? (Y/N)**
Emulsion breaking pretest	*Sample contained all the emulsion-*	*2.01*	*60*	*1 hour*	*24 hours*		*NA*	*NA*			
	breaking constituents except	*11.74*	*60*	*1 hour*	*24 hours*		*NA*	*NA*			
	Linalool and Pyrethrin II.	*7*	*25*	*1 hour*	*24 hours*		*NA*	*NA*			
Emulsion breaking	*Cyanazine*	*2*	*60*	*1 hour*	*24 hours*		*3,750*	*714*			
	Linalool	*Emulsion breaking data for this constituent were not available.*					*NA*	*NA*			
	Metolachlor	*2*	*60*	*1 hour*	*24 hours*		*15,700*	*20,400*			
	Pendimethalin	*2*	*60*	*1 hour*	*24 hours*		*110*	*49.0*			
	Pyrethrin II	*Emulsion breaking data for this constituent were not available.*					*NA*	*NA*			
	Biological Oxygen Demand (BOD_5)	*2*	*60*	*1 hour*	*24 hours*		*< 108*	*< 35*			
	Hexane Extractable Material (HEM)	*2*	*60*	*1 hour*	*24 hours*		*< 16.5*	*56.0*			
	Total Organic Carbon (TOC)	*2*	*60*	*1 hour*	*24 hours*		*534*	*534*			
	Total Suspended Solids (TSS)	*2*	*60*	*1 hour*	*24 hours*		*334*	*6.00*			
Hydrolysis	*Cyanazine*	*12*	*60*			*24 hours*	*714*	*< 2*			
	Linalool	*12*	*60*			*24 hours*	*5,760*	*792*			
	Metolachlor	*12*	*60*			*24 hours*	*20,400*	*14,700*			
	Pendimethalin	*12*	*60*			*24 hours*	*49.0*	*45.0*			
	Pyrethrin II	*12*	*60*			*24 hours*	*81.1*	*< 5*			
	Biological Oxygen Demand (BOD_5)	*12*	*60*			*24 hours*	*< 35*	*45.0*			
	Hexane Extractable Material (HEM)	*12*	*60*			*24 hours*	*56.0*	*44.0*			
	Total Organic Carbon (TOC)	*12*	*60*			*24 hours*	*534*	*505*			
	Total Suspended Solids (TSS)	*12*	*60*			*24 hours*	*6.00*	*303*			

[1] NA=not analyzed, NC=not calculated.

Figure 6-5. Documenting Test Results

sults in the last column, **"Effectively Treated?"** A facility should evaluate three measures to determine if the technology effectively removed that constituent:

- Percent removal;
- Final effluent concentration; and
- Minimum detection limit.

Table E

For example, if 95% or more of a constituent is removed by a technology, that technology would be considered effective. Conversely, if a technology only removes 30% of a constituent, but the constituent is removed to below its detection limit, the constituent is effectively treated.

For cost purposes, the facility should also evaluate the technology-specific performance measures. For example, as shown in Figure 6-6, metolachlor is somewhat reduced by the hydrolysis step; however, the half-life is almost 60 hours. Hydrolysis alone would not be a cost-effective treatment technology for metolachlor in this wastewater.

In addition to the DRE calculation, a discussion of several technology-specific measures typically used to evaluate hydrolysis and activated carbon adsorption treatability test results are described below. Requirements for measuring treatment effectiveness for other technologies may be identified through review of technical literature.

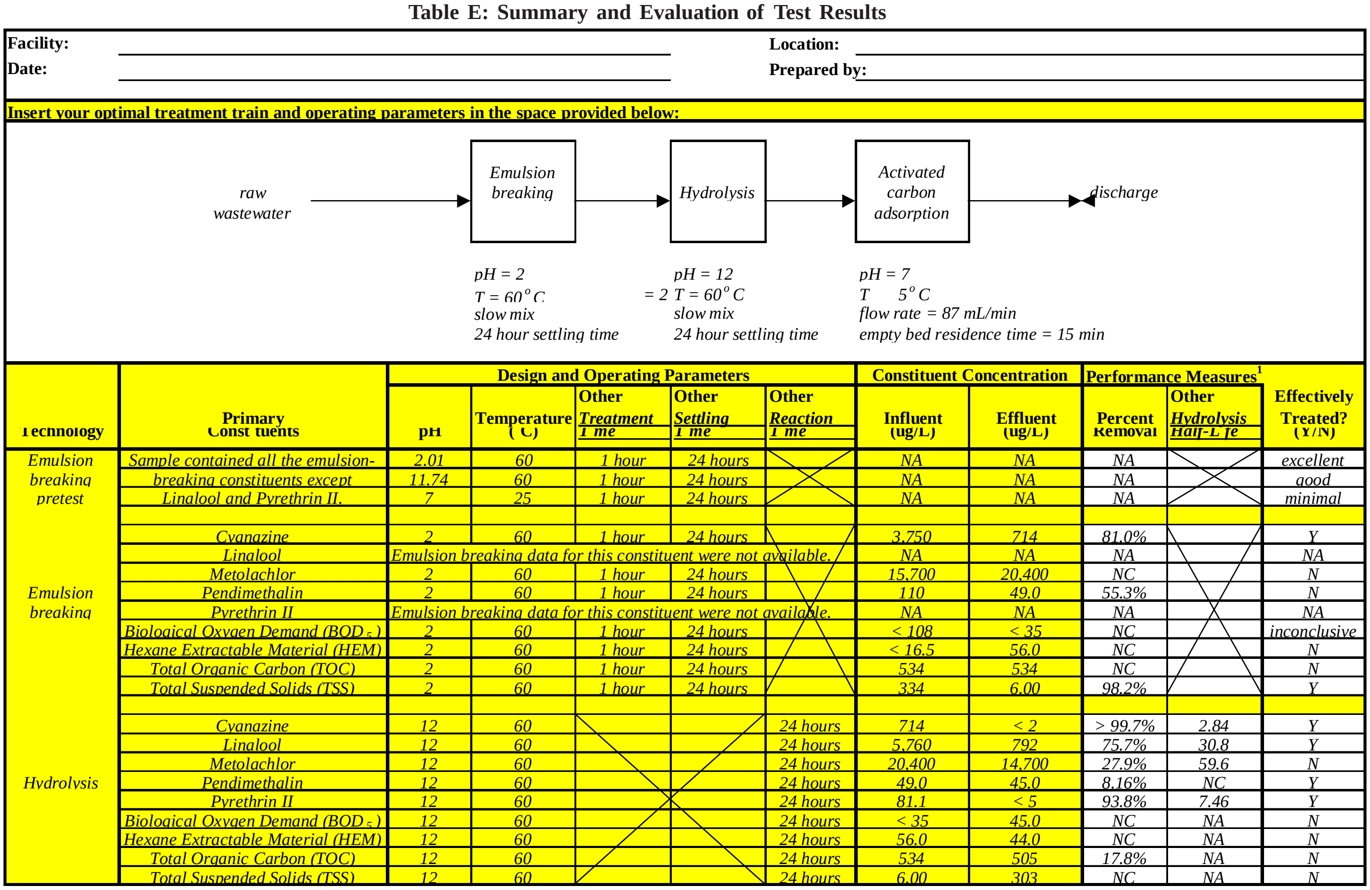


Table E: Summary and Evaluation of Test Results

Facility:
Location:
Date:
Prepared by:

Insert your optimal treatment train and operating parameters in the space provided below:

raw wastewater → *Emulsion breaking* → *Hydrolysis* → *Activated carbon adsorption* → *discharge*

pH = 2
T = 60° C
slow mix
24 hour settling time

= 2

pH = 12
T = 60° C
slow mix
24 hour settling time

pH = 7
T 5° C
flow rate = 87 mL/min
empty bed residence time = 15 min

Technology	Primary Constituents	Design and Operating Parameters					Constituent Concentration		Performance Measures[1]		Effectively Treated? (Y/N)
		pH	Temperature (°C)	Other *Treatment Time*	Other *Settling Time*	Other *Reaction Time*	Influent (ug/L)	Effluent (ug/L)	Percent Removal	Other *Hydrolysis Half-Life*	
Emulsion breaking pretest	*Sample contained all the emulsion-*	*2.01*	*60*	*1 hour*	*24 hours*		*NA*	*NA*	*NA*		*excellent*
	breaking constituents except	*11.74*	*60*	*1 hour*	*24 hours*		*NA*	*NA*	*NA*		*good*
	Linalool and Pyrethrin II.	*7*	*25*	*1 hour*	*24 hours*		*NA*	*NA*	*NA*		*minimal*
Emulsion breaking	*Cyanazine*	*2*	*60*	*1 hour*	*24 hours*		*3,750*	*714*	*81.0%*		*Y*
	Linalool	*Emulsion breaking data for this constituent were not available.*					*NA*	*NA*	*NA*		*NA*
	Metolachlor	*2*	*60*	*1 hour*	*24 hours*		*15,700*	*20,400*	*NC*		*N*
	Pendimethalin	*2*	*60*	*1 hour*	*24 hours*		*110*	*49.0*	*55.3%*		*N*
	Pyrethrin II	*Emulsion breaking data for this constituent were not available.*					*NA*	*NA*	*NA*		*NA*
	Biological Oxygen Demand (BOD_5)	*2*	*60*	*1 hour*	*24 hours*		*< 108*	*< 35*	*NC*		*inconclusive*
	Hexane Extractable Material (HEM)	*2*	*60*	*1 hour*	*24 hours*		*< 16.5*	*56.0*	*NC*		*N*
	Total Organic Carbon (TOC)	*2*	*60*	*1 hour*	*24 hours*		*534*	*534*	*NC*		*N*
	Total Suspended Solids (TSS)	*2*	*60*	*1 hour*	*24 hours*		*334*	*6.00*	*98.2%*		*Y*
Hydrolysis	*Cyanazine*	*12*	*60*			*24 hours*	*714*	*< 2*	*> 99.7%*	*2.84*	*Y*
	Linalool	*12*	*60*			*24 hours*	*5,760*	*792*	*75.7%*	*30.8*	*Y*
	Metolachlor	*12*	*60*			*24 hours*	*20,400*	*14,700*	*27.9%*	*59.6*	*N*
	Pendimethalin	*12*	*60*			*24 hours*	*49.0*	*45.0*	*8.16%*	*NC*	*Y*
	Pyrethrin II	*12*	*60*			*24 hours*	*81.1*	*< 5*	*93.8%*	*7.46*	*Y*
	Biological Oxygen Demand (BOD_5)	*12*	*60*			*24 hours*	*< 35*	*45.0*	*NC*	*NA*	*N*
	Hexane Extractable Material (HEM)	*12*	*60*			*24 hours*	*56.0*	*44.0*	*NC*	*NA*	*N*
	Total Organic Carbon (TOC)	*12*	*60*			*24 hours*	*534*	*505*	*17.8%*	*NA*	*N*
	Total Suspended Solids (TSS)	*12*	*60*			*24 hours*	*6.00*	*303*	*NC*	*NA*	*N*

[1] NA=not analyzed, NC=not calculated.

Figure 6-6. Calculating Performance Measures

➡ Destruction and Removal Efficiency Calculation

Table E

The DRE is an overall measure of the effectiveness of a treatment. While some technologies, such as hydrolysis and chemical oxidation, destroy contaminants by breaking chemical bonds joining the atoms in a molecule, other technologies, such as activated carbon adsorption and emulsion breaking, remove contaminants by separating the contaminants from the wastewater. Other technologies may use a combination of destruction and removal.

The DRE of a particular technology is based on the sum of the destruction and removal achieved by a technology and does not differentiate between the two. Some facilities may need to differentiate between destruction and removal technologies for practical purposes. Since destruction technologies (e.g., hydrolysis) eliminate a contaminant, they typically do not generate a residue that must be further disposed of, or if they do generate a residue, it is generally of a smaller volume than removal technologies. Removal technologies (e.g., activated carbon adsorption) separate the contaminants from the wastewater, but the separated contaminants then require additional management, such as reuse, recycling, or disposal.

As shown in Figure 6-7, the DRE is equal to the mass of contaminant in the treatment system influent minus the mass of contaminant in the effluent, divided by the mass of contaminant in the influent. This measure may also be referred to as the percent removal when expressed as a percentage.

$$DRE = \frac{(Mass_{influent}) - (Mass_{effluent})}{(Mass_{influent})}$$

Figure 6-7. Destruction and Removal Efficiency Calculation

A mass balance constructed for the treatment system may help facilities identify areas of wastewater and contaminant gain and loss. Constructing a mass balance requires listing all of the influent streams and all of the effluent streams of a system and listing their masses. Using the law of conservation of mass, the total system influent mass should equal the total system effluent mass plus any mass that may have been destroyed through a chemical reaction. If the mass does not balance, then it is likely that some influent or effluent stream (e.g., adsorption to treatment system components or evaporation) has been overlooked. A mass balance can be conducted on individual unit operations or on an entire treatment train; it can also be performed on the entire wastewater volume treated or on one specific contaminant. When the volume of the wastewater does not significantly change during treatment, the DRE can be calculated using the contaminant concentration rather than mass.

Determining the DRE may be difficult if contaminant concentrations are less than the analytical detection limit, or if contaminants in the wastewater interfere with laboratory analysis and cause a high detection limit. Table 6-14 contains some general rules of thumb to follow when estimating the DRE in these circumstances.

When determining treatment efficiency, it may be helpful to calculate DREs for each unit operation as well as for the entire treatment system. Information on DREs for individual unit operations may help facilities identify which unit operations in a treatment train are not performing optimally. In some cases, it may even be possible to exclude individual unit operations from the treatment train if the treatment effectiveness for one particular operation is insignificant.

Table 6-14
Calculation of DREs When Constituents Are Below the Level of Detection

The DRE can be calculated, using the formula in Figure 6-7, if the following conditions apply:

- Both the influent and effluent concentrations are greater than the reported detection limits, and the influent concentration is greater than the effluent concentration; and
- The influent concentration is greater than the reported detection limit, and the effluent concentration is less than the reported detection limit. The DRE can be calculated using the reported detection limit for the effluent concentration in the calculation in Figure 6-7. The percent removals calculated should be shown in the test report with the “greater than” (“>”) symbol.

The DRE cannot be calculated if the following conditions apply:

- Both the influent and effluent concentrations are greater than the reported detection limits, and the influent concentration is less than the effluent concentration;
- The influent concentration is less than the reported detection limit, and the effluent concentration is detected; and
- Both the influent and effluent concentrations are less than the reported detection limits.

➡ Hydrolysis Half-Life Calculation

Hydrolysis is an aqueous chemical reaction in which a molecule is broken into two or more organic molecules. Hydrolysis of most pesticide active ingredients takes place at an elevated pH and temperature, although some pesticides may be amenable to acid hydrolysis.

To evaluate the effectiveness of hydrolysis on PFPR wastewater, half-lives are typically calculated for each pesticide active ingredient. The hydrolysis half-life is defined as the time required for the reactant concentration to decrease to half the initial concentration. When hydrolysis occurs in alkaline conditions (e.g., pH = 12), the reaction can be modeled with a first-order rate equation, as shown in Figure 6-8.

$$t_{1/2} = \frac{\ln(2)}{k_1}$$

$t_{1/2}$ = *half-life (minutes)*

k_1 = *pseudo first-order rate constant (minutes^{-1})*

Figure 6-8. Hydrolysis Half-Life Equation

For alkaline hydrolysis, the half-life is determined using the procedure detailed in Table 6-15. For further information on hydrolysis rate reactions and the calculation of half-lives under different treatment conditions, consult a hydrolysis text or see the references listed at the end of Chapter 5.

Table 6-15
Alkaline Hydrolysis Half-Life Determination

1) Plot the natural logarithm of the constituent concentration versus time.
2) Draw a trend line to linearly fit the data.
3) Calculate the slope of the line, which is equal to the hydrolysis rate constant, k_1.
4) Calculate the half-life using the equation in Figure 6-8.

➡ Activated Carbon Adsorption Performance Measures

Activated carbon adsorption is a treatment technology that removes certain organic constituents from wastewater through physical and chemical forces that bind the constituents to the carbon surface. The adsorption of pesticide active ingredients typically takes place at neutral pH and ambient temperatures. Two performance measures are used to evaluate the effectiveness of activated carbon adsorption on PFPR wastewater: carbon saturation loadings and carbon breakthrough curves.

The carbon saturation loading is the mass of organic constituents that can be adsorbed onto a unit mass of activated carbon. As wastewater is processed through a carbon bed, organic constituents are adsorbed onto the activated carbon. At the same time, other constituents may be desorbed from the carbon. When the rate of sorption and desorption reach equilibrium, the carbon is said to be saturated, and no further removal of organic constituents is achieved.

The saturation loading varies with the concentration of the compounds being adsorbed, the wastewater pH and temperature, and the presence of other adsorbable compounds. A carbon adsorption isotherm is typically constructed to show the relationship between the saturation loading and the pollutant equilibrium concentration at a given temperature. This information can be used to determine how much carbon is necessary to remove a constituent to a set effluent concentration. Figure 6-9 presents an example of a carbon adsorption isotherm for metolachlor, a pesticide active ingredient.

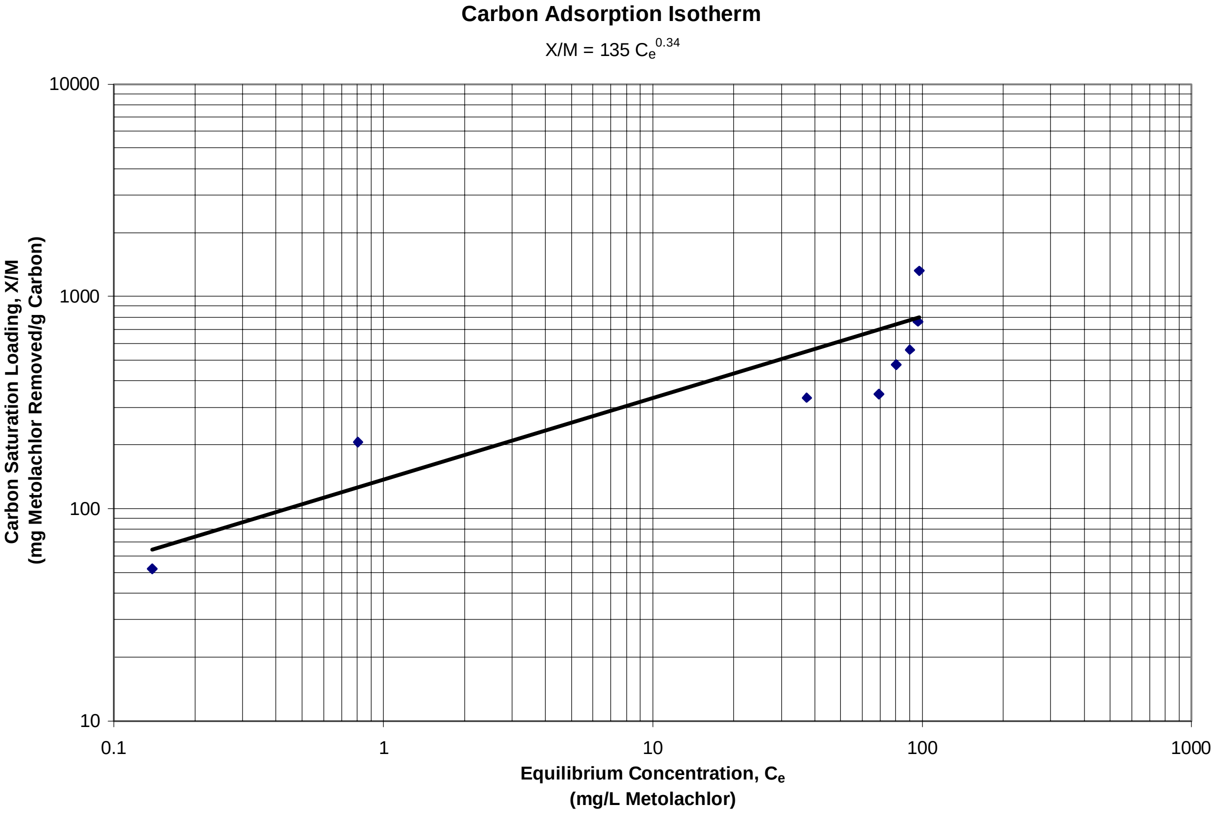


Figure 6-9. Carbon Adsorption Isotherm.

Carbon isotherms can be found in literature for many pesticide active ingredients; however, a facility may also conduct a separate treatability test to construct their own isotherms, since precise saturation loadings are specific to a facility's individual wastewater stream. One experimental technique for determining saturation loadings is presented in *Carbon Adsorption Isotherms for Toxic Organics,* listed in the references at the end of Chapter 5. For further information on activated carbon treatment and the construction of adsorption isotherms, consult a wastewater treatment text or see the references listed at the end of Chapter 5.

Carbon breakthrough curves are another useful measure of the performance of an activated carbon system. Breakthrough curves are often used to estimate how much wastewater can be treated through an activated carbon unit before it is necessary to replace or regenerate the activated carbon. The curve is constructed by plotting contaminant concentration in the effluent versus volume of wastewater treated. When wastewater is first treated through a bed of fresh carbon, the concentration of contaminant in the effluent is at a minimum level. At some later time during treatment, the carbon becomes saturated and the contaminant is no longer adsorbed completely. The concentration of the contaminant in the effluent increases as more wastewater passes through the unit and more of the available pore space in the carbon becomes filled with contaminant. At the point where no additional contaminant is being adsorbed, the carbon is said to be exhausted. Figure 6-10 presents an example of a breakthrough curve for a general pesticide active ingredient. As seen in this example, carbon breakthrough occurred after about 10 liters of wastewater were treated through the carbon bed.

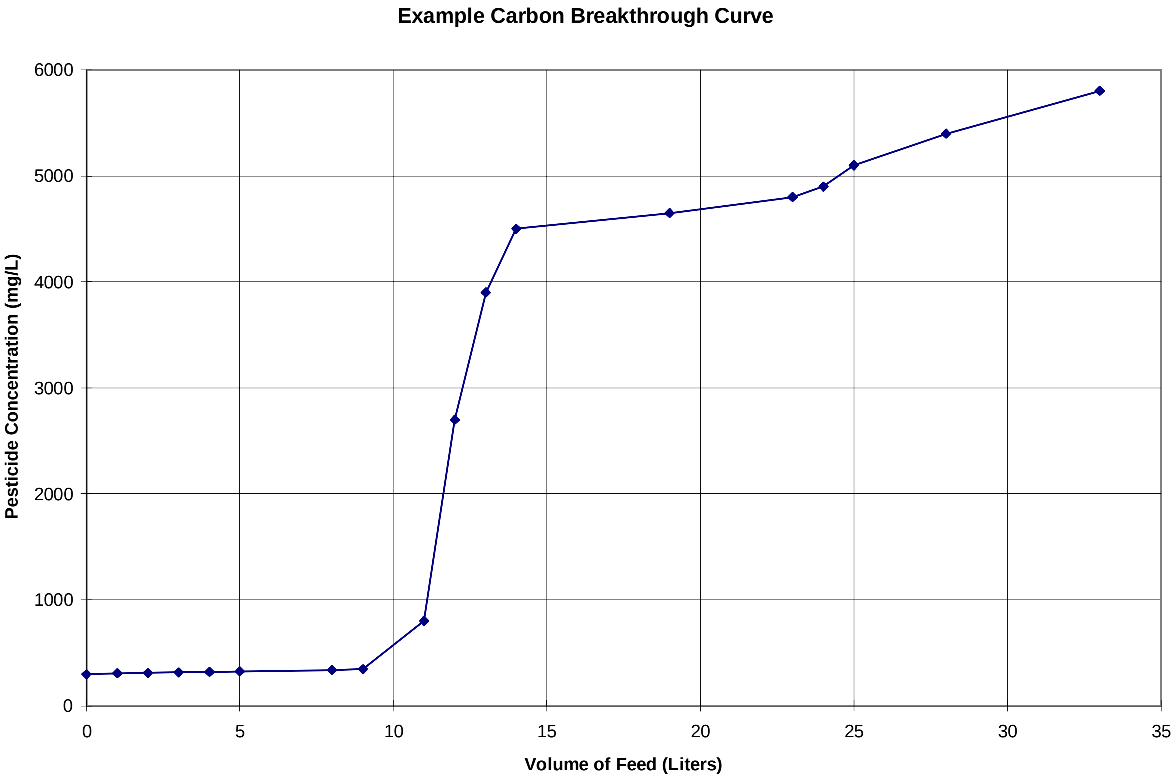


Figure 6-10. Carbon Breakthrough Curve

Step 3: Compare Treatment Technology Results

To identify the most appropriate treatment train, the facility needs to compare the results of their treatability tests to previous treatability tests, either conducted by the facility or contained in the technical literature. The facility may wish to consider aspects other than overall treatment effectiveness, including cost, reliability, residuals generated, and need for highly skilled operators. When comparing treatability tests conducted using the same technology, the comparison is more straightforward than when comparing treatability tests using different technologies.

When comparing the same technologies, the facility can evaluate treatment effectiveness measures, such as effluent concentrations and DREs, but they can also compare technology-specific measures, such as hydrolysis half-lives. The facility may also be able to compare factors other than treatment effectiveness (e.g., reliability and cost) more directly.

When comparing different technologies, the comparisons may be more difficult. Although the facility can still compare final effluent concentrations and DREs, technology-specific criteria are not directly comparable. In addition, it may be more difficult to compare technologies on bases other than treatment effectiveness, such as reliability and cost.

Facilities should exercise caution when comparing test results from different wastewaters. Because of the high degree of variability of PFPR wastewaters, treatment that is effective on some wastewaters might not be effective on other wastewaters that are similar. For example, two separate facilities have metolachlor in their wastewater, but one facility has a low TOC loading in their wastewater, while the second facility has a high TOC loading. Activated carbon may effectively remove the metolachlor from the wastewater with low TOC levels; however, the wastewater with high TOC levels may have other organic constituents that compete with the metolchlor for adsorption, resulting in reduced removal of metolachlor.

Therefore, when comparing treatability test results from different facilities, from EPA-sponsored treatability tests, or from technical literature, facilities should take into account how their wastewater differs from the wastewater tested. Differences in contaminant concentrations, combinations of contaminants, and levels of suspended solids, dissolved solids, TOC, surfactants, detergents, and solvents may cause wastewater differences that can affect the performance, cost, and/or reliability of a treatment technology.

Step 4: Evaluate Cost-Effectiveness of Treatment

As discussed in Step 3, facilities should compare the treatment technology test results to choose the technology(ies) that will treat their wastewater to the level required to comply with the final rule and that will be the most cost-effective for them to use. In determining cost-effectiveness, facilities need to examine factors such as the cost of installing new technologies and the annual operation and maintenance costs for those technologies, as well as whether the technologies will meet the regulatory requirements of the rule.

In evaluating the cost-effectiveness of different treatment technologies, facilities should consider whether wastewater treatment is the most cost-effective method for them to comply with the rule. One of the factors that should be taken into consideration is the volume of wastewater generated. A facility may be able to treat its wastewater adequately using available technologies; however, because the facility's volume of wastewater is so small, it may be less expensive for the facility to dispose of the wastewater off site than to install a treatment system.

After conducting the treatability test to determine the most effective treatment method, the facility may determine that the technologies they have tested and compared simply are not cost-effective. For example, the facility has determined through treatabilty testing that its floor wash water can be adequately treated using activated carbon adsorption, preceded by an emulsion breaking pretreatment step. However, the cost of installing and operating this treatment train is more than what the facility would pay to have the floor wash water contract hauled off site for disposal. In this case, it would be more cost-effective for the facility to segregate its floor wash water and store it until it can be transferred for off-site disposal. Note that cost-effectiveness may not be the only factor considered by facilities when choosing to install treatment or contract off site for disposal. Some facilities may choose to limit the possible cross-media impacts associated with off-site disposal.

As discussed in Chapter 4, the facility can use Table C to reach a preliminary decision on how to comply with the final rule for each wastewater stream (i.e., zero discharge or wastewater treatment and discharge after implementing approved P2 practices). For those wastewater streams for which the facility chose the P2 alternative and that would require treatment prior to discharge, the facility now has the information necessary to make the final compliance choice. In some cases, the facility may change its preliminary compliance decision from the P2 alternative (including on-site wastewater treatment) to contract hauling of its wastewater, based on its evaluation of its wastewater treatment options. The final compliance decision and Table C are discussed in more detail in the on-site compliance paperwork section of Chapter 7.

Step 5: Prepare the Test Report

For each treatability test, facilities should prepare a final test report that presents the information gathered during the test and the analysis of test results. The report can serve as documentation of the test and as a reference for future testing.

As mentioned previously in this chapter, Tables D and E can be used by facilities to identify the wastewaters and contaminants that will be treated at the facility and the treatment technologies within the facility's treatment train that are expected to treat each contaminant. Many facilities will find it helpful to use a block diagram to draw each treatment step of a treatment train. In such a diagram, facilities can list the influent wastewater streams to each unit operation in a treatment train, the contaminants within each wastewater stream, and the contaminants treated within each unit operation block.

Test Report Components

- Recorded design and operating parameters;
- Observations made by treatability test personnel;
- Deviations from the sampling and analysis plan;
- Analytical results; and
- Calculations of DREs and other treatment criteria.

Tables D and E can also be used as compliance documentation to show that appropriate treatment technologies are being used to treat each wastewater stream. Chapter 7 discusses in detail the documentation needed to show compliance with the final rule.

CHAPTER 7

Regulatory Compliance Documentation

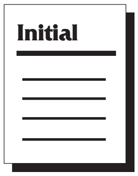
Each facility subject to the PFPR effluent guidelines and standards is required to keep certain paperwork on site to demonstrate compliance with the rule. This paperwork must be available to the permitting agencies, control authorities, and enforcement officials and must document the compliance options chosen by the facility. As part of the on-site compliance paperwork, the PFPR rule requires a one-time initial certification statement and periodic certification statements to be submitted to the permitting agency or control authority. The permitting agency or control authority may also choose to require submittal of additional paperwork for approval, including the supporting documentation for the facility's selected P2 practices and wastewater treatment technologies. Indirect-discharging facilities must also meet the paperwork requirements under the General Pretreatment Regulation (40 CFR 403), such as submittal of a baseline monitoring report (BMR) (40 CFR 403.12(b)). Guidance on the requirements of the BMR and applicability of categorical pretreatment standards to industrial users, including zero dischargers, is included in Appendix E.

As stated previously in this manual, each facility subject to the rule must make an initial choice of how to comply with the rule. This choice is documented in the initial certification statement. The facility periodically reviews those choices and makes any necessary adjustment in the periodic certification statement. Chapter 4 discusses the P2 audit and how a facility can use that tool to determine which compliance strategy to choose (i.e., zero discharge or P2 alternative). Chapter 6 discusses how to choose appropriate wastewater treatment technologies and make a final compliance decision after weighing the economic impacts of treatment. The information in these two chapters provides the means with which a facility can choose its method of complying with the PFPR regulation. This chapter discusses the way in which a facility documents its compliance decisions.

Necessary Paperwork for the P2 Alternative

- One-time initial certification statement (40 CFR 455.41 (a));
- Periodic certification statement (40 CFR 455.41 (b)); and
- On-site compliance paperwork (40 CFR 455.41 (c)).

Initial Certification Statement



The initial certification statement required for PFPR facilities includes four items. As shown in Table 7-1, the requirements under these items can be met by completing Tables A through E (shown in Chapters 4 and 6). As discussed in Chapter 4, Tables A and B walk the user through conducting a P2 audit. Table A prompts the facility to identify its wastewater sources and Table B identifies P2 practices that are in use or potentially could be used to comply with the P2 alternative for those sources (Item 2). Tables B and C also provide a column for listing modifications to the listed P2 practices (Item 3). After completing Tables A

Table 7-1 Initial Certification Statement Requirements

	One-time submission to the appropriate control authority or permitting agency including the following:	**Table**
(1)	List and description of those product families, process lines, and/or process units for which the PFPR facility is implementing the P2 alternative and those for which it chooses to achieve zero discharge;	**C**
(2)	Description of the PFPR facility-specific practices for each product line/process line/process unit which are to be practiced as part of the P2 alternative;	**A, B**
(3)	Description of any justification allowing modification to the practices listed on Table 8 of the final rule; and	**B, C**
(4)	Description of the treatment system being used to obtain a P2 allowable discharge (as defined by the final rule).	**D, E**

and B, the facility can complete Table C through the preliminary compliance decision (Item 1), which includes any modifications to listed P2 practices chosen by the facility. Note that Table C has a column to list the approval date for modifications to any P2 practices chosen by a facility that are not listed in Table 8 of the final rule. The facility will need to obtain approval for all nonlisted modifications, and the on-site compliance paperwork should reflect this approval, prior to the facility implementing these modifications.

Initial

The fourth requirement for completing of the initial certification statement can be met by filling out Tables D and E, as discussed in Chapter 6. Table D identifies the treatment technologies that a facility will choose to treat its wastewater remaining after implementation of P2 practices in order to meet the allowable discharge requirement. Table E presents the results of the treatability tests for the technologies identified in Table D. Once the facility has chosen the best treatment options for its remaining wastewater (i.e., treatment and discharge or contract haul), final compliance decisions can then be documented on Table C.

The initial certification statement must be submitted to the permitting agency at the time of issuance, renewal, or modification of an NPDES permit for direct dischargers and to the control authority (e.g., POTW) prior to the November 6, 1999 compliance deadline for indirect dischargers. The statement must be signed by the appropriate manager in charge of overall operations at the site to ensure that information provided is true, accurate, and complete to the best of his/her knowledge. This manager should be the same person who signs the compliance status reports as required by 40 CFR 403.12(l) or 40 CFR 122.22. The initial certification statement should also be kept on file at the facility as part of the required on-site compliance paperwork for as long as the facility is in operation.

Periodic Certification Statement

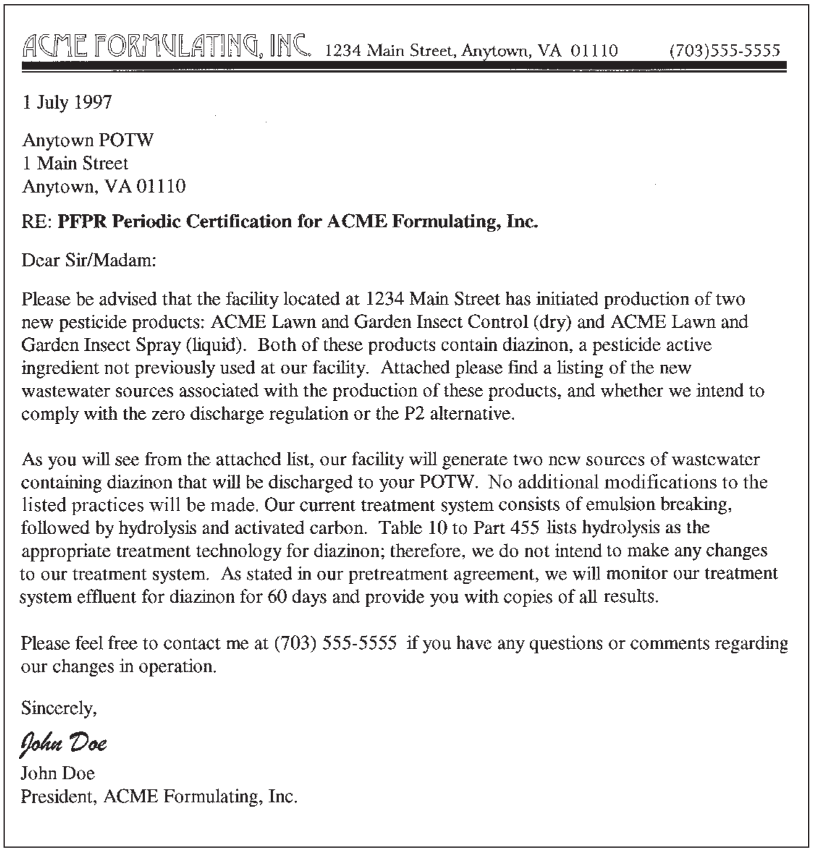
Periodic

The periodic certification statement required for PFPR facilities consists of a written submission to the appropriate permitting agency or control authority. This submission states that the P2 alternative is being implemented in the manner set forth in the local control mechanism/pretreatment agreement (for indirect dischargers) or NPDES permit (for direct dischargers), as well as the initial certification, or states that a listed justification from Table 8 of the final regulation has been implemented at the facility allowing modification of their P2 practices.

Periodic

If the information contained in the facility's permit or pretreatment agreement and initial certification statement is still applicable, a facility may simply state that in a letter to the permitting authority, and that letter will constitute the periodic statement. However, if the facility has modified their P2 practices in any way or is deciding to change their compliance status for one of their product lines/process lines/process units (i.e., going from zero discharge to a P2 practice followed by allowable discharge), they must include such information in their periodic statement. To comply with this requirement, the facility may submit a revised Table C, indicating the change on the table. To modify a listed P2 practice for which a justification is not listed in the final regulation, the facility must request the modification from the permitting agency or the control authority (e.g., POTW). The permit writer/control authority is expected to use Best Engineering Judgment/Best Professional Judgment (BEJ/BPJ) to approve the modification.

The periodic certification statement must be submitted to the permitting agency once a year for direct dischargers and to the control authority twice a year for indirect dischargers. The statement must be signed by the appropriate manager in charge of overall operations at the site to ensure that information provided is true, accurate, and complete to the best of his/her knowledge. Again, this manager should be the same person who signs compliance status reports as required by 40 CFR 403.12(l) or 40 CFR 122.22. The periodic certification statements should also be kept on file at the facility as part of the required on-site compliance paperwork for as long as the facility is in operation. An example of a periodic certification statement is shown in Figure 7-1.



ACME FORMULATING, INC. 1234 Main Street, Anytown, VA 01110 (703)555-5555

1 July 1997

Anytown POTW
1 Main Street
Anytown, VA 01110

RE: **PFPR Periodic Certification for ACME Formulating, Inc.**

Dear Sir/Madam:

Please be advised that the facility located at 1234 Main Street has initiated production of two new pesticide products: ACME Lawn and Garden Insect Control (dry) and ACME Lawn and Garden Insect Spray (liquid). Both of these products contain diazinon, a pesticide active ingredient not previously used at our facility. Attached please find a listing of the new wastewater sources associated with the production of these products, and whether we intend to comply with the zero discharge regulation or the P2 alternative.

As you will see from the attached list, our facility will generate two new sources of wastewater containing diazinon that will be discharged to your POTW. No additional modifications to the listed practices will be made. Our current treatment system consists of emulsion breaking, followed by hydrolysis and activated carbon. Table 10 to Part 455 lists hydrolysis as the appropriate treatment technology for diazinon; therefore, we do not intend to make any changes to our treatment system. As stated in our pretreatment agreement, we will monitor our treatment system effluent for diazinon for 60 days and provide you with copies of all results.

Please feel free to contact me at (703) 555-5555 if you have any questions or comments regarding our changes in operation.

Sincerely,

John Doe

John Doe
President, ACME Formulating, Inc.

Figure 7-1. Example of a Periodic Certification Statement

On-Site Compliance Paperwork

On-site Paperwork

In addition to the initial and periodic certification statements, the on-site compliance paperwork should include the four items listed in Table 7-2. This paperwork must be available for review at any time by the permitting agency or control authority. As discussed under the section describing the initial certification statement, the on-site paperwork requirements may include the information documented on Tables A through E, as described in Chapters 4 and 6. These tables document the wastewater sources, P2 practices and modifications, if any, and wastewater treatment technologies/disposal options chosen by the facility.

The on-site paperwork should also include more detailed materials supporting the decisions in the initial and periodic certification statements. The appropriate documentation for each of these decisions is discussed in more detail below.

Table 7-2
On-Site Compliance Paperwork Components

(1) Supporting documentation for P2 modifications;
(2) Discussion of treatment system demonstrating removal of PAIs;
(3) Method for ensuring treatment system is well operated and maintained; and
(4) Rationale for method shown in Item 3.

➡ P2 Modification Documentation

If a facility chooses to comply with the P2 alternative using a modification listed in Table 8 of the final rule for any wastewater source, the facility must detail those modifications in their on-site compliance paperwork. Table 7-3 presents the practices from the rule that have listed modifications. Each of these listed modifications requires supporting documentation, as described in Table 8 of the final rule. For example, a facility has determined that they cannot store and reuse the interior equipment rinsate from a specific product because the rinsate exhibits biological growth that would affect the product quality if reused in a subsequent formulation. The facility lists "BIOGROWTH" as their modification to Practice 10 for that product, and includes as documentation a picture of the rinsate after growth has occurred and/or a copy of the product QA test results showing unacceptable constituents present.

Table 7-3
P2 Practices With Listed Modifications Requiring Documentation

Practice 1 - Water Conservation
Practice 2 - Good Housekeeping
Practice 6 - Air Pollution Control Scrubbers
Practice 7 - Drum/Shipping Container Rinsing (water-based)
Practice 8 - Drum/Shipping Container Rinsing (solvent-based)
Practice 9 - Production Equipment Dedication
Practice 10 - Reuse of Interior Rinsate

If a facility wishes to modify any P2 practice using a justification that is not listed in Table 8, the facility must submit to the control authority or permit writer the appropriate documentation stating their reasons for modifying the practice. This documentation must be approved by the permitting agency or control authority prior to implementation by the facility. Both the supporting documentation and the approval must be included in the on-site compliance paperwork.

➡ Treatment System Discussion

On-site Paperwork

If a facility chooses to install a wastewater treatment system to treat PFPR wastewater prior to direct or indirect discharge, the facility must include a complete description of the system in their on-site compliance paperwork. This description should include the information listed in Table 7-4, as well as any documentation necessary to support the conclusions drawn by the facility.

Following completion of a P2 audit (described in Chapter 4), the facility should be able to identify the wastewater sources that require treatment prior to discharge under the P2 alternative. In the on-site compliance paperwork, the facility must list the specific pesticide active ingredients expected to be present in the facility wastewater. Facilities may use production records or product labels listing the pesticide active ingredients used at the facility or wastewater monitoring data that specifically identifies the constituents. The facility should review the production and monitoring data covering a sufficient time period to accurately capture all possible pesticide active ingredients present in the wastewater.

Table 7-4
Treatment System Description

(1) List of pesticide active ingredients belived present in wastewater to be treated;

(2) List of treatment technology(ies) believed effective at removing each pesticide active ingredient listed in Item 1; and

(3) Treatability test results supporting Item 2 or indication that the treatment appears in 40 CFR 455, Table 10 as the "appropriate treatment" for pesticide active ingredient(s).

Next, the facility must describe the treatment system, including a list of the technologies and operating conditions, and document that the technologies do, in fact, remove the pesticide active ingredients from the wastewater prior to discharge. This documentation may simply state that the technology(ies) is listed in Table 10 to Part 455 as the appropriate technology(ies) for the specific pesticide active ingredients present in the facility's wastewater or that the technology(ies) removes the specific pesticide active ingredients from their pesticide manufacturing wastewater. Chapters 5 and 6 discuss the test methods available to identify the specific pesticide active ingredients present in the wastewater and the appropriate treatment technologies for their removal. Chapter 6 also describes how to document those results on Tables D and E. An example of a treatment system description using Tables D and E is shown in Figure 7-2.

If the facility chooses to use different technologies than those listed in the final rule, they must include treatability test results or sampling test results (described in Chapter 6) to show the system is equivalent. The technologies listed in the final rule were chosen because of their effectiveness in removing or reducing pesticide active ingredients. Following sufficient pretreatment of PFPR wastewater to break emulsions and/or remove solids, these listed technologies were generally successful in removing more than 95% of the pesticide active ingredients, typically to below detection limits. To determine whether a different technology or set of technologies is equivalent to the listed technologies, the facility should evaluate three measures:

Equivalent System (40 CFR 455.10)

A wastewater treatment system that is demonstrated in literature, treatability tests, or self-monitoring data to remove a similar level of pesticide active ingredients or priority pollutants as the applicable appropriate pollution control technology listed in Table 10 to Part 455.

Table D: Identification of Wastewater Sources and Treatment Technologies

Facility: ______________________________ **Location:** ______________________________

Date: ______________________________ **Prepared by:** ______________________________

Stream Type	Source	Potential Pollutants		Wastewater Treatment Information			Characteristics That Hinder Treatment
		Active Ingredients	Other Pollutants	Table 10 Technology[1]	Alternate Treatment Technology[1]	Source for Alternative Technology	
~~**1. Shipping Container/ Drum Cleaning** - *water or solvent rinses of the containers used to ship raw material, finished products, and/or waste products prior to reuse or disposal of the containers.*~~	1.a.						
	1.b.						
~~**2. Bulk Tank Rinsate** - *cleaning of the interior of any bulk storage tank containing raw materials, intermediate blends, or finished products associated with PFPR operations.*~~	2.a.						
	2.b.						
3. Formulating Equipment Interior Cleaning - *routine cleaning, cleaning due to product changeover, or special cleaning of the interior of any formulating equipment, including formulation and/or storage tanks, pipes, and hoses. Cleaning materials may include water, detergent, or solvent.*	3.a. *liquid formulation tank # 2*	*Metolachlor* *Pendimethalin* *Pyrethrin II*	*BOD_5, TOC, TSS*	*AC* *AC* *HD*	*HD*	*Treatability testing, Literature*	
	3.b. *liquid formulation tank # 3*	*Metolachlor* *Pendimethalin* *Pyrethrin II*	*BOD_5, TOC, TSS*	*AC* *AC* *HD*	*HD*	*Treatability testing, Literature*	
	3.c. *dry formulation tank*	*Linalool* *Pendimethalin*	*BOD_5, TOC, TSS*	*AC* *AC*	*HD*	*Treatability testing, Literature*	*High solids content*
	3.d.						

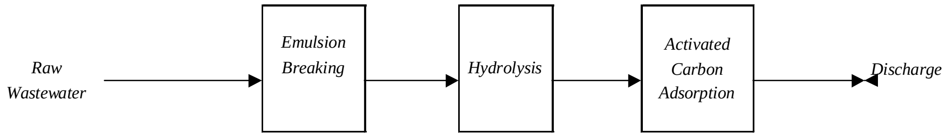
[1] HD = hydrolysis, AC = activated carbon, PT = precipitation, CO = chemical oxidation, P2 = pollution prevention, OT = other_____________

Table E: Summary and Evaluation of Test Results

Facility: ______________________________ **Location:** ______________________________

Date: ______________________________ **Prepared by:** ______________________________

Insert your optimal treatment train and operating parameters in the space provided below:



pH = 2
T = 60°C
slow mix
24 hour settling time

pH = 12
T = 60°C
slow mix
24 hour settling time

pH = 7
T = 25°C
flow rate = 87 mL/min
empty bed residence time = 15 min

Technology	Primary Constituents	Design and Operating Parameters					Constituent Concentration		Performance Measures[1]		Effectively Treated? (Y/N)
		pH	Temperature (°C)	Other *Treatment Time*	Other *Settling Time*	Other *Reaction Time*	Influent (ug/L)	Effluent (ug/L)	Percent Removal	Other *Hydrolysis Half-Life*	
Overall effectiveness	*Cyanazine*						3750	< 2	> 99.9%		Y
	Linalool						5760	< 100	> 98.3%		Y
	Metolachlor						15700	< 0.8	> 99.9%		Y
	Pendimethalin						110	< 0.5	> 99.6%		Y
	Pytrethin II						81.1	< 5	> 93.8%		Y
	Biological Oxygen Demand (BOD_5)						< 108	31	< 71.3%		Y
	Hexane Extractable Material (HEM)						56	< 5	> 91.1%		Y
	Total Organic Carbon (TOC)						534	63	88.2%		Y
	Total Suspended Solids (TSS)						334	< 4	> 98.8%		Y

Figure 7-2. Example of a Treatment System Description

- Percent removal of the pesticide active ingredient;
- Final effluent concentration of the pesticide active ingredient; and
- Minimum detection limit of the pesticide active ingredient.

These methods are not exclusive and are not ranked in order of importance. All three methods may be useful when determining equivalency.

Percent removals and effluent concentrations discussed in the final PFPR effluent guidelines and standards are shown for ***guidance*** only.

On-site Paperwork

➡ Treatment System Operation and Maintenance

Facilities that treat PFPR wastewater prior to discharge must also choose a method to demonstrate that their treatment system is well operated and maintained. This method should be stated and the rationale for choosing it discussed in the on-site compliance paperwork.

Proper operation and maintenance of a system includes a qualified person to operate the system, use of the correct treatment chemicals in appropriate quantities, and operation of the system within the stated design parameters (e.g., temperature and pressure). For example, if the facility is operating a treatment system that consists of emulsion breaking, hydrolysis, and activated carbon, as described in Figure 7-2, the types of operation and maintenance records detailed in Table 7-6 should be kept on site. The method for determining whether the system is well operated can be as simple as keeping the types of records shown in Table 7-6, or as complex as monitoring the treated effluent for specific parameters (such as pesticide active ingredients, priority pollutants, or other local parameters of concern).

Table 7-6
Operation and Maintenance Records

Emulsion Breaking

- Temperature and pH of the emulsion breaking step
- Duration of the emulsion breaking step
- Physical characteristics of the wastewater before and after emulsion breaking

Hydrolysis Treatment

- Temperature and pH of the hydrolysis step
- Duration of the hydrolysis step
- Physical characteristics of the wastewater before and after hydrolysis

Activated Carbon Treatment

- Dates and volumes of carbon changeouts
- Amount of carbon used in the system
- Flow rate through the carbon system and /or volume of wastewater treated since the last carbon changeout

The decision to use one method over another is connected to the consistency of the facility's wastewater. If the facility formulates, packages, or repackages the same or similar products for long periods of time, it is reasonable to expect that a treatment system designed for the wastewater generated during those production operations will be effective if operated and maintained as designed. In these cases, the facility may monitor the effluent from the treatment system for an initial period of time (typically set by the permitting agency or control authority) to establish the typical effluent concentration or load for the pollutants of concern. During the monitoring period, the facility may also document the information detailed in Table 7-6 to establish the normal operating procedures. Following the monitoring period, the facility would only be required to document the operating and maintenance information and may periodically monitor the effluent for the pollutants of concern.

If a facility begins producing new products containing one or more pollutants of concern, the typical concentration or load for those pollutants may need to be revised through another monitoring period, as determined by the permit writer or control authority.

Additional Considerations for Permit Writers and Control Authorities/POTWs[1]

Permit writers and control authorities must use best professional judgement when evaluating certification statements and reviewing on-site compliance paperwork from PFPR facilities. Factors that may influence their decisions include previous experience with the facility, the facility management's commitment to program implementation, and the thoroughness and accuracy of the supporting documentation.

One area subject to interpretation is the determination of treatment system equivalency. When reviewing treatment system performance data, the permit writer or control authority should review the source of the data, the time period during which it was collected, and the type of data collected. The level of performance should also be evaluated through one or more of the following methods.

➡ Calculate percent removals

The percent removal, as discussed in Chapter 6, is equal to the difference between the influent and effluent values. The percent removal can be calculated on concentrations or on mass loadings. It is important to note that the percent removal is highly dependent on the quantity of pollutant in the influent. For example, an activated carbon system removes bromacil to its target effluent concentration of 0.431 mg/L. If the influent concentration was 100 mg/L, the percent removal is 99.6%, whereas if the influent concentration was 5 mg/L, the percent removal is 91.4 percent.

➡ Evaluate the final effluent concentrations

During development of the PFPR rule, EPA identified target effluent concentrations for pesticide active ingredients treated in systems using appropriate treatment technologies, as specified in Table 10 of the final rule. These concentrations are not effluent limitations and do not account for the variability that may occur in PFPR wastewaters and in treatment systems. Permit writ-

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[1] The term control authority refers to a POTW when the POTW has an approved pretreatment program. Otherwise, the control authority is the State or EPA Region.

ers and control authorities have the authority to request additional treatability test results or monitoring to better evaluate the variability of the treatment system effluent.

➡ Review the minimum detection limit

It is important to note the minimum detection limit achieved by the analytical laboratory that completed the analyses. If the laboratory neglects to perform an appropriate number of dilutions, the results may be inconclusive. For example, if the influent concentration of a pollutant is 100 mg/L and the effluent concentration is reported as <100 mg/L, it is impossible to conclude what level of pollutant removal has been achieved by the treatment system.

CHAPTER 8

Case Studies

This chapter describes the P2 practices implemented by two PFPR facilities. The first facility, operated by Ennis Agrotech and located in Ennis, Texas, is a formulator and packager of agricultural products. Ennis Agrotech uses a variety of P2 techniques, such as reuse of treated wastewaters, to achieve zero discharge of PFPR process wastewaters. The second facility, operated by MGK (McLaughlin Gormley King Company), was constructed in 1992 in Chaska, Minnesota, and illustrates how new facilities can incorporate P2 opportunities into their design.

In each case study, the following information is presented:

- An overview of the facility;
- A description of the PFPR operations, including wastewater generation; and
- A discussion of the P2 techniques implemented by the facility.

Each case study was prepared from information collected during site visits and through follow-up telephone calls with facility personnel. *This information was correct at the time of development of the final rule, but operations may have changed since that time.* The P2 practices implemented and their benefits are solely based on the opinions of the facilities presented here. Specific P2 practices and equipment presented in the case studies in ***italicized bold*** print are defined in the P2 glossary in Chapter 3.

Case Study 1: Ennis Agrotech, Ennis, Texas

Facility Overview

Ennis Agrotech, formerly Agriculture Warehouse, operates a contract (or toll) PFPR facility that does not produce or market its own labeled products. Instead, the facility formulates registered pesticide products for about 20 domestic and foreign companies. These companies supply Ennis Agrotech with the necessary raw materials, product recipes, and packaging and labels required to make the final product. Ennis Agrotech assembles a production line using the customer’s bench-scale process as a guide, formulates and packages the product, and then turns the product over to the customer's marketing division. The production line consists of equipment from Ennis Agrotech’s inventory as well as custom-designed equipment manufactured as needed by a local machine shop.

PFPR Operations

The facility operates eight independent process lines to formulate and package both liquid and solid pesticide products. The list of formulated products varies over time due to changing contracts; however, Ennis Agrotech attempts to schedule formulating and packaging contracts such that only compatible pesticide products are being produced at the same time.

The eight production areas operated at the facility (termed "manufacturing modules" by Ennis Agrotech) are individually configured to handle a certain type, or formulation, of pesticide product. The equipment setup in each of the process areas can be reconfigured to formulate new products. New formulation and packaging lines usually consist of a combination of existing and new custom-designed equipment. Existing equipment is refurbished, pressure-washed in a curbed area (if necessary), and stored in a warehouse building (called the machine shop) when it is not being used on one of the process lines. At the time this manual was written, Ennis Agrotech was conducting formulating, packaging, and repackaging operations in the following eight production areas:

- The first manufacturing module is used to formulate and package mosquito growth-regulator briquets. To produce the briquets, an insecticide is mixed with carbon and gypsum cement, poured into plastic trays with numerous quarter-sized molds, cured, and packaged.
- The second manufacturing module is a semiautomated line used to produce various dry animal health products containing carbaryl and/or phosmet. The products are formulated in grinding and milling equipment, stored in tote bags, sampled and analyzed to assure compliance with product specifications, and packaged.
- The third manufacturing module is a pilot plant configured to formulate and package a product that is used on cow ear tags. A liquid active ingredient is combined with other raw ingredients in a mixer and then sprayed onto a clay or granular carrier in a Munson blender.
- The fourth manufacturing module is used to formulate and package a fire ant control product. Liquid active ingredient is mixed in a kettle and sprayed onto granulated clay material in a Continental blender. The product is then lifted by an elevator into a hopper, screened to filter out oversized particles, and packaged into bags.
- The fifth manufacturing module, called the "Pellet Mill System," is used to produce pelletized aquatic and pasture herbicides. Active ingredients mixed with water, binding agents, and dispersion agents are sprayed onto a solid carrier as it is mixed in a Marion paddle blender. The formulated product is transferred via a conveyor to a mill where it is pelletized. The pellets are either packaged "raw" or coated with sulfonates (a pulp and paper industry byproduct) that act as a water-soluble coating to minimize dust generation during pellet handling. The raw or coated pellets are gravity fed through an elevator to a hopper and then packaged

into bags. Due to the large volume of water incorporated into the product during the formulating and pelletizing process, the facility uses a combination of city water and treated water, which is stored in a 5,000-gallon tank located outside of the laboratory. The finished product contains 15 to 18% water.

- The sixth manufacturing module is used to repackage a finished dry product supplied by the client company from bulk containers to smaller containers. The product is removed from 2,000-pound tote bags, agitated if necessary, and packaged into smaller containers, such as 2-pound application packs.
- The seventh manufacturing module is used to produce a greenhouse insecticide product that controls spider mites. The active ingredient is mixed with three solvents in the first of three steel formulation vessels operated in series. The product is transferred to the second vessel where it is tested. Necessary formulation adjustments are made in this vessel if the product is found to be off-spec. The product is then transferred to the third vessel where it is held for packaging.
- The eighth manufacturing module is the facility's primary liquid production area. The line is currently configured to formulate and package a solvent-based insecticide for use on cotton crops.

P2 Practices

Ennis Agrotech generates pesticide-containing wastewater from four sources: (1) interior equipment cleaning; (2) exterior equipment cleaning and floor washing; (3) drum and shipping container rinsing; and (4) spill and leak cleanups. The facility uses a local Texas-certified laboratory to analyze all raw materials, products, and wastes; as a result, no laboratory wastewater is generated on site. The facility has a stormwater runoff contingency plan, but does not currently collect precipitation.

Ennis Agrotech achieves zero discharge of all PFPR process wastewater through a variety of P2 practices and wastewater management techniques. The benefits associated with these practices include:

1. Enhanced reputation with their customers, due to the reduction of cross-contamination liability;
2. Reduced raw material (i.e., active and inert formulation ingredients) costs due to the recovery of these materials during equipment cleanouts; and
3. Positive relationships with local community and with state and federal regulatory agencies.

Specifically, Ennis Agrotech uses the following P2 practices:

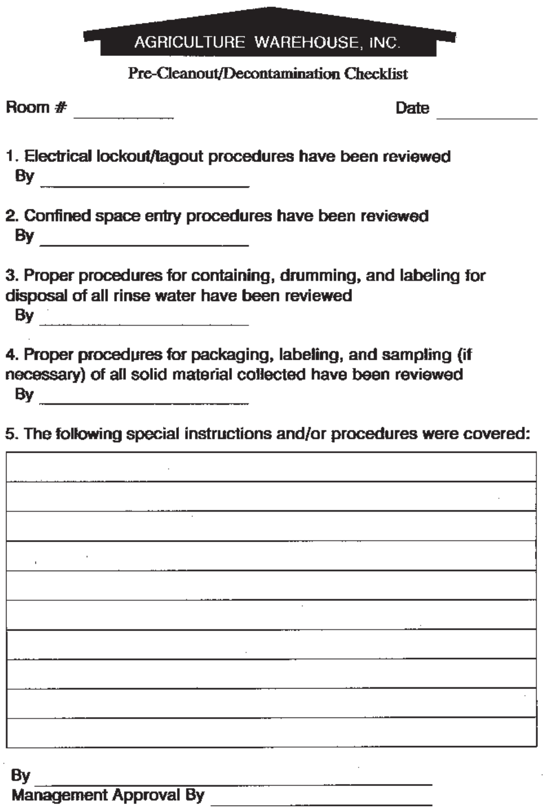
Interior Equipment Cleaning—Process wastewater associated with the formulating and packaging of a given product is minimized through the ***dedication of equipment***, the use of ***dry process cleaning equipment***, and water washes using ***flow reduction equipment***. In addition, effective ***inventory management*** practices enable the facility to maximize ***interior rinsate storage and reuse***.

Ennis Agrotech dedicates manufacturing modules to specific pesticide classes, such as fungicides, herbicides, and insecticides, in order to minimize the potential for cross-contamination between pesticide classes and to minimize the number of product changeover cleaning operations. In addition, when making products within the same pesticide class, formulating and packaging equipment is cleaned before product changeover occurs to allay cross-contamination concerns, and at set intervals during production, if needed. Typically, equipment used to formulate water-dispersible granular products only requires vacuum cleaning, while equipment used to formulate pellet products usually requires water washing. The cleaning processes depend on the compatibility of the pesticide products, and range in scope from multiple rinses to breaking down all equipment and cleaning to nondetect levels for active ingredients.

Interior equipment cleaning due to a product changeover within a pesticide class consists of scraping with wire brushes, flushing with the formulation carrier (such as sand, limestone, or clay) or a solvent wash, and if product residue or other buildup remains in the equipment, washing with water using high-pressure (3,500 pounds per square inch)/low-volume (1 gallon per minute) equipment. About 70 to 80% of the changeovers only require dry cleaning. The flushed formulation carrier is stored and reused in the next formulation. If the high-pressure wash step is required, approximately 30 to 35 gallons of water are used to clean the interior of the mixing system. In some cases, rinsates from interior equipment cleaning operations are collected and stored for reuse in a subsequent batch of the product.

Ennis Agrotech manages wastewater (and solid waste) reuse with the same computerized inventory management control system used to track the storage and use of all raw materials. This system is maintained by management personnel assisted by a "waste movement" consultant. Equipment cleanouts are documented on "Pre-Cleanout and Decontamination Checklists" (shown in Figure 8-1). Separate forms are used for each unit and product. Wastes generated during these cleanouts (including wash water, solvents, and dry formulation carriers) are collected, weighed, labeled, and stored in the manufacturing module; the information is entered into the computer system. When that product is formulated, the computer generates a production sheet for that batch, which tells the operator how much raw material to use, including the amount of stored cleaning material.

For example, production in the Pellet Mill system (Figure 8-2) uses a large amount of dry carrier left from cleaning as raw formulation materials, as well as cleaning rinsates. The Pellet Mill cleanout procedures are documented on a checklist (Figure 8-3) that clearly indicates how each piece of equipment is cleaned, the type of cleaning materials used, and how the residual cleaning materials are to be handled.



AGRICULTURE WAREHOUSE, INC.

Pre-Cleanout/Decontamination Checklist

Room # __________ Date __________

1. Electrical lockout/tagout procedures have been reviewed
By ____________________

2. Confined space entry procedures have been reviewed
By ____________________

3. Proper procedures for containing, drumming, and labeling for disposal of all rinse water have been reviewed
By ____________________

4. Proper procedures for packaging, labeling, and sampling (if necessary) of all solid material collected have been reviewed
By ____________________

5. The following special instructions and/or procedures were covered:

By ______________________________

Management Approval By ____________________

Figure 8-1. General Pre-Cleanout/ Decontamination Checklist

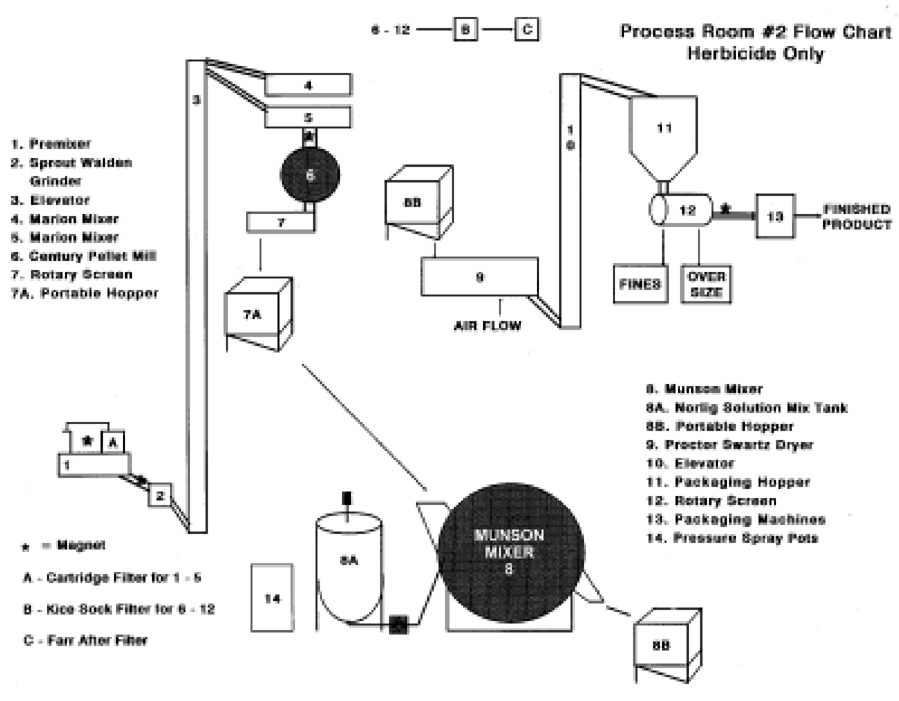
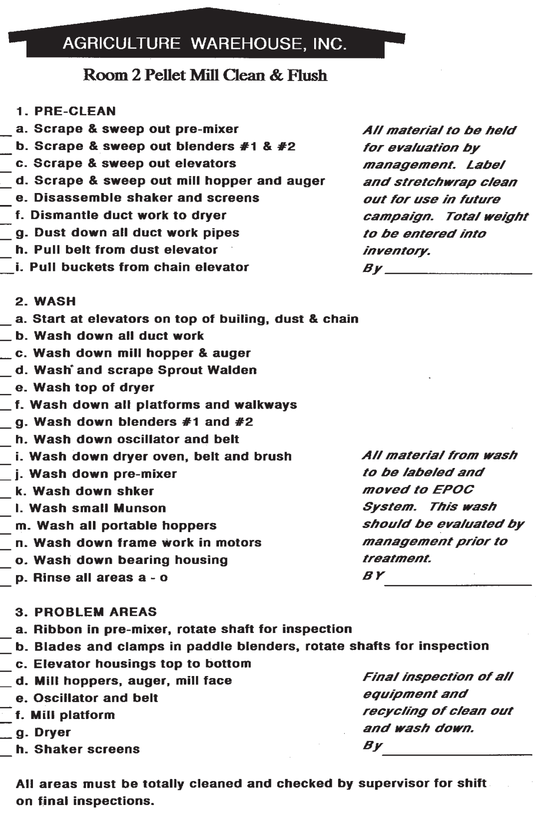


Figure 8-2 Pellet Mill System

Cleaning water from the Pellet Mill production area is stored in a 5,000-gallon bulk tank and treated prior to the next production run of the same product. The cleaning water is treated using a microfiltration unit followed by an activated carbon filter system. The microfiltration unit is a vertical, poly-type, cross-flow filtration system manufactured by EPOC Water Systems of Fresno, California. The Pellet Mill System uses approximately 12,000 gallons of water during each production campaign, of which up to 4,000 gallons is recycled wastewater; the balance is fresh make-up water.

The Pellet Mill system cleaning material reuse "cycle" is illustrated in Figure 8-4.

Exterior Equipment Cleaning—Exterior equipment cleaning wash water and floor wash water are controlled in the same way as the interior equipment cleaning rinsates. These wash waters are generated during product changeover (the facility vacuums the floors and walls at all other times). The floors and walls are washed with water from a high-pressure hose. The entire cleaning process (including both interior and exterior cleaning) usually requires between 30 and 75 gallons of water. Wastewater generated during product changeover


AGRICULTURE WAREHOUSE, INC.

Room 2 Pellet Mill Clean & Flush

1. PRE-CLEAN
by ____________ a. Scrape & sweep out pre-mixer
by ____________ b. Scrape & sweep out blenders #1 & #2
by ____________ c. Scrape & sweep out elevators
by ____________ d. Scrape & sweep out mill hopper and auger
by ____________ e. Disassemble shaker and screens
by ____________ f. Dismantle duct work to dryer
by ____________ g. Dust down all duct work pipes
by ____________ h. Pull belt from dust elevator
by ____________ i. Pull buckets from chain elevator

All material to be held for evaluation by management. Label and stretchwrap clean out for use in future campaign. Total weight to be entered into inventory.
By ____________

2. WASH
by ____________ a. Start at elevators on top of builing, dust & chain
by ____________ b. Wash down all duct work
by ____________ c. Wash down mill hopper & auger
by ____________ d. Wash and scrape Sprout Walden
by ____________ e. Wash top of dryer
by ____________ f. Wash down all platforms and walkways
by ____________ g. Wash down blenders #1 and #2
by ____________ h. Wash down oscillator and belt
by ____________ i. Wash down dryer oven, belt and brush
by ____________ j. Wash down pre-mixer
by ____________ k. Wash down shker
by ____________ l. Wash small Munson
by ____________ m. Wash all portable hoppers
by ____________ n. Wash down frame work in motors
by ____________ o. Wash down bearing housing
by ____________ p. Rinse all areas a - o

All material from wash to be labeled and moved to EPOC System. This wash should be evaluated by management prior to treatment.
BY ____________

3. PROBLEM AREAS
by ____________ a. Ribbon in pre-mixer, rotate shaft for inspection
by ____________ b. Blades and clamps in paddle blenders, rotate shafts for inspection
by ____________ c. Elevator housings top to bottom
by ____________ d. Mill hoppers, auger, mill face
by ____________ e. Oscillator and belt
by ____________ f. Mill platform
by ____________ g. Dryer
by ____________ h. Shaker screens

Final inspection of all equipment and recycling of clean out and wash down.
By ____________

All areas must be totally cleaned and checked by supervisor for shift on final inspections.

Figure 8-3. Pellet Mill System Cleanout Procedures

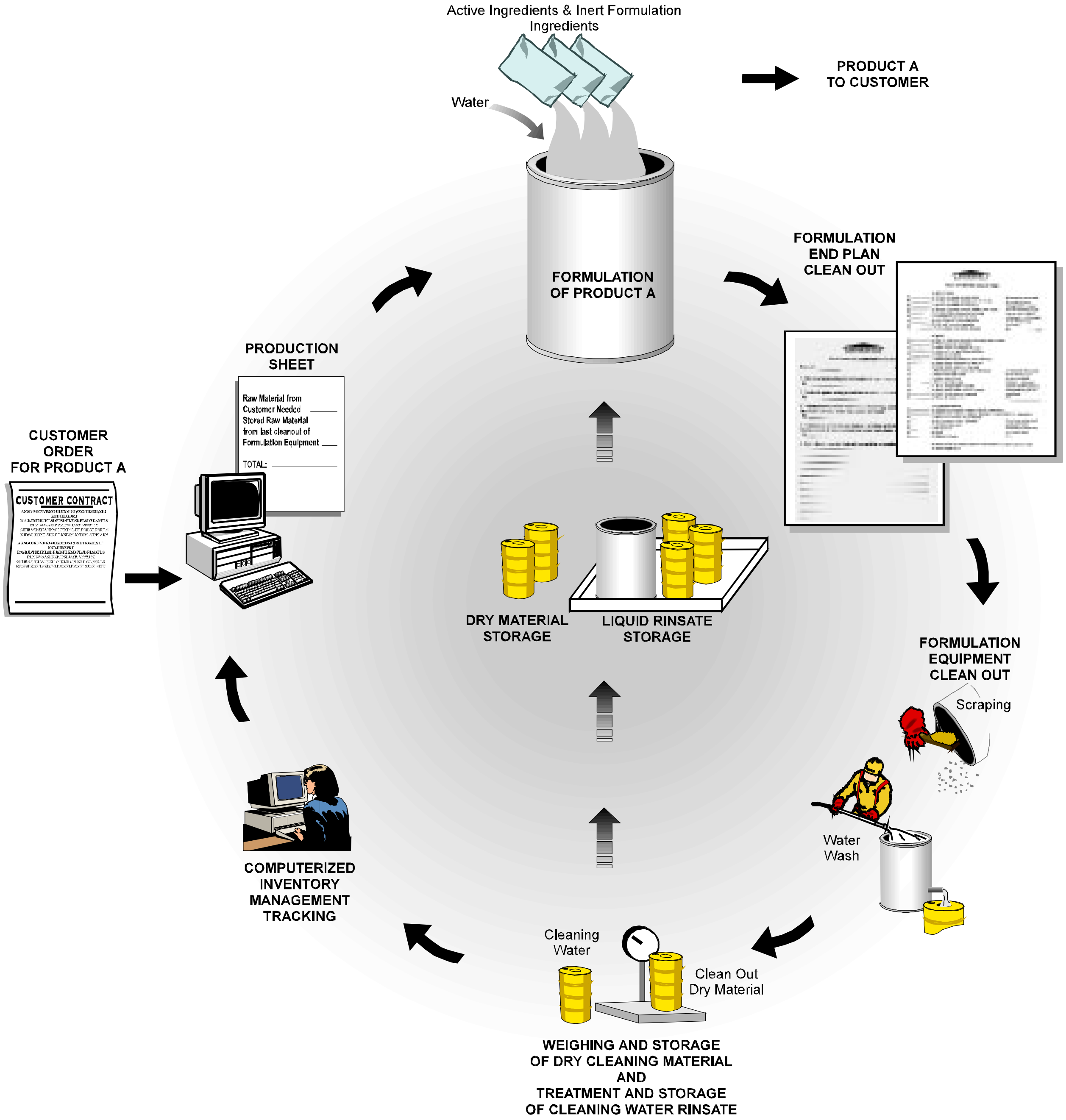


Figure 8-4. Pellet Mill System Cleaning Material Reuse Cycle

is collected in a sump and ultimately pumped back into the next product batch (solids, if present, are strained out). For example, four drums of marked "rinsate" were present in the mosquito growth-regulator briquets process area at the time of an EPA plant visit. This water was reused in the next formulation batch of the briquets.

Drum and Shipping Container Cleaning—Ennis Agrotech operated a ***drum rinsing station*** to minimize the generation of water from drum rinsing operations. Recently, however, the facility has implemented ***direct reuse of drum rinsate*** into product formulations. Drum shipping containers are triple-rinsed with the same solvent that is used in the formulation to which the drummed ingredient is being added. The solvent rinsate is added to the formulation at the time of the formulation. The drums are then disposed of according to the customer's instructions.

Spill and Leak Cleanup—Ennis Agrotech uses ***good housekeeping practices*** to reduce waste. Spills and leaks that may occur are cleaned up with adsorbent material, which is disposed of off site.

Other—Any wastewater that cannot be reused at Ennis Agrotech is disposed of off site at the direction of the client. Ennis Agrotech arranges for disposal based on the client's direction, pays the disposal bill, and then invoices the client. In some cases, Ennis Agrotech returns the wastewater to the client for ultimate disposal. For example, rinsate from tank trucks used to transport active ingredients is sometimes returned to the client.

Case Study 2: MGK, Chaska, Minnesota

Facility Overview

MGK operates a combination pesticide manufacturing and PFPR facility that produces manufacturing-use concentrates. These concentrates are sold to customers who formulate them into consumer products for household and lawn and garden use. The Chaska facility, constructed in 1992, currently includes one active ingredient manufacturing line dedicated to the production of MGK 264 (n-2-ethylhexyl bicycloheptene dicarboximide), although the facility plans to move additional manufacturing lines to this location in the future.

In addition, the facility operates several production lines used to formulate, package, and repackage products containing MGK 264, MGK 326, pyrethrins, and DEET. The PFPR portion of the Chaska plant consists of a formulating room, three packaging lines, and a warehousing area. MGK currently holds approximately 400 product registrations and typically formulates and packages 150 of those products in any one year.

PFPR Operations

The MGK Chaska facility uses MGK 264, as well as other active ingredients obtained from off-site sources, in the products formulated and packaged on site. Active ingredients used in formulations that are not manufactured on site are received in liquid and powder form. Liquid active ingredients are received in drums and are placed in a heated storage room to ensure the ingredient's flowability until needed for a formulation. Powders are stored in a separate, enclosed dry formulations area for dust control. Solvent and inert ingredients are stored in a tank farm located behind the facility.

In the formulating area, raw material active ingredients are stored in dedicated day tanks with dedicated supply lines. The tanks are connected to two mixing stations equipped with weigh scales. When a custom formulation order is received, the required active ingredient is gravity fed through a dedicated line into a drum, which is positioned on one of the weigh cells. The appropriate amount of active ingredient, by weight, is pumped from the drum to a formulation tank, along with water or solvent and any inert ingredients. The volume of the formulation tanks ranges from 55 gallons to 6,500 gallons. If the volume of an order is small enough, it may be custom formulated in the appropriate size shipping container at the mixing station, instead of in a formulation tank. MGK's formulation tanks are dedicated to specific products or product groups based on estimated product volume requirements, product similarity, or product compatibility. Dedication of tanks minimizes the need for equipment cleaning between product formulations and maximizes the flexibility of operations.

Formulated product is pumped directly from the tank to the packaging line. MGK operates three packaging lines for formulated product. Product is packaged into bags, 5-gallon pails, 55-gallon drums, and tote bins. MGK also provides packaging in bulk form, and is considering 1-gallon packaging. MGK has the flexibility to reconfigure operations to meet the requirements of any custom formulation.

The solvent used in the MGK's formulations is methylene chloride. In the formulations area, a ***solvent recovery unit*** (still) is operated to recover methylene chloride used to clean equipment interiors and raw active ingredient drums.

Equipment for formulation of dry product is dedicated by chemical type, which eliminates the need for interior equipment cleaning. Methylene chloride is also used in this area to clean raw material tanks and drums, as necessary.

P2 Practices

MGK generates pesticide-containing wastewater associated with PFPR operations from three sources: (1) floor wash water; (2) exterior equipment cleaning rinsate; and (3) spill and leak cleanup. MGK also generates pesticide-containing solvent from two sources: (1) interior equipment cleaning; and (2) drum and shipping container rinsate. Noncontact wastewaters generated at the Chaska facility and stormwater are collected in a 40,000-gallon stormwater settling basin. These wastewaters are discharged directly without treatment through a dedicated sewer line separate from the wastewater sewer line that handles wastewater discharged from the pesticide manufacturing and PFPR areas.

MGK incorporated P2 into the original design of the facility and follows certain wastewater management techniques to achieve P2 at their facility. The benefits associated with these practices include:

1. Reduced raw material (i.e., active and inert formulation ingredient) costs due to recovery of these materials in rinsates.
2. Reduced disposal costs due to recovery of solvent used for cleaning formulation equipment and raw material drums.
3. Reduced water use; reduced hazards from slips, falls, and chemical residues; and decreased labor costs associated with floor cleaning through the use of a ***floor scrubber***.
4. Enhanced corporate image with the local community due to the implementation of practices that prevent or reduce pollution.
5. Reduced air emissions, leaks, and the need for drip pans through the use of welded joints instead of flanges in process piping.

Specifically, MGK uses the following P2 practices:

Interior Equipment Cleaning Rinsate—Although MGK product formulations include both solvent-based and water-based formulations, methylene chloride solvent is used for all interior equipment cleaning operations. The PFPR operations do not generate any interior equipment cleaning wastewater. A ***solvent recovery unit*** is operated in the PFPR area to recover methylene chloride for reuse in the formulating processes. The heel from the distillation unit is disposed of as hazardous waste.

In addition, waste associated with the formulating and packaging of a given product is minimized through the ***dedication of equipment***, ***production scheduling***, and ***formulating and packaging small batches in containers***. MGK Chaska also uses effective ***inventory management systems*** to maximize ***interior rinsate storage and reuse***.

MGK's Chaska facility uses dedication of equipment in a number of areas to reduce the need for cleaning equipment, thus reducing waste solvent from cleaning. Dry formulation equipment is dedicated, which eliminates the need to clean dry formulation equipment interiors. Many of the bulk raw material tanks and the piping leading from these tanks to formulating equipment are dedicated to a specific active ingredient, eliminating the need to clean these tanks and associated piping. Also, formulating equipment is dedicated by product family to reduce the need to clean these tanks and to reduce the possibility of cross-contamination between incompatible products. The facility also dedicates totes used for special formulations to the specific customer and formulation.

The facility also schedules production runs to minimize the need to clean formulation equipment. For example, the facility may schedule the production of two different products containing the same active ingredients but at different concentrations to immediately follow each other, eliminating the need to clean formulation equipment between the production runs.

MGK formulates small batches of product directly into 55-gallon drums. Piping that is dedicated by active ingredient feeds to a scale upon which 55-gallon drums can be placed. The appropriate weight of each active ingredient and inert is measured directly into the drum. This practice eliminates the use of a formulation tank and any associated formulation tank cleaning.

The facility also maintains an ***inventory management system*** for raw materials, products, and solvents that are recovered for reuse. A computerized system is used to keep track of raw materials and products, and to optimize production runs to minimize cleanings for product changeovers. The facility also maintains water meters throughout the facility, so that the amount of water used by the facility used for specific purposes, such as sanitary waters or cleaning water, can be determined.

Drum/Shipping Container Rinsate—Active ingredient drums are triple-rinsed with methylene chloride, and the methylene chloride is recovered in the ***solvent recovery*** unit for reuse in PFPR operations. ***Flow reduction equipment*** (i.e., spray guns) are used to rinse drums to improve the level of cleaning and to reduce the amount of solvent used in cleaning operations.

Floor Wash Water—The MGK Chaska facility was specifically designed to allow enough clearance to use a ***floor scrubber***. This mechanical floor washer, which operates on a 5-gallon recycled reservoir containing water and detergent, is used to clean the floors in the PFPR area. When this reservoir is replaced with new water and detergent, the spent cleaning solution is dumped in the floor drains in the MGK 264 or PFPR process area. In MGK's older facilities, the floors, which are sloped to a center drain, are sprayed down with water and soap. Facility personnel stated that this method takes longer and has more labor cost associated with it, and the floors tend to be more slippery.

Exterior Equipment Cleaning Rinsate—In addition, when deemed necessary by plant personnel, a complete floor and equipment wash is conducted by spraying walls, floors, and equipment exteriors with water from a hose equipped with a ***spray nozzle***. This cleaning is typically conducted once per month. The MGK 264 floor drains, as well as the floor drains in the PFPR area, feed into an equalization tank, located in the MGK 264 area, which is ultimately discharged to the local POTW.

Spill and Leak Cleanup—Incorporation of ***good housekeeping practices*** at the facility provides the facility with additional pollution prevention as well as other benefits. Daily inspection of tanks and equipment for leaks is conducted, and leaks and spills are cleaned up as quickly as possible after being discovered. In addition, the facility incorporated welded joints instead of flanges into the facility's design wherever possible to reduce the potential for leaks and to reduce air emissions. Regularly scheduled maintenance is performed on valves and fittings. The facility was also designed as a closed facility to minimize the accumulation of dust. When appropriate, material from spill and leak cleanup operations are processed through the ***solvent recovery unit***.

Other—MGK Chaska has incorporated ***training and written standard operation procedures*** into PFPR operations. Facility employees are provided with initial training as well as yearly refresher training, which includes training in pollution prevention and waste minimization. In addition, the facility conducts bimonthly meetings at which pollution prevention topics are emphasized. Records of employee training are maintained at the facility. In addition, the facility has an employee incentive program that bases employee bonuses, in part, on adherence to pollution prevention procedures.

Documentation of P2 practices include written P2 plans and procedures, records of facility maintenance and inspections, such as floor washes, and daily inspections for leaks and spills.

CHAPTER 9

Where to Get Additional P2 Help

This chapter presents additional sources of information, as well as EPA contacts, that may help the user obtain additional information related to P2 implementation. Specifically, the chapter presents a list of selected federal P2 programs, a list of EPA regional P2 contacts, and a list of selected periodicals and directories relating to P2. These lists also include information on how to reach EPA program personnel and how to access periodicals and directories.

For copies of documents directly related to the PFPR effluent guidelines, such as the Technical Development Document (EPA 821-R-96-019), the Economic Analysis (EPA 821-R-96-017), the Cost Effectiveness Analysis (EPA 821-R-96-018), or additional copies of this guidance manual (EPA 821-B-98-017), contact the Office of Water Resource Center at (202) 260-7786 or by E-mail at: waterpubs@epamail.epa.gov or fax: (202) 260-0386.

Questions specifically related to the effluent limitations guidelines and standards for the PFPR industry, including the P2 Alternative Option, should be directed to:

Ms. Shari Zuskin
Engineering and Analysis Division
Office of Water
U.S. EPA (4303)
401 M Street, SW
Washington, DC 20460
Tel: (202) 260-7130
Fax: (202) 260-7185
E-Mail: zuskin.shari@epamail.epa.gov

Federal P2 Programs and Contacts

Enviroene

Enviroene is EPA's new electronic library of information on pollution prevention, technical assistance, and environmental compliance. With free public access to the system, Enviroene is aimed at facilitating the sharing of technologies and experience across private and public sectors, and encouraging pollution prevention technologies suitable for export. A list of topics Enviroene contains information on includes:

- Contracts, training opportunities, and news;
- Federal regulations, executive orders, and laws;
- Pollution prevention technical information, databases, initiatives;
- Federal agency and facility information;
- Technology information, databases, and initiatives;
- Funding, grants, and contracts information; and
- International resources.

Other features include E-mail with thousands of environmental professionals world-wide, electronic registration for EPA training courses, and key word searching of full text or abstracts.

To access Enviroene:

Via Internet
The address is:
http://www.epa.gov/envirosense/index.html
The World Wide Web hotline number is (208) 526-6956

Via Modem
Set communications to 8, N, 1; Emulation: ANSI or
VT-100. Telephone Number: (703) 908-2092

EPA Headquarters Information Resource Center

The EPA Headquarters Information Resource Center provides information support services to EPA staff and maintains a varied collection of environmental resources, including CD-ROMs, an online catalog, and other program-specific services. The library provides services to the general public and develops several publications, including newsletters and brochures. Library hours are 8:00 a.m. to 5:00 p.m. ET, Monday through Friday. EPA's Online Library Service (OLS) is available through telnet: “epaibm.rtpnc.epa.gov”. (See **Pollution Prevention Information Clearinghouse (PPIC)** and **EPA on the World Wide Web.**)

EPA on the World Wide Web

EPA’s webserver is the primary public access mechanism on the Internet for EPA. The webserver provides a range of EPA-generated information in electronic format, and also offers access to OLS, the national online catalog of the EPA library network. It includes the catalogs of the Headquarters Information Resource Center and all the Regional libraries. The special collection of the PPIC is cataloged on OLS and is recognized with the call letters “PPC”.

Via Internet
EPA’s home page on the world wide web:
http://www.epa.gov
EPA’s P2 home page on the world wide web:
http://www.epa.gov/opptintr/p2home/

EPA's Pollution Prevention Research Branch Program

The Pollution Prevention Research Branch at EPA's National Risk Management Research Laboratory supports projects and provides technical assistance to encourage the development and adoption of technologies, products, and P2 techniques to reduce environmental pollution. Pollution prevention resources developed by the lab are available through the Technology Transfer and Support Division at:

Technology Transfer and Support Division
26 West Martin Luther King Drive
Cincinnati, Ohio 45268
Phone (513) 569-7562
Fax: (513) 569-7566

A compilation of summaries of current Branch Projects is available from:

Current Projects: Tomasina Bayliss
National Risk Management Research Laboratory
U.S. Environmental Protection Agency
26 West MArtin Luther King Drive
Cincinnati, Ohio 45268
Phone (513) 569-7748
Fax (513) 569-7566

National Technical Information Service (NTIS)

Located in the U.S. Department of Commerce, the National Technical Information Service (NTIS) is the central source for the public sale of U.S. Government-sponsored research, development, and engineering reports. It is also a central source for federally generated machine processible data files. It contains reports on air pollution, acid rain, water pollution, marine pollution, marine ecosystems, land use planning, fisheries management, solar energy, offshore oil drilling, solid wastes, traffic noise, and radiation monitoring.

For more information, contact:
Chief, Order Processing Branch
National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
Tel: (703) 487-4650
Fax:(703) 321-8547

Pollution Prevention Division (PPD)

The Pollution Prevention Division (PPD) within EPA's Office of Pollution Prevention and Toxics was established in 1988 to integrate a multimedia P2 ethic within EPA and its developing programs, as well as to provide outreach support to the public and other government departments. Its primary role is to ensure that EPA incorporates P2 into rulemaking efforts and to support P2 efforts by EPA's program offices, EPA Regions, state and local governments, industry, and the public, in keeping with the Pollution Prevention Act of 1990.

PPD staff are involved with or assist EPA offices in a variety of ongoing projects, including the Source Reduction Review Project, the Common Sense Initiative, and Design for the Environment. PPD oversees the Pollution Prevention Information Clearinghouse (see related listing), manages the Pollution Prevention Incentives for state grants program, and manages EPA's Environmental Accounting project. In addition, PPD coordinates EPA's work on environmental labeling issues, the development of guidance for environmentally preferable products, and International Standards, and is a collaborator on EPA's life cycle assessment work.

For more information, contact:
Pollution Prevention Division
Office of Pollution Prevention and Toxics
U.S. EPA (7409)
401 M Street, SW
Washington, DC 20460
Tel: (202) 260-3557

Pollution Prevention Information Clearinghouse (PPIC)

The Pollution Prevention Information Clearinghouse (PPIC) was established by EPA in response to the Pollution Prevention Act of 1990 to promote source reduction. It is a free service containing technical, policy, program, and legislative information relating to P2 and source reduction. PPIC has three primary functions: (1) acting as a distribution center for documents; (2) maintaining a telephone hotline to take document orders and refer callers to other EPA information resources; and (3) maintaining a library collection of documents and publications relating to P2, waste minimization, and alternative technologies. The library collection is available for browsing in the EPA Office of Pollution Prevention and Toxics (OPPT) Library during visitor hours (8:30 a.m. to 4:00 p.m. ET) and through EPA's Online Library System (OLS) (See **EPA HQ Information Resource Center** above). PPIC currently publishes a list of available P2 resources that they distribute free of charge.

Some highlights of the resources available from PPIC:

Pollution Prevention Directory. Directory of publicly sponsored pollution prevention sources and state contacts available across the United States.

Pollution Prevention Publications List. EPA fact sheet, updated periodically, including forms for ordering documents. Available through PPIC, (202) 260-1023.

Pollution Prevention News. Free bimonthly newsletter on pollution prevention topics, including reports from EPA offices, people and places in the news, state programs, and calendar of conferences and events.

Also available through PPIC are environmental accounting documents and software, particularly spreadsheet software for "P2/FINANCE" (Pollution Prevention Financial Analysis Cost Evaluation). This is a spreadsheet system for conducting financial evaluations of current and potential investments. P2/FINANCE differs from conventional capital budgeting tools because it expressly addresses traditional obstacles to the financial justification of pollution prevention (P2) investments. Specifically, it expands the cost and savings inventory to include indirect and less tangible environmental costs, and uses profitability indicators and time horizons that capture the longer-term savings typical of pollution prevention investments. It runs with either Lotus 1-2-3 Version 3.4a for DOS or Microsoft Excel Version 5.0 for Windows. (EPA 742-C-96-001/002)

For more information, contact:
Pollution Prevention Information Clearinghouse
U.S. EPA (MC 7409)
401 M Street, SW
Washington, DC 20460
Tel: (202) 260-1023, Fax: (202) 260-4659, E-mail: ppic@epamail.epa.gov

EPA Regional P2 Contacts

Contacts* for general P2 assistance are listed by each EPA Regional Office:

Region	Address	Name	Telephone	Fax
1	JFK Federal Building Boston, MA 02203 (617) 565-3420	Abby Swaine Mark Mahoney	(617) 565-4523 (617) 565-1155	(617) 565-3346
2	(2-OPM-PPI) 290 Broadway New York, NY 1007-1886 (212) 637-3000	Janet Sapadin	(212) 637-3584	(212) 637-5045
3	841 Chestnut Building Philadelphia, PA 19107 (215) 566-5000	Jeff Burke Cathy Libertz	(215) 597-8327 (215) 597-0765	(215) 597-7906
4	345 Courtland Street, NE Atlanta, GA 30365 (404) 562-8357	Connie Roberts	(404) 562-9084	(404) 562-9066
5	(HRP-8J) 77 W. Jackson Boulevard Chicago, IL 60604-3590 (312) 353-2000	Phil Kaplan	(312) 353-4669	(312) 353-5374
6	1445 Ross Avenue, Suite 1200 Dallas, TX 75270 (214) 665-6444	Robert Lawrence Linda Thompson	(214) 665-6568 (214) 665-6568	(214) 665-7446
7	726 Minnesota Avenue Kansas City, KS 66101 (913) 551-7000	Marc Matthews	(913) 551-7517	(913) 551-7065
8	999 18th Street, Suite 500 Denver, CO 80202-2405 (303) 312-6312	Linda Walters	(303) 312-6385	(303) 312-6339
9	75 Hawthorne Street, (H-1-B) San Francisco, CA 94105 (415) 744-1305	Bill Wilson (waste minimization) Eileen Sheehan (water)	(415) 744-2192 (415) 744-2190	(415) 744-1796
10	1299 Sixth Avenue (MD-142) Seattle,.WA 98101 (206) 553-1200	Carolyn Gangmark	(206) 399-4072	(206) 553-4957

*Individual contacts may change over time; in such an event, call the main region phone number listed under the address.

Periodicals and Directories

Access EPA. Directory published by EPA's Office of Information Resources Management. Includes public information tools, major EPA dockets, clearinghouses and hotlines, library and information services, state environmental libraries, and EPA acronyms. 1993 edition, EPA 220-B-008. Available from the EPA HQ Information Resource Center, U.S. EPA (3404), 401 M Street SW, Washington, DC 20460. Superintendent of documents, P.O. Box 371954, Pittsburgh, PA 15250-7954, Cost $24.

Guide to Pollution Prevention Funding Organizations. Directory of public and private organizations that fund pollution prevention research. Available from Pacific Northwest Pollution Prevention Research Center, 1218 Third Avenue #1205, Seattle, WA 98101. Tel: (206) 223-1151.

Pollution Prevention Review. Quarterly journal on source reduction and waste minimization, with emphasis on technical and institutional issues encountered in industrial settings. Available from Executive Enterprises, Inc., 22 West 21st Street, New York, NY 10010-6990. Tel: (800) 332-8804.

Pollution Prevention Update. Highlights federal legislation, EPA initiatives, roundtable activities, and state pollution prevention program activities. Available from the National Pollution Prevention Roundtable, 218 D Street SE, Washington, DC 20003. Tel: (202) 543-7272.

Pollution Prevention Yellow Pages. Lists and describes state and local pollution prevention programs. Available from National Pollution Prevention Roundtable, 218 D Street SE, Washington, DC 20003. Tel: (202) 543-7272.

Public Information Center Publications List. List of publications available from the EPA HQ Information Resource Center, U.S. EPA (3404), 401 M Street SW, Washington, DC 20460.

CHAPTER 10

Workshop Questions and Answers

Introduction

EPA conducted five two-day workshops from July through September 1997 in Chicago, IL, Atlanta, GA, Dallas, TX, Portland, OR, and Kansas City, MO to help facilitate understanding of the final PFPR rule. The information presented in the workshops mirrored the information presented in this P2 Guidance Manual. In addition, at each workshop, participants were able to walk through a P2 audit exercise and attend breakout sessions that presented more in-depth material on various key aspects of implementation of the rule. Most importantly, the workshops offered participants the opportunity to ask questions directly of EPA about the final PFPR rule.

This chapter includes questions that were asked at the five workshops and presents EPA's responses to these questions. EPA attempted to address all questions that were asked; some questions were consolidated because the same or very similar questions were asked at multiple workshops. The questions and answers are grouped by topic; a table of contents is included on the next page for ease of finding topics of interest.

Contents

Applicability

Zero Discharge

P2 Alternative

Treatment/Treatability Issues

Compliance

Applicability

General

How many facilities are covered under the scope of this rule? How many discharge wastewater?	EPA estimates that there are 2,631 facilities covered by the PFPR rule, 443 of which discharge wastewater.

Facility Operations

How is toll formulating defined?	There is no regulatory definition of "toll formulating". Toll formulators, as referred to by the PFPR rule, typically formulate, package, or repackage one or more products under contract to another registrant. The toll formulator does not own the registrations for these products. In addition, they may have multiple contracts of varying length with several different companies at the same time. Registrants typically use toll formulators for one or more of the following reasons: • The toll formulator has specialized equipment for the formulating or packaging of a product; • The registrant does not have room at their facility to formulate, package, or repackage the product; or • The registrant wishes to avoid potential cross contamination concerns by segregating incompatible products (e.g., herbicides and insecticides).
If an industry (i.e., a facility) formulates a product, but does not sell the product, is that operation covered?	Yes, if the operation meets the definition of formulation of an in-scope product/pesticide active ingredient, it is covered. It does not matter whether the facility sells that product or uses it internally. More specifically, the facility must have the potential to discharge in-scope process wastewater from PFPR operations to be covered by the rule.
Formulation pilot (i.e., R&D) facilities may also produce (for sale) formulations in smaller quantities until a contract/toll formulating arrangement can be established. Since these pilot facilities change over frequently and have a small portion of commingled wastewater from formulating operations, are they covered under the PFPR regulation? If so, can a control authority grant a waiver to this type of facility?	Research and development facilities are not covered by the PFPR rule. In addition, these facilities cannot *sell* unregistered experimental pesticide products in the United States without an Experimental Use Permit (EUP) granted by EPA. Therefore, if the facility is producing a formulation for "sale" under a EUP for that product, the facility is still performing R&D activities, which would not be covered under the PFPR rule. However, if the facility is producing an in-scope formulation for sale in the U.S. as a registered product (or outside the U.S. without registration), these formulation activities would be covered under the PFPR rule.

Why are R&D laboratories and operations exempted from the rule? These operations, due to the use of new compounds and formulations, appear to be *potentially* more dangerous polluters than PFPR operations that have existing controls, especially since the volume of wastewater generated does not necessarily increase or decrease the pollutant load.	In general, research and development activities at PFPR facilities do not generate the same wastewater volumes or pollutant loads that are found in manufacturing R&D facilities. They are generally very small operations that develop a new pesticide product or a new formulation (e.g., concentrate, solution ready-to-use, microencapsulated) of an existing product. They cannot store and reuse rinsates for two main reasons: experimental controls and they only make the product one time or in one set of trials. In addition, in a large number of effluent guidelines, including the Pesticide Chemicals Manufacturing Point Source Category, R&D activities are not covered by the rule and can be regulated on a best professional judgement BPJ basis.
Whose responsibility is it to dispose of wastewater generated by contract packagers? For example, a company formulates a dry granular product containing atrazine and sends it to another company to package.	It is the responsibility of the facility that performs the covered activity to comply with this rule, including all paperwork requirements. Using the example in the question, the packager would be required to comply for all in-scope wastewaters generated during or associated with their packaging operation.
Is repackaging of pesticide active ingredients as both pesticide and nonpesticide products covered under the PFPR standards no matter what the product?	No, only products that are pesticides and that meet the applicability of the PFPR rule are covered by the standards. Nonpesticide products that may contain the same active ingredients are not covered by the rule.
If a facility repackages a pesticide active ingredient in a container for ultimate sale, are they covered under Subcategory C or Subcategory E?	This answer assumes that the product is not exempt from the PFPR rule. If the product that is repackaged is an agricultural pesticide product *and* is packaged in a refillable container *and* the facility is not performing other pesticide formulating or packaging operations, then the production is covered under Subcategory E. Otherwise, the production is covered under Subcategory C.
Are farm cooperatives that supply products to farmers covered by Subcategory E regulations?	Yes, if those cooperatives formulate, package, or repackage pesticide products that are covered by the scope of the rule, and discharge or have the potential to discharge the resulting wastewater. Many farm cooperatives package pesticides from bulk into smaller minibulk (refillable) containers that are delivered to the end user (i.e., the farmer). The water used to clean/rinse these minibulk containers is a covered wastewater under the rule (Subpart E).
Are farmers who repackage pesticide products into smaller containers for delivery to parts of the farm covered by Subcategory E regulations?	No. End users of the pesticide products are not covered by either Subcategory C or E regulations.

Are applicators covered by this rule?

In general, no. Wastewater generated from application of pesticide products is not covered. Therefore, if the only operation is application of the pesticide, they are not covered by the rule (applicators are the end user). However, if they also formulate, package, or repackage products, the wastewater from the formulation, packaging, and repackaging operation is covered.

Is an applicator formulating a product for its own use covered under this rule?

If the product is a registered FIFRA pesticide product or meets the definition of making a pesticidal claim rule (see page 57549, §455.40 of the preamble to the final rule in Appendix A for a discussion of pesticidal claim, as well as 40 CFR 152.8, 152.10, and 152.15) *AND* is being formulated as a manufacturing or end use product (§455.10(i)) for use in the U.S. and is not exempt from the PFPR rule, then the wastewater from formulation *is* covered by the rule. However, the wastewater from application services is *not* covered by the rule.

Are aerial applicators/crop dusters covered by this rule?

No, wastewaters related to custom application services are not covered by this rule (see 40 CFR 455.60(b)).

Less than 0.25% of a facility's operation is the repackaging of pesticides. Is the facility covered by the rule?

Yes, the wastewater from such in-scope repackaging operations is covered if the facility discharges or has the potential to discharge process wastewater from their repackaging operations. There is no *de minimis* production exemption.

Do all pesticide active ingredient drums require rinsing?

The PFPR rule does not require rinsing of any drums or equipment, although other regulations (e.g., 40 CFR 165.9 in FIFIRA or 40 CFR 261.7(b)(3)) may require specific rinsing procedures for certain drums containing pesticide active ingredients or certain hazardous wastes. However, if a facility rinses these drums, the wastewater generated is subject to the PFPR rule.

Is wastewater from remedial actions (e.g., groundwater remediation operations) occurring at a current or former PFPR facility covered by these categorical standards?

No, wastewater from remedial actions does not meet the definition of process wastewater. However, any treatment standards for the discharge of such wastewaters that may be established through a remedial process may take into account the PFPR regulation.

If a facility blends a pesticide product with something else (e.g., grass or fertilizer), is that production covered by the rule?

Yes, unless the operation is considered a custom blending operation, as defined in 40 CFR 167.3.

Are facilities required to rinse inert drums?

No. The rinsing of drums containing pesticide active ingredients or inerts or other raw materials is not required by the PFPR rule. However, if a facility does rinse their drums, the wastewater generated by those rinsing operations is covered by the rule.

Note that FIFRA (40 CFR 165.9(b)) requires that Group II containers (noncombustible containers which formerly contained organic or metallo-organic pesticides, except organic mercury, lead, cadmium, or arsenic compounds) should first be triple-rinsed before reuse or disposal. Also, there are certain RCRA regulations which require rinsing of containers that have held certain types of hazardous waste (40 CFR 261.7(b)(3)).

Pesticide Active Ingredients and Pesticide Products

Is "Neem Oil," an active ingredient similar in application to citronella, covered by the rule?	EPA excluded two groups of chemical mixtures from the final rule. The first group is defined at 40 CFR Part 455.10 (j) as "any product whose only pesticidal active ingredient(s) is: a common food/food constituent or nontoxic household item; or is a substance that is generally recognized as safe (GRAS) by the Food and Drug Administration (21 CFR 170.30, 182, 184, and 186) in accordance with good manufacturing practices, as defined by 21 CFR Part 182; or is exempt from FIFRA under 40 CFR 152.25." EPA believes that citronella is exempt from the PFPR rule as a Group I mixture. Neem oil is an oil extract from the seed kernels of the Indian Neem tree. If neem oil also meets the Group I mixture definition, it is also excluded from the rule. EPA also excluded a second group of chemical mixtures, but did not develop a definition for this group. The Group 2 mixtures are listed in Table 9 to Part 455; however, because Neem Oil is not listed there, it is not excluded as a Group 2 mixture.
Are Group I chemicals exempted because they are exempted from FIFRA?	Some of the Group 1 chemicals are exempted from certain FIFRA reporting and registration requirements under 40 CFR 152.25; however, Group 1 mixtures also include products whose only pesticide active ingredients are chemicals that are common food/food constituents or nontoxic household items or substances generally recognized as safe (GRAS) by the Food and Drug Administration (21 CFR 170.30, 182, 184, and 186) in accordance with good manufacturing practices, as defined by 21 CFR Part 182.
Are pool chemicals exempt from the rule?	Yes. Pool chemicals (as defined in 40 CFR 455.10(q)) are exempt from this rule (40 CFR 455.40(d)).
Please clarify the sanitizer exemption, specifically for those products that are considered sanitizers, but are not exempted from the PFPR rule by the sanitizer exemption.	The exempted sanitizer products, as defined in section 455.10, are "pesticide products that are intended to disinfect or sanitize, reducing or mitigating growth or development of microbiological organisms including bacteria, fungi, or viruses on inanimate surfaces in the household, instritutional, and/or commercial environment and whose labeled directions for use result in the product being discharged to . . . POTWs. This definition shall also include sanitizer solutions as defined by 21 CFR 178.1010 and pool chemicals as defined in section 455.10(q). This definition does not include liquid chemical sterilants (including sporicidals) exempted by section 455.40(f) or

otherwise, industrial preservatives, and water treatment microbiocides other than pool chemicals."

In other words, sanitizers, as defined (and including pool chemicals), are exempt from the rule when their labelled directions for *use* (not disposal) result in discharge to POTWs. The rule still covers certain liquid chemical sterilants, industrial preservatives, and water treatment microbiocides other than pool chemicals (e.g., cooling tower or boiler treatment microbiocides). If one product is registered for use as a sanitizer, pool, *and* cooling tower product, is it exempt from the rule?

In general, EPA intends to cover cooling tower biocides under this rule. However, if one product recipe (i.e., registered formulation) has the multiple uses listed above (meaning the chemical is used in the same concentration (percent active ingredient) in both sanitizer and cooling tower uses), the registrant can request their Regional Office or EPA's Office of Water to determine whether the wastewater resulting from the formulation, packaging, or repackaging of such a product is exempt from this rule. EPA has determined that sodium hypochlorite is not subject to the PFPR guideline. Contact information is provided in Chapter 9 of this guidance manual.

Does chlorine gas meet the definition for exemption as an inorganic wastewater treatment chemical?	Chlorine gas is exempt from the final PFPR rule if it is used in wastewater treatment operations.
Why is EPA interested in tracking inert materials in a P2 audit? Are inert materials covered under the PFPR regulation?	Inert materials are covered in discharges from PFPR operations if they are also priority pollutants. However, the reason EPA suggests tracking inert materials during the P2 audit is to identify possible contaminants in wastewater that will require treatment prior to discharge or to identify characteristics that may hinder effective treatment of pesticide active ingredients or priority pollutants.
What kind of treatment is required for inert materials?	The PFPR rule requires treatment of pesticide active ingredients and priority pollutants. No specific treatment technology has been listed for inert materials, although activated carbon is effective for many organic priority pollutants.
Are fertilizers covered by the rule?	No.
If a pesticide active ingredient that a facility uses is not listed in Table 10, does that mean it is not covered by this rule or it does not require treatment?	No. Table 10 is *not* a list of all covered pesticide active ingredients; it was developed to aid facilities, permit writers, and control authorities in identifying appropriate treatment technologies for existing pesticide active ingredients. In order to determine whether your pesticide active ingredient is covered by the rule, you must review the rule applicability statements

found in III.A (page 57523) of the final rule, located in Appendix A of this guidance manual.

In order to determine the appropriate treatment technology for pesticide active ingredients not listed in Table 10, the facility and control/permitting authority must use best professional judgement (BPJ).

If a facility adds a biocide to their product (e.g., adhesives), is it covered under the rule?

If the facility claims that the final product has pesticidal qualities (because of the addition of the biocide), the product would be covered by the PFPR rule.

If the facility adds the biocide as a preservative (to protect the quality of their product), and therefore is the *end user* of the biocide, then the product is *not* covered under the PFPR rule.

As new pesticide active ingredients come on the market, how does one determine if they are covered by this rule or whether they require treatment?

If the pesticide active ingredient or product is a pesticide as defined in FIFRA regulations (i.e., there is a pesticidal claim made regarding that pesticide active ingredient or product) and the pesticide active ingredient/product will be formulated, packaged, or repackaged into a pesticide product that is not exempted from the rule, then the pesticide active ingredient/product is covered by this rule (see page 57549, §455.40 of the preamble to the final rule in Appendix A for a discussion of pesticidal claim, as well as 40 CFR 152.8, 152.10, and 152.15). Also, the facility must have the potential to discharge wastewater associated with in-scope PFPR production to be covered by these PFPR effluent guidelines.

If wastewater containing a new pesticide active ingredient is covered under the rule, treatment technologies can be determined by identifying the technology for a pesticide active ingredient with a similar chemical structure or through treatability testing.

If certain chemicals (e.g., zinc, copper) are used for both pesticide and nonpesticide products, is the facility covered under the PFPR categorical standards only when they blend these items with inert materials to produce a product specifically marketed as a pesticide product?

The PFPR rule covers the formulating, packaging, and repackaging of pesticide products that meet the applicability of the PFPR rule. Nonpesticide products that may contain the same active ingredients are not covered by the rule. See Chapter 1 of this document for definitions of formulating, packaging, and repackaging.

Does the PFPR rule apply to herbicide growth regulators and surfactants that may contain toxic chemicals?

The PFPR rule applies to all pesticide products that are formulated, packaged, or repackaged and are not specifically exempted from the rule. FIFRA regulations provide the following definitions for pesticide and pesticide product (40 CFR 152.3), as well as pest (40 CFR 152.5):

Pesticide means any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest, or intended for use as a plant regulator, defoliant, or desiccant, other than any article that:

(1) Is a new animal drug under FFDCA Sec. 201(w), or

(2) Is an animal drug that has been determined by regulation of the Secretary of Health and Human Services not to be a new animal drug, or

(3) Is an animal feed under FFDCA Sec. 201(x) that bears or contains any substances described by paragraph (s)(1) or (2) of this section.

Pesticide product means a pesticide in the particular form (including composition, packaging, and labeling) in which the pesticide is, or is intended to be, distributed or sold. The term includes any physical apparatus used to deliver or apply the pesticide if distributed or sold with the pesticide.

Pest means an organism is declared to be a pest under circumstances that make it deleterious to man or the environment, if it is:

(a) Any vertebrate animal other than man;

(b) Any invertebrate animal, including but not limited to, any insect, other arthropod, nematode, or mollusk such as a slug and snail, but excluding any internal parasite of living man or other living animals;

(c) Any plant growing where not wanted, including any moss, alga, liverwort, or other plant of any higher order, and any plant part such as a root; or

(d) Any fungus, bacterium, virus, or other microorganisms, except for those on or in living man or other living animals and those on or in processed food or processed animal feed, beverages, drugs (as defined in FFDCA sec. 201(g)(1)) and cosmetics (as defined in FFDCA sec. 201(i)).

Growth regulators are considered pesticides as defined in the FIFRA regulations. Therefore, the in-scope wastewater associated with the PFPR of growth regulators would be covered by the PFPR rule. Surfactants are generally inert, not active, ingredients of the pesticide product; therefore, when formulated into a pesticide product as an inert material, the surfactant isn’t specifically covered, but wastewater associated with the PFPR of the pesticide product (which contains the surfactant) would be covered, as long as the pesticide active ingredient (or the product as a whole) is not exempt from the regulation.

If a chemical can be shown not to pass through a publicly owned treatment works (POTW), can that chemical be exempt from the PFPR rule?

The P2 alternative allows some amount of discharge when a facility is following certain P2 practices set out by this rule and is performing treatment where required by the rule, even if the chemical is deemed to pass through. A facility can perhaps also obtain removal credits from the POTW/control authority for a particular chemical (see page 57547 of the preamble to the final PFPR rule in Appendix A). Basically, once compliance with 40 CFR Part 403.7 (removal credit regulations) is shown and removal credit authority is granted, the control authority can remove the requirement for pretreatment of the pollutants that remain in a PFPR facility's wastewater discharge after all applicable P2 practices have been implemented and those pollutants can be demonstrated to neither pass through nor interfere with the operation of the POTW (in accordance with 40 CFR 403 provisions). The PFPR industrial user would also have to continue to comply with the pollution prevention practices as specified in the P2 alternative even if a removal credit has been provided. Note that four organic chemicals considered to be priority pollutants (phenol, 2-chlorophenol, 2,4-dichlorophenol, and 2,4-demethyl phenol) are already excluded from pretreatment standards of this regulation because they do not pass through a POTW.

How does a facility demonstrate that a pesticide active ingredient does *not* pass through the POTW?

As defined at 40 CFR 403.3, pass-through occurs when a POTW violates their NPDES permit. Pass-through of pesticide active ingredients cannot be shown in this manner unless the POTW has limits for specific pesticide active ingredients or has whole effluent toxicity limits (and a toxicity event can be tied to one or more pesticide active ingredients).

The POTW can also make a separate determination whether pesticide active ingredients that are discharged from industrial users are pollutants that could potentially pass through. In this analysis, the POTW measures the level of pesticide active ingredient in both the POTW's influent and effluent. The pesticide active ingredient must be detected in the influent to determine whether pass through occurs. In addition, the POTW can decide whether the presence of the pesticide active ingredient adversely impacts the POTW's treatment operations. If the POTW determines that the pesticide active ingredient either passes through or adversely impacts operations, local limitations may be assigned.

What about the pesticide active ingredient limits that were developed for regulation of the pesticide manufacturing industry (58 FR 50637)?

The limitations developed for the pesticide manufacturing industry covered a much smaller scope of chemicals than the PFPR rule. In addition, the mass-based limitations for the manufacturing industry were developed based on the variability of their wastewaters. PFPR wastewaters can be more variable than pesticide manufacturing wastewaters; therefore, in some cases, it may not be appropriate to transfer the limitation to the PFPR industry. However, it may be possible and desirable for a pesticide manufacturer to receive an additional allowance in their discharge for their PFPR wastewater by applying the pesticide manufacturing limits to the additional production associated with PFPR operations after the facility has incorporated the listed P2 practices into their PFPR operations.

PFPR Wastewater

What is the difference between drum rinsates and interior equipment rinsates and their respective P2 practices?	Both are defined as interior wastewater sources (which require treatment prior to discharge); however, they are different sources. Drum rinsates are generated from the cleaning of raw material drums and can typically be used *immediately* in the product formulation. Drum cleaning also includes the cleaning of shipping containers that may be returned to the shipping facility. The listed P2 practices for drum rinsing include direct reuse, storage and reuse, or use of a countercurrent drum rinsing station. Interior equipment cleaning rinsates are generated from the cleaning of equipment used to formulate, package, or repackage products *following* the formulation, packaging, or repackaging of the product. Therefore, facilities are more likely to store these rinsates for reuse in the next formulation of the same or compatible product. The listed P2 practice for interior equipment rinsates is storage and reuse.
Does formulating equipment interior cleaning include the cleaning of piping and hosing, too?	Yes.
What if a facility produces a water-based product followed by a solvent-based product? The facility cleans the equipment with water, followed by *alcohol,* prior to formulating the solvent-based product. Is the alcohol rinse covered by the PFPR rule? Since the water picked up in the alcohol rinse evaporates, is there anything to preclude reusing the alcohol continuously?	There is nothing to preclude reusing the alcohol continuously, and achieving zero discharge for this cleaning operation. If the facility is not able to reuse the alcohol for some reason, they may choose to dispose of it. In that case, the alcohol rinse is not considered a wastewater covered by the PFPR rule, but would be subject to applicable solvent disposal regulations. However, the P2 alternative encourages facilities to segregate their solvent-based and water-based production to avoid the generation of non-reusable rinsates requiring disposal.
Are cleaning waters from a bulk tank that contains a material used in both pesticide and nonpesticide products covered under this rule?	Yes. The intent of the rule is to cover wastewater associated with pesticide production; therefore, cleaning rinsates of a bulk tank containing a material used in PFPR production would be covered under the PFPR rule. If the facility has more than one bulk storage tank for a particular material, and can specify that only material from certain tanks are used in PFPR production, then only the rinsate from those tanks is covered under the PFPR rule; however, if the facility cannot make this distinction, then rinsate from all tanks containing that material is covered by the rule.
Do DOT test bath waters require treatment?	No; however, under the P2 alternative, DOT test bath water from continuous overflow baths must include some recircula-

	tion or be a batch bath. Otherwise, they must meet zero discharge.
If a facility manufactures a pesticide active ingredient and formulates a product with the same pesticide active ingredient, is the laboratory exemption only applicable to the PFPR laboratory wastewater?	Yes.
If a facility only has safety showers and eye washes, is it within the scope of the regulation? If so, what are the implications of this rule?	Determining whether the facility is within the scope of the regulation depends on whether they have a potential to discharge process wastewater. EPA's Pretreatment Bulletin #13 (see Appendix E) states that it is possible to discharge noncovered wastewater streams, in this case safety showers and eye washes, in such a way that there is no potential for the facility to also discharge process wastewater. However, if the noncovered wastewater sources are located in an area (e.g., a formulating area), where it is possible for the noncovered wastewater discharge to become contaminated with process wastewater, then the facility has a potential to discharge and is within the scope of the regulation. Documentation that would be required would depend on the facility's potential to discharge.
Are wastewaters associated with the cleaning of coveralls covered by the rule?	On-site laundry operations are not covered under the scope of this rule.
Are water emissions from research and development pilot plant operations exempt from the rule?	Yes. See 40 CFR 455.40(e) of the final rule.
Is storm water completely exempt from regulation? What about contaminated storm water from diked areas?	Storm water is exempt from coverage under the final PFPR rule (61 FR 57524), and therefore is not subject to the P2 practices and treatment requirements of that rule. However, a facility's storm water discharges *are* covered under Phases I or II of the General Storm Water Regulations (61 FR 57524).
Assume a facility stores all rinsates in an outdoor storage tank. Are leaks and spills from that tank covered, since storm water is not covered?	Leaks and spills are covered by this rule. All leaks and spills must be cleaned up in a timely fashion, as discussed in P2 alternative practice #2 (61 FR 57553). Leaks and spills in outdoor storage tanks should be cleaned up prior to storm events; the resulting storm water is not covered by the rule.

Zero Discharge (see also Compliance—Potential to Discharge)

General

Does EPA have guidance on the PFPR rule available for zero discharge facilities? Are zero dischargers covered by the rule?

The legal basis of this rule (i.e., the basis used to determine whether a facility is covered by the rule) is the *potential* to discharge process wastewater pollutants. A PFPR facility is a categorical industrial user (CIU) and is subject to the PFPR regulations of "no discharge of wastewater pollutants" (or the P2 alternative) when there is a potential to discharge any PFPR process wastewater covered by the PFPR regulation. If a facility has no potential to adversely affect a POTW's operation or violate any pretreatment standard or requirement due to accidental spills, operational problems, or other causes so that no regulated process wastewater can reach the POTW, then the facility is not covered under the PFPR rule and it is not legally required at the Federal level for these facilities to submit paperwork (i.e., BMR). In addition, if the only wastewater that a PFPR facility discharges (or has the potential to discharge) is not a regulated process wastewater under the PFPR effluent guidelines (e.g., sanitary wastewater, employee showers, laundry water), then the PFPR facility is not covered by the PFPR effluent guidelines and the facility is not a CIU for that discharge for purposes of 40 CFR Part 403 (General Pretreatment Standards).

Facilities that are meeting zero discharge, but do have the potential to discharge, are covered by the rule. However, they are currently in compliance with the zero discharge portion of the rule. These facilities must submit all paperwork required by the rule for facilities that choose to comply with zero discharge, including a BMR.

A PFPR facility that employs 100% recycle or claims no discharge of regulated PFPR process wastewater should be thoroughly evaluated through an on-site inspection to determine if there is any reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement due to accidental spills, operational problems, or other causes. If the control authority concludes that no regulated process wastewater can reach the POTW (i.e., there is no potential to discharge), and therefore the PFPR facility has no reasonable potential for adversely affecting the POTW's operation or for violating the PFPR effluent guidelines, then the PFPR effluent guidelines are not applicable to that PFPR facility.

However, EPA Pretreatment Bulletin #13 (see Appendix E) suggests that the control authority issue an individual control mechanism containing the following conditions:

- No discharge of process wastewater is permitted;
- Requirements to notify the POTW of any changes in operation resulting in a potential for discharge;
- Requirements to certify semiannually that no discharge has occurred;
- Notice that the POTW may inspect the facility as necessary to assess and assure compliance with the "no discharge" requirement; and
- Requirements to comply with Resource Conservation and Recovery Act (RCRA) and state hazardous waste regulations regarding the proper disposal of hazardous waste.

Can a facility comply with zero discharge by showing pollutant levels below detection limits (for pesticide active ingredients and/or priority pollutants) in their effluent? If so, what kind of implications are there for enforcement (e.g., what happens if on occasion a facility discharges a pollutant above the detection limit)?

A facility may comply with zero discharge by demonstrating that all pesticide active ingredients and priority pollutants are below their method detection limits in the facility's final effluent, and only if all pollutants have approved analytical methods. A detection of any of these pollutants means the facility is out of compliance with the rule.

Why is zero discharge defined as "no discharge of process wastewater pollutants"?

Section 301 of the Clean Water Act prohibits the discharge of "any pollutant" except if the discharge of such pollutant is in compliance with a permit. Because it is impossible to achieve an analytical detection of "zero" for a pollutant, facilities are allowed to show compliance with zero discharge if each process wastewater pollutant (e.g., the specific pesticide active ingredient) is not analytically detected in the effluent. Another way to show zero discharge is to show no flow of process wastewater from the facility.

Does "no discharge of process wastewater pollutants" refer only to the pesticide active ingredients and priority pollutants?

In the PFPR rule, "no discharge of process wastewater pollutants" refers only to pesticide active ingredients and priority pollutants associated with in-scope pesticide products from in-scope wastewater sources. However, there may also be local limitations on additional pollutants.

Does a facility need to say they are implementing the P2 alternative if they totally reuse their wastewater, or if they do not generate wastewater because they use a solvent to rinse equipment?

A facility that completely reuses all PFPR wastewater (including floor wash, leak and spill cleanup, etc.) meets the definition of zero discharge and does not need to claim they are meeting the requirements of the P2 alternative. However, even though the facility is meeting zero discharge, they still have the choice to say they are complying with the zero discharge requirement (which has minor paperwork requirements) or the P2 alternative (which has more comprehensive paperwork requirements, but may give the facility more flexibility if they decide to discharge in the future).

	If the facility only generates spent solvent and generates *no* wastewater (including floor wash, leaks and spills, etc.), then the facility has no potential to discharge and is not covered by the PFPR rule (see Appendix E for a definition of "potential to discharge").
If a company has two facilities 150 miles apart, can wash water from one facility be transported to the other facility and used as make-up water?	Yes. The first facility could transfer their wastewater off site for reuse by their other facility, or for off-site disposal. However, the second facility (unless it is a centralized waste treatment facility or an incinerator) must either achieve zero discharge or incorporate the P2 alternative prior to discharge.

Potential to Discharge

Is a facility that currently has a potential to discharge PFPR regulated wastewater sources, but does not discharge, a new or existing source?	The facility is an existing source.
If a facility has safety showers and/or eye wash stations, does that constitute "potential to discharge"?	No. "Potential to discharge" only applies to regulated (i.e., in-scope) wastewater sources. As discussed earlier, if the only wastewater that a PFPR facility discharges (or has the potential to discharge) is not a regulated process wastewater under the PFPR effluent guidelines (e.g., sanitary wastewater, employee showers, laundry water), then the PFPR facility is not covered by the PFPR effluent guidelines.
Does a facility with permanently plugged drains in the PFPR process areas have a "potential to discharge"?	No. There is no potential to discharge from the process area. If a facility has no potential to adversely affect a POTW's operation or violate any pretreatment standard or requirement due to accidental spills, operational problems, or other causes so that no regulated process wastewater can reach the POTW, then the facility is not covered under the PFPR rule.
How can a facility that uses water have *no* potential to discharge if there is a connection on site to the POTW?	The determination of "no potential" relates only to regulated process wastewater sources that are addressed in the PFPR rule. Therefore, a facility may have a connection to a POTW and may use water, but still have no "potential to discharge" if the control authority concludes that there are no regulated process wastewater sources that can reach the POTW and therefore, the industrial user has no reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement.

P2 Alternative

General

What is the difference between listing a preliminary compliance decision as "P2 alternative" versus "P2 alternative with modification" in Table C of the P2 Audit?	Listing "P2 alternative" means that the facility will follow the P2 practices listed in Table 8 of the final rule for that wastewater source without utilizing any of the listed (or nonlisted) modifications. For example, if a facility generates an interior equipment cleaning rinsate, they will store and reuse the rinsate in their PFPR operations. Listing "P2 alternative with modification" means that the facility is claiming a modification (listed or nonlisted) to a Table 8 P2 practice, meaning they have a good justification to not conduct that specific practice. For example, if a facility generates an interior equipment cleaning rinsate, but has documented that biological growth occurs when they store the rinsate for that product, they could claim a listed modification to release them from the requirement to reuse that rinsate in their PFPR operations. However, the facility would still need to treat this rinsate prior to discharge to the receiving stream or POTW.
If an indirect discharger disposes of interior wastewaters, leak/spill water, and floor wash water off site, can other PFPR process wastewaters be discharged to the POTW without implementing P2 practices?	No. The reasoning behind allowing a discharge under the P2 alternative is to encourage greater use of the P2 practices. Therefore, certain general practices, such as water conservation, would still need to be implemented even though other P2 practices, such as the recycle of interior wastewater, would not be applicable if interior wastewaters were disposed of off site. However, if the facility was implementing P2 practices and disposing interior wastewaters, leak/spill water, and floor wash water off site, the facility could discharge the remaining PFPR process wastewater sources to a POTW without prior treatment.

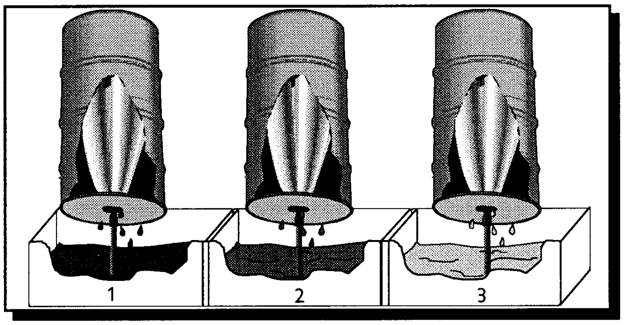
P2 Practices/Best Management Practices

How does EPA define triple rinsing of equipment?	EPA defines triple rinsing in 40 CFR 165.1 (Regulations for the Acceptance of Certain Pesticides and Recommended Procedures for the Disposal and Storage of Pesticides and Pesticides Containers), as follows: "Triple rinse means the flushing of containers three times, each time using a volume of the normal diluent equal to approximately ten percent of the container's capacity, and adding the rinse liquid to the spray mixture or disposing of it by a method prescribed for disposing of the pesticide." The Container regulation also allows for an equivalent pressure rinse. Note that the final PFPR rule does not require triple

rinsing as part of the P2 alternative, but when PFPR-related equipment is triple rinsed/pressure rinsed, the wastewater generated would be covered by the P2 alternative if it is generated from in-scope PFPR production and wastewater sources.

Why is the drum rinsing station referred to as countercurrent rinsing?

The drum rinsing station is not *true* countercurrent rinsing; however, it is operated in a countercurrent fashion, where the drums are moved from station 1 to 2 to 3 and the water is moved from Station 3 to 2 to 1, where station 1 contains the most concentrated rinse and station 3 contains the least concentrated rinse. When station 1 becomes too contaminated to effectively rinse drums, fresh water is used to replace it, and station 1 becomes station 3, station 3 becomes station 2, and station 2 becomes station 1.



Why didn't EPA include the operation of a countercurrent drum rinsing station that uses solvent in the list of P2 practices?

Drum rinsing stations allow for the recycle (as opposed to reuse) of drum rinsates (note: discharge from drum rinsing stations must be treated prior to discharge). EPA did not specifically list the use of countercurrent drum rinsing stations for solvent-containing drums because it is not common in the industry; however, a facility could seek an unlisted modification for this practice.

Instead of using drip pans, can a facility operate a general sump in their compounding area?

A facility can operate a general sump in the compounding area as part of the P2 alternative if they can demonstrate that they are reusing the water collected in the sump. The intent of this P2 practice is to reuse the collected drips and spills, or, at a minimum, to prevent concentrated leaks and spills from increasing the pollutant loading in the floor wash water. The facility would need to request a nonlisted modification and receive approval for that modification from the permitting/control authority. If the water is not being reused, the facility would need to provide justification as to why drip pans could not be used.

Does a facility have to use drip pans, or could they use some other method of collecting drips and spills (e.g., hard pipe, welded flanges, etc.)?

The facility could implement another practice, although they would need to request a nonlisted modification. In addition, the facility must show that the alternate method would adequately prevent leaks and drips from occurring or would allow reuse of the material (see above).

Do facilities that operate wet air pollution control scrubbers discharge that wastewater?

Yes, facilities that operate these devices typically discharge a blowdown stream from the scrubber periodically. Some facilities may also operate these devices with a continuous discharge. Often, these facilities treat the scrubber water prior to discharge to the POTW or receiving stream. Note: Under the P2 alternative, facilities must employ some recirculation of water used in air pollution control scrubbers.

Can you store and reuse material for greater than 90 or 180 days?

If you are storing hazardous or characteristic material (e.g., rinsate) on site *for reuse*, it is not considered *waste* and therefore is not covered by the 90- and 180-day storage limitation. However, the RCRA regulations require that materials being stored for reuse not be accumulated speculatively. Material not considered speculatively accumulated includes material that is shown to be recyclable, to have a feasible means of being recycled, and, that during the calendar year, the amount of material recycled equals at least 75% by weight or volume of the amount of that material accumulated at the beginning of the period. This discussion is included on page 57529 of the preamble to the final rule in Appendix A.

Many inerts at a facility are also used in nonregistered products. How is it determined which inert drum rinsates are covered by the PFPR regulations?

It is the intent of the rule to cover wastewater associated with pesticide production; therefore, cleaning rinsates of drums containing inert materials used in PFPR production would be covered under the PFPR rule. Many facilities are able to separate pesticide and nonpesticide operations. Therefore, if the facility can specify that only material from certain drums are used in PFPR production, then only the rinsate from those drums is covered under the PFPR rule. If the facility cannot make this distinction, then rinsate from all drums containing that material is covered by the rule. Note: Not all drums will need to be rinsed. Many inert containing drums hold chemicals that do not trigger the rinsing requirements under FIFRA or RCRA.

A facility may be able to request a nonlisted modification if they are unable to reuse all inert drum rinsate; however, they must show good justification as to why they cannot reuse it, as well as demonstrating reuse of some of the rinsate in their PFPR process.

If a facility uses equipment to produce both solvent- and water-based products, at what point after solvent rinsing is the final water rinse considered "clean" enough (i.e., no longer containing detectable quantities of pesticide active ingredient)?	Practice 9 (listed in Table 8) states that facilities must dedicate PFPR production equipment to water-based versus solvent-based products. This practice is intended to eliminate the generation of solvent-contaminated wastewater, which are typically unable to be reused in PFPR operations. By dedicating production equipment, facilities may reuse solvent rinses and water rinses into solvent-based and water-based formulations, respectively. Facilities may also discuss incorporating a listed modification (i.e., operation of a solvent recovery system) or nonlisted modification to this practice with their control/permitting authority.
Does a facility have to reuse rinsates from the cleaning of refillable containers? These containers may contain impurities, which precludes the reuse of the rinsate in the product formulation because of quality control concerns.	Under the P2 alternative (for Subcategory C facilities), reusing rinsates from the cleaning of refillable containers would be required unless the facility requested a modification. Although the stated reason for not reusing the rinsate is not a listed modification, a facility could request a nonlisted modification if they are also able to supply sufficient documentation of the quality control issue. The P2 alternative is not available to refilling establishments (Subcategory E facilities); therefore, facilities are not required to reuse rinsates. However, these facilities must achieve zero discharge of all PFPR process wastewaters.
If the shipping containers/drums are metal, they may not need to be rinsed since refurbishers have a flame to clean drums.	Drums may be metal, fiber, or plastic. The PFPR rule does not require rinsing of drums; however, if drums are rinsed, the drum rinsate is a covered wastewater source and is subject to the P2 alternative.
A facility performs the first two rinses of their pesticide active ingredient raw material drums with a solvent compatible with the formulation. The third rinse uses a water/detergent blend to remove the solvent. This water/detergent blend cannot be used in the formulation or in any formulation at the facility. Is the water/detergent rinse eligible for treatment and discharge under the P2 alternative, or must it meet zero discharge (through off-site disposal)?	If the facility must use the water/detergent blend for the final rinse because a drum refurbisher requires such cleaning before accepting the drums, the facility can meet the P2 alternative by using the listed modification for Practice 8 ["REFURB"]. However, if the facility is not required by a drum refurbisher/recycler to rinse the drums in this manner, the facility must either meet zero discharge for the final rinse or request a nonlisted modification from their control authority/permitter to allow treatment and discharge under the P2 alternative. The facility could also use a drum rinsing station for the water/detergent rinsing step, which would allow for recycle of the water/detergent rinsate to clean a large number of drums.
What does a facility do with solvent used to rinse tanks, since they will not be able to reuse the solvent forever?	For solvent rinses associated with drum rinsing or interior equipment cleaning rinsing operations, it is expected that, under the P2 alternative, a facility will reuse the solvent into the formulated product (or, at a minimum, they will segregate their

	solvent rinsates from their water rinsates). If the facility is not able to completely reuse their solvent rinses in this manner, they must dispose of the solvent in accordance with appropriate disposal regulations; however, the PFPR rule only covers *wastewater* discharges (not solid or hazardous waste disposal operations).
Has EPA looked at any of the "clean laboratory practices"? Are they required for this rule and, if so, how does that affect compliance with this rule?	The words "clean," "ultra-clean," "clean techniques," "clean laboratory practices," and other words and phrases have been used to describe additional steps taken to preclude contamination during sampling and analysis of trace metals. These techniques are not required for effluent monitoring. However, EPA has been made aware that for some metals (e.g., zinc) it may be prudent to apply some of these clean techniques in effluent monitoring to assure that results are reliable and are not the result of contamination. This rule does not specifically require analytical testing, but testing may be necessary to show that the facility's treatment system is "well operated and maintained," as discussed in 40 CFR 455.41(c)(5) [page 57550 of the preamble to the final rule, located in Appendix A of this guidance manual].
The PFPR rule states that disposing of wastewater at a RCRA incinerator complies with "zero discharge." In addition, incinerator scrubber water is not considered a process wastewater. Therefore, can a facility receive BPJ allowances for incinerator scrubber water pollutant loads without implementing P2 practices?	Yes, but such an allowance must be based on the PFPR contribution to the facility's production.
If equipment used for dry production is cleaned first by running a dry carrier through to pick up residual product, followed by a water rinse, is the water rinse considered "the final rinse of a triple rinse" and therefore eligible for a waiver from pretreatment from the control authority?	In general, that water rinse could be equated to the final rinse of a triple rinse; however, the control/permitting authority will use BPJ to determine whether a waiver is appropriate to be granted.

Does inventory management only concern the management of rinsates? May it also include liquid and/or solid raw materials and intermediates in order to reduce waste generation due to shelf-life limitations?

Inventory management systems can be used for the management of raw materials, intermediates, finished products, rinsates, etc. that are associated with PFPR operations. Inventory management is not a P2 practice required by the PFPR regulation, but generally is a good practice to incorporate.

Listed Modifications to P2 Practices

If your formulation only requires the amount of water generated from the rinsing of pesticide active ingredient drums, can you discharge the rinsate from the inert drums?

Assuming that the facility has already implemented flow reduction measures when rinsing their pesticide active ingredient and inert drums, the facility would be able to use the listed inert modification. Note: many inert ingredients do not trigger FIFRA or RCRA drum rinsing requirements; therefore, inert-containing drums may not need to be rinsed prior to recycle or disposal.

Is a one-time test per product acceptable to justify the "BIOGROWTH" modification?

Yes, over the time period of the permit (usually three years), unless the product formulation or method of production is altered in a way that could affect the quality of the wastewater. If a facility is going to use laboratory testing to demonstrate biological growth (or other product deterioration), it should be performed with a sample that is representative of the formulation, as well as the typical storage period.

A facility has very long production runs (1 to 2 years) and cannot predict when product changeover will occur. When they do change over production, they generate a non-reusable rinsate. Is this facility eligible for the "DROP" modification?

After demonstrating the use of water conservation practices (as specified in P2 practice #1 in Table 8 of the PFPR rule), a facility could use historical production data to support the "DROP" modification. This modification allows the facility to discharge interior rinsates under the P2 alternative when the facility is dropping registration or production of the formulation and there is no compatible formulation for reuse of the rinsates or the facility can provide a reasonable explanation of why it does not anticipate formulation of the same or compatible formulation within the next 12 months.

Nonlisted Modifications

Can economics be taken into account when asking for waivers on interior rinsates (i.e., for a nonlisted modification)?

EPA has not specified economics as a modification to Table 8; however, local authorities have the opportunity to use best professional judgement in considering nonlisted modifications. Note, though, that POTWs and control authorities may not be able to be flexible in approving nonlisted modifications for PFPR facilities if they are tied to what they are allowed to discharge to their receiving streams.

EPA did evaluate the cost of PFPR facilities complying with the P2 alternative and found that the P2 alternative (with listed modifications) is economically achievable for the industry. In addition, EPA built in other types of waivers to treatment. EPA will allow the control authority to waive the pretreatment requirements for floor wash and the final interior rinse of a triple rinse that has been demonstrated to be non-reusable when the facility demonstrates that the level of pesticide active ingredients and priority pollutants in these wastewaters are present in concentrations too low to be effectively pretreated at the facility. In addition, these pollutants must neither pass through nor interfere with the operation of the POTW (see 40 CFR 403.5). The control authority should take into account whether the facility has used water conservation practices when generating such a non-reusable wastewater.

Is there a listed modification for toll formulators/packagers so that they do not have to dedicate solvent- vs. water-based production equipment, since their production changes so often and they cannot control what products are made when?

No. However, these toll formulators could install a solvent recovery system (as some toll formulators have already done) and take the listed modification ("RECOVERY"). In addition, the facility may be able to justify an unlisted modification; however, the fact that the facility is a toll formulator is not justification enough.

Practice 7 in Table 8 of the rule allows for disposal of rinse water from cleaning shipping containers if a staged drum rinsing system is used. Is this system an acceptable alternative for solvent-based products as well (i.e., Practice 8)? In both practices, product quality objectives generally dictate disposal of drum rinsates. The use of staged drum rinsing will minimize the volume of waste generated. With increasingly stringent FIFRA regulations on cross-contamination, we are reluctant to reuse rinsate from containers that have been out of our direct control even though the containers are in dedicated service.

Drum rinsing stations allow for the recycle (as opposed to reuse) of drum rinsates (note: discharge from drum rinsing stations must be treated prior to discharge). EPA did not specifically list the use of countercurrent drum rinsing stations for solvent-containing drums because it is not common in the industry; however, a facility could seek an unlisted modification for this practice.

P2 Audit

Does a facility need to track raw material bags, which are emptied and disposed of, during the P2 audit?

No, the P2 audit that is suggested by EPA for compliance with the PFPR rule focuses on water use and wastewater sources. Therefore, it is not intended to track nonwater waste sources such as empty raw material bags. However, it may be useful for facilities to evaluate all waste sources (including solid wastes and air emissions) associated with their processes to identify potential P2 opportunities that limit cross-media transfers.

P2 Allowable Discharge

What is the *de minimis* exemption allowed by this rule?	The rule does not have any *de minimis* exemptions, but does have a P2 allowable discharge, which is the discharge of any remaining PFPR wastewaters after implementation of P2 practices and any necessary treatment. The amount is expected to be small; however, it is not referred to as a *de minimis* exemption because it is not quantifiable.
Is there a *de minimis* concentration of pesticide active ingredient allowed in wastewater (i.e., if the concentration is below the *de minimis* value, is it exempted from regulation)?	No, there is no *de minimis* concentration of pesticide active ingredient exempted from the rule. However, certain products or pesticide active ingredients are exempted, and certain wastewaters are exempted based on their source. For Subcategory C, please refer to Section 455.40(c), (d), (e), and (f) for a discussion of these exemptions. For Subcategory E, please refer to Section 455.60(b) and (c). The final rule may be found in Appendix A of this guidance manual.
Is there a volume or upper limit to the P2 allowable discharge?	No, a facility may discharge whatever remains after implementation of the specified P2 practices (and treatment when necessary). Note: the P2 practices include water conservation practices, which will reduce the volumes of wastewater to be treated and discharged.
How does a facility document "insignificant" levels of pesticide active ingredient and obtain a waiver for floor wash and outside packaging equipment wipe-down rinsate?	A control authority may grant a waiver that removes the requirement to pretreat certain wastewaters prior to discharge. This waiver may be granted to indirect dischargers for two types of wastewaters: floor wash water or the final rinse of a non-reusable triple rinse (note that under the P2 alternative, exterior equipment cleaning rinsate is not required to be pretreated). The waiver may be granted only when the levels of pesticide active ingredients and priority pollutants are too low to be effectively pretreated and have been shown to neither pass through nor interfere with the operation of the POTW (see footnote 9 on page 57529 of the final rule, located in Appendix A of this guidance manual). The granting of such a waiver is through the best professional judgement of the control authority/POTW; therefore, the facility must work with the control authority/POTW to determine the documentation necessary to demonstrate these items.

Treatment/Treatability Issues

Wastewaters Requiring Treatment

If a facility chooses the P2 alternative, will they always have to install and operate a wastewater treatment system? What PFPR wastewater requires treatment prior to discharge?

The P2 alternative of the final PFPR rule stipulates that direct discharging facilities must treat *any* PFPR wastewater that remains following implementation of the P2 practices. Direct discharging facilities that are also pesticide manufacturers may be able to use their current treatment systems to treat PFPR wastewaters. Indirect discharging facilities must only treat, prior to discharge, certain PFPR wastewaters that remain after the facility has implemented the P2 practices. These wastewaters are all interior equipment cleaning rinsates (including drum rinsates), leak and spill cleanup water, and floor wash water (see Section IV of the preamble to the final rule in Appendix A of this guidance manual).

Does DOT test bath water require treatment prior to discharge if a can has burst in the bath?

If the bath is operated as a batch bath, the bath water may be discharged indirectly without treatment, even if a can has burst in the bath. Treatment is required prior to direct discharge.

If the bath is operated as a continuous overflow bath, the bath water must either have some recirculation under the P2 alternative (and may be indirectly discharged without treatment) or the facility must meet zero discharge for this source.

Many facilities have standard operating procedures in place for when cans burst in a DOT bath. At many facilities, these procedures include collecting the pesticide-containing wastewater for off-site disposal.

Treatment Technology Operations

Activated Carbon

What is the difference between the feed rate and the capacity of the carbon?

The feed rate is the rate at which wastewater enters the activated carbon adsorption unit. It is a unit of flow (i.e., volume per unit time), such as gallons per minute or liters per second. The feed rate should allow the wastewater sufficient time to contact the carbon so that contaminants can be adsorbed onto the carbon. If the feed rate is too high, pesticide active ingredients will pass through the carbon adsorption system that otherwise could have been adsorbed. During its treatability testing, EPA used a feed rate that gave the wastewater an empty bed residence time of approximately 15 minutes.

The capacity is the amount of pesticide active ingredient that will be adsorbed per amount of carbon. It is usually given in units of weight of pesticide active ingredient removed per weight of carbon, such as grams of pesticide active ingredient

	removed per gram of carbon. Determining the capacity can help one determine how much carbon is needed in the unit to remove a particular amount of chemical.
Does an activated carbon system have to be run continuously?	No, an activated carbon system may be run in batch mode. Facilities may store wastewater prior to treatment (storage of wastewater is common in this industry). EPA observed PFPR facilities treating wastewater with activated carbon in batch mode and also performed activated carbon treatment in batch mode on wastewaters collected from PFPR facilities. In addition, PFPR facilities with wastewater matrices that vary daily may find that batches of stored wastewater may be more consistent from treatment period to treatment period.
Since the PFPR rule does not require testing, how does one determine when to change carbon in an activated carbon system?	Although the rule does not require specific testing, it does require that a treatment system be *demonstrated* to be well operated and maintained. To demonstrate this, a facility may need to perform some testing to determine when carbon breakthrough occurs for their system and therefore when the carbon needs to be changed.
Can you use TOC to determine carbon breakthrough?	In some cases, TOC or other parameters may be used as an indicator of carbon breakthrough by a pesticide active ingredient, but only after treatability testing or monitoring has been conducted that demonstrates that TOC is a good indicator of breakthrough of that pesticide active ingredient. A parameter may be a good indicator of carbon breakthrough for a pesticide active ingredient if it tends to break through before or about the same time as the pesticide active ingredient, but not if it breaks through after the pesticide active ingredient.
When using activated carbon adsorption as a treatment technology, what does the facility do with the carbon once it is saturated? Must it be disposed of as a hazardous waste?	Spent activated carbon should be disposed of or regenerated. Manufacturers of activated carbon may take the carbon back for regeneration; however, the cost of regeneration typically depends on the amount of carbon to be regenerated, the distance to the regeneration facility, and other factors. Some facilities may wish to dispose of their spent activated carbon instead of having it regenerated. In this case, the activated carbon would need to be disposed of as hazardous waste if it meets the definition of hazardous waste in 40 CFR 261.4. Many pesticide active ingredients are not RCRA-listed hazardous wastes, and most PFPR wastewaters do not exhibit hazardous waste characteristics. Residue from treatment of PFPR wastewaters, such as spent activated carbon, would not be considered a hazardous waste if it did not contain a listed hazardous waste and/or did not exhibit a characteristic of a hazardous waste.

Emulsion Breaking

When performing emulsion breaking, won't the removal of the oil/scum layer remove organic pollutants?

Yes. The oil/scum layer removed during emulsion breaking typically contains some level of organic pollutants, and may also include organic pesticide active ingredients. During treatability tests conducted by EPA on wastewater collected from PFPR facilities, the emulsion breaking step typically lowered the pesticide active ingredient concentration in the remaining wastewater. However, it did not typically reduce the pesticide active ingredient concentration enough to be considered an adequate pesticide active ingredient treatment technology.

In general, pretreatment technologies are meant to be used in conjunction with the pesticide active ingredient destruction and removal technologies listed in Table 10, or other technologies demonstrated to be equivalent to those listed in Table 10. However, it is possible that some technologies that EPA has identified as pretreatment technologies can provide treatment equivalent to the technologies listed in Table 10. In many of the treatment systems sampled by EPA, removal of pesticide active ingredients was observed during pretreatment steps. For example, emulsion breaking typically occurs at conditions of low pH and temperature, which may also hydrolyze some pesticide active ingredients. An equivalency demonstration as described in Chapter 7 of the P2 Guidance Manual would be required for any pretreatment technology that a facility wished to use as the primary treatment technology for a pesticide active ingredient.

Does a facility have to use sulfuric acid or other concentrated acid to perform the emulsion breaking step?

No. It is not necessary to use a specific acid to perform emulsion breaking, as long as the selected acid lowers the pH to the desired level. In general, any strong acid (e.g., sulfuric, hydrochloric, or nitric acid) could be used. During EPA treatability studies on PFPR wastewater, sulfuric acid was used to lower the pH of wastewaters for emulsion breaking and neutralization after hydrolysis at high pH. However, facilities should be aware that the addition of acid to PFPR wastewater may generate toxic or hazardous components, so an acid should be chosen that will minimize the potential adverse health and safety risks and the generation of toxic and hazardous compounds. For chemicals that react to form hazardous or toxic byproducts under acidic conditions, regardless of the acid used, it may be advisable to use a different treatment technology that does not lower the pH of the wastewater, or to use P2 practices or off-site disposal instead of treating the wastewater.

Hydrolysis

What types of acid are used to perform acid hydrolysis?

There is no specific type of acid that must be used for any of the processes used to treat PFPR wastewaters, including acid hydrolysis. The only requirement is that the acid be capable of achieving the desired pH. In general, any strong acid, such as sulfuric, hydrochloric, or nitric acid, could be used. During EPA treatability studies on PFPR wastewaters, sulfuric acid was used to lower the pH of wastewaters for emulsion breaking and neutralization after hydrolysis at high (alkaline) pH. Facilities should also be aware that toxic or hazardous components may be generated through the addition of acid to PFPR wastewater, so an acid should be chosen that will minimize the potential adverse health and safety risks and the generation of toxic and hazardous compounds.

Precipitation

When performing hydrogen sulfide precipitation, what does EPA suggest to ensure that there is no excess hydrogen sulfide in the effluent from the system?

When performing chemical precipitation to remove metals or organo-metallic pesticide active ingredients, sodium hydroxide and/or sodium sulfide may be used to form these contaminants into a precipitate. EPA does not recommend adding hydrogen sulfide to remove pesticide active ingredients, and hydrogen sulfide should not form during sulfide precipitation as long as a pH of 7 or above is maintained in the system.

In general, the amount of sodium hydroxide and sodium sulfide added to wastewater to perform chemical precipitation should be based on the concentration of metals contained in the wastewater. However, facilities should conduct bench- or full-scale treatability tests to optimize the performance of their chemical precipitation treatment step. To determine whether excess sodium sulfide has been added during the chemical precipitation step, a facility should monitor the chemical precipitation effluent during the treatability testing and during full-scale treatment as it deems necessary. EPA based its cost estimates on an addition of 0.416 pounds of sodium sulfide per 1,000 gallons of wastewater treated for all facilities because it did not have information available on the specific concentrations of metallic and organo-metallic contaminants in PFPR wastewaters.

Treatment Residuals

How are the oil/sludge layers disposed of from treatment systems? Are they hazardous?

The oil/sludge layers from treatment systems may be disposed of in a variety of ways. They may be reused in the PFPR product, disposed of in an on-site treatment unit (such as an incinerator), or they may be disposed of off site. Off-site disposal may be done at a centralized waste treatment facility, waste-oil recovery facility, or other treatment and disposal facility. Oil, sludge, and other residuals from treatment are hazardous waste if they meet the definition of hazardous waste in 40 CFR 261.4.

Determination of Treatment Equivalency

If a wastewater requires treatment, does it have to be treated using the treatment technologies listed in Table 10?	No, facilities may use the appropriate Table 10 technology *or* an equivalent technology *or* a pesticide manufacturing treatment system that is treating the same pesticide active ingredients that are manufactured as are formulated/packaged/repackaged.
How does one identify an appropriate treatment technology for a pesticide active ingredient that is not listed in Table 10?	EPA tried to include all pesticide active ingredients identified at the time of promulgation of the regulation. As new pesticide active ingredients come into being, one could apply the technology transfer methodology (described in the treatability database reports, listed in Table 6-1 in Chapter 6 of this manual) that EPA used to develop Table 10. Also, as a starting point, one could identify the treatment technology(ies) listed in Table 10 for structurally similar pesticide active ingredients.
How does a facility justify using a technology other than those listed in Table 10?	The facility must demonstrate that the technology will be just as effective as the technology listed in Table 10 of the final rule for the pesticide active ingredient in question, or that the technology is used in a pesticide manufacturing treatment system used to treat the same pesticide active ingredient. Chapter 7 of the P2 Guidance Manual discusses the requirements for demonstrating that a technology will provide treatment performance equivalent to the technology listed in Table 10. In order to demonstrate equivalence, a facility must include treatability test results or sampling results (including those from literature, similar wastewater matrices, or self-monitoring) in their on-site compliance paperwork. A more detailed discussion of treatability tests is contained in Chapter 6 of the P2 Guidance Manual. The determination of equivalency will be based on a combination of the percent removal of pesticide active ingredient (in general, greater than 90% removal is required), final effluent concentration of the pesticide active ingredient, and the minimum detection limit for the pesticide active ingredient. If treatability information is not available for a particular pollutant, it may be necessary to identify a treatment technology based on the facility's knowledge of the pollutant. For example, a technology that is effective on one pesticide active ingredient is often effective on other pesticide active ingredients with similar chemical properties and structure. Treatment effectiveness should, however, be verified through a treatability test. See Table 6-1 in Chapter 6 for sources of information on identifying treatment technologies and transferring treatability data from one pesticide active ingredient to another.

Are any pretreatment technologies alone effective enough to remove pesticide active ingredients and priority pollutants, or must they be used in combination with other technologies?

In general, pretreatment technologies are meant to be used in conjunction with the pesticide active ingredient destruction and removal technologies listed in Table 10, or other technologies demonstrated to be equivalent to those listed in Table 10. However, it is possible that some technologies that EPA has identified as pretreatment technologies can provide treatment equivalent to the technologies listed in Table 10. In many of the treatment systems sampled by EPA, removal of pesticide active ingredients was observed during pretreatment steps. For example, emulsion breaking typically occurs at conditions of low pH and high temperature, which may also hydrolyze some pesticide active ingredients. An equivalency demonstration such as the one described in Chapter 7 of the P2 Guidance Manual would be required for any pretreatment technology that a facility wished to use as the primary treatment technology for a pesticide active ingredient.

A facility that currently operates an activated carbon column generates wastewater containing 2,4-D, MCPP, and MCPA (all structurally similar chemicals). Table 10 lists chemical oxidation for 2,4-D and MCPA, but lists activated carbon for MCPP. Does the facility have to install both treatment technologies in an on-site treatment system?

Not necessarily. The PFPR rule allows technologies other than those listed in Table 10 to be used to treat wastewater containing a particular pesticide active ingredient, provided the facility can demonstrate that the technology is equivalent to the one listed in Table 10 (Chapter 7 of the P2 Guidance Manual discusses the requirements for demonstrating that a technology will provide treatment performance equivalent to the technology listed in Table 10). In this case, if the facility demonstrates that chemical oxidation is equivalent to activated carbon adsorption for MCPP, or that activated carbon adsorption is equivalent to chemical oxidation for 2,4-D and MCPA, only one of the technologies would need to be installed.

The technologies listed in Table 10 to 40 CFR Part 455 are those that are expected to effectively treat the PAI. When more than one technology can effectively treat a PAI, EPA listed the technology that is least expensive to employ. In the case of 2,4-D, EPA has data indicating that it is treatable by either chemical oxidation or activated carbon adsorption, but chemical oxidation is expected to be less expensive, therefore this technology is listed in Table 10. In the cases of MCPP and MCPA, EPA has data indicating that activated carbon adsorption is an effective treatment, but information on chemical oxidation is not available for these chemicals. Listed below are references gathered by EPA concerning the treatability of 2,4-D, MCPP, and MCPA. These documents can be found in the administrative record for the final PFPR rule using the document control numbers (DCNs) shown below.

Aly, O.M. et al., *Removal of 2,4-Dichlorophenoxyacetic Acid Derivatives from Natural Waters*, Rutgers University, Dept. of Environmental Science, New Brunswick, NJ, February 1965 (DCN F6303).

Research Triangle Institute, *Treatment Technology For Pesticide Manufacturing Effluents: Atrazine, Maneb, MSMA, and Oryzalin*, Research Triangle Park, NC, February 2, 1980 (DCN F5795).

Environmental Science and Engineering, Inc., *Final Report of Laboratory Study of Pesticides Wastewater Treatability*, November 11, 1985 and revised January 9, 1987 (DCN F6328).

Is an incinerator treating wastewater from pesticide manufacturing and PFPR operations that has an NPDES discharge permit for scrubber water considered a wastewater treatment unit (i.e., is the incinerator exempt from RCRA Part B permit requirements)?

No, the incinerator described above would not be exempt from RCRA Part B permit requirements for the following reason.

A unit that satisfies the definition of "wastewater treatment unit" set forth in 40 CFR 260.10 is exempt from Part 264 requirements for treatment, storage, and disposal facilities (TSDFs), Part 265 requirements for interim status TSDFs, and Part 270 requirements for RCRA permits. *See* 40 CFR 264.1(g)(6), 265.1(c)(10), and 270.1(c)(2)(v).

To satisfy the definition of "wastewater treatment unit" at 40 CFR 260.10, the unit must be a device that:

(1) Is part of a wastewater treatment facility that is subject to section 402 or 307(b) of the Clean Water Act;

(2) Receives and treats or stores an influent hazardous wastewater, or that generates and accumulates a hazardous wastewater treatment sludge, or treats or stores a hazardous wastewater treatment sludge; and

(3) Is a tank, as defined in § 260.10.

The incinerator described in the question would not satisfy the third criterion. Although the incinerator generally meets the broad definition of tank, it also meets the more specific definition of incinerator in § 260.10. EPA does not consider a unit to be a "tank" if another, more immediately relevant term would apply to that unit. Therefore, the incinerator would not be a wastewater treatment unit, and thus, would not be exempt from the requirements in Parts 264, 265, and 270. Instead, the incinerator would be subject to the Subpart O requirements for incinerators in Parts 264 and 265, permit requirements in Part 270, and any other relevant requirements.

Can EPA provide a reference in the pesticide manufacturing development document/final rule that demonstrates that incineration is equivalent and/or superior to treatment methods listed in the PFPR rule for various pesticide active ingredients?

Table 7-11 in the *Development Document for Effluent Limitations Guidelines, Pretreatment Standards, and New Source Performance Standards for the Pesticide Chemicals Manufacturing Point Source Category* (EPA 821-R-93-016, September 1993) lists the BAT technologies used to establish numerical limitations for 120 pesticide active ingredients in that industry. These BAT technologies are considered to be equivalent to the technologies listed in Table 10 of the final PFPR rule.

Table 7-11 of the Pesticide Manufacturing Development Document lists incineration as the BAT technology for the following pesticide active ingredients: pendimethalin, acephate, phorate, terbufos, captafol, fenarimol, isopropalin, and tebuthiuron.

In addition, the preamble to the PFPR regulation (61 FR 57517) states that on-site incineration is equivalent to off-site incineration and is considered to meet zero discharge for the PFPR rule. See page 57527 of the preamble to the final rule located in Appendix A for more discussion regarding on-site incineration as a means to achieve zero discharge.

Treatability Testing

Did EPA evaluate inert materials in treatability tests?	EPA did not focus on the inert materials; however, in addition to analyzing wastewaters for the specific pesticide active ingredients, EPA analyzed for a full scan of organic and metal pollutants, including priority pollutants, to identify other potential pollutants of concern from inert ingredients. Treatment efficiencies were focused on pesticide active ingredients and priority pollutants.
Are the EPA treatability reports, including those reports listed at the end of Chapter 5, available on the Internet?	Not at this time, although all treatability reports generated during the development of this PFPR effluent guideline are available through EPA's Water Docket (see page 46 of Chapter 5 for information on contacting the EPA Water Docket). Please note that some treatability reports contain confidential business information and are available in a nonconfidential form.
Do treatability tests require elaborate QA/QC procedures?	No, the level of QA/QC conducted during EPA sampling and treatability testing is not necessary for facility treatability testing, but facilities should use a level of QA/QC that will ensure the quality of their data. Chapter 6 of the P2 Guidance Manual provides some direction on using QA/QC in treatability testing. The QA/QC procedures include preparation of a QA/QC plan and the collection of field duplicate, field blank, equipment blank, and trip blank samples.
What type of samples should a facility collect to test how the treatment system is operating (grab vs. composite)?	The type of samples collected to determine the efficiency of an operating treatment system depends on whether the unit operation is a batch or continuous operation. Generally, grab samples are collected for batch operations and composite samples are collected for continuous operations. Samples collected to characterize raw waste streams are typically grab samples because of the batch nature of wastewater generation. Samples collected during treatability testing are typically grab samples.
Do bench-scale test results scale up well to full scale?	The correlation between bench- and full-scale test results will depend on a variety of factors, including how well the bench-scale test was designed and performed, the difference in wastewater volume treated between bench- and full-scale treatment, the type of technology tested, the contaminants in the wastewater treated, and other factors. If a bench-scale test is well

designed and performed, it should scale up well. However, the scale-up invariably results in some difference from bench-scale results due to the different equipment, operating conditions, and other parameters at the full scale. Although the bench-scale test can provide valuable information for the design and operation of a full-scale treatment system, it is commonly necessary to adjust the full-scale treatment system design and operating parameters to optimize performance. For scaling up from a bench-scale test to a large-volume full-scale treatment system, it may be advisable to perform a pilot-scale treatability test on an intermediate scale. Also, in some PFPR facilities, the volume of PFPR wastewater to be treated may only require equipment that typically would be considered pilot- or bench-scale.

An example that illustrates the difference in how different treatment technologies compare in terms of scale-up is discussed below. Hydrolysis bench-scale tests typically correlate well with full-scale treatment, provided an actual wastewater was treated, the full-scale unit is well-mixed, and other operating parameters such as temperature, pH, and treatment time are the same. However, activated carbon bench-scale tests may not scale up as well. Activated carbon bench-scale tests frequently use a beaker in which some activated carbon is allowed to come into equilibrium with a wastewater to determine the saturation loading. This is different from an actual treatment system in which wastewater passes through a bed of activated carbon, and therefore can result in differences between saturation loadings observed during bench- and full-scale operation.

What reference shows which pesticide active ingredients in Table 10 had treatment technologies established based on a transfer of treatability data?

This information is presented in the *Final Pesticide Formulators, Packagers, and Repackagers Treatability Database Report* and *Addendum* (see Chapter 5 for more detail on how to access these sources).

Sampling/Monitoring

Why is it necessary to evaluate the wastewater matrix, particularly as it pertains to inert ingredients that may be present in the wastewater?

Inert ingredients are covered in discharges from PFPR operations if they are also priority pollutants. However, the reason EPA suggests evaluating the wastewater matrix during the P2 audit is to identify possible contaminants in wastewater that may hinder effective treatment of pesticide active ingredients or priority pollutants. In these cases, the wastewater may require pretreatment in order to allow the treatment system to effectively remove the pesticide active ingredients.

How does one determine if the pesticide active ingredient is in the water phase or oil/sludge phase of a wastewater? Can one use alcohol-water coefficients?	Octanol-water coefficients can be used to determine whether a pesticide active ingredient is likely to be in the water phase or the oil phase of a wastewater. However, octanol-water coefficients are determined using a pure octanol-water system, whereas PFPR wastewaters typically contain a variety of contaminants that may render the octanol-water coefficient invalid for a particular wastewater. In addition, octanol-water coefficients are not available for many pesticide active ingredients. Therefore, the various phases of a wastewater may need to be chemically analyzed to determine what fraction of pesticide active ingredient has partitioned to each phase.
If a facility chooses to meet zero discharge through no discharge of process wastewater pollutants (rather than no flow), how do they show "zero"?	In order to demonstrate zero discharge analytically (instead of via "no flow"), any pesticide active ingredient potentially present in the wastewater must have an EPA-approved analytical method for use in wastewater, and the pesticide active ingredient must not be present at or above the detection limit in the approved method. Some methods contain a detection limit, a method detection limit (MDL; 40 CFR 136, Appendix B), an estimated detection limit, or some other detection limit concept. The words "detection limit" are generally understood to encompass these terms.
Does a facility need to monitor for priority pollutants when conducting a treatability test to develop a relationship for surrogate parameters used to demonstrate a treatment system is well operated and maintained? If so, must they monitor for the whole list of priority pollutants, or only those pollutants that were identified in the BMR?	The PFPR rule does not require monitoring or the establishment of a surrogate parameter for compliance. However, if a facility chooses to use a surrogate parameter to demonstrate that a treatment system is well operated and maintained, they would monitor for specific pesticide active ingredients and the constituent chosen as the surrogate to establish the relationship between the surrogate and the PFPR process wastewater pollutants. In terms of priority pollutants monitoring, a facility could use a list of those priority pollutants identified in the BMR; however, if products/raw materials have changed since the BMR was developed, the facility should include any additional priority pollutants expected to be in the wastewater.
Are industrial users (IUs) required to submit monitoring data to the POTW/control authority if samples are collected in addition to samples required by the PFPR regulation?	Sample collection is not specifically by the PFPR regulation. However, the individual control mechanism with the POTW/control authority may require monitoring and analysis to demonstrate continued compliance; this is described in 40 CFR 403.12(g). If a facility is using certain monitoring data to back up or demonstrate information in their initial or periodic certifications for the P2 alternative, then such data should be kept with the facility's on-site compliance paperwork and would be available to the POTW/control authority, as well as to enforcement officials.

EPA Test Methods

What if a wastewater matrix causes interference with the analytical method (and therefore, the detection limit is higher than normal)?	The discharger must eliminate the interference using the procedures given in EPA's *Guidance on Evaluation, Resolution, and Documentation of Analytical Problems Associated with Compliance Monitoring* (EPA 821-B-93-001) or other interference elimination procedures.
Are the EPA-approved methods highly specific methods?	Many of the EPA-approved methods are based on methods developed by pesticide active ingredient manufacturers. In general, these methods are expensive to run and not performed by many laboratories. However, there are several methods that will detect a series of different pesticide active ingredients. For example, Method 1656 is used to analyze organo-halide pesticides. For more information on pesticide active ingredient methods, please reference *Methods for the Determination of Nonconventional Pesticides in Municipal and Industrial Wastewater* (EPA 821-R-93-010). EPA has also produced other reference materials on water and wastewater methods, including the Environmental Monitoring Methods Index (a powerful PC database that electronically links over 4,000 substances with methods and regulations) and the *Methods and Guidance for the Analysis of* Water (EPA 821/C-97-001). These reference materials are available through the National Technical Information Service (NTIS), which can be reached between 8:30 a.m. and 5:00 p.m. Eastern Time at (703) 487-4639 or via the Internet at **http://www.ntis.gov/ordernow**.
Does EPA have method detection limits for each pesticide active ingredient that has an EPA-approved analytical method?	Yes, although facilities must also take into account the wastewater matrix and the number of dilutions performed by the laboratory.
Is it possible to use a non-EPA-approved method for pesticide active ingredients that do not have approved methods promulgated (i.e., use a facility's method)?	Yes. For pesticide active ingredients that have no EPA-approved analytical methods, PFPR facilities may use alternative sampling and analytical methods as specified in 40 CFR 136.4 and 403(g)(4). See page 57548 in the preamble to the final rule in Appendix A for more detail.
Are the methods promulgated under Part 455 for pesticide active ingredients valid for the NPDES program and pretreatment programs under Part 136?	Yes. Language in 40 CFR 403 and 136 allows for analytical methods found in Part 136, Section 304(h) of the Clean Water Act, *or* that are approved by the Administrator (403.12(g)(4) and 136.4, 136.5). Therefore, although the Part 455 regulations have not been incorporated into Part 136, the Administrator has approved these analytical methods by signing the Pesticide Manufacturing Effluent Limitations Guidelines and Standards (58 FR 50637; September 28,1993). These pesticide active ingredient methods have been published in a document entitled, "*Methods for the Determination of Nonconventional Pesticides in*

Municipal and Industrial Wastewater, EPA-821-R-93-010-A, Revision 1, August 1993."

Are the methods part of the AWWT (American Waste Water Treaters) published methods?

The EPA-approved pesticide active ingredient methods have been published in the FR (40 CFR 455.5, Subpart D), and are available from EPA (*Methods for the Determination of Nonconventional Pesticides in Municipal and Industrial Wastewater*, EPA-821-R-93-010-A, Revision 1, August 1993).

How does a facility adjust to changing method detection limits (MDLs) for pesticide active ingredients if the "zero discharge" option (with flow) is the compliance option of choice? Would a capping of MDLs be allowed?

No. Facilities using MDLs to demonstrate compliance with zero discharge are allowed to do so because MDLs are the closest to zero that can be currently measured. The MDLs are *not* the set limitation. If improvements in analytical instruments leads to the lowering of MDLs, those facilities demonstrating zero using MDLs would need to show compliance with the lower MDLs.

Determination of Sufficient Treatment

What does EPA consider "effectively treated" for this rule (i.e., is it a certain percent removal)?

A facility can evaluate the effectiveness of a treatment technology by performance measures that look at how much contaminant is removed from the wastewater, the amount of other waste generated by the treatment step, and the cost of the treatment. The facility should evaluate three measures to determine if the treatment technology effectively removed the contaminant: percent removal, final effluent concentration, and minimum detection limit. For example, if 95% or more of a constituent is removed by a technology, that technology would be considered effective. Conversely, if a technology only removes 30% of a constituent, but the constituent is removed to below its detection limit, EPA considers the constituent to be effectively treated. The facility should also take cost into account. A technology may effectively remove a constituent, but at a high cost relative to other treatment technologies that may also effectively remove the constituent. Chapter 6 of the P2 Guidance Manual provides more detail on how to measure treatment effectiveness.

If a facility generates high concentrations of pesticide active ingredients in rinsewaters, is the goal to treat the wastewater to nondetect levels of pesticide active ingredients? If not, what criteria determine whether a wastewater is effectively treated?

Nondetect levels are a good goal, but are not required by the P2 alternative. The goal of the P2 alternative is to use the pollution prevention, recycle, and reuse practices in the rule (in combination with treatment when necessary) to achieve a reduction of pollutants, while preventing possible cross-media impacts associated with zero discharge. Following the implementation of the P2 practices, evaluation of the percent removal or destruction of the pesticide active ingredient, as well as the final effluent concentration and detection limit, determines whether a wastewater has been effectively treated. In most cases, these technologies can reduce the concentration of the pesticide active ingredient to at or near detection limits. A treatment goal may be set by the control/permitting authority using best professional judgement.

Will most PFPR facilities be able to run a treatment system as envisioned by EPA, in terms of size and cost?

Yes. Most PFPR facilities do not generate large volumes of water, and will be able to store their wastewater over time and treat the water in 3 to 4 batches per year. In many cases, facilities will be able to implement P2 practices instead of treating their wastewater. Some facilities may also choose to contract haul small volumes of wastewater for off-site disposal.

The treatment systems effective on PFPR wastewaters generally use simple, easily operated unit operations that use standard, off-the-shelf equipment, particularly at the small scale needed by the typical PFPR facility. The treatment system can be designed to be operated in a batch mode, so facilities generating a small volume of wastewater can store it until a sufficient volume is available for treatment. During the rulemaking process, EPA designed a small-scale wastewater treatment system that was then used to treat wastewaters collected from PFPR facilities in batches of about 100 gallons. This system used standard, off-the-shelf equipment. EPA also evaluated the cost of compliance with the P2 alternative and found that the P2 alternative (with listed modifications and appropriate treatment) is economically achievable for the industry.

Is EPA concerned about reaction byproducts that may be generated during wastewater treatment operations? Sometimes these byproducts have a negative impact on the environment, but are not analyzed or treated.

Yes, EPA is concerned about reaction byproducts; however, for this rule, EPA focused on those reaction byproducts that are pesticide active ingredients or priority pollutants. In general, reaction byproducts have lower toxicity factors than the pesticide active ingredients themselves.

The control/permitting authority should evaluate the possible impacts on local limitations from specific chemical byproducts that may form during treatment operations. The presence of these byproducts may require additional treatment, or may require a different primary treatment technology to be used in specific instances.

In one treatabilty study conducted by EPA, chlorinated and other organic compounds were generated from chemical oxidation of PAIs using a chlorine-based oxidizer. Chemical oxidation produced: chloroform, bromodichloromethane, dibromochloromethane, and acetone in wastewater containing Metam; 1,3,5-trithiane in wastewater containing KN-Methyl; and N,N-dimethylformamide in wastewater containing Namet. Polychlorinated dioxins were also detected in parts per quadrillion concentrations in these wastewaters after treatment. Where chemical oxidation with a chlorinating agent results in the generation of chlorinated organics, use of a non-chlorinating oxidizer, such as ozone or peroxide may provide effective treatment without generating chlorinated organics.

Why is "pollution prevention" listed as an appropriate *treatment* technology?

Based on available data, EPA was unable to identify a cost-effective technology for use in the PFPR industry for some pesticide active ingredients on Table 10. Therefore, EPA determined that, if a facility generates wastewater that *only* contains such pesticide active ingredients, they are in compliance with the rule if they have implemented the Table 8 pollution prevention practices (i.e., such facilities do not have to treat PFPR wastewaters containing these specific PAIs prior to discharge).

Are all the different technologies listed in Table 10 part of a pretreatment system that a facility should have in place to treat wastewater prior to discharge to a POTW?

The technologies required for an on-site treatment system are identified based on the pesticide active ingredients present in the wastewater discharged from the facility. These technologies could be combined into one treatment train, or could be conducted individually on separate wastewaters, depending on how the facility chooses to treat their wastewater. In addition, if emulsions exist, an emulsion breaking step (or equivalent technology) is required to meet the definition of "appropriate" treatment.

Why isn't neutralization considered treatment?

For this rule, treatment is intended to mean removal or destruction of pesticide active ingredients or priority pollutants. Neutralization does not achieve that purpose.

Is there any guidance on how much money facilities should spend on treatment of PFPR wastewater?

There is no real guidance on the amount of money a facility should spend on wastewater treatment; it depends on a number of factors and the facility should consider all of these factors in making a final compliance decision. These factors include the amount of wastewater being generated, treatment currently in place at the facility, the size of the facility, and the how economically sound the facility is. A facility should consider whether treatment is the most cost-effective solution for their particular situation. A facility may be able to treat their wastewater adequately using available technologies; however, if the amount of wastewater that would need to be treated is very small, the facility may find it more cost-effective to contract haul it instead of installing or adding additional treatment technologies.

EPA performed an economic assessment for this rulemaking to determine the most cost-effective regulation for the PFPR industry. As part of this assessment, EPA estimated the cost to comply with the regulation. Subcategory C facilities were estimated to incur an average annual cost of $39,900 for stand-alone PFPR facilities and $373,000 for PFPR/manufacturing facilities; refilling establishments (Subcategory E facilities) would incur compliance costs of $1,000 or less. The estimated total annual cost to the industry is $29.9 million.

Why calculate the destruction and removal efficiency (DRE) for a constituent that is below the detection limit in the effluent?

The PFPR regulation does not require facilities to calculate the DRE of pesticide active ingredients or priority pollutants; however, it may be helpful to determine which treatment units in a treatment train are providing significant removal of the constituents of interest. For example, the following table summarizes the removal of a constituent through a treatment system consisting of hydrolysis and activated carbon. The DRE shows that even though activated carbon removes the constituent to below detection (i.e.,µg/L), the hydrolysis unit achieves the majority of the constituent's reduction (i.e., 98 percent).

Wastewater Source	Concentration (µg/L)	DRE
Raw wastewater	1,000 µg/L	–
Hydrolysis effluent	20 µg/L	98%
Activated carbon effluent	<10 µg/L	>50%

In addition, calculating the DRE can help faciliites demonstrate equivlency of an alternate technology and/or demonstrate that the treatment system is "well operated and maintained."

Can EPA clarify what is meant by "organics" in Table 6-2, Wastewater Characteristics That Adversely Impact Treatment Effectiveness, of the P2 Guidance Manual (i.e., are there specific organic chemicals that interfere with activated carbon adsorption)?

"Organics" refers to any organic chemical contained in the wastewater being treated. Due to the variable nature of PFPR formulations and operations, the specific organic chemicals contained in PFPR wastewaters and their concentrations vary from facility to facility. Therefore, Table 6-2 does not identify specific organic chemicals, but indicates where the presence of organic chemicals may cause a technology to perform poorly. In the case of activated carbon adsorption, organic chemicals will compete with the pesticide active ingredient for available adsorption sites on the carbon, reducing the total amount of pesticide active ingredient that will be adsorbed by a given amount of activated carbon, and resulting in more frequent carbon changeouts. The degree to which organic chemicals will affect the performance of activated carbon adsorption will depend on the specific organic chemicals in the wastewater, the concentrations of those chemicals, and the pesticide active ingredients targeted for removal by activated carbon adsorption. In some cases, the presence of organics may not significantly affect the performance of activated carbon, while in others it may render it ineffective. Table 6-3 lists some pretreatment technologies that may be useful in removing organics prior to treatment by activated carbon adsorption.

Who makes the decision on how much treatment is needed?

The control/permitting authority must use BPJ to determine if the facility has installed the appropriate treatment and if the treatment system is well operated and maintained.

What happens if a facility needs to add different technologies to their treatment system in the future?	If a facility plans to add new production to their PFPR operations, they must incorporate the appropriate P2 practices into their operations and identify the appropriate or equivalent treatment technology(ies) to be put in place if the new production generates wastewater to be discharged. The P2 practices and treatment technologies must be certified (e.g., at the time of submittal of the periodic certification) and approved by the control/permitting authority before the facility can begin to discharge wastewater associated with the new production.
If a facility operates a treatment system consisting of hydrolysis and activated carbon, and decides to drop hydrolysis and only run activated carbon, would the facility require approval first?	If the Table 10 technologies for the pesticide active ingredients present in the wastewater are both hydrolysis and activated carbon, then the facility would need to show that activated carbon is *equivalent* to hydrolysis for those pesticide active ingredients whose listed technology is hydrolysis before removing the hydrolysis unit from the treatment system. In addition, the facility must also demonstrate that the activated carbon system would be well operated and maintained. This would include reevaluating the frequency of carbon changeout to account for the carbon removing more pesticide active ingredients (and therefore becoming saturated more quickly).

Well Operated Treatment Systems

If a facility adds a new product (e.g., diazinon), which has a Table 10 technology of hydrolysis, can the facility use different surrogates (e.g., half-life, treatment time, pH, temperature) for that one pesticide active ingredient than are being used for the rest of the system (e.g., TOC and carbon change-out for activated carbon units)?	Yes. However, a surrogate parameter that is approved for a facility's treatment system will depend on the treatability data used to support the use of the surrogate and the ability to show a relationship in the data between the pesticide active ingredient and the surrogate.

Compliance

Baseline Monitoring Report

Is guidance available for completion of the baseline monitoring report (BMR)?	See Appendix E for EPA's guidance memorandum on completing the BMR. The BMR was due on July 7, 1997 for existing indirect dischargers.
To whom is the BMR submitted and where is this stated?	The BMR is submitted to the control authority. For states that have approved pretreatment programs, the BMR goes to the POTW/control authority. In other states, the BMR may be submitted to the regional EPA office. Section 403 of Title 40 of the

	CFR, as well as EPA Pretreatment Bulletin #13 (included in Appendix E), discuss these issues.
Does the PFPR regulation require monitoring, other than priority pollutant monitoring for the BMR?	No. Facilities will be able to generate a list of pesticide active ingredients based on the products made at their facilities. EPA guidance has suggested that monitoring for priority pollutants or other surrogate parameters (e.g., TOC) would be helpful since facilities may not always be aware of sources of these pollutants in their wastewater, particularly pollutants that may be present through the addition of inert materials to the formulated products.
How many samples are required for the BMR?	40 CFR 403.12(b)(5)(iv) states, "The User shall take a minimum of one representative sample to compile that data necessary to comply with the requirements of this paragraph." The type of sample will depend on the nature of the pollutant as described in 40 CFR 403.12(b)(5)(iii), which states "a minimum of four (4) grab samples must be used for pH, cyanide, total phenols, oil and grease, sulfide, and volatile organics. For all other pollutants, 24-hour composite samples must be obtained through flow-proportional composite sampling techniques where feasible. The Control Authority may waive flow-proportional composite sampling for any Industrial User that demonstrates that flow-proportional sampling is infeasible. In such cases, samples may be obtained through time-proportional composite sampling techniques or through a minimum of four (4) grab samples where the User demonstrates that this will provide a representative sample of the effluent being discharged." If the process produces a discharge that is a homogenous batch, one grab sample may be taken.
If a facility is covered under other categorical standards and already has a BMR on file with the control authority, do they need to submit a new BMR? Does this also apply to PFPR/manufacturing facilities that commingle wastewater from PFPR and pesticide manufacturing operations and that previously submitted a BMR for compliance with the pesticide manufacturing regulations [58 FR 50637]; can they revise that BMR or do they have to perform separate BMR monitoring for their PFPR wastewater?	At a minimum, the facility should update the non-monitoring sections of the BMR (e.g., process information, flow). In addition, if the facility is choosing the P2 alternative, they would need to list the P2 practices, if any, currently in place that affect their PFPR production/wastewaters. The facility may have to submit monitoring data for pollutants that were not present at the time they submitted the BMR for the pesticide manufacturing effluent guidelines; otherwise, historical monitoring would suffice.

In submitting the BMR, do PFPR/manufacturing facilities have to test commingled wastewater for the 126 priority pollutants or for specific pesticide active ingredient pollutants listed in Table 10?	In submitting a BMR for the PFPR regulation, facilities must monitor only for priority pollutants. Specific pesticide active ingredients used in PFPR products must be listed in the BMR, but do not require testing.
Can a facility use toxicity measurements for their BMR if they haven't been testing the specific pesticide active ingredients?	The BMR does not require pesticide active ingredient-specific measurements, although if a facility is choosing the P2 alternative, they should list the pesticide active ingredients that are present (or believed to be present) and monitor for the priority pollutants. Facilities are certainly welcome to provide additional data (e.g., toxicity measurements).

P2 Alternative/Allowable Discharge

Can you choose zero discharge for an individual source?	Yes, as long as you clearly indicate it in your compliance paperwork.
If a direct discharging PFPR facility chose to comply with the PFPR effluent guidelines by meeting a zero discharge limitation and were issued an NPDES permit that included zero discharge for their PFPR wastewaters, at the time of permit renewal or reissue, could that facility choose to switch to the P2 alternative? Would there be any "backsliding" implications?	Yes, a facility could switch from zero discharge to the P2 alternative at the time of permit renewal without invoking any regulations dealing with "backsliding," as it would not apply in this situation. "Backsliding" is a term that has been used to describe a circumstance where a facility has an NPDES permit that lists certain effluent limitations and upon renewal/reissue of the permit, the "new" effluent limitations are made less stringent then those in the previous permit. In general, "backsliding" is not allowed. The regulations that discuss "backsliding" are found at 40 CFR 122.44(l). These regulations discuss the renewal or reissue of NPDES permits (for direct dischargers) and say that the effluent limitations, standards, or conditions in the renewed/reissued permit "must be at least as stringent" as the effluent limitations, standards, or conditions in the previous permit. The regulations do provide several exemptions which would allow "backsliding" (e.g., circumstances have materially and substantially changed since the time the permit was issued). However, EPA believes that the regulations of 40 CFR 122.44(l) ("backsliding") do not apply to the situation where a PFPR facility switches from zero discharge to the P2 alternative at the time of permit renewal. This is because EPA designed the zero discharge and P2 alternative limitations of the PFPR effluent guidelines (40 CFR 455.40) to be equivalent. Therefore, the P2 alternative is not only "at least as stringent" as zero discharge, but it is just as stringent.

At first it may seem counter intuitive that some wastewater discharge, even a very small amount, is just as stringent as zero discharge. However, as discussed in the PFPR effluent guidelines preamble to the final rule (61 FR 57518; November 6, 1996), EPA believes that when considering the potential cross-media impacts associated with zero discharge (e.g., impacts to air from contract hauling for off-site incineration of dilute, low-BTU-value, wastewaters), the P2 alternative may be more protective of the environment overall.

Necessary Paperwork

Are facilities required to complete the P2 audit tables (Tables A through C) and Tables D and E for compliance documentation?

No, facilities are not required to complete these tables. They are provided as a tool. However, if a facility chooses to complete them, they can be used to meet some of the paperwork requirements (see Chapters 4, 6, and 7 of this manual for more detail).

Who is the entity that conducts a P2 audit and regulates a facility?

The control authority (for indirect dischargers) or the permitting authority (for direct dischargers) enforces the PFPR rule. The P2 audit is one way of determining compliance with the rule; however, the P2 audit is not required by the rule. The P2 audit was designed as a tool for the facilities, control/permitting authorities, consultants, etc. to help organize the various pieces of information that will aid in making compliance decisions. A control authority/permitting authority may ask a facility to conduct such an audit, or may conduct the audit themselves. The P2 audit tables were designed so that they could be used as part of the compliance paperwork, but they are not required.

Who receives the initial certification?

The control authority/permitting authority receives the certification from facilities that choose the P2 alternative and that discharge or have the potential to discharge.

Under the General Pretreatment Program (40 CFR 403), certain sampling and analysis is required to be defensible (for enforcement procedures). How does that affect the analysis that would be conducted for the PFPR rule?

40 CFR 403.8(f)(2)(vi) requires the POTW to take care and establish procedures so that sampling data and analysis can be admissible in enforcement procedures. However, Part 403.12(g) requires that Industrial User (IU) sampling must be appropriate/representative and in accordance with 40 CFR 136. Therefore, Part 403 does not require IU sampling to be defensible in enforcement procedures. This means that the sampling performed by the IU for purposes of this rule (e.g., for collecting data to demonstrate that the wastewater treatment system is "well operated and maintained") must be appropriate and representative. However, other state or local regulations may also apply.

What kind of compliance paperwork is required for zero dischargers, including facilities that do not generate wastewater and facilities that totally reuse all wastewater generated?

If the facility does not have a "potential to discharge," such as facilities that do not generate wastewater, they are not covered by the scope of the regulation; however, a facility may want to send a letter or certification statement to their POTW/control authority stating that they have "no potential to discharge."

If the facility does have the "potential to discharge," even if they are not actively discharging (which may be the case with facilities that totally reuse wastewater), the facility needs to complete a BMR. For the monitoring requirements portion of the BMR, they should indicate that they will be achieving zero discharge, and therefore, there is nothing to monitor.

If the facility is complying with zero discharge by demonstrating "nondetects" of pesticide active ingredients and priority pollutants, the BMR should contain monitoring data for the priority pollutants, as well as a list of the pesticide active ingredients expected to be used in production in the next 12 months.

According to the Section 403 regulations, paperwork must be kept on site for 3 years. How long must on-site compliance paperwork for the PFPR rule be kept?

PFPR facilities complying with the P2 alternative must keep the compliance paperwork necessary to document their current activities. In addition, facilities must keep "old" paperwork for the three-year minimum discussed in 40 CFR 403.12(o).

For on-site compliance paperwork, may a facility cross-reference other records at the facility, or does a separate copy of those records need to exist in their PFPR compliance file?

Facilities may cross-reference records in other parts of the facility (e.g, production records), but must be able to produce those records when requested by their permitting or control authority.

For the initial certification statement, do facilities need to use the certification statement listed in Section 403.6(a)(2)(ii)? Can the same manager who certifies under Section 403 also certify under the PFPR rule?

Facilities may use the following certification statement listed in Section 403, but they are not required to use that exact wording for compliance with the PFPR rule:

"I certify under penalty of law that this document and all attachments were prepared under my direction of supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Most importantly, the "responsible corporate official" (or general partner or proprietor or duly authorized official), as defined in Section 403.12(l), must certify that the information is true and accurate.

The Initial and Periodic certification statements of the PFPR rule have the same signatory requirements as those listed in Section 403.12(l) of the General Pretreatment Regulations:

(l) *Signatory requirements for industrial user reports*. The reports required . . . shall be signed as follows:

> (1) By a responsible corporate officer, if the Industrial User submitting the reports required...is a corporation. For the purpose of this paragraph, a responsible corporate officer means (i) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operation facilities employing more than 250 persons or having gross annual sales or expenditures exceeding $25 million (in second-quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.
>
> (2) By a general partner or proprietor if the Industrial User submitting the reports required . . . is a partnership or sole proprietorship, respectively.
>
> (3) By a duly authorized representative of the individual designated in paragraph (l)(1) or (l)(2) of this section if:
>
> > (i) The authorization is made in writing by the individual described in paragraph (l)(1) or (l)(2);
> >
> > (ii) The authorization specifies either an individual or a position having responsibility for the overall operation of the facility from which the Industrial Discharge originates, such as the position of plant manager, operator of a well, or well field superintendent, or a position of equivalent responsibility, or having overall responsibility for environmental matters for the company; and
> >
> > (iii) the written authorization is submitted to the Control Authority.
>
> (4) If an authorization under paragraph (l)(3) of this section is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, or overall responsibility for environmental matters for the company, a new authorization satisfying the requirements of paragraph (l)(3) of this section must be submitted to the Control Authority prior to or together with any reports to be signed by an authorized representative.

	This responsible corporate official can be the same person for both Section 403 and 455 certifications. Note that the timing of submittal of the PFPR Periodic Certification Statement and the Part 403 periodic compliance reporting have been coordinated so that a facility can submit them to the POTW/control authority at the same time (and have them signed by the same person).
If a facility certifies that no process wastewater pollutants will be detected in the effluent from their treatment, does that mean that the MDL is their compliance limitation? What if the facility certifies that their treatment system will result in an effluent below 10 g/L (or some other number)?	If the facility chooses to meet zero discharge, then the limitation is zero, not the method detection limit. However, the facility can demonstrate zero discharge by achieving no detection of process wastewater pollutants. If the method detection limit decreases over time, the facility would still need to show no detection of process wastewater pollutants. If the facility wishes to achieve compliance by meeting a number (e.g., less than 10 g/L), then that facility can choose to comply with the P2 alternative.
How is CBI that is included as part of compliance paperwork (either initial or periodic certification or other on-site compliance paperwork) handled? What can a facility claim as CBI? Will the confidentiality requirements described in 40 CFR 403 apply to on-site compliance paperwork required by the P2 alternative?	The POTW/control authority is authorized to view CBI, but they must have procedures in place to protect CBI from unauthorized public access. POTWs and control authorities have to allow access to the public at least to the extent that the EPA confidentiality regulations allow public access. 40 CFR 403.8(f)(l)(vii) requires POTWs (with approved pretreatment programs) to implement legal authority that complies with 40 CFR 403.14. 40 CFR 403.14(b) and (c) require that effluent data not be considered confidential, and all other information must be made available to the extent required under 40 CFR 2.302. Most POTWs have an allowance in their local ordinances for confidentiality.
Can a facility claim both treatment system effluent and outfall effluent data CBI?	Any data associated with the "point of compliance" cannot be held as CBI. Therefore, it depends on the point of compliance, which should be explicitly listed in the permit. The point of compliance in many regulations is upstream from a commingled outfall.
At times, facilities may be required to change to a new contract/toll formulator at a moment's notice due to unforseen circumstances. Can a waiver be granted (from the local control authority) to the new contract/toll formulator for the 90-day notification?	If the new toll formulator is performing any in-scope PFPR operations, then they do not need to provide a 90-day notification; however, they would need to notify the control authority of the "change of discharge" [40 CFR 403.12(j)] and would indicate this change in their PFPR periodic certification paperwork. If the new toll formulator does not currently perform any PFPR operations, the toll formulator may need to meet zero discharge (e.g., through off-site disposal or through sending wastewater back to the facility through which they are con-

tracting) or store the wastewater until a proper control mechanism is in place.

Permit/Control Mechanism Issues

How does the POTW/control authority regulate pollutants if one production line is achieving zero discharge and another production line is complying with the P2 alternative and they are only sampling the discharge four times per year?	The final PFPR rule is different from other effluent guidelines and standards in that there is no set of limitations to meet for discharge. Therefore, the rule cannot be enforced by monitoring end-of-pipe pollutant concentrations. To ensure that the production line using the P2 alternative is complying with the rule, the control authority/permitter would need to tour the facility to determine that the P2 practices are in place and in use, that the treatment system is well operated and maintained, and that the paperwork is in place to document compliance.
Is it up to the discharger whether or not they are a discharger (i.e., whether they choose to meet zero discharge versus the P2 alternative, what treatment they will perform, etc.)?	These decisions are initially made by the discharger; however, approvals are needed/required by the control/permitting authority. Local jurisdiction can be more stringent, but not less stringent than the national guidelines and standards. Therefore, the final approach to complying with the PFPR rule is really up to both the discharger and the regulating authority. If the control authority does not respond to the discharger's compliance paperwork with an approval or a disapproval, the facility is still responsible for ensuring that they are in compliance with 40 CFR 455 Subcategory C requirements.
In the end, does the permitter come up with a mass- or concentration-based limit?	It is not necessary for the permitter to develop such a limit, although they may choose to do so if there are sufficient data and an appropriate analytical method for the specified pesticide active ingredient.
How much flexibility does a control authority/permitter have to modify a practice?	A control/permitting authority has the authority to use best professional judgement (BPJ) to modify any practice. In so doing, they should use the environmental hierarchy to promote pollution prevention practices first, followed by recycle/reuse, treatment, and finally disposal. In addition, the final rule enables permitting/control authorities to add or replace P2 practices specified in the rule with new or innovative practices that are more effective at reducing the pollutant loadings from a specific facility to the environment (see page 57526 of the preamble to the final rule in Appendix A).
Does the PFPR rule give the criteria the control authority/permitting authority can/should use in modifying practices?	As discussed in the answer to the previous question, the preamble to the final PFPR rule provides guidance to permitters/control authorities on the criteria for modifying P2 practices under the P2 alternative. See page 57526 of the preamble to the final rule in Appendix A.

If the control authority or permitter is touring a facility and finds that the plant is obviously not following a specified Table 8 practice, is that cause for an enforcement action?	If the facility has certified they are implementing a specific Table 8 practice, but the control authority or permitter observes that the practice is *not* being implemented or utilized, then this could be cause for an enforcement action. However, many PFPR facilities produce nonpesticide products on the same equipment as pesticide products. Therefore, the control authority/permitter should be sure that they are observing operations related to in-scope PFPR production before taking any action.
How do control authorities/permitting authorities use Table 10?	If a PFPR facility chooses the P2 alternative and generates wastewaters that require treatment prior to discharge following implementation of P2 practices, then the control/permitting authority can use Table 10 as one way to identify that the treatment being used is "appropriate."
How do treatment decisions work and how does a permit writer determine limits for PFPR/manufacturing facilities?	If a PFPR/manufacturing facility chooses to comply with zero discharge, there is no allowance ("zero" allowance) given for pesticide active ingredients that they also manufacture (i.e., the limit is based solely on their manufacturing production). Nonmanufactured pesticide active ingredients must not be detected in their effluent (i.e., the permit should specify zero discharge). If the facility chooses to comply with the P2 alternative, the P2 practices would be included in the facility's permit. The limitation for pesticide active ingredients that are also manufactured could be adjusted to include the facility's PFPR production. If the pesticide active ingredient is not manufactured, that pesticide active ingredient would not require a specific limitation. See page 57528 of the preamble to the final rule in Appendix A for a detailed discussion of compliance for PFPR/manufacturers.
In order for a control authority to give a waiver for floor wash or the final rinse of a triple rinse, first, the wastewater must be unable to be reused and, second, the pesticide active ingredients in the wastewater must be at levels too low to be effectively pretreated and that will not cause interference at the POTW. How does the control authority determine the second condition?	Determining the levels at which the pesticide active ingredient is not effectively pretreated is based more on BPJ than on an objective number (e.g., the pesticide active ingredient concentration). EPA developed the waiver with the goal of providing some relief to facilities that were already implementing P2 practices by reusing all wastewater streams that were reusable, and that would otherwise have to build a treatment system to treat the inherently non-reusable wastewater streams (e.g., floor wash and a non-reusable final rinse of a triple rinse). Control authorities may look at a facility's operations and determine that, if a facility has successfully implemented P2 practices, it can use the waiver to discharge whatever small amount of floor wash is left (after water conservation) or the final rinse of a triple rinse to the POTW when the volume of that final rinse exceeds the volume that is reusable.

How can an enforcement agency determine if a treatment system is well operated and maintained?

The determination of whether a treatment system is well operated and maintained will be based on the rationale and "method of demonstration" chosen by the facility and approved by the control/permitting authority. For example, if a facility chose an activated carbon adsorption treatment system based on treatability test data (including carbon saturation loading/carbon breakthrough curves) and used that data to establish a relationship between TOC and pesticide active ingredient concentrations, they might demonstrate that the system is well operated and maintained by monitoring TOC and documenting the frequency of carbon changeout. The enforcement agency would then be able to review the TOC data and carbon records to determine if the facility was complying with their method of demonstration.

Does a POTW/control authority need to monitor specifically for pesticide active ingredients to ensure that a facility is complying with the PFPR rule?

No, monitoring may not be economically feasible and there may not be analytical methods available for all pesticide active ingredients. Compliance with the P2 alternative may be shown through ensuring that P2 practices have been implemented, the appropriate treatment is in place and is well operated and maintained, and documentation has been prepared and is readily available at the facility.

If a facility chooses to comply with zero discharge through "no flow" of process wastewater, the POTW/control authority would mostly ensure compliance through facility inspection of the PFPR process areas. However, if a facility is complying with zero discharge by demonstrating non-detect levels of pesticide active ingredients and priority pollutants, analytical methods must exist and the POTW/control authority would monitor at a minimum for expected priority pollutants and those pesticide active ingredients used in PFPR production.

For a POTW/control authority to set more stringent limitations, do they have to show some basis (e.g., evidence of pass through)? If not, can industry sue?

POTWs/control authorities are required by Federal Regulations to develop local limits to protect against pass through and interference (40 CFR 403.5(c) and 403.8(f)(4)). This means the POTW/control authority must develop local limits that protect the treatment plant from pollutants that may upset the plant, pass through the plant untreated (or inadequately treated), may endanger the well being of workers, or would inhibit sludge management options. Some of these limitations may be more stringent than limitations found in national categorical standards. The basis for these limitations would not be the evidence of pass through or interference, but rather the potential for pass through or interference. The pretreatment regulations are designed to protect against pass through and interference rather than react to it.

How is the control authority able to show compliance when there are no numeric limits?

By ensuring that their categorical industrial users are maintaining their on-site compliance paperwork accurately, that the specified P2 practices have been implemented, and that the treatment systems are appropriate and have been demonstrated to be well operated and maintained.

Under Section 403, the POTW is required to take a certain number of samples from the regulated facility. How do they complete this item when the facility is complying with the P2 alternative? What is the absolute minimum that the POTW must do to meet requirements for a control authority?

The PFPR rule does not require monitoring for pesticide active ingredients. Therefore, the POTW would only need to monitor for their local limits. Note that if a POTW monitors their effluent for pesticide active ingredients at the point of discharge to the receiving stream, the contribution of pesticide active ingredients comes not only from PFPR facilities but also nonpoint source dischargers (e.g., agricultural runoff).

When is a PFPR facility not in compliance with the rule (i.e., how is noncompliance determined when numeric limits are not in the permit)?

A facility is not in compliance if they are not implementing the P2 practices specified in Table 8, have not documented their justifications for modifications to those P2 practices, have not documented the equivalency of their treatment system to the list of "appropriate" technologies listed in Table 10, and are not able to demonstrate that the system is well operated and maintained based on the rationale discussed in their on-site compliance paperwork.

Can EPA provide guidance to permit enforcement officials on allowing negotiation of a compliance plan without penalties?

EPA's Small Business Policy promotes environmental compliance by providing incentives, such as penalty waivers and penalty mitigation, to those small businesses that participate in on-site compliance assistance programs or conduct environmental audits to discover, disclose, and correct violations. A small business may be eligible under the Agency's "Policy on Compliance Incentives For Small Businesses" to have all potential penalties for non-compliance waived if the companies agree to come into compliance and meet other criteria.

The policy applies to a person, corporation, partnership, or other organization that employs 100 or fewer individuals. EPA may eliminate its penalty against the small business if:

- the business receives on-site compliance assistance or conducts an environmental audit;
- the business identifies the violation(s) through the assistance or audit, and discloses it within 10 days (or such shorter period provided by law) to the appropriate government agencies;
- it is the first violation of the requirement in a three-year period and no environmental enforcement actions against the business have been taken in the last five years; the violation is corrected within 180 days after detection of the violation (or 360 days if pollution prevention is employed); and
- the violation has not caused actual serious harm, and does not pose a potentially imminent and substantial endangerment to the public or environment, does not involve criminal conduct, and did not result in a significant economic benefit.

	For more information on the EPA's audit policies, please see the web site for EPA's Office of Enforcement and Compliance Assurance at **http://www.epa.gov/oeca/index.html**.
As a PFPR facility, the flexibility of the rule to develop documentation in numerous ways is helpful. However, if an auditor finds a better or different P2 practice than what the facility has found, what action will EPA take? How will enforcement occur?	Better or improved pollution prevention practices should not be the basis of an enforcement action. Enforcement actions related to the P2 practices would be more likely to be incurred if a P2 practice is listed in the control mechanism/permit and is not being performed. In the case of a new practice brought up by the control/permitting authority, the new P2 practice must be agreed upon by both the facility and the control/permitting authority and included in the permit/control mechanism. After that, if facility is not following the practices, then enforcement actions may be taken.
Are there any RCRA issues associated with the practices mentioned (e.g., storage and reuse)?	Yes. There is a discussion of RCRA issues on pages 57528 and 57529 of the preamble to the final rule (located in Appendix A).
If treating wastewaters that are listed or characteristic wastes, is a RCRA permit required?	If these wastewaters are treated in a treatment system covered by a Clean Water Act effluent guideline, the treatment system is exempted from needing a RCRA permit. However, this does not necessarily mean that the wastewater being treated is exempt from RCRA regulations.
Do changes specified in the periodic certification require NPDES permits to be reopened?	The method in which changes are incorporated into NPDES permits may vary depending on the locality, state, or region in which the facility is located; however, it may be possible to set up the permit to specify that the P2 practices and appropriate treatment requirements for the PFPR rule are located in an approved plan, as is done with spill control plans. This method may allow changes in practices or treatment to be incorporated without reopening the whole permit.
How does a facility determine what to put in the permit for operation of the treatment system if the volume and characteristics of the water changes over time?	If a facility adds new production, they may need to reevaluate what treatment is appropriate for their PFPR wastewater sources. When initially determining treatment requirements, the facility should keep in mind that most PFPR facilities (after implementing P2 practices) generate volumes of wastewater small enough to store and treat periodically. Therefore, even though there may be a large variation in daily or weekly wastewater characteristics, it is more likely that wastewater treated periodically (e.g., one time per quarter) will be more consistent from one treatment batch to the next. In addition, a facility may find it most useful to evaluate a long-term plan of present and future production. Over time, the facility will need to demonstrate that the system is well operated and maintained for their changing wastewater

	by keeping logs/records of the volumes and characteristics of their wastewater.
Does the P2 alternative override or make a current discharge permit obsolete?	Facilities that directly discharge wastewater will incorporate the requirements of the PFPR rule (either zero discharge and/or the P2 alternative) at the time their permit is issued, reissued, or renewed. Facilities that indirectly discharge wastewater and choose to comply with the P2 alternative will have a new permit/control mechanism put in place prior to the compliance deadline of November 6, 1999. This permit/control mechanism can still include aspects of previous permits, as well as additional local limitaitons, as long as it incorporates the information necessary for complying with the P2 alternative.

Potential to Discharge (see also Zero Discharge)

What will a permit for a zero discharge/no-flow PFPR facility look like?	Facilities with no potential for discharge are not covered under the PFPR categorical standards. For facilities that achieve zero discharge, but have the potential to discharge, the permit would most likely only require a certification statement that the facility is at zero discharge. It may also list inspections that the facility would undergo. A facility may comply with zero discharge by demonstrating that all pesticide active ingredients and priority pollutants are below their method detection limits in the facility's final effluent, and only if all pollutants have approved analytical methods. A detection of any of these pollutants means the facility is out of compliance with the rule.
When determining whether a facility has a "potential to discharge," how are sanitary hookups viewed? For example, what if a worker dumps a bucket of floor wash into a toilet?	The potential to discharge only includes regulated wastewater sources. Sanitary water, as well as employee shower and laundry water, are not regulated wastewater sources under the PFPR rule. Therefore, a facility could have a sanitary hookup and still be considered as having "no potential to discharge" regulated wastewater. If a facility is concerned that their employees may discharge regulated wastewater sources through a sanitary hookup, they may want to establish a training program, including standard operating procedures (SOPs) to cover the management of wastes at their site.
Who determines whether a facility has the "potential to discharge"?	The facility is not covered under the scope of the rule, but may want to notify their control/permitting authority and/or submit a certification stating that they have "no potential to discharge" regulated PFPR wastewater sources. This certification would be submitted to (and approved by) the control/permitting authority following inspection.

Compliance Time Line

When do facilities have to start certifying their operations (i.e., now versus November 6, 1999)?

Existing indirect dischargers (i.e., those facilities that discharge to a POTW) must determine a specific compliance schedule with their POTW/control authority. This schedule must include milestones that lead to compliance with the rule *no later than* November 6, 1999.

Existing direct dischargers (i.e., those facilities that discharge directly to a river or receiving stream) must be in compliance at the time of issuance, renewal, or modification of their existing NPDES permit.

New sources must be in compliance with the PFPR rule at the commencement of discharge.

If a new indirect discharging facility comes into being in 1998, do they have until November 6, 1999 to come into compliance with the rule? If not, why not?

A new indirect source (any PFPR facility that meets the definition of new source in 40 CFR 403.3(k) as of April 14, 1994) must come into compliance when they begin discharging. New sources were given the opportunity to plan for requirements of the final rule (new source determination is made based on the proposed rule date). Existing indirect sources were already operating prior to the proposed rule and therefore could not plan the design of their facilities to meet the final regulation (this is especially true in the case of an effluent guideline where standards are more stringent for new sources). NOTE: The pretreatment standards are equal for existing and new sources under the final PFPR rule.

40 CFR 403.6(b) is the citation that explains the difference between new and existing sources - "(b) *Deadline for Compliance with Categorical Standards.* Compliance by existing sources with categorical Pretreatment Standards shall be within 3 years of the date the Standard is effective unless a shorter compliance time is specified in the appropriate subpart of 40 CFR chapter I, subchapter N....Existing sources which become Industrial Users subsequent to promulgation of an applicable categorical Pretreatment Standard shall be considered existing Industrial Users except where such sources meet the definition of a New Source as defined in § 403.3(k). New Sources shall install and have in operating condition, and shall "start-up" all pollution control equipment required to meet applicable Pretreatment Standards before beginning to Discharge. Within the shortest feasible time (not to exceed 90 days), New Sources must meet all applicable Pretreatment Standards."

If an indirect discharging facility is interested in entering the PFPR market in the next 1-2 years, what steps should that facility take *before* production begins and *after* production begins?

New sources must complete a BMR 90 days prior to discharge and must be in compliance with the PFPR pretreatment standards (PSNS) at the commencement of discharge. This means the facility must submit their initial certification statement (or certify that they achieve zero discharge) to the control authority and have their on-site compliance paperwork completed. Ninety days following commencement of discharge, the facility must complete their 90-day compliance report. If the facility chooses the P2 alternative, they will also need to complete their periodic certification statement in June and December of each year.

If the facility is *not* a new source, the facility will have to be in compliance with the PFPR regulation by November 6, 1999. At this point, the BMR (which was due by July 7, 1997) and the initial certification statement must be submitted and the on-site paperwork completed. Ninety days following commencement of discharge, the facility must complete their 90-day compliance report. If the facility chooses the P2 alternative, they will also need to complete their periodic certification statement in June and December of each year.

After November 6, 1999, when are facilities (new sources) required to submit their initial certification?	At the time of permit issuance prior to discharge.
Is any paperwork required between now and November 6, 1999 for indirect dischargers?	In addition to submitting the BMR, if a facility is not in compliance at the time they submit the BMR, then they must develop a compliance schedule with milestones with their control authority. The facility would need to show they are meeting each milestone on their way to full compliance.
When does the BMR get submitted? Is it after the permit has been issued and after decisions have been made on treatability for the wastewater to be discharged?	No. For indirect dischargers, it is prior to the initial certification. The BMR is the first piece of compliance paperwork required and is submitted well ahead of choosing wastewater treatment technologies. The BMR is supposed to reflect current operations, not necessarily compliance levels. The BMR was due on July 7, 1997 for existing indirect dischargers.
Why aren't facilities required to submit their initial certification at the time the BMR is due?	Initial certifications are due *no later than* November 6, 1999, although they may be submitted earlier. The BMR measures the baseline performance of the facility, but the initial certification cannot be made until the facility has invested time (and often money) to gather the information needed to make the compliance decisions (i.e., zero discharge or P2 alternative) that are documented in the initial certification.
How does the November 6, 1999 date apply to facilities that either choose to achieve zero discharge or already achieve zero discharge?	Indirect dischargers would need to be achieving zero discharge by November 6, 1999 for those wastewater sources for which they chose zero discharge in the initial certification statement. If the facility is already meeting zero discharge, then they would not need to set up the 90-day compliance schedule with milestones discussed in 40 CFR 403. Direct dischargers must be in compliance at the time of issuance, reissuance, or modification of their NPDES permit.

Do all facilities within the scope of the PFPR rule have to meet zero discharge by the November 6, 1999 compliance date?

No. Existing indirect discharging facilities have to be in compliance with *either* zero discharge or the P2 alternative on a source by source basis *no later than* November 6, 1999. Existing direct dischargers must be in compliance at the time of issuance, reissuance, or modification of their NPDES permit.

Should initial certification paperwork be completed *before* installing full-scale treatment?

Indirect dischargers must set up a compliance schedule with their POTW or control authority that specifies milestones to be achieved to assure compliance by November 6, 1999, including the installation and operation of any necessary treatment required prior to discharge. The initial certification paperwork must be completed by or before the compliance deadline.

Direct dischargers must complete the initial certification paperwork by the time of permit issuance, reissuance, or renewal.

Does the 3-year compliance date of November 6, 1999 apply to facilities choosing the P2 alternative (i.e., do they have until November 6, 1999 to install treatment systems)?

The 3-year compliance date only applies to indirect dischargers and this is the date at which they must be *in compliance* with the rule. If the facility wishes to be discharging wastewater at that time and treatment of that wastewater is necessary for compliance, the appropriate treatment system would need to be installed, tested, and a procedure for determining that it is well operated and maintained determined. Indirect dischargers must establish milestones with their control authority that the facility must meet to achieve compliance with the rule by November 6, 1999.

Does the treatment system have to be fully tested and operational at the time the initial certification statement is submitted?

Indirect dischargers must set up milestones for achieving compliance with the PFPR rule by November 6, 1999; therefore, it is possible that the treatment system may be tested following submission of the initial certification statement. However, the system must be fully operational by the agreed date of compliance or November 6, 1999, whichever is earlier.

Direct dischargers may also submit the initial certification statement before the issue, reissue, or renewal of their permit is complete. In such a situation, the treatment system may not yet be fully operational.

When is a facility allowed to discharge after selecting a compliance option?

If a facility is not currently discharging PFPR wastewater, they may begin discharging wastewater under the terms of their permit/control mechanism as soon as their permit/control mechanism is in place.

Must the control/permitting authority approve the P2 practices and modifications before they are implemented?

If the P2 practice and modification are listed in Table 8 to Part 455, then the control/permitting authority does not need to give prior approval; however, they do have the right to ensure that the proper backup documentation is present at the facility to justify the modification and to ensure that local limitations are being complied with.

If the P2 practice and modification are not listed in Table 8, the control/permitting authority does need to approve the practice with modification prior to discharge.

When is the periodic certification required, now or after November 6, 1999?

The periodic certification requirement begins after the facility has submitted their initial certification and is required twice per year for indirect dischargers and once per year for direct dischargers. The timing of submittal can be coordinated with the submittal of compliance paperwork required by the General Pretreatment Regulations or the NPDES regulations.

If a customer asks a facility to begin making a new product, when must the control authority be notified and when can discharge begin?

The facility must notify their control/permitting authority if a change in discharge is occurring, implement the appropriate P2 practices, update their treatment system to include the appropriate or equivalent treatment if new pesticide active ingredients exist in the wastewater to be treated, and receive approval before discharging wastewater associated with the new product. A facility is allowed to begin production at any time; however, they may need to store the generated wastewater until discharge approval is received.

Other Questions

The Section 403 regulations were revised to change the language from a "pretreatment agreement" to "control mechanism" because of concerns regarding the legal implications of that language. The PFPR regulations seem to be adding the pretreatment agreement language back in. Why are the two regulations inconsistent?

The term "pretreatment agreement" in the PFPR regulation was not used intentionally; it is intended to be a synonym for an individual control mechanism or permit.

Is there any way the government can track the commodity chemicals used in pesticide products by PFPR and pesticide manufacturing facilities?

Facilities are required to submit Confidential Statements of Formula (CSFs) to EPA, which include the specific "recipe" for the product registered; however, these recipes are typically considered confidential business information (CBI) under FIFRA.

Also, facilities are required to report emissions of toxic chemicals under the SARA Section 313 program (i.e., the Toxic Release Inventory program). However, PFPR facilities often do not use toxic chemicals in the amounts necessary to trigger reporting under this program, although some pesticide manufacturers do.

How did EPA come to the conclusion that facilities would store wastewater and treat it quarterly?

A storage period of 90 days or longer prior to treatment is not uncommon in this industry, based on information EPA gathered during site visits. EPA originally evaluated batch treatment of PFPR wastewater on a quarterly basis because of possible RCRA requirements that might be applicable if wastewater was stored for more than 90 days on site (or 180 days for small quantity generators). EPA determined that, under the P2 alternative, wastewater stored for more than 90 days prior to reuse would not need a RCRA storage permit if it was hazardous. Most interior rinsates are expected to be reused and/or be non-RCRA hazardous. See page 57529 of the preamble to the final rule in Appendix A for more detail.

When facilities are treating RCRA-hazardous wastewaters prior to discharge, the 90-day limit for large quantity generators (and the 180-day limit for small quantity generators) still applies. In addition, EPA believes that facilities will wish to limit the length of time that wastewater is stored prior to treatment even when non-hazardous.

Was toxicity testing considered in lieu of the P2 alternative?

No, the Clean Water Act requires effluent limitations guidelines and standards to be technology-based, not risk-based. However, toxicity-testing may be used in combination with the P2 alternative to provide a surrogate measure for demonstrating that the treatment system is well operated and maintained.

Will the P2 Guidance Manual be available on the Internet?

Yes. The Guidance Manual can be found on EPA's Effluent Guidelines web site (**http://www.epa.gov/OST/guide**) under the Pesticide Formulating, Packaging, and Repackaging Industry.

Is there a place where treatability data could be logged or collated so all facilities can utilize the results?

At this time, there is no specific clearinghouse for information on PFPR treatment technologies or treatability data. However, interested parties can check into other EPA clearinghouses or databases on the Internet via the EPA Homepage: **http://www.epa.gov**.

How do we determine the CAS numbers of the pesticide active ingredients listed on Table 10?

EPA has included a table in Appendix C that lists pesticide active ingredients from Table 10 with their corresponding Shaughnessey codes and CAS numbers.

P2 Guidance Manual Feedback Survey

1. **Please rate each of the following chapters:**

Chapter—Title	More Detail Needed	Right Amount of Detail	Less Detail Needed
1—Introduction	☐	☐	☐
2—PFPR Operations	☐	☐	☐
3—Pollution Prevention Glossary	☐	☐	☐
4—Conducting the P2 Audit	☐	☐	☐
5—Wastewater Treatment Technologies	☐	☐	☐
6—Conducting the Treatability Test	☐	☐	☐
7—Regulatory Compliance Documentation	☐	☐	☐
8—Case Studies	☐	☐	☐
9—Where to Get Additional P2 Help	☐	☐	☐
10—Workshop Questions and Answers	☐	☐	☐

2. **What is the most useful part of the manual?**

3. **Please list any specfic changes you would suggest.**

4. **Are there any parts of the promulgated rule that are still unclear?**

5. **How can this manual be improved to relate the specifics of the rule?**

6. **Do you feel EPA has communicated guidance information pertaining to this rule in an effective manner?**

   ☐ yes ☐ no (*please elaborate)*

7. **If you are from a PFPR facility, whether or not you decide to implement the P2 Alternative Option, are you planning to implement any new P2 practices as a result of reading this manual and/or attending an EPA PFPR P2 workshop? If so, which one(s)?**

8. What additional information could EPA provide to make implementing:

- the P2 practices easier:
- the P2 Alternative Option easier:

9. Do you find this guidance manual useful for:

	Yes	No
• Determining compliance with PFPR rule?	☐	☐
• Evaluating PFPR process(es) for P2 opportunities?	☐	☐
• Evaluating treatment technologies?	☐	☐

10. Please check the box that most closely describes your company:

☐ Pesticide manufacturing/PFPR facility
☐ PFPR facility
☐ Trade association
☐ POTW
☐ State or regional EPA permitter
☐ Other ___________________________

11. Please check the box that most closely describes your familiarity with the following topics prior to this guidance:

	Very Familiar	Somewhat Familiar	Not at all Familiar
PFPR Operations	☐	☐	☐
Effluent Guidelines	☐	☐	☐
P2 Alternative Option	☐	☐	☐
Pollution Prevention	☐	☐	☐
Wastewater Treatment Technologies	☐	☐	☐

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Ms. Shari Zuskin
U.S. Environmental Protection Agency
Engineering and Analysis Division (4303)
401 M Street, SW
Washington, DC 20460

APPENDIX A

PFPR Final Regulation (40 CFR Part 455)

Wednesday
November 6, 1996

Part II

Environmental Protection Agency

40 CFR Part 455

Pesticide Chemicals Category, Formulating, Packaging and Repackaging Effluent Limitations Guidelines, Pretreatment Standards, and New Source Performance Standards; Final Rule

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 455

[FRL–5630–9]

RIN 2040–AC21

Pesticide Chemicals Category, Formulating, Packaging and Repackaging Effluent Limitations Guidelines, Pretreatment Standards, and New Source Performance Standards

AGENCY: Environmental Protection Agency.

ACTION: Final rule.

SUMMARY: This final regulation limits the discharge of pollutants into navigable waters of the United States and into publicly owned treatment works (POTWs) by existing and new facilities that formulate, package and repackage pesticide products. This regulation covers two subcategories of the Pesticide Chemicals Point Source Category—Subcategory C: Pesticide Formulating, Packaging and Repackaging (PFPR) which includes PFPR facilities that also manufacture pesticide active ingredients (PFPR/Manufacturers) and Subcategory E: Agricultural Refilling Establishments. EPA estimates that there are approximately 2,600 facilities in the industry. This regulation establishes effluent limitations guidelines and standards under the Clean Water Act including ‘‘best conventional pollutant control technology (BCT), and ‘‘best available technology economically achievable (BAT)’’ for existing direct dischargers, ‘‘new source performance standards (NSPS)’’ for new direct dischargers and ‘‘pretreatment standards for existing and new indirect dischargers (PSES and PSNS)’’. This regulation also amends and clarifies the limitations based on ‘‘best practicable control technology (BPT)’’ for direct discharging facilities.

Under the final rule refilling establishments (Subcategory E) will be required to achieve zero discharge of wastewater pollutants. The final regulation provides Subcategory C facilities (herein referred to as ‘‘PFPR facilities’’) a choice between zero discharge and the ‘‘Pollution Prevention Alternative.’’ This compliance alternative was developed in response to comments on the proposed rule from the industry and has received a large amount of industry support in comments on the supplemental notice. This structure provides a compliance option to facilities who agree to implement certain pollution prevention, recycle and reuse practices. Facilities choosing and implementing the pollution prevention alternative will receive a discharge allowance.

The final rule will benefit the environment by removing toxic pollutants (pesticide active ingredients and priority pollutants) from water discharges that have adverse effects on human health and aquatic life. EPA has estimated the compliance costs and economic impacts expected to result from the Zero Discharge/Pollution Prevention Alternative (i.e., Zero/P2 Alternative). The Agency has determined that the Zero/P2 Alternative will result in a similar removal of toxic pound equivalents per year (approximately 7.6 million toxic pound equivalents) as the zero discharge option alone. At the same time, the Zero/P2 Alternative is expected to result in a reduced annualized cost ($29.9 million in 1995), no facility closures and 150 moderate impacts. EPA has determined that both Zero Discharge and the Zero/P2 Alternative are economically achievable. However, EPA’s addition of the pollution prevention alternative to achieving zero discharge provides benefits to the environment by minimizing the potential cross-media impacts that would otherwise occur from hauling and incinerating the non-reusable portion of PFPR wastewaters. The provision of an alternative compliance method also provides flexibility to industry in meeting the effluent limitations guidelines and standards.

DATES: This regulation shall become effective January 6, 1997. The information collection requirements contained in this rule are included in two separate Information Collection Request (ICR) documents. The NPDES/Compliance Assessment/Certification ICR (No. 1427.05) and the National Pretreatment Program (40 CFR part 403) ICR (No. 0002.08). OMB has not yet approved these ICRs; therefore, the information collection requirements contained in this rule are not effective until OMB has approved them. Once OMB has approved the ICRs, EPA will publish another notice in the Federal Register to announce OMB’s approval and to amend 40 CFR Part 9 to indicate the OMB approval number. The compliance date for §§ 455.46 and 455.66 (PSES) is as soon as possible, but no later than November 6, 1999. The compliance dates for §§ 455.45 and 455.65 (NSPS) and §§ 455.47 and 455.67 (PSNS) are the dates the new sources commence discharging. Deadlines or compliance with §§ 455.42 and 455.62 (BPT), §§ 455.43 and 455.63 (BCT), and §§ 455.44 and 455.64 (BAT) are established in the National Pollutant Discharge Elimination System (NPDES) permits.

ADDRESSES: For additional technical information write to Ms. Shari H. Zuskin, Engineering & Analysis Division (4303), U.S. EPA, 401 M Street SW, Washington, D.C. 20460 or send e-mail to: zuskin.shari@epamail.epa.gov or call at (202) 260–7130. For additional economic information contact Dr. Lynne Tudor at the address above or by calling (202) 260–5834.

The complete record (excluding confidential business information) for this rulemaking is available for review at EPA’s Water Docket; 401 M Street, SW, Washington, DC 20460. For access to Docket materials, call (202) 260–3027 between 9 a.m. and 3:30 p.m. for an appointment. The EPA public information regulation (40 CFR part 2) provides that a reasonable fee may be charged for copying.

The Technical Development Document [EPA–821–R–96–019], Economic Analysis [EPA–821–R–96–017] and Cost-Effectiveness Analysis [EPA–821–R–96–018] supporting today’s final rule may be obtained by writing to the EPA Office of Water Resource Center (RC–4100), 401 M Street SW., Washington, DC 20460, or calling (202) 260–7786.

FOR FURTHER INFORMATION CONTACT: For additional technical information write or call Ms. Zuskin at (202) 260–7130. For additional information on the economic impact analyses contact Dr. Lynne G. Tudor at the above address or by calling (202) 260–5834.

EPA is preparing a PFPR Pollution Prevention Alternative Guidance Manual and a series of regional workshops to aid industry, permit writers and control authorities in implementing the final rule. A public announcement will be published in Federal Register regarding availability of the guidance manual and the dates and locations of the regional workshops.

SUPPLEMENTARY INFORMATION:

Regulated Entities

Entities potentially regulated by this action are: (1) Those which generate process wastewater from the formulation, packaging and/or repackaging of pesticide products (excluding those pesticide active ingredients not covered by the rule); or (2) those which are agricultural refilling establishments. Regulated categories and entities include:

Category	Examples of regulated entities
Industry	• Pesticide formulating, packaging and repackaging (PFPR) facilities; • PFPR facilities that also manufacture pesticide active ingredients; • Agricultural refilling establishments.

This table is not intended to be exhaustive, but rather provides a guide for readers regarding entities likely to be regulated by this action. This table lists the types of entities that EPA is now aware could potentially be regulated by this action. Other types of entities not listed in the table could also be regulated. To determine whether your facility is regulated by this action, you should carefully examine the applicability criteria in § 455.40 and § 455.60 of the rule. If you have questions regarding the applicability of this action to a particular entity, consult the person listed in the preceding **FOR FURTHER INFORMATION CONTACT** section.

Preamble Outline

I. Legal Authority

This final regulation establishes effluent guidelines and standards of performance for the Pesticide Formulating, Packaging and Repackaging Subcategories of the Pesticide Chemicals Point Source Category under the authorities of sections 301, 304, 306, 307, and 501 of the Clean Water Act (‘‘the Act’’), 33 U.S.C. 1311, 1314, 1316, 1317, and 1361.

In accordance with 40 CFR part 23, this regulation shall be considered promulgated for purposes of judicial review at 1 p.m. Eastern time on November 20, 1996. Under section 509(b)(1) of the Act, judicial review of this regulation can be had only by filing a petition for review in the United States Court of Appeals within 120 days after the regulation is considered promulgated for purposes of judicial review. Under section 509 (b)(2) of the Act, the requirements in this regulation may not be challenged later in civil or criminal proceedings brought by EPA to enforce these requirements.

II. Background

A. Clean Water Act

The Federal Water Pollution Control Act Amendments of 1972 established a comprehensive program to ‘‘restore and maintain the chemical, physical, and biological integrity of the Nation’s waters,’’ (section 101(a)). To implement the Act, EPA is to issue effluent limitations guidelines, pretreatment standards and new source performance standards for industrial dischargers. These guidelines and standards are summarized in the proposed regulation at 59 FR 17850, 17851–52 (April 14, 1994).

Section 304(m) of the Clean Water Act (33 U.S.C. 1314(m)), added by the Water Quality Act of 1987, requires EPA to establish schedules for (1) reviewing and revising existing effluent limitations guidelines and standards (‘‘effluent guidelines’’), and (2) promulgating new effluent guidelines. On January 2, 1990, EPA published an Effluent Guidelines Plan (55 FR 80), in which schedules were established for developing new and revised effluent guidelines for several industry categories. One of the industries for which the Agency established a schedule was the Pesticide Chemicals Point Source Category.

Natural Resources Defense Council, Inc. (NRDC) and Public Citizen, Inc., challenged the Effluent Guidelines Plan in a suit filed in U.S. District Court for the District of Columbia (*NRDC et al* v. *Reilly,* Civ. No. 89–2980). The plaintiffs charged that EPA's plan did not meet the requirements of sec. 304(m). A Consent Decree in this litigation was entered by the Court on January 31, 1992. The terms of the Consent Decree are reflected in the Effluent Guidelines Plan published on September 8, 1992 (57 FR 41000). This plan states, among other things, that EPA will propose and take final action on effluent guidelines for the formulating, packaging and repackaging subcategories of the pesticide chemicals category by dates certain.

B. The Pollution Prevention Act

The Pollution Prevention Act of 1990 (PPA) (42 U.S.C. 13101 et seq., Pub. L. 101–508, November 5, 1990) ''declares it to be the national policy of the United States that pollution should be prevented or reduced whenever feasible; pollution that cannot be prevented should be recycled in an environmentally safe manner, whenever feasible; pollution that cannot be prevented or recycled should be treated in an environmentally safe manner whenever feasible; and disposal or release into the environment should be employed only as a last resort* * *'' (Sec. 6602; 42 U.S.C. 13101(b). In short, preventing pollution before it is created is preferable to trying to manage, treat or dispose of it after it is created. This effluent guideline was reviewed for its incorporation of pollution prevention as part of this Agency effort.

According to the PPA, source reduction reduces the generation and release of hazardous substances, pollutants, wastes, contaminants or residuals at the source, usually within a process. The term source reduction ''include[s] equipment or technology modifications, process or procedure modifications, reformulation or redesign of products, substitution of raw materials, and improvements in housekeeping, maintenance, training, or inventory control.'' The term ''source reduction'' does not include any practice which alters the physical, chemical, or biological characteristics or the volume of a hazardous substance, pollutant, or contaminant through a process or activity which itself is not integral to or necessary for the production of a product or the providing of a service.'' 42 U.S.C. 13102(5). In effect, source reduction means reducing the amount of a pollutant that enters a waste stream or that is otherwise released into the environment prior to out-of-process recycling, treatment, or disposal.

The PPA directs the Agency to, among other things, ''review regulations of the Agency prior and subsequent to their proposal to determine their effect on source reduction'' (Sec. 6604; 42 U.S.C. 13103(b)(2). This directive led the Agency to implement a pilot project called the Source Reduction Review Project that would facilitate the integration of source reduction in the Agency's regulations, including the technology-based effluent guidelines and standards.

C. Updated Industry Overview

The pesticide formulating, packaging and repackaging industry is made up of two distinct types of activities. These activities result in subcategorization for purposes of this rulemaking. The two subcategories are referred to as:

- Subcategory C: Pesticides formulating, packaging and repackaging (PFPR) including pesticides formulating, packaging and repackaging occurring at pesticides manufacturing facilities (PFPR/Manufacturer) and at stand-alone PFPR facilities; and
- Subcategory E: Repackaging of agricultural chemicals at refilling establishments (Refilling Establishments).

The pesticide formulating, packaging and repackaging industry covered by this rulemaking is made up of an estimated 2,631 in-scope facilities. These facilities are located throughout the country, with greater concentrations of refilling establishments located in the Midwestern and southeastern states to serve the agricultural market.

The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) requires that any substance intended to prevent, destroy, repel or mitigate any pest must be registered with EPA and bear a label directing the safe use of the product. 7 U.S.C. 136a. In addition, production of all pesticide products must be reported annually to EPA. 7 U.S.C. 136e. Thus, EPA has extensive data on the contents of pesticide products, their annual production, who formulates, packages or repackages these products and the uses for which these products are registered. EPA's Office of Water made extensive use of this data in its analysis of the pesticide formulating, packaging and repackaging industry.

Based on 1988 FIFRA establishment registration data, EPA identified the pesticide formulating, packaging, and repackaging facilities in the United States that were using one or more of the active ingredients that were the focus of the Pesticide Manufacturing rulemaking. These pesticide active ingredients are referred to as the ''272 PAIs'' and were the focus of the survey questionnaire for the PFPR rule 1988 data collection.[1] EPA sent out approximately 700 questionnaires using a stratified random sample of these facilities. Based on these survey results, EPA estimates that for all of the PAIs covered by the final rule (in-scope 272 and non-272 PAIs), that in 1988 there were approximately 1,497 facilities involved in formulating, packaging and repackaging pesticide products (of which 413 facilities processed non-272 PAIs only) and approximately 1,134 refilling establishments.[2]

Included in the 1,497 PFPR facilities, there were 48 pesticide manufacturing facilities in the pesticide chemicals manufacturing rulemaking survey database (58 FR 50637, September 28, 1993) that also formulated and packaged pesticide products containing any of the 272 PAIs which were the focus of that rulemaking. A detailed description of the development of this profile is contained in Section 3 of the Technical Development Document [EPA–821–R–96–019] for this final rule.

Pesticide formulating is the mixing/diluting of one or more PAIs with active or inert ingredients, without a chemical reaction, to obtain a manufacturing use or end use product (see § 455.10 of the final regulation for the definitions of formulating, packaging, repackaging and refilling establishment). Pesticide formulations take all forms: Water-based liquid; organic solvent-based liquid; dry products in granular, powder, solid forms; pressurized gases; and aerosols. The formulations can be in a concentrated form requiring dilution before application or can be ready to apply. The packaging of the formulated pesticide product is dependent on the type of formulation. Liquids generally are packaged into jugs, cans, or drums; dry formulations generally are packaged into bags, boxes, drums, or jugs. Pressurized gases are packaged into cylinders. Some formulations are packaged into aerosol cans.

As described above, the formulating, packaging and repackaging industry produces products in different forms. EPA has observed formulating, packaging or repackaging performed a number of different ways ranging from very sophisticated and automated

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[1] All remaining pesticide active ingredients are referred to in today's notice as the ''non-272 PAIs.'' In addition, not all non-272 PAIs are in the scope of this rulemaking.

[2] EPA has not re-estimated the number of refilling establishments based on both 272 PAIs and non-272 PAIs because EPA believes that there would not be any refilling establishments that use only non-272 PAIs.

formulation and packaging lines to completely manual lines. In general, for liquid products the process involves mixing the active ingredient with liquid inert ingredients in a tank and then transferring the product to containers. For dry products, the active ingredient may be sprayed in liquid form onto a dry substrate or it may be mixed in dry form. Dry products may undergo processes for mixing, grinding, sifting and finally packaging. The formulating process for aerosol products is the same as for liquid products, but the packaging is more complex and involves filling the container, capping it, drawing a vacuum on the container, adding propellant under pressure, and sealing the container.

Some other types of pesticide products include collars to repel and kill fleas and ticks; pesticides that are micro-encapsulated; and pesticides that are formed into solid shapes.

The pesticide industry is changing and efforts are being made to improve products to meet demands of consumers for less toxic and safer pesticides. For example, water-based solutions are gradually replacing organic solvents in liquid pesticide formulations. Developments in packaging also are underway. For example, the growing use of water soluble packages can reduce worker exposure to pesticides and minimize problems with disposal of packaging.

The refilling establishments represent a newer population of facilities that was identified in the Agency's Survey of Pesticide Producing Establishments. EPA discovered a significant population of facilities that reported repackaging only. These facilities are retail and wholesale dealers of agricultural chemicals and farm supplies. These facilities repackage pesticides, usually herbicides, into refillable containers which are used to transport the pesticide to the site where it is applied.

The use of refillable containers began to grow during the 1980's (and became widespread in the 1990's) to reduce the number of empty pesticide containers needing to be disposed of by farmers. In general, registrants distribute large undivided quantities of pesticides to dealerships (refilling establishments) where the products are stored in large bulk tanks. The dealer then repackages the pesticide from the bulk storage tanks to portable minibulk containers that generally have capacities of about 110 gallons. The increased use of refillable containers led to an increased amount of herbicide stored in bulk quantities and the need to have a secondary containment system built around the bulk storage tanks. Separate from this rulemaking, EPA has proposed a regulation under FIFRA that sets standards for such secondary containment structures (59 FR 6712; February 11, 1994). In addition, many states (22 have/are developing secondary containment regulations) now require secondary containment for bulk pesticide storage and dispensing operations.

D. Final Rule

Today's final rule sets forth an innovative and flexible, yet environmentally protective, approach for the establishment of effluent limitations and pretreatment standards under the Act. For Subcategory C—facilities that formulate, package, or repackage pesticides—EPA is establishing effluent limitations and pretreatment standards which allow each facility to choose to meet a zero discharge limitation or comply with a pollution prevention alternative that authorizes discharge of PAI and priority pollutants after various pollution prevention practices are followed and treatment is conducted as needed (now characterized as the Zero/P2 Alternative option). This rule also establishes a zero discharge limitation and pretreatment standard for agricultural pesticide refilling establishments (Subcategory E).

EPA had originally proposed a zero discharge limitation and pretreatment standard for PFPR facilities. 59 FR 17850 (April 14, 1994). EPA received comment which argued that the proposed zero discharge limitation and pretreatment standard would result in adverse non-water quality environmental impacts and that the scope of the proposed rule should be refined in a variety of ways. Various members of the PFPR community commented that the Agency should adopt a final rule which would require facilities to engage in pollution prevention practices and thereafter discharge de minimis levels of PAI and priority pollutants in the process wastewaters. Upon receiving these comments, EPA published a Supplemental Notice which described the Zero/P2 alternative option in addition to some potential changes in the scope of the rule. 60 FR 30217 (June 8, 1995).

Today's rule adopts the Zero/P2 alternative option for PFPR facilities and changes the scope by reducing the number of PAIs and wastewater sources which are addressed. Under the Zero/P2 option each owner or operator of a PFPR facility in Subcategory C will make an initial choice of whether the facility will meet zero discharge or comply with the P2 Alternative. This choice can be made on a product family/process line/process unit basis rather than a facility wide basis. If the zero discharge option is chosen, the facility owner/operator will need to do whatever is necessary, *e.g.*, wastewater reuse or recycle, either with or without treatment, incineration on-site or haul the wastewater for incineration off-site or underground injection, so that zero discharge of PAIs and priority pollutants in the wastewater is achieved.

If the P2 Alternative portion of the option is chosen for a particular PAI product family/process line/process unit, then the owner/operator of the facility must agree to comply with the P2 practices identified in Table 8 to Part 455 of today's rule for that PFPR family/line/unit. This agreement to comply with the P2 practices and any necessary treatment would be contained in the NPDES permit for direct discharging PFPR facilities or in an individual control mechanism with the control authority, *i.e.*, the POTW, for indirect discharging PFPR facilities (see 403.12(a) for the definition of control authority). In general, PFPR facilities choosing the P2 Alternative need only to submit a small portion of the paperwork to a permitting or control authority (e.g., initial and periodic certification statements). The on-site compliance paperwork is described in Part XII.A.1 of today's notice.

Today's rule changes the scope of the proposed rule in the following ways. First, the rule does not cover PAIs which are sanitizers, including pool chemicals. Also certain liquid chemical sterilants that are used on critical or semi-critical medical devices are not covered. Second, the rule does not apply to PAIs that are microorganisms, such as *Bacillus thuringiensis* (B.t.). Third, the rule does not apply to two groups of PAIs that are mixtures—Group 1 Mixtures include substances which pose no risks and Group 2 Mixtures include substances whose treatment technology has not been identified. Fourth, the pretreatment standards portion of the rule does not apply to one PAI and three priority pollutants which EPA has determined will not pass through or interfere with POTWs. Today's rule also does not cover inorganic wastewater treatment chemicals. With regard to wastewater sources, EPA has decided not to cover storm water at PFPR facilities or at refilling establishments through this rule. In addition, there are a few other wastewater sources such employee showers, on-site laundries, fire equipment test water, eye washes and safety showers, certain Department of Transportation (DOT) aerosol leak test bath water and laboratory water that are not considered process wastewater under the final rule.

EPA believes that this rule is an important example of how the Agency is re-inventing environmental regulation. The Zero/P2 alternative option being promulgated today is cheaper for the regulated community to comply with than the proposed zero discharge standard. The Zero/P2 alternative option is smarter than the proposed zero discharge standard because it incorporates flexibility in choosing which option is best for a particular product line. The Zero/P2 alternative option is cleaner than the proposed zero discharge standard because the P2 Alternative reduces cross-media impacts to the environment while still achieving, virtually, the same level of pollutant removal from discharges of PFPR process wastewaters (see Section XI for a discussion on the non-water quality impacts associated with the final rule).

E. The Proposed Rule

On April 14, 1994 (59 FR 17850), EPA proposed effluent limitations guidelines and standards for the control of wastewater pollutants from the Pesticide Formulating, Packaging and Repackaging (PFPR) Industry. The proposed rulemaking covered two subcategories. Subcategory C included stand-alone PFPR facilities as well as formulating, packaging and repackaging at pesticide manufacturing facilities (PFPR/Manufacturers). Subcategory E, as proposed, included repackagers of agricultural pesticides at refilling establishments (‘‘refilling establishments’’). These proposed guidelines were not intended to apply to the production of pesticide products through an intended chemical reaction (i.e., pesticide manufacturing). (For definitions used in the final rule, see § 455.10 of the final regulation of this notice.) Furthermore, as discussed in Section 1 of the proposal Technical Development Document [EPA–821–R–94–002], Subcategory E (refilling establishments) of these guidelines was not intended to apply to wastewaters generated by custom blending or custom application operations when performed independently or at refilling establishments. The proposed rulemaking would have established a zero discharge limitation for wastewater pollutants from the formulating, packaging and repackaging of almost all pesticide active ingredients for both subcategories covered by this regulation. Only a small number of PAIs were not completely covered by the proposed zero discharge, as a result of disproportionate economic impacts to small facilities.

Due to these impacts, EPA proposed a partial exemption from these guidelines for the exterior wastewaters [3] from small sanitizer facilities. Small sanitizer facilities were defined as those facilities which formulate, package or repackage 265,000 lbs/yr or less of all registered products containing one or more sanitizer active ingredients (listed in Table 8 of the proposed regulation) on sanitizer-only production lines. The production cutoff of 265,000 lbs/yr represents the production level (of these sanitizer products) at the largest facility that would experience economic impacts if there was no exemption for non-interior wastewater sources. (See Section III.A.1 of this notice for a description of revisions made to this exemption).

In addition to the partial exemption given to ‘‘small sanitizers,’’ EPA proposed to exempt sodium hypochlorite from coverage under the pretreatment standards for new and existing sources (PSES and PSNS). (See Section III.A.1 of this notice for a description of revisions made to this exemption). EPA also proposed to exempt wastewater generated by on-site employee showers and laundries and from the testing of fire protection equipment from the applicability of these effluent guidelines and standards. In general, these wastewater sources were excluded from the proposed regulation because of worker health and safety concerns. (See Section IX.A of the proposed rule or Section 5 of the Final Technical Development Document (TDD) [EPA–821–R–96–019] for a more detailed discussion of wastewater sources excluded from regulation).

EPA based the proposed zero discharge limitation for Subcategory C on pollution prevention, recycle/reuse and, when necessary, treatment through the Universal Treatment System (UTS) for reuse. EPA visualized the UTS as a flexible system consisting of a variety of treatment technologies that have been determined to be effective for treating PFPR wastewaters. In calculating compliance costs, EPA included costs for various combinations of treatment technologies consisting of emulsion breaking, hydrolysis, chemical oxidation, metals precipitation and carbon adsorption. EPA also included costs for contract hauling treatment residuals (sludges) from the UTS for incineration. Because of the estimates of reduced wastewater volumes based on the increase in reuse/recycle practices, the overall volume of wastewaters being contract hauled off-site for incineration was not expected to increase. Thus, EPA did not include additional costs for contract hauling of PFPR wastewaters in the original proposal. Based on comments, revised costs for the proposed zero discharge option were estimated for the Supplemental Notice (60 FR 30217; June 8, 1995). (See the Final Cost and Loadings Report (September 1996) in the public record for a discussion on the changes to the costing methodology).

EPA based the zero discharge limitation for Subcategory E on reuse of wastewater as makeup water for application to fields, in accordance with the product label.

The subject of the comments on the proposed rule spanned a variety of topics, including changes to the scope of the regulation, EPA’s pesticide cross-contamination policy and its effect on the industry’s ability to meet zero discharge, increased cross-media impacts due to contract hauling of wastewater for incineration to meet zero discharge, perceived conflicts with the Resource Conservation and Recovery Act (RCRA) requirements, and requests for a discharge allowance when following specific pollution prevention practices. See Section III of today’s notice for a summary of the changes that were made to the proposal in response to comment.

F. The Supplemental Notice

In response to many of the comments on the proposed rule, EPA published a supplemental notice (60 FR 30217) in the Federal Register on June 8, 1995. EPA published the Supplemental Notice to obtain public comment on two major topics and several smaller issues. The first major topic for which EPA requested comments was related to the scope and applicability of the rulemaking. Commenters on the proposed rule had requested that EPA exempt certain pesticide active ingredients (PAIs) and certain wastewater sources from the scope of the final rule.

EPA requested comment on expansion of the ‘‘sanitizer exemption’’ to exempt additional sanitizer active ingredients, remove the exemption’s production limit, and to include both interior and exterior wastewater sources in the revised exemption. EPA also requested comment on the exclusion of some other chemicals including pool chemicals, microorganisms, mixtures

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[3] At the time of proposal, exterior wastewaters included: Exterior equipment cleaning water, floor wash, leak and spill cleanup water, safety equipment cleaning water, DOT (Department of Transportation) aerosol test bath water, air pollution control scrubber water, laboratory rinsate and contaminated precipitation runoff.

and pollutants that have been determined to not pass through a POTW. (See Section III.A.1 of today's notice for a discussion of these exemptions; also see Comment Response Document in the public record).

In addition to the exclusion of certain pesticide active ingredients, EPA solicited comment on the partial or full exclusion of certain wastewater sources. These wastewater sources included aerosol leak test bath water, safety equipment cleaning water, laboratory equipment rinse water, and storm water.

The second major topic for which EPA solicited comments was a regulatory option comprised of two alternatives between which industry could choose: (1) Achieving zero discharge or (2) incorporating specific pollution prevention practices and treatment technologies at the facility and allowing a discharge of very small quantities of pollutants. This combined regulatory approach is referred to as the Zero Discharge/Pollution Prevention Alternative (Zero/P2 Alternative).

In particular, the supplemental notice requested comments on the structure of the Zero/P2 Alternative, the extent of best professional judgement (BPJ) allowed, the specific practices included, the modifications allowed and the details of regulatory implementation. Overall, the comments received on the Supplemental Notice were overwhelmingly supportive of the Zero/P2 Alternative. Furthermore, EPA has incorporated many of the suggestions offered in the comments into the Zero/P2 Alternative found in today's notice (see Section XII of today's notice for a discussion of regulatory implementation).

The other issues for which EPA solicited comments in the supplemental notice included: the applicability of the rule to PFPR research and development facilities and stand alone direct discharging facilities, the concentrations found in second and third rinses of a triple rinse, and the expected burden to the permitting authorities.

III. Summary of Most Significant Changes from Proposal

This section describes the most significant changes to the rule since proposal. Many of these changes have resulted from the comments that are discussed in more detail in the Comment Response Document which is contained in the record for this rulemaking. This section will summarize the changes in the rule concerning: The scope of the rule, the addition of the Zero/P2 Alternative, applicability of the rule to research and development facilities, clarification of issues for PFPR/Manufacturers, modification of the existing BPT for direct dischargers, clarification of the definition and applicability for refilling establishments, and RCRA issues.

The major comments received on the supplemental notice are described in detail in the Comment Response Document in the public record. Those comments included: Support for the pollution prevention alternative, requests for self-certification as the method of implementation for the final rule, comments on the specific practices listed in the P2 Alternative, and support for the use of Best Professional or Engineering Judgement (BPJ or BEJ) by the permitting or control authority, respectively.

A. Scope

At the time of proposal, the scope of the rule would have included the formulating, packaging and repackaging of all pesticide active ingredients (with the exception of sodium hypochlorite and the partial exemption of small sanitizers) and a wide variety of associated wastewater sources. Since the proposal, EPA has refined the scope concerning pesticide active ingredients (PAIs) and wastewater sources in response to comments on both the proposed rule and the supplemental notice. The following discussion summarizes these revisions. See the Comment Response Document in the rulemaking record for a more detailed discussion on the changes.

1. Pesticide Active Ingredients (PAIs)

a. Sanitizer Active Ingredients and Pool Chemicals

Several changes have been made to the original ''sanitizer exemption,'' as proposed. In the proposed rule EPA placed small sanitizer facilities in their own subgroup within Subcategory C. However, for the final rule, most sanitizer products have been excluded from Subcategory C (see § 455.10 of the final regulation of today's rule for the definition of sanitizer products). This exclusion is based on a number of factors. The partial exemption for small sanitizer facilities that was included in the proposal was largely based on disproportionate economic impacts. However, based on comments EPA has expanded the sanitizer exemption to include additional chemicals for the following reasons: (1) Sanitizer products are formulated for the purposes of their labeled end use to ''go down the drain;'' (2) sanitizer active ingredients are more likely to be sent to POTWs in greater concentrations and volumes from their labeled end use than from rinsing formulating equipment at the PFPR facility; (3) biodegradation data received with comments on some of these sanitizer active ingredients supports the hypothesis that they do not pass through POTWs; (4) these sanitizer active ingredients represent a large portion of the low toxicity PAIs considered for regulation at the time of proposal; and (5) many sanitizer solutions containing these active ingredients are cleared by the Food & Drug Administration (FDA) as indirect food additives under 21 CFR 178.1010.

The exemption now covers both interior and exterior wastewater sources. In addition, the proposed list of 28 sanitizer active ingredients has been expanded to incorporate the pool chemicals exemption as well as to include home use, institutional and most commercial antimicrobial active ingredients, with the exception of liquid chemical sterilants (including sporicidals), industrial preservatives and water treatment micro biocides other than pool chemicals (as defined in § 455.10 of today's regulation). Certain liquid chemical sterilant products are exempt from today's rule, as discussed in Section III.A.1.c. Furthermore, based on comments, EPA has eliminated the use of a list to define the exempted sanitizer active ingredients and is employing a written definition (see § 455.10 of the final regulation for the definition used in today's final rule).

As mentioned above, EPA has combined the pool chemicals exemption into the sanitizer exemption. This was based on comments on the Supplemental Notice and information gathered in post-proposal site visits (60 FR 30219). EPA believes that a large portion of the pool chemicals that were being reviewed for exemption can and should also be classified as sanitizer active ingredients. In order to avoid possible confusion, EPA has decided to combine these two groups and has incorporated pool chemicals into the definition for sanitizer active ingredients. In addition to this change, the pool chemicals exemption has undergone another refinement. Under the proposed rule, the only pool chemical that was exempt was sodium hypochlorite. Under the final rule, EPA has added several other chemicals to the exemption. These chemicals include calcium hypochlorite, lithium hypochlorite, potassium hypochlorite, chlorinated isocyanurate compounds and halogenated hydantoins. As with the sanitizer chemicals, these chemicals are not exempted via a list, but are instead exempted by definition. See § 455.10 of the final regulation.

b. Other Pesticide Active Ingredients

EPA has excluded several other groups of active ingredients from the final regulation. As discussed in the Supplemental Notice and in the Comment Response Document, microorganisms that are considered PAIs under FIFRA will not be covered by this regulation and will be excluded by definition. Based on the available information on the formulation, packaging and repackaging of such microorganisms and the generation and characteristics of wastewaters from such operations, EPA believes these pesticides are not formulated in a similar fashion as other PAIs covered by this rule. Microorganisms which have registered pesticidal uses are generally created through a fermentation process, similar to those found in some food processing or pharmaceutical plants. Fermentation is a biological process, whereas other pesticides are manufactured and formulated through chemical and physical processes.

In addition, almost all the microorganisms registered as pesticide products are exempt from the requirement of obtaining a (residue) tolerance for pesticides in or on raw agricultural commodities (40 CFR 180.1001). Under Part 180 Subpart D—Exemptions From Tolerance—it states that ‘‘an exemption from a tolerance shall be granted when it appears that the total quantity of the pesticide chemical in or on all raw agricultural commodities for which it is useful under conditions of use currently prevailing or proposed will involve no hazard to the public health.’’

EPA has also excluded a group of chemicals, referred to in today’s notice as ‘‘Group 1 mixtures.’’ This group includes many herbs and spices (e.g., rosemary, thyme, peppermint, cloves...), foods/food constituents, plants/plant extracts (excluding pyrethrins) and many chemicals that are considered to be GRAS (generally recognized as safe) by the Food and Drug Administration as well as those products exempt from FIFRA under 40 CFR 152.25 (61 FR 8876; March 6, 1996)(see § 455.10 of the final regulation of today’s notice for the definition of Group 1 mixtures).

There is a second group of mixtures, ‘‘Group 2 mixtures,’’ that are being excluded from the regulation. EPA has not been able to transfer treatability data for many of these mixtures because the characteristics that EPA uses for technology transfer are not easily identified (e.g., molecular weights, solubilities and aromaticity). For example, within a given structural group, PAIs that are aromatic, have high molecular weights or low solubility in water have been found to be amenable to activated carbon adsorption. However, when such characteristics cannot be identified, EPA cannot transfer treatability data for carbon adsorption.

EPA previously considered reserving this group of chemicals for regulation at a later time; however, after further research EPA has decided to exclude these chemicals from the scope of the final rule. One reason, as mentioned above, is that the treatability data is insufficient and to obtain treatment performance data on these mixtures would be very difficult due to the inability to transfer data. Also, most of these chemicals in pesticide products are used as inert ingredients rather than active ingredients and the total volume of these mixtures in use in pesticide products is very small (i.e., Group 2 Mixture PAIs only represent approximately eight percent of all of pesticide products). EPA was not able to develop a definition to cover all the chemicals in this group due to the lack of homogeneity between the chemicals. Therefore, Group 2 mixtures will be excluded from the scope of the final rule by list as opposed to definition (see Table 9 to Part 455 of the final regulation).

There are two other groups of chemicals that are being excluded from the final rule: Inorganic wastewater treatment chemicals and chemicals that do not pass through POTWS. Based on comments and data collected for the Treatability Database Report and its Addendum (see the public record for the rulemaking), EPA has decided to exclude, from the scope of the final regulation, inorganic chemicals that are commonly used as wastewater treatment chemicals (e.g., ferric sulfate, potassium permanganate, sulfuric acid, carbon, chlorine, etc...). See Comment Response Document for a discussion on the rationale behind this exclusion. Many of these chemicals are also excluded under the sanitizer/pool chemicals exemption. Again, the use of a definition will be employed to exclude these chemicals. (See § 455.10 of today’s final rule for the definition). The four chemicals which are excluded from the pretreatment standards because EPA determined that they do not pass through POTWs are phenol, 2-chlorophenol, 2,4-dichlorophenol and 2,4-dimethylphenol. Phenol, as a constituent in sanitizer products, is excluded from the rule as it was excluded under the proposed sanitizer exemption due to disproportionate economic impacts. See the Comment Response Document in the rulemaking record for a further discussion on the decision to exclude these wastewater treatment chemicals and the chemicals that do not pass through.

c. Liquid Chemical Sterilants

Section 221 of the Food Quality Protection Act of 1996 (Pub. L. 104–170) amended the definition of ‘‘pesticide’’ in FIFRA to exclude liquid chemical sterilant products (including any sterilant or subordinate disinfectant claims on such products) which are used on a critical or semi-critical device (as defined in section 201 of the Federal Food, Drug, and Cosmetic Act (‘‘FFDCA’’) (21 U.S.C. 321). *See* 7 U.S.C. 136(u), as amended. Because Congress has chosen to exclude such sterilant products from the definition of ‘‘pesticide’’, EPA has modified the applicability provisions of this rule so that the effluent limitations and pretreatment standards do not cover the wastewater discharges from the formulation, packaging, and/or repackaging of liquid chemical sterilants for use on critical devices or semi-critical devices as these terms are now defined in FFDCA section 201 and FIFRA section 2(u). See *40* CFR 455.40(f). However, facilities which formulate, package, or repackage products containing liquid chemical sterilants into other types of products, *e.g.,* pesticide products which are *not* used on critical or semi-critical devices introduced directly into the human body, should be aware that the wastewaters resulting from the formulating, packaging, and repackaging activities are covered by this rule.

2. Wastewater Sources

In the proposal, EPA excluded water from on-site employee showers, laundries and testing of fire protection equipment (59 FR 17903). EPA has added several other wastewater sources to the exclusion. These include: Storm water,[4] water used for testing and emergency operation of safety showers and eye washes; DOT leak test bath water from non-continuous overflow baths (i.e., batch baths) where no cans have burst from the time of the last water change out; and water used for cleaning analytical equipment and glassware and for rinsing the retain sample container in on-site laboratories. However, the initial rinse of the retain sample container is considered a process wastewater source for the final regulation. (See the Comment Response

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[4] Storm water at PFPR facilities and Refilling Establishments is covered by the Storm water Regulations Phase I and II, respectively.

Document for a discussion on the exclusion of these wastewaters).

B. The Zero Discharge/Pollution Prevention Alternative Option

Commenters submitted a variety of comments which prompted the Agency to consider the Zero/P2 Alternative option. The most significant are summarized below. (See the Comment Response Document in the public record for additional summary of comment responses and responses to individual comments.)

1. Cross Media Impacts and Incineration Issues

Commenters on the proposed rule believe that the zero discharge standard, as proposed, would lead to a large increase in cross-media impacts because the majority of facilities would be forced to contract haul dilute non-reusable wastewaters off-site for incineration (or other off-site disposal). Commenters questioned the goal of achieving zero discharge when it leads to an increase in cross-media impacts.

At the time of the proposed rule, EPA believed that the proposed approach to achieving ‘‘zero discharge’’ of wastewater pollutants from PFPR facilities would result in increasing the recycling, reuse and recovery of wastewater pollutants. In addition, EPA based the requirements on the best practices observed at PFPR facilities studied as part of the development of the rule. However, based on the concerns raised by commenters about the potential cross-media impacts EPA decided to seek comment on the pollution prevention (P2) alternative to zero discharge in order to reduce these impacts (60 FR 30217). The P2 Alternative to the zero discharge standard will allow a discharge of wastewater after waste discharge reductions are achieved using certain flow conservation, recycle or reuse and, under certain circumstances, wastewater treatment practices. Should a facility choose to comply with the regulation through the P2 Alternative the need for off-site disposal is reduced; thus, the cross-media effects are reduced.

For those facilities that choose to comply with the final rule by achieving zero discharge, EPA has revised the cost model. The revisions add costs to account for increased volumes of non-reusable wastewaters being contract hauled for off-site incineration (see the Final Cost and Loadings Report (September 1996) for a discussion on changes to the costing methodology). The revised cost estimates for the industry to achieve zero discharge of wastewater pollutants, including the additional contract hauling costs, are still found to be economically achievable for the industry. (See Section V of today’s notice for a discussion on the economic achievability of the final regulation.)

Commenters also commented that a significant decrease in incineration capacity and an increased cost would result from EPA’s combustion policy which may limit the permitting of new incinerators or the expansion of capacity of existing incinerators. EPA has addressed this concern in two ways. First, through the use of the P2 Alternative to zero discharge, this final rule will allow for the discharge of much of the non-reusable PFPR wastewaters that might otherwise be contract hauled for incineration. Second, as mentioned above, EPA has revised its costing methodology for the zero discharge option to include off-site incineration of these additional non-reusable wastewaters and has still found the rule to be economically achievable by the industry. In addition, EPA does not believe an additional burden will be placed on incineration capacity. This is supported by a survey, ‘‘Hazardous Waste Incineration 1994,’’ published in the *EI Digest,* June 1994 which showed that while there is increasing demand for incineration there is still great untapped capacity. The surveyed commercial incinerators believe that market saturation, competition with cement kilns and successful waste minimization efforts by industry account for the unused capacity and the decline in the average price for incineration. [See the memo in the record entitled *Incineration Costs for PFP Facilities,* September 30, 1994.]

2. Cross-Contamination Policy

Commenters also stated that complete reuse, as proposed, is not achievable because of EPA’s existing policy on cross-contamination of pesticide products. At the time of proposal EPA was using a standard of zero for cross-contamination. This meant that an active ingredient may not be present at *any* concentration in a FIFRA registered product where it is not listed on the confidential statement of formula (CSF) of that product or reported to EPA as an impurity. During the study phase for the development of the proposal, the industry practice was to triple rinse containers and equipment. Because of recent EPA enforcement actions, industry commented that additional rinsing is being used to comply with the cross-contamination policy.

Commenters believe that more aggressive enforcement of a zero-standard cross-contamination policy would increase wastewater volumes to the point that it would not be feasible to reuse these volumes. The commenters also believe that these factors were not taken into account when the proposed zero discharge regulation was developed. According to commenters, a facility that performs a triple rinse of the equipment interiors when changing from formulating one product to another, may have to perform additional rinses (e.g., a five times rinse) to ensure a level of zero cross-contamination. Commenters stated that even in cases where the rinsate from the ‘‘triple rinse’’ could be stored for use in a future formulation, the additional rinses create more rinsewater than could be reused and that these very dilute wastewaters would have to be contract hauled for off-site disposal to achieve zero discharge. Commenters believe this additional contract hauling of wastewater not only makes the proposed regulation economically unachievable, but increases the opportunity for cross-media impacts.

At the time of the supplemental notice EPA was reviewing the pesticide cross-contamination policy. EPA has since published a Notice of Availability on a more risk-based draft policy in the Federal Register for public comment (61 FR 1928; January 24, 1996) and expects publication of the final policy by the end of 1996. In addition, EPA has created the P2 Alternative to zero discharge in this rulemaking which would allow formulators, packagers and repackagers to discharge these dilute non-reusable rinses following the use of specified pollution prevention practices.

3. Request for De Minimis Discharge

Due to the concerns described above, many commenters requested a discharge allowance for these excess or non-reusable wastewaters. Commenters suggested that they would be willing to agree to use specified pollution prevention practices and pointed to the pollution prevention, recycle and reuse practices described in the preamble to the proposal (59 FR 17866) and the technical development document for the proposal [EPA #821–R–94–002]. In some cases commenters provided examples of possible additional practices they would be willing to agree to use. EPA believes that a discharge allowance (‘‘pollution prevention allowable discharge’’) may provide an added incentive to increase the use of pollution prevention and recycle practices, while ensuring that facilities are maximizing pollutant reductions in the wastewater while minimizing cross-media effects. Therefore, in response to the request for a ‘‘de minimis’’ discharge alternative, EPA has incorporated the P2 Alternative into the zero discharge standard for the final regulation.

4. Pollution Prevention Alternative

Several changes have been made to the P2 Alternative since it was first presented in the Supplemental Notice. The most significant revision is that a facility will be able to choose between achieving zero discharge or an allowable discharge (using the P2 Alternative) on a product family/process line/process unit basis.

In the supplemental notice, this choice was to be made on a facility wide basis. However, based on comments, EPA believes that the zero/P2 alternative option will be most practical if facilities can choose zero discharge for those processes/process units at their facility that are most amenable to zero discharge, while choosing the P2 Alternative for other portions of the facility for which the pollution prevention practices are most suited. EPA believes that this change will also reduce burden.

In addition, EPA has made some changes to the listed pollution prevention practices. First, the two tables of listed practices, as found in Appendix B of the Supplemental Notice, have been combined into one table. In addition, based on comments, revisions have been made to the language used on the table of listed practices. Under the final rule, any practice may be modified with an adequate justification. When no justification is listed for the specific practice it can be modified via best professional or engineering judgement (BPJ or BEJ, respectively). EPA believes this is appropriate due to the unique and individual situations that may arise at a particular facility (see the Comment Response Document in the rulemaking record or the P2 Guidance Manual for the PFPR Industry for examples of such situations). However, for listed practices where no justification is listed on the table, a facility will initially have to submit a request for a modification to the permitting/control authority for review and approval. The permitting/control authority is expected to use BPJ or BEJ to decide if the justification provided is adequate. In addition, the permitting/control authority will be able to add or replace practices specified by the rule with new or innovative practices that are more effective at reducing the pollutant loadings from a specific facility to the environment.

EPA has also added some additional justifications to the table of listed practices based on comments. For example, EPA will allow facilities to modify the practice of reusing and/or storing and reusing rinsates generated by rinsing of drums containing only inerts when a facility can demonstrate that the large concentration of the inert in the formulation creates more volume, after using water conservation practices, than could feasibly be reused or when the concentration of the inert is so small (i.e., perfumes) that the reuse would cause a formulation to exceed the ranges allowed in the Confidential Statement of Formula (CSF).

Based on comment, EPA has also combined, added and removed other practices. For example, EPA has added a practice concerning dry formulation interior equipment cleaning that specifies that facilities must cleanout such interiors with dry carrier prior to any water rinse and that this carrier material should preferably be stored and reused in future formulation of the same or compatible product (or, as a last resort, properly disposed of as solid waste). EPA has combined many of the water conservation practices, such as use of flow reduction on hoses, use of low volume/high pressure rinsing equipment and floor scrubbing machines, into one listed practice. Finally, EPA has removed the provision for dedicated equipment that was contingent on the inability to reuse interior rinsates. Instead, this practice will be discussed in the P2 Guidance Manual for the PFPR Industry. (See Table 8 to Part 455 of the final regulation, for the listed practices and listed justifications).

Furthermore, EPA has refined the definition of P2 allowable discharge. In response to comment, this definition states that ‘‘appropriate pollution control technologies’’ include not only those technologies listed on Table 10 of the regulation, but also include a pesticide manufacturer’s treatment system or an equivalent system, used individually or in any combination to achieve the level of pollutant reduction determined by the permitting authority or control authority. An equivalent system is a wastewater treatment system that is demonstrated in literature, treatability tests or self-monitoring data to remove a similar level of pesticide active ingredient (PAI) or priority pollutants as the applicable treatment technology listed in Table 10 to part 455 of the final regulation.

Finally, EPA has decided to allow the control authority to use best engineering judgement to waive pretreatment at the PFPR facility prior to discharge to the POTW under certain circumstances. Under the final P2 Alternative to zero discharge, an indirect discharger must pretreat the portion of their allowable P2 discharge that includes interior equipment rinsates (including drum rinsates), leak and spill cleanup water and floor wash prior to discharge to the POTW. However, EPA will allow the control authority to waive the pretreatment requirements for floor wash and the final interior rinse of a triple rinse that has been demonstrated to be non-reusable when the facility demonstrates that the level of PAIs and priority pollutants in such wastewaters are at a level that is too low to be effectively pretreated at the facility and have been shown to neither pass through or interfere with the operations of the POTW. The control authority should also take into account whether or not the facility has employed water conservation when generating such a non-reusable wastewater.

C. Applicability to On-Site and Stand-alone Research & Development (R&D) Laboratories

EPA has clarified the applicability of the final PFPR regulations to on-site and stand-alone R&D laboratories (i.e., no PFPR on-site). The final PFPR effluent guidelines and standards do not apply to wastewater generated from the development of new formulations of pesticide products and the associated efficacy and field testing (where resulting product is not manufactured for sale). This includes such wastewaters generated at stand-alone R&D laboratories as well as at R&D laboratories located on-site at PFPR facilities. EPA received many comments describing the operations at both on-site and stand-alone R&D facilities. Commenters believe that wastewaters generated at these R&D laboratories have extremely limited reuse potential due to their experimental nature, as such formulations may only be produced once or, at most, for one set of trials. Therefore, commenters believe that the pollution prevention practices listed in the Supplemental Notice (for example, reuse of interior rinsates in future formulation) are not amenable to these one-time wastewaters. In addition, experiments require the use of experimental controls. According to commenters, the addition of rinsates into the ‘‘experimental design could alter the results of the experiment and render the data obtained useless.’’ EPA has taken the above information into account, in addition to the typically low quantities discharged from these operations and believes that the wastewaters generated by experimental formulation, efficacy and field testing can be adequately addressed in permits and pretreatment agreements through BPJ and BEJ, respectively.

D. Clarification of Issues Concerning PFPR/Manufacturers

Pesticide Manufacturing is covered by 40 CFR part 455 subparts A and B. However, close to 50 pesticide manufacturers also perform pesticide formulating, packaging and repackaging at their facility (called ''PFPR/Manufacturers''). EPA has included a discussion, below, to aid in clarifying how the final rule applies to the PFPR/Manufacturers in regard to three specific issues. First, EPA will clarify the difference between adding a solvent to stabilize an active ingredient and adding a solvent (or other inert ingredients) to formulate a pesticide product, and which practice constitutes manufacturing and which constitutes formulation. Second, EPA will discuss whether on-site incineration can be considered as achieving zero discharge under the PFPR final rule. Finally, EPA will amend and clarify the interpretation of the 1978 zero discharge BPT rule for direct discharging PFPR/Manufacturers and PFPR stand-alone facilities.

1. Stabilizing versus Formulating

Pesticide manufacturers may sometimes add a solvent (organic or aqueous) to a manufactured PAI or intermediate for the purpose of stabilizing the product (e.g., for transport or storage). The Pesticide Manufacturing Final Technical Development Document [EPA–821–R–93–016; page 1–9] states that dilution of the manufactured active ingredient is only covered by the Pesticide Manufacturing rule when it is ''a necessary step following a chemical reaction to stabilize the product.'' Thus, EPA would like to clarify that manufacturers can perform such operations without being subject to the PFPR effluent guidelines as long as it is a necessary step to stabilize the product following a chemical reaction. Typically, such operations are performed without placing the pesticide in a marketable container (i.e., they are shipped in bulk via tank truck, rail car or tote tank). However, PFPR facilities should not conclude that they can receive PAIs (that they do not manufacture), even in bulk quantities, and dilute it with solvent or other carrier without being subject to the PFPR effluent guidelines, as this would be considered formulating under § 455.10.

2. On-site Incineration as Zero Discharge

Although EPA proposed zero discharge limitations based on pollution prevention, recycle/reuse and treatment for reuse, facilities may meet this zero discharge requirement through a number of other practices. These practices include hauling wastewater to off-site destinations, such as sites which have incineration, deep well injection disposal and centralized (commercial) wastewater treatment and subsequent discharge. In some cases, wastewaters are returned to the registrant or manufacturer. In a few instances, on-site incineration of PFPR wastewaters is being conducted.

EPA received comment requesting clarification of whether on-site incineration is an acceptable means of achieving zero discharge. For purposes of this rule, EPA considers on-site incineration a valid option for achieving zero discharge of PFPR process wastewaters. Wet scrubbing devices used for air pollution control on existing on-site incinerators at PFPR facilities are not subject to the PFPR effluent guidelines. The only existing on-site incinerators at facilities covered by the PFPR regulation are at facilities which also manufacture pesticide active ingredients (PFPR/Manufacturers). Scrubber wastewater discharges from these incineration activities are currently regulated under the pesticide manufacturing effluent guidelines (40 CFR part 455, subparts A and B; see 58 FR 50638, September 28, 1993) for the PAIs manufactured at these facilities.

On-site incineration at new sources (i.e., NSPS and PSNS), would also qualify as meeting zero discharge under the PFPR regulation and scrubber water discharges from these on-site incinerators would be covered by the pesticide manufacturing new source standards. However, scrubber wastewater discharges from the on-site incineration of PAIs not regulated by the pesticide manufacturing rule would have to be controlled using a BPJ or BEJ basis.

3. Amending and Clarifying of BPT

The 1978 BPT regulation (43 FR 44846; September 29, 1978) established a zero discharge limitation for direct discharges from pesticide formulating and packaging[5] facilities. This included pesticide formulating, packaging and repackaging that occurred at direct discharge pesticide manufacturing facilities as well as stand-alone PFPR facilities.[6] The basis for the 1978 zero discharge BPT limitation was water conservation, reuse and recycle practices, with any residual water being evaporated or hauled off-site to a landfill. However, many facilities that were direct dischargers in 1978 switched to indirect discharge of wastewaters through POTWs instead of achieving zero discharge via recycle and land filling or evaporation. Due to the 1978 BPT regulation, presently, there should be no direct discharging PFPR facilities. However, the zero discharge limitation was not interpreted or implemented in the same way for PFPR/Manufacturers as it was for stand-alone PFPR facilities.

It is EPA's understanding that permitting authorities incorporated the BPT zero discharge standard for PFPR wastewaters into the pesticide manufacturers' NPDES permits as a ''zero allowance.'' A zero allowance would let a PFPR/Manufacturer discharge PFPR wastewaters along with their pesticide manufacturing wastewaters as long as they did not exceed the pesticide limitations in the Pesticide Manufacturing rule. The 1978 pesticide manufacturing BPT limitations were presented as a total pesticides limit for 49 specific PAIs. However, the more recent BAT and NSPS limitations (58 FR 50638; September 28, 1993) do not set a total pesticides limit but, instead set individual production-based limitations. Since the pesticide manufacturing limits are based solely on the manufacturing production and do not include the PFPR production, permits could still use a zero allowance approach to allow discharges of PFPR wastewater from these combined facilities.

At the time of proposal, EPA did not believe it was necessary to amend the 1978 BPT because the zero discharge limitation was comparable to the proposed standard of zero discharge.[7] EPA recognized that the bases for the 1978 BPT and proposed rule were not identical and that land filling and evaporation were no longer the best options for achieving zero discharge (59 FR 17870). However, EPA believed that

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[5] In 1978 repackaging was not included in the title of Subcategory C, but was covered by the BPT regulation and, therefore, will be included in the title for the final rule.

[6] A stand-alone PFPR facility is a PFPR facility where either: (1) No pesticide manufacturing occurs; or (2) where pesticide manufacturing process wastewaters are not commingled with PFPR process wastewaters. Such facilities may formulate, package or repackage or manufacture other non-pesticide chemical products and be considered a ''stand-alone'' PFPR facility.

[7] EPA proposed a zero discharge standard for PSES based on pollution prevention, recycle/reuse and, when necessary, treatment and reuse and expected it to be implemented via ''no flow'' of process wastewater.

since both the 1978 BPT and the proposed rule were largely based on water conservation, recycle and reuse practices, facilities could meet BPT in a manner similar to the proposed rule.

Following proposal, EPA received many comments on and requests for revision of the BPT regulation from the PFPR/Manufacturing facilities and trade associations. Commenters raised issues related to the technical feasibility of zero discharge for both the proposed rule and the 1978 BPT rule.

Commenters believed that, because not all wastewaters were reusable as EPA had assumed, the potential increase in cross-media impacts associated with a zero discharge regulation in addition to the large costs associated with contract hauling for incineration made any zero discharge regulation infeasible. The commenters requested numeric discharge limitations and/or a ''de minimis'' discharge allowance (associated with pollution prevention practices) for their PFPR wastewaters and that BPT be revised accordingly. Based on these and other comments on the proposed rule, EPA developed the Zero/P2 Alternative for PSES and BAT (for Subcategory C facilities) which was discussed in the Supplemental Notice and revised based on additional comment for today's final rule.

Commenters also specifically commented on the need for revision of the 1978 BPT due to: (1) Certain practices on which the 1978 BPT was based (for example, land filling and evaporation) are no longer desirable because they may cause cross-media impacts or may no longer be available; and (2) the changes in PAIs and pesticide formulation chemistries since 1978. For example, many pesticide products have been reformulated from an organic solvent-based product to a water-based product to avoid the generation of volatile organic compounds (VOCs). This has, in many cases, caused an increase in the volume of wastewater generated by this industry. In addition, many facilities are switching to safer, more ''environmentally friendly'' pesticide active ingredients which would change the characteristics of the wastewaters from those determined in 1978. Commenters believe that EPA must revise BPT or account for the additional costs associated with the current practices that would be utilized to meet the zero discharge limitation (i.e., off-site incineration).

Based on the comments discussed above, EPA has decided to amend BPT for both the existing direct discharging PFPR/Manufacturers and stand-alone PFPR facilities to allow them to choose between zero discharge and the P2 Alternative. EPA believes that although the stand-alone PFPR facilities are already achieving zero discharge, in compliance with the 1978 BPT, the methods they are employing may potentially result in cross-media impacts that the use of the P2 Alternative would potentially reduce.

Also, these changes will make BPT consistent with BAT (and PSES) while essentially achieving the same pollutant removals and potentially decreasing cross-media impacts associated with various off-site disposal methods. In addition, the change to the BPT limitation that is being promulgated today for PFPR/Manufacturers will clarify that the method by which the zero discharge limitation has been implemented (i.e., use of a zero allowance) is appropriate.

The final PFPR rule will allow discharge of PFPR wastewaters from PFPR/Manufacturing facilities in two specific ways. For those facilities choosing to comply with zero discharge (as opposed to the P2 Alternative), their permits should incorporate the ''zero allowance'' approach for the PFPR portion of their operations for the PAIs that they manufacture. For those PAIs formulated and not manufactured at the facility, the permit should apply a strict zero discharge. In part, this is because their pesticide manufacturing wastewater treatment system may not consist of the appropriate treatment technologies for such PAIs or the treatment system may not be designed to treat the additional volumes and/or concentrations of the ''non-manufactured'' PAIs.

However, PFPR/Manufacturers can choose the P2 Alternative to zero discharge. Such facilities would not have to achieve zero discharge or zero allowance of their PFPR wastewaters. Instead, these facilities would comply with the practices specified in the P2 Alternative and would receive a ''P2 discharge allowance'' following treatment (see § 455.41 of the final regulation for the definition of P2 allowable discharge). The P2 discharge allowance can be applied to both pesticides that are formulated/packaged/repackaged and manufactured as well as those that are not manufactured on-site. [Note: Facilities can choose between zero discharge and the P2 Alternative on a product family/process line/process unit basis.]

The treatment system used to treat the combined PFPR and pesticide manufacturing wastewaters must incorporate treatment that is appropriate for those PAIs which are not also manufactured on-site (i.e., those PAIs for which individual pesticide manufacturing production-based limitations are not contained in the NPDES permit). Treatment is deemed appropriate through the use of: treatability studies found in literature or performed by the facility; long-term monitoring data; or Table 10 of the final rule.

As discussed above, EPA is also amending BPT for stand-alone PFPR facilities. Stand-alone facilities that do not send their wastewaters to POTWs can choose to comply with the P2 Alternative or can remain as zero discharge. Facilities choosing the P2 Alternative may have to apply for an NPDES permit if they do not already have a permit.

E. Clarification of Refilling Establishments

EPA has decided to use the same general definition for ''refilling establishment'' as in the proposed effluent guideline and the proposed FIFRA Standards for Pesticide Containers and Containment rule (i.e., an establishment where the activity of repackaging pesticide product into refillable containers occurs). However, EPA will use different applicability statements in each of the regulations to further define the term as appropriate for the particular regulation. (See the Comment Response Document for additional discussion). The limitations and standards of Subpart E of the PFPR final rule apply to the repackaging of pesticide products performed by refilling establishments: (a) That repackage agricultural pesticides; (b) whose primary business is wholesale or retail sales; and (c) where no pesticide manufacturing, formulating or packaging occurs. Subpart E (Refilling Establishments) is not applicable to wastewater generated from custom application or custom blending.

F. RCRA Issues

A number of commenters requested clarification concerning the potential for conflict between the proposed zero discharge effluent guidelines limitations and standards and certain requirements under the Resource Conservation and Recovery Act (RCRA). Specifically, commenters requested that EPA explain, in the final rule, its interpretation of the wastewater treatment unit exemption under RCRA (40 CFR 264.1(g)(6), 265.1(c)(10)) with respect to facilities regulated by a national effluent guideline requirement of zero discharge and how such an exemption would apply to the Universal Treatment System (UTS). They also requested clarification on the 90-day RCRA hazardous waste storage limitation.

In general, owners and operators of hazardous waste treatment, storage, and disposal (TSD) facilities must meet the standards outlined in 40 CFR part 264 (and part 265 for interim status). However, the wastewater treatment unit exemption (40 CFR 264.1(g)(6), 40 CFR 265.1(c)(10)) is intended to exempt, from certain RCRA requirements, wastewater treatment units at facilities that are subject to the NPDES or pretreatment requirements under the Clean Water Act[8] (for example, PFPR facilities). The specific definition of wastewater treatment units that are exempt from certain RCRA requirements is found in 40 CFR 260.10. The RCRA wastewater treatment unit exemption does not exempt hazardous wastewaters at these facilities from RCRA requirements, but does exempt the facilities from obtaining a TSD permit for wastewater treatment systems treating, storing, or generating listed (40 CFR 261.30–33) or characteristic (40 CFR 261.20–24) hazardous wastes. EPA points out that many pesticide active ingredients are not RCRA listed hazardous wastes and most PFPR wastewaters do not exhibit hazardous waste characteristics; therefore, such non-hazardous wastewaters would not be covered by the RCRA Subtitle C requirements.

As mentioned above, many commenters requested that EPA clarify whether or not the wastewater treatment unit exemption can be applied to facilities that are not discharging their treated wastewater effluent due to a zero discharge limitation in a national effluent guideline. Facilities subject to an effluent guideline which sets a zero discharge or other limitations or standards (such as the P2 Alternative) can, in fact, be eligible for the RCRA wastewater treatment unit exemption, assuming that they also satisfy the exemption's other criteria.

Commenters also requested clarification on how the RCRA 90-day limit on the storage of hazardous wastes (40 CFR 262.34) applies to rinsates being stored for subsequent reuse in accordance with the PFPR effluent guidelines. Generally, RCRA TSD permits (or interim status) are required for facilities that store hazardous waste on site. However, the RCRA regulations allow facilities that generate hazardous waste to store the waste without a permit or interim status provided that certain criteria, including a 90-day limit on storage for large quantity generators, are satisfied (these criteria are outlined in 40 CFR 262.34). As mentioned earlier in this section, most PFPR wastewaters would not be defined as RCRA hazardous waste, either because the wastewater does not meet a RCRA listing, or does not exhibit any hazardous characteristic; of course, generators are still required to make this determination with respect to their own wastes (40 CFR 262.11). If a material is not a hazardous waste, the RCRA regulations, including storage requirements, do not apply.

For any rinsewaters that potentially meet a RCRA listing or exhibit a RCRA characteristic, such rinsewaters being stored for direct reuse as outlined under today's final PFPR effluent guidelines and standards would not be considered wastes by the Agency (see 40 CFR 261.2(e)(1)). As described elsewhere in today's rulemaking, these rinsewaters do not require treatment prior to reuse and, due to stringent product specifications, do not contain constituents that are not needed in the product being formulated. In these situations where the rinsewaters are not classified as a waste, the RCRA regulations (including the generator requirements and storage requirements) do not apply. However, the RCRA regulations do require that materials being stored for reuse not be accumulated speculatively (speculatively accumulated materials are classified as wastes). A material is not accumulated speculatively if the person accumulating it shows that the material is recyclable, has a feasible means of being recycled, and that during the calendar year, the amount of material recycled equals at least 75 percent by weight or volume of the amount of that material accumulated at the beginning of the period. See 40 CFR 261.1(c)(8) and 261.2(e)(2)(iii).

IV. The Final Regulation

A. Pretreatment Standards for Existing Sources (PSES)

1. Pesticide Formulating, Packaging and Repackaging (Subcategory C)

Under the final rule, EPA is establishing a zero discharge pretreatment standard with a P2 Alternative which allows a discharge to POTWs. The zero discharge standard is based on pollution prevention, recycle and reuse practices and, when necessary, treatment (through the Universal Treatment System) for reuse. The basis also includes some amount of contract hauling for off-site incineration which may be necessary to achieve zero discharge. Compliance with the alternative (P2 Alternative) is based on performing specific pollution prevention, recycle, reuse and water conservation practices (as listed in Table 8 to part 455 of the final rule) followed by a P2 allowable discharge which requires treatment of interior wastewater sources (including drum rinsates), leak/spill cleanup water and floor wash prior to discharge to a POTW.[9]

EPA visualized the Universal Treatment System (UTS) as a flexible system consisting of a variety of treatment technologies that have been determined to be effective for treating PFPR wastewaters. The UTS can include various combinations of treatment technologies consisting of emulsion breaking, hydrolysis, chemical oxidation, metals precipitation and carbon adsorption. See Section 7 of the Final Technical Development Document [EPA–821–R–96–019] for the PFPR effluent guideline and the proposal (59 FR 17873) for a detail description of the UTS.

EPA determines which pollutants to regulate in PSES on the basis of whether or not they pass through, interfere with, or are incompatible with the operation of POTWs (including interference with sludge practices). A pollutant is deemed to pass through when the average percentage removed nationwide by well-operated POTWs (those meeting secondary treatment requirements) is less than the percentage removed by directly discharging facilities applying BAT for that pollutant. In the pesticide chemical manufacturing final rule, phenol, 2-chlorophenol, 2,4-dichlorophenol and 2,4-dimethylphenol were found to not pass through POTWs (58 FR 50649; September 28 1993). Phenol is a PAI that is exempted from this final rule under the sanitizer exemption while the remaining three chemicals are priority pollutants.

As discussed in Section III.A.1, based on comments and the addition of the pollution prevention alternative to the zero discharge standard for the final rule, EPA believes it is appropriate to exempt phenol from the final PFPR effluent guidelines and standards, and to exclude 2-chlorophenol, 2,4-dichlorophenol and 2,4-dimethylphenol from regulation in the final categorical pretreatment standards (PSES and

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[8] Section 402 of the Clean Water Act addresses the NPDES requirements, while Section 307(b) addresses the pretreatment standards.

[9] In individual cases the requirement of wastewater pretreatment prior to discharge to the POTW may be removed for floor wash or the final rinse of a non-reusable triple rinse by the control authority when the facility has demonstrated that the levels of PAIs and priority pollutants in such wastewaters are at a level that is too low to be effectively pretreated at the facility and have been shown to neither pass through or interfere with the operations of the POTW.

PSNS) because these three pollutants have been determined not to pass through POTWs.

EPA has estimated the compliance cost for the industry to achieve the pretreatment standards (PSES) contained in the final rule at $29.9 million annually ($1995). The current PAI pollutant loading to POTWs is estimated at 192,789 pounds with PAI removals achieved by the final regulation estimated at 189,908 pounds (assuming zero removals by POTWs currently—see Cost-Effectiveness Analysis in Section V.D.6). This means that compliance with the final rule would remove almost 99% of the current pollutant loading. Due to the toxic nature of the majority of PAIs, the equivalent toxic weighted pollutant removals are 7.6 million pound equivalents[10].

2. Refilling Establishments (Subcategory E)

EPA is establishing pretreatment standards for existing refilling establishments at zero discharge of pollutants in process wastewaters to POTWs. This standard is based on collection and storage of process wastewaters followed by reuse of the wastewaters as make-up water for application to fields in accordance with the product label. Based on the PFPR 1988 questionnaire survey, 98 percent of the existing refilling establishments achieve zero discharge.

Only a small number of refilling establishments are indirect dischargers and EPA has estimated that they can comply with the final pretreatment standards at nearly zero cost. EPA has estimated that only 19 facilities (of the 1134) do not achieve zero discharge and they currently discharge to POTWs. EPA estimates a capital cost of only $500 (i.e., the approximate cost of a minibulk tank to store water for reuse) for each the 19 facilities to meet the zero discharge PSES standard.

B. Best Practicable Control Technology Currently Available (BPT)

1. Pesticide Formulating, Packaging and Repackaging (Subcategory C)

As discussed in Section III.D.3. of today's notice, EPA has amended and clarified the BPT limitations for the PFPR/Manufacturers and established BPT limitations for the stand-alone PFPR facilities (ie., PFPR facilities where no pesticide manufacturing occurs or where pesticide manufacturing process wastewaters are not commingled with PFPR process wastewaters). In addition to clarifying the use of ''zero allowance'' for zero discharge for PFPR/Manufacturers, EPA is providing both the PFPR/Manufacturers and the stand-alone PFPRs with the opportunity to use the P2 Alternative.

Under the final rule, EPA is amending the 1978 BPT standard by establishing a zero discharge limitation with a compliance alternative which provides for P2 allowable discharge to surface waters. EPA is also establishing a zero discharge limitation (without the use of a ''zero allowance'' permitting mechanism) with a compliance alternative for a P2 allowable discharge for the stand-alone PFPR facilities. (See Section III.D.3. for additional discussion.)

The zero discharge limitation is based on pollution prevention, recycle and reuse practices and, when necessary, treatment and reuse for those PAIs that are formulated, packaged and/or repackaged but are not also manufactured at the facility. The basis also includes some amount of contract hauling for off-site incineration.

Zero allowance is established for PFPR/Manufacturers for those pesticides that are formulated, packaged and/or repackaged *and* manufactured at the facility. Zero allowance is based on pollution prevention, recycle and reuse practices and treatment and discharge through the manufacturer's wastewater treatment system within the pesticide manufacturing production-based numeric limitations (i.e., giving no allowance for the PFPR wastewater or its production). This is consistent with how the existing 1978 BPT zero discharge requirements have been implemented by permit writers.

The compliance alternative (P2 Alternative) is based on performing specific pollution prevention, recycle, reuse and water conservation practices (as listed in Table 8 to part 455 of the final rule) followed by a P2 allowable discharge which requires treatment of all process wastewaters prior to direct discharge to surface waters.

EPA has estimated that there are no additional costs or pollutant removals associated with the BPT limitation for the PFPR/Manufacturers, as these costs have already been absorbed by the industry over the past 18 years as a result of the 1978 BPT regulation. (See Section IV.C.1. for a discussion on BAT and the associated costs of compliance).

EPA has not assigned any additional costs to the stand-alone PFPR facilities as they are also currently achieving zero discharge. However, facilities may choose to take advantage of the P2 Alternative in order to achieve a decrease in cross-media impacts. Depending on the current means of achieving zero discharge, a facility's costs may increase or decrease when switching to the P2 Alternative. The costs may increase initially due to the cost of installing a wastewater treatment system due to the associated capitol costs; however, EPA believes that over the long term, the annual costs for those facilities which select the P2 Alternative would be lower. EPA assumes that facilities will make the choice, to continue to comply with zero discharge or to move to the P2 Alternative based, in significant part, on economic considerations. Therefore, EPA believes that if the costs associated with the P2 Alternative were significantly higher, the facility would not alter their current means of compliance. Accordingly, EPA has assumed no incremental costs as a result of the addition of the P2 Alternative to BPT for stand-alone PFPR facilities.

2. Refilling Establishments (Subcategory E)

The existing BPT regulations did not cover refilling establishments. As discussed in the proposal (59 FR 17870), the practice of refilling minibulks did not begin until the late 1980's, i.e., after the original BPT regulation was promulgated in 1978. Based on the PFPR survey, 98 percent of the existing refilling establishments achieve zero discharge. EPA proposed zero discharge of process wastewater pollutants as the BPT limitations for refilling establishments.

In the final regulation EPA is establishing a BPT limitation for existing refilling establishments at zero discharge of pollutants in process wastewaters to waters of the U.S. This limitation is based on collection and storage of process wastewaters, including rinsates from cleaning minibulk containers and their ancillary equipment; and wastewaters from secondary containment and loading pads. The collected process wastewater would be reused as make-up water for

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[10] The toxic weighted pollutant removals (in pound-equivalents) for the final rule are not directly comparable to the toxic weighted pollutant removals presented in the proposal or supplemental notice. This is because: (1) The method used to convert acute toxicity values to chronic value was revised from a 1:100 ratio to a 1:10 ratio and reduces the toxic weighting factor for many PAIs; (2) the toxic weighting factor for the pyrethrins was revised; and (3) EPA is using an average non-272 PAI toxic weighting factor based on values for 91 non-272 PAIs instead of using the current loading-weighted average of the toxic weighting factors for the 272 PAIs.

application to fields in accordance with the product label. Since greater the 98% of these facilities already achieve zero discharge and the remaining facilities discharge to POTWs, the costs associated for BPT have been estimated to be nearly zero.

C. Best Available Technology Economically Achievable (BAT)

1. Pesticide Formulating, Packaging and Repackaging (Subcategory C)

EPA has established BAT limitations that are equivalent to the limitations established for BPT for PFPR/ Manufacturers and stand-alone PFPR facilities (see Section IV.B.1 for discussion of BPT limitations).

Under the proposal, existing direct discharge PFPR/Manufacturers were expected to treat (for reuse) their PFPR wastewaters in a separate treatment system from their pesticide manufacturing wastewater treatment systems. EPA estimated the compliance costs for these facilities by costing them for separate PFPR universal treatment systems.

Under the final rule, existing direct discharging Subcategory C facilities will have a choice of either complying with a zero discharge limitation or the P2 Alternative (see Section III.D.3. for a discussion on amending and clarifying BPT). However, the rule clarifies that in meeting the zero discharge limitation, permitting authorities may authorize the commingling of pesticide manufacturing and PFPR process wastewaters to meet the pertinent BAT limitations for pesticide manufacturers with a zero allowance for PAIs in PFPR wastewaters. EPA has revised the cost model to account for changes in the final rule due to updated analytical data, changes in scope and the addition of the P2 Alternative. However, EPA believes that an overestimate of the costs would result if EPA included costs for separate UTS systems when the facilities' current controls, used for treating PFPR wastewaters (i.e., prior to commingling with pesticide manufacturing wastewater) and/or treating commingled wastewater (i.e., their pesticide manufacturing treatment systems), already achieve the BAT limitation of zero discharge or ''zero allowance.''

Thus, EPA is not including these costs and removals in the total industry estimate. However, EPA has made a determination of economic achievability even if these costs would be incurred, and is presenting the costs and pollutant removals associated with the (17) direct discharging PFPR/Manufacturers for informational purposes. When current treatment in place is not accounted for, the estimated compliance cost for the PFPR/Manufacturers to comply with BAT is $2.8 million ($1995) and is estimated to remove greater than 99% of the pollutants. This equals 50,248 lbs (or 71.6 million lb-eq.[11]) of PAIs. Again, EPA believes this cost is economically achievable.

2. Refilling Establishments (Subcategory E)

EPA is establishing BAT limitations for this subcategory that are equivalent to the limitations established for BPT. Since BPT requires zero discharge of process wastewater pollutants and 98 percent of the existing refilling establishments already achieve zero discharge, EPA believes the same technology basis and discharge prohibition is appropriate and economically achievable for BAT.

D. New Source Performance Standards (NSPS)

1. Pesticide Formulating, Packaging and Repackaging (Subcategory C)

EPA has set the new source performance standards for PFPR/ Manufacturers and stand-alone PFPRs the same as BPT and BAT. The new source standards are established as follows:

EPA has established NSPS limitations equivalent to the limitations that are established for BPT and BAT. Since EPA found the Zero/P2 alternative to be economically achievable for existing facilities under BPT and BAT on a facility basis and since new facilities will be able to choose between zero discharge and the P2 Alternative on a product family/process line/process unit basis, EPA believes that this NSPS standard does not create a barrier to entry.

2. Refilling Establishments (Subcategory E)

EPA is establishing NSPS standards for this subcategory that are equivalent to the limitation established for BPT and BAT. Since BPT requires zero discharge of process wastewater pollutants and 98 percent of the existing refilling establishments already achieve zero discharge, EPA believes an equivalent technology basis is appropriate for NSPS and will not create a barrier to entry.

E. Pretreatment Standards for New Sources (PSNS)

1. Pesticide Formulating, Packaging and Repackaging (Subcategory C)

EPA is establishing PSNS standards for this subcategory that are equivalent to the standards established for PSES (i.e., zero discharge with a compliance alternative for a P2 allowable discharge). EPA believes that the standards established for PSNS will not create a barrier to entry as they are equivalent to PSES which were found to be economically achievable.

EPA did not propose to set PSNS (or NSPS) equal to PSES (or BAT). Although the PSNS Zero/P2 Alternative standard discussed above is a change from the proposed PSNS, it is consistent with the Supplemental Notice and comments submitted. At proposal, PSES included a partial exemption for exterior wastewater sources from small sanitizer facilities (see Section II.E of today's notice for a discussion of the proposed partial sanitizer exemption); however, the proposed PSNS did not include such an exemption and was found not to create a barrier to entry for new facilities. The partial sanitizer exemption no longer effects the economic achievability of the standards because in response to comments, sanitizer products are no longer included in the scope of the PFPR effluent guidelines. Based on the addition of the P2 Alternative option to these effluent guidelines and standards and the associated estimated reductions in cross-media impacts, EPA believes that it is appropriate to give new facilities the opportunity to use the P2 Alternative to meet PSNS.

2. Refilling Establishments (Subcategory E)

EPA is establishing PSNS standards for this subcategory that are equivalent to the limitations established for PSES (i.e., zero discharge). In addition, BPT, BAT and NSPS also require zero discharge of process wastewater pollutants, and 98 percent of the existing refilling establishments already achieve zero discharge; thus, EPA believes an equivalent technology basis is appropriate for PSNS and will not create a barrier to entry.

F. Best Conventional Pollutant Control Technology (BCT)

1. Pesticide Formulating, Packaging and Repackaging (Subcategory C)

EPA has established BCT limitations that are equivalent to the limitations established for BPT. This is because BPT and BAT establish zero discharge

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[11] The large number of toxic weighted pound equivalents is driven by a large PFPR production value reported from a single PFPR/Manufacturer using coumaphos with a toxic weighting factor = 5.6 x 10^3.

with a compliance alternative for a P2 allowable discharge and BCT can be no less stringent than BPT and no more stringent that BAT. EPA believes there are no additional costs associated with these limitations.

2. Refilling Establishments (Subcategory E)

EPA is establishing BCT limitations for this subcategory that are equivalent to the limitations established for BPT. Since BPT requires zero discharge of process wastewater pollutants and 98 percent of the existing refilling establishments already achieve zero discharge, EPA believes an equivalent technology basis is appropriate for BCT.

V. Economic Considerations

A. Introduction

Promulgation of the final PFPR rule requires that the discharge limitations be both technically and economically achievable. This section of today's notice reviews EPA's analysis of the economic impacts of the regulation and presents EPA's finding that the limitations are economically achievable.

EPA's detailed economic impact assessment can be found in the report titled ''Economic Analysis of Final Effluent Limitations Guidelines and Standards for the Pesticide Formulating, Packaging, and Repackaging Industry'' (hereafter ''final EA'') [EPA–821–R–96–017]. The report estimates the economic effect on the industry of compliance with the regulation in terms of facility closures (severe impacts), and conversions of production lines to alternate activities and/or compliance costs exceeding five percent of facility revenues (moderate impacts). The report also includes: Analysis of the effects of the regulation on new pesticide formulating, packaging, and repackaging facilities and a Regulatory Flexibility Analysis detailing impacts on small businesses and small entities. A separate report, ''Cost-Effectiveness Analysis of Final Effluent Limitations Guidelines and Standards for the Pesticide Formulating, Packaging, and Repackaging Industry,'' presents an analysis of the cost-effectiveness of the final regulation. All of these analyses support the conclusion that the effluent limitations guidelines and standards contained in the final PFPR regulation are economically achievable by the PFPR industry.

The discussion of economic achievability is organized in three sections, as follows. Section V.B. summarizes the economic findings for the regulation as proposed in April 1994. Section V.C. reviews certain changes in the regulation since proposal that were the basis of a supplemental notice issued in June 1995; and Section V.D. presents the economic analysis of the final regulation, as delineated in the preceding sections of this preamble.

B. Review of the Proposed Regulation

The April 14, 1994 notice of proposed rulemaking (59 FR 17850) included a description of the anticipated economic impacts of proposed effluent limitations guidelines and standards for the PFPR industry. These economic impacts are briefly reviewed below. (See Section II.E. for a review of the proposed regulation.)

At proposal, BCT and BAT requirements were proposed to be equivalent to the 1978 BPT requirements; therefore, no additional costs were expected for compliance with the BCT and BAT limitations. Accordingly, the EIA focused on analyzing alternative PSES options for the two industry subcategories.

1. Subcategory C: PFPR and PFPR/Manufacturers

Since completion of the proposal EIA, EPA has continued to review its information regarding the structure of the PFPR industry and has increased its estimates of the numbers of facilities using only non-272 PAIs that would potentially be subject to the Subcategory C regulation. As a result, EPA's estimates of the number of affected facilities and the impacts and costs of the proposed regulation are higher than those presented at proposal. For example, at proposal, EPA estimated that Subcategory C included 1,479 water-using facilities that were potentially subject to regulation. Using the newer population estimates, EPA now estimates that under the proposal a total of 2,018 water-using facilities would have been potentially subject to regulation. The increase in this estimate comes entirely from the increased estimate of the number of facilities using only non-272 PAIs.[12] The following discussion of the proposed Subcategory C regulation reflects these updated estimates of the numbers of facilities, costs, and impacts.

For the re-estimated proposed rule, EPA estimates that 2,018 Subcategory C, water-using facilities were potentially subject to regulation. Of these 2,018 facilities, 943 used the 272 PAIs that EPA originally considered for regulation[13] and 1,075 used only the additional non-272 PAIs. EPA estimates that 1,142 of these facilities would incur total annualized compliance costs of $71.9 million in 1995 dollars[14] under the proposed rule of zero discharge.

The EIA for the proposed regulation used three primary impact measures:

- Severe impacts, which were defined as facility closures;
- Moderate impacts or facility impacts short of closure, which were defined as line conversions or incurrence of annualized compliance costs exceeding five percent of facility revenue; and
- Employment losses, which, for the impact analysis, were assumed to accompany facility closures and line conversions (but not incurrence of annualized compliance costs exceeding 5 percent of facility revenue).

Under the proposed PSES requirements and using the updated estimate for the number of non-272 PAI-using facilities, EPA estimates that three facilities would close as a result of proposed regulation, while 327 facilities would incur moderate impacts. In addition, under the proposed zero discharge rule, EPA conservatively estimates total job losses at facilities incurring impacts at 890 full-time employment positions. EPA judges the proposed regulation as economically achievable using these updated impact values that are based on the higher number of non-272 PAI-using facilities.

In addition to the facility impact analysis, EPA analyzed the cost-effectiveness of the proposed regulation for Subcategory C facilities. Cost-effectiveness is calculated as the ratio of the incremental annual costs in 1981 dollars to the incremental pounds-equivalent of pollutants removed for each option. Using the updated estimates of costs and removals for the proposed regulation, EPA estimates total pollutant removals of 505,235 pounds, or 38.9 million pounds-equivalent on a toxic weighted basis, and an average cost-effectiveness value of $1.65 per pound-equivalent.[15] [16] EPA considers the proposed option to be cost-effective.

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[12] Due to changes in scope for the final regulation, 1,411 water using facilities will be potentially subject to the final regulation.

[13] Many of these facilities also used non-272 PAIs in addition to the 272 PAIs.

[14] The costs of regulatory compliance are all reported in 1995 dollars. In the EIA and the Federal Register Notice for the regulation at proposal and in the Supplemental Notice, regulatory compliance were reported in 1988 dollars, the base year of the PFPR industry survey. All cost estimates, including the proposal and the supplemental notice have been brought forward to 1995.

[15] The toxicity of the non-272 PAIs used in generating this cost-effectiveness value was estimated as the average pre-compliance loading-weighted average toxicity of the 272 PAIs.

[16] At proposal, EPA reported an *average* cost-effectiveness, or the cost-effectiveness value calculated relative to the baseline of no regulation, and an *incremental* cost-effectiveness, or the cost-effectiveness relative to the next less stringent

For analysis of the final regulation, EPA revised the toxic weighting factors to reflect additional information on the toxicity of the PAIs. In general, the revisions reduced the estimated toxicity of the PAIs subject to regulation (see Section V.D.6, below, which contains the discussion of the cost-effectiveness analysis for the final regulation). Using these revised toxic weighting factors and also taking into account the updated estimates of costs and pollutant removals for non-272 PAI-using facilities, EPA estimates that the proposed regulation would remove an estimated 23.2 million pounds-equivalent, yielding a cost-effectiveness value of $2.77 per pound-equivalent ($1981).

2. Subcategory E: Refilling Establishments

At proposal, an estimated 1,134 refilling establishments (Subcategory E PFPR facilities) were potentially subject to regulation. EPA estimates that 98 percent of these facilities, were already in compliance with the proposed Subcategory E limitations and pretreatment standards. All but 19 of the 1,134 existing facilities were expected to incur no costs to comply with the proposed option. The remaining 19 facilities were expected to achieve compliance with no significant additional cost[17] (See Section VI.B.2). No economic impacts were estimated to occur due to compliance with the proposed rule.

C. Changes to the EIA Since Proposal: Issuance of the June 1995 Supplemental Notice

In response to public comments on the regulation, EPA issued a Supplemental Notice (60 FR 30217) on June 8, 1995 that solicited comment on proposed changes in the scope of the PFPR regulation for Subcategory C facilities and on the Zero/P2 Alternative. In addition, EPA revised the cost estimating methodology and economic impact estimates.

As discussed in Section III.B.4. of today’s notice, EPA estimated compliance costs for each facility to comply with the Zero/P2 Alternative option. Each facility was assumed to choose either zero discharge or the P2 Alternative for compliance, depending on which alternative would impose the lower annualized costs on the facility. For the Supplemental Notice, EPA estimated total annualized compliance costs for facilities covered under PSES at $43.4 million, in 1995 dollars, or 40 percent less than the costs for the proposed regulation. Under the Zero/P2 Alternative option, no facilities were assessed as closures as the result of the compliance requirements, while 208 facilities were assessed as incurring moderate impacts.[18] The comparable values for the regulation for the proposal (re-estimated using the revised cost previously discussed) are 3 facility closures and 327 facilities with moderate impacts.

D. Assessment of Costs and Impacts for the Final PFPR Regulations

This section describes the impact measures used in the Economic Analysis, the estimated impacts associated with the final rule, impacts on new sources, and the cost-effectiveness analysis. As discussed below, EPA is promulgating the regulation for Subcategory E facilities as presented at proposal with storm water now exempted, but the analysis of costs and impacts for the Subcategory E regulation remain the same as presented at proposal. Accordingly, the following discussion focuses on the Pretreatment Standards for Existing Sources (PSES) regulation for Subcategory C facilities.

1. Summary of Economic Analysis Methodology and Data

The data sources and methodology for analyzing economic impacts remain the same as used at proposal and for the Supplemental Notice. For a more detailed discussion of the methodology used in the economic impact analysis, see the preamble for the PFPR regulation at proposal (59 FR 17850), the proposal EIA report and final EA report.

The economic impact analysis measures three types of primary impacts: severe impacts (facility closures), moderate impacts (facility impacts short of closure), and job losses. Each impact analysis measure is reviewed briefly below.

- *Severe Impacts.* Severe impacts, defined as facility closures, were assessed on the finding that the regulation would be expected to cause a facility to incur, on average, negative after-tax cash flow over the three-year period of analysis. This analysis was performed for PFPR/Manufacturers and for facilities that do not manufacture PAIs, but receive at least 25 percent of their revenue from PFPR activities. Facilities with relatively low reliance on PFPR activities as a source of revenue (i.e., less than 25 percent of revenue) were excluded from this analysis because EPA does not anticipate that such facilities would close in entirety because of costs of regulatory compliance associated with PFPR activities. EPA also did not include PFPR facilities from Subcategory E (refilling establishments) in this analysis largely because of their relatively low reliance on PFPR activities as a source of revenue (an average of 15 percent).
- *Moderate Impacts.* Moderate impacts were defined as a financial impact short of entire facility closure and were analyzed in two ways. First, PFPR facilities subject to the Subcategory C regulation and with less than 25 percent of revenue from PFPR activities were assessed for line conversions by comparing the after-tax return on assets (ROA) from PFPR activities after regulation with the ROA estimated to be achievable in an alternative line of business. Facilities for which the post-compliance ROA for PFPR activities was found to be less than the return achievable in an alternative line of business were assumed to switch out of PFPR operations. Second, all Subcategory C and E facilities, regardless of PFPR revenue reliance, were assessed for the incurrence of total annualized compliance costs exceeding five percent of facility revenue.
- *Employment losses.* Possible employment losses were assessed for facilities estimated to close as a result of regulation and for facilities estimated to convert PFPR lines to an alternative business activity. EPA believes that the estimates of employment loss resulting from this analysis are highly conservative because of the assumption that line conversions would result in loss of employment for a facility’s PFPR-related employment. More realistically, EPA expects that line conversions will not generally lead to full loss of PFPR-related employment.

As in the economic impact analysis for the proposed PFPR regulation, these analyses for the final regulation assume that PFPR facilities would not be able to pass the costs of compliance on to their customers through price increases. Analysis of pesticide product markets and the likely response of pesticide product customers to price increases (as discussed in the proposal EIA), indicates that a substantial number of facilities should recover some part of their compliance costs through price

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regulatory option considered. However, the incremental calculation and the comparison are no longer relevant as the alternative options at proposal are no longer under consideration. For this reason, in the current discussion, EPA is reporting only the cost-effectiveness value calculated relative to the baseline of no regulation.

[17] A capital investment of approximately $500 was estimated for each of these facilities.

[18] The cost and impact values for the Supplemental Notice regulation reflect updating of the estimates of non-272 PAI-using facilities.

increases. Thus, the analyses of compliance cost and impacts overstate the severity of the regulation's financial burden on the PFPR industry.

EPA extrapolated information on compliance costs, pollutant loadings, and the frequency of facility-level compliance impacts from data on facilities in the original PFPR industry survey to analyze the technical and economic impacts of regulating the additional non-272 PAIs.[19] In the following discussion, EPA has not separated the estimated costs or impacts according to which set of PAIs facilities are estimated to use. Additional details of the analysis of costs and impacts for the facilities using the different sets of PAIs may be found in the final EA.

Although the impact analysis methodology for the final regulation is unchanged from proposal (see the Proposal EIA), its application has been changed for analyzing the Zero/P2 Alternative. This regulatory option was analyzed for each sample facility as part of two separate compliance approaches: (1) Zero discharge and (2) pollution prevention in combination with treatment followed by discharge (see Section IV.A.1). Facilities were assumed to adopt the compliance approach with the lower total annualized compliance cost including both annual operating and maintenance costs and an annual allowance for capital outlays. Although most facilities were estimated to achieve compliance by pollution prevention and treatment, some were estimated to comply by zero discharge. Thus, the combination of the analyses for the two separate compliance approaches yields the aggregate analysis for the final regulation for Subcategory C facilities. EPA believes this methodology provides a realistic appraisal of the costs and impacts of the final regulation as it embodies the compliance decision that facility management is expected to face in deciding whether to comply by zero discharge or by pollution prevention in combination with treatment followed by discharge. In addition, because EPA's analysis considers both capital and operating costs, EPA believes that the findings from the compliance decision analysis will reasonably approximate facility managements' findings regarding choice of the less financially burdensome compliance approach. In addition, under the final rule, facilities will be able to make the choice between zero discharge and the P2 Alternative on a product family/process line/process unit basis, which will give them even more flexibility in their compliance choice.

2. Estimated Facility Economic Impacts

a. Subcategory C: PFPR and PFPR/Manufacturers

The costs and impacts for the final regulation applicable to PSES Subcategory C facilities are discussed in this section and are compared with the values estimated for the proposed and supplemental notice regulations. In addition, the cost and impacts for the final regulation are compared with those that EPA estimates would occur if facilities were not provided the flexibility to choose the preferred compliance approach from the zero discharge and pollution prevention allowable discharge alternatives. These comparisons show that the final regulation provides a more economical and less financially burdensome approach to achieving desired discharge reductions than the proposed, and otherwise previously noticed, requirements considered.

The following comparisons with the proposed regulation are relative to the cost and impact values based on the new estimates of the number of facilities using only non-272 PAIs. As noted previously, these revisions increased the costs and impacts estimated for the proposed regulation. The following discussion will show that the costs and impacts for the final regulation are substantially less than the updated estimates for the proposed regulation. Although this discussion will not include comparisons with the values for the proposed regulation as originally published, EPA points out that the costs and impacts for the final regulation are also markedly less than the original estimates of costs and impacts for the proposed regulation.

Of the 2,018 water-using Subcategory C facilities re-estimated to be subject to the regulation at proposal, EPA estimates that 506 facilities, or 25 percent, including baseline failures, will incur costs in complying with the final Subcategory C PSES regulation. Total annualized compliance costs for these facilities are estimated at $29.9 million, in 1995 dollars (see Table 1, below). Excluding baseline closures from the cost analysis reduces the number of facilities expected to incur costs to 421 facilities and total annual costs to $24.2 million, in 1995 dollars. In estimating the costs of the final regulation, facilities were assigned to the compliance option—zero discharge or the pollution prevention alternative—with the lower total annualized compliance cost. From this analysis, 69 percent of the cost-incurring facilities (including baseline failures) were expected to select the P2 Alternative with the remaining 31 percent selecting zero discharge.

No facilities are projected to close under the final regulation. A total of 150 possible line conversions (a moderate impact) are estimated. EPA does not generally expect that line conversions will result in employment losses. However, to be conservative in its analysis, EPA estimated the maximum potential employment loss associated with the regulation by assuming that all PFPR employment would be lost in facilities with line conversions. From this assumption, the upper bound employment loss for the final regulation is estimated at 458 full-time employment positions (FTEs).

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[19] Although the PFPR industry survey focused on facilities using the original 272 PAIs, some of these facilities were also found to use one or more of the additional non-272 PAIs in their PFPR activities. During site visits, EPA also observed PFPR operations at several facilities that process both original 272 and non-272 PAIs. Thus, the set of facilities used for extrapolating financial and technical information to facilities using the non-272 PAI chemicals and the impacts of bringing these additional PAIs under regulation also includes information on facilities that use these non-272 PAIs.

TABLE 1.—ESTIMATED COSTS AND IMPACTS OF THE FINAL, PROPOSED AND SUPPLEMENTAL NOTICE PSES REGULATION FOR SUBCATEGORY C FACILITIES

	Number of facilities incurring costs	Total annualized compliance cost ($1995, millions)	Severe impacts †	Moderate impacts *	Maximum potential employment loss ††
Proposed Regulation	1,142	$71.9	3	327	890
Supplemental Notice	709	43.4	0	208	634
Final Regulation—Costs Including Baseline Closures	506	29.9	0	150	458
Final Regulation—Costs Excluding Baseline Closures	421	24.2			

† Severe impacts are defined as facility closures. All facility employment is assumed to be lost as the result of a facility closure.

* Moderate impacts are defined as line conversions and/or total annual compliance costs exceeding 5 percent of total facility revenue. EPA does not expect that employment losses would generally accompany line conversions; however, for this analysis, EPA assessed the maximum potential loss based on the assumption that all employment associated with PFPR activities would be lost as a result of a line conversion.

†† Employment loss for the proposed regulation includes the estimated employment loss in facility closures and the worst case estimate of employment loss in facilities with line conversions. The reported employment loss for the Supplemental Notice and Final Regulation reflects no facility closures and includes only the worst case employment loss in facilities with line conversions.

In addition to presenting the estimated costs and impacts for the final regulation, Table 1 also presents the comparable values for the proposal (re-estimated) and the supplemental notice. As shown in the table, the expected burden of the regulation has fallen considerably from proposal through supplemental notice to the final regulation. From proposal (re-estimated) to final, the number of Subcategory C facilities expected to incur costs has fallen from 1,142 to 506 facilities, or 56 percent[20]. This can be attributed to the reduction in scope of certain PAIs and wastewater sources as well as to the addition of the P2 Alternative as a compliance option to zero discharge. The estimated drop in total annual compliance cost, from $71.9 million to $29.9 million ($1995), represents an even greater reduction from proposal, at 58 percent. As noted above, no severe impacts are assessed for the final regulation while 3 facility closures were estimated for the proposed regulation. Finally, the number of moderate impacts and potential employment losses are also substantially reduced from proposal, falling by 54 percent and 49 percent, respectively. In summary, under the final regulation, the number of facilities estimated to incur costs, the expected cost, and the facility impacts are considerably less than estimated for the proposed regulation.

EPA also believes that the final regulation is superior to the other options considered because of the flexibility it provides to facilities in deciding how to achieve compliance. In particular, by allowing facilities to choose the less expensive compliance approach—the pollution prevention alternative or zero discharge—the regulation achieves substantial pollution reductions but at substantially lower costs and economic impacts than would occur if the regulation allowed compliance by only one of the possible approaches.[21] Moreover, EPA notes that, by encouraging consideration and use of pollution prevention as a compliance approach, the final regulation will reduce the potential for cross-media impacts that would occur under a strict zero discharge requirement. The regulation achieves these benefits with only a very modest reduction in the expected pollutant removals that would be achieved under a zero discharge regulation. Specifically, EPA estimates that the final regulation will remove 189,908 pounds or 98.5 percent, of the estimated 192,789 pounds of pollutant discharges subject to control by the final regulation (assuming zero removals by POTWs currently—see Cost-Effectiveness Analysis in Section V.D.6). EPA estimates that only 2,881 pounds, or about 1.5 percent of the pollutant loadings subject to the final regulation will continue to be discharged to POTWs.

Finding of Economic Achievability

The final regulation achieves substantial reductions in harmful pollutant discharges at very modest economic burden to the PFPR industry. Under a conservative assumption that facilities will recover none of their compliance costs through price increases, the regulation is estimated to impose no severe impacts (i.e., facility closures), 150 moderate impacts (i.e., line conversion or annualized compliance cost exceeding 5 percent of facility revenue), and a worst-case employment loss of 458 FTEs. In addition, the final regulation provides industry with considerable latitude in deciding how to comply with the regulation—that is, by zero discharge or pollution prevention and treatment. In this regard, EPA's analyses of the selected compliance approach may overstate compliance costs because the analyses assume application of one approach throughout the facility instead of a more customized choice of compliance approach by PFPR line. Also, EPA estimates that a relatively small fraction—25 percent—of the facilities potentially subject to the proposed regulation are likely to incur costs in complying with the final regulation. That such a small fraction of the industry is expected to incur costs reflects in large part EPA's decision to exclude additional PAIs and wastestreams from coverage under the final regulation. Finally, EPA notes that the aggregate costs and impacts estimated for the final regulation are substantially less than those estimated for the proposed regulation, both as analyzed for the original proposal and as analyzed on the basis of the higher estimate of non-272 PAI-using facilities. In light of these very modest impacts estimated for the final regulation, EPA finds that the final PSES regulation for Subcategory C facilities is economically achievable.

b. Subcategory E: Refilling Establishments

The regulatory approach and costing methodology for Subcategory E facilities is unchanged from that presented at proposal with the exception that storm water is no longer considered a process wastewater subject to this regulation. The analysis of costs, loadings, and economic methodology at proposal stands as previously presented.

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[20] All comparisons with the proposed regulation and supplemental notice are based on the analyses including baseline closures.

[21] EPA has worded the final regulation to allow facilities to make the choice between zero discharge and the pollution prevention alternative on a product family/process unit/process line basis (as opposed to a full facility basis). However, EPA could not estimate costs on this basis.

EPA is establishing BPT and BAT regulations for Subcategory E facilities set to zero discharge (equivalent to PSES). EPA's survey of the PFPR industry indicated that no Subcategory E facilities are direct dischargers. Accordingly, EPA estimates that the Subcategory E portion of the PFPR industry will incur no costs for complying with the BPT or BAT requirements.

4. Regulatory Effects Not Re-Estimated

Because the aggregate compliance costs and facility impacts estimated under the final regulation are substantially less than those estimated for the regulation as presented at proposal, EPA did not re-evaluate the following economic measures for the final regulation: community impacts, foreign trade effects, impacts on firms owning PFPR facilities, the direct economic benefits to facilities of pollution prevention practices, and the labor requirements. The analysis of these additional impact categories depends on the estimated aggregate costs for the regulation and on the results of the facility impact analysis. With the final regulation estimated to impose aggregate compliance costs that are 56 percent less than originally estimated for the proposed regulation and to cause no facility closures (compared to the 2 closures originally estimated at proposal), EPA concluded that the analysis for these additional impact categories under the final regulation would find less consequential effects than had been originally estimated at proposal. Because EPA had judged the slight impacts estimated at proposal for the additional impact categories to be consistent with an economically achievable regulation, EPA, therefore, concluded that the impacts under the final regulation for these additional impact categories would also be found consistent with an economically achievable regulation. As a result, EPA decided not to expend the resources that would be necessary to re-estimate and re-document the lower impact levels for these additional impact categories.

5. Impacts of Pretreatment Standards for New Sources (PSNS) and New Source Performance Standards (NSPS)

a. Subcategory C: PFPR and PFPR/Manufacturers

(1) PSNS

EPA is setting PSNS (Pretreatment Standards for New Sources) for Subcategory C facilities equal to PSES limitations for existing sources. In general, EPA believes that new sources will be able to comply at costs that are similar to or less than the costs for existing sources, because new sources can apply control technologies and P2 practices (including dedicated lines and pressurized hoses for equipment cleaning) more efficiently than sources that need to retrofit for those technologies and P2 practices. As a result, given EPA's finding of economic achievability for the final PSES regulation for Subcategory C facilities, EPA also finds that the PSNS regulation will be economically achievable and will not constitute a barrier to entry for new sources.

(2) NSPS

EPA has established NSPS limitations equivalent to the limitations that are established for BPT and BAT. BPT and BAT limitations allow facilities to use the Zero/P2 Alternative and were found to be economically achievable; therefore, NSPS limitations will not present a barrier to entry for new facilities.

b. Subcategory E: Refilling Establishments

EPA is setting NSPS/PSNS for Subcategory E facilities equal to BAT/PSES limitations for existing sources. EPA estimates that compliance with BAT/PSES will impose no costs on existing facilities. Likewise, new facilities are not expected to incur additional annual costs due to the regulation. Because EPA found compliance with the final regulation to be economically achievable for existing facilities, EPA determined that compliance with NSPS/PSNS will also be economically achievable and not a barrier to entry for new sources.

6. Cost-Effectiveness Analysis

EPA also performed a cost-effectiveness analysis of the final PSES regulation for Subcategory C facilities. (A more detailed discussion can be found in the final Cost-Effectiveness Analysis (September 1996) [EPA–821–R–96–018]. The cost-effectiveness analysis compares the total annualized cost incurred for a regulatory option to the corresponding effectiveness of that option in reducing the discharge of pollutants.

Cost-effectiveness calculations are used during the development of effluent limitations guidelines and standards to compare the efficiency of one regulatory option in removing pollutants to another regulatory option. Cost-effectiveness is defined as the incremental annual cost of a pollution control option in an industry subcategory per incremental pollutant removal. The increments are considered relative to another option or to a benchmark, such as existing treatment. In cost-effectiveness analysis, pollutant removals are measured in toxicity normalized units called ''pounds-equivalent.'' The cost-effectiveness value, therefore, represents the unit cost of removing an additional pound-equivalent (lb eq.) of pollutants. In general, the lower the cost-effectiveness value, the more cost-efficient the regulation will be in removing pollutants, taking into account their toxicity. While not required by the Clean Water Act, cost-effectiveness analysis is a useful tool for evaluating regulatory options for the removal of toxic pollutants. Cost-effectiveness analysis does not analyze the removal of conventional pollutants (e.g., oil and grease, bio-chemical oxygen demand, and total suspended solids).

For the cost-effectiveness analysis, the estimated pounds-equivalent of pollutants removed were calculated by multiplying the number of pounds of each pollutant removed by the toxic weighting factor for each pollutant. The more toxic the pollutant, the higher will be the pollutant's toxic weighting factor; accordingly, the use of pounds-equivalent gives correspondingly more weight to pollutants with higher toxicity. Thus, for a given expenditure and pounds of pollutants removed, the cost per pound-equivalent removed would be lower when more highly toxic pollutants are removed than if pollutants of lesser toxicity are removed. Annual costs for all cost-effectiveness analyses are reported in 1981 dollars so that comparisons of cost-effectiveness may be made with regulations for other industries that were issued at different times.

a. Subcategory C: PFPR and PFPR/Manufacturers

Table 2 provides estimates of the total annualized compliance costs, in 1981 dollars, the total pollutant removals in pounds and pounds-equivalent, and the cost-effectiveness of the final PSES regulation for Subcategory C facilities with estimates of various POTW removals. EPA has estimated the pollutant removals and the cost-effectiveness value for the final rule using the same methodology as used in the proposed rule and supplemental notice (and the Pesticide Manufacturing effluent guideline). This methodology assumes that all PAIs pass through the POTW (i.e., no removal by the POTW), as there is little field data on the effectiveness of POTWs removing PAIs.

However, EPA has developed laboratory estimates for the percent removals of a large number of pollutants (including some PAIs) which were published in the Domestic Sewage Study (DSS), February 1986 [EPA/530–SW–86–004]. For each pollutant studied, two estimates were developed, an ''acclimated'' removal percentage, which might be achieved by a well-run treatment facility with a constant flow rate of the pollutant in question, and an ''unacclimated'' removal percentage, adjusted to account for the slug loadings and batch discharges which POTWs experience in everyday operation. While the unacclimated removals were intended to more accurately reflect real world operating conditions, a limited amount of test data on non-PAI pollutants indicates that POTWs may achieve or even exceed the acclimated removal estimates in practice. Thus it is not clear whether the acclimated or unacclimated estimates more accurately represent the removal percentages achieved in practice for PAIs. EPA has thus developed a range of cost-effectiveness and total removals using three different assumptions about the removal efficiency of POTWs: zero removals (this most conservative estimate is included because of the lack of actual data), unacclimated removals (which range from 30% to 90% and average 48%), and acclimated removals (which range from 80% to 95%).

Using this range of POTW removals, EPA has estimated the range of removal to be between 18,991 and 189,908 pounds of pollutants, or 760,000 to 7.6 million toxic pounds-equivalent with cost-effectiveness ranging from $2.74 to $27.35 per pound-equivalent when compliance costs are held constant at $20.9 million [22] in 1981 dollars. EPA considers even the high end of this range to be cost effective. In order to be consistent with the proposed rule and supplemental notice (and because of the lack of actual POTW removal data for PAIs), EPA is presenting the cost-effectiveness and total removals for the final rule as $2.74 per pound-equivalent and 189,908 pounds or 7.6 million pounds-equivalent, respectively.

TABLE 2.—NATIONAL ESTIMATES OF TOTAL ANNUALIZED COSTS, REMOVALS AND COST-EFFECTIVENESS VALUES FOR SUBCATEGORY C PSES FACILITIES UNDER THE FINAL REGULATION

POTW removal assumption used	Total annualized compliance costs (millions of $, 1981)	Pollutant removals, pounds	Pollutant removals, (pounds-equivalent)	Cost-effectiveness ($/lb.-eq.)
No POTW Removals	$20.9	189,908	7.6 million	$2.74
POTW Removals per DSS	20.9	165,460	5.8 million	3.60
90 Percent Removal Efficiency	20.9	18,991	760,000	27.35

Notes:
1. Includes estimated baseline failures.
2. Toxic weighting factors used in the analyses reflect more recent toxicological information and are generally lower than the factors used at proposal and supplemental.

EPA has also estimated the removals, annual compliance cost, and cost-effectiveness excluding baseline closures (when zero removal at POTWs is assumed). Excluding estimated baseline failures lowers the costs and removals to $17.1 million ($1981) and 156,592 pounds (5.8 million pounds-equivalent). The cost-effectiveness value excluding baseline failures is $2.93 per pound-equivalent, which EPA considers to be cost-effective.

The cost-effectiveness value (assuming no POTW removal) for the final regulation is not directly comparable to the values presented in the previous Federal Register notices for the proposed regulation and the supplemental notice for two reasons. First, the scope of the regulation has changed with fewer PAIs and waste streams covered under the final regulation. As a result, the baseline pollutant discharges and pollutant removals estimated for the final regulation are lower than the values estimated for the proposed regulation. Second, the toxic weighting factors (TWFs) used by EPA for calculating the cost-effectiveness of the final regulation reflect more recent toxicological data and, in general, are lower than the values used for the proposal and supplemental notice analyses. To provide a consistent comparison of the proposed, supplemental, and final regulations, EPA re-calculated the toxic-weighted baseline discharges, pollutant removals, and cost-effectiveness values for the proposed and supplemental notice regulations using the more recent toxic weighting factors (see Table 3).[23] The calculations for the final regulation also embody the changes in regulatory scope.

TABLE 3.—ESTIMATED COST-EFFECTIVENESS OF THE FINAL PSES REGULATION FOR SUBCATEGORY C FACILITIES COMPARED WITH THE PROPOSED AND SUPPLEMENTAL NOTICE REGULATIONS

[All toxic-weighted values based on toxic weighting factors developed for the Final Regulation]

	Proposed regulation: Zero discharge with sanitizer exemption (Option 3/S.1)	Supplemental notice: Zero discharge/pollution prevention alternative	Final regulation: Zero discharge/pollution prevention alternative
Total Annualized Cost, $1981	$64.1 million	$32.7 million	$20.9 million.
Pollutant Discharges Subject to Regulation, pounds	505,235	337,995	192,789.
Pollutant Loadings Subject to Regulation, pounds-equivalent	23.2 million	15.4 million	7.7 million.
Pollutant Removals, pounds	503,114	333,731	189,908.

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[22] EPA believes that if POTWs are removing PAIs, the cost of compliance of the industry would be lower than $20.9 million ($1981) due to the reduction in operating and maintenance costs associated with the treatment system used to pretreat PFPR wastewaters prior to discharge to the POTW.

[23] The re-calculated cost-effectiveness values for the proposed regulation also reflect the updated estimates of the number of facilities using non-272 PAIs.

TABLE 3.—ESTIMATED COST-EFFECTIVENESS OF THE FINAL PSES REGULATION FOR SUBCATEGORY C FACILITIES COMPARED WITH THE PROPOSED AND SUPPLEMENTAL NOTICE REGULATIONS—Continued

[All toxic-weighted values based on toxic weighting factors developed for the Final Regulation]

	Proposed regulation: Zero discharge with sanitizer exemption (Option 3/S.1)	Supplemental notice: Zero discharge/pollution prevention alternative	Final regulation: Zero discharge/pollution prevention alternative
Pollutant Removals, pounds-equivalent	23.2 million	15.3 million	7.6 million.
Cost-Effectiveness‡	$2.77/lb-eq	$2.14/lb-eq	$2.74/lb-eq.

AAA‡ Cost-effectiveness analysis is conventionally calculated on an incremental basis: that is, the costs and removals of a given option are calculated as the differences from the values for the next less stringent option. At proposal, the cost-effectiveness of Option 3/S.1 was calculated on an incremental basis relative to the next less stringent option, Option 3/S. However, the cost-effectiveness values for the supplemental notice and final regulations are relative to a next less stringent option of no regulation. To permit consistent comparison of the three regulations, the cost-effectiveness of the proposed regulation has been restated relative to a no-regulation baseline.

The effect of the regulation’s reduced scope is seen by the reductions in pollutant loadings subject to regulation in pounds and pounds-equivalent (see Table 3, lines 2 and 3). These results show the pollutant loadings subject to the rule at proposal to be 505,235 pounds, and on a toxic-weighted basis, 23.2 million pounds-equivalent; under the final regulation, the pollutant loadings within the scope of the regulation fall to 192,789 pounds and 7.7 million pounds-equivalent on a toxic-weighted basis. The cost-effectiveness values of the regulations using the current set of weighting factors are: $2.77 per pound-equivalent for the proposed regulation, $2.14 per pound-equivalent for the supplemental notice, and $2.74 per pound-equivalent for the final regulation. The cost-effectiveness value for the final regulation is low in relation to the values calculated for other effluent limitations guidelines and standards recently promulgated by EPA.

b. Subcategory E: Refilling Establishments

Estimates of compliance costs and pollutant removals associated with Subcategory E facilities have not changed since the proposed regulation. EPA believes that the final regulation can be implemented at a minimal cost (i.e., a capital investment of approximately $500 for a mini-bulk tank to store water for reuse) at the 19 facilities not currently in compliance. Therefore, EPA determines the final regulation to be cost-effective for Subcategory E facilities.

E. Regulatory Flexibility Act

Pursuant to section 605(b) of the Regulatory Flexibility Act, 5 U.S.C. 605(b), the Administrator certifies that this rule will not have a significant economic impact on a substantial number of small entities. EPA analyzed the potential impact of the rule on both small businesses and small local governments.

Under the Regulatory Flexibility Act, an agency is not required to prepare a regulatory flexibility analysis for a rule that the agency head certifies will not have a significant economic impact on a substantial number of small entities. While the Administrator has so certified today’s rule, the Agency nonetheless prepared a regulatory flexibility assessment equivalent to that required by the Regulatory Flexibility Act as modified by the Small Business Regulatory Enforcement Fairness Act of 1996. The assessment for this rule is detailed in the ‘‘Economic Analysis of Final Effluent Limitations Guidelines and Standards for the Pesticide Formulating, Packaging, and Repackaging Industry’’ [EPA–821–R–96–017].

EPA received many comments regarding the rule (see Section 15.6 of the technical record and Section IV in the economic record for the rulemaking). A number of commenters raised issues concerning small business impacts and the need to reduce the regulation’s burden on small businesses. Specifically, as a way of reducing possible adverse impacts on smaller businesses, some commenters requested that EPA broaden its exemption from the regulation to include all small businesses. In addition, some commenters argued that EPA did not need to regulate the discharges of small PFPR businesses because the pollutant discharges of such facilities were not likely to have a consequential environmental impact.

EPA disagrees with this claim and believes it is inappropriate to set small-business and/or small-production exemptions for all small businesses and/or production volumes because of the substantial toxicity of many of the PAIs. The size of the business and/or the volume of PAIs processed annually are not a sufficient basis for determining that a facility should be exempted from regulation. Because of the high toxicity of many of the PAIs, the processing of even very small quantities of such PAIs can result in pollutant discharges of substantial toxicity. In addition, small business size does not necessarily equate with small pesticide production volume, particularly in terms of toxicity. Some small-business PFPR facilities process a substantial volume of PAIs and have the potential to discharge substantial volumes of toxic pollutants unless discharges are limited by the PFPR regulation. (see the Comment Response Documents in the rulemaking record for more information on these comments and EPA’s response to them.)

Taking into account commenters’’ concerns regarding possible impacts on small entities, EPA introduced the Zero/P2 Alternative Option and made numerous changes to the rule designed to reduce the burden upon all PFPR facilities, particularly small business entities. As previously discussed, the final rule expands the sanitizer exemption to exempt additional lower toxicity PAIs from regulatory coverage and gives facilities a Zero/P2 compliance choice on a line by line or process by process basis.

The factual analysis and basis for the ‘‘no significant impact’’ certification is contained in Chapter 4 of the final EA report referenced previously and is summarized below.

1. Analysis of Impacts on Small Business Entities

To gauge the impact of the final regulation on small business, EPA analyzed the impact of the final regulation on Subcategory C facilities according to the business size of the owning firms and compared the findings for the final regulation with those for the proposed regulation. Given the large presence of small business-owned entities in the PFPR industry, EPA exercised substantial care at proposal and throughout development of the final regulation, to ensure that the final regulation would not impose a significant impact on a substantial number of small business-owned facilities. This effort results in the modest incurrence of both costs and impacts by small business entities under the final regulation.

EPA estimates that 1,513 (75.0 percent) of the 2,018 PFPR facilities potentially subject to a Subcategory C PSES regulation are owned by small entities. Of the 506 facilities estimated to potentially incur compliance costs under the final rule (including baseline failures), 357 (70.6 percent) are estimated to be owned by small entities. Excluding projected baseline failures, 421 facilities are expected to incur costs, of which 274, or 65.1 percent are small business-owned facilities.

No small business-owned facilities are estimated to close as a result of regulation. Less than 10 percent of small business-owned facilities (137 facilities) are estimated to incur a moderate impact ‘‘ that is, a line conversion or annualized compliance cost exceeding 5 percent of facility revenue. The average compliance cost burden among small business-owned facilities is also small in relation to facility revenue: on average, annualized compliance costs amount to 2.7 percent of facility revenue for small business-owned facilities.

Finally, the number of small business-facilities incurring costs, and the numbers of small business-facilities incurring severe or moderate impacts are substantially less than estimated for the proposed regulation. For the proposed regulation (re-estimated), 859 small business-facilities were estimated to incur costs, 3 facilities were assessed as potential closures (severe impacts), and 275 facilities were assessed as moderate impacts; the comparable values for the final regulation are 357 small-business facilities incurring costs, zero severe impacts, and 137 moderate impacts. The substantial reduction in impacts among small business-owned facilities from proposed to final regulation reflects EPA’s efforts to moderate the burden of the regulation by introducing a new option which gives facilities the two compliance alternatives, by reducing the PAIs and wastestreams subject to the regulation, and by providing facilities with greater flexibility in deciding how to achieve regulatory compliance. In light of these findings, EPA certifies that the final regulation does not impose significant impacts on a substantial number of small business-owned facilities.

2. Analysis of Impacts on Other Small Entities

In addition to considering the impact of the final regulation on small business-owned facilities, EPA also considered the regulation’s likely effects on two other categories of small entities that will be affected by the regulation: (1) Publicly Owned Treatment Works operated by small governments, which may be responsible for implementing the regulation at the local level; and (2) small communities, which may contain businesses that are adversely affected by the regulation. EPA concluded that the final regulation would not impose significant impacts on either of these additional small entity categories.

In the course of developing the final regulation, EPA solicited comments on regulatory implementation issues from over 76 POTWs that had been identified as receiving PFPR facility discharges. Fifteen of these are POTWs are considered small—that is, POTWs that are located in smaller jurisdictions (less than 50,000 population) or that are small POTWs on the basis of daily treatment volume (less than or equal to 1 million gallons per day). Comments were requested on such matters as the burden of implementing the pollution prevention/treatment alternative element of the regulation. Although small entity POTWs were afforded the opportunity to comment on the implementation requirements of the proposed regulation, none chose to do so. However, in response to the request for comment on the supplemental notice, EPA received responses from eight POTWs. Several of these comments indicated that POTWs might face modestly higher burdens from administering a regulation with the compliance flexibility offered by the P2 Alternative than from administering a regulation strictly based on zero discharge. However, none indicated that such a regulation would be expected to impose a significant additional burden beyond the requirements that POTWs already face in administering permits and compliance programs for industrial facilities. In addition, POTWs also indicated that the modest additional burden seemed reasonable given the regulation’s expected discharge reductions and its innovative structure, which gives facilities greater flexibility in designing a compliance approach and which encourages use of pollution prevention as a compliance method. In view of these responses and given the fact that no small entity POTWs responded to the request for comments, EPA certifies that the regulation will not impose a significant impact on a substantial number of small entity POTWs.

In addition to the analysis required by the Regulatory Flexibility Act, EPA also considered the regulation’s effect on small communities in which PFPR facilities might be located. Specifically, in the community impact analysis performed for the proposed PFPR regulation, EPA examined the impact of possible employment losses, including multiplier effects, in communities in which PFPR facilities with moderate or severe impacts were located. Using the criterion that an estimated aggregate employment loss exceeding one percent of community employment is significant, EPA found no significant community employment impacts for the proposed regulation as originally analyzed. At the same time, the final regulation is estimated to have substantially fewer facility and employment impacts than those estimated for the original proposed regulation. Given that no significant community impacts were found among any communities for the original proposed regulation—regardless of community size—5and that the final regulation’s impacts are expected to be substantially less than those of the proposed regulation, the final regulation will not impose a significant burden on small communities.

VI. Unfunded Mandates Reform Act

Title II of the Unfunded Mandates Reform Act of 1995 (UMRA), Pub. L. 104–4 establishes requirements for Federal agencies to assess the effects of their regulatory actions on State, local, and tribal governments and the private sector. Under Section 202 of the UMRA, EPA generally must prepare a written statement, including a cost-benefit analysis, for proposed and final rules with ‘‘Federal mandates’’ that may result in expenditures to State, local, and tribal governments, in the aggregate, or to the private sector, of $100 million or more in any one year. Before promulgating an EPA rule for which a written statement is needed, Section 205 of the UMRA generally requires EPA to identify and consider a reasonable number of regulatory alternatives and adopt the least costly, most cost-effective or least burdensome alternative that achieves the objectives of the rule. The provisions of Section 205 do not apply when they are inconsistent with applicable law. Moreover, Section 205 allows EPA to adopt an alternative other than the least costly, most cost-effective or least burdensome alternative if the Administrator publishes with the final rule an explanation why that alternative was not adopted. Before EPA establishes any regulatory requirements that may significantly or uniquely affect small governments, including tribal governments, it must have developed under Section 203 of the UMRA a small government agency plan. The plan must provide for notifying potentially affected small governments, enabling officials of affected small governments to have meaningful and timely input in the development of EPA regulatory proposals with significant Federal intergovernmental mandates, and informing, educating, and advising small governments on compliance with the regulatory requirements.

EPA has determined that this rule does not contain a Federal mandate that may result in expenditures of $100 million or more for State, local, and tribal governments, in the aggregate, or the private sector in any one year. Thus, today's rule is not subject to the requirements of Sections 202 and 205 of the UMRA.

Although not subject to the UMRA because the cost of the rule to all parties that would be effected is well below $100 million, EPA has complied with numerous provisions of the UMRA. Today's rule is the least costly, least burdensome alternative that was considered.

Consistent with the intergovernmental consultation provisions, EPA has already initiated consultations with the Publicly Owned Treatment Works (POTWs) that will be affected by the rule and sought their input as part of the regulation development process. Specifically, after publication of the Supplemental Notice (60 FR 30217), EPA solicited comments from over 70 POTWs that had been identified as receiving discharges from PFPR facilities. This request sought input on several aspects of the PSES regulation, including allowance of self-certification of compliance by PFPR facilities, use of Best Professional Judgment to revise or modify the pollution prevention practices listed in the Supplemental Notice, and the burden on POTWs from administering the pollution prevention compliance alternative as part of the regulation proposed in the Supplemental Notice.

In response to this request, EPA received comments from eight POTWs. Four of these included comment on the expected burden to POTWs from administering the pollution prevention and treatment compliance alternative. The general thrust of these comments is that administering the pollution prevention/treatment alternative will impose somewhat higher burdens on POTWs than administering a regulation requiring compliance strictly by zero discharge. POTWs stated that inspection requirements for verification of compliance will be more difficult and time-consuming because inspectors will have to review technical plans, equipment, and processes to verify that the specified pollution prevention and treatment measures have been properly implemented, maintained, and operated by PFPR facilities. In contrast, verification of compliance with a zero discharge regulation would be more straightforward. POTWs also stated that the option of relying on Best Engineering Judgment to alter requirements on facilities would increase, rather than reduce, implementation burdens. However, at the same time, POTWs also noted that the burden of administering the PFPR regulation did not seem unreasonable in comparison to requirements for other regulations and that the regulation's implementation requirements are necessary if the regulation is to be effective.

In keeping with the provisions to inform, educate, and advise small governments, EPA will publish a Guidance Manual prior to the compliance deadline of the rule to inform, educate, and advise interested facilities, permit writers, and POTWs on pollution prevention processes and procedures applicable to the PFPR industry. It will also serve as guidance for the implementation of and compliance with the P2 Alternative requirements.

VII. Executive Order 12866

Under Executive Order 12866, (58 FR 51735 (October 4, 1993)) the Agency must determine whether the regulatory action is ''significant'' and therefore subject to OMB review and the requirements of the Executive Order. The Order defines ''significant regulatory action'' as one that is likely to result in a regulation that may:

(1) Have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities;

(2) Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;

(3) Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or

(4) Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order.

Pursuant to the terms of Executive Order 12866, it has been determined that this rule is a ''significant regulatory action.'' As such, this action was submitted to OMB for review. Changes made in response to OMB suggestions or recommendations will be documented in the public record for this rulemaking.

VIII. Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA)

Under 5 U.S.C. 801(a)(1)(A) as added by the Small Business Regulatory Enforcement Fairness Act of 1996, EPA submitted a report containing this rule and other required information to the U.S. Senate, the U.S. House of Representatives and the Comptroller General of the General Accounting Office prior to publication of the rule in today's Federal Register. This rule is not a ''major rule'' as defined by 5 U.S.C. 804(2).

IX. Paperwork Reduction Act

The information collection requirements in this rule have been submitted for approval to the Office of Management and Budget (OMB) under the Paperwork Reduction Act, 44, U.S.C. 3501 et seq. Two separate Information Collection Request (ICR) documents have been prepared by EPA. Burden estimates for PFPR direct dischargers to comply with their NPDES permits and the P2 Alternative are contained in the ''National Pollutant Discharge Elimination System (NPDES)/Compliance Assessment/Certification Information'' ICR (No.1427.05). Burden estimates for indirect discharging PFPR facilities to comply with 40 CFR part 403 and the P2 Alternative are included in the ''National Pretreatment Program (40 CFR part 403)'' ICR (No. 0002.08). The approval of these ICRs is still pending; therefore, the information requirements contained in this rule are not effective until OMB approves them. A copy of these ICRs may be obtained from Sandy Farmer, OPPE Regulatory Information Division; U.S. Environmental Protection Agency (2136), 401 M St., NW., Washington, DC 20460, by calling (202) 260–2740, or electronically by sending an e-mail message to ''farmer.sandy@epamail.epa.gov''.

Burden means the total time, effort, or financial resources expended by persons to generate, maintain, retain, or disclose or provide information to or for a Federal agency. This includes the time needed to review instructions; develop, acquire, install, and utilize technology and systems for the purposes of collecting, validating, and verifying information, processing and maintaining information, and disclosing and providing information; adjust the existing ways to comply with any previously applicable instructions and requirements; train personnel to be able to respond to a collection of information; search data sources; complete and review the collection of information; and transmit or otherwise disclose the information.

EPA estimates that each water using facility is expected to spend an average of 20 to 60 hours preparing the initial certification statement (including brief descriptions) for submittal to the permitting/control authority as well as preparing the paperwork to be kept on-site (i.e., treatment information, supporting documentation for modifications, etc. . .). EPA has estimated less hours for direct dischargers than for the indirect dischargers (i.e., 20 hours versus 60 hours) because the direct dischargers are typically also pesticide manufacturers with treatment systems in place that are well documented while most indirect dischargers do not have treatment in place and have less technical expertise in the area of wastewater treatment. However, some indirect dischargers will use less than the 60 hours because they are also pesticide manufacturers or they may be able to reuse all of their wastewater that would otherwise have to be pretreated prior to discharge to the POTW (i.e., interior wastewater sources, floor wash and/or leak and spill cleanup water).

Note: Although most indirect dischargers will not implement the P2 Alternative prior to the compliance deadline (3 years following promulgation) and; therefore would not be covered by the Pretreatment ICR (No. 0002.08) which expires in three years, EPA has estimated that approximately ten percent of the 1500 water-using PFPR facilities/new facilities (i.e., 150 facilities) would implement the P2 Alternative prior to the compliance deadline. Therefore, the burden presented in the Pretreatment ICR concerning the P2 Alternative is estimated for 150 facilities over the 3 years of the ICR. EPA will include burden for the remainder of the water using PFPR facilities in the subsequent Pretreatment ICR in 1999.

Beyond the initial submittal, a PFPR facility is expected to spend 15 minutes to prepare and sign the periodic certification statement to be submitted to the permitting authority once per year and to the control authority twice per year. If a facility has made changes in the P2 practices they are using or in the choice of zero discharge or P2 Alternative for a process line/product family that was initially specified in the initial certification (or previous period), they must provide a brief description with their periodic certification statement. EPA assumes that ten percent of facilities will have to prepare such a description each year and that the associated burden/facility is four hours for direct dischargers and 10 hours for indirect dischargers. EPA has also included four hours per facility for direct dischargers and 10 hours for indirect dischargers for the burden associated with a request for approval of modifications where the justification is not listed on Table 8 to part 455 of the final regulation. Again, EPA has used the assumption that ten percent of facilities per year will have to prepare such a request for modification.

An Agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. The OMB control numbers for EPA's regulations are listed in 40 CFR part 9 and 48 CFR Chapter 15.

Send comments on the burden estimates and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to EPA at the address provided above, with a copy to the Office of Information and Regulatory Affairs, Office of Management and Budget, 725 17th St., NW., Washington, DC 20503, marked ‘‘Attention: Desk Officer for EPA.’’ Please remember to include the ICR number in any correspondence.

X. Water Quality Analysis

Most of the PAIs being regulated have at least one toxic effect (e.g., human health carcinogen and/or systemic toxicant or aquatic toxicant). Many of these pollutants have the potential to bioaccumulate and persist in the environment. Various studies have demonstrated the bioaccumulation of pesticides in aquatic life and accumulation of pesticides in sediments. Documented human health impacts at pesticide formulating, packaging, and repackaging (PFPR) facilities include respiratory disease and impaired liver function, primarily through worker exposure.

For example, 137 of the original 272 PAIs are known to be highly or moderately toxic to aquatic life, 25 have carcinogenic effects, 149 are known to have systemic or other health effects, 24 have an established concentration limit under the Safe Drinking Water Act and 134 have a high or moderate potential to bioaccumulate in the environment. (See the ‘‘Potential Fate and Toxicity Categorization of Pollutants Associated with PFPR Wastewater’’ Report; September 1996 in the rulemaking record).

Numerous incidents of groundwater and soil contamination at refilling establishments, largely due to spills, are identified in the Office of Pesticide Programs proposed ‘‘Standards for Pesticide Containers and Containment’’ (59 FR 6712, February 11, 1994). Several examples cited in the Standards for Pesticide Containers and Containment proposed rule are summarized below.

Based on the 1991 study, ‘‘Report on Wisconsin Pesticide Mixing and Loading Site Study,’’ an estimated 45 to 75 percent of the commercial agrichemical facilities in Wisconsin will require soil remediation and 29 to 63 percent of these sites potentially exceed the State's groundwater standards for pesticides. In the ‘‘Environmental Cleanup of Fertilizer and Agricultural Chemical Dealer Sites’’ report, the Iowa Fertilizer and Chemical Association estimates that 40 to 50 percent of refilling establishments in Iowa may require groundwater remediation. A 1992 letter from the National Agricultural Retailers Association (formerly NARA, now ARA) stated that 70 to 80 percent of the detections of pesticides in groundwater in Kansas could be traced back to refilling establishments. Groundwater contamination by pesticides is also documented at numerous refilling establishments in Michigan, Minnesota, Illinois, and Utah.

The water quality benefits of controlling the indirect discharges from PFPR facilities are evaluated by modeling the impact of those discharges on receiving streams. This model assumes that no additional removal occurs at the POTW. EPA believes this to be a valid assumption because the PAIs that are still covered by the scope of the final pretreatment standards (PSES) are expected to pass-through POTWs. The effects of POTW wastewater discharges of 139 PAIs are evaluated at current and post-compliance (e.g., zero/P2 Alternative) levels for 85 indirect discharging PFPR facilities which discharge to 79 POTWs on 77 receiving streams. Water quality models are used to project pollutant instream concentrations based on estimated releases at current and zero/P2 Alternative levels; the instream concentrations are then compared to EPA published water quality criteria or to documented toxic effect levels.

The instream pollutant concentration for one PAI is projected to exceed human health criteria in two receiving streams at current discharge levels. Both excursions are projected to be eliminated under the zero/P2 Alternative. The number of pollutants with receiving streams projected to exceed aquatic life criteria or aquatic toxic effect levels would be reduced from 21 PAIs in 23 streams at current discharge levels to four PAIs in six streams at zero/P2 Alternative levels.

The potential impacts of these indirect discharging PFPR facilities are also evaluated in terms of inhibition of POTW operation and contamination of sludge. Potential biological inhibition problems are projected to occur for current discharges at four POTWs for three PAIs; sludge criteria are unavailable for PAIs. No potential biological inhibition problems are projected to occur for the Zero/P2 Alternative option. The POTW inhibition values used in this analysis are not, in general, regulatory values. They are based upon engineering and health estimates contained in guidance or guidelines published by EPA and other sources. Thus, EPA is not basing its regulatory approach for pretreatment discharge levels upon the finding that some pollutants interfere with POTWs by impairing their treatment effectiveness. However, the values used in the analysis do help indicate the potential benefits for POTW operation that may result from the compliance with the final regulation.

In addition, the water quality benefits of controlling the direct discharges from PFPR facilities were evaluated by modeling the impact of direct wastewater discharges on receiving stream water quality. However, as described in Section IV.C.1 of today's notice, EPA's estimates of costs and current pollutant loadings for direct discharges did not include pollutant removals for treatment already in place (i.e., pesticide manufacturing treatment systems). Therefore, an estimate of the water quality impacts resulting from current direct discharges would result in an overestimation of the current water quality impacts because these facilities do have treatment in place and are already meeting zero discharge or zero allowance (i.e., no additional discharge allowance in the pesticide manufacturers' limitations for PFPR wastewaters). Thus, EPA is presenting only those water quality impacts associated with the final rule.

Seventeen (17) direct discharging PFPR facilities, which discharge 61 PAIs to 16 receiving streams, were evaluated. Water quality models are used to project pollutant instream concentrations based on estimated releases at post-compliance (e.g., zero/P2 Alternative) levels; the instream concentrations are then compared to EPA published water quality criteria or to documented toxic effect levels where EPA water quality criteria are not available for certain PAIs. The zero/P2 Alternative option is projected to result in aquatic life exceedances of three PAIs in two receiving streams. No exceedances of human health criteria are projected to occur for the zero/P2 Alternative option.

XI. Non-Water Quality Environmental Impacts

The elimination or reduction of one form of pollution may create or aggravate other environmental problems. Therefore, Sections 304(b) and 306 of the Act call for EPA to consider the non-water quality environmental impacts of effluent limitations guidelines and standards. Accordingly, EPA has considered the effect of these regulations on air pollution, solid waste generation, and energy consumption. As discussed throughout today's notice, EPA selected to promulgate the Zero/P2 Alternative option due to the cross-media impacts that could occur under a zero discharge regulation due to contract hauling to off-site incineration of potentially large volumes of non-reusable wastewaters.

EPA has estimated the non-water quality impacts associated with the selected option, i.e., the Zero/P2 Alternative, as well as a zero discharge option. As discussed previously in this notice, under the Zero/P2 Alternative, facilities will be able to choose between complying with zero discharge or the P2 Alternative on a line-by-line basis. However, for the purposes of estimating compliance costs and non-water quality impacts, EPA has assumed that a facility will choose between these compliance options on a whole-facility basis. Therefore, the non-water quality estimates for the Zero/P2 Alternative represent those cross-media impacts associated with a percentage of the facilities choosing to comply with the P2 Alternative and others choosing to comply with zero discharge.

EPA has used the assumption that, under the zero discharge option, facilities would recycle and reuse some wastewaters while hauling the remaining wastewaters off-site for incineration. Under the P2 Alternative portion of the Zero/P2 Alternative, some facilities may be able to avoid the need for wastewater treatment by comprehensively applying source reduction practices to all their wastewater sources; however, it is more likely that, following the use of recycle and reuse practices, facilities will need to employ some pollution control treatment technologies prior to discharging their wastewaters.

There are some cross-media impacts that are associated with the Zero/P2 Alternative and its use of a wastewater treatment system that are not associated with a zero discharge option since treatment is not utilized under the zero discharge option. These cross-media impacts include sludge generation and energy consumption and air emissions of criteria air pollutants[24] from the trucks that transport spent activated carbon for regeneration. However, the zero discharge option relies heavily on the contract hauling of wastewater for incineration which significantly increases the cross-media impacts due to air emissions of criteria air pollutants from the trucks that transport the wastewater to incineration and from the incineration of the wastewater itself.

EPA believes that selecting the Zero/P2 Alternative option will minimize these cross-media impacts, overall, as compared to the zero discharge option. In particular, the Zero/P2 Alternative has a significantly lower cross-media impact on air emissions of criteria air pollutants than the zero discharge option while still preventing the discharge of 98.5 percent of the pesticide active ingredients (PAIs) from being discharged to the water. The following sections present the estimates for air emissions, solid waste generation and energy consumption for the final rule.

A. Air Pollution

For the purpose of preparing a cross-media impact analysis, the air pollution effects are divided into two separate types of air emissions generated as a result of the final rule. First, there are air emissions estimated for the Zero/P2 Alternative based on the treatment of wastewater through a treatment system, such as the Universal Treatment System, discussed in Section II.E. of today's preamble. These emissions consist mainly of volatile priority pollutants. EPA does not anticipate that there will be any significant losses of PAIs into the atmosphere under the Zero/P2 alternative, because most PAIs have low volatility. The second type of air emissions are those generated from the transport (i.e., air emissions from the trucks' exhaust and gasoline) of both wastewater and spent activated carbon as well as emissions from the incineration of wastewater that is hauled off-site for disposal. Estimates of both types of air emissions are presented on Table 4 of today's preamble for the Zero/P2 Alternative and for zero discharge. As seen on Table

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[24] Criteria air pollutants include: Volatile organic compounds (VOCs), nitrogen oxides (NOx), sulfur dioxide (SO2), particulate matter (PM) and carbon monoxide (CO). Criteria air pollutants can injure health, harm the environment and cause property damage.

4, the emissions for criteria air pollutants from the transport of wastewaters and spent activated carbon and from the incineration of the non-reusable wastewaters under the zero discharge option would create a significant cross-media impact as compared to the Zero/P2 Alternative.

Table 4: Criteria Air Pollutant Emissions (lb/yr)

Emission source	VOCs	NO_x	PM	CO	SO_2
Wastewater Transportation:					
Zero/P2 Alternative	14,720	121,200	6,800	175,400	....
Zero Discharge	87,600	720,000	40,400	1,044,000	....
Wastewater Incineration:					
Zero/P2 Alternative	5	1,838	10	133	2
Zero Discharge	264	94,600	530	6,880	106
Spent Activated Carbon Transportation:					
Zero/P2 Alternative	1,692	13,920	780	20,200	....
Zero Discharge†	NA	NA	NA	NA	....
Wastewater Treatment: ‡					
Zero/P2 Alternative	84,700	NA	NA	NA	NA
Zero Discharge	52,500	NA	NA	NA	NA

NA=not applicable

a: EPA estimates that under the Zero/P2 Alternative 69% of facilities incurring costs will choose the P2 Alternative and 31% will choose to comply with zero discharge.

† There is no wastewater treatment system used under the zero discharge option and, therefore, no spent activated carbon to transport for re-generation.

‡ Air emissions estimates from wastewater treatment include only volatile priority pollutants.

EPA also estimates the reduction of volatile priority pollutants emissions that would occur under the Zero/P2 Alternative and under zero discharge. EPA estimates that in addition to the 192,789 lbs of PAIs that are currently (i.e., prior to today's regulation) being discharged to water, 381,000 pounds of volatile priority pollutant are currently emitted when wastewater is discharged to POTWs or are emitted to the air from the wastewater treatment process at the POTWs. EPA estimates that under the Zero/P2 Alternative, the air emissions from wastewater reuse, treatment and discharge to POTWs will be reduced to 84,700 pounds of volatile priority pollutants. This means that implementing the Zero/P2 Alternative will reduce air emissions of volatile priority pollutants from wastewater reuse, treatment and discharge by 296,300 pounds annually. In addition, the remaining emissions are localized and in many cases may be more likely to be captured and treated by the UTS. The loss of priority pollutants to the atmosphere is likely to occur during reuse of wastewater and particularly from the emulsion breaking, hydrolysis, and/or chemical oxidation treatment steps where the addition of heat is likely to promote their release [25]. It is also possible that some emissions of priority pollutants could occur during the cleaning of equipment or containers, particularly if high-pressure cleaning or steam cleaning is used. Under the zero discharge option, 52,500 pounds of volatile priority pollutants are expected to be emitted during the recycle and reuse of wastewaters.

B. Solid Waste

EPA estimates that under the Zero/P2 Alternative there will be 856,000 pounds of sludge generated from emulsion breaking and sulfide precipitation treatment annually. EPA has assumed that the sludge generated via emulsion breaking and sulfide precipitation will be hauled to hazardous waste incinerators. In addition to the sludge generated, treatment of wastewater through the Universal Treatment System will generate 3,830,000 pounds annually of spent activated carbon. It is assumed that the activated carbon will be sent off-site for regeneration, which means that it is reused and would *not* become a waste. See Section XI.A. for the estimate of air emissions from transporting the spent activated carbon for regeneration and from the hauling of wastewater/sludge to incineration as well as the air emissions associated with incineration.

EPA believes the Zero/P2 Alternative is consistent with the goals established for EPA's Hazardous Waste Minimization and Combustion Strategy (November, 1994). This draft combustion strategy establishes the goal of a strong preference for source reduction over waste management, thereby reducing the long-term demand for combustion and other waste management facilities. In addition, the strategy states that combustion does have an appropriate role and that EPA wants to ensure that combustion facilities (such as incinerators and boilers and industrial furnaces (BIFs)) are designed in a manner to protect public health.

C. Energy Requirements

EPA estimates that compliance with the final regulation will increase energy consumption by a small increment over present industry use. The main energy requirement is the generation of steam that is used in the wastewater treatment system to accomplish emulsion breaking and hydrolysis. Steam provides the heat energy to assist with the separation of emulsified phases and increases the rate at which active ingredients hydrolyze. It is estimated that about 6.28 x 10^7 pounds per year of steam would be required by the Universal Treatment System. This would require approximately 13,581 barrels of oil annually. This is, relatively, very small compared to the 18 million barrels per day that the United States currently consumes.

Additionally, EPA estimates that the operation of the Universal Treatment System will consume 811,000 kilowatt hours per year. This is expended by the pumps and agitators used in treatment and associated with the storage of water until it can be reused.

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[25] EPA believes that use of closed vessels in the treatment system will additionally control the release of volatile priority pollutants to the air and, therefore; has used the costs associated with closed vessels when estimating costs for the regulation. However, for the analysis of the air pollution emissions estimates for this rule, estimates on volatile priority pollutant emissions from closed vessels were not available. Therefore, the volatile priority pollutant emissions estimate assumes the use of open vessels during treatment which may overestimate the emissions.

XII. Regulatory Implementation

The purpose of this section is to provide assistance and direction to permit writers and control authorities to aid in their implementation of this regulation and its unique compliance alternative. This section also discusses the relationship of upset and bypass provisions, variances and modifications, and analytical methods to the final limitations and standards.

A. Implementation of the Limitations and Standards

1. Pesticide Formulating, Packaging and Repackaging (Subcategory C)

Each PFPR facility subject to this regulation will need to make an initial choice on either a facility-wide basis or on a process basis (i.e., product family/process line/process unit). They will need to choose to either comply with the zero discharge effluent limitation/pretreatment standard *or* choose to agree to conduct the listed pollution prevention practices (or a variation of the listed practices based on self-implemented modifications or those agreed to by the permit/control authority) and also agree to make the practices and the pollution prevention discharge allowance enforceable (see § 455.41 of the final rule for the definition of P2 allowable discharge). However, beyond this initial choice, much of the continued implementation of the Zero/P2 Alternative will differ for direct and indirect dischargers.

Direct Dischargers

For direct dischargers, the Zero/P2 Alternative will be implemented through the NPDES permitting process. For each new or existing direct discharging facility, the facility would need to make the initial choice at the permitting stage or at the time for permit modification or renewal, respectively. Facilities that do not choose the P2 Alternative (or zero discharge) for the facility in its entirety will be required to clearly state in their NPDES permit each product family, process unit or process line and the option selected for each. For those processes for which a direct discharge facility chooses the P2 Alternative over the zero discharge limitation, the permitting authority would include all of the P2 practices and any specified treatment technologies in the facility's NPDES permit. The definition of P2 allowable discharge for direct dischargers requires the appropriate treatment of *all* process wastewater prior to discharge. Therefore, permit writers may want to include in the permit the method chosen by the facility to demonstrate that the treatment system: (1) Is appropriate for the PAIs in their process wastewaters (that are not also being manufactured); and (2) is properly operated and maintained; or the permit writer can set numerical limitations based on BPJ for any additional PAIs, as necessary.

Today's final regulations do not require facilities to submit all of the necessary compliance paperwork to the NPDES permit writer, but instead require the facility choosing the P2 Alternative to keep the paperwork on-site and available for the permitting authority and enforcement officials. However, EPA is requiring the submittal of an initial certification statement at the time of issuance, renewal, or modification of an NPDES permit for direct dischargers. In addition, as suggested by a commenter, EPA is also requiring the submittal of a periodic certification statement to be submitted every year to the NPDES permit writer. The pollution prevention practices and treatment technologies included in such a NPDES permit would be enforceable under CWA sections 309 and 505.

For those processes where a new or existing direct discharge PFPR/Manufacturer has chosen to comply with zero discharge, the permit would include: (1) The pesticide manufacturing limitations (40 CFR part 455, subparts A and B) with no additional allowance for the PFPR wastewaters for those PAIs that are also manufactured; and (2) limitations set equal to the detection limit of the PAIs expected to be in the wastewater (or no PFPR process wastewater flow) for PAIs that are not also manufactured at the facility. The NPDES permits for new or existing stand-alone direct discharging facilities that choose to achieve zero discharge from specified processes will include either limitations set equal to the detection limit of the analytical method for the PAIs expected to be in the wastewater or will allow no process wastewater flow.

Indirect Dischargers

Existing and new PFPR facilities (including PFPR/Manufacturers) which are indirect dischargers would also need to make an initial choice on a process basis of meeting the zero discharge pretreatment standard or adopting and implementing the P2 practices and the treatment technologies (if so specified). Facilities that choose the zero discharge option for specified processes (or for the entire facility) would agree in their control mechanism or pretreatment agreement to demonstrate zero discharge through no process wastewater flow or compliance by meeting a numerical standard be set equal to the detection limit of the analytical method for the PAIs expected in the wastewater.

If the indirect discharging PFPR facility chooses the P2 Alternative for any or all processes/lines/product families, the facility would need to notify the Control Authority of its intention by submitting an initial certification statement as described in § 455.41(a) of the final regulation. Facilities that do not choose the P2 Alternative for the facility in its entirety will be required to include a brief description of each product family, process unit or process line and the option selected for each with the initial certification statement. In addition, the facility must include all of the P2 practices (or modifications) and any specified treatment technologies that will be implemented to meet the requirements of the practices listed in Table 8 to part 455 for those processes which the P2 Alternative was chosen. For indirect dischargers appropriate pretreatment is required for any interior equipment cleaning wastewater (including drums), floor wash[26] or leak/spill cleanup water that is part of the P2 allowable discharge. Other wastewater sources can be discharged to the POTW without pretreatment. The initial certification statement to be submitted requires a signature by the appropriate manager in charge of overall operations of the facility to assure that information provided is true, accurate, and complete to the best of his or her knowledge.

Other required paperwork can be kept on-site (e.g., supporting documentation for any modifications, treatment technologies used that are not listed on Table 10 to part 455 of the regulation, the method chosen and supporting documentation for demonstrating that appropriate treatment is well operated and maintained and the rationale for choosing the method of demonstration). Any modifications for a reason *not* listed on Table 8 to part 455 of the regulation must be submitted to the control authority for approval.

Once an individual control mechanism (or pretreatment agreement) is in place, facilities need to submit a

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[26] In individual cases the requirement of wastewater pretreatment prior to discharge to the POTW may be removed by the control authority for floor wash or the final rinse of a non-reusable triple rinse when the facility has demonstrated that the levels of PAIs and priority pollutants in such wastewaters are at a level that is too low to be effectively pretreated at the facility and have been shown to neither pass through or interfere with the operations of the POTW. The control authority should also take into account whether or not the facility has employed water conservation when generating such a non-reusable wastewater.

periodic certification statement to the control authority indicating that the P2 Alternative is being implemented as in the previous period or that a modification to the individual control mechanism is needed. The certification statement is to be submitted to the control authority on the same time table, i.e., twice per year (June and December), as the reporting required by 40 CFR 403.12(e). The control authority, as part of its approved pretreatment program, must have the authority to ensure compliance with a pretreatment standard (40 CFR 403.8(f)(1)(ii)) and to carry out inspections of the indirect dischargers' self-certifications and of the paperwork described below. 40 CFR 403.8(f)(1)(v).

Necessary Paperwork for the P2 Alternative

As briefly mentioned above, both direct and indirect discharging facilities are required to keep certain paperwork on-site and available for permitting/control authorities and enforcement officials.

Note: Although EPA is not requiring submittal of all the paperwork for approval in these national regulations, NPDES programs and control authorities may choose to require submittal of any of the paperwork for approval.

The paperwork which is required to be submitted includes the one-time initial certification statement (see § 455.41(a) of the final rule) and the periodic certification statements (see § 455.41(b) of the final rule). The paperwork which can be kept on-site is referred to in this final rule as the ''On-site Compliance Paperwork'' (see § 455.41(c)). Each of these is described below.

For each PFPR facility, the initial certification statement would include, at a minimum, a listing of and descriptions of the processes (i.e., product families/process lines/process units) for which it chooses the P2 Alternative and those for which it chooses to achieve zero discharge; descriptions of the P2 practices (from Table 8 to part 455 of the regulation) that are being employed and how they are being implemented; description of any justifications allowing modification to the practices listed on Table 8 to part 455; and a description of the treatment system being used to obtain a P2 allowable discharge (as defined in § 455.41). The initial certification statement must be signed by the responsible corporate officer as defined in 40 CFR 403.12(l) or 40 CFR 122.22.

The periodic certification statement is to be submitted twice per year for indirect discharging facilities and once per year for direct discharging facilities and should indicate whether the P2 Alternative is being implemented as set forth in the NPDES permit/control mechanism or that a justification allowing modification of the listed practices has been implemented resulting in a change in the P2 practices conducted at the facility. If the modification needed is not listed on Table 8 of part 455, the facility should request a modification from their permitting/control authority if it has not already done so.

The on-site compliance paperwork should include the information from the initial and periodic certifications but must also include: (1) The supporting documentation for any modifications that have been made to the listed P2 practices (including records that indicate/demonstrate, for example, microbial growth, specific directions for other disposal from the manufacturer, use of a solvent recovery system, etc.); (2) a written discussion demonstrating that the treatment system being used contains the appropriate treatment technologies (i.e., listed by PAI in the Table 10 to Part 455 of the final regulation, equivalent system as defined in § 455.10(h), or pesticide manufacturing system) for removing PAIs that are used in production at their facility and could be in their wastewater; (3) a method for demonstrating that the treatment system is well operated and maintained; and (4) a discussion of the rationale for choosing the method of demonstration. For example, a facility may utilize a surrogate method for determining breakthrough of their carbon adsorption unit. This method could be used instead of performing analytical testing for all or any of the PAIs that may have been in production at the facility over a specific period of time. The facility could possibly use records of carbon change out/purchase to demonstrate that the system is properly operated and maintained and could describe the initial testing and/or vendor information used to determine the useful life of the activated carbon.

Control authorities, at or any time after entering into an individual control mechanism, or permitting authorities, at or any time after issuing, reissuing, or modifying the NPDES permit, could inspect the PFPR facility to see that the listed practices are being employed, that the treatment system is well operated and maintained and that the necessary paperwork provides sufficient justification for any modifications. When facilities need to modify a listed P2 practice for which a justification is not listed in the final regulation, the facility must make a request for the modification from the NPDES permitting authority or the control authority. The permit writer/control authority is expected to use BPJ/BEJ to approve the modification.

Note: EPA is preparing a guidance manual to aid permit writers/control authorities as well as PFPR facilities.

Compliance Dates

EPA has established a three-year deadline for compliance with the PFPR pretreatment standards for existing sources (PSES). Under the zero/P2 alternative facilities will need time to assess which process lines are amenable to the P2 alternative and which lines will have to comply with zero discharge. This decision will most likely be based on economics as well as the characteristics of the individual process line. In addition, facilities will have to determine the treatment necessary for the PAIs expected to be found in the wastewater at their facility and they will need time to design and install these systems. Finally, facilities will need time to prepare the on-site compliance paperwork necessary to support the P2 alternative. Thus, EPA believes that a full three-year compliance period is appropriate.

Existing direct dischargers must comply by the date of issue, reissue or modification of the NPDES permit. New source standards and limitations (PSNS and NSPS) must be complied with when a facility commences the discharging of wastewater.

Note: For this rule, a direct discharge facility is considered a new source if its construction commenced following promulgation of the final rule (40 CFR 122.2); while an indirect discharge facility is considered a new source if construction commenced after proposal (April 1994) of the pretreatment standards (40 CFR 403.3).

Direct dischargers may be subject to the establishment, by the permitting authority, of more stringent effluent limitations based on applicable water quality standards. *See* 40 CFR 122.44. In addition, those PFPR facilities that are indirect dischargers remain subject to the Pass-Through and Interference prohibitions contained in the general pretreatment regulations. 40 CFR 403.5(a)(1). Indirect dischargers could also be subject to local limits established by the control authority receiving the facility's wastewater. 40 CFR 403.5(c).

The Agency emphasizes that although the Clean Water Act is a strict liability statute, EPA can initiate enforcement proceedings at its discretion. EPA has exercised and intends to exercise that discretion in a manner that recognizes and promotes good faith compliance.

2. Refilling Establishments (Subcategory E)

The limitations and standards for existing and new refilling establishments are set as zero discharge. In addition, many states (with national regulations soon to follow) require these facilities to have secondary containment systems and loading pads for their bulk pesticide and pesticide dispensing operations. Under these state and eventual national secondary containment regulations under FIFRA, facilities are collecting process wastewaters that were formerly contaminating soil and groundwater.

Since the majority of these facilities are not located in an area where direct or indirect discharge is feasible, EPA believes that the zero discharge can be implemented as seen on site visits. Typically, these facilities collect their process wastewaters (including interior equipment cleaning of minibulks, bulk tanks and related ancillary equipment and leak/spill cleanup water) and store these collected rinsates for reuse. The stored rinsates are then used as product make-up water in future custom application activities. Facilities that do not operate their own custom application services or that are located in states where the purchase of make-up water for reuse in applications is prohibited have been known to give away these rinsates to custom applicators or directly to farmers. A small number of facilities in such a situation may choose some means of off-site disposal, such as contract hauling to incineration.

B. Upset and Bypass Provisions

A recurring issue is whether industry limitations and standards should include provisions authorizing noncompliance with effluent limitations during periods of ‘‘upset’’ or ‘‘bypass’’. An upset, sometimes called an ‘‘excursion,’’ is an unintentional and temporary noncompliance with technology-based effluent limitations occurring for reasons beyond the reasonable control of the permittee. EPA believes that upset provisions are necessary to recognize an affirmative defense for an exceptional incident including ‘‘Acts of God’’. Because technology-based limitations can require only what properly designed, maintained and operated technology can achieve, it is claimed that liability for such situations is improper.

While an upset is an unintentional episode during which effluent limitations are exceeded, a bypass is an act of intentional noncompliance during which wastewater treatment facilities are circumvented in emergency situations.

EPA has both upset and bypass provisions in NPDES permits, and has promulgated NPDES and pretreatment regulations which include upset and bypass permit provisions. (40 CFR 122.41(m), 122.41(n) and 40 CFR 403.16 and 403.17.) The upset provision establishes an upset as an affirmative defense to prosecution for violation of technology-based effluent limitations. The bypass provision authorizes bypassing to prevent loss of life, personal injury, or severe property damage. Since there are already upset and bypass provisions in NPDES permits and pretreatment regulations, EPA will let local permit and control authorities deal with individual upsets or requests for bypass.

C. Variances and Modifications

Upon the promulgation of these regulations, the effluent limitations for the appropriate subcategory must be applied in all Federal and State NPDES permits issued to direct dischargers in the pesticide formulating, packaging or repackaging industry. In addition, the pretreatment standards are directly applicable to indirect dischargers.

1. Fundamentally Different Factors Variances

For the BPT effluent limitations, the only exception to the binding limitations is EPA’s ‘‘fundamentally different factors’’ (‘‘FDF’’) variance (40 CFR part 125, subpart D). This variance recognizes factors concerning a particular discharger which are fundamentally different from the factors considered in this rulemaking. Although this variance clause was set forth in EPA’s 1973–1976 effluent guidelines, it is now included in the NPDES regulations and not the specific industry regulations. (See 44 FR 32854, 32893 [June 7, 1979] for an explanation of the ‘‘fundamentally different factors’’ variance). The procedures for application for a BPT FDF variance are set forth at 40 CFR 122.21(m)(1)(I)(A).

Dischargers subject to the BAT limitations in these final regulations may also apply for an FDF variance, under the provisions of section 301(n) of the Act, which regulates BAT, BCT, and pretreatment FDFs. In addition, BAT limitations for nonconventional pollutants may be modified under section 301(c) (for economic reasons) and 301(g) (for water quality reasons) of the Act. These latter two statutory modifications are not applicable to ‘‘toxic’’ or conventional pollutants.

Dischargers subject to pretreatment standards for existing sources (PSES) are also subject to the ‘‘fundamentally different factors’’ variance provision (40 CFR 403.13) and credits for pollutants removed by POTWs, as discussed in Section XII.C.2. Dischargers subject to pretreatment standards for new sources (PSNS) are subject only to the removal credit provision (*see* Section XII.C.2).

New sources subject to NSPS are not eligible for EPA’s ‘‘fundamentally different factors’’ variance or any statutory or regulatory variances. *See E.I. Du Pont* v. *Train*, 430 U.S. 112 (1977).

2. Removal Credits

Congress, in enacting Section 307(b) of the CWA, recognized that, in certain instances, POTWs could provide some or all of the treatment of an industrial user’s wastestream that would be required pursuant to the pretreatment standard. Consequently, Congress established a discretionary program for POTWs to grant ‘‘removal credits’’ to their indirect dischargers. The credit, in the form of a less stringent pretreatment standard, allows an increased amount of pollutants to flow from the indirect discharger’s facility to the POTW.

Section 307(b) of the CWA establishes a three-part test for obtaining removal credit authority for a given pollutant. Removal credits may be authorized only if (1) the POTW ‘‘removes[27] all or any part of such toxic pollutant,’’ (2) the POTW’s ultimate discharge would ‘‘not violate that effluent limitation, or standard which would be applicable to that toxic pollutant if it were discharged’’ directly rather than through a POTW and (3) the POTW’s discharge would ‘‘not prevent sludge use and disposal by such [POTW] in accordance with section [405] . . . .’’ Section 307(b).

EPA has promulgated removal credit regulations in 40 CFR 403.7. The United States Court of Appeals for the Third Circuit has interpreted the statute to require EPA to promulgate comprehensive sewage sludge regulations before any removal credits could be authorized. *NRDC* v. *EPA*, 790 F.2d 289, 292 (3rd Cir. 1986) *cert. denied*. 479 U.S. 1084 (1987). Congress made this explicit in the Water Quality Act of 1987 which provided that EPA

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[27] In 40 CFR 403.7, removal is defined to mean ‘‘a reduction in the amount of a pollutant in the POTW’s effluent or alteration of the nature of a pollutant during treatment at the POTW. The reduction or alteration can be obtained by physical, chemical or biological means and may be the result of specifically designed POTW capabilities or may be incidental to the operation of the treatment system. Removal as used (in § 403.7) shall not mean dilution of a pollutant in the POTW.’’

could not authorize any removal credits until it issued the sewage sludge use and disposal regulations required by section 405(d)(2)(a)(ii).

Section 405 of the CWA requires EPA to promulgate regulations which establish standards for sewage sludge when used or disposed for various purposes. These standards must include sewage sludge management standards as well as numerical limits for pollutants which may be present in sewage sludge in concentrations which may adversely affect public health and the environment. Section 405 requires EPA to develop these standards in two phases. On November 25, 1992, EPA promulgated the Round One sewage sludge regulations establishing standards, including numerical pollutant limits, for the use and disposal of sewage sludge. 58 FR 9248. EPA established pollutant limits for ten metals when sewage sludge is applied to land, for three metals when it is disposed of at surface disposal sites and for seven metals and total hydrocarbons, a surrogate for organic pollutant emissions, when sewage sludge is incinerated. These requirements are codified at 40 CFR part 503.

At the same time EPA promulgated the Round One regulations, EPA also amended its pretreatment regulations to provide that removal credits would be available for certain pollutants regulated in the sewage sludge regulations. *See* 58 FR at 9386. The amendments to Part 403 provide that removal credits may be made potentially available for the following pollutants:

(1) If a POTW applies its sewage sludge to the land for beneficial uses, disposes of it on surface disposal sites or incinerates it, removal credits may be available, depending on which use or disposal method is selected (so long as the POTW complies with the requirements in part 503). When sewage sludge is applied to land, removal credits may be available for ten metals. When sewage sludge is disposed of on a surface disposal site, removal credits may be available for three metals. When the sewage sludge is incinerated, removal credits may be available for seven metals and for 57 organic pollutants. *See* 40 CFR 403.7(a)(3)(iv)(A).

(2) In addition, when sewage sludge is used on land or disposed of on a surface disposal site or incinerated, removal credits may also be available for additional pollutants so long as the concentration of the pollutant in sludge does not exceed a concentration level established in part 403. When sewage sludge is applied to land, removal credits may be available for two additional metals and 14 organic pollutants. When the sewage sludge is disposed of on a surface disposal site, removal credits may be available for seven additional metals and 13 organic pollutants. When the sewage sludge is incinerated, removal credits may be available for three other metals. *See* 40 CFR 403.7(a)(3)(iv)(B).

(3) When a POTW disposes of its sewage sludge in a municipal solid waste land fill that meets the criteria of 40 CFR part 258 (MSWLF), removal credits may be available for any pollutant in sewage sludge. *See* 40 CFR 403.7(a)(3)(iv)(C).

Thus, given compliance with the requirements of EPA's removal credit regulations,[28] following promulgation of the pretreatment standards being proposed here, removal credits may be authorized for any pollutant subject to pretreatment standards if the applying POTW disposes of its sewage sludge in a MSWLF that meets the requirements of 40 CFR part 258. If the POTW uses or disposes of its sewage sludge by land application, surface disposal or incineration, removal credits may be available for the following metal pollutants (depending on the method of use or disposal): Arsenic, cadmium, chromium, copper, lead, mercury, molybdenum, nickel, selenium and zinc. Given compliance with § 403.7, removal credits may be available for the following organic pollutants (depending on the method of use or disposal): acrylonitrile, aldrin/dieldrin (total), benzene, benzidine, benzo(a)pyrene, bis(2-chloroethyl)ether, bis(2-ethylhexyl)phthalate, bromodichloromethane, bromoethane, bromoform, carbon tetrachloride, chlordane, chloroform, chloromethane, DDD, DDE, DDT, dibromochloromethane, dibutyl phthalate, 1,2-dichloroethane, 1,1-dichloroethylene, 2,4-dichlorophenol, 1,3-dichloropropene, diethyl phthalate, 2,4-dinitrophenol, 1,2-diphenylhydrazine, di-n-butyl phthalate, endosulfan, endrin, ehtylbenzene, heptachlor, heptachlor epoxide, hexachlorobutadiene, alphahexachlorocyclohexane, betahexachlorocyclohexane, hexachlorocyclopentadiene, hexachloroethane, hydrogen cyanide, isophorone, lindane, methylene chloride, nitrobenzene, n-nitrosodimethylamine, n-nitrosodi-n-propylamine, pentachlorophenol, phenol, polychlorinated biphenyls, 2,3,7,8-tetrachlorodibenzo-p-dioxin, 1,1,2,2-tetrachloroethane, tetrachloroethylene, toluene, toxaphene, trichloroethylene, 1,2,4-trichlorobenzene, 1,1,1-trichloroethane, 1,1,2-trichloroethane and 2,4,6-trichlorophenol.

With regard to the use of removal credit authority for any pollutant subject to these pretreatment standards, a POTW (once compliance with 40 CFR 403.7 is shown and removal credit authority is granted) may be able to effectively authorize the waiving of what otherwise would be required treatment of the PFPR wastewaters by authorizing a removal credit to the PFPR industrial user to the extent of any pollutants remaining in its discharge after all applicable pollution prevention practices have been complied with. However, removal credits could only be granted to the extent that granting of such credits would not result in pass through or interference at the POTW as defined in 40 CFR 403.3 and in accordance with the provisions of § 403.5, and EPA would expect that the PFPR industrial user would have to continue to comply with the pollution prevention practices as specified in the P2 Alternative even if a removal credit had been provided.

D. Analytical Methods

Section 304(h) of the Act directs EPA to promulgate guidelines establishing test methods for the analysis of pollutants. These methods are used to determine the presence and concentration of pollutants in wastewater, and are used for compliance monitoring and for filing applications for the NPDES program under 40 CFR 122.21, 122.41, 122.44 and 123.25, and for the implementation of the pretreatment standards under 40 CFR 403.10 and 403.12. To date, EPA has promulgated methods for conventional pollutants, toxic pollutants, and for some non-conventional pollutants. The five conventional pollutants are defined at 40 CFR 401.16. Table I–B at 40 CFR part 136 lists the analytical methods approved for these pollutants. The 65 toxic metals and organic pollutants and classes of pollutants are defined at 40 CFR 401.15. From the list of 65 classes of toxic pollutants EPA identified a list of 126 ''Priority Pollutants.'' This list of Priority Pollutants is shown, for example, at 40 CFR part 423, appendix A. The list includes non-pesticide organic pollutants, metal pollutants, cyanide, asbestos, and pesticide

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[28] Under § 403.7, a POTW is authorized to give removal credits only under certain conditions. These include applying for, and obtaining, approval from the Regional Administrator (or Director of a State NPDES program with an approved pretreatment program), a showing of consistent pollutant removal and an approved pretreatment program. *See* 40 CFR 403.7(a)(3)(I), (ii), and (iii).

pollutants. Currently approved methods for metals and cyanide are included in the table of approved inorganic test procedures at 40 CFR 136.3, Table I–B. Table I–C at 40 CFR 136.3 lists approved methods for measurement of non-pesticide organic pollutants, and Table I–D lists approved methods for the toxic pesticide pollutants and for other pesticide pollutants.

EPA believes that the analytical methods for pesticide active ingredients contained in the promulgated pesticide manufacturing effluent guidelines and standards (see *Methods for the Determination of Nonconventional Pesticides in Municipal and Industrial Wastewater*, Volumes I & II, EPA 821–R–93–010–A&B, August 1993, Revision 1) will perform equally well on treated pesticide formulating, packaging or repackaging wastewaters as on pesticide manufacturing wastewaters. Raw wastewater samples may on occasion require some separation prior to analysis, analogous to the emulsion breaking pretreatment included in EPA's costed BAT technology. Many of these methods have in fact been used on the PFPR sampled wastewaters. All of the active ingredient pollutant data that supports the proposed effluent limitations were generated using analytical methods that employ the approved methods or are based upon the approved methods at 40 CFR part 136 or contained in *Methods for the Determination of Nonconventional Pesticides in Municipal and Industrial Wastewater.* For PAI's that have no EPA-approved analytical methods, PFPR facilities may utilize alternative sampling and analysis methods as specified in 40 CFR 136.4 and 403.12(g)(4). At some future date, EPA may transfer the analytical methods promulgated at part 455 to part 136 as a part of EPA's effort to consolidate analytical methods and streamline promulgation of new methods. As discussed in Section XII.A.1, EPA believes that those facilities choosing zero discharge will either demonstrate zero discharge through no process wastewater flow or will demonstrate compliance using the analytical methods to show PAIs levels are at or below detection (or meeting pesticide manufacturing limitations with no allowance given to PFPR wastewater). Facilities choosing to demonstrate that they are in compliance with the P2 Alternative will use submittal of certification statements, inspections, and demonstrated implementation of the listed P2 practices to assure compliance with the final rule. However, some facilities, although not required, may use analytical methods to demonstrate that their treatment system are ''well operated and maintained,'' as explained in the P2 Alternative. In addition, permitting/control authorities can set numerical limitations using BPJ/BEJ which may rely on the use of analytical methods for demonstrating compliance.

List of Subjects in 40 CFR Part 455

Environmental protection, Chemicals, Packaging and containers, Pesticides and pests, Pollution prevention, Waste treatment and disposal, Water pollution control.

Dated: September 30, 1996.

Carol M. Browner,
Administrator.

Appendix A to the Preamble—Abbreviations, Acronyms, and Other Terms Used in This Document

B.t.—Bacillus thuringiensis
BAT—Best Available Control Technology Economically Achievable
BCT—Best Conventional Pollutant Control Technology
BEJ—Best Engineering Judgement
BIF—Boilers and Industrial Furnaces
BOD—Biochemical Oxygen Demand
BPJ—Best Professional Judgement
BPT—Best Practicable Control Technology Currently Available
CAA—Clean Air Act
CO—Carbon Monoxide
CSF—Confidential Statement of Formula
CWA—Clean Water Act
DOT—Department of Transportation
FATES—FIFRA and TSCA Enforcement System
FDA—Food and Drug Administration
FDF—Fundamentally Different Factors
FIFRA—Federal Insecticide, Fungicide, Rodenticide Act
GMPs—Good Manufacturing Practices
GRAS—Generally Recognized As Safe
ICR—Information Collection Request
NO_x—Nitrogen oxides
NPDES—National Pollutant Discharge Elimination System
NSPS—New Source Performance Standards
P2—Pollution Prevention
PAI—Pesticide Active Ingredient
PFPR—Pesticide Formulating, Packaging and Repackaging
PM—Particulate Matter
POTW—Publicly Owned Treatment Works
PPA—Pollution Prevention Act
PSES—Pretreatment Standards for Existing Sources
PSNS—Pretreatment Standards for New Sources
RCRA—Resource Conservation and Recovery Act
R & D—Research and Development
SBREFA—Small Business Regulatory Enforcement Fairness Act
SO_2—Sulfur dioxide
SRRP—Source Reduction Review Project
TDD—Technical Development Document
TSCA—Toxic Substances Control Act
TSD—Treatment, Storage and Disposal
TSS—Total Suspended Solids
UMRA—Unfunded Mandate Reform Act
UTS—Universal Treatment System
VOCs—Volatile Organic Compounds
Zero/P2 Alternative—Zero Discharge/Pollution Prevention Alternative Option

For the reasons set out in the preamble, title 40, chapter I of the Code of Federal Regulations is amended as follows:

PART 455—PESTICIDE CHEMICALS

1. The authority citation for part 455 continues to read as follows:

Authority: Secs. 301, 304, 306, 307, and 501, Pub. L. 92–500, 86 Stat, 816, Pub. L. 95–217, 91 Stat. 156, and Pub. L. 100–4, 101 Stat. 7 (33 U.S.C. 1311, 1314, 1316, 1317, and 1361).

1a. Section 455.10 is amended by adding paragraphs (g) through (u) to read as follows:

§ 455.10 General definitions.

* * * * *

(g) *Appropriate pollution control technology* means the wastewater treatment technology listed in Table 10 to this part 455 for a particular PAI(s) including an emulsion breaking step prior to the listed technology when emulsions are present in the wastewater to be treated.

(h) *Equivalent system* means a wastewater treatment system that is demonstrated in literature, treatability tests or self-monitoring data to remove a similar level of pesticide active ingredient (PAI) or priority pollutants as the applicable appropriate pollution control technology listed in Table 10 to this Part 455.

(i) *Formulation* of pesticide products means the process of mixing, blending or diluting one or more pesticide active ingredients (PAIs) with one or more active or inert ingredients, without an intended chemical reaction to obtain a manufacturing use product or an end use product.

(j) *Group 1 mixtures* means any product whose only pesticidal active ingredient(s) is: a common food/food constituent or non-toxic household item; or is a substance that is generally recognized as safe (GRAS) by the Food and Drug Administration (21 CFR 170.30, 182, 184, and 186) in accordance with good manufacturing practices, as defined by 21 CFR part 182; or is exempt from FIFRA under 40 CFR 152.25.

(k) *Group 2 mixtures* means those chemicals listed in Table 9 to this part 455.

(l) *Inorganic wastewater treatment chemicals* means inorganic chemicals that are commonly used in wastewater treatment systems to aid in the removal of pollutants through physical/chemical technologies such as chemical precipitation, flocculation, neutralization, chemical oxidation, hydrolysis and/or adsorption.

(m) *Interior wastewater sources* means wastewater that is generated from cleaning or rinsing the interior of pesticide formulating, packaging or repackaging equipment; or from rinsing the interior of raw material drums, shipping containers or bulk storage tanks; or cooling water that comes in direct contact with pesticide active ingredients (PAIs) during the formulating, packaging or repackaging process.

(n) *Microorganisms* means registered pesticide active ingredients that are biological control agents listed in 40 CFR 152.20(a)(3) including Eucaryotes (protozoa, algae, fungi), Procaryotes (bacteria), and Viruses.

(o) *Packaging* of pesticide products means enclosing or placing a formulated pesticide product into a marketable container.

(p) *PFPR/Manufacturer* means a pesticide formulating, packaging and repackaging facility that also performs pesticide manufacturing on-site and commingles their PFPR process wastewaters and pesticide manufacturing process wastewaters.

(q) *Pool chemicals* means pesticide products that are intended to disinfect or sanitize, reducing or mitigating growth or development of microbiological organisms including bacteria, algae, fungi or viruses in the water of swimming pools, hot tubs, spas or other such areas, in the household and/or institutional environment, as provided in the directions for use on the product label.

(r) *Refilling establishment* means an establishment where the activity of repackaging pesticide product into refillable containers occurs.

(s) *Repackaging* of pesticide products means the transfer of a pesticide formulation (or PAI) from one container to another without a change in composition of the formulation or the labeling content, for sale or distribution.

(t) *Sanitizer products* means pesticide products that are intended to disinfect or sanitize, reducing or mitigating growth or development of microbiological organisms including bacteria, fungi or viruses on inanimate surfaces in the household, institutional, and/or commercial environment and whose labeled directions for use result in the product being discharged to Publicly Owned Treatment Works (POTWs). This definition shall also include sanitizer solutions as defined by 21 CFR 178.1010 and pool chemicals as defined in this section (455.10(q)). This definition does not include liquid chemical sterilants (including sporicidals) exempted by § 455.40(f) or otherwise, industrial preservatives, and water treatment microbiocides other than pool chemicals.

(u) *Stand-alone PFPR facility* means a PFPR facility where either: No pesticide manufacturing occurs; or where pesticide manufacturing process wastewaters are not commingled with PFPR process wastewaters. Such facilities may formulate, package or repackage or manufacture other non-pesticide chemical products and be considered a ‘‘stand-alone’’ PFPR facility.

1b. Section 455.11 is revised to read as follows:

§ 455.11 Compliance date for pretreatment standards for existing sources (PSES).

All discharges subject to pretreatment standards for existing sources (PSES) in subparts A and B of this part must comply with the standards no later than September 28, 1993.

Subpart C—Pesticide Formulating, Packaging and Repackaging (PFPR) Subcategory

2. Section 455.40 is revised as to read as follows:

§ 455.40 Applicability; description of the pesticide formulating, packaging and repackaging subcategory.

(a) The provisions of this subpart are applicable to discharges resulting from all pesticide formulating, packaging and repackaging operations except as provided in paragraphs (b), (c), (d), (e) and (f) of this section.

(b) The provisions of this subpart do not apply to repackaging of agricultural pesticides performed at refilling establishments, as described in § 455.60.

(c) The provisions of this subpart do not apply to wastewater discharges from: the operation of employee showers and laundry facilities; the testing of fire protection equipment; the testing and emergency operation of safety showers and eye washes; storm water; Department of Transportation (DOT) aerosol leak test bath water from non-continuous overflow baths (batch baths) where no cans have burst from the time of the last water change-out; and on-site laboratories from cleaning analytical equipment and glassware and rinsing the retain sample container (except for the initial rinse of the retain sample container which is considered a process wastewater source for this subpart).

(d) The provisions of this subpart do not apply to wastewater discharges from the formulation, packaging and/or repackaging of sanitizer products (including pool chemicals); microorganisms; inorganic wastewater treatment chemicals; group 1 mixtures and group 2 mixtures, as defined under § 455.10.

(e) The provisions of this subpart do not apply to wastewater discharges from the development of new formulations of pesticide products and the associated efficacy and field testing at on-site or stand-alone research and development laboratories where the resulting pesticide product is not produced for sale.

(f) The provisions of this subpart do not apply to wastewater discharges from the formulation, packaging and/or repackaging of liquid chemical sterilant products (including any sterilant or subordinate disinfectant claims on such products) for use on a critical or semi-critical device, as defined in Section 201 of the Federal Food, Drug and Cosmetic Act and in Section 2(u) of the Federal Insecticide, Fungicide and Rodenticide Act.

3. Section 455.41 is added to Subpart C to read as follows:

§ 455.41 Special definitions.

(a) *Initial Certification Statement* for this subpart means a written submission to the appropriate permitting authority, *e.g.*, the local Control Authority (the POTW) or NPDES permit writer which must be signed by the responsible corporate officer as defined in 40 CFR 403.12(l) or 40 CFR 122.22 and which:

(1) Lists and describes those product families, process lines and/or process units for which the PFPR facility is implementing the Pollution Prevention Alternative (‘‘P2 Alternative’’);

(2) Describes the PFPR facility specific practices for each product family/process line/process unit which are to be practiced as part of the P2 Alternative;

(3) Describes any justification allowing modification to the practices listed in Table 8 to this part 455; and

(4) Lists the treatment system being used to obtain a P2 allowable discharge (as defined in 455.41).

(b) *Periodic Certification Statement* for this subpart means a written submission to the appropriate permitting authority, *e.g.*, the local Control Authority (the POTW) or NPDES permit writer, which states that the P2 Alternative is being implemented in the manner set forth in the control mechanism (for indirect dischargers) or NPDES permit (for direct dischargers) or that a justification allowing modification of the practices listed in Table 8 to this part 455 has been implemented resulting in a change in the pollution prevention practices conducted at the facility. The Periodic Certification Statement must be signed by the responsible corporate officer as defined in 40 CFR 403.12(l) or 40 CFR 122.22.

(c) *On-site Compliance Paperwork* for this subpart means data or information maintained in the offices of the PFPR facility which supports the initial and periodic certification statements as follows:

(1) Lists and describes those product families, process lines and/or process units for which the facility is implementing the P2 Alternative;

(2) Describes the facility specific practices for each product family/process line/process unit which are to be practiced as part of the P2 Alternative;

(3) Describes any justification allowing modification to the practices listed in Table 8 to this part 455;

(4) Includes a written discussion demonstrating that the treatment system being used contains the appropriate pollution control technologies (or equivalent systems/pesticide manufacturing systems) for removing the PAIs which may be found in the wastewater;

(5) Establishes a method for demonstrating to the permitting/control authority that the treatment system is well operated and maintained; and

(6) Includes a discussion of the rationale for choosing the method of demonstration.

(d) For Indirect Dischargers:

Pollution prevention (P2) allowable discharge (excluding interior wastewater sources, leak and spill clean-up water, and floor wash) for this subpart means the quantity of/concentrations of pollutants in PFPR process wastewaters that remain after a facility has demonstrated that it is using the specified practices of the Pollution Prevention Alternative as listed in Table 8 to this part 455.

Pollution prevention (P2) allowable discharge for interior wastewater sources, leak and spill cleanup water, and floor wash for this subpart means the quantity of/concentrations of pollutants in PFPR process wastewaters that remain after a facility has demonstrated that it is using the specified practices of the Pollution Prevention Alternative as listed in Table 8 to this part 455 and that have been pretreated using appropriate pollution control technologies, as defined in § 455.10(g), or a pesticide manufacturer's treatment system, or an equivalent system, used individually, or in any combination to achieve a sufficient level of pollutant reduction. Pretreatment requirements may be modified or waived by the Control Authority (POTW) to the extent that removal credits have been granted by the POTW in accordance with 40 CFR 403.7, provided the granting of such credits does not result in pass through or interference as defined in 40 CFR 403.3 and complies with the provisions of 40 CFR 403.5. The facility must demonstrate that the appropriate pollution control technology is properly maintained and operated.

(e) For Direct Dischargers:

Pollution prevention (P2) allowable discharge for this subpart means the quantity of/concentrations of pollutants in PFPR process wastewaters that remain after a facility has demonstrated that it is using the specified practices of the Pollution Prevention Alternative as listed in Table 8 to this part 455 and that have been treated using appropriate pollution control technologies, as defined in § 455.10(g), or a pesticide manufacturer's treatment system, or an equivalent system, used individually, or in any combination to achieve a sufficient level of pollutant reduction. The facility must demonstrate that the appropriate pollution control technology is properly maintained and operated.

(f) *Process wastewater,* for this subpart, means all wastewater associated with pesticide formulating, packaging and repackaging except for sanitary water, non-contact cooling water and those wastewaters excluded from the applicability of the rule in § 455.40.

4. Section 455.42 is revised to read as follows:

§ 455.42 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available, (BPT).

Except as provided in 40 CFR 125.30 through 125.32, any existing point source subject to this subpart shall achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

(a) Except as provided in paragraph (b) of this section, the following limitations establish the quantity or quality of pollutants or pollutant properties controlled by this paragraph which may be discharged from the formulation, packaging or repackaging of pesticides: There shall be no discharge of process wastewater pollutants to navigable waters.

Note: For existing PFPR/Manufacturer facilities, as defined in § 455.10(p), which are also subject to the provisions of § 455.22 or § 455.32, ''zero discharge'' means that permitting authorities shall provide no additional discharge allowance for those pesticide active ingredients (PAIs) in the pesticide formulating, packaging and repackaging wastewaters when those PAIs are also manufactured at the same facility.

(b) Any existing facility subject to paragraph (a) of this section may have a pollution prevention allowable discharge, as defined in § 455.41(e), of wastewater pollutants to navigable waters if the discharger agrees to NPDES permit conditions as follows:

(1) The discharger will meet the requirements of the Pollution Prevention Alternative listed in Table 8 to this part 455 (or received a modification by Best Professional Judgement for modifications not listed in Table 8 of this Part 455);

(2) The discharger will notify its NPDES permit writer at the time of renewal or modification of its permit, of its intent to utilize the Pollution Prevention Alternative by submitting to the NPDES permit writer an initial certification statement as described in § 455.41(a);

(3) The discharger will submit to its NPDES permitting authority a periodic certification statements as described in § 455.41(b) once each year of operation; and

(4) The discharger will maintain at the office of the facility and make available for inspection the on-site compliance paperwork as described in § 455.41(c).

5. New §§ 455.43 through 455.47 are added to subpart C to read as follows:

§ 455.43 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT).

Except as provided in 40 CFR 125.30 through 125.32, any existing point source subject to this subpart must achieve the effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology.

(a) Except as provided in paragraph (b) of this section, the BCT limitations are established as follows: There shall be no discharge of process wastewater pollutants to navigable waters.

Note: For existing PFPR/Manufacturer facilities, as defined in § 455.10(p), which are also subject to the provisions of §§ 455.23, *zero discharge* means that permitting authorities shall provide no discharge additional discharge allowance for those pesticide active ingredients (PAIs) in the pesticide formulating, packaging and repackaging wastewaters when those PAIs are also manufactured at the same facility.

(b) Any existing facility subject to paragraph (a) of this section may have a pollution prevention allowable discharge, as defined in § 455.41(e), of wastewater pollutants to navigable waters if the discharger agrees to NPDES permit conditions as follows:

(1) The discharger will meet the requirements of the Pollution Prevention Alternative listed in Table 8 to this Part 455 (or received a modification by Best Professional Judgement for modifications not listed in Table 8 of this Part 455);

(2) The discharger will notify its NPDES permit writer at the time of renewal or modification of its permit, of its intent to utilize the Pollution Prevention Alternative by submitting to the NPDES permit writer an initial certification statement as described in § 455.41(a);

(3) The discharger will submit to its NPDES permitting authority a periodic certification statement as described in § 455.41(b) once each year of operation; and

(4) The discharger will maintain at the office of the facility and make available for inspection the on-site compliance paperwork as described in § 455.41(c).

§ 455.44 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available control technology economically achievable (BAT).

Except as provided in 40 CFR 125.30 through 125.32, any existing point source subject to this subpart must achieve the effluent limitations representing the degree of effluent reduction attainable by the application of the best available technology (BAT).

(a) Except as provided in paragraph (b) of this section, the BAT limitations are established as follows: There shall be no discharge of process wastewater pollutants to navigable waters.

Note: For existing PFPR/Manufacturer facilities, as defined in § 455.10(p), which are also subject to the provisions of §§ 455.24, *zero discharge* means that permitting authorities shall provide no additional discharge allowance for those pesticide active ingredients (PAIs) in the pesticide formulating, packaging and repackaging wastewaters when those PAIs are also manufactured at the same facility.

(b) Any existing facility subject to paragraph (a) of this section may have a pollution prevention allowable discharge, as defined in § 455.41(e), of wastewater pollutants to navigable waters if the discharger agrees to NPDES permit conditions as follows:

(1) The discharger will meet the requirements of the Pollution Prevention Alternative listed in Table 8 to this Part 455 (or received a modification by Best Professional Judgement for modifications not listed on Table 8 of this Part 455);

(2) The discharger will notify its NPDES permitting authority at the time of renewal or modification of its permit, of its intent to utilize the Pollution Prevention Alternative by submitting to the NPDES permit writer an initial certification statement as described in § 455.41(a);

(3) The discharger will submit to its NPDES permit writer a periodic certification statement as described in § 455.41(b) once each year of operation; and

(4) The discharger will maintain at the office of the facility and make available for inspection the on-site compliance paperwork as described in § 455.41(c).

§ 455.45 New Source Performance Standards (NSPS).

(a) Any new source, except as provided in paragraph (b) of this section, subject to this subpart which discharges process wastewater must meet the following standards: There shall be no discharge of process wastewater pollutants to navigable waters.

Note: For new PFPR/Manufacturer facilities, as defined in § 455.10(p), which are also subject to the provisions of §§ 455.25, *zero discharge* means that permitting authorities shall provide no additional discharge allowance for those pesticide active ingredients (PAIs) in the pesticide formulating, packaging and repackaging wastewaters when those PAIs are also manufactured at the same facility.

(b) Any new source subject to paragraph (a) of this section may have a pollution prevention allowable discharge, as defined in § 455.41(e), of wastewater pollutants to navigable waters if the discharger agrees to NPDES permit conditions as follows:

(1) The discharger will meet the requirements of the Pollution Prevention Alternative listed in Table 8 to this Part 455 (or received a modification by Best Professional Judgement for modifications not listed in Table 8 of this Part 455);

(2) The discharger will notify its NPDES permit writer at the time of submitting its application for a permit, of its intent to utilize the Pollution Prevention Alternative by submitting to the NPDES permit writer an initial certification statement as described in § 455.41(a);

(3) The discharger will submit to its NPDES permitting authority a periodic certification statement as described in § 455.41(b) once each year of operation; and

(4) The discharger will maintain at the office of the facility and make available for inspection the on-site compliance paperwork as described in § 455.41(c).

§ 455.46 Pretreatment standards for existing sources (PSES).

(a) Except as provided in 40 CFR 403.7 and 403.13 or in paragraph (b) of this section, no later than November 6, 1999, any existing source subject to this subpart which introduces pollutants into a publicly owned treatment works must comply with 40 CFR part 403 and achieve PSES as follows: There shall be no discharge of process wastewater pollutants.

(b) Except as provided in 40 CFR 403.7 and 403.13, any existing source subject to paragraph (a) of this section which introduces pollutants into a publicly owned treatment works must comply with 40 CFR part 403 and may have a pollution prevention allowable discharge of wastewater pollutants, as defined in § 455.41(d), if the discharger agrees to control mechanism or pretreatment agreement conditions as follows:

(1) The discharger will meet the requirements of the Pollution Prevention Alternative listed in Table 8 to this Part 455 (or received a modification by Best Engineering Judgement for modifications not listed in Table 8 to this Part 455);

(2) The discharger will notify its local Control Authority at the time of renewing or modifying its individual control mechanism or pretreatment agreement of its intent to utilize the Pollution Prevention Alternative by submitting to the local Control Authority an initial certification statement as described in § 455.41(a);

(3) The discharger will submit to its local Control Authority a periodic certification statement as described in § 455.41(b) during the months of June and December of each year of operation; and

(4) The discharger will maintain at the offices of the facility and make available for inspection the on-site compliance paperwork as described in § 455.41(c).

(c) Except as provided in 40 CFR 403.7 and 403.13, any existing source subject to § 455.46(b) which introduces pollutants into a publicly owned treatment works must comply with 40 CFR part 403 and may submit a request to its Control Authority to waive pretreatment of: floor wash; and/or a non-reusable final rinse of a triple rinse, if the concentrations of pesticide active ingredients and priority pollutants in those wastewater sources have been demonstrated to be too low to be effectively pretreated at the facility. The Control Authority may waive pretreatment for these two wastewaters only if the existing source makes the demonstrations and is in compliance with 40 CFR 403.5.

§ 455.47 Pretreatment Standards for New Sources (PSNS).

(a) Except as provided in 40 CFR 403.7 and 403.13 or in paragraph (b) of this section, any new source subject to this subpart which introduces pollutants into a publicly owned treatment works must comply with 40 CFR part 403 and achieve PSNS as follows: There shall be no discharge of process wastewater pollutants.

(b) Except as provided in 40 CFR 403.7 and 403.13, any new source subject to paragraph (a) of this section which introduces pollutants into a publicly owned treatment works must comply with 40 CFR part 403 and may have a pollution prevention allowable discharge of wastewater pollutants, as defined in § 455.41(d), if the discharger agrees to control mechanism or pretreatment agreement conditions as follows:

(1) The discharger will meet the requirements of the Pollution Prevention Alternative listed in Table 8 to this Part 455 (or received a modification by Best Engineering Judgement for modifications not listed in Table 8 to this Part 455);

(2) The discharger will notify its local Control Authority at the time of submitting its application for an individual control mechanism or pretreatment agreement of its intent to utilize the Pollution Prevention Alternative by submitting to the local Control Authority an initial certification statement as described in § 455.41(a);

(3) The discharger will submit to its local Control Authority a periodic certification statement as described in § 455.41(b) during the months of June and December of each year of operation; and

(4) The discharger will maintain at the offices of the facility and make available for inspection the on-site compliance paperwork as described in § 455.41(c).

(c) Except as provided in 40 CFR 403.7 and 403.13, any new source subject to paragraph (b) of this section which introduces pollutants into a publicly owned treatment works must comply with 40 CFR part 403 and may submit a request to its Control Authority to waive pretreatment of: floor wash; and/or a non-reusable final rinse of a triple rinse, if the concentrations of pesticide active ingredients and priority pollutants in those wastewater sources have been demonstrated to be too low to be effectively pretreated at the facility. The Control Authority may waive pretreatment for these two wastewaters only if the new source makes the demonstrations and is in compliance with 40 CFR 403.5.

6. A new subpart E consisting of §§ 455.60 through 455.67 is added to read as follows:

Subpart E—Repackaging of Agricultural Pesticides Performed at Refilling Establishments

Subpart E—Repackaging of Agricultural Pesticides Performed at Refilling Establishments

§ 455.60 Applicability; description of repackaging of agricultural pesticides performed by refilling establishments subcategory.

(a) The provisions of this subpart are applicable to discharges resulting from all repackaging of agricultural pesticides performed by refilling establishments, as defined in § 455.10; whose primary business is wholesale or retail sales; and where no pesticide manufacturing, formulating or packaging occurs, except as provided in paragraphs (b), (c) and (d) of this section.

(b) The provisions of this subpart do not apply to wastewater discharges from custom application or custom blending, as defined in 40 CFR 167.3.

(c) The provisions of this subpart do not apply to wastewater discharges from: the operation of employee showers and laundry facilities; the testing of fire protection equipment; the testing and emergency operation of safety showers and eye washes; or storm water.

(d) The provisions of this subpart do not apply to wastewater discharges from the repackaging of microorganisms or Group 1 Mixtures, as defined under § 455.10, or non-agricultural pesticide products.

§ 455.61 Special definitions.

Process wastewater, for this subpart, means all wastewater except for sanitary water and those wastewaters excluded from the applicability of the rule in § 455.60.

§ 455.62 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable pollutant control technology (BPT).

Except as provided in 40 CFR 125.30 through 125.32, any existing point source subject to this subpart must achieve effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable pollutant control technology: There shall be no discharge of process wastewater pollutants.

§ 455.63 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT).

Except as provided in 40 CFR 125.30 through 125.32, any existing point source subject to this subpart must achieve effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollution control technology: There shall be no discharge of process wastewater pollutants.

§ 455.64 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable (BAT).

Except as provided in 40 CFR 125.30 through 125.32, any existing point source subject to this subpart must achieve effluent limitations representing the degree of effluent reduction attainable by the application of the best available technology economically achievable: There shall be no discharge of process wastewater pollutants.

§ 455.65 New source performance standards (NSPS).

Any new source subject to this subpart which discharges process wastewater pollutants must meet the following standards: There shall be no discharge of process wastewater pollutants.

§ 455.66 Pretreatment standards for existing sources (PSES).

Except as provided in 40 CFR 403.7 and 403.13, no later than November 6, 1999 subpart which introduces pollutants into a publicly owned treatment works must comply with 40

CFR part 403 and achieve the pretreatment standards for existing sources as follows: There shall be no discharge of process wastewater pollutants.

§ 455.67 Pretreatment standards for new sources (PSNS).

Except as provided in 40 CFR 403.7 and 403.13, any new source subject to this subpart which introduces pollutants into a publicly owned treatment works must comply with 40 CFR part 403 and achieve the pretreatment standards for existing sources as follows: There shall be no discharge of process wastewater pollutants.

7. Tables 8, 9, and 10 are added to part 455 to read as follows:

Table 8 to Part 455—List of Pollution Prevention Alternative Practices

A modification to the list of practices on this table that an individual facility must comply with to be eligible for the pollution prevention alternative is allowed with acceptable justification as listed on this table as approved by the permit writer or control authority (using BPJ/BEJ) after submittal by the facility of a request for modification. A modification, for purposes of this table, means that a facility would no longer have to perform a listed practice or would need to comply with a modified practice. However, the modification only applies to the specific practice for which the modification has been justified and to no other listed practices. Facilities are required to thoroughly discuss all modifications in the on-site compliance paperwork as described above in the limitations and standards (§ 455.41(c)).

1. Must use water conservation practices. These practices may include, but are not limited to using: spray nozzles or flow reduction devices on hoses, low volume/high pressure rinsing equipment, floor scrubbing machines, mop(s) and bucket(s), and counter current staged drum rinsing stations.

[Modification allowed when: Rinsing narrow transfer lines or piping where sufficient rinsing is better achieved by flushing with water.]

2. Must practice good housekeeping:

(a) Perform preventative maintenance on all valves and fittings and repair leaky valves and fittings in a timely manner;

(b) Use drip pans under any valves or fittings where hoses or lines are routinely connected and disconnected, collect for reuse when possible; and

(c) Perform quick cleanup of leaks and spills in outdoor bulk storage or process areas.

3. Must sweep or vacuum dry production areas prior to rinsing with water.

4. Must clean interiors of dry formulation equipment with dry carrier prior to any water rinse. The carrier material must be stored and reused in future formulation of the same or compatible product or properly disposed of as solid waste.

5. If operating continuous overflow Department of Transportation (DOT) aerosol leak test baths—>

Must operate with some recirculation.

6. If operating air pollution control wet scrubbers—>

Must operate as recirculating scrubbers (periodic blowdown is allowed as needed).

[Modification allowed when: Facility demonstrates that they would not be able to meet Resource Conservation Recovery Act or Clean Air Act (CAA) requirements.]

7. When performing rinsing of raw material drums, storage drums, and/or shipping containers that contained liquid PAI(s) and/or inert ingredients for the formulation of water-based products—>

Must reuse the drum/shipping container rinsate DIRECTLY into the formulation at the time of formulation; or store for use in future formulation of same or compatible product; or use a staged drum rinsing station (counter current rinsing).

[Modification allowed when: the drum/shipping container holds inert ingredient(s) only and (1) the facility can demonstrate that, after using water conservation practices, the large concentration of inert ingredient in the formulation creates more volume than could feasibly be reused; or (2) the facility can demonstrate that the concentration of the inert in the formulation is so small that the reuse would cause a formulation to exceed the ranges allowed in the Confidential Statement of Formula (CSF) (40 CFR 158.155).]

8. When performing rinsing of raw material drums, storage drums, and/or shipping containers that contained liquid PAI(s) and/or inert ingredients for the formulation of solvent-based products—>

Must reuse the drum/shipping container rinsate DIRECTLY into the formulation at the time of formulation or store for use in future formulation of same or compatible product.

[Modification allowed when:

(a) The drum/shipping container holds inert ingredient(s) only *and*: (1) The facility can demonstrate that, after using water conservation practices, the large concentration of inert ingredient in the formulation creates more volume than could feasibly be reused; or (2) the facility can demonstrate that the concentration of the inert in the formulation is so small that the reuse would cause a formulation to exceed the ranges allowed in the Confidential Statement of Formula (CSF) (40 CFR 158.155); *or*

(b) Drums/shipping containers are going to a drum refurbisher/recycler who will only accept drums rinsed with water.]

9. Must dedicate PFPR production equipment by water-based versus solvent-based products. Dedicated solvent-based or water-based equipment may be used on a non-routine basis for non-dedicated operations; however the facility may not discharge the solvent/aqueous changeover rinsate as part of their P2 allowable discharge (i.e., the facility must achieve zero discharge of those process wastewater pollutants).

[Modification allowed when: Facility has installed and is using a solvent recovery system for the changeover rinsate (can also be used for other solvent recovery).]

10. Must store the rinsate from interior rinsing (does not include drum/shipping container rinsate) for reuse in future formulation of same or compatible product.

[Modification allowed when:

(a) Facility has evidence of biological growth or other product deterioration over a typical storage period;

(b) Facility has space limitations, BUT must still store rinsates for most frequently produced products;

(c) Manufacturer (or formulator contracting for toll formulating) has directed otherwise (i.e., send back to them or send for off-site disposal);

(d) Facility is dropping registration or production of the formulation and there is no compatible formulation for reuse of the rinsates or facility can provide reasonable explanation of why it does not anticipate formulation of same or compatible formulation within the next 12 months;

(e) Facility only performs packaging of the pesticide product from which interior rinsate is generated; or

(f) Facility has demonstrated that it must use a detergent to clean the equipment.]

Notes

For indirect dischargers: After following the practices above, some wastewaters may require pretreatment prior to discharge to POTWs. See definition of pollution prevention allowable discharge for indirect dischargers (§ 455.41(d)).

For direct dischargers: After following the practices above, all wastewaters require treatment prior to discharge directly to the nation's waters. See definition of pollution prevention allowable discharge for direct dischargers (§ 455.41(e)).

Additional information and guidance on implementing these P2 practices as well as evaluating compliance with these practices will be available in a P2 Guidance Manual for the PFPR Industry.

TABLE 9 TO PART 455.—GROUP 2 MIXTURES

Shaughnessey code	Chemical name[1]
002201	Sabadilla alkaloids.
006501	Aromatic petroleum derivative solvent.
006602	Heavy aromatic naphtha.
016601[2]	Dry ice.
022003	Coal tar.
025001	Coal tar neutral oils.
025003	Creosote oil (Note: Derived from any source).
025004	Coal tar creosote.
031801	Ammonium salts of C8–18 and C18' fatty acids.
055601	BNOA.
063501	Kerosene.
063502	Mineral oil—includes paraffin oil from 063503.
063503	Petroleum distillate, oils, solvent, or hydrocarbons; also p.
063506	Mineral spirits.
067003	Terpineols (unspec.).
067205	Pine tar oil.
067207	Ester gum.
067302	Amines, N-coco alkyltrimethylenedi-, acetates.
069152	Amines, coco alkyl, hydrochlorides.
070801	Red Squill glycoside.
071004	Cube Resins other than rotenone.
071501	Ryania speciosa, powdered stems of.
072602[2]	Silica gel.
072605[2]	Silicon dioxide.
079014	Turkey red oil.
079021	Potassium salts of fatty acids.
079029	Fatty alcohols (52–61% C10, 39–46% C8, 0–3% C6, 0–3% C12).
079034	Methyl esters of fatty acids (100% C8–C12)
079059	Fatty alcohols (54.5% C10, 45.1% C8, 0.4% C6)
086803	Xylene range aromatic solvent
107302	Polyhedral inclusion bodies of Douglas fir tussock moth nucl.
107303	Polyhedral inclusion bodies of gypsy moth nucleopolyhedrosis.
107304	Polyhedral inclusion bodies of n. sertifer
116902	Gibberellin A4 mixt. with Gibberellin A7.
117001	Nosema locustae.
128888	Lactofen (ANSI).
128934[2]	Nitrogen, liquid.
129029	Bergamot Oil.
224600	Diethanolamides of the fatty acids of coconut oil (coded 079).
505200	Isoparaffinic hydrocarbons.

[1] Shaughnessey codes and chemical names are taken directly from the FATES database. Several chemical names are truncated because the chemical names listed in the FATES database are limited to 60 characters.

[2] EPA does not believe this PAI will persist in sanitary streams long enough to reach a POTW.

Table 10 to Part 455—List of Appropriate Pollution Control Technologies

This table contains those pollutant control technologies, such as hydrolysis, chemical oxidation, precipitation and activated carbon adsorption, which have been used for estimating compliance costs on a PAI specific basis. In general, these treatment technologies have been determined to be effective in treating pesticide containing wastewaters in literature, in bench or pilot scale treatability studies or in the Pesticide Manufacturing effluent guidelines. These are the same technologies that are presented as part of the Universal Treatment System. However, these technologies are PAI specific and may need to be used in conjunction with one another to provide treatment for all PAIs used at a facility over a period of time. In addition, facilities may experience difficulties treating wastewaters that contain emulsions, therefore, "appropriate" treatment for emulsified wastewaters must include an emulsion breaking step. For PAIs whose technology is listed as "Pollution Prevention", the permitting authority/control authority can determine if additional treatment is necessary through best professional judgement/best engineering judgement, respectively.

TABLE 10 TO PART 455.—LIST OF APPROPRIATE POLLUTION CONTROL TECHNOLOGIES[1]

PAI name[2]	PAI code[3]	Shaughnessy code[4]	Structural group[5]	Treatment technology
Dicofol	001	10501	DDT	Hydrolysis.
Maleic Hydrazide	002	51501	Hydrazide	Activated Carbon.
EDB	003	42002	EDB	Activated Carbon.
Vancide TH	004	82901	s-Triazine	Activated Carbon.
1,3-Dichloropropene	005	29001	EDB	Hydrolysis.
Thenarsazine Oxide	006	12601	Organoarsenic	Precipitation.
Dowicil 75	007	17901	NR4	Activated Carbon.
Triadimefon	008	109901	s-Triazine	Activated Carbon.
Hexachlorophene	009	44901	Chlorophene	Activated Carbon.
Tetrachlorophene	010	....	Chlorophene	Activated Carbon.
Dichlorophene	011	55001	Chlorophene	Activated Carbon.
Dichlorvos	012	84001	Phosphate	Hydrolysis.
Landrin-2	013	....	Carbamate	Activated Carbon.
2,3,6-T, S&E or Fenac	014	82605	2,4-D	Activated Carbon.
2,4,5-T and 2,4,5-T, S&E	015	(*)	2,4-D	Activated Carbon.
2,4-D (2,4-D, S&E)	016	(*)	2,4-D	Chemical Oxidation.
2,4-DB, S&E	017	(*)	2,4-D	Activated Carbon.
Dyrene or Anilazine	018	80811	s-Triazine	Activated Carbon.
Dinocap	019	36001	Phenylcrotonate	Activated Carbon.
Dichloran or DCNA	020	31301	Aryl Halide	Activated Carbon.
Busan 90	021	8707	Miscellaneous Organic	Activated Carbon.
Mevinphos	022	15801	Phosphate	Hydrolysis.
Sulfallate	023	....	Dithiocarbamate	Activated Carbon.

Table 10 to Part 455.—List of Appropriate Pollution Control Technologies [1]—Continued

PAI name [2]	PAI code [3]	Shaughnessy code [4]	Structural group [5]	Treatment technology
Chlorfenvinphos	024	84101	Phosphate	Activated Carbon.
Cyanazine or Bladex	025	100101	s-Triazine	Activated Carbon.
Propachlor	026	19101	Acetanilide	Activated Carbon.
MCPA, S&E	027	(*)	2,4-D	Activated Carbon.
Octhilinone	028	99901	Heterocyclic	Activated Carbon.
Pindone	029	67703	Miscellaneous Organic	Activated Carbon.
Dichlorprop, S&E	030	(*)	2,4-D	Activated Carbon.
MCPP, S&E or Mecoprop	031	(*)	2,4-D	Activated Carbon.
Thiabendazole	032	60101	Heterocyclic	Activated Carbon.
Belclene 310	033	80815	s-Triazine	Activated Carbon.
Chlorprop, S&E	034	21202	2,4-D	Activated Carbon.
Busan 72 or TCMTB	035	35603	Heterocyclic	Hydrolysis.
Chlorophacinone	037	67707	Miscellaneous Organic	Activated Carbon.
Landrin-1	038		Carbamate	Activated Carbon.
Pronamide	039	101701	Chlorobenzamide	Activated Carbon.
Methiocarb or Mesurol	040	100501	Carbamate	Hydrolysis.
Propanil	041	28201	Chloropropionanilide	Activated Carbon.
Polyphase [6]	042	107801	Carbamate	Activated Carbon.
Coumafuryl or Fumarin	043	86001	Coumarin	Activated Carbon.
DNOC	044		Phenol	Activated Carbon.
Metribuzin	045	101101	Triazathione	Activated Carbon.
CPA, S&E	046	(*)	2,4-D	Activated Carbon.
MCPB, S&E	047	19202	2,4-D	Activated Carbon.
Aminocarb	048		Carbamate	Hydrolysis.
Etridiazole	049	84701	Heterocyclic	Activated Carbon.
Ethoxyquin	050	55501	Quinolin	Activated Carbon.
Acephate or Orthene	052	103301	Phosphoroamidothioate	Activated Carbon.
Acifluorfen	053	114402	Benzoic Acid	Activated Carbon.
Alachlor	054	90501	Acetanilide	Activated Carbon.
Aldicarb	055	98301	Carbamate	Hydrolysis.
Allethrin	057	(*)	Pyrethrin	Activated Carbon.
Ametryn	058	80801	s-Triazine	Activated Carbon.
Amitraz	059	106201	Iminamide	Activated Carbon.
Atrazine	060	80803	s-Triazine	Hydrolysis.
Bendiocarb	061	105201	Carbamate	Hydrolysis.
Benomyl	062	99101	Carbamate	Hydrolysis.
BHC	063		Lindane	Hydrolysis.
Benzyl Benzoate	064	9501	Ester	Activated Carbon.
Lethane 60	065		Thiocyanate	Activated Carbon.
Bifenox	066	104301	Nitrobenzoate	Activated Carbon.
Biphenyl	067	17002	Aryl	Activated Carbon.
Bromacil (Lithium Salt)	068	(*)	Uracil	Activated Carbon.
Bromoxynil	069	(*)	Benzonitrile	Activated Carbon.
Butachlor	070		Acetanilide	Activated Carbon.
Giv-gard	071	101401	Miscellaneous Organic	Activated Carbon.
Cacodylic Acid	072	(*)	Organoarsenic	Precipitation.
Captafol	073		Phthalimide	Hydrolysis.
Captan	074	81301	Phthalimide	Hydrolysis.
Carbaryl	075	56801	Carbamate	Hydrolysis.
Carbofuran	076	90601	Carbamate	Hydrolysis.
Carbosulfan	077		Carbamate	Activated Carbon.
Chloramben	078	(*)	Benzoic Acid	Activated Carbon.
Chlordane	079	58201	Tricyclic	Activated Carbon.
Chloroneb	080	27301	Aryl Halide	Chemical Oxidation.
Chloropicrin	081	81501	Alkyl Halide	Chemical Oxidation.
Chlorothalonil	082	81901	Chloropropionanilide	Activated Carbon.
Chloroxuron	083		Urea	Activated Carbon.
Stirofos	084	83701	Phosphate	Hydrolysis.
Chlorpyrifos Methyl	085	59102	Phosphorothioate	Hydrolysis.
Chlorpyrifos	086	59101	Phosphorothioate	Chemical Oxidation.
Mancozeb	087	14504	Dithiocarbamate	Activated Carbon.
Bioquin (Copper)	088	24002	Organocopper	Precipitation.
Copper EDTA	089	39105	Organocopper	Precipitation.
Pydrin or Fenvalerate	090	109301	Pyrethrin	Activated Carbon.
Cycloheximide	091		Cyclic Ketone	Activated Carbon.
Dalapon	092	(*)	Alkyl Halide	Activated Carbon.
Dienochlor	093	27501	HCp	Activated Carbon.
Demeton	094		Phosphorothioate	Hydrolysis.
Desmedipham	095	104801	Carbamate	Hydrolysis.
Amobam	096		Miscellaneous Organic	Activated Carbon.
DBCP	097		EDB	Activated Carbon.

TABLE 10 TO PART 455.—LIST OF APPROPRIATE POLLUTION CONTROL TECHNOLOGIES [1]—Continued

PAI name [2]	PAI code [3]	Shaughnessy code [4]	Structural group [5]	Treatment technology
Dicamba	098	(*)	Aryl Halide	Activated Carbon.
Dichlone	099	29601	Quinone	Activated Carbon.
Thiophanate Ethyl	100	103401	Carbamate	Hydrolysis.
Perthane	101		DDT	Activated Carbon.
EXD	102		Dithiocarbamate	Activated Carbon.
Diazinon	103	57801	Phosphorothioate	Hydrolysis.
Diflubenzuron	104	108201	Urea	Activated Carbon.
Dimethoate	106	35001	Phosphorodithioate	Hydrolysis.
Parathion Methyl	107	53501	Phosphorothioate	Hydrolysis.
Dicrotophos	108	35201	Phosphate	Activated Carbon.
Crotoxyphos	109	58801	Phosphate	Activated Carbon.
DCPA	110	78701	Aryl Halide	Activated Carbon.
Trichlorofon	111	57901	Phosphonate	Activated Carbon.
Dinoseb	112	37505	Phenol	Activated Carbon.
Dioxathion	113	37801	Phosphorodithioate	Hydrolysis.
Diphacinone	114	67701	Indandione	Activated Carbon.
Diphenamide	115	36601	Acetamide	Activated Carbon.
Diphenylamine	116	38501	Aryl Amine	Activated Carbon.
MGK 326	117	47201	Ester	Activated Carbon.
Nabonate	118	63301	Isocyanate	Chemical Oxidation.
Diuron	119	35505	Urea	Activated Carbon.
Metasol DGH	120	44303	NR4	Activated Carbon.
Dodine	121	44301	NR4	Activated Carbon.
Endosulfan	122	79401	Tricyclic	Activated Carbon.
Endothall (Endothall S&E)	123	(*)	Bicyclic	Activated Carbon.
Endrin	124	41601	Tricyclic	Activated Carbon.
Ethalfluralin	125	113101	Toluidine	Activated Carbon.
Ethion	126	58401	Phosphorodithioate	Hydrolysis.
Ethoprop	127	41101	Phosphorodithioate	Activated Carbon.
Fenamiphos	128	100601	Phosphoroamidate	Activated Carbon.
Chlorobenzilate	129	28801	Aryl Halide	Activated Carbon.
Butylate	130	41405	Thiocarbamate	Activated Carbon.
Famphur	131		Phosphorothioate	Hydrolysis.
Fenarimol	132	206600	Pyrimidine	Activated Carbon.
Fenthion or Baytex	133	53301	Phosphorothioate	Hydrolysis.
Ferbam	134	34801	Dithiocarbamate	Activated Carbon.
Fluometuron	135	35503	Urea	Activated Carbon.
Fluoroacetamide	136		Acetamide	Activated Carbon.
Folpet	137	81601	Phthalimide	Hydrolysis.
Glyphosate (Glyphosate S&E)	138	(*)	Phosphoroamidate	Chemical Oxidation.
Glyphosine	139		Phosphoroamidate	Activated Carbon.
Heptachlor	140	44801	Tricyclic	Activated Carbon.
Cycloprate	141		Thiocarbamate	Activated Carbon.
Hexazinone	142	107201	s-Triazine	Activated Carbon.
Isofenphos	143	109401	Phosphoroamidothioate	Activated Carbon.
Isopropalin	144	100201	Toluidine	Activated Carbon.
Propham	145		Carbamate	Hydrolysis.
Karabutilate	146	97401	Carbamate	Hydrolysis.
Lindane	147	9001	Lindane	Activated Carbon.
Linuron	148	35506	Urea	Chemical Oxidation.
Malachite Green	149	39504	NR4	Activated Carbon.
Malathion	150	57701	Phosphorodithioate	Hydrolysis.
Maneb	151	14505	Dithiocarbamate	Activated Carbon.
Manam	152		Dithiocarbamate	Activated Carbon.
Mefluidide	153	114002	Carbamate	Activated Carbon.
Methamidophos	154	101201	Phosphoroamidothioate	Activated Carbon.
Methidathion	155	100301	Phosphorodithioate	Activated Carbon.
Methomyl	156	90301	Carbamate	Hydrolysis.
Methoprene	157	(*)	Ester	Activated Carbon.
Methoxychlor	158	34001	DDT	Hydrolysis.
Methyl Bromide	160	53201	Alkyl Halide	Activated Carbon.
Monosodium Methyl Arsenate	161	(*)	Organoarsenic	Precipitation.
Nalco D-2303	163	68102	Thiocyanate	Activated Carbon.
Quinomethionate	164	54101	Miscellaneous Organic	Activated Carbon.
Metolachlor	165	108801	Acetanilide	Activated Carbon.
Mexacarbate	166		Carbamate	Hydrolysis.
Metiram	167	14601	Dithiocarbamate	Activated Carbon.
Monuron TCA	168	35502	Urea	Activated Carbon.
Monuron	169	35501	Urea	Activated Carbon.
Napropamide	170	103001	Carbamate	Activated Carbon.
Deet	171	80301	Toluamide	Activated Carbon.

TABLE 10 TO PART 455.—LIST OF APPROPRIATE POLLUTION CONTROL TECHNOLOGIES[1]—Continued

PAI name[2]	PAI code[3]	Shaughnessy code[4]	Structural group[5]	Treatment technology
Nabam	172	14503	Dithiocarbamate	Chemical Oxidation.
Naled	173	34401	Phosphate	Hydrolysis.
Norea	174		Urea	Activated Carbon.
Norflurazon	175	105801	Heterocyclic	Activated Carbon.
Naptalam or Neptalam	176	30703	Phthalamide	Activated Carbon.
MGK 264	177	57001	Bicyclic	Activated Carbon.
Benfluralin	178	84301	Toluidine	Activated Carbon.
Sulfotepp	179	79501	Phosphorothioate	Activated Carbon.
Aspon	180		Phosphorothioate	Activated Carbon.
Coumaphos	181	36501	Phosphorothioate	Hydrolysis.
Fensulfothion	182	32701	Phosphorothioate	Hydrolysis.
Disulfoton	183	32501	Phosphorodithioate	Hydrolysis.
Fenitrothion	184	105901	Phosphorothioate	Hydrolysis.
Phosmet	185	59201	Phosphorodithioate	Hydrolysis.
Azinphos Methyl (Guthion)	186	58001	Phosphorodithioate	Hydrolysis.
Oxydemeton Methyl	187	58702	Phosphorothioate	Activated Carbon.
Organo-Arsenic Pesticides	188		Organoarsenic	Precipitation.
Organo-Cadmium Pesticides	189		Organocadmium	Precipitation
Organo-Copper Pesticides	190	(*)	Organocopper	Precipitation.
Organo-Mercury Pesticides	191	(*)	Organomercury	Precipitation.
Organo-Tin Pesticides	192	(*)	Organotin	Precipitation.
o-Dichlorobenzene	193	59401	Aryl Halide	Activated Carbon.
Oryzalin	194	104201	Sulfanilamide	Activated Carbon.
Oxamyl	195	103801	Carbamate	Hydrolysis.
Oxyfluorfen	196	111601	Miscellaneous Organic	Activated Carbon.
Bolstar	197	111501	Phosphorodithioate	Activated Carbon.
Sulprofos Oxon	198		Phosphorothioate	Hydrolysis.
Santox (EPN)	199	41801	Phosphorodithioate	Hydrolysis.
Fonofos	200	41701	Phosphorodithioate	Hydrolysis.
Propoxur	201	47802	Carbamate	Hydrolysis.
p-Dichlorobenzene	202	61501	Aryl Halide	Activated Carbon.
Parathion Ethyl	203	57501	Phosphorothioate	Hydrolysis.
Pendimethalin	204	108501	Benzeneamine	Activated Carbon.
PCNB	205	56502	Aryl Halide	Activated Carbon.
PCP or Penta	206	(*)	Phenol	Activated Carbon.
Perfluidone	207		Sulfonamide	Activated Carbon.
Permethrin	208	109701	Pyrethrin	Activated Carbon.
Phenmedipham	209	98701	Carbamate	Hydrolysis.
Nemazine	210	64501	Heterocyclic	Activated Carbon.
Phorate	212	57201	Phosphorodithioate	Hydrolysis.
Phosalone	213	97701	Phosphorodithioate	Hydrolysis.
Phosphamidon	214	18201	Phosphate	Hydrolysis.
Picloram	215	(*)	Pyridine	Activated Carbon.
Piperonyl Butoxide	216	67501	Ester	Activated Carbon.
PBED or WSCP (Busan 77)	217	69183	NR4	Activated Carbon.
Busan 85 or Arylane	218	34803	Dithiocarbamate	Chemical Oxidation.
Busan 40	219	102901	Dithiocarbamate	Chemical Oxidation.
KN Methyl	220	39002	Dithiocarbamate	Chemical Oxidation.
Metasol J26	221	101301	Miscellaneous Organic	Activated Carbon.
Profenofos	222	111401	Phosphorothioate	Activated Carbon.
Prometon or Caparol	223	80804	s-Triazine	Chemical Oxidation.
Prometryn	224	80805	s-Triazine	Activated Carbon.
Propargite	225	97601	Miscellaneous Organic	Activated Carbon.
Propazine	226	80808	s-Triazine	Activated Carbon.
Propionic Acid	227	77702	Alkyl Acid	Activated Carbon.
Previcur N	228	119301	Carbamate	Hydrolysis.
Pyrethrin Coils	229	69004	Pyrethrin	Activated Carbon.
Pyrethrum I	230	69001	Pyrethrin	Hydrolysis.
Pyrethrum II	231	69002	Pyrethrin	Hydrolysis.
Pyrethrins	232	(*)	Pyrethrin	Hydrolysis.
Resmethrin	233	(*)	Pyrethrin	Activated Carbon.
Fenchlorphos or Ronnel	234	58301	Phosphorothioate	Hydrolysis.
Mexide or Rotenone	235	71003	Miscellaneous Organic	Activated Carbon.
DEF	236	74801	Phosphorotrithioate	Activated Carbon.
Siduron or Tupersan	237	35509	Urea	Activated Carbon.
Silvex	238	(*)	2,4-D	Activated Carbon.
Simazine	239	80807	s-Triazine	Activated Carbon.
Sodium Bentazon	240	103901	Heterocyclic	Chemical Oxidation.
Carbam-S or Sodam	241	34804	Dithiocarbamate	Chemical Oxidation.
Sodium Fluoroacetate	242	75003	Acetamide	Activated Carbon.
Vapam or Metham Sodium	243	39003	Dithiocarbamate	Chemical Oxidation.

TABLE 10 TO PART 455.—LIST OF APPROPRIATE POLLUTION CONTROL TECHNOLOGIES [1]—Continued

PAI name [2]	PAI code [3]	Shaughnessy code [4]	Structural group [5]	Treatment technology
Sulfoxide	244	57101	Miscellaneous Organic	Activated Carbon.
Cycloate or Ro-Neet	245	41301	Thiocarbamate	Activated Carbon.
EPrecipitationC or Eptam	246	41401	Thiocarbamate	Activated Carbon.
Molinate	247	41402	Thiocarbamate	Activated Carbon.
Pebulate or Tillman	248	41403	Thiocarbamate	Activated Carbon.
Vernolate or Vernam	249	41404	Thiocarbamate	Activated Carbon.
HPrecipitationMS	250	35604	Thiosulphonate	Activated Carbon.
Bensulide or Betesan	251	9801	Phosphorodithioate	Activated Carbon.
Tebuthiuron	252	105501	Urea	Activated Carbon.
Temephos	253	59001	Phosphorothioate	Hydrolysis.
Terbacil	254	12701	Uracil	Activated Carbon.
Terbufos or Counter	255	105001	Phosphorodithioate	Activated Carbon.
Terbuthylazine	256	80814	s-Triazine	Activated Carbon.
Terbutryn	257	80813	s-Triazine	Activated Carbon.
Tetrachlorophenol	258	63004	Phenol	Activated Carbon.
Dazomet	259	35602	Heterocyclic	Chemical Oxidation.
Thiophanate Methyl	260	102001	Carbamate	Hydrolysis.
Thiram	261	79801	Dithiocarbamate	Activated Carbon.
Toxaphene	262	80501	Bicyclic	Activated Carbon.
Merphos	263	74901	Phosphorotrithioate	Hydrolysis.
Trifluralin or Treflan	264	36101	Toluidine	Activated Carbon.
Warfarin	265	(*)	Coumarin	Activated Carbon.
Zinc MBT	266	51705	Organozinc	Precipitation.
Zineb	267	14506	Dithiocarbamate	Activated Carbon.
Ziram	268	34805	Dithiocarbamate	Activated Carbon.
Triallate	269	78802	Thiocarbamate	Activated Carbon.
Phenothrin	270	69005	Pyrethrin	Activated Carbon.
Tetramethrin	271	69003	Pyrethrin	Activated Carbon.
Chloropropham	272	18301	Carbamate	Hydrolysis.
Non-272 PAIs				
CFC 11		13	Alkyl Halide	Activated Carbon.
CFC 12		14	Alkyl Halide	Activated Carbon.
Polyethylene		152	Polymer	Activated Carbon.
Acrolein		701	Alcohol	Activated Carbon.
Dimethyl-m-dioxan-4-ol acetate		1001	Heterocyclic	Activated Carbon.
Dodecyl alcohol		1509	Alcohol	Activated Carbon.
Tetradecyl alcohol		1510	Alcohol	Activated Carbon.
Rosin amine D acetate		4201	Alkyl Acid	Activated Carbon.
Dihydroabietylamine acetate		4213	Alkyl Acid	Activated Carbon.
Amitrole		4401	Heterocyclic	Activated Carbon.
Allyl isothiocyanate		4901	Thiocyanate	Activated Carbon.
AMS		5501	Inorganic	Pollution Prevention.
Calcium sulfate		5602	Inorganic	Pollution Prevention.
Tartar emetic		6201	Inorganic	Pollution Prevention.
Diphenylstibene 2-ethylhexanoate		6202	Aryl	Activated Carbon.
Streptomycin		6306	Heterocyclic	Activated Carbon.
Oxytetracycline hydrochloride		6308	Phthalamide	Activated Carbon.
Streptomycin sesquisulfate		6310	Heterocyclic	Activated Carbon.
Neomycin sulfate		6313	Benzeneamine	Activated Carbon.
Antimycin A		6314	Heterocyclic	Activated Carbon.
Calcium oxytetracycline		6321	Phthalamide	Activated Carbon.
Espesol 3A		6601	Phosphorothioate	Activated Carbon.
Arsenic acid		6801	Metallic	Precipitation.
Arsenic acid anhydride		6802	Metallic	Precipitation.
Arsenous acid anhydride		7001	Metallic	Precipitation.
Copper oxychloride		8001	Metallic	Precipitation.
Basic cupric sulfate		8101	Metallic	Precipitation.
Basic copper III—zinc sulfate complex (Declare copper and.		8102	Metallic	Precipitation.
Bromophos		8706	Phosphorothioate	Activated Carbon.
Benzyl bromoacetate		8710	Benzoic acid	Activated Carbon.
Benzoic acid		9101	Benzoic acid	Activated Carbon.
Benzyl diethyl ((2,6-xylylcarbamoyl)methyl) ammonium benzoate.		9106	NR4	Activated Carbon.
Benzyl alcohol		9502	Aryl	Activated Carbon.
3–Chloro-p-toluidine hydrochloride		9901	Chloropropionanilide	Activated Carbon.
Butoxyethoxy)ethyl thiocyanate		10002	Thiocyanate	Activated Carbon.
2-Naphthol		10301	Phenol	Activated Carbon.
Boric acid		11001	Inorganic	Pollution Prevention.
Barium metaborate		11101	Inorganic	Pollution Prevention.

TABLE 10 TO PART 455.—LIST OF APPROPRIATE POLLUTION CONTROL TECHNOLOGIES [1]—Continued

PAI name [2]	PAI code [3]	Shaughnessy code [4]	Structural group [5]	Treatment technology
Boron sodium oxide (B8Na2O13), tetrahydrate (12280–03–4).	....	11103	Inorganic	Pollution Prevention.
Sodium metaborate (NaBO2)	....	11104	Inorganic	Pollution Prevention.
Boron sodium oxide (B8Na2O13) (12008–41–2).	....	11107	Inorganic	Pollution Prevention.
Boron sodium oxide (B4Na2O7), pentahydrate (12179–04–3).	....	11110	Inorganic	Pollution Prevention.
Boron sodium oxide (B4Na2O7) (1330–43–4).	....	11112	Inorganic	Pollution Prevention.
Polybutene	....	11402	Polymer	Activated Carbon.
Polyisobutylene	....	11403	Polymer	Activated Carbon.
Butyl cellosolve	....	11501	Alcohol	Activated Carbon.
Butoxypolypropylene glycol	....	11901	Polymer	Activated Carbon.
Neburon (ANSI)	....	12001	Chloropropionanilide	Activated Carbon.
Methyltrimethylenedioxy)bis(4-methyl-1,3,2-dioxaborinane).	....	12401	Bicyclic	Activated Carbon.
Oxybis(4,4,6-trimethyl-1,3,2-dioxaborinane)	....	12402	Bicyclic	Activated Carbon.
Cadmium chloride	....	12902	Metallic	Precipitation.
Lead arsenate, basic	....	13502	Metallic	Precipitation.
Lead arsenate	....	13503	Metallic	Precipitation.
Sodium arsenate	....	13505	Metallic	Precipitation.
Sodium arsenite	....	13603	Metallic	Precipitation.
Potassium bromide	....	13903	Inorganic	Pollution Prevention.
Camphor	....	15602	Bicyclic	Activated Carbon.
Carbon disulfide	....	16401	Inorganic	Pollution Prevention.
Carbon tetrachloride	....	16501	Alkyl Halide	Activated Carbon.
Barban (ANSI)	....	17601	Carbamate	Activated Carbon.
Chloro-2-propenyl)-3,5,7,triaza-1-azo niatricyclo(3.3.1.1)sup.	....	17902	Tricyclic	Activated Carbon.
Chlormequat chloride	....	18101	NR4	Activated Carbon.
Chloromethoxypropylmercuric acetate	....	18401	Metallic	Precipitation.
Allidochlor	....	19301	Acetanilide	Activated Carbon.
Chromic acid	....	21101	Metallic	Precipitation.
Chromic oxide	....	21103	Metallic	Precipitation.
Cresol (unspec) (Cresylic acid)	....	22101	Phenol	Activated Carbon.
Cresol	....	22102	Phenol	Activated Carbon.
Copper (metallic)	....	22501	Metallic	Precipitation.
Copper ammonium carbonate	....	22703	Metallic	Precipitation.
Copper carbonate	....	22901	Metallic	Precipitation.
Copper hydroxide	....	23401	Metallic	Precipitation.
Copper chloride hydroxide (Cu2Cl(OH)3)	....	23501	Metallic	Precipitation.
Copper oxychloride sulfate	....	23503	Metallic	Precipitation.
Copper sulfate	....	24401	Metallic	Precipitation.
Copper (from triethanolamine complex)	....	24403	Metallic	Precipitation.
Copper as metallic (in the form of chelates of copper citrat).	....	24405	Metallic	Precipitation.
Copper as elemental from copper—ethylenediamine complex.	....	24407	Metallic	Precipitation.
Copper sulfate (anhydrous)	....	24408	Metallic	Precipitation.
Copper(I) oxide	....	25601	Metallic	Precipitation.
Cuprous thiocyanate	....	25602	Metallic	Precipitation.
Cyclohexane	....	25901	Aryl	Activated Carbon.
Cyclohexanone	....	25902	Cyclic Ketone	Activated Carbon.
Dichlobenil	....	27401	Chloropropionanilide	Activated Carbon.
Diquat dibromide	....	32201	NR4	Activated Carbon.
Dimethrin (ANSI)	....	34101	Pyrethrin	Activated Carbon.
Dicapthon	....	34502	Phosphorothioate	Activated Carbon.
Ziram, cyclohexylamine complex	....	34806	Dithiocarbamate	Activated Carbon.
Butyl dimethyltrithioperoxycarbamate	....	34807	Dithiocarbamate	Activated Carbon.
Daminozide	....	35101	Acetanilide	Activated Carbon.
Bis(trichloromethyl) sulfone	....	35601	Miscellaneous Organic	Activated Carbon
Bis(bromoacetoxy)-2-butene	....	35605	Alkyl Halide	Activated Carbon.
Dazomet, sodium salt	....	35607	Heterocyclic	Activated Carbon.
Butonate	....	35701	Phosphonate	Activated Carbon.
Trifluoro-4-nitro-m-cresol(**)=alpha,alpha,alpha-.	....	6201	Phenol	Activated Carbon.
Triethanolamine dinoseb (2-sec-Butyl-4,6-dinitrophenol).	....	37506	Phenol	Activated Carbon.
Sodium 4,6-dinitro-o-cresylate	....	37508	Phenol	Activated Carbon.
Dinitrophenol	....	37509	Phenol	Activated Carbon.

TABLE 10 TO PART 455.—LIST OF APPROPRIATE POLLUTION CONTROL TECHNOLOGIES [1]—Continued

PAI name [2]	PAI code [3]	Shaughnessy code [4]	Structural group [5]	Treatment technology
Alkanol* amine dinoseb (2-sec-butyl-4,6-dinitrophenol) *(s.	....	37511	Phenol	Activated Carbon.
Sodium dinoseb (2-sec-Butyl-4,6-dinitrophenol).	....	37512	Phenol	Activated Carbon.
Nitrilotriacetic acid, trisodium salt	....	39106	Acetamide	Activated Carbon.
Trisodium(2-hydroxyethyl)ethylene diaminetriacetate.	....	39109	Acetanilide	Activated Carbon.
Ammonium ethylenediaminetetraacetate	....	39117	Acetamide	Activated Carbon.
Pentasodium diethylenetriaminepentaacetate.	....	39120	Acetanilide	Activated Carbon.
Ethyl-1,3-hexanediol	....	41001	Alcohol	Activated Carbon.
Ethylene	....	41901	Miscellaneous Organic	Pollution Prevention.
EDC	....	42003	EDB	Activated Carbon.
Methylene chloride	....	42004	Alkyl Halide	Activated Carbon.
Methoxyethanol	....	42202	Alcohol	Activated Carbon.
Ethylene glycol	....	42203	Alcohol	Activated Carbon.
Butylene glycol	....	42205	Alcohol	Activated Carbon.
Ethylene oxide	....	42301	Miscellaneous Organic	Pollution Prevention.
Copper(II) oxide	....	42401	Metallic	Precipitation.
Cuprous and cupric oxide, mixed	....	42403	Metallic	Precipitation.
Propylene oxide	....	42501	Miscellaneous Organic	Pollution Prevention.
Formaldehyde	....	43001	Miscellaneous Organic	Pollution Prevention.
Paraformaldehyde	....	43002	Polymer	Activated Carbon.
Bis(2-butylene) tetrahydro-2-furaldehyde	....	43302	Tricyclic	Activated Carbon.
Giberellic acid	....	43801	Tricyclic	Activated Carbon.
Potassium gibberellate	....	43802	Tricyclic	Activated Carbon.
Glutaral	....	43901	Alcohol	Activated Carbon.
Copper citrate	....	44005	Metallic	Precipitation.
Methyl nonyl ketone	....	44102	Miscellaneous Organic	Activated Carbon.
Methyl-2-pentanone	....	44105	Miscellaneous Organic	Activated Carbon.
Monosodium 2,2'-methylenebis (3,4,6-trichlorophenate).	....	44902	Chlorophene	Activated Carbon.
Potassium 2,2'-methylenebis (3,4,6-trichlorophenate).	....	44904	Chlorophene	Activated Carbon.
Hexachloroepoxyoctahydro-endo, exo-dimethanoaphthalene 85%.	....	45001	Tricyclic	Activated Carbon.
Chlorhexidine diacetate	....	45502	Chloropropionanilide	Activated Carbon.
Hydrocyanic acid	....	45801	Inorganic	Activated Carbon.
Hydroxyethyl octyl sulfide	....	46301	Alcohol	Activated Carbon.
Heptadecenyl-2-(2-hydroxyethyl)-2-i midazolinium chloride.	....	46608	NR4	Activated Carbon.
Hydroxyethyl)-2-alkyl-2-imidazoline (as in fatty acids of t.	....	46609	NR4	Activated Carbon.
IBA	....	46701	Bicyclic	Activated Carbon.
Dihydropyrone	....	46801	Cyclic ketone	Activated Carbon.
Butoxypolypropoxypolyethoxyethanol-iodine complex.	....	46901	Polymer	Activated Carbon.
Polyethoxypolypropoxyethanol-iodine complex.	....	46904	Polymer	Activated Carbon.
Use code no. 046904 (polyethoxypolypropoxy ethanol-iodine complex).	....	46909	Polymer	Activated Carbon.
Iodine-potassium iodide complex	....	46917	Inorganic	Pollution Prevention.
Alkyl-omega-hydroxypoly(oxyethylen e)-iodine complex *(100%.	....	46921	Polymer	Activated Carbon.
Lead acetate	....	48001	Metallic	Precipitation.
Nickel sulfate hexahydrate	....	50505	Metallic	Precipitation.
Maleic hydrazide, diethanolamine salt	....	51502	Hydrazide	Activated Carbon.
Maleic hydrazide, potassium salt	....	51503	Hydrazide	Activated Carbon.
Sodium 2-mercaptobenzothiolate	....	51704	Heterocyclic	Activated Carbon.
Mercuric chloride	....	52001	Metallic	Precipitation.
Mercurous chloride	....	52201	Metallic	Precipitation.
Metaldehyde	....	53001	Miscellaneous Organic	Activated Carbon.
Methylated naphthalenes	....	54002	Aryl	Activated Carbon.
Sodium 2,2'-methylenebis(4-chlorophenate)	....	55005	Chlorophene	Activated Carbon.
Naphthalene	....	55801	Aryl	Activated Carbon.
NAD	....	56001	Benzoic Acid	Activated Carbon.
NAA (1–Naphthaleneacetic Acid)	....	56002	Benzoic Acid	Activated Carbon.
Potassium 1-naphthaleneacetate	....	56003	Benzoic Acid	Activated Carbon.
Ammonium 1-naphthaleneacetate	....	56004	Benzoic Acid	Activated Carbon.
Sodium 1-naphthaleneacetate	....	56007	Benzoic Acid	Activated Carbon.

Table 10 to Part 455.—List of Appropriate Pollution Control Technologies [1]—Continued

PAI name [2]	PAI code [3]	Shaughnessy code [4]	Structural group [5]	Treatment technology
Ethyl 1-naphthaleneacetate	....	56008	Benzoic Acid	Activated Carbon.
Nitrophenol	....	56301	Phenol	Activated Carbon.
Nicotine	....	56702	Pyridine	Activated Carbon.
Carbophenothion (ANSI)	....	58102	Phosphorodithioate	Activated Carbon.
Sodium 5-chloro-2-(4-chloro-2-(3-(3,4-dichlorophenyl)ureido).	....	58802	Aryl Halide	Activated Carbon.
Monocrotophos	....	58901	Phosphate	Activated Carbon.
Chlordimeform	....	59701	Chloropropionanilide	Activated Carbon.
Chlordimeform hydrochloride	....	59702	Chloropropionanilide	Activated Carbon.
Thiabendazole hypophosphite	....	60102	Hydrazide	Activated Carbon.
Hexachlorobenzene	....	61001	Lindane	Activated Carbon.
Butyl paraben	....	61205	Phenol	Activated Carbon.
Paraquat dichloride	....	61601	Pyridine	Activated Carbon.
Chloro-4-phenylphenol	....	62206	Chlorophene	Activated Carbon.
Chloro-2-phenylphenol	....	62208	Chlorophene	Activated Carbon.
Chloro-2-biphenylol, potassium salt	....	62209	Chlorophene	Activated Carbon.
Chloro-2-phenylphenol	....	62210	Chlorophene	Activated Carbon.
Chloro-2-phenylphenol, potassium salt	....	62211	Chlorophene	Activated Carbon.
Sodium phenate	....	64002	Phenol	Activated Carbon.
Butylphenol, sodium salt	....	64115	Phenol	Activated Carbon.
Ammonium 2-phenylphenate	....	64116	Phenol	Activated Carbon.
Chloro-2-cyclopentylphenol	....	64202	Chlorophene	Activated Carbon.
Bithionolate sodium	....	64203	Chlorophene	Activated Carbon.
Chloro-3-cresol	....	64206	Chlorophene	Activated Carbon.
Sodium 2,4,5-trichlorophenate	....	64217	Chlorophene	Activated Carbon.
Aluminum phosphide	....	66501	Inorganic	Pollution Prevention.
Phosphorus	....	66502	Inorganic	Pollution Prevention.
Magnesium phosphide	....	66504	Inorganic	Pollution Prevention.
1-(Alkyl*amino)-3-aminopropane* (Fatty acids of coconut oil).	....	67301	Iminamide	Activated Carbon.
Alkyl* amino)-3-aminopropane *(53%C12, 19%C14, 8.5%C16, 7%C8.	....	67305	Iminamide	Activated Carbon.
Alkyl*amino)-3-aminopropane benzoate*(fatty acids of coconut.	....	67307	Iminamide	Activated Carbon.
Alkyl* dipropoxyamine *(47% C12, 18% C14, 10% C18, 9% C10, 8.	....	67308	Iminamide	Activated Carbon.
Alkyl*amino)-3-aminopropane hydroxyacetate* (acids of coconut.	....	67309	Iminamide	Activated Carbon.
Alkyl* amino)-3-aminopropane *(42%C12, 26%C18, 15%C14, 8%C16.	....	67310	Iminamide	Activated Carbon.
Alkyl*amino)-3-aminopropane diacetate* (fatty acids of coconut.	....	67313	Iminamide	Activated Carbon.
Octadecenyl-1,3-propanediamine monogluconate.	....	67316	Acetamide	Activated Carbon.
Alkyl* amine acetate *(5%C8, 7%C10, 54%C12, 19%C14, 8%C16,.	....	67329	Iminamide	Activated Carbon.
Pindone sodium salt	....	67704	Indandione	Activated Carbon.
Diphacinone, sodium salt	....	67705	Indandione	Activated Carbon.
Isovaleryl-1,3-indandione, calcium salt	....	67706	Indandione	Activated Carbon.
Methyl isothiocyanate	....	68103	Thiocyanate	Pollution Prevention.
Potassium dichromate	....	68302	Inorganic	Pollution Prevention.
Sodium chromate	....	68303	Inorganic	Pollution Prevention.
Sodium dichromate	....	68304	Metallic	Precipitation.
Alkenyl* dimethyl ethyl ammonium bromide *(90%C18', 10%C16').	....	69102	NR4	Activated Carbon.
Alkyl*-N-ethyl morpholinium ethyl sulfate *(92%C18, 8%C16).	....	69113	Heterocyclic	Activated Carbon.
Alkyl* isoquinolinium bromide *(50% C12, 30% C14, 17% C16, 3).	....	69115	Quinolin	Activated Carbon.
Alkyl* methyl isoquinolinium chloride *(55%C14, 12%C12, 17%C).	....	69116	Quinolin	Activated Carbon.
Cetyl trimethyl ammonium bromide	....	69117	NR4	Activated Carbon.
Cetyl pyridinium bromide	....	69118	Pyridine	Activated Carbon.
Dodecyl dimethyl benzyl ammonium naphthenate.	....	69127	NR4	Activated Carbon.
Alkyl* dimethyl ethylbenzyl ammonium cyclohexylsulfamate *(5).	....	69135	NR4	Activated Carbon.
Alkyl*-N-ethyl morpholinium ethyl sulfate *(66%C18, 25%C16).	....	69147	Heterocyclic	Activated Carbon.
Alkyl* trimethyl ammonium bromide *(95%C14, 5%C16).	....	69153	NR4	Activated Carbon.

TABLE 10 TO PART 455.—LIST OF APPROPRIATE POLLUTION CONTROL TECHNOLOGIES [1]—Continued

PAI name [2]	PAI code [3]	Shaughnessy code [4]	Structural group [5]	Treatment technology
Benzyl((dodecylcarbamoyl) methyl)di methyl ammonium chloride.		69159	NR4	Activated Carbon.
Cetyl pyridinium chloride		69160	Pyridine	Activated Carbon.
Alkyl* dimethyl ethyl ammonium bromide *(85%C16, 15%C18).		69186	NR4	Activated Carbon.
Cetyl-N-ethylmorpholinium ethyl sulfate		69187	Heterocyclic	Activated Carbon.
Use code no. 069102 (Alkenyl* Dimethyl Ethyl Ammonium bromide).		69198	NR4	Activated Carbon.
p-Aminopyridine		69201	Pyridine	Activated Carbon.
Nitrapyrin (ANSI)		69203	Pyridine	Activated Carbon.
Alkyl pyridines		69205	Pyridine	Activated Carbon.
Pyrazon (ANSI)		69601	Heterocyclic	Activated Carbon.
Capsaicin (in oleoresin of capsicum)		70701	Phenol	Activated Carbon.
Ryanodine		71502	Tricyclic	Activated Carbon.
Silver		72501	Inorganic	Pollution Prevention.
Silver chloride		72506	Inorganic	Pollution Prevention.
Silver thiuronium acrylate co-polymer		72701	Polymer	Activated Carbon.
Sodium chlorate		73301	Inorganic	Pollution Prevention.
Calcium cyanide		74001	Inorganic	Pollution Prevention.
Sodium cyanide		74002	Inorganic	Pollution Prevention.
Cryolite		75101	Inorganic	Pollution Prevention.
Sodium fluoride		75202	Inorganic	Pollution Prevention.
Ammonium fluosilicate		75301	Inorganic	Pollution Prevention.
Sodium fluosilicate		75306	Inorganic	Pollution Prevention.
Potassium iodide		75701	Inorganic	Pollution Prevention.
Potassium tetrathionate		75903	Inorganic	Pollution Prevention.
Potassium nitrate		76103	Inorganic	Pollution Prevention.
Sodium nitrate		76104	Inorganic	Pollution Prevention.
Sodium nitrite		76204	Inorganic	Pollution Prevention.
Benzenesulfonamide, N-chloro-, sodium salt		76501	Sulfonamide	Activated Carbon.
Salicyclic acid		76202	Benzoic Acid	Activated Carbon.
Ethoxyethyl p-methoxycinnamate		76604	Aryl	Activated Carbon.
Calcium polysulfide		76702	Polymer	Activated Carbon.
Strychnine		76901	Tricyclic	Activated Carbon.
Strychnine sulfate		76902	Tricyclic	Activated Carbon.
Niclosamide		77401	Chlorobenzamide	Activated Carbon.
Dibromosalicylamilide		77402	Chlorobenzamide	Activated Carbon.
Tribromsalan		77404	Chlorobenzamide	Activated Carbon.
Dibromosalicylanilide		77405	Chlorobenzamide	Activated Carbon.
Chlorosalicylanilide		77406	Chlorobenzamide	Activated Carbon.
Sulfur		77501	Inorganic	Pollution Prevention.
Sulfaquinoxaline		77901	Sulfanilamide	Activated Carbon.
Sulfacetamide		77904	Sulfanilamide	Activated Carbon.
Sulfuryl fluoride		78003	Inorganic	Pollution Prevention.
Sodium bisulfite		78201	Inorganic	Pollution Prevention.
Tetrachloroethylene		78501	EDB	Activated Carbon.
Ethoxylated isooctylphenol		79004	Phenol	Activated Carbon.
Lauric diethanolamide		79018	Acetanilide	Activated Carbon.
Triethanolamine oleate		79025	NR4	Activated Carbon.
Dioctyl sodium sulfosuccinate		79027	Thiosulfonate	Activated Carbon.
Use code no. 069179 (alkyl*mono-ethanolamide).		79036	Miscellaneous Organic	Activated Carbon.
Alkyl* diethanolamide *(70%C12, 30%C14)		79045	Miscellaneous Organic	Activated Carbon.
Tetradecyl formate		79069	Alkyl Acid	Activated Carbon.
Polyoxyethylene sorbitol oleate-laurate		79075	Polymer	Activated Carbon.
Polyethoxylated stearylamine		79094	Polymer	Activated Carbon.
Capric diethanolamide		79099	Acetanilide	Activated Carbon.
Calcium thiosulfate		80101	Inorganic	Pollution Prevention.
Ammonium thiosulfate		80103	Inorganic	Pollution Prevention.
Thymoxydichloroacetic acid		80401	Benzoic Acid	Activated Carbon.
Thymol		80402	Phenol	Activated Carbon.
Sodium trichloroacetate		81001	Alkyl Halide	Activated Carbon.
Trichloroacetic acid		81002	Alkyl Halide	Activated Carbon.
Hexahydro-1,3,5-tris(2-hydroxyethyl)-s-triazine.		83301	s-Triazine	Activated Carbon.
2-(Hydroxymethyl)-2-nitro-1,3-propanediol		83902	Alcohol	Activated Carbon.
Bomyl		84201	Phosphate	Activated Carbon.
Turpentine		84501	Miscellaneous Organic	Activated Carbon.
Chloro-1-(2,5-dichlorophenyl)vinyl) O,O-diethyl phosphorothi.		84901	Phosphorothioate	Activated Carbon.
Zinc chloride		87801	Metallic	Precipitation.

TABLE 10 TO PART 455.—LIST OF APPROPRIATE POLLUTION CONTROL TECHNOLOGIES [1]—Continued

PAI name [2]	PAI code [3]	Shaughnessy code [4]	Structural group [5]	Treatment technology
Zinc 2-pyridinethiol-1-oxide		88002	Metallic	Precipitation.
Hydroxy-2-(1H)-pyridinethione, sodium salt		88004	Pyridine	Activated Carbon.
Omadine TBAO		88005	Pyridine	Activated Carbon.
Zinc naphthenate		88301	Metallic	Precipitation.
Zinc oxide		88502	Metallic	Precipitation.
Zinc phosphide (Zn3P2)		88601	Metallic	Precipitation.
Zinc phenol sulfonate		89002	Metallic	Precipitation.
Zinc sulfate, basic		89101	Metallic	Precipitation.
Dimetilan		90101	Carbamate	Activated Carbon.
Carboxin		90201	Heterocyclic	Activated Carbon.
Oxycarboxin		90202	Heterocyclic	Activated Carbon.
Benzocaine		97001	Benzeneamine	Activated Carbon.
Piperalin		97003	2,4-D	Activated Carbon.
Tetracaine hydrochloride		97005	Benzeneamine	Activated Carbon.
Formetanate hydrochloride		97301	Toluamide	Activated Carbon.
Azacosterol HCl		98101	Tricyclic	Activated Carbon.
Use code no. 039502 (gentian violet)		98401	NR4	Activated Carbon.
Ammonium alum		98501	Inorganic	Pollution Prevention.
Bismuth subgallate		98601	Metallic	Precipitation.
Chlorflurenol, methyl ester		98801	Aryl Halide	Activated Carbon.
Benzisothiazolin-3-one		98901	Heterocyclic	Activated Carbon.
Methyl 2-benzimidazolecarbamate phosphate.		99102	Carbamate	Activated Carbon.
Ethephon		99801	Phosphate	Activated Carbon.
Pentanethiol		100701	Miscellaneous Organic	Activated Carbon.
Nitrobutyl)morpholine		100801	Heterocyclic	Activated Carbon.
Ethyl-2-nitrotrimethylene)dimorpholine		100802	Heterocyclic	Activated Carbon.
Tolyl diiodomethyl sulfone		101002	Thiosulfonate	Activated Carbon.
Isobutyric acid		101502	Alkyl Acid	Activated Carbon.
Dibromo-3-nitrilopropionamide		101801	Acetamide	Activated Carbon.
Polyethoxylated oleylamine		101901	Acetamide	Activated Carbon.
Dinitramine (ANSI)		102301	Nitrobenzoate	Activated Carbon.
Phenylethyl propionate		102601	Phenylcrotonate	Activated Carbon.
Eugenol		102701	Phenol	Activated Carbon.
Tricosene		103201	Miscellaneous Organic	Activated Carbon.
Tricosene		103202	Miscellaneous Organic	Activated Carbon.
Sodium 1,4′,5′-trichloro-2′-(2,4,5-trichlorophenoxy)methanes.		104101	2,4-D	Activated Carbon.
Hexahydro-1,3,5-tris(2-hydroxypropyl)-s-triazine.		105601	s-Triazine	Activated Carbon.
Methazole		106001	Hydrazide	Activated Carbon.
Difenzoquat methyl sulfate		106401	Hydrazide	Activated Carbon.
Butralin		106501	Benzeneamine	Activated Carbon.
Fosamine ammonium		106701	Carbamate	Activated Carbon.
Asulam		106901	Carbamate	Activated Carbon.
Sodium asulam		106902	Carbamate	Activated Carbon.
Hydroxymethoxymethyl-1-aza-3,7-dioxabicyclo(3.3.0)octane.		107001	Bicyclic	Activated Carbon.
Hydroxymethyl-1-aza-3,7-dioxabicyclo(3.3.0)octane.		107002	Bicyclic	Activated Carbon.
Hydroxypoly(methyleneoxy)* methyl-1-aza-3,7-dioxabicyclo(3.3).		107003	Bicyclic	Activated Carbon.
Chloro-2-methyl-3(2H)-isothiazolone		107103	Heterocyclic	Activated Carbon.
Methyl-3(2H)-isothiazolone		107104	Heterocyclic	Activated Carbon.
Trimethoxysilyl)propyl dimethyl octadecyl ammonium chloride.		107401	NR4	Activated Carbon.
Kinoprene		107502	Ester	Activated Carbon.
Triforine (ANSI)		107901	Hydrazide	Activated Carbon.
Pirimiphos-methyl (ANSI)		108102	Phosphorothioate	Activated Carbon.
Thiobencarb		108401	Thiocarbamate	Activated Carbon.
Ancymidol (ANSI)		108601	Pyrimidine	Activated Carbon.
Oxadiazon (ANSI)		109001	Hydrazide	Activated Carbon.
Mepiquat chloride		109101	NR4	Activated Carbon.
Fluvalinate		109302	Toluamide	Activated Carbon.
Chloro-N-(hydroxymethyl)acetamide		109501	Acetamide	Activated Carbon.
Dikegulac sodium		109601	Tricyclic	Activated Carbon.
Iprodione (ANSI)		109801	Hydrazide	Activated Carbon.
Phenylmethyl)-9-(tetrahydro-2H-pyran-2-yl)-9H-purin-6-amine.		110001	Pyrimidine	Activated Carbon.
Prodiamine		110201	Benzeneamine	Activated Carbon.
Erioglaucine		110301	Benzeneamine	Activated Carbon.

Table 10 to Part 455.—List of Appropriate Pollution Control Technologies[1]—Continued

PAI name[2]	PAI code[3]	Shaughnessy code[4]	Structural group[5]	Treatment technology
Tartrazine		110302	Hydrazide	Activated Carbon.
Dodemorph acetate		110401	Heterocyclic	Activated Carbon.
Ethofumesate (ANSI)		110601	Bicyclic	Activated Carbon.
Aldoxycarb (ANSI)		110801	Carbamate	Activated Carbon.
Diclofop-methyl		110902	Aryl Halide	Activated Carbon.
Bromo-1-(bromomethyl)-1,3-propanediCarbon.itrile.		111001	Isocyanate	Activated Carbon.
Poly (imino imidocarbonyliminoimidocarbonyliminohexamethylene).		111801	Polymer	Activated Carbon.
Imazalil		111901	Aryl Halide	Activated Carbon.
Bromadiolone		112001	Coumarin	Activated Carbon.
Brodifacoum		112701	Coumarin	Activated Carbon.
Bromethalin (ANSI)		112802	Aryl Amine	Activated Carbon.
Fluridone (ANSI)		112900	Aryl Halide	Activated Carbon.
Vinclozolin		113201	Aryl Halide	Activated Carbon.
Metalaxyl		113501	Benzeneamine	Activated Carbon.
Propetamphos (ANSI)		113601	Phosphoroamidothioate	Activated Carbon.
Methyl-1-naphthyl)maleimide		113701	Phthalamide	Activated Carbon.
Hexadecadien-1-yl acetate		114101	Ester	Activated Carbon.
Hexadecadien-1-yl acetate		114102	Ester	Activated Carbon.
Epoxy-2-methyloctadecane		114301	Heterocyclic	Activated Carbon.
Thiodicarb (ANSI)		114501	Thiocarbamate	Activated Carbon.
Dimethyloxazolidine (8CA & 9CA)		114801	Heterocyclic	Activated Carbon.
Trimethyloxazolidine		114802	Heterocyclic	Activated Carbon.
Hydroxyphenyl)oxoacetohydroximic chloride		114901	Phenol	Activated Carbon.
EEEBC		115001	Carbamate	Activated Carbon.
MDM Hydantoin		115501	Hydrazide	Activated Carbon.
DMDM Hydantoin		115502	Hydrazide	Activated Carbon.
Triclopyr (ANSI)		116001	Pyridine	Activated Carbon.
Triethylamine triclopyr		116002	Pyridine	Activated Carbon.
Butoxyethyl triclopyr		116004	Pyridine	Activated Carbon.
Decenyl)dihydro-2(3H)-furanone		116501	Ester	Activated Carbon.
Cytokinins		116801	Toluidine	Activated Carbon.
Benzyladenine		116901	Pyrimidine	Activated Carbon.
Clopyralid, monoethanolamine salt		117401	Pyridine	Activated Carbon.
Clopyralid (ANSI)		117403	Pyridine	Activated Carbon.
Flucythrinate (ANSI)		118301	Pyrethrin	Activated Carbon.
Hydramethylnon (ANSI)		118401	Iminimide	Activated Carbon.
Chlorsulfuron		118601	s-Triazine	Activated Carbon.
Dimethipin		118901	Heterocyclic	Activated Carbon.
Hexadecenal		120001	Miscellaneous Organic	Activated Carbon.
Tetradecenal		120002	Miscellaneous Organic	Activated Carbon.
Thidiazuron		120301	Urea	Activated Carbon.
Metronidazole		120401	Hydrazide	Activated Carbon.
Erythrosine B		120901	Tricyclic	Activated Carbon.
Sethoxydim		121001	Cyclic Ketone	Activated Carbon.
Clethodim		121011	Heterocyclic	Activated Carbon.
Cyromazine		121301	s-Triazine	Activated Carbon.
Tralomethrin		121501	Pyrethrin	Activated Carbon.
Azadirachtin		121701	Tricyclic	Activated Carbon.
Tridecen-1-yl acetate		121901	Ester	Activated Carbon.
Tridecen-1-yl acetate		121902	Ester	Activated Carbon.
Sulfometuron methyl		122001	Pyrimidine	Activated Carbon.
Metsulfuron-methyl		122010	s-Triazine	Activated Carbon.
Propiconazole		122101	Aryl Halide	Activated Carbon.
Furanone, dihydro-5-pentyl		122301	Cyclic Ketone	Activated Carbon.
Furanone, 5-heptyldihydro-		122302	Cyclic Ketone	Activated Carbon.
Abamectin (ANSI)		122804	Tricyclic	Activated Carbon.
Fluazifop-butyl		122805	Pyridine	Activated Carbon.
Fluazifop-R-butyl		122809	Pyridine	Activated Carbon.
Flumetralin		123001	Nitrobenzoate	Activated Carbon.
Fosetyl-Al		123301	Phosphate	Activated Carbon.
Methanol, (((2-(dihydro-5-methyl-3(2H)-oxazolyl)-1-methyl)et.		123702	Heterocyclic	Activated Carbon.
Fomesafen		123802	Nitrobenzoate	Activated Carbon.
Tridiphane		123901	Aryl Halide	Activated Carbon.
POE isooctadecanol		124601	Alcohol	Activated Carbon.
Periplanone B		124801	Bicyclic	Activated Carbon.
Fenoxycarb		125301	Carbamate	Activated Carbon.
Clomazone		125401	Aryl Halide	Activated Carbon.

TABLE 10 TO PART 455.—LIST OF APPROPRIATE POLLUTION CONTROL TECHNOLOGIES [1]—Continued

PAI name [2]	PAI code [3]	Shaughnessy code [4]	Structural group [5]	Treatment technology
Clofentezine	....	125501	Aryl Halide	Activated Carbon.
Paclobutrazol	....	125601	Hydrazide	Activated Carbon.
Flurprimidol	....	125701	Pyrimidine	Activated Carbon.
Isoxaben	....	125851	Heterocyclic	Activated Carbon.
Isazofos	....	126901	Phosphorothioate	Activated Carbon.
Triadimenol	....	127201	Hydrazide	Activated Carbon.
Fenpropathrin	....	127901	Pyrethrin	Activated Carbon.
Sulfosate	....	128501	Phosphorothioate	Activated Carbon.
Fenoxaprop-ethyl	....	128701	Heterocyclic	Activated Carbon.
Quizalofop-ethyl	....	128711	Phthalimide	Activated Carbon.
Bensulfuron-methyl	....	128820	Pyrimidine	Activated Carbon.
Imazapyr	....	128821	Hydrazide	Activated Carbon.
Bifenthrin	....	128825	Pyrethrin	Activated Carbon.
Imazapyr, isopropylamine salt	....	128829	Hydrazide	Activated Carbon.
Sodium salt of 1-carboxymethyl-3,5,7-triaza-1-azoniatricyclo.	....	128832	s-Triazine	Activated Carbon.
Linalool	....	128838	Alcohol	Activated Carbon.
Imazaquin, monoammonium salt	....	128840	Pyrimidine	Activated Carbon.
Imazethabenz	....	128842	Pyrimidine	Activated Carbon.
Thifensulfuron methyl	....	128845	s-Triazine	Activated Carbon.
Imazaquin	....	128848	Pyrimidine	Activated Carbon.
Myclobutanil (ANSI)	....	128857	s-Triazine	Activated Carbon.
Zinc borate (3ZnO, 2B03, 3.5H2O; mw 434.66).	....	128859	Metallic	Precipitation.
Cyhalothrin	....	128867	Pyrethrin	Activated Carbon.
Potassium cresylate	....	128870	Phenol	Activated Carbon.
Triflumizole	....	128879	Toluidine	Activated Carbon.
Tribenuron methyl	....	128887	s-Triazine	Activated Carbon.
Cyhalothrin	....	128897	Pyrethrin	Activated Carbon.
Chlorimuron-ethyl	....	128901	Pyrimidine	Activated Carbon.
Dodecen-1-yl acetate	....	128906	Ester	Activated Carbon.
Dodecen-1-yl acetate	....	128907	Ester	Activated Carbon.
DDOL	....	128908	Alcohol	Activated Carbon.
Farnesol	....	128910	Alcohol	Activated Carbon.
Nerolidol	....	128911	Alcohol	Activated Carbon.
Tefluthrin	....	128912	Pyrethrin	Activated Carbon.
Bromoxynil heptanoate	....	128920	Chloropropionanilide	Activated Carbon.
Imazethapyr	....	128922	Pyrimidine	Activated Carbon.
Imazethapyr, ammonium salt	....	128923	Pyrimidine	Activated Carbon.
Chitosan	....	128930	Polymer	Activated Carbon.
Sulfuric acid, monourea adduct	....	128961	Urea	Activated Carbon.
Hydroprene	....	128966	Miscellaneous Organic	Activated Carbon.
Triasulfuron	....	128969	Urea	Activated Carbon.
Primisulfuron-methyl	....	128973	Urea	Activated Carbon.
Uniconazole (ANSI)	....	128976	s-Triazine	Activated Carbon.
Tetradecenyl acetate	....	128980	Miscellaneous Organic	Activated Carbon.
Chitin	....	128991	Polymer	Activated Carbon.
Sulfluramid	....	128992	Sulfonamide	Activated Carbon.
Dithiopyr (ANSI)	....	128994	Pyridine	Activated Carbon.
Nicosulfuron	....	129008	Pyrimidine	Activated Carbon.
Zinc	....	129015	Metallic	Precipitation.
Tetradecen-1-ol, acetate, (E)-	....	129019	Alkyl Acid	Activated Carbon.
Imazaquin, sodium salt	....	129023	Pyrimidine	Activated Carbon.
Dodecadien-1-ol	....	129028	Alcohol	Activated Carbon.
Ionone	....	129030	Miscellaneous Organic	Activated Carbon.
Dicamba, aluminum salt	....	129042	Aryl Halide	Activated Carbon.
Benzenemethanaminium, N-(2-((2,6-dimethylphenyl)amino)-2-oxo.	....	129045	NR4	Activated Carbon.
Fenoxaprop-p-Ethyl	....	129092	Tricyclic	Activated Carbon.
Alkyl* bis(2-hydroxyethyl) ammonium acetate *(as in fatty ac.	....	169103	NR4	Activated Carbon.
Alkenyl* dimethyl ammonium acetate *(75% C18’, 25% C16’).	....	169104	NR4	Activated Carbon.
Amines, N-coco alkyltrimethylenedi-, adipates.	....	169109	Iminamide	Activated Carbon.
Dialkyl* dimethyl ammonium bentonite *(as in fatty acids of.	....	169111	NR4	Activated Carbon.
Alkyl* bis(2-hydroxyethyl) amine acetate *(65% C18, 30% C16,.	....	169125	Acetamide	Activated Carbon.
Dodecyl bis(hydroxy ethyl) dioctyl ammonium phosphate.	....	169154	NR4	Activated Carbon.

TABLE 10 TO PART 455.—LIST OF APPROPRIATE POLLUTION CONTROL TECHNOLOGIES [1]—Continued

PAI name [2]	PAI code [3]	Shaughnessy code [4]	Structural group [5]	Treatment technology
Dodecyl bis(2-hydroxyethyl) octyl hydrogen ammonium phosphat.	....	169155	NR4	Activated Carbon.
Didecyl-N-methyl-3-(trimethoxysilyl)propanaminium chloride.	....	169160	NR4	Activated Carbon.
Cholecalciferol	....	202901	Bicyclic	Activated Carbon.
Use code no. 202901 (Vitamin D3)	....	208700	Bicyclic	Activated Carbon.
Alkyl* N,N-bis(2-hydroxyethyl)amine *(100% C8–C18).	....	210900	NR4	Activated Carbon.
Bromo-2-nitropropane-1,3-diol	....	216400	Alcohol	Activated Carbon.
Use code no. 114601 (cyclohexyl-4, 5-dichloro- 4-isothioazolin-3-one).	....	229300	Heterocyclic	Activated Carbon.
Diethatyl ethyl	....	279500	Toluidine	Activated Carbon.
Hydroprene (ANSI)	....	486300	Miscellaneous Organic	Activated Carbon.
Zinc sulfate monohydrate	....	527200	Metallic	Precipitation
Geraniol	....	597501	Alcohol	Activated Carbon.

[1] The 272 Pesticide Active Ingredients (PAIs) are listed first, by PAI code, followed by the non-272 PAIs from the 1988 FIFRA and TSCA Enforcement System (FATES) Database, which are listed in Shaughnessy code order. PAIs that were exempted or reserved from the PFPR effluent guidelines are not listed in the table.
[2] The non-272 PAI names are taken directly from the 1988 FATES database. Several of the PAI names are truncated because the PAI names listed in the FATES database are limited to 60 characters.
[3] The non-272 PAIs do not have PAI codes.
[4] All Shaughnessy codes are taken from the 1988 FATES database. Some of the 272 PAIs are not listed in the 1988 FATES database; therefore, no Shaughnessy codes are listed for these PAIs.
[5] Structural groups are based on an analysis of the chemical structures of each PAI.
[6] EPA has also received data indicating that acid hydrolysis may also be effective in treating this PAI.
* This PAI code represents a category or group of PAIs; therefore, it has multiple Shaughnessy codes.

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BILLING CODE 6560–50–P

APPENDIX B

PFPR Compliance Documentation (Sample Forms)

Table A	**Identification of Wastewater Sources**
Table B	**Evaluation of PFPR P2, Recycle, and Reuse Practices**
Table C	**Summary of PFPR Compliance Decisions**
Table D	**Identification of Wastewater Sources and Treatment Technologies**
Table E	**Summary and Evaluation of Test Results**

Table A: Identification of Wastewater Sources

Facility: ______________________ **Location:** ______________________

Date: ______________________ **Prepared by:** ______________________

Stream Type	Source	Batch or Continuous	Volume Generated	Generation Frequency	Active Ingredients	Wastewater Matrix[1]	Wastewater Management[2]	Comments
1. Shipping Container/ Drum Cleaning - *water or solvent rinses of the containers used to ship raw material, finished products, and/or waste products prior to reuse or disposal of the containers.*	1.a.							
	1.b.							
2. Bulk Tank Rinsate - *cleaning of the interior of any bulk storage tank containing raw materials, intermediate blends, or finished products associated with PFPR operations.*	2.a.							
	2.b.							
3. Formulating Equipment Interior Cleaning - *routine cleaning, cleaning due to product changeover, or special cleaning of the interior of any formulating equipment, including formulation and/or storage tanks, pipes, and hoses. Cleaning materials may include water, detergent, or solvent.*	3.a.							
	3.b.							
	3.c.							
	3.d.							

[1] Inerts (e.g., emulsifiers, surfactants), solids, detergent, etc.

[2] RE=reuse, TR=treatment and reuse, TD=treatment and discharge, DI=indirect discharge, DD=direct discharge, IN=incineration, DP=off-site disposal

Table A: Identification of Wastewater Sources

Facility: ______________________ **Location:** ______________________

Date: ______________________ **Prepared by:** ______________________

Stream Type	Source	Batch or Continuous	Volume Generated	Generation Frequency	Active Ingredients	Wastewater Matrix[1]	Wastewater Management[2]	Comments
4. Packaging Equipment Interior Cleaning - *routine cleaning, cleaning due to product changeover, or special cleaning of the interior of any packaging equipment, including filling or storage tanks,pipes, and hoses. Cleaning materials may include water, detergent, or solvent.*	4.a.							
	4.b.							
	4.c.							
5. Repackaging Equipment Interior Cleaning - *routine cleaning, cleaning due to product changeover, or special cleaning of the interior of any repackaging equipment, including filling or storage tanks, pipes, and hoses. Cleaning materials may include water, detergent, or solvent.*	5.a.							
	5.b.							
	5.c.							
	5.d.							
6. Aerosol (DOT) Leak Testing - *water used to perform aerosol leak tests for Department of Transportation (DOT) requirements (when cans have burst).*	6.a.							
	6.b.							

[1] Inerts (e.g., emulsifiers, surfactants), solids, detergent, etc.

[2] RE=reuse, TR=treatment and reuse, TD=treatment and discharge, DI=indirect discharge, DD=direct discharge, IN=incineration, DP=off-site disposal

Table A: Identification of Wastewater Sources

Facility: ______________________________ **Location:** ________________________

Date: ______________________________ **Prepared by:** ________________________

Stream Type	Source	Batch or Continuous	Volume Generated	Generation Frequency	Active Ingredients	Wastewater Matrix[1]	Wastewater Management[2]	Comments
7. Exterior Equipment Cleaning - *cleaning of the exterior of any formulating, packaging, or repackaging equipment, including tanks, pipes, hoses, conveyors, etc. Cleaning materials may include water, detergent, or solvent.*	7.a.							
	7.b.							
	7.c.							
8. Exterior Wall Cleaning - *cleaning of walls in the PFPR operations areas.*	8.a.							
	8.b.							
9. Floor Washing - *cleaning of floors in the PFPR operations areas.*	9.a.							
	9.b.							
	9.c.							

[1] Inerts (e.g., emulsifiers, surfactants), solids, detergent, etc.

[2] RE=reuse, TR=treatment and reuse, TD=treatment and discharge, DI=indirect discharge, DD=direct discharge, IN=incineration, DP=off-site disposal

Table A: Identification of Wastewater Sources

Facility: ______________________________ **Location:** ________________________

Date: ______________________________ **Prepared by:** ________________________

Stream Type	Source	Batch or Continuous	Volume Generated	Generation Frequency	Active Ingredients	Wastewater Matrix[1]	Wastewater Management[2]	Comments
10. Leaks and Spills - *cleaning of leaks and/or spills which occur during PFPR operations.*	10.a.							
	10.b.							
11. Safety Equipment Cleaning - *cleaning of personal protective equipment (e.g., gloves, splash aprons, boots, respirators) worn by employees in PFPR operations areas.*	11.a.							
	11.b.							
12. Air Pollution Control Scrubbers - *wet scrubbers used to control air emissions from PFPR operations.*	12.a.							
13. Laboratory Equipment Cleaning - *Initial rinse of the retain sample container.*	13.a.							

[1] Inerts (e.g., emulsifiers, surfactants), solids, detergent, etc.

[2] RE=reuse, TR=treatment and reuse, TD=treatment and discharge, DI=indirect discharge, DD=direct discharge, IN=incineration, DP=off-site disposal

Table A: Identification of Wastewater Sources

Facility: ____________________ **Location:** ____________________
Date: ____________________ **Prepared by:** ____________________

Stream Type	Source	Batch or Continuous	Volume Generated	Generation Frequency	Active Ingredients	Wastewater Matrix[1]	Wastewater Management[2]	Comments
Other streams not specifically included in the P2 Alternative								
14. Contaminated Precipitation Runoff - *runoff from raw material storage, loading pads, final product storage, and outdoor production areas.*	14.a.							
	14.b.							
15. Laboratory Equipment Cleaning - *Water used to clean analytical equipment and glassware.*	15.a.							
16. Aerosol (DOT) Leak Testing - *Water used in non-continuous overflow baths to perform aerosol leak tests for DOT requirements when no cans have burst from the last water change out.*	16.a.							
	16.b.							
17. Other Sources - *other sources of waste not specifically mentioned (please specify).*	17.a.							
	17.b.							
	17.c.							

[1] Inerts (e.g., emulsifiers, surfactants), solids, detergent, etc.

[2] RE=reuse, TR=treatment and reuse, TD=treatment and discharge, DI=indirect discharge, DD=direct discharge, IN=incineration, DP=off-site disposal

Table B: Evaluation of PFPR P2, Recycle, and Reuse Practices

Facility: ______________________ **Location:** ______________________

Date: ______________________ **Prepared by:** ______________________

	Table 8 Listed Practice[1]	Practice	Does Facility Use this Practice?	Source Code from Table A	Extent of Use of this Practice Observed During Audit	Could Facility Implement this Practice in the Future?	Required Justification for Modification[2]	Comments
1. Flow Reduction								
1-1	1	Hoses used for rinsing have spray nozzles or other flow reduction devices.						
		Low-volume/high-pressure rinsing equipment is used for rinsing PFPR equipment interiors (specify type of equipment) when rinsing with water.						
1-2	1	A floor scrubbing machine and/or mop and bucket is used to clean floors in liquid production areas.						
1-3	3	Dry production areas are swept or vacuumed prior to rinsing with water.						
		Dry production areas are rinsed with water.						
2. Good Housekeeping Practices								
2-1	2a	Facility performs preventive maintenance on valves and fittings and repairs leaks in a timely manner.						
2-2	2b	Facility places drip pans under valves and fittings where hoses and lines are routinely connected and disconnected.						
2-3	2c	Facility immediately cleans up spills and leaks in outdoor bulk storage and process areas.						
3. DOT Test Bath								
3-1	5	Facility operates continuous overflow test baths with some recirculation of water.						

[1] 40 CFR 455.67

[2] Insert the following modification codes in the column titled "Required Justification for Modification":
ALTDISPOSE, BIOGROWTH, BREAKCAA, DETERGENT, DROP, INERT, NARROW, PACKAGE, RECOVERY, REFURB, SPACE, OTHER
(Modification Code Sheet at end of table contains a detailed explanation of each code.)

Table B: Evaluation of PFPR P2, Recycle, and Reuse Practices

Facility: ______________________ **Location:** ______________________

Date: ______________________ **Prepared by:** ______________________

	Table 8 Listed Practice[1]	Practice	Does Facility Use this Practice?	Source Code from Table A	Extent of Use of this Practice Observed During Audit	Could Facility Implement this Practice in the Future?	Required Justification for Modification[2]	Comments
4. Air Pollution Controls								
4-1	6	Facility operates wet scrubbers with recirculation (periodic blowdown is allowed as needed).						
5. Reuse of Drum Rinsate of Water-Based Products								
5-1	7	Facility reuses drum/shipping container rinsate directly into product formulations.						
5-2	7	Facility stores drum/shipping container rinsate for use in future formulations of same or compatible products.						
5-3	1,7	Facility operates a staged drum rinsing station (countercurrent rinsing).						
6. Drum Rinsing for Formulation of Solvent-Based Products								
6-1	8	Facility reuses drum/shipping container rinsate directly into product formulations.						
6-2	8	Facility stores drum/shipping container rinsate for use in future formulations of same or compatible products.						
6-3	NA	Facility uses base solvent to rinse drums.						

[1] 40 CFR 455.67

[2] Insert the following modification codes in the column titled "Required Justification for Modification":
ALTDISPOSE, BIOGROWTH, BREAKCAA, DETERGENT, DROP, INERT, NARROW, PACKAGE, RECOVERY, REFURB, SPACE, OTHER
(Modification Code Sheet at end of table contains a detailed explanation of each code.)

Table B: Evaluation of PFPR P2, Recycle, and Reuse Practices

Facility: ____________________ **Location:** ____________________

Date: ____________________ **Prepared by:** ____________________

	Table 8 Listed Practice[1]	Practice	Does Facility Use this Practice?	Source Code from Table A	Extent of Use of this Practice Observed During Audit	Could Facility Implement this Practice in the Future?	Required Justification for Modification[2]	Comments
7. Dedicated Equipment for Solvent- and Water-Based Products								
7-1	9	Facility dedicates PFPR production equipment to water-based vs. solvent-based products. Dedicated solvent-based or water-based equipment may be used on a non-routine basis for non-dedicated operations, but facility may not discharge the aqueous changeover rinsate as part of their P2 allowable discharge.						
8. Interior Rinsate Storage and Reuse								
8-1	10	Interior rinsate is stored for reuse in future formulations of the same or compatible product (note: does not include drum/shipping container rinsate).						
8-2	4	Dry carrier material is stored and reused in future formulation of the same or compatible product or disposed of as solid waste.						
8-3	4	Interiors of dry formulation equipment are cleaned with dry carrier prior to water rinse.						

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[1] 40 CFR 455.67

[2] Insert the following modification codes in the column titled "Required Justification for Modification":
ALTDISPOSE, BIOGROWTH, BREAKCAA, DETERGENT, DROP, INERT, NARROW, PACKAGE, RECOVERY, REFURB, SPACE, OTHER
(Modification Code Sheet at end of table contains a detailed explanation of each code.)

Table B: Evaluation of PFPR P2, Recycle, and Reuse Practices

Facility: ______________________ **Location:** ______________________

Date: ______________________ **Prepared by:** ______________________

	Table 8 Listed Practice[1]	Practice	Does Facility Use this Practice?	Source Code from Table A	Extent of Use of this Practice Observed During Audit	Could Facility Implement this Practice in the Future?	Required Justification for Modification[2]	Comments
9. Dedicated Process Equipment								
9-1	NA	Facility dedicates some portion of equipment to:						
		i. Top production products						
		ii. Hard-to-clean products						
		iii. Product families (attach definition of product families)						
9-2	NA	Facility sequences production on dedicated process equipment.						
10. Inventory Management								
10-1	NA	Facility has an inventory management system for raw material, product, and wastewater rinsate.						
10-2	NA	System includes one or more of the following:						
		i. Central storage and access controls.						
		ii. Computerized inventory control.						
		iii. Protection from precipitation.						

[1] 40 CFR 455.67

[2] Insert the following modification codes in the column titled "Required Justification for Modification":
ALTDISPOSE, BIOGROWTH, BREAKCAA, DETERGENT, DROP, INERT, NARROW, PACKAGE, RECOVERY, REFURB, SPACE, OTHER
(Modification Code Sheet at end of table contains a detailed explanation of each code.)

Table B: Evaluation of PFPR P2, Recycle, and Reuse Practices

Facility: ______________________ **Location:** ______________________

Date: ______________________ **Prepared by:** ______________________

	Table 8 Listed Practice[1]	Practice	Does Facility Use this Practice?	Source Code from Table A	Extent of Use of this Practice Observed During Audit	Could Facility Implement this Practice in the Future?	Required Justification for Modification[2]	Comments
11. Training and Written Standard Operating Procedures								
11-1	NA	Facility provides personnel with P2 training.						
11-2	NA	Facility has employee incentive programs encouraging P2.						
11-3	NA	Facility has documentation of P2 practices and procedures.						
12. Other P2 Practices/Equipment								
12-1	NA							
12-2	NA							
12-3	NA							
12-4	NA							
12-5	NA							
12-6	NA							

[1] 40 CFR 455.67

[2] Insert the following modification codes in the column titled "Required Justification for Modification":
ALTDISPOSE, BIOGROWTH, BREAKCAA, DETERGENT, DROP, INERT, NARROW, PACKAGE, RECOVERY, REFURB, SPACE, OTHER
(Modification Code Sheet at end of table contains a detailed explanation of each code.)

Modification Code Sheet

Table B Practice	Table 8 Listed Practice	Modification Code	Description
1-1	1	NARROW	Rinsing narrow transfer lines or piping where sufficient rinsing is better achieved by flushing with water.
4-1	6	BREAKCAA	Facility demonstrates that would not be able to meet Resource Conservation Recovery Act (RCRA) or Clean Air Act (CAA) requirements.
5-1 to 5-3	7	INERT	Drum/shipping container holds inert ingredient(s) only and (1) the facility can demonstrate that, after using water conservation practices, the large concentration of inert ingredients in the formulation creates more volume than could feasibly be reused; or (2) the facility can demonstrate that the concentration of the inert in the formulation is so small that the reuse would cause a formulation to exceed the ranges allowed in the Confidential Statement of Formula (CSF) (40 CFR 158.155).
6-1 to 6-3	8	REFURB	Drums/shipping containers are going to a drum refurbisher/recycler who will only accept drums rinsed with water.
		INERT	Drum/shipping container holds inert ingredient(s) only and (1) the facility can demonstrate that, after using water conservation practices, the large concentration of inert ingredients in the formulation creates more volume than could feasibly be reused; or (2) the facility can demonstrate that the concentration of the inert in the formulation is so small that the reuse would cause a formulation to exceed the ranges allowed in the Confidential Statement of Formula (CSF) (40 CFR 158.155).
7-1	9	RECOVERY	Facility has installed and is using a solvent recovery system for the changeover rinsate (can also be used for other solvent recovery).
8-1	10	ALTDISPOSE	PAI manufacturer (or formulator contracting for toll formulating) has directed otherwise (i.e., send back to them or send for off-site disposal).
		BIOGROWTH	Facility has evidence of biological growth or product deterioration over a typical storage period (review facility data).
		DETERGENT	Facility has demonstrated that it must use a detergent to clean equipment.
		DROP	Facility is dropping registration or production of the formulation and there is no compatible formulation for reuse of the rinsates or facility can provide reasonable explanation of why it does not anticipate formulation of same or compatible formulation within the next twelve months.
		PACKAGE	Facility only performs packaging of the pesticide product from which interior rinsate is generated.
		SPACE	Facility has space limitations, BUT must still store rinsates for most frequently produced products.
NA	NA	OTHER[1]	

[1] Other practices must be approved by the permitting/control authority prior to discharge.

Table C: Summary of PFPR Compliance Decisions

Facility: ______________________ Location: ______________________

Date: ______________________ Prepared by: ______________________

Stream Type	Source	Preliminary Compliance Decision	Comments[1]	Wastewater to be Treated?	Final Compliance Decision	Approval Date for Nonlisted Modifications
1. Shipping Container/ Drum Cleaning - *water or solvent rinses of the containers used to ship raw material, finished products, and/or waste products prior to reuse or disposal of the containers.*	1.a.					
	1.b.					
2. Bulk Tank Rinsate - *cleaning of the interior of any bulk storage tank containing raw materials, intermediate blends, or finished products associated with PFPR operations.*	2.a.					
	2.b.					
3. Formulating Equipment Interior Cleaning - *routine cleaning, cleaning due to product changeover, or special cleaning of the interior of any formulating equipment, including formulation and/or storage tanks, pipes, and hoses. Cleaning materials may include water, detergent, or solvent.*	3.a.					
	3.b.					
	3.c.					
	3.d.					

[1] Insert the following modification codes in the column titled "Comments":
ALTDISPOSE, BIOGROWTH, BREAKCAA, DETERGENT, DROP, INERT, NARROW, PACKAGE, RECOVERY, REFURB, SPACE, OTHER
(Modification Code Sheet at end of table contains a detailed explanation of each code.)

Table C: Summary of PFPR Compliance Decisions

Facility: ____________________ **Location:** ____________________

Date: ____________________ **Prepared by:** ____________________

Stream Type	Source	Preliminary Compliance Decision	Comments[1]	Wastewater to be Treated?	Final Compliance Decision	Approval Date for Nonlisted Modifications
4. Packaging Equipment Interior Cleaning - *routine cleaning, cleaning due to product changeover, or special cleaning of the interior of any packaging equipment, including filling or storage tanks,pipes, and hoses. Cleaning materials may include water, detergent, or solvent.*	4.a.					
	4.b.					
	4.c.					
5. Repackaging Equipment Interior Cleaning - *routine cleaning, cleaning due to product changeover, or special cleaning of the interior of any repackaging equipment, including filling or storage tanks, pipes, and hoses. Cleaning materials may include water, detergent, or solvent.*	5.a.					
	5.b.					
	5.c.					
	5.d.					
6. Aerosol (DOT) Leak Testing - *water used to perform aerosol leak tests for Department of Transportation (DOT) requirements (when cans have burst).*	6.a.					
	6.b.					

[1] Insert the following modification codes in the column titled "Comments":
ALTDISPOSE, BIOGROWTH, BREAKCAA, DETERGENT, DROP, INERT, NARROW, PACKAGE, RECOVERY, REFURB, SPACE, OTHER
(Modification Code Sheet at end of table contains a detailed explanation of each code.)

Table C: Summary of PFPR Compliance Decisions

Facility: ____________________ **Location:** ____________________

Date: ____________________ **Prepared by:** ____________________

Stream Type	Source	Preliminary Compliance Decision	Comments[1]	Wastewater to be Treated?	Final Compliance Decision	Approval Date for Nonlisted Modifications
7. Exterior Equipment Cleaning - *cleaning of the exterior of any formulating, packaging, or repackaging equipment, including tanks, pipes, hoses, conveyors, etc. Cleaning materials may include water, detergent, or solvent.*	7.a.					
	7.b.					
	7.c.					
8. Exterior Wall Cleaning - *cleaning of walls in the PFPR operations areas.*	8.a.					
	8.b.					
9. Floor Washing - *cleaning of floors in the PFPR operations areas.*	9.a.					
	9.b.					
	9.c.					

[1] Insert the following modification codes in the column titled "Comments":
ALTDISPOSE, BIOGROWTH, BREAKCAA, DETERGENT, DROP, INERT, NARROW, PACKAGE, RECOVERY, REFURB, SPACE, OTHER
(Modification Code Sheet at end of table contains a detailed explanation of each code.)

Table C: Summary of PFPR Compliance Decisions

Facility:	______________________	**Location:**	______________________
Date:	______________________	**Prepared by:**	______________________

Stream Type	**Source**	**Preliminary Compliance Decision**	**Comments**[1]	**Wastewater to be Treated?**	**Final Compliance Decision**	**Approval Date for Nonlisted Modifications**
10. Leaks and Spills - *cleaning of leaks and/or spills which occur during PFPR operations.*	10.a.					
	10.b.					
11. Safety Equipment Cleaning - *cleaning of personal protective equipment (e.g., gloves, splash aprons, boots, respirators) worn by employees in PFPR operations areas.*	11.a.					
	11.b.					
12. Air Pollution Control Scrubbers - *wet scrubbers used to control air emissions from PFPR operations.*	12.a.					
13. Laboratory Equipment Cleaning - *Initial rinse of the retain sample container.*	13.a.					

[1] Insert the following modification codes in the column titled "Comments":
ALTDISPOSE, BIOGROWTH, BREAKCAA, DETERGENT, DROP, INERT, NARROW, PACKAGE, RECOVERY, REFURB, SPACE, OTHER
(Modification Code Sheet at end of table contains a detailed explanation of each code.)

Table C: Summary of PFPR Compliance Decisions

Facility: ____________________ **Location:** ____________________

Date: ____________________ **Prepared by:** ____________________

Stream Type	**Source**	**Preliminary Compliance Decision**	**Comments**[1]	**Wastewater to be Treated?**	**Final Compliance Decision**	**Approval Date for Nonlisted Modifications**
Other streams <u>not</u> specifically included in the P2 Alternative						
14. Contaminated Precipitation Runoff - *runoff from raw material storage, loading pads, final product storage, and outdoor production areas.*	14.a.					
	14.b.					
15. Laboratory Equipment Cleaning - *Water used to clean analytical equipment and glassware.*	15.a.					
16. Aerosol (DOT) Leak Testing - *Water used in non-continuous overflow baths to perform aerosol leak tests for DOT requirements when no cans have burst from the last water change out.*	16.a.					
	16.b.					
17. Other Sources - *other sources of waste not specifically mentioned (please specify).*	17.a.					
	17.b.					
	17.c.					

[1] Insert the following modification codes in the column titled "Comments":
ALTDISPOSE, BIOGROWTH, BREAKCAA, DETERGENT, DROP, INERT, NARROW, PACKAGE, RECOVERY, REFURB, SPACE, OTHER
(Modification Code Sheet at end of table contains a detailed explanation of each code.)

Modification Code Sheet

Table B Practice	Table 8 Listed Practice	Modification Code	Description
1-1	1	NARROW	Rinsing narrow transfer lines or piping where sufficient rinsing is better achieved by flushing with water.
4-1	6	BREAKCAA	Facility demonstrates that would not be able to meet Resource Conservation Recovery Act (RCRA) or Clean Air Act (CAA) requirements.
5-1 to 5-3	7	INERT	Drum/shipping container holds inert ingredient(s) only and (1) the facility can demonstrate that, after using water conservation practices, the large concentration of inert ingredients in the formulation creates more volume than could feasibly be reused; or (2) the facility can demonstrate that the concentration of the inert in the formulation is so small that the reuse would cause a formulation to exceed the ranges allowed in the Confidential Statement of Formula (CSF) (40 CFR 158.155).
6-1 to 6-3	8	REFURB	Drums/shipping containers are going to a drum refurbisher/recycler who will only accept drums rinsed with water.
		INERT	Drum/shipping container holds inert ingredient(s) only and (1) the facility can demonstrate that, after using water conservation practices, the large concentration of inert ingredients in the formulation creates more volume than could feasibly be reused; or (2) the facility can demonstrate that the concentration of the inert in the formulation is so small that the reuse would cause a formulation to exceed the ranges allowed in the Confidential Statement of Formula (CSF) (40 CFR 158.155).
7-1	9	RECOVERY	Facility has installed and is using a solvent recovery system for the changeover rinsate (can also be used for other solvent recovery).
8-1	10	ALTDISPOSE	PAI manufacturer (or formulator contracting for toll formulating) has directed otherwise (i.e., send back to them or send for off-site disposal).
		BIOGROWTH	Facility has evidence of biological growth or product deterioration over a typical storage period (review facility data).
		DETERGENT	Facility has demonstrated that it must use a detergent to clean equipment.
		DROP	Facility is dropping registration or production of the formulation and there is no compatible formulation for reuse of the rinsates or facility can provide reasonable explanation of why it does not anticipate formulation of same or compatible formulation within the next twelve months.
		PACKAGE	Facility only performs packaging of the pesticide product from which interior rinsate is generated.
		SPACE	Facility has space limitations, BUT must still store rinsates for most frequently produced products.
NA	NA	OTHER[1]	

[1] Other practices must be approved by the permitting/control authority prior to discharge.

Table D: Identification of Wastewater Sources and Treatment Technologies

Facility: ______________________ **Location:** ______________________

Date: ______________________ **Prepared by:** ______________________

		Potential Pollutants		**Wastewater Treatment Information**			
Stream Type[1]	**Source**	**Active Ingredients**	**Other Pollutants**	**Table 10 Technology**[2]	**Alternate Treatment Technology**[2]	**Source for Alternative Technology**	**Characteristics That Hinder Treatment**
1. Shipping Container/ Drum Cleaning - *water or solvent rinses of the containers used to ship raw material, finished products, and/or waste products prior to reuse or disposal of the containers.*	1.a.						
	1.b.						
2. Bulk Tank Rinsate - *cleaning of the interior of any bulk storage tank containing raw materials, intermediate blends, or finished products associated with PFPR operations.*	2.a.						
	2.b.						
3. Formulating Equipment Interior Cleaning - *routine cleaning, cleaning due to product changeover, or special cleaning of the interior of any formulating equipment, including formulation and/or storage tanks, pipes, and hoses. Cleaning materials may include water, detergent, or solvent.*	3.a.						
	3.b.						
	3.c.						
	3.d.						

[1] Stream types marked with an asterisk ("*") do not require treatment prior to discharge to a POTW under the final PFPR pretreatment standards; however, facilities may be required to perform pretreatment by the control authority to meet local limits. Stream types marked with a plus ("+") do not require treatment prior to discharge to a POTW if they have not been commingled with stream types that do require pretreatment.

[2] HD = hydrolysis, AC = activated carbon, PT = precipitation, CO = chemical oxidation, P2 = pollution prevention, OT = other______________________________

Table D: Identification of Wastewater Sources and Treatment Technologies

Facility: ______________________ **Location:** ______________________

Date: ______________________ **Prepared by:** ______________________

		Potential Pollutants		Wastewater Treatment Information			
Stream Type[1]	**Source**	**Active Ingredients**	**Other Pollutants**	**Table 10 Technology[2]**	**Alternate Treatment Technology[2]**	**Source for Alternative Technology**	**Characteristics That Hinder Treatment**
4. Packaging Equipment Interior Cleaning - *routine cleaning, cleaning due to product changeover, or special cleaning of the interior of any packaging equipment, including filling or storage tanks,pipes, and hoses. Cleaning materials may include water, detergent, or solvent.*	4.a.						
	4.b.						
	4.c.						
5. Repackaging Equipment Interior Cleaning - *routine cleaning, cleaning due to product changeover, or special cleaning of the interior of any repackaging equipment, including filling or storage tanks, pipes, and hoses. Cleaning materials may include water, detergent, or solvent.*	5.a.						
	5.b.						
	5.c.						
***6. Aerosol (DOT) Leak Testing -** *water used to perform aerosol leak tests for Department of Transportation (DOT) requirements (when cans have burst).*	6.a.						
	6.b.						

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[1] Stream types marked with an asterisk ("*") do not require treatment prior to discharge to a POTW under the final PFPR pretreatment standards; however, facilities may be required to perform pretreatment by the control authority to meet local limits. Stream types marked with a plus ("+") do not require treatment prior to discharge to a POTW if they have not been commingled with stream types that do require pretreatment.

[2] HD = hydrolysis, AC = activated carbon, PT = precipitation, CO = chemical oxidation, P2 = pollution prevention, OT = other______________________________

Table D: Identification of Wastewater Sources and Treatment Technologies

Facility: ______________________ **Location:** ______________________

Date: ______________________ **Prepared by:** ______________________

		Potential Pollutants		Wastewater Treatment Information			
Stream Type[1]	**Source**	**Active Ingredients**	**Other Pollutants**	**Table 10 Technology**[2]	**Alternate Treatment Technology**[2]	**Source for Alternative Technology**	**Characteristics That Hinder Treatment**
+7. Exterior Equipment Cleaning - *cleaning of the exterior of any formulating, packaging, or repackaging equipment, including tanks, pipes, hoses, conveyors, etc. Cleaning materials may include water, detergent, or solvent.*	7.a.						
	7.b.						
	7.c.						
+8. Exterior Wall Cleaning - *cleaning of walls in the PFPR operations areas.*	8.a.						
	8.b.						
9. Floor Washing - *cleaning of floors in the PFPR operations areas.*	9.a.						
	9.b.						
	9.c.						

[1] Stream types marked with an asterisk ("*") do not require treatment prior to discharge to a POTW under the final PFPR pretreatment standards; however, facilities may be required to perform pretreatment by the control authority to meet local limits. Stream types marked with a plus ("+") do not require treatment prior to discharge to a POTW if they have not been commingled with stream types that do require pretreatment.

[2] HD = hydrolysis, AC = activated carbon, PT = precipitation, CO = chemical oxidation, P2 = pollution prevention, OT = other______________________________

Table D: Identification of Wastewater Sources and Treatment Technologies

Facility: ____________________ **Location:** ____________________

Date: ____________________ **Prepared by:** ____________________

Stream Type[1]	Source	Potential Pollutants		Wastewater Treatment Information			Characteristics That Hinder Treatment
		Active Ingredients	Other Pollutants	Table 10 Technology[2]	Alternate Treatment Technology[2]	Source for Alternative Technology	
10. Leaks and Spills - *cleaning of leaks and/or spills which occur during PFPR operations.*	10.a.						
	10.b.						
***11. Safety Equipment Cleaning** - *cleaning of personal protective equipment (e.g., gloves, splash aprons, boots, respirators) worn by employees in PFPR operations areas.*	11.a.						
	11.b.						
***12. Air Pollution Control Scrubbers** - *wet scrubbers used to control air emissions from PFPR operations.*	12.a.						
***13. Laboratory Equipment Cleaning** - *Initial rinse of the retain sample container.*	13.a.						

[1] Stream types marked with an asterisk ("*") do not require treatment prior to discharge to a POTW under the final PFPR pretreatment standards; however, facilities may be required to perform pretreatment by the control authority to meet local limits. Stream types marked with a plus ("+") do not require treatment prior to discharge to a POTW if they have not been commingled with stream types that do require pretreatment.

[2] HD = hydrolysis, AC = activated carbon, PT = precipitation, CO = chemical oxidation, P2 = pollution prevention, OT = other______________________________

Table D: Identification of Wastewater Sources and Treatment Technologies

Facility: ______________________ **Location:** ______________________
Date: ______________________ **Prepared by:** ______________________

		Potential Pollutants		Wastewater Treatment Information			
Stream Type[1]	**Source**	**Active Ingredients**	**Other Pollutants**	**Table 10 Technology[2]**	**Alternate Treatment Technology[2]**	**Source for Alternative Technology**	**Characteristics That Hinder Treatment**
Other streams not specifically included in the P2 Alternative							
***14. Contaminated Precipitation Runoff -** *runoff from raw material storage, loading pads, final product storage, and outdoor production areas.*	14.a.						
	14.b.						
***15. Laboratory Equipment Cleaning -** *Water used to clean analytical equipment and glassware.*	15.a.						
***16. Aerosol (DOT) Leak Testing -** *Water used in non-continuous overflow baths to perform aerosol leak tests for DOT requirements when no cans have burst from the last water change out.*	16.a.						
	16.b.						
17. Other Sources - *other sources of waste not specifically mentioned (please specify).*	17.a.						
	17.b.						
	17.c.						

[1] Stream types marked with an asterisk ("*") do not require treatment prior to discharge to a POTW under the final PFPR pretreatment standards; however, facilities may be required to perform pretreatment by the control authority to meet local limits. Stream types marked with a plus ("+") do not require treatment prior to discharge to a POTW if they have not been commingled with stream types that do require pretreatment.

[2] HD = hydrolysis, AC = activated carbon, PT = precipitation, CO = chemical oxidation, P2 = pollution prevention, OT = other______________________________

Table E: Summary and Evaluation of Test Results

Facility: ______________________________ **Location:** ______________________________

Date: ______________________________ **Prepared by:** ______________________________

Insert your optimal treatment train and operating parameters in the space provided below:

Technology	Primary Constituents	Design and Operating Parameters					Constituent Concentration		Performance Measures		Effectively Treated? (Y/N)
		pH	Temperature (^{o}C)	Other	Other	Other	Influent (ug/L)	Effluent (ug/L)	Percent Removal	Other	

Table E: Summary and Evaluation of Test Results

Facility: ______________________ **Location:** ______________________

Date: ______________________ **Prepared by:** ______________________

		Design and Operating Parameters					Constituent Concentration		Performance Measures		
Technology	Primary Constituents	pH	Temperature (°C)	Other	Other	Other	Influent (ug/L)	Effluent (ug/L)	Percent Removal	Other	Effectively Treated? (Y/N)

APPENDIX C

Table 10 to Part 455 (with CAS Numbers)

List of PAIs from Table 10 to Part 455 With Their Corresponding Shaughnessy Codes and CAS Numbers[1]

PAI Name[2]	PAI Code[3]	Shaughnessy Code[4]	CAS Number[5]
Dicofol	1	010501	115-32-2
Maleic Hydrazide	2	051501	123-33-1
EDB	3	042002	106-93-4
Vancide TH	4	082901	7779-27-3
1,3 Dichloropropene	5	029001	542-75-6
Thenarsazine Oxide	6	012601	58-36-6
Dowicil 75	7	017901	4080-31-3
Triadimefon	8	109901	43121-43-3
Hexachlorophene	9	044901	70-30-4
Tetrachlorophene	10	....	....
Dichlorophene	11	055001	97-23-4
Dichlorvos	12	084001	62-73-7
Landrin 2	13	102402	2655-15-4
2,3,6 T, S&E or Fenac	14	082605	69462-13-1
2,4,5 T and 2,4,5 T, S&E	15	*	*
2,4 D (2,4 D, S&E)	16	*	*
2,4 DB, S&E	17	*	*
Dyrene or Anilazine	18	080811	101-05-3
Dinocap	19	036001	39300-45-3
Dichloran or DCNA	20	031301	99-30-9
Busan 90	21	008707	2491-38-5
Mevinphos	22	015801	7786-34-7
Sulfallate	23	039001	95-06-7
Chlorfenvinphos	24	084101	470-90-6
Cyanazine or Bladex	25	100101	21725-46-2
Propachlor	26	019101	1918-16-7
MCPA, S&E	27	*	*
Octhilinone	28	099901	26530-20-1
Pindone	29	067703	83-26-1
Dichlorprop, S&E	30	*	*
MCPP, S&E or Mecoprop	31	*	*
Thiabendazole	32	060101	148-79-8
Belclene 310	33	080815	22936-75-0
Chlorprop, S&E	34	021202	53404-22-1
Busan 72 or TCMTB	35	035603	21564-17-0
Chlorophacinone	37	067707	3691-35-8
Landrin 1	38	102401	2686-99-9
Pronamide	39	101701	23950-58-5
Methiocarb or Mesurol	40	100501	2032-65-7
Propanil	41	028201	709-98-8
Polyphase	42	107801	55406-53-6
Coumafuryl or Fumarin	43	086001	117-52-2
DNOC	44	037507	534-52-1
Metribuzin	45	101101	21087-64-9
CPA, S&E	46	*	*

List of PAIs from Table 10 to Part 455 With Their Corresponding Shaughnessy Codes and CAS Numbers[1]

PAI Name[2]	PAI Code[3]	Shaughnessy Code[4]	CAS Number[5]
MCPB, S&E	47	019202	6062-26-6
Aminocarb	48	044401	2032-59-9
Etridiazole	49	084701	2593-15-9
Ethoxyquin	50	055501	91-53-2
Acephate or Orthene	52	103301	30560-19-1
Acifluorfen	53	114402	62476-59-9
Alachlor	54	090501	15972-60-8
Aldicarb	55	098301	116-06-3
Allethrin	57	*	*
Ametryn	58	080801	834-12-8
Amitraz	59	106201	33089-61-1
Atrazine	60	080803	1912-24-9
Bendiocarb	61	105201	22781-23-3
Benomyl	62	099101	17804-35-2
BHC	63	008901	608-73-1
Benzyl Benzoate	64	009501	120-51-4
Lethane 60	65	010101	301-11-1
Bifenox	66	104301	42576-02-3
Biphenyl	67	017002	92-52-4
Bromacil (Lithium Salt)	68	012302	53404-19-6
Bromoxynil	69	*	*
Butachlor	70	112301	23184-66-9
Giv gard	71	101401	7166-19-0
Cacodylic Acid	72	*	*
Captafol	73	081701	2939-80-2
Captan	74	081301	133-06-2
Carbaryl	75	056801	63-25-2
Carbofuran	76	090601	1563-66-2
Carbosulfan	77	090602	55285-14-8
Chloramben	78	*	*
Chlordane	79	058201	57-74-9
Chloroneb	80	027301	2675-77-6
Chloropicrin	81	081501	76-06-2
Chlorothalonil	82	081901	1897-45-6
Chloroxuron	83	025501	1982-47-4
Stirofos	84	083701	961-11-5
Chlorpyrifos Methyl	85	059102	5598-13-0
Chlorpyrifos	86	059101	2921-88-2
Mancozeb	87	014504	8018-01-7
Bioquin (Copper)	88	024002	10380-28-6
Copper EDTA	89	039105	12276-01-6
Pydrin or Fenvalerate	90	109301	51630-58-1
Cycloheximide	91	043401	66-81-9
Dalapon	92	*	*
Dienochlor	93	027501	2227-17-0

List of PAIs from Table 10 to Part 455 With Their Corresponding Shaughnessy Codes and CAS Numbers[1]

PAI Name[2]	PAI Code[3]	Shaughnessy Code[4]	CAS Number[5]
Demeton	94	057601	8065-48-3
Desmedipham	95	104801	13684-56-5
Amobam	96	014502	3566-10-7
DBCP	97	011301	96-12-8
Dicamba	98	*	*
Dichlone	99	029601	117-80-6
Thiophanate Ethyl	100	103401	23564-06-9
Perthane	101	032101	72-56-0
EXD	102	086501	502-55-6
Diazinon	103	057801	333-41-5
Diflubenzuron	104	108201	35367-38-5
Dimethoate	106	035001	60-51-5
Parathion Methyl	107	053501	298-00-0
Dicrotophos	108	035201	141-66-2
Crotoxyphos	109	058801	7700-17-6
DCPA	110	078701	1861-32-1
Trichlorofon	111	057901	52-68-6
Dinoseb	112	037505	88-85-7
Dioxathion	113	037801	78-34-2
Diphacinone	114	067701	82-66-6
Diphenamide	115	036601	957-51-7
Diphenylamine	116	038501	122-39-4
MGK 326	117	047201	136-45-8
Nabonate	118	063301	138-93-2
Diuron	119	035505	330-54-1
Metasol DGH	120	044303	13590-97-1
Dodine	121	044301	2439-10-3
Endosulfan	122	079401	115-29-7
Endothall (Endothall S&E)	123	*	*
Endrin	124	041601	72-20-8
Ethalfluralin	125	113101	55283-68-6
Ethion	126	058401	563-12-2
Ethoprop	127	041101	13194-48-4
Fenamiphos	128	100601	22224-92-6
Chlorobenzilate	129	028801	510-15-6
Butylate	130	041405	2008-41-5
Famphur	131	059901	52-85-7
Fenarimol	132	206600	60168-88-9
Fenthion or Baytex	133	053301	55-38-9
Ferbam	134	034801	14484-64-1
Fluometuron	135	035503	2164-17-2
Fluoroacetamide	136	075002	640-19-7
Folpet	137	081601	133-07-3
Glyphosate (Glyphosate S&E)	138	*	*
Glyphosine	139	103602	2439-99-8

List of PAIs from Table 10 to Part 455 With Their Corresponding Shaughnessy Codes and CAS Numbers[1]

PAI Name[2]	PAI Code[3]	Shaughnessy Code[4]	CAS Number[5]
Heptachlor	140	044801	76-44-8
Cycloprate	141	115601	54460-46-7
Hexazinone	142	107201	51235-04-2
Isofenphos	143	109401	25311-71-1
Isopropalin	144	100201	33820-53-0
Propham	145	047601	122-42-9
Karabutilate	146	097401	4849-32-5
Lindane	147	009001	58-89-9
Linuron	148	035506	330-55-2
Malachite Green	149	039504	569-64-2
Malathion	150	057701	121-75-5
Maneb	151	014505	12427-38-2
Manam	152	034802	15339-36-3
Mefluidide	153	114002	53780-36-2
Methamidophos	154	101201	10265-92-6
Methidathion	155	100301	950-37-8
Methomyl	156	090301	16752-77-5
Methoprene	157	*	*
Methoxychlor	158	034001	72-43-5
Methyl Bromide	160	053201	74-83-9
Monosodium Methyl Arsenate	161	*	*
Nalco D 2303	163	068102	6317-18-6
Quinomethionate	164	054101	2439-01-2
Metolachlor	165	108801	51218-45-2
Mexacarbate	166	044201	315-18-4
Metiram	167	014601	9006-42-2
Monuron TCA	168	035502	140-41-0
Monuron	169	035501	150-68-5
Napropamide	170	103001	15299-99-7
Deet	171	080301	134-62-3
Nabam	172	014503	142-59-6
Naled	173	034401	300-76-5
Norea	174	035801	18530-56-8
Norflurazon	175	105801	27314-13-2
Naptalam or Neptalam	176	030703	132-67-2
MGK 264	177	057001	113-48-4
Benfluralin	178	084301	1861-40-1
Sulfotepp	179	079501	3689-24-5
Aspon	180	079101	3244-90-4
Coumaphos	181	036501	56-72-4
Fensulfothion	182	032701	115-90-2
Disulfoton	183	032501	298-04-4
Fenitrothion	184	105901	122-14-5
Phosmet	185	059201	732-11-6
Azinphos Methyl (Guthion)	186	058001	86-50-0

List of PAIs from Table 10 to Part 455 With Their Corresponding Shaughnessy Codes and CAS Numbers[1]

PAI Name[2]	PAI Code[3]	Shaughnessy Code[4]	CAS Number[5]
Oxydemeton Methyl	187	058702	301-12-2
Organo Arsenic Pesticides	188	*	*
Organo Cadmium Pesticides	189	*	*
Organo Copper Pesticides	190	*	*
Organo Mercury Pesticides	191	*	*
Organo Tin Pesticides	192	*	*
o Dichlorobenzene	193	059401	95-50-1
Oryzalin	194	104201	19044-88-3
Oxamyl	195	103801	23135-22-0
Oxyfluorfen	196	111601	42874-03-3
Bolstar	197	111501	35400-43-2
Sulprofos Oxon	198	219900	38527-90-1
Santox (EPN)	199	041801	2104-64-5
Fonofos	200	041701	944-22-9
Propoxur	201	047802	114-26-1
p Dichlorobenzene	202	061501	106-46-7
Parathion Ethyl	203	057501	56-38-2
Pendimethalin	204	108501	40487-42-1
PCNB	205	056502	82-68-8
PCP or Penta	206	*	87-86-5
Perfluidone	207	108001	37924-13-3
Permethrin	208	109701	52645-53-1
Phenmedipham	209	098701	13684-63-4
Nemazine	210	064501	92-84-2
Phorate	212	057201	298-02-2
Phosalone	213	097701	2310-17-0
Phosphamidon	214	018201	13171-21-6
Picloram	215	*	*
Piperonyl Butoxide	216	067501	51-03-6
PBED or WSCP (Busan 77)	217	069183	31512-74-0
Busan 85 or Arylane	218	034803	128-03-0
Busan 40	219	102901	51026-28-9
KN Methyl	220	039002	137-41-7
Metasol J26	221	101301	53404-62-9
Profenofos	222	111401	41198-08-7
Prometon or Caparol	223	080804	1610-18-0
Prometryn	224	080805	7287-19-6
Propargite	225	097601	2312-35-8
Propazine	226	080808	139-40-2
Propionic Acid	227	077702	79-09-4
Previcur N	228	119301	24579-73-5
Pyrethrin Coils	229	069004	....
Pyrethrum I	230	069001	8003-34-7
Pyrethrum II	231	069002	8003-34-7
Pyrethrins	232	*	*

List of PAIs from Table 10 to Part 455 With Their Corresponding Shaughnessy Codes and CAS Numbers[1]

PAI Name[2]	PAI Code[3]	Shaughnessy Code[4]	CAS Number[5]
Resmethrin	233	*	*
Fenchlorphos or Ronnel	234	058301	299-84-3
Mexide or Rotenone	235	071003	83-79-4
DEF	236	074801	78-48-8
Siduron or Tupersan	237	035509	1982-49-6
Silvex	238	*	*
Simazine	239	080807	122-34-9
Sodium Bentazon	240	103901	50723-80-3
Carbam S or Sodam	241	034804	128-04-1
Sodium Fluoroacetate	242	075003	62-74-8
Vapam or Metham Sodium	243	039003	137-42-8
Sulfoxide	244	057101	120-62-7
Cycloate or Ro Neet	245	041301	1134-23-2
EPrecipitationC or Eptam	246	041401	759-94-4
Molinate	247	041402	2212-67-1
Pebulate or Tillman	248	041403	1114-71-2
Vernolate or Vernam	249	041404	1929-77-7
HPrecipitationMS	250	035604	29803-57-4
Bensulide or Betesan	251	009801	741-58-2
Tebuthiuron	252	105501	34014-18-1
Temephos	253	059001	3383-96-8
Terbacil	254	012701	5902-51-2
Terbufos or Counter	255	105001	13071-79-9
Terbuthylazine	256	080814	5915-41-3
Terbutryn	257	080813	886-50-0
Tetrachlorophenol	258	063004	25167-83-3
Dazomet	259	035602	533-74-4
Thiophanate Methyl	260	102001	23564-05-8
Thiram	261	079801	137-26-8
Toxaphene	262	080501	8001-35-2
Merphos	263	074901	150-50-5
Trifluralin or Treflan	264	036101	1582-09-8
Warfarin	265	*	*
Zinc MBT	266	051705	155-04-4
Zineb	267	014506	12122-67-7
Ziram	268	034805	137-30-4
Triallate	269	078802	2303-17-5
Phenothrin	270	069005	26002-80-2
Tetramethrin	271	069003	7696-12-0
Chloropropham	272	018301	101-21-3
Non-272 PAIs			
CFC 11	....	000013	75-69-4
CFC 12	....	000014	75-71-8
Polyethylene	....	000152	9002-88-4
Acrolein	....	000701	107-02-8

List of PAIs from Table 10 to Part 455 With Their Corresponding Shaughnessy Codes and CAS Numbers[1]

PAI Name[2]	PAI Code[3]	Shaughnessy Code[4]	CAS Number[5]
Dimethyl m dioxan 4 ol aceta	....	001001	828-00-2
Dodecyl alcohol	....	001509	112-53-8
Tetradecyl alcohol	....	001510	112-72-1
Rosin amine D acetate	....	004201	2026-24-6
Dihydroabietylamine acetate	....	004213	53466-80-1
Amitrole	....	004401	61-82-5
Allyl isothiocyanate	....	004901	57-06-7
AMS	....	005501	7773-06-0
Calcium sulfate	....	005602	7778-18-9
Tartar emetic	....	006201	28300-74-5
Diphenylstibene 2 ethylhexan	....	006202	5035-58-5
Streptomycin	....	006306	57-92-1
Oxytetracycline hydrochlorid	....	006308	2058-46-0
Streptomycin sesquisulfate	....	006310	3810-74-0
Neomycin sulfate	....	006313	1405-10-3
Antimycin A	....	006314	1397-94-0
Calcium oxytetracycline	....	006321	7179-50-2
Espesol 3A	....	006601	68602-80-2
Arsenic acid	....	006801	7778-39-4
Arsenic acid anhydride	....	006802	1303-28-2
Arsenous acid anhydride	....	007001	1327-53-3
Copper oxychloride	....	008001	1332-40-7
Basic cupric sulfate	....	008101	*
Basic copper III zinc sulf	....	008102	55072-57-6
Bromophos	....	008706	2104-96-3
Benzyl bromoacetate	....	008710	5437-45-6
Benzoic acid	....	009101	65-85-0
Benzyl diethyl ((2,6 xylylca	....	009106	3734-33-6
Benzyl alcohol	....	009502	100-51-6
3 Chloro p toluidine hydroch	....	009901	7745-89-3
Butoxyethoxy)ethyl thiocyana	....	010002	112-56-1
2 Naphthol	....	010301	135-19-3
Boric acid	....	011001	10043-35-3
Barium metaborate	....	011101	13701-59-2
Boron sodium oxide (B8Na2O13	....	011103	12280-03-4
Sodium metaborate (NaBO2)	....	011104	7775-19-1
Boron sodium oxide (B8Na2O13	....	011107	12008-41-2
Boron sodium oxide (B4Na2O7)	....	011110	12179-04-3
Boron sodium oxide (B4Na2O7)	....	011112	1330-43-4
Polybutene	....	011402	9003-29-6
Polyisobutylene	....	011403	9003-27-4
Butyl cellosolve	....	011501	111-76-2
Butoxypolypropylene glycol	....	011901	9003-13-8
Neburon (ANSI)	....	012001	555-37-3
Methyltrimethylenedioxy)bis(	....	012401	2665-13-6

List of PAIs from Table 10 to Part 455 With Their Corresponding Shaughnessy Codes and CAS Numbers[1]

PAI Name[2]	PAI Code[3]	Shaughnessy Code[4]	CAS Number[5]
Oxybis(4,4,6 trimethyl-1,3,2	....	012402	14697-50-8
Cadmium chloride	....	012902	10108-64-2
Lead arsenate, basic	....	013502	1327-31-7
Lead arsenate	....	013503	7784-40-9
Sodium arsenate	....	013505	13464-38-5
Sodium arsenite	....	013603	7784-46-5
Potassium bromide	....	013903	7758-02-3
Camphor	....	015602	76-22-2
Carbon disulfide	....	016401	75-15-0
Carbon tetrachloride	....	016501	56-23-5
Barban (ANSI)	....	017601	101-27-9
Chloro 2 propenyl) 3,5,7,tri	....	017902	51229-78-8
Chlormequat chloride	....	018101	999-81-5
Chloromethoxypropylmercuric	....	018401	1319-86-4
Allidochlor	....	019301	93-71-0
Chromic acid	....	021101	7738-94-5
Chromic oxide	....	021103	1308-38-9
Cresol (unspec) (Cresylic ac	....	022101	1319-77-3
Cresol	....	022102	108-39-4
Copper (metallic)	....	022501	7440-50-8
Copper ammonium carbonate	....	022703	33113-08-5
Copper carbonate	....	022901	12069-69-1
Copper hydroxide	....	023401	20427-59-2
Copper chloride hydroxide	....	023501	1332-65-6
Copper oxychloride sulfate	....	023503	8012-69-9
Copper sulfate	....	024401	7758-99-8
Copper (from triethanolamine	....	024403	82027-59-6
Copper as metallic (in the f	....	024405	*
Copper as elemental from cop	....	024407	13426-91-0
Copper sulfate (anhydrous)	....	024408	7758-98-7
Copper(I) oxide	....	025601	1317-39-1
Cuprous thiocyanate	....	025602	1111-67-7
Cyclohexane	....	025901	110-82-7
Cyclohexanone	....	025902	108-94-1
Dichlobenil	....	027401	1194-65-6
Diquat dibromide	....	032201	85-00-7
Dimethrin (ANSI)	....	034101	70-38-2
Dicapthon	....	034502	2463-84-5
Ziram, cyclohexylamine compl	....	034806	16509-79-8
Butyl dimethyltrithioperoxyc	....	034807	3304-97-0
Daminozide	....	035101	1596-84-5
Bis(trichloromethyl) sulfone	....	035601	3064-70-8
Bis(bromoacetoxy) 2 butene	....	035605	20679-58-7
Dazomet, sodium salt	....	035607	53404-60-7
Butonate	....	035701	126-22-7

List of PAIs from Table 10 to Part 455 With Their Corresponding Shaughnessy Codes and CAS Numbers[1]

PAI Name[2]	PAI Code[3]	Shaughnessy Code[4]	CAS Number[5]
Trifluoro 4 nitro m cresol (	....	036201	88-30-2
Triethanolamine dinoseb (2 s	....	037506	6420-47-9
Sodium 4,6 dinitro o cresyla	....	037508	2312-76-7
Dinitrophenol	....	037509	51-28-5
Alkanol* amine dinoseb (2 se	....	037511	8048-12-2
Sodium dinoseb (2 sec Butyl	....	037512	35040-03-0
Nitrilotriacetic acid, triso	....	039106	5064-31-3
Trisodium(2 hydroxyethyl)eth	....	039109	139-89-9
Ammonium ethylenediaminetetr	....	039117	7379-26-2
Pentasodium diethylenetriami	....	039120	140-01-2
Ethyl 1,3 hexanediol	....	041001	94-96-2
Ethylene	....	041901	74-85-1
EDC	....	042003	107-06-2
Methylene chloride	....	042004	75-09-2
Methoxyethanol	....	042202	109-86-4
Ethylene glycol	....	042203	107-21-1
Butylene glycol	....	042205	107-88-0
Ethylene oxide	....	042301	75-21-8
Copper(II) oxide	....	042401	1317-38-0
Cuprous and cupric oxide, mi	....	042403	82010-82-0
Propylene oxide	....	042501	75-56-9
Formaldehyde	....	043001	50-00-0
Paraformaldehyde	....	043002	30525-89-4
Bis(2 butylene)tetrahydro-2	....	043302	126-15-8
Gibberellic acid	....	043801	77-06-5
Potassium gibberellate	....	043802	125-67-7
Glutaral	....	043901	111-30-8
Copper citrate	....	044005	10402-15-0
Methyl nonyl ketone	....	044102	112-12-9
Methyl 2 pentanone	....	044105	108-10-1
Monosodium 2,2' methylenebis	....	044902	5736-15-2
Potassium 2,2' methylenebis(	....	044904	67923-62-0
Hexachloroepoxyoctahydro end	....	045001	60-57-1
Chlorhexidine diacetate	....	045502	56-95-1
Hydrocyanic acid	....	045801	74-90-8
Hydroxyethyl octyl sulfide	....	046301	3547-33-9
Heptadecenyl 2 (2 hydroxyeth	....	046608	53466-82-3
Hydroxyethyl) 2 alkyl 2 imid	....	046609	61791-39-7
IBA	....	046701	133-32-4
Dihydropyrone	....	046801	532-34-3
Butoxypolypropoxypolyethoxye	....	046901	68610-00-4
Polyethoxypolypropoxyethanol	....	046904	26617-87-8
Use code no. 046904 (polyeth	....	046909	26617-87-8
Iodine potassium iodide co	....	046917	12298-68-9
Alkyl omega hydroxypoly(oxye	....	046921	68439-47-4

List of PAIs from Table 10 to Part 455 With Their Corresponding Shaughnessy Codes and CAS Numbers[1]			
PAI Name[2]	**PAI Code[3]**	**Shaughnessy Code[4]**	**CAS Number[5]**
Lead acetate	....	048001	301-04-2
Nickel sulfate hexahydrate	....	050505	10101-97-0
Maleic hydrazide, diethanola	....	051502	5716-15-4
Maleic hydrazide, potassium	....	051503	28382-15-2
Sodium 2 mercaptobenzothiola	....	051704	2492-26-4
Mercuric chloride	....	052001	7487-94-7
Mercurous chloride	....	052201	10112-91-1
Metaldehyde	....	053001	108-62-3
Methylated naphthalenes	....	054002	1321-94-4
Sodium 2,2' methylenebis(4 c	....	055005	10254-48-5
Naphthalene	....	055801	91-20-3
NAD	....	056001	86-86-2
NAA (1 Naphthaleneacetic Aci	....	056002	86-87-3
Potassium 1 naphthaleneaceta	....	056003	15165-79-4
Ammonium 1 naphthaleneacetat	....	056004	25545-89-5
Sodium 1 naphthaleneacetate	....	056007	61-31-4
Ethyl 1 naphthaleneacetate	....	056008	2122-70-5
Nitrophenol	....	056301	100-02-7
Nicotine	....	056702	54-11-5
Carbophenothion (ANSI)	....	058102	786-19-6
Sodium 5 chloro 2 (4 chloro	....	058802	3567-25-7
Monocrotophos	....	058901	6923-22-4
Chlordimeform	....	059701	6164-98-3
Chlordimeform hydrochloride	....	059702	19750-95-9
Thiabendazole hypophosphite	....	060102	28558-32-9
Hexachlorobenzene	....	061001	118-74-1
Butyl paraben	....	061205	94-26-8
Paraquat dichloride	....	061601	1910-42-5
Chloro 4 phenylphenol	....	062206	92-04-6
Chloro 2 phenylphenol	....	062208	*
Chloro 2 biphenylol, potassi	....	062209	53404-21-0
Chloro 2 phenylphenol	....	062210	85-97-2
Chloro 2 phenylphenol, potas	....	062211	18128-17-1
Sodium phenate	....	064002	139-02-6
Butylphenol, sodium salt	....	064115	5787-50-8
Ammonium 2 phenylphenate	....	064116	52704-98-0
Chloro 2 cyclopentylphenol	....	064202	13347-42-7
Bithionolate sodium	....	064203	6385-58-6
Chloro 3 cresol	....	064206	59-50-7
Sodium 2,4,5 trichlorophenat	....	064217	136-32-3
Aluminum phosphide	....	066501	20859-73-8
Phosphorus	....	066502	7723-14-0
Magnesium phosphide	....	066504	12057-74-8
1 (Alkyl*amino) 3 aminopropa	....	067301	61791-63-7
Alkyl* amino) 3 aminopropane	....	067305	61791-58-0

List of PAIs from Table 10 to Part 455 With Their Corresponding Shaughnessy Codes and CAS Numbers[1]

PAI Name[2]	PAI Code[3]	Shaughnessy Code[4]	CAS Number[5]
Alkyl*amino) 3 aminopropane	....	067307	68188-29-4
Alkyl* dipropoxyamine *(47%	....	067308	68516-06-3
Alkyl*amino) 3 aminopropane	....	067309	68155-43-1
Alkyl* amino) 3 aminopropane	....	067310	68155-37-3
Alkyl*amino) 3 aminopropane	....	067313	61791-64-8
Octadecenyl 1,3 propanediami	....	067316	83542-86-3
Alkyl* amine acetate *(5%C8	....	067329	61790-57-6
Pindone sodium salt	....	067704	6120-20-3
Diphacinone, sodium salt	....	067705	42721-99-3
Isovaleryl 1,3 indandione, c	....	067706	23710-76-1
Methyl isothiocyanate	....	068103	556-61-6
Potassium dichromate	....	068302	7778-50-9
Sodium chromate	....	068303	7775-11-3
Sodium dichromate	....	068304	10588-01-9
Alkenyl* dimethyl ethyl ammo	....	069102	*
Alkyl* N ethyl morpholinium	....	069113	61791-34-2
Alkyl* isoquinolinium bromid	....	069115	53466-68-5
Alkyl* methyl isoquinolinium	....	069116	71820-38-7
Cetyl trimethyl ammonium bro	....	069117	57-09-0
Cetyl pyridinium bromide	....	069118	140-72-7
Dodecyl dimethyl benzyl ammo	....	069127	....
Alkyl* dimethyl ethylbenzyl	....	069135	*
Alkyl* N ethyl morpholinium	....	069147	61791-34-2
Alkyl* trimethyl ammonium br	....	069153	1119-97-7
Benzyl((dodecylcarbamoyl)met	....	069159	100-95-8
Cetyl pyridinium chloride	....	069160	123-03-5
Alkyl* dimethyl ethyl ammoni	....	069186	134595-54-3
Cetyl N ethylmorpholinium et	....	069187	78-21-7
Use code no. 069102 (Alkenyl	....	069198	*
p Aminopyridine	....	069201	504-24-5
Nitrapyrin (ANSI)	....	069203	1929-82-4
Alkyl pyridines	....	069205	68391-11-7
Pyrazon (ANSI)	....	069601	1698-60-8
Capsaicin (in oleoresin of c	....	070701	404-86-4
Ryanodine	....	071502	15662-33-6
Silver	....	072501	7440-22-4
Silver chloride	....	072506	7783-90-6
Silver thiuronium acrylate c	....	072701	53404-00-5
Sodium chlorate	....	073301	7775-09-9
Calcium cyanide	....	074001	592-01-8
Sodium cyanide	....	074002	143-33-9
Cryolite	....	075101	15096-52-3
Sodium fluoride	....	075202	7681-49-4
Ammonium fluosilicate	....	075301	16919-19-0
Sodium fluosilicate	....	075306	16893-85-9

List of PAIs from Table 10 to Part 455 With Their Corresponding Shaughnessy Codes and CAS Numbers[1]

PAI Name[2]	PAI Code[3]	Shaughnessy Code[4]	CAS Number[5]
Potassium iodide	....	075701	7681-11-0
Potassium tetrathionate	....	075903	13932-13-3
Potassium nitrate	....	076103	7757-79-1
Sodium nitrate	....	076104	7631-99-4
Sodium nitrite	....	076204	7632-00-0
Benzenesulfonamide, N chloro	....	076501	127-52-6
Salicylic acid	....	076602	69-72-7
Ethoxyethyl p methoxycinnama	....	076604	104-28-9
Calcium polysulfide	....	076702	1344-81-6
Strychnine	....	076901	57-24-9
Strychnine sulfate	....	076902	60-41-3
Niclosamide	....	077401	1420-04-8
Dibromosalicylanilide	....	077402	87-12-7
Tribromsalan	....	077404	87-10-5
Dibromosalicylanilide	....	077405	2577-72-2
Chlorosalicylanilide	....	077406	4638-48-6
Sulfur	....	077501	7704-34-9
Sulfaquinoxaline	....	077901	59-40-5
Sulfacetamide	....	077904	144-80-9
Sulfuryl fluoride	....	078003	2699-79-8
Sodium bisulfite	....	078201	7631-90-5
Tetrachloroethylene	....	078501	127-18-4
Ethoxylated isooctylphenol	....	079004	9004-87-9
Lauric diethanolamide	....	079018	120-40-1
Triethanolamine oleate	....	079025	2717-15-9
Dioctyl sodium sulfosuccinat	....	079027	1639-66-3
Use code no. 069179 (alkyl*m	....	079036	68140-00-1
Alkyl* diethanolamide *(70%	....	079045	52900-12-6
Tetradecyl formate	....	079069	5451-63-8
Polyoxyethylene sorbitol ole	....	079075	53466-71-0
Polyethoxylated stearylamine	....	079094	26635-92-7
Capric diethanolamide	....	079099	136-26-5
Limonene	....	079701	138-86-3
Calcium thiosulfate	....	080101	10124-41-1
Ammonium thiosulfate	....	080103	7783-18-8
Thymoxydichloroacetic acid	....	080401	22228-05-3
Thymol	....	080402	89-83-8
Sodium trichloroacetate	....	081001	650-51-1
Trichloroacetic acid	....	081002	76-03-9
Hexahydro 1,3,5 tris(2 hydro	....	083301	4719-04-4
2 (Hydroxymethyl) 2 nitro-1,	....	083902	126-11-4
Bomyl	....	084201	122-10-1
Turpentine	....	084501	8006-64-2
Chloro 1 (2,5 dichlorophenyl	....	084901	1757-18-2
Zinc chloride	....	087801	7646-85-7

List of PAIs from Table 10 to Part 455 With Their Corresponding Shaughnessy Codes and CAS Numbers[1]

PAI Name[2]	PAI Code[3]	Shaughnessy Code[4]	CAS Number[5]
Zinc 2 pyridinethiol 1 oxide	....	088002	13463-41-7
Hydroxy 2 (1H) pyridinethion	....	088004	15922-78-8
Omadine TBAO	....	088005	33079-08-2
Zinc naphthenate	....	088301	12001-85-3
Zinc oxide	....	088502	1314-13-2
Zinc phosphide (Zn3P2)	....	088601	1314-84-7
Zinc phenol sulfonate	....	089002	127-82-2
Zinc sulfate, basic	....	089101	68813-94-5
Dimetilan	....	090101	644-64-4
Carboxin	....	090201	5234-68-4
Oxycarboxin	....	090202	5259-88-1
Benzocaine	....	097001	94-09-7
Piperalin	....	097003	3478-94-2
Tetracaine hydrochloride	....	097005	136-47-0
Formetanate hydrochloride	....	097301	23422-53-9
Azacosterol HCl	....	098101	1249-84-9
Use code no. 039502 (gentian	....	098401	548-62-9
Ammonium alum	....	098501	7784-25-0
Bismuth subgallate	....	098601	99-26-3
Chlorflurenol, methyl ester	....	098801	2536-31-4
Benzisothiazolin 3 one	....	098901	2634-33-5
Methyl 2 benzimidazolecarbam	....	099102	52316-55-9
Ethephon	....	099801	16672-87-0
Pentanethiol	....	100701	110-66-7
Nitrobutyl)morpholine	....	100801	2224-44-4
Ethyl 2 nitrotrimethylene)di	....	100802	1854-23-5
Tolyl diiodomethyl sulfone	....	101002	20018-09-1
Isobutyric acid	....	101502	79-31-2
Dibromo 3 nitrilopropionamid	....	101801	10222-01-2
Polyethoxylated oleylamine	....	101901	26635-93-8
Dinitramine (ANSI)	....	102301	29091-05-2
Phenylethyl propionate	....	102601	122-70-3
Eugenol	....	102701	97-53-0
Tricosene	....	103201	27519-02-4
Tricosene	....	103202	35857-62-6
Sodium 1,4',5' trichloro-2'-	....	104101	69462-14-2
Hexahydro 1,3,5 tris(2 hydro	....	105601	25254-50-6
Methazole	....	106001	20354-26-1
Difenzoquat methyl sulfate	....	106401	43222-48-6
Butralin	....	106501	33629-47-9
Fosamine ammonium	....	106701	25954-13-6
Asulam	....	106901	3337-71-1
Sodium asulam	....	106902	2302-17-2
Hydroxymethoxymethyl 1 aza 3	....	107001	59720-42-2
Hydroxymethyl 1 aza 3,7 diox	....	107002	6542-37-6

List of PAIs from Table 10 to Part 455 With Their Corresponding Shaughnessy Codes and CAS Numbers[1]

PAI Name[2]	PAI Code[3]	Shaughnessy Code[4]	CAS Number[5]
Hydroxypoly(methyleneoxy)* m	....	107003	56709-13-8
Chloro 2 methyl 3(2H)-isothi	....	107103	26172-55-4
Methyl 3(2H) isothiazolone	....	107104	2682-20-4
Trimethoxysilyl)propyl dimet	....	107401	27668-52-6
Kinoprene	....	107502	65733-20-2
Triforine (ANSI)	....	107901	26644-46-2
Pirimiphos methyl (ANSI)	....	108102	29232-93-7
Thiobencarb	....	108401	28249-77-6
Ancymidol (ANSI)	....	108601	12771-68-5
Oxadiazon (ANSI)	....	109001	19666-30-9
Mepiquat chloride	....	109101	24307-26-4
Fluvalinate	....	109302	69409-94-5
Chloro N (hydroxymethyl)acet	....	109501	2832-19-1
Dikegulac sodium	....	109601	52508-35-7
Iprodione (ANSI)	....	109801	36734-19-7
Phenylmethyl) 9 (tetrahydro	....	110001	2312-73-4
Prodiamine	....	110201	29091-21-2
Erioglaucine	....	110301	2650-18-2
Tartrazine	....	110302	1934-21-0
Dodemorph acetate	....	110401	31717-87-0
Ethofumesate (ANSI)	....	110601	26225-79-6
Aldoxycarb (ANSI)	....	110801	1646-88-4
Diclofop methyl	....	110902	51338-27-3
Bromo 1 (bromomethyl)-1,3 pr	....	111001	35691-65-7
Poly(iminoimidocarbonylimino	....	111801	32289-58-0
Imazalil	....	111901	35554-44-0
Bromadiolone	....	112001	28772-56-7
Brodifacoum	....	112701	56073-10-0
Bromethalin (ANSI)	....	112802	63333-35-7
Fluridone (ANSI)	....	112900	59756-60-4
Vinclozolin	....	113201	50471-44-8
Metalaxyl	....	113501	57837-19-1
Propetamphos (ANSI)	....	113601	31218-83-4
Methyl 1 naphthyl)maleimide	....	113701	70017-56-0
Hexadecadien 1 yl acetate	....	114101	53042-79-8
Hexadecadien 1 yl acetate	....	114102	52207-99-5
Epoxy 2 methyloctadecane	....	114301	29804-22-6
Thiodicarb (ANSI)	....	114501	59669-26-0
Dimethyloxazolidine (8CA & 9	....	114801	51200-87-4
Trimethyloxazolidine	....	114802	75673-43-7
Hydroxyphenyl)oxoacetohydrox	....	114901	34911-46-1
EEEBC	....	115001	62732-91-6
MDM Hydantoin	....	115501	6440-58-0
DMDM Hydantoin	....	115502	116-25-6
Triclopyr (ANSI)	....	116001	55335-06-3

List of PAIs from Table 10 to Part 455 With Their Corresponding Shaughnessy Codes and CAS Numbers[1]

PAI Name[2]	PAI Code[3]	Shaughnessy Code[4]	CAS Number[5]
Triethylamine triclopyr	....	116002	57213-69-1
Butoxyethyl triclopyr	....	116004	64700-56-7
Decenyl)dihydro 2(3H) furano	....	116501	64726-91-6
Cytokinins	....	116801	....
Benzyladenine	....	116901	1214-39-7
Clopyralid, monoethanolamine	....	117401	57754-85-5
Clopyralid (ANSI)	....	117403	1702-17-6
Flucythrinate (ANSI)	....	118301	70124-77-5
Hydramethylnon (ANSI)	....	118401	67485-29-4
Chlorsulfuron	....	118601	64902-72-3
Dimethipin	....	118901	55290-64-7
Hexadecenal	....	120001	53939-28-9
Tetradecenal	....	120002	53939-27-8
Thidiazuron	....	120301	51707-55-2
Metronidazole	....	120401	443-48-1
Erythrosine B	....	120901	16423-68-0
Sethoxydim	....	121001	74051-80-2
Clethodim	....	121011	99129-21-2
Cyromazine	....	121301	66215-27-8
Tralomethrin	....	121501	66841-25-6
Azadirachtin	....	121701	992-20-1
Tridecen 1 yl acetate	....	121901	65954-19-0
Tridecen I yl acetate	....	121902	72269-48-8
Sulfometuron methyl	....	122001	74222-97-2
Metsulfuron methyl	....	122010	74223-64-6
Propiconazole	....	122101	60207-90-1
Furanone, dihydro 5 pentyl	....	122301	104-61-0
Furanone, 5 heptyldihydro	....	122302	104-67-6
Abamectin (ANSI)	....	122804	71751-41-2
Fluazifop butyl	....	122805	69806-50-4
Fluazifop R butyl	....	122809	79241-46-6
Flumetralin	....	123001	62924-70-3
Fosetyl Al	....	123301	39148-24-8
Methanol, (((2 (dihydro 5 me	....	123702	97553-90-7
Fomesafen	....	123802	72178-02-0
Tridiphane	....	123901	58138-08-2
POE isooctadecanol	....	124601	52292-17-8
Periplanone B	....	124801	61228-92-0
Fenoxycarb	....	125301	72490-01-8
Clomazone	....	125401	81777-89-1
Clofentezine	....	125501	74115-24-5
Paclobutrazol	....	125601	76738-62-0
Flurprimidol	....	125701	56425-91-3
Isoxaben	....	125851	82558-50-7
Isazofos	....	126901	42509-80-8

List of PAIs from Table 10 to Part 455 With Their Corresponding Shaughnessy Codes and CAS Numbers[1]

PAI Name[2]	PAI Code[3]	Shaughnessy Code[4]	CAS Number[5]
Triadimenol	....	127201	55219-65-3
Fenpropathrin	....	127901	39515-41-8
Sulfosate	....	128501	81591-81-3
Fenoxaprop ethyl	....	128701	66441-23-4
Quizalofop ethyl	....	128711	76578-14-8
Bensulfuron methyl	....	128820	83055-99-6
Imazapyr	....	128821	81334-34-1
Bifenthrin	....	128825	82657-04-3
Imazapyr, isopropylamine sal	....	128829	81510-83-0
Sodium salt of 1 carboxymeth	....	128832	92623-86-4
Linalool	....	128838	78-70-6
Imazaquin, monoammonium salt	....	128840	81335-47-9
Imazethabenz	....	128842	81405-85-8
Thifensulfuron methyl	....	128845	79277-27-3
Imazaquin	....	128848	81335-37-7
Myclobutanil (ANSI)	....	128857	88671-89-0
Zinc borate (3ZnO, 2B03, 3.5	....	128859	*
Cyhalothrin	....	128867	68085-85-8
Potassium cresylate	....	128870	12002-51-6
Triflumizole	....	128879	68694-11-1
Tribenuron methyl	....	128887	101200-48-0
Cyhalothrin	....	128897	91465-08-6
Chlorimuron ethyl	....	128901	90982-32-4
Dodecen 1 yl acetate	....	128906	28079-04-1
Dodecen 1 yl acetate	....	128907	38363-29-0
DDOL	....	128908	40642-40-8
Farnesol	....	128910	4602-84-0
Nerolidol	....	128911	7212-44-4
Tefluthrin	....	128912	79538-32-2
Bromoxynil heptanoate	....	128920	56634-95-8
Imazethapyr	....	128922	81335-77-5
Imazethapyr, ammonium salt	....	128923	101917-66-2
Chitosan	....	128930	9012-76-4
Sulfuric acid, monourea addu	....	128961	21351-39-3
Hydroprene	....	128966	65733-18-8
Triasulfuron	....	128969	82097-50-5
Primisulfuron methyl	....	128973	86209-51-0
Uniconazole (ANSI)	....	128976	83657-17-4
Tetradecenyl acetate	....	128980	20711-10-8
Chitin	....	128991	1398-61-4
Sulfluramid	....	128992	4151-50-2
Dithiopyr (ANSI)	....	128994	97886-45-8
Nicosulfuron	....	129008	111991-09-4
Zinc	....	129015	7440-66-6
Tetradecen 1 ol, acetate, (E	....	129019	33189-72-9

List of PAIs from Table 10 to Part 455 With Their Corresponding Shaughnessy Codes and CAS Numbers[1]

PAI Name[2]	PAI Code[3]	Shaughnessy Code[4]	CAS Number[5]
Imazaquin, sodium salt	....	129023	81335-46-8
Dodecadien 1 ol	....	129028	33956-49-9
Ionone	....	129030	127-41-3
Dicamba, aluminum salt	....	129042	....
Benzenemethanaminium, N (2 (	....	129045	90823-38-4
Fenoxaprop p Ethyl	....	129092	71283-80-2
Alkyl* bis(2 hydroxyethyl) a	....	169103	61791-31-9
Alkenyl* dimethyl ammonium a	....	169104	22968-84-9
Amines, N coco alkyltrimethy	....	169109	68155-42-0
Dialkyl* dimethyl ammonium b	....	169111	68953-58-2
Alkyl* bis(2 hydroxyethyl) a	....	169125	....
Dodecyl bis(hydroxyethyl)dio	....	169154	68961-66-0
Dodecyl bis(2 hydroxyethyl)	....	169155	125091-04-5
Didecyl N methyl 3 (trimetho	....	169160	68959-20-6
Cholecalciferol	....	202901	67-97-0
Use code no. 202901 (Vitamin	....	208700	67-97-0
Alkyl* N,N bis(2 hydroxyethy	....	210900	....
Bromo 2 nitropropane 1,3 dio	....	216400	52-51-7
Use code no. 114601 (cyclohe	....	229300	57063-29-3
Diethatyl ethyl	....	279500	38727-55-8
Hydroprene (ANSI)	....	486300	41096-46-2
Zinc sulfate monohydrate	....	527200	7446-19-7
Geraniol	....	597501	106-24-1

[1] The 272 Pesticide Active Ingredients (PAIs) are listed first, by PAI code, followed by the non-272 PAIs from the 1988 FIFRA and TSCA Enforcement System (FATES) Database, which are listed in Shaughnessy code order. PAIs that were exempted or reserved from the PFPR effluent guidelines are not listed in the table.

[2] The non-272 PAI names are taken directly from the 1988 FATES database. Several of the PAI names are truncated because the PAI names listed in the FATES database are limited to 60 characters.

[3] The non-272 PAIs do not have PAI codes.

[4] Shaughnessy codes are taken from the 1988 FATES database when available. Some of the 272 PAIs are not listed in the 1988 FATES database; in these instances, the Shaughnessy codes are taken from the Office of Pesticide Products (OPP) Chemical Database.

[5] The CAS numbers are taken from a variety of sources including the Aldrich 1994-1995 Catalog, the Chemical Synonyms Document, the Farm Chemicals Handbook, the Merck Index (11th edition), the Office of Research and Development (ORD) Risk Reduction Engineering Laboratory (RREL) Database, and the OPP Chemical Database.

* This PAI code represents a category or group of PAIs; therefore, it has multiple Shaughnessy codes and/or CAS numbers.

APPENDIX D

Example Treatability Test Procedures

INTRODUCTION

The following test procedures have been excerpted from Section 4.0 of the report *Pilot-Scale Tests of the Universal Treatment System for the Pesticides Formulating, Packaging, and Repackaging Industry*, September 1996 (DCN F7938). The report details the results of a series of pilot-scale treatability tests conducted by the U.S. Environmental Protection Agency during development of the Pesticide Formulating, Packaging, and Repackaging effluent limitations guidelines and standards. These tests evaluted the effectiveness of a flexible treatment train that was referred to as the Universal Treatment System (UTS).

The UTS is simply a term used to describe a simple, flexible system that consists of standard wastewater treatment equipment: tanks, pumps, piping, and activated carbon columns that can be purchased individually off-the-shelf from vendors. This equipment can be used to conduct the following physical/chemical treatment steps: emulsion breaking, hydrolysis, activated carbon adsorption, chemical oxidation, and precipitation.

4.0 TEST PROCEDURES

This section provides a discussion of the equipment, procedures, and operating parameters used to perform the three pilot-scale UTS treatability tests. Each pilot-scale test consisted of a bench-scale emulsion-breaking pretest, emulsion breaking (where it was determined via bench-scale pretesting that emulsion breaking would be effective) or settling, hydrolysis, and activated carbon adsorption.

To characterize the performance of each UTS treatment step, samples were collected before and after each step to gather data on the overall effectiveness of the UTS in treating PFPR wastewater. Each of these samples was analyzed for pesticide active ingredients (PAIs), volatile organics, semivolatile organics, and classical wet chemistry parameters. The influent to and effluent from the UTS system were also analyzed for metals.

Samples were also collected throughout hydrolysis treatment; these samples were analyzed for PAIs and classical wet chemistry parameters. The PAI analytical results were used to prepare hydrolysis half-life curves, which are presented in Section 6.0. Samples were collected throughout activated carbon treatment and analyzed for PAIs. The analytical results were used to prepare carbon breakthrough curves for each of the PAIs, which are also presented in Section 6.0.

Section 4.1 provides a discussion of the test equipment used in all three UTS treatability tests. Because each type of wastewater treated in the pilot-scale UTS differed in composition and treatability, the UTS procedures were modified slightly for each test to achieve adequate treatment. Sections 4.2 through 4.4 describe the procedures and design and operating parameters for each UTS test.

4.1 Test Equipment

The pilot-scale UTS treatability tests were conducted at Radian Corporation's Milwaukee, Wisconsin laboratory facilities. The following subsections describe the equipment used to perform the pilot-scale tests, as well as the emulsion-breaking pretest.

4.1.1 Emulsion-Breaking Pretest

The bench-scale emulsion breaking pretest was conducted in glass beakers. Hot plates were used to heat the aliquots. Magnetic stirrers with Teflon®-coated stirring bars mixed the aliquots.

4.1.2 Tanks

The pilot-scale emulsion-breaking tests and hydrolysis tests were conducted in two 190-liter stainless steel tanks with open tops. These tanks were heated using electric band heaters wrapped around the tanks. Aluminum foil was used to cover the tops of the tanks during portions of the tests to reduce evaporative losses. Several plastic tanks and a 40-liter graduated plastic tank were used to hold and measure the volume of the wastewater. Plastic tanks were used to hold the supernatant from the emulsion-breaking step while the sludge layers were measured and washed out of the stainless steel tanks. The graduated plastic tank was used to measure the volume of wastewater added to the plastic activated carbon feed tank.

4.1.3 Mixers

The wastewater tanks used for the pilot-scale emulsion breaking step were mixed using milk-jug hand mixers, an electrically powered paddle mixer, or an electrically powered Lightning® mixer. Each milk-jug mixer consisted of a long stainless steel rod attached to the center of a stainless steel disc with holes punched in it. Mixing was conducted by submerging the disc in the liquid and moving it up and down. The paddle mixer consisted of an electric motor that rotated a stainless steel paddle. The motor was clamped to a board placed across the opening of a tank. The paddle remained submerged in the liquid in the tank. The Lightning® mixer consisted of an electric motor that rotated a stainless steel rod with a small, warped stainless steel disc at its tip. The Lightning® mixer was clamped to the side of a tank so that the rod and the disc remained submerged in the liquid in the tank.

4.1.4 Pumps

Wastewater was transferred into and out of the various tanks and the activated carbon column either by pouring it or by pumping it through one of three pumps: a sump pump (submersible pump), a centrifugal pump, and a peristaltic pump. The sump pump consisted of a motor located in a plastic housing with an open bottom. The motor was attached to a rope and was lowered into the liquid to be pumped until the open bottom of the housing was submerged in the liquid. The liquid was pumped through a tube at the top of the motor housing. The sump pump had the highest flow rate but its speed was not adjustable, and it tended to cause settled solids to resuspend during pumping.

The centrifugal pump was used by attaching tubes to the pump inlets and outlets. The open end of the tube attached to the inlet was submerged in the liquid to be pumped, and the open end of the tube attached to the outlet was placed in the empty container. The centrifugal pump had a variable speed motor, which could be adjusted to minimize the resuspension of settled solids.

The peristaltic pump was used to pump the wastewater from the activated carbon feed tank through a length of flexible tubing and into the carbon column. This pump was operated by wrapping a piece of flexible tubing around a gear. As the gear rotated, the tubing was compressed, which caused the liquid to flow through the tubing.

4.1.5 Activated Carbon Column

The activated carbon column consisted of a clear glass tube seven feet high and one inch in diameter. The ends of the column were capped with plastic plugs that had openings for stainless steel fittings. These fittings were used to attach flexible tubing to the column inlet and outlet. For each UTS test, the column was packed with 680 grams of granular activated carbon that had been washed and deaerated. The carbon used in each of the three tests was pulverized Filtrasorb 300, manufactured by Calgon Corporation. The carbon had a mesh size of 300 to 400.

The carbon was weighed and washed by measuring a small amount of carbon into a glass flask. Distilled water was added to the flask and swirled to cause the carbon fines to be suspended, which generated a black water above the granular carbon. The water was decanted from the carbon. These steps were repeated until the swirling no longer suspended many fines and the water remained relatively clear after swirling. The carbon was then deaerated by placing the flask under a vacuum of about seven inches of mercury using a vacuum pump. The flask was swirled to help release air bubbles from the carbon. The vacuum and swirling were continued until the water above the carbon became relatively free of air bubbles. The carbon was then scooped from the flask or washed from the flask using distilled water, and loaded into the carbon column.

4.1.6 Measurements

Measurements of pH were performed using an electronic pH meter, which was calibrated daily, or using disposable pH strips. Temperature measurements were conducted using a portable electric thermocouple or a mercury-filled glass thermometer. Prior to use, all equipment was washed using water, detergent solution, scrubbers, and scouring pads, as needed, and was triple-rinsed with distilled water.

4.2 Facility A Treatability Test

Facility A is a toll formulator that formulates and packages home insecticides, insect repellents, and pet-care products such as flea and tick shampoos. Wastewater collected from Facility A for treatability testing included formulation vessel interior rinsates from the formulation of four separate products (referred to in this report as Rinsates 1, 2, 3, and 4) and floor wash water from a mechanical floor scrubbing machine used to clean floors in the facility's product formulation areas. The wastewater was collected between March 27 and March 29, 1995 and placed for transport in one of seven plastic carboys. Table 4-1 provides a summary of the wastewater collection at Facility A.

Table 4-1
Summary of Wastewater Collection for UTS Treatability Testing at Facility A

Carboy Number	Carboy Contents (Pesticide Active Ingredients)	Carboy Volume (Liters)	Wastewater Appearance
Carboy #1	Rinsate 1 (permethrin, methoprene)	60	Milky-white, opaque
Carboy #2	Rinsate 2 (linalool)	60	Light green, translucent
Carboy #3	Rinsate 2 (linalool)	50	Light green, translucent
Carboy #4	Rinsate 3 (pyrethrins, piperonyl butoxide)	60	Light green, translucent, foamy
Carboy #5	Rinsate 3 (pyrethrins, piperonyl butoxide)	60	Light green, translucent, foamy
Carboy #6	Rinsate 4 (permethrin, methoprene)	35	Milky-white, opaque, foamy
Carboy #7	Floor Wash Water (permethrin, methoprene, linalool, limonene, pyrethrins, piperonyl butoxide)	20	Black, opaque

Rinsate 1 was generated from the interior cleaning of a tank used to formulate an insecticide spray that contains the PAIs permethrin and methoprene. The operator used about 95 liters of hot water in 10 minutes to clean the tank. Sixty liters of the wastewater were collected into Carboy #1 from a valve connected to the bottom of the tank. The wastewater had an opaque, milky-white appearance.

Rinsate 2 was generated from the interior cleaning of a tank used to formulate an insecticidal pet shampoo that contains the PAI linalool. The operator used about 230 liters of hot water in 20 minutes to clean the tank. Using a hose connected to a valve at the bottom of the tank, wastewater collection personnel put 60 liters of the wastewater into Carboy #2 and 50 liters of the wastewater into Carboy #3. The wastewater had a translucent, slightly green hue and contained surfactants from the raw materials used to formulate the product.

Rinsate 3 was generated from the interior cleaning of a tank used to formulate another insecticidal pet shampoo that contains the PAIs pyrethrin and piperonyl butoxide. The operator used about 150 liters of hot water in 10 minutes to clean the tank. Sixty liters of the wastewater were collected into Carboy #4 and 60 liters were collected into Carboy #5 using a hose connected to a valve at the bottom of the tank. The wastewater was foamy and had a translucent, slightly green hue, and contained surfactants from the raw materials used to formulate the product.

Rinsate 4 was generated from the interior cleaning of a tank used to formulate an insecticide spray that contains the PAIs permethrin and methoprene. The operator used about 35 liters of hot water to clean the tank. Wastewater collection personnel placed all 35 liters of the wastewater into Carboy #6 using a valve connected to the bottom of the tank. The wastewater was foamy and had an opaque, milky-white appearance.

Floor wash water was collected from a mechanical floor scrubber that is used to clean the floors in the Facility A pesticide products packaging area. The floor in the formulation area is rarely washed; however, the rest of the facility, including the floors surrounding the packaging lines, is cleaned periodically. While personnel were on site to collect wastewater, the floors in the packaging area were cleaned using a mechanical floor scrubber. Wastewater collection personnel collected 20 liters of wash water into Carboy #7 from the water reservoir in the floor scrubber. This water was generated over two floor washings, with approximately 10 liters generated per washing. The wash water had the potential to contain all of the PAIs used in the products packaged at the facility, including the PAIs in Rinsates 1 through 4, and the PAI limonene, which is contained in another product that is packaged at the facility. In addition, the wash water contained detergents used in the floor scrubber to help clean floors, as well as surfactants from products that may have leaked or spilled during packaging. The wastewater had an opaque, black appearance.

The wastewater was shipped via air cargo to Radian's Milwaukee, Wisconsin laboratory facilities and was immediately placed in cold storage (approximately 4°C). The UTS treatability testing of Facility A wastewater began on March 30, 1995 and was completed by April 9, 1995. Table 4-2 lists the sample point description, Sample Control Center (SCC) sample number, date and time of sample collection, pH, and temperature and collection methods for the samples collected during the Facility A treatability test.

4.2.1 Emulsion-Breaking Pretest

Table 4-3 lists the composition of each aliquot for the emulsion breaking pretest, including the initial pH and appearance, the volume of acid or base added, the resulting pH, and the observations of the effects of the emulsion-breaking pretest.

The emulsion-breaking pretest was initially conducted on six 1-liter aliquots, with five aliquots of the individual wastewater and one aliquot of commingled wastewater from all carboys. The five aliquots of individual wastewater and the commingled aliquot were lowered to a pH of approximately 2 and raised to a temperature of 60°C for 1 hour as they were mixed; the aliquots were then allowed to cool and settle overnight. Observations indicated that emulsion breaking was not effective on the interior equipment rinsates or on the commingled wastewater. However, emulsion breaking did appear to be effective on the aliquot that consisted only of floor wash water; a distinct sludge phase settled out following heat and acidification.

Table 4-2
Summary of Wastewater Sampling for UTS Treatability Testing of Facility A Wastewater

Sample	SCC Number	Sample Date	Sample Time	pH	Temp. (°C)	Collection Method
Commingled Influent to Hydrolysis	27767	04/04/95	10:15	6.10	12.5	Scooped from tank using glass measuring cup
Commingled Influent to Hydrolysis (duplicate)	27768	04/04/95	10:15	6.10	12.5	Scooped from tank using glass measuring cup
Hydrolysis (first batch, 6-hour)	27770	04/05/95	19:15	NA	60.7	Scooped from tank using glass measuring cup
Hydrolysis (first batch, 12-hour)	27771	04/06/95	1:15	NA	55.1	Scooped from tank using glass measuring cup
Hydrolysis (first batch, 24-hour)	27772	04/06/95	13:13	NA	57.9	Scooped from tank using glass measuring cup
Hydrolysis (second batch, 24-hour)	27769	04/07/95	19:45	7.46	21	Scooped from tank using glass measuring cup
Activated Carbon (60-liter)	27773	04/07/95	21:30	NA	NA	Collected in 4-L glass jar from carbon column effluent tubing
Activated Carbon (120-liter)	27774	04/08/95	8:15-10:00	NA	NA	Collected in 9.6-L glass jar from carbon column effluent tubing
Activated Carbon (180-liter)	27775	04/08/95	19:30-21:15	NA	NA	Collected in 4-L glass jar from carbon column effluent tubing
Activated Carbon (240-liter)	27776	04/09/95	8:38-1:30	NA	NA	Collected in stainless steel tank from carbon column effluent tubing

NA - Information not available.
SCC - Sample Control Center.

To determine whether alkaline conditions increased the effectiveness of emulsion breaking for the commingled wastewater, a second commingled aliquot was prepared from the post-emulsion breaking aliquots of the five individual wastewaters. The pH of this second commingled aliquot was raised to approximately 12 and heated to a temperature of 60°C for 1 hour as it was mixed. This aliquot was then allowed to cool and settle overnight. The emulsion-breaking pretest results indicated that emulsion-breaking using alkaline conditions was not effective on the second commingled aliquot. Therefore, pilot-scale emulsion breaking was performed only on the floor wash water (Carboy #1).

Table 4-3
Emulsion-Breaking Pretest Data for UTS Treatability Testing of Site A Wastewater

Aliquot Number	Rinsate	Sample Composition	Initial Appearance	Initial pH	Material Added To Adjust pH	pH	Observations
1	Interior Rinse #1	1,000 ml Carboy #1	Milky-white, opaque	8.17	0.4 ml H_2SO_4 (50% w/w)	1.98	No separation
2	Interior Rinse #2	500 ml Carboy #2 500 ml Carboy #3	Light green, translucent	6.65	0.4 ml H_2SO_4 (50% w/w)	1.95	No separation
3	Interior Rinse #3	500 ml Carboy #4 500 ml Carboy #5	Light green, translucent	8.19	0.2 ml H_2SO_4 (50% w/w)	1.98	No separation
4	Interior Rinse #4	1,000 ml Carboy #6	Milky-white, opaque	7.11	0.3 ml H_2SO_4 (50% w/w)	1.98	No separation
5	Floor Wash	1,000 ml Carboy #7	Black, opaque	7.26	0.5 ml H_2SO_4 (50% w/w)	1.99	Settling of black sludge
6	First Commingled Aliquot	177 ml Carboy #1 165 ml Carboy #2 165 ml Carboy #3 170 ml Carboy #4 170 ml Carboy #5 100 ml Carboy #6 55 ml Carboy #7	Milky-white, opaque	7.19	1.9 ml H_2SO_4 (50% w/w)	1.98	Minor settling of black material; may just be solids from floor sweepings
7	Second Commingled Aliquot	177 ml Beaker #1 330 ml Beaker #2 340 ml Beaker #3 100 ml Beaker #4 55 ml Beaker #5	Milky-white, opaque	1.99	3.1 ml NaOH (10 N)	12.03	Slight separation, small amount of thick, viscous sludge at bottom

4.2.2 Emulsion Breaking

Based on the results of the emulsion-breaking pretest, the pilot-scale emulsion breaking step was conducted only on the floor wash water. The 16 liters of floor wash water remaining after the emulsion-breaking pretest were poured into a 19-liter stainless steel bucket, the pH was adjusted to 2 using 70 ml of 50% weight of acid per weight of water (w/w) sulfuric acid, and the bucket was heated to 60°C as it was stirred with a magnetic stirring bar. The bucket was maintained at 60°C for one hour as the stirring continued. The stirring was then stopped, and the wastewater was allowed to cool and settle overnight. After one hour of cooling, a noticeable settling began to occur. After 24 hours, the supernatant was pumped into a plastic tank using the peristaltic pump. The supernatant became progressively darker as the upper layers were pumped into the plastic tank. However, a distinct sludge layer had settled to the bottom of the bucket, and this layer began to resuspend as the supernatant was pumped out of the tank and the pump approached the level of the sludge. The volume of the sludge and the supernatant that could not be pumped out without resuspending the sludge was about 3 liters.

4.2.3 Hydrolysis

Following the emulsion breaking of the floor wash water, the contents of Carboys #1 through #6 were poured into a plastic tank with the floor wash supernatant, and the tank was mixed with the milk-jug mixers. Influent and influent duplicate samples were collected from the commingled wastewater in the plastic tank by scooping the water from the tank using a glass measuring cup and pouring it into the appropriate sample bottles. Approximately 293 liters of commingled wastewater remained in the tank following sample collection, and was hydrolyzed in two treatment batches.

Batch 1—A volume of 171 liters of the well-mixed commingled influent was pumped into a stainless steel tank using the sump pump. Electric band heaters were used to heat the tank, and 175 ml of 10 N sodium hydroxide were added to the tank to raise the pH of the wastewater to 12. Aluminum foil was used to insulate the tank and reduce evaporation during the heating, and the paddle mixer was used to keep the wastewater mixed throughout the hydrolysis testing. After about three hours of heating, the tank achieved a temperature of 60°C. The temperature of the tank varied between 51°C and 82°C over the next 24 hours. The variation in temperature was due to a malfunctioning automatic temperature controller. The temperature had to be checked periodically using an electronic thermocouple or a glass thermometer. The control knobs on the band heaters were adjusted manually based on these temperature readings, with the goal of maintaining the temperature at 60°C.

Samples of the hydrolysis wastewater were collected at 6, 12, and 24 hours after the tank initially reached 60°C. Samples were collected by scooping water from the tank into a glass measuring cup, and then pouring it into the appropriate sample bottles. Approximately 26 liters of wastewater were collected for the three sample volumes, an additional 12 liters were lost due to evaporation and about 133 liters of wastewater remained in the tank.

After the 24-hour hydrolysis sample was collected, the tank was cooled by submerging a length of stainless steel tubing in the wastewater; noncontact cooling water was circulated through the tubing while the tank contents were stirred with the paddle mixer. Cooling the tank from 56°C, its temperature at the time of collection of the 24-hour sample, to 27°C required about 1.5 hours, at which point the stainless steel cooling coil was removed from the tank and cleaned for reuse. The pH of the wastewater was adjusted from 11.4 to 7.3 using 62 ml of 50% (w/w) sulfuric acid. The wastewater, which was originally milky white, turned turbid yellow during pH adjustment. The wastewater was then pumped from the hydrolysis tank through a 10-mm filter to the plastic activated carbon feed tank using the submersible sump pump. The 10-µm filter was used to remove filterable solids that could cause plugging problems in the carbon column. The stainless steel tank, paddle mixer, and sump pump were cleaned for reuse. Table A-1 in Appendix A[1] lists the operating data for the first hydrolysis treatment batch.

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[1] This is referring to Appendix A of *Pilot-Scale Tests of the Universal Treatment System for the Pesticides Formulating, Packaging, and Repackaging Industry*, September 1996 (DCN F7938).

Batch 2—The remaining wastewater (about 122 liters) that had not been treated with the first batch was transferred to the cleaned stainless steel tank for hydrolysis treatment. Electric band heaters were used to heat the tank, and 160 ml of 10 N sodium hydroxide were added to the tank to raise the pH of the wastewater to 12. Aluminum foil was used to insulate the tank and to reduce evaporation during the heating, and the paddle mixer was used to keep the wastewater mixed throughout the hydrolysis testing. After about 2.5 hours of heating, the tank achieved a temperature of 60°C. The temperature of the tank varied between 39°C and 73°C over the next 24 hours.

A final sample of the hydrolysis wastewater was collected about 24 hours after the tank initially reached 60°C by scooping water from the tank into a glass measuring cup and then pouring it into the appropriate sample bottles. No interim samples were collected at 6- and 12-hour intervals as was done for the first batch. Approximately 4 liters of wastewater were collected for the sample and an additional 8 liters were lost due to evaporation; about 110 liters of wastewater remained in the tank upon completion of the treatment step.

Unlike the first hydrolysis batch, the tank was cooled, and the pH of the wastewater was adjusted to a neutral level prior to collection of the 24-hour sample. The tank was cooled by submerging a length of stainless steel tubing in the wastewater; non-contact cooling water was circulated through the tubing while the tank contents were stirred with the paddle mixer. The cooling of the tank from 62°C to 22°C required about 1.5 hours. The pH of the wastewater was then adjusted from 11.8 to 7.5 using 50% (w/w) sulfuric acid. The wastewater turned from milky white to a turbid yellow during the pH adjustment. The 24-hour sample was then collected, and the wastewater was pumped from the hydrolysis tank through a 10-mm filter to the plastic activated carbon feed tank using the sump pump. The stainless steel tank, paddle mixer, and sump pump were cleaned for reuse. Table A-2 of Appendix A[1] lists the operating data for the second hydrolysis treatment batch.

4.2.4 Activated Carbon Adsorption

Treatment of the wastewater from the first hydrolysis batch through activated carbon adsorption was initiated during the hydrolysis treatment of the second batch of wastewater. The wastewater from the activated carbon feed tank was pumped by the peristaltic pump through flexible tubing into the top of the column. The wastewater passed down through the column, out the bottom of the column, and into another length of flexible tubing from which samples were taken. The wastewater flow rate through the column was maintained at a rate of 82 to 88 milliliters per minute throughout the test. Samples were collected after 60, 120, 180, and 240 liters of wastewater had passed through the column by collecting the column effluent into glass jars and pouring the treated effluent from the glass jars into the appropriate sample bottles.

The wastewater from the second hydrolysis batch was pumped into the activated carbon feed tank after about 56 liters of water from the first batch had passed through the column and about 76 liters of wastewater from the first batch remained in the feed tank. About 100 liters of wastewater from the

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[1] This is referring to Appendix A of *Pilot-Scale Tests of the Universal Treatment System for the Pesticides Formulating, Packaging, and Repackaging Industry*, September 1996 (DCN F7938).

second hydrolysis batch were added to the feed tank. The first activated carbon wastewater sample (i.e., the 60-liter sample) was collected immediately after the wastewater from the second hydrolysis batch was added to the activated carbon feed tank. The activated carbon effluent did not have the turbid, yellow color of the influent, but it did have a milky-white color. In addition, some white deposits were observed on top of the packed carbon and in the pore spaces between the carbon granules.

4.3 Facility B Treatability Test

Facility B formulates and packages pesticide products primarily for use in the agricultural market. The wastewater collected from Facility B for treatability testing consisted of an interior cleaning rinsate from the washing of formulating and packaging equipment dedicated to a product that contains the PAI tetrachlorvinphos. The product also contained molasses, and the rinsate was expected to have high BOD_5 and TOC levels. The operator cleaned the interior of the formulation vessel using a hot, high-pressure washer and about 430 liters of water over a 50-minute timeframe. The wastewater was allowed to drain by gravity from the formulation vessel through the packaging equipment, and it was collected from a hose connected to a manifold at the bottom of the formulation equipment and from nozzles on the packaging equipment. Wastewater collection personnel placed about 350 liters of the wastewater into 5-gallon carboys. The wastewater had an opaque, brown appearance.

The wastewater was collected on June 27, 1995, and was transported to Radian's Milwaukee, Wisconsin laboratory facilities via Federal Express, where it was placed in cold storage (approximately 4°C). The UTS treatability testing of Facility B wastewater began on June 29, 1995 and was completed by July 11, 1995. Table 4-4 lists the sample point description, SCC number, date and time of sample collection, pH, temperature, and collection method for the samples collected during the Facility B treatability test.

4.3.1 Emulsion-Breaking Pretest

Upon receipt in Milwaukee, the wastewater was poured from the carboys into two stainless steel tanks, Tank 1 and Tank 2. The wastewater was dark brown, and clumps of solids had settled to the bottoms of the carboys. After the wastewater was poured into the stainless steel tanks, the tanks were vigorously mixed using the milk-jug mixers to resuspend the solids, and two 1-liter aliquots were collected for the emulsion-breaking pretest. The tanks were then placed in a walk-in refrigerator at 4°C to prevent biological growth from occurring. Emulsion breaking at pH 2 and 60°C was performed on one of the aliquots, and the second aliquot was used as a control sample.

The first aliquot of wastewater was lowered to a pH of 1.98 by adding 15.8 ml of 36 N sulfuric acid to the wastewater and was raised to a temperature of 60°C for one hour as it was mixed; the aliquot was then allowed to cool and settle overnight. The aliquot turned a slightly lighter shade of brown as the pH was adjusted downward. The second aliquot was simply allowed to settle overnight with no heating, mixing, or pH adjustment. The emulsion-breaking pretest results indicated that emulsion breaking by adding acid and heat did not significantly improve the settling of the solids or the clarity of the supernatant over the control sample. However, solids did settle out of both

Table 4-4
Summary of Wastewater Sampling for UTS Treatability Testing of Facility B Wastewater

Sample	SCC No.	Sample Date	Sample Time	pH	Temp. (°C)	Collection Method
UTS Influent	28918	06/30/95	11:30	NA	NA	Half of sample volume measured from each tank using glass measuring cup
UTS Influent (duplicate)	28919	06/30/95	11:30	NA	NA	Half of sample volume measured from each tank using glass measuring cup
Settling Supernatant	28920	07/04/95	11:20	5.85	NA	Half of sample volume measured from each tank using glass measuring cup
Hydrolysis (6-hour)	28921	07/05/95	20:00	NA	57[a]	Half of sample volume measured from each tank using glass measuring cup
Hydrolysis (12-hour)	28922	07/06/95	2:14	NA	64.5[a]	Half of sample volume measured from each tank using glass measuring cup
Hydrolysis (24-hour)	28923	07/06/95	14:00	10.6[a]	63[a]	Half of sample volume measured from each tank using glass measuring cup
Activated Carbon (60-liter)	28924	07/10/95	8:20-8:45	7.04	NA	Collected in 4-L glass jar from carbon column effluent tubing
Activated Carbon (120-liter)	28925	07/10/95	19:08-20:30	7.02	NA	Collected in 9.6-L glass jar from carbon column effluent tubing
Activated Carbon (180-liter)	28926	07/11/95	7:22-9:47	7.00	NA	Collected in 4-L glass jar from carbon column effluent tubing
Activated Carbon (240-liter)	28927	07/11/95	14:55-19:15	7.05	NA	Collected in stainless steel tank from carbon column effluent tubing

[a] Average of both tanks.
NA - Information not available.
SCC - Sample Control Center.

the emulsion-breaking aliquot and the control aliquot; therefore, a settling step was used instead of an emulsion-breaking step for the pilot-scale UTS treatment test.

4.3.2 Settling

After the emulsion-breaking pretest, the stainless steel tanks were removed from the refrigerator and their contents were remixed. Tank 1, which contained 156 liters of wastewater, was mixed using the paddle mixer, and Tank 2, which contained 163 liters of wastewater, was mixed using the Lightning®

mixer. Both mixers effectively mixed the contents of the tanks, so the difference in mixer types should not have affected the test results. After mixing, the influent and influent duplicate samples were collected by scooping the well-mixed wastewater into a glass measuring cup and pouring it into the appropriate sample bottles. For each sample bottle, a volume of wastewater equal to half of its capacity was collected from one tank, and the remainder of the volume was collected from the other tank.

The wastewater was allowed to settle overnight. After settling, the supernatant from Tank 1 was pumped into a plastic tank using the submersible sump pump. The supernatant volume was about 92% of the original Tank 1 volume. The supernatant from Tank 2 was pumped into a separate plastic tank. The supernatant volume was about 91% of the original Tank 2 volume. The stainless steel tanks, sump pump, and Lightning® and paddle mixers were cleaned for future use.

A sample of the supernatant was collected by scooping water from the plastic tanks into a glass measuring cup and pouring the wastewater into the appropriate sample bottles. For each sample bottle, a volume of wastewater equal to half of its capacity was collected from one tank, and the remainder of the volume was collected from the other tank. The wastewater was then pumped back into the stainless steel tanks and placed in the walk-in refrigerator.

4.3.3 Hydrolysis

A volume of 146 liters of wastewater was contained in each stainless steel tank at the start of the hydrolysis testing. Electric band heaters were used to heat the tanks, and 5.3 liters of 40% sodium hydroxide (w/w) were added to the Tank 1 to raise its pH from 5.81 to 12.02. The pH of Tank 2 was raised from 5.78 to 12.04 through the addition of 4.9 L of 40% sodium hydroxide (w/w). Aluminum foil was used to insulate the tanks and to reduce evaporation during the heating. The Lightning® mixer (Tank 1) and the paddle mixer (Tank 2) were used to mix the wastewater throughout the hydrolysis test. After about five hours of heating, the tanks achieved the target temperature of 60°C. The temperatures of the tanks varied between 52°C and 74°C over the next 24 hours. Table A-3 of Appendix A lists the operating data for the hydrolysis test.

Samples of the hydrolysis wastewater were collected at 6, 12, and 24 hours after the tanks initially reached 60°C by scooping the well-mixed wastewater into a glass measuring cup and pouring it into the appropriate sample bottles. For each sample bottle, a volume of wastewater equal to half of its capacity was collected from one tank, and the remainder of the volume was collected from the other tank. Approximately 20 liters of wastewater were collected for the samples from each tank; about 135 liters of wastewater remained in each tank following completion of hydrolysis. The volume of wastewater lost due to evaporation during the hydrolysis step was negligible.

After the 24-hour hydrolysis sample was collected, the pH of Tank 1 was reduced from 10.6 to 6.4 using 1.22 L of 36 N sulfuric acid, and the pH of Tank 2 was adjusted from 10.8 to 7.2 using 1.22 L of 36 N sulfuric acid. The wastewater was pumped from each of the hydrolysis tanks through a 10-mm filter into separate plastic tanks using the sump pump. The filter became clogged several times with solids from the wastewater and was replaced twice during the pumping of each tank. The wastewater was pumped from the plastic tanks back into the stainless steel tanks, and was then placed in the walk in-refrigerator to prevent biological growth. The plastic tanks, paddle mixer, and sump pump were cleaned for reuse.

4.3.4 Activated Carbon Adsorption

The wastewater was removed from the walk-in refrigerator and approximately 38 liters were pumped from each tank into the plastic activated carbon feed tank. The stainless steel tanks were then returned to the walk-in refrigerator to prevent biological growth. The wastewater from the activated carbon feed tank was pumped using the peristaltic pump through flexible tubing into the top of the column. The wastewater passed down through the column, out the bottom of the column, and into another length of flexible tubing from which samples were taken. The wastewater flow rate through the column was maintained at a rate of 85 to 98 milliliters per minute throughout the test. Samples were collected after 60, 120, and 180 liters of wastewater had passed through the column. The column effluent was collected into glass jars and poured from the glass jars into the appropriate sample bottles. A final sample was collected after 240 liters of wastewater had passed through the column. Throughout the test, the activated carbon effluent had the same brownish color as the influent.

Additional wastewater from the stainless steel tanks was pumped into the activated carbon feed tank after the first 60 liters had been treated and about 12 liters of wastewater remained in the feed tank. Approximately 38 liters of wastewater were pumped from each tank into the plastic activated carbon feed tank. The stainless steel tanks were then returned to the walk-in refrigerator to prevent biological growth. About 27 liters remained in the activated carbon feed tank following collection of the 120-liter sample. Another 38 liters of wastewater were pumped from each stainless steel tank into the plastic activated carbon feed tank. The stainless steel tanks were then returned to the walk-in refrigerator to prevent biological growth. About 17 liters of wastewater remained in the feed tank following collection of the 180-liter sample, and the remaining wastewater in the stainless steel tanks was pumped into the plastic activated carbon feed tank. About 22 liters were pumped from Tank 1, and about 34 liters were pumped from Tank 2.

4.4 Facility C Treatability Test

Facility C formulates and packages fertilizer and herbicide products, and toll formulates products for other companies. The products formulated in the dry formulations area contain the PAIs ametryn, atrazine, cyanazine, ethalfluralin, metolachlor, and pendimethalin. For four to five weeks prior to sample collection, Facility C accumulated interior cleaning water from the washing of formulating and packaging equipment for dry products and wash water from floor washings in the dry formulation area. This wastewater was stored on site in a 20,000-gallon stainless steel tank and based on the odor and scum content, this wastewater supported biological growth. During wastewater collection, the wastewater was allowed to drain by gravity from the storage

Table 4-5
Summary of Wastewater Sampling for UTS Treatability Testing of Facility C Wastewater

Sample	SCC No.	Sample Date	Sample Time	pH	Temp. (°C)	Collection Method
UTS Influent	29769	07/28/95	10:30	7	13	Half of sample volume measured from each tank using glass measuring cup
UTS Influent (duplicate)	29770	07/28/95	10:30	7	13	Half of sample volume measured from each tank using glass measuring cup
Emulsion-Breaking Supernatant	29771	07/30/95	9:30	2.09	33	Half of sample volume measured from each tank using glass measuring cup
Hydrolysis (6-hour)	29772	07/31/95	20:15	12	NA	Half of sample volume measured from each tank using glass measuring cup
Hydrolysis (12-hour)	29773	08/01/95	2:30	NA	NA	Half of sample volume measured from each tank using glass measuring cup
Hydrolysis (24-hour)	29774	08/01/95	2:00	12	59	Half of sample volume measured from each tank using glass measuring cup
Activated Carbon (60-liter)	29775	08/02/95	7:50-8:40	7	21	Collected in 4-L glass jar from carbon column effluent tubing
Activated Carbon (120-liter)	29776	08/02/95	22:15-23:00	7	18	Collected in 9.6-L glass jar from carbon column effluent tubing
Activated Carbon (200-liter)	29778	08/03/95	9:00-14:30	7.9	NA	Collected in stainless steel tank from carbon column effluent tubing

NA - Information not available.
SCC - Sample Control Center.

tank through a hose connected to a valve at the bottom of the tank into fourteen 30-liter carboys. Approximately 420 liters of wastewater were collected. The wastewater had an opaque, gray appearance and a strong odor.

The wastewater was collected on July 27, 1995, and was transported by van from Facility C to Radian's Milwaukee, Wisconsin laboratory facilities. The wastewater arrived on July 27 and was placed in the walk-in refrigerator until treatability testing began. The UTS treatability testing of Facility C wastewater began on July 28, 1995 and was completed by August 3, 1995. Table 4-5 lists the sample point description, SCC number, date and time of sample collection, pH, temperature and collection method for the samples collected during the Facility C treatability test.

4.4.1 Emulsion-Breaking Pretest

On July 28, 1995, the wastewater in twelve of the carboys was poured into two stainless steel tanks, Tank 1 and Tank 2. The wastewater in the remaining two carboys was held in reserve. The wastewater was an opaque, gray color. After the wastewater was poured into the stainless steel tanks, the tanks were vigorously mixed using the milk-jug mixers, and the influent and influent duplicate samples were collected by scooping the well-mixed wastewater into a glass measuring cup and pouring it into the appropriate sample bottles. For each sample bottle, a volume of wastewater equal to half of its capacity was collected from one tank, and the remainder of the volume was collected from the other tank.

After the influent and influent duplicate samples were collected, three 1.5-liter aliquots were collected for the emulsion-breaking pretest. The tanks were then placed in a walk-in refrigerator at 4°C to prevent biological growth.

The pH of the first aliquot of wastewater was lowered from 7.38 to 2.01 by adding 1.1 ml of 36 N sulfuric acid. The temperature was raised to 60°C for one hour as it was mixed; the aliquot was then allowed to cool and settle overnight. Visible settling of a brown flocculent began to occur when the mixing was stopped. After settling overnight, a compact gray sludge had settled out of a translucent, yellow supernatant. The sludge occupied approximately 3% of the original aliquot volume of 1.5 liters.

The pH of the second aliquot of wastewater was raised from 7.07 to 11.74 by adding 6.1 ml of 10 N sodium hydroxide. The temperature was raised to 60°C for one hour as it was mixed; the aliquot was then allowed to cool and settle overnight. Visible settling of a brown flocculent began to occur when the mixing was stopped; however, this settling was not as dramatic as the settling that occurred in the first aliquot. After settling overnight, a gray sludge had settled out of an opaque, brown supernatant. The sludge occupied approximately 7% of the original aliquot volume of 1.5 liters, but was not as compact as the sludge in the first aliquot. The third aliquot was simply allowed to settle overnight with no heating, mixing, or pH adjustment. No visible settling occurred immediately; however, after settling overnight, about 750 ml (50% of the original volume) exhibited signs of settling. As with the second aliquot, the settling that was observed was not as complete and the sludge was not as compact as the first aliquot.

4.4.2 Emulsion Breaking

Because the pretest of the first aliquot resulted in more complete settling of the solids and a clearer supernatant, pilot-scale emulsion breaking using heat and acid was conducted on the Facility C wastewater. Each of the two stainless steel tanks of wastewater, which contained approximately 170 liters of wastewater, were removed from the walk-in refrigerator. The pH of the tanks was adjusted from 7.2 to 2.1 using 175 ml of 36 N sulfuric acid per tank. The tanks were heated from their initial temperature of 7°C using the band heaters. During the heating, Tank 1 was stirred with the paddle mixer and Tank 2 was stirred with the Lightning® mixer. After about six hours the tanks reached 60°C; the tanks were maintained at a temperature between 60°C and 70°C for one hour as the stirring was continued. A 50-ml aliquot of Tank 1 wastewater was collected in a 50-ml glass graduated cylinder for the purpose of more accurately identifying the volume of sludge that would settle out of the wastewater. The mixers were then stopped, and the wastewater was allowed to cool and settle overnight.

A noticeable settling of a brown flocculent in a translucent yellow supernatant began to occur as soon as the mixers were stopped. After settling overnight the supernatant in Tank 1 appeared to be a translucent yellow color, while the supernatant in Tank 2 appeared to be a slightly turbid green color. The 50-ml aliquot taken from Tank 1 contained a translucent, yellow supernatant with 2 ml (or 4%) of gray sludge.

The emulsion-breaking effluent sample was collected from the tanks by scooping the supernatant into a glass measuring cup and pouring it into the appropriate sample bottles. For each sample bottle, a volume of wastewater equal to half of its capacity was collected from one tank, and the remainder of the volume was collected from the other tank.

The supernatant from Tank 1 was pumped into a plastic tank using the sump pump. However, turbulence from the sump pump caused the sludge to resuspend. The supernatant was then pumped back into Tank 1, and the emulsion-breaking process was repeated by heating the tank back to 60°C and stirring its contents with the paddle mixer. While Tank 1 was reheating, the supernatant from Tank 2 was pumped to a plastic tank using a centrifugal pump, which did not cause the supernatant to resuspend. About 8 liters (or 4.7%) of sludge remained in the tank after the supernatant was pumped from Tank 2.

Because Tank 1 was already at a pH of about 2, no pH adjustment was required prior to performing the emulsion-breaking step on Tank 1 a second time. The tank was reheated to 60°C and the temperature was maintained for one hour as the contents of the tank were mixed with the paddle mixer. The mixer was then turned off and the tank was allowed to cool and settle for about three hours. A translucent, yellow supernatant was then pumped from Tank 1, using the centrifugal pump, into a separate plastic tank, which left about 4 liters (or 2.3%) of gray sludge in Tank 1. The sludge from both Tank 1 and Tank 2 was disposed of, and the tanks, mixers, and pumps were cleaned for future use. The plastic tanks of supernatant were cooled overnight.

4.4.3 Hydrolysis

After cooling overnight, the supernatant from Tank 1 was pumped back into Tank 1, and the supernatant from Tank 2 was pumped back into Tank 2. Electric band heaters were used to heat the tanks, and 550 ml of 40% sodium hydroxide (w/w) was added to each tank to raise the pH. The pH of Tank 1 was raised from 2.05 to 11.33, and the pH of Tank 2 was raised from 2.05 to 11.43. During the hydrolysis testing, the paddle mixer was used to stir Tank 1, and the Lightning® mixer was used to stir Tank 2. After about five hours of heating, the pH reading for each tank was approximately 11; therefore, an additional 50 ml of 40% sodium hydroxide (w/w) was added to each tank to raise its pH to 12. After about five and one-half hours of heating, the tanks achieved the target temperature of 60°C. The temperatures of the tanks varied between 50°C and 70°C over the next 24 hours. The temperatures of the tank were not recorded; therefore, no table of operating data is provided for the hydrolysis of wastewater from Facility C. About one hour after the tanks achieved their target temperature, aluminum foil was placed over the tops of the tanks to insulate the tanks and to reduce evaporation during the heating.

Samples of the hydrolysis wastewater were collected at 6, 12, and 24 hours after the tank initially reached 60°C by scooping the well-mixed wastewater into a glass measuring cup and pouring it into the appropriate sample bottles. For each sample bottle, a volume of wastewater equal to half of its capacity was collected from one tank, and the remainder of the volume was collected from the other tank. The wastewater in both tanks appeared translucent yellow throughout the hydrolysis testing. Sampling personnel noted that a small amount of brown sludge settled to the bottoms of the samples. However, this sludge became resuspended in the samples that were preserved to neutral or acidic pH, resulting in a slightly turbid brown sample.

After the 24-hour hydrolysis sample was collected, Tanks 1 and 2 were cooled by submerging a length of stainless steel tubing in the two wastewaters; noncontact cooling water was circulated through the tubing while the tank contents were stirred with the paddle mixer. Approximately 45 minutes were required to cool Tank 1 from its temperature of 59°C to 35°C; Tank 2 required about 40 minutes to lower the temperature from 55°C to 35°C.

4.4.4 Activated Carbon Adsorption

Following hydrolysis, the pH of Tank 1 was adjusted from about 12 to 7 using 100 ml of 36 N sulfuric acid. The pH of Tank 2 was also adjusted using 100 ml of 36 N sulfuric acid, which lowered its pH from about 12 to 4. An additional 60 ml of 40% sodium hydroxide (w/w) was added to Tank 2 to raise its pH to 7. The wastewater turned a slightly turbid brown color during the pH adjustment.

Using the sump pump, 30 liters of wastewater from Tank 1 were pumped through a 10-mm filter into a plastic tank with volume gradations marked on the side of the tank. The filtered water was then poured into the plastic activated carbon feed tank. This process was repeated with 30 liters of wastewater from Tank 2; however, the filter became clogged with solids from the wastewater and was replaced. An additional 30 liters of wastewater were pumped again from each tank using the same procedures, but again the filter become clogged and had to be replaced. Yellow-brown solids were caked on the filters when they were replaced. The total volume of wastewater pumped to the activated carbon feed tank was 120 liters. Tank 1 and Tank 2 were then placed in the walk-in refrigerator to prevent biological growth in the wastewater.

The wastewater from the activated carbon feed tank was pumped by the peristaltic pump through flexible tubing into the top of the column. The wastewater passed down through the column, out the bottom of the column, and into another length of flexible tubing from which samples were taken. The activated carbon effluent was initially clear, but it developed a faint yellow-green tinge after about 60 liters of wastewater had passed through the column. The wastewater flow rate through the column was maintained at a rate of 82 to 93 milliliters per minute throughout the test. A sample was collected after 60 liters of wastewater had passed through the column by collecting the column effluent into a glass jar and pouring the treated effluent from the glass jar into the appropriate sample bottles.

About six hours after the collection of the 60-liter sample, an additional volume (35 liters) of wastewater from Tank 1 was pumped, using the submersible sump pump, through a 10-mm filter into a plastic tank with volume gradations marked on the side of the tank. The filtered water was poured into the plastic activated carbon feed tank, and the filter, which had become caked with yellow-brown solids during the pumping, was replaced. This process was repeated with 35 liters of wastewater from Tank 2 and then with the remaining 8 liters of wastewater from Tank 1 and the 22 liters from Tank 2.

About one hour after the remaining wastewater was filtered into the activated carbon feed tank, the flow rate through the carbon column decreased to about 40 milliliters per minute, and a cake of solids was visible on top of the carbon packed in the column. The wastewater in the activated carbon feed tank was then refiltered using a 5-mm filter by pumping the wastewater from the carbon feed tank through the 5-mm filter into a clean plastic tank. Yellow-brown solids accumulated on the filter during the filtration. The activated carbon column was then backwashed with about 1 liter of distilled water, which caused the caked solids at the top of the column to break apart. However, some air became entrapped in the column during the backwashing. A vacuum of about 18 centimeters of mercury was applied to the column for 15 minutes while the column was tapped with a mallet to remove the entrapped air. Some air bubbles remained in the spaces between the carbon granules following this procedure. The column was then restarted and the flow rate of wastewater from the activated carbon feed tank was adjusted to 85 milliliters per minute.

A sample was collected after a total of 120 liters of wastewater had passed through the column by collecting the column effluent into a glass jar and pouring the treated effluent from the glass jar into the appropriate sample bottles. Two additional samples of the carbon effluent were planned, one at 180 liters of effluent and one at 240 liters of effluent, but only a total of about 220 liters of wastewater was available for activated carbon treatment because wastewater was lost to evaporation during the hydrolysis and emulsion-breaking steps. Therefore, only one additional sample was taken after 200 liters of wastewater had passed through the column.

APPENDIX E

Guidance on the Baseline Monitoring Report (BMR) and General Pretreatment Regulation Requirements

Introduction

Appendix E includes guidance from EPA on requirements of the Baseline Monitoring Report (BMR) and general pretreatment requirements. This appendix comprises two attachments that consist or or are excerpted from already issued EPA guidance.

Attachment 1 is an excerpt from the EPA Pretreatment Bulletin #13, which discusses the applicability of categorical pretreatment standards in specific situations, including zero discharge industrial users. A PFPR facility is a categorical industrial user (CIU) and is subject to the PFPR regulations of "no discharge of wastewater pollutants" (or the P2 alternative) when there is a potential to discharge any of the PFPR process wastewater covered by the PFPR regulation. If the only wastewater that a PFPR facility discharges (or has the potential to discharge) is not a regulated process wastewater under the PFPR effluent guidelines, then the PFPR facility is not covered by the PFPR effluent guidelines and the facility is not a CIU for that discharge for purposes of 40 CDR Part 403 (General Pretreatment Stadards). Attachment 1 provides more detail on the definition of potential to discharge for industrial users.

Attachment 2 is a copy of a memornadum from the Engineering and Analysis Division and the Permits Division with EPA's Office of Water to the Water Management Division Directors of all 10 EPA regions, discussing the Baseline Monitoring Report requirements for PFPR facilities. The memorandum briefly discusses the background of the PFPR rule, the issues associated with complying with both the P2 alternative and BMR requirements, and guidance for PFPR facilities in fulfilling the BMR requirements until the General Pretreatment Regulations can be modified to accomodate the PFPR compliance requirements.

ATTACHMENT 1: APPLICABILITY OF CATEGORICAL PRETREATMENT STANDARDS TO "ZERO-DISCHARGE" INDUSTRIAL USERS*

The Environmental Protection Agency (EPA) recently issued guidance concerning the applicability of categorical pretreatment standards to zero-discharge industrial users (IU) in a letter from Jeffrey Lape, Acting Chief, Pretreatment and Multimedia Branch, to Robert Babcock, Pretreatment Field Support Unit, Michigan Department of Natural Resources, dated April 16, 1993. If an IU is subject to categorical pretreatment standards, it satisfies one of four criteria for an IU to be deemed a significant industrial user (SIU) as defined by 40 CFR Part 403.3(t). Once defined an SIU, minimum requirements are established for the control authority (e.g., issuance of an individual control mechanism, annual inspection and monitoring).

An SIU includes "All industrial users subject to Categorical Pretreatment Standards under 40 CFR Part 403.6 and 40 CFR Chapter I, Subchapter N" (40 CFR Part 403.3(t)(1)). For this purpose, an IU is deemed to be a categorical industrial user (CIU) when it meets the applicability requirements for a specific category and is subject to pretreatment standards for existing sources (PSES) or pretreatment standards for new sources (PSNS).

Although there are many industrial categories with promulgated effluent guidelines and standards, not all contain PSES or PSNS requirements. Where an IU falls within a promulgated industrial category that only provides reference to the general pretreatment provisions in 40 CFR Part 403 (or its predecessor, Part 128), this alone would not be considered PSES or PSNS requirements, and the IU would not be considered to be subject to categorical pretreatment standards. This position was articulated in Pretreatment Bulletin #3 (November 6, 1987) and in a memorandum entitled "Non-Consent Decree Categorical Pretreatment Standards" from James Elder, Director, Office of Water Enforcement and Permits, dated August 24, 1988.

The following address the applicability of categorical pretreatment standards in specific situations, including zero-discharge IUs.

1. Where an IU operates a categorical process, but no regulated process wastewater is discharged or has the potential to be discharged to the publicly owned treatment works (POTW), should the IU be considered a CIU, and therefore an SIU, even if it discharges other unregulated process or sanitary wastes?

Answer: No. If the only wastestream that an IU discharges or could potentially discharge to the POTW is not subject to PSES or PSNS requirements, it is not a CIU for purposes of that discharge or for purposes of 40 CFR Part 403. An example of this situation would be a metal finisher that discharges its sanitary wastes to the POTW and all of its regulated process wastewater to a receiving water under a National Pollutant Discharge Elimination System (NPDES) permit. This facility would not be considered a categorical industry for purposes of the SIU definition since no PSES or PSNS requirements would apply. Of course, noncategorical IUs are still subject to the General Pretreat-

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*Reprinted from the U.S. EPA Pretreatment Bulletin #13, October 1993, Office of Wastewater Enforcement and Compliance.

ment Regulations and local limits, may warrant periodic inspection and monitoring by the control authority, and may be considered an SIU because of the other criteria in 40 CFR 403(t).

An important example to consider here would be a metal finisher that performs any one of the six primary qualifying operations for which there is no potential to discharge at any time but also performs one of the 40 ancillary process operations for which there is a corresponding indirect discharge. This facility would be considered a categorical industry because PSES or PSNS requirements would apply to the regulated wastestream from the ancillary process. This position has been articulated in a letter from Baldwin Jarrett, U.S. EPA, to Grace Scott, Michigan Department of Natural Resources, dated April 28, 1992.

2.A. If a categorical pretreatment standard requires testing or a certification statement (i.e., certification that a particular pollutant or process is not used, as in the case of paper and pharmaceutical standards) and a facility certifies that it does not use the pollutant of concern, is it still a CIU?

Answer: Yes. These are specific PSES and PSNS requirements and an IU that meets the applicability requirements of the categorical standard would be considered a CIU and thus an SIU.

2.B. Is the certification a one-time statement, or is it required as part of the categorical industry's continued compliance report?

Answer: If the categorical pretreatment standard requires a testing or certification statement, the CIU must report and certify that it is not using the pollutant of concern, and this must be done semiannually as required by 40 CFR Part 403.12, unless specified otherwise by the categorical pretreatment standard. This certification provision only applies where prescribed by a categorical pretreatment standard. Any IU that is subject to a categorical pretreatment standard (PSES or PSNS) that does not contain a certification requirement must sample and report on all regulated pollutants at least twice per year even if it is not using the pollutant of concern.

3. If an IU is subject to a categorical pretreatment standard which provides a requirement of "no discharge of pollutants," or similar requirement, is the IU considered a CIU?

Answer: Yes, provided that there is a potential to discharge a wastestream that is subject to the standard. There are a number of categorical pretreatment standards which have PSES or PSNS requirements that contain such language. An IU subject to this particular PSES or PSNS requirement is considered a CIU, and thus an SIU. However, if the only wastestream that an IU discharges or could potentially discharge to the POTW is not subject to PSES or PSNS (i.e., sanitary wastes), then the analysis would be as set forth in question 1 above and the facility would not be considered a CIU. This further develops the position articulated in the memorandum referred to above from James Elder, dated August 24, 1988, and another memorandum from James Elder, dated February 16, 1989, entitled "Conventional Pollutants Regulated by Categorical Pretreatment Standards."

4. If a facility has a regulated process wastestream and employs a treatment system that results in 100% recycle, is it considered a CIU?

Answer: The situation here is essentially the same as in question 1. If the IU uses a 100% recycle of regulated process wastewater and does not have the potential to discharge regulated process wastewater to the POTW, the IU would not be considered a CIU.

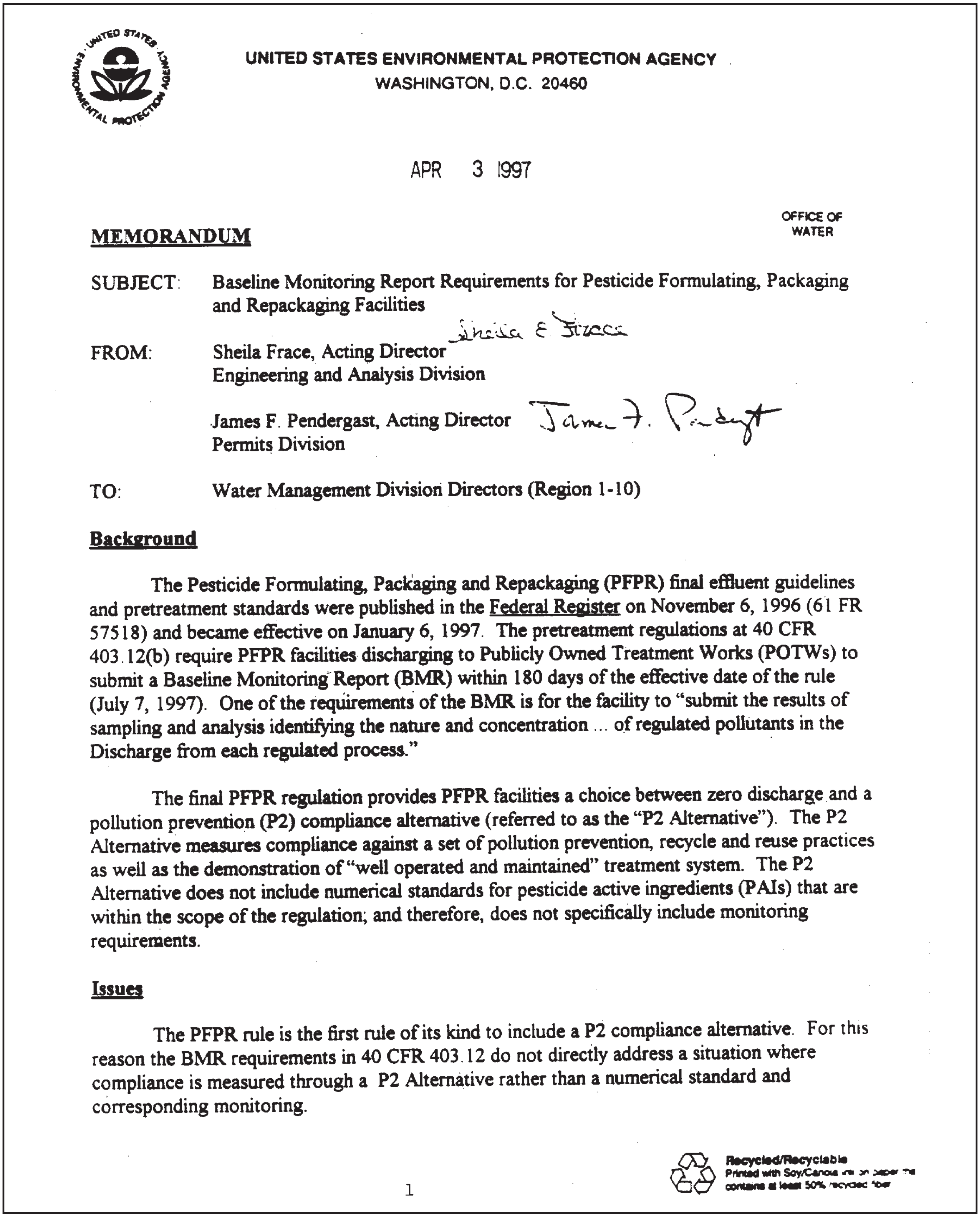
CIUs that employ a 100% recycle or claim no discharge of regulated process wastewater should be thoroughly evaluated through an on-site inspection to determine if there is any reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement due to accidental spills, operational problems, or other causes. If the control authority concludes that no regulated process wastewater can reach the POTW, and therefore, the IU has no reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement, the IU need not be designated a CIU and thus an SIU, as provided by 403.3(t).

As a precaution, however, even if the control authority determines that a zero discharge facility is not a CIU, it is suggested the control authority issue a permit (or equivalent individual control mechanism) to the facility containing at least the following conditions:

- "No discharge of process wastewater is permitted."
- Requirements to notify the POTW of any changes in operation resulting in a potential for discharge.
- Requirements to certify semiannually that no discharge has occurred.
- Notice that the POTW may inspect the facility as necessary to assess and assure compliance with the "no discharge requirement."
- Requirements to comply with Resource Conservation and Recovery Act (RCRA) and state hazardous waste regulations regarding the proper disposal of hazardous waste.

If you have any questions concerning this guidance, please contact: Permits Division (4203), U.S. EPA, 401 M Street, SW, Washington, DC 20460, (202) 260-9545.

ATTACHMENT 2: BASELINE MONITORING REPORT REQUIREMENTS FOR PESTICIDE FORMULATING, PACKAGING, AND REPACKAGING FACILITIES



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

APR 3 1997

OFFICE OF
WATER

MEMORANDUM

SUBJECT: Baseline Monitoring Report Requirements for Pesticide Formulating, Packaging and Repackaging Facilities

FROM: Sheila E Frace
Sheila Frace, Acting Director
Engineering and Analysis Division

James F. Pendergast
James F. Pendergast, Acting Director
Permits Division

TO: Water Management Division Directors (Region 1-10)

Background

The Pesticide Formulating, Packaging and Repackaging (PFPR) final effluent guidelines and pretreatment standards were published in the Federal Register on November 6, 1996 (61 FR 57518) and became effective on January 6, 1997. The pretreatment regulations at 40 CFR 403.12(b) require PFPR facilities discharging to Publicly Owned Treatment Works (POTWs) to submit a Baseline Monitoring Report (BMR) within 180 days of the effective date of the rule (July 7, 1997). One of the requirements of the BMR is for the facility to "submit the results of sampling and analysis identifying the nature and concentration ... of regulated pollutants in the Discharge from each regulated process."

The final PFPR regulation provides PFPR facilities a choice between zero discharge and a pollution prevention (P2) compliance alternative (referred to as the "P2 Alternative"). The P2 Alternative measures compliance against a set of pollution prevention, recycle and reuse practices as well as the demonstration of "well operated and maintained" treatment system. The P2 Alternative does not include numerical standards for pesticide active ingredients (PAIs) that are within the scope of the regulation; and therefore, does not specifically include monitoring requirements.

Issues

The PFPR rule is the first rule of its kind to include a P2 compliance alternative. For this reason the BMR requirements in 40 CFR 403.12 do not directly address a situation where compliance is measured through a P2 Alternative rather than a numerical standard and corresponding monitoring.

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Recently, industry representatives, state coordinators, and POTW pretreatment personnel have requested guidance on how to comply with the BMR requirements for those facilities choosing the P2 Alternative.

We recognize that in order to address this situation, ultimately, the regulation requiring submittal of the BMR (403.12(b)) will need to be modified. We plan to make these modifications as part of the larger streamlining initiative that is currently underway. However, such modifications will not be finalized prior to the BMR submittal date of July 7, 1997.

We have developed the following guidance in order to assist these facilities prior to the modification of the Pretreatment Regulations.

Guidance

In order to comply with the requirements of 40 CFR 403.12(b)(5), an Industrial User (IU) subject to the PFPR pretreatment standards (40 CFR 455), should submit a BMR containing the following: (1) information on the sampling and analysis of priority pollutants (see 40 CFR 423, Appendix A); (2) identification of PAI(s) which the IU expects to have in the discharge in the next 12 months; and (3) a list of the P2 practices, if any, the IU currently engages in which affect the discharge of PAIs and priority pollutants. Note that the IU must still comply with the other sections of 403.12(b).

For additional information, contact Shari Zuskin at (202) 260-7130 or Patrick Bradley at (202) 260-6963.

cc: Regional Pretreatment Coordinators (Region 1-10)
Susan Lepow, OGC-Water

APPENDIX F

Definitions

Administrator: The Administrator of the U.S. Environmental Protection Agency.

Aerosol container (DOT) leak testing wastewaters: Wastewaters from pressurization/leak testing of pesticide product containers to meet DOT shipping requirements.

Agency: The U.S. Environmental Protection Agency.

Appropriate pollution control technology: The wastewater treatment technology listed on Table 10 to Part 455 (Appendix A) for a particular PAI(s) including an emulsion breaking step prior to the listed technology when emulsions are present in the wastewater to be treated.

B.t.: Bacillus thuringiensis, a microorganism pesticide active ingredient that is excluded from the scope of the final PFPR rule.

BAT: The best available technology economically achievable, as described in Section 304(b)(2) of the Clean Water Act.

BCT: The best conventional pollutant control technology, as described in Section 304(b)(4) of the Clean Water Act.

BEJ: Best engineering judgment.

Bench-scale operation: Laboratory testing of materials, methods, or processes on a small scale, such as on a laboratory worktable.

Binder: An ingredient added in order to form films, such as a drying oil or polymeric substance.

BMP or BMPs: Best management practice(s), as described in Section 304(e) of the Clean Water Act.

BOD_5: Five-day biochemical oxygen demand. A measure of biochemical decomposition of organic matter in a water sample. It is determined by measuring the dissolved oxygen consumed by microorganisms to oxidize the organic contaminants in a water sample under standard laboratory conditions of five days and 20°C. BOD_5 is not related to the oxygen requirements in chemical combustion.

BPJ: Best professional judgment.

BPT: The best practicable control technology currently available, as described in Section 304(b)(1) of the Clean Water Act.

Bulk product: Formulated product held in inventory prior to packaging into marketable containers.

CAA: Clean Air Act. The Air Pollution Prevention and Control Act (42 U.S.C. 7401 et. seq.), as amended, *inter alia*, by the Clean Air Act Amendments of 1990 (Public Law 101-549, 104 Stat. 2399).

CFR: *Code of Federal Regulations*, published by the U.S. Government Printing Office. A codification of the general and permanent rules published in the Federal Register by the Executive departments and agencies of the federal government. The Code is divided into 50 titles which represent broad areas subject to federal regulation. Each title is divided into chapters which usually bear the name of the issuing agency, and each chapter is divided into parts covering specific regulatory areas. Citations of the *Code of Federal Regulations* include title, part, and section number (e.g., 40 CFR 1.1 - title 40, part 1, and section 1).

Changeover: Changing from one pesticide product to another pesticide product, to a non-pesticide product, or to idle equipment condition.

CN: Abbreviation for total cyanide.

CO: Abbreviation for carbon monoxide.

COD: Chemical oxygen demand (COD) - A nonconventional bulk parameter that measures the total oxygen-consuming capacity of wastewater. This parameter is a measure of materials in water or wastewater that are biodegradable and materials that are resistant (refractory) to biodegradation. Refractory compounds slowly exert demand on downstream receiving water resources. Certain of the compounds measured by this parameter have been found to have carcinogenic, mutagenic, and similar adverse effects, either singly or in combination. It is expressed as the amount of oxygen consumed by a chemical oxidant in a specific test.

Combustion device: An individual unit of equipment, including but not limited to, an incinerator or boiler, used for the thermal oxidation of organic hazardous air pollutant vapors.

Contract hauling: The removal of any waste stream from the plant or facility, excluding discharges to sewers or surface waters.

Control authority: (1) The POTW if the POTW's submission for its pretreatment program (§403.3(t)(1)) has been approved in accordance with the requirements of §403.11; or (2) the approval authority if the submission has not been approved.

Conventional pollutants: Constituents of wastewater as determined in Section 304(a)(4) of the Clean Water Act and the regulations thereunder (i.e., biochemical oxygen demand (BOD_5), total suspended solids (TSS), oil and grease, fecal coliform, and pH).

CSF: Confidential statement of formula.

CWA: Clean Water Act. The Federal Water Pollution Control Act Amendments of 1972 (33 U.S.C. 1251 et seq.), as amended, *inter alia*, by the Clean Water Act of 1977 (Public Law 95-217) and the Water Quality Act of 1987 (Public Law 100-4).

Device (packaging): Any instrument or conveyance (other than a firearm) which is intended for trapping, destroying, repelling, or mitigating any pest or any other form of plant or animal life (other than man and other than bacteria, virus, or other microorganism on or in living man or other living animals), but not including equipment used for the application of pesticides when sold separately therefrom.

Direct discharger: The discharge of a pollutant or pollutants directly to a water of the United States with or without treatment by the discharger.

DOT: Department of Transportation.

Effluent: Wastewater discharges.

EPA: The U.S. Environmental Protection Agency.

Equivalent system: A wastewater treatment system that is demonstrated in literature, treatability tests, or self-monitoring data to remove a similar level of pesticide active ingredient or priority pollutants as the applicable appropriate pollution control technology listed in Table 10 to Part 455 (Appendix A).

FATES: FIFRA and TSCA Enforcement System.

FDA: Food and Drug Administration.

FDF: Fundamentally different factors.

FIFRA: The Federal Insecticide, Fungicide, and Rodenticide Act, as amended (7 U.S.C. 135 et.seq.).

Formulation: The process of mixing, blending, or diluting one or more pesticide active ingredients with one or more other active or inert ingredients, without a chemical reaction that changes one active ingredient into another active ingredient, to obtain a manufacturing use product or an end use product.

FR: *Federal Register*, published by the U.S. Government Printing Office, Washington, D.C. A publication making available to the public regulations and legal notices issued by federal agencies. These include Presidential proclamations and Executive Orders and federal agency documents having general applicability and legal effect, documents required to be published by act of Congress and other federal agency documents of public interest. Citations of the *Federal Register* include volume number and page number (e.g., 55 FR 12345).

GMPs: Good Manufacturing Practices.

GRAS: Generally Recognized as Safe (label given to certain items by the Food and Drug Administration).

Group 1 mixtures: Any product whose only pesticidal active ingredient(s) is: a common food/food constituent or nontoxic household item; or is a substance that is generally recognized as safe (GRAS) by the Food and Drug Administration (21 CFR 170.30, 182, 184, and 186) in accordance with good manufacturing practices, as defined by 21 CFR Part 182; or is exempt from FIFRA under 40 CFR Part 152.25.

Group 2 mixtures: Those chemicals listed on Table 9 to Part 455 of the final regulation, which is included in Appendix A of this document.

Hazardous waste: Any material that meets the Resource Conservation and Recovery Act definition of "hazardous waste" contained in 40 CFR Part 261.

Incinerator: An enclosed combustion device that is used for destroying organic compounds. Auxiliary fuel may be used to heat waste gas to combustion temperatures. Any energy recovery section present is not physically formed into one manufactured or assembled unit with the combustion section; rather, the energy recovery section is a separate section following the combustion section and the two are joined by ducts or connections carrying flue gas.

Indirect discharge: The discharge of a pollutant or pollutants into a publicly owned treatment works (POTW) with or without pretreatment by the discharger.

Inert ingredient: Any substance (or group of structurally similar substances if designated by EPA), other than a pesticide active ingredient, which is intentionally included in a pesticide product.

Inorganic wastewater treatment chemicals: Inorganic chemicals that are commonly used in wastewater treatment systems to aid in the removal of pollutants through physical/chemical technologies such as chemical precipitation, flocculation, neutralization, chemical oxidation, hydrolysis, and/or adsorption.

Interior wastewater sources: Wastewater that is generated from cleaning or rinsing the interior of pesticide formulating, packaging, or repackaging equipment; or from rinsing the interior of raw material drums, shipping containers or bulk storage tanks; or cooling water that comes in direct contact with pesticide active ingredients during the formulating, packaging, or repackaging process.

Leaks and spills: Leaks and spills to be quantified are those which contain a pesticide active ingredient(s), or those which are combined prior to disposal with leaks or spills containing an active ingredient(s).

Line: Equipment and interconnecting piping or hoses arranged in a specific sequence to mix, blend, impregnate, or package, or repackage pesticide products. These products contain one or more pesticide active ingredients with other materials to impart specific desirable physical properties for a product or device, or to achieve a desired pesticide active ingredient concentration for a particular product or device, or to package it into marketable containers. The line begins with the opening of shipping containers or the transfer of active ingredient(s) and other materials from a manufacturer or another formulator/packager, or from inventory of bulk storage. The line ends with the packaging or repackaging of a product into marketable containers or into tanks for application.

Manufacture: The production of pesticide active ingredient(s) involving a chemical change(s) in the raw material(s) or intermediate precursors.

Microorganisms: Registered pesticide active ingredients that are biological control agents listed in 40 CFR 152.20(a)(3) including Eucaryotes (protozoa, algae, fungi), Procaryotes (bacteria), and Viruses.

Minimum level: The level at which an analytical system gives recognizable signals and an acceptable calibration point.

New Source: As defined in 40 CFR 122.2, 122.29, and 403.3 (k), a new source is any building, structure, facility, or installation from which there is or may be a discharge of pollutants, the construction of which commenced (1) for purposes of compliance with New Source Performance Standards, after the promulgation of such standards under CWA section 306; or (2) for the purposes of compliance with Pretreatment Standards for New Sources, after the publication of proposed standards under CWA section 307(c), if such standards are thereafter promulgated in accordance with that section.

Noncontact cooling water: Water used for cooling in formulating/packaging operations which does *not* come into direct contact with any raw material, intermediate product, by-product, waste product, or finished product. This term is not intended to relate to air conditioning systems.

Non-water quality environmental impact: An environmental impact of a control or treatment technology, other than to surface waters.

Noncontinuous or intermittent discharge: Discharge of wastewaters stored for periods of at least 24 hours and released on a batch basis.

Nonconventional pollutants: Pollutants that are neither conventional pollutants nor toxic pollutants listed at 40 CFR Section 401, including many pesticide active ingredients.

Nondetect value: A concentration-based measurement reported below the minimum level that can reliably be measured by the analytical method for the pollutant.

NO_x: Nitrogen oxides.

NPDES: The National Pollutant Discharge Elimination System, a federal program requiring industry dischargers, including municipalities, to obtain permits to discharge pollutants to the nation's water, under Section 402 of the CWA.

NRDC: Natural Resources Defense Council.

NSPS: New source performance standards. This term refers to standards for new sources under Section 306 of the CWA.

OPCSF: Organic Chemicals, Plastics, and Synthetic Fibers Manufacturing Point Source Category (40 CFR Part 414).

P2: Pollution prevention (see Source Reduction).

Packaging: Enclosing or placing a formulated pesticide active ingredient into a marketable container.

PAI (Pesticide Active Ingredient): Any technical grade active ingredient used for controlling, preventing, destroying, repelling, or mitigating any pest. The PAIs may make up only a small percentage of the final product which also consists of binders, fillers, diluents, etc.

Pesticide: A pesticide means any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest or intended for use as a plant regulator, defoliant, or desiccant other than any article that:

1) Is a new animal drug under Federal Food, Drug, and Cosmetic Act (FFDCA) Section 201(w), or
2) Is an animal drug that has been determined by regulation of the Secretary of Health and Human Services not to be a new animal drug, or
3) Is an animal feed under FFDCA Section 201(x) that bears or contains any substances described by 1 or 2 above.

See CFR §122.5 for a definition of pest, §152.8 for a description of products that are *not* pesticides because they are not for use against pests. See §152.10 for a description of products that are not pesticides because they are not deemed to be used for pesticidal effect and §152.15 for a description of pesticide products required to be registered under the Federal Fungicide, Insecticide, and Rodenticide Act.

Pesticide-producing establishment: As defined under FIFRA, any site where a pesticide product, active ingredient, or device is produced, regardless of whether the site is independently owned or operated, and regardless of whether the site is domestic and producing a pesticidal product for export only, or foreign and producing any pesticidal product for import into the United States.

PFPR/Manufacturers: Pesticide manufacturers that also perform pesticide formulating, packaging, and/or repackaging at their facilities.

PFPR: Pesticide formulating, packaging, and repackaging operations.

Pilot-scale: The trial operation of processing equipment which is the intermediate stage between laboratory experimentation and full-scale operation in the development of a new process or product.

PM: Particulate matter.

Point source category: A category of sources of water pollutants that are included within the definition of "point source" in Section 502(14) of the CWA.

Pollutant (to water): Chemical constituent, dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, certain radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt, and industrial, municipal, and agricultural waste discharged into water. See CWA Section 502(6); 40 CFR 122.2.

Pool chemicals: Pesticide products that are intended to disinfect or sanitize, reducing or mitigating growth or development of microbiological organisms including bacteria, algae, fungi or viruses in the water of swimming pools, hot tubs, spas or other such areas in the household and/or institutional environment, as provided in the directions for use on the product label.

POTW or POTWs (Publicly owned treatment works): A treatment works as defined by Section 212 of the CWA, which is owned by a state or municipality (as defined by Section 502(4) of the Act). This definition includes any devices and systems used in the storage, treatment, recycling and reclamation of municipal sewage or industrial wastes of a liquid nature. It also includes sewers, pipes, and other conveyances only if they convey wastewater to a POTW Treatment Plant. The term also means the municipality as defined in Section 502(4) of the CWA, which has jurisdiction over the indirect discharges to and the discharges from such a treatment works.

PPA: Pollution Prevention Act of 1990 (42 U.S.C. 13101 et seq., Pub.L. 101-508, November 5, 1990).

Pretreatment standard: A regulation specifying industrial wastewater effluent quality required for discharge to a POTW.

Priority pollutants: The toxic pollutants listed in 40 CFR Part 423, Appendix A.

Process: The steps performed on a pesticide active ingredient or group of pesticide active ingredients, beginning with the opening of shipping containers containing pesticide active ingredient(s) (or transfer of active ingredient(s) from a manufacturing or another formulating operation), including the physical mixing of these pesticide active ingredients with each other or with nonpesticide materials, and concluding with the packaging of a product into marketable containers.

Process wastewater collection system: A piece of equipment, structure, or transport mechanism used in conveying or storing a process wastewater stream. Examples of process wastewater collection system equipment include individual drain systems, wastewater tanks, surface impoundments, and containers.

PSES: Pretreatment standards for existing sources of indirect discharges, under Section 307(b) of the CWA.

psig: Pounds per square inch gauge.

PSNS: Pretreatment standards for new sources of indirect discharges, under Section 307(b) and (c) of the CWA.

R&D: Research and Development.

RCRA: Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6901, et seq.).

RCRA empty: A container or an inner liner removed from a container that has held any hazardous waste, except a waste that is a compressed gas or that is identified as an acute hazardous waste listed in 40 CFR 261.31, 261.32, or 261.33(e) is empty if:

(i) All wastes have been removed that can be removed using the practices commonly employed to remove materials from that type of container (e.g., pouring, pumping, and aspirating), and

(ii) No more than 2.5 centimeters (one inch) of residue remain on the bottom of the container or inner liner, or

(iii)(A) No more than 3 percent by weight of the total capacity of the container remains in the container or inner liner if the container is less than or equal to 110 gallons in size, or

(B) No more than 0.3 percent by weight of the total capacity of the container remains in the container or inner liner if the container is greater than 110 gallons in size. (40 CFR 261.7).

Reagents: Chemicals used to cause a chemical reaction.

Repackaging: The direct transference of a single pesticide active ingredient or single formulation from any marketable container to another marketable container, without intentionally mixing in any inerts, diluents, solvents, or other active ingredients, or other materials of any sort.

Reuse: The use in product formulation or cleaning operations of all or part of a waste stream produced by an operation which would otherwise be disposed of, whether or not the stream is treated prior to reuse, and whether the reused waste stream is fed to the same operation or to another operation.

Sanitizer products: Pesticide products that are intended to disinfect or sanitize, reducing or mitigating growth or development of microbiological organisms including bacteria, fungi or viruses on inanimate surfaces in the household, institutional, and/or commercial environment and whose labeled directions for use result in the product being discharged to Publicly Owned Treatment Works (POTWs). This definition shall also include sanitizer solutions as defined by 21 CFR Part 178.1010 and pool chemicals as defined in this section (455.10(q)). This definition does not include liquid chemical sterilants (including sporicidals) exempted by 455.40(f) or otherwise, industrial preservatives, and water treatment microbiocides other than pool chemicals.

SBREFA: Small Business Regulatory Enforcement Fairness Act of 1996 (5 U.S.C. 801).

Septic system: A system which collects and treats wastewater, particularly sanitary sewage. The system is usually composed of a septic tank which settles and anaerobically degrades solid waste, and a drainfield which relies on soil to adsorb or filter biological contaminants. Solid wastes are periodically pumped out of the septic tank and hauled to off-site disposal.

Shipping container rinsate: The water or solvent which is generated by the rinsing of shipping containers.

SIC: Standard Industrial Classification. A numerical categorization system used by the U.S. Department of Commerce to denote segments of industry. An SIC code refers to the principal product, or group of products, produced or distributed, or to services rendered by an operating establishment. SIC codes are used to group establishments by the primary activity in which they are engaged.

Solvent: An ingredient added to a formulation in order to dissolve the active ingredient to form a uniformly dispersed mixture. Also liquids, other than water, used to clean pesticide formulating and packaging equipment.

Source reduction: The reduction or elimination of waste generation at the source, usually within a process. Any practice that: 1) reduces the amount of any hazardous substance, pollutant, or contaminant entering any waste stream or otherwise released into the environment (including fugitive emissions) prior to recycling, treatment, or disposal; and 2) reduces the hazards to public health and the environment associated with the release of such substances, pollutants, or contaminants.

SO_x: Sulphur oxides.

Special or nonroutine conditions: Situations which do not normally occur during routine operations. These may include equipment failure, use of binders, dyes, carriers and other materials that require additional cleaning time, or larger volumes of solvents and/or water.

SRRP: Source Reduction Review Project.

Stand-alone PFPR facility: A PFPR facility where either: 1) no pesticide manufacturing occurs; or 2) where pesticide manufacturing process wastewaters are not commingled with PFPR process wastewaters. Such facilities may formulate, package, or repackage or manufacture other nonpesticide chemical products and be considered a "stand-alone" PFPR facility.

Subcategory C: Pesticide formulating, packaging, and repackaging (PFPR), including pesticide formulating, packaging, and repackaging occurring at pesticide manufacturing facilities (PFPR/Manufacturers) and at stand-alone PFPR facilities.

Subcategory E: Repackaging of agricultural pesticide products at refilling establishments (refilling establishments).

Technical Development Document: Development Document for Best Available Technology, Pretreatment Technology, and New Source Performance Technology for the Pesticide Formulating, Packaging, and Repackaging Industry (EPA 821-R-96-019).

Technical grade of active ingredient: A material containing an active ingredient: 1) which contains no inert ingredient, other than one used for purification of the active ingredient and 2) which is produced on a commercial or pilot-plant production scale (whether or not it is ever held for sale).

Toxic pollutants: The pollutants designated by EPA as toxic in 40 CFR Part 401.15. Also known as priority pollutants.

TSCA: Toxic Substances Control Act (15 U.S.C. 2613).

TSS: Total suspended solids.

UIC: Underground Injection Control.

UMRA: Unfunded Mandates Reform Act of 1995 (Pub. L. 104-4).

UTS: Universal Treatment System, a treatment system envisioned by EPA to be sized to handle small volumes of wastewater on a batch basis and would combine the most commonly used and effective treatment technologies for PAIs (hydrolysis, chemical oxidation, activated carbon, and sulfide precipitation (for metals)) with one or more pretreatment steps, such as emulsion breaking, solids settling, and filtration.

VOCs: Volatile organic compounds.

Waters of the United States: The same meaning set forth in 40 CFR 122.2.

Wet air pollution or odor pollution control system scrubbers: Any equipment using water or water mixtures to control emissions of dusts, odors, volatiles, sprays, or other air pollutants.

Zero/P2 Alternative Option: Regulatory option promulgated by EPA that allows each Subcategory C facility a choice: to meet a zero discharge limitation or to comply with a pollution prevention (P2) alternative that authorizes discharge of PAIs and priority pollutants after various P2 practices are followed and treatment is conducted as needed.

Zero discharge: No discharge of process wastewater pollutants to waters of the United States or to a POTW.