

The Facility-Wide Permit Pilot Program

2007

**Office of Pollution Prevention and Right to Know
New Jersey Department of Environmental Protection**

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Executive Summary

The New Jersey Pollution Prevention (P2) Act of 1991 directed the New Jersey Department of Environmental Protection (Department) to undertake an innovative pilot program to issue multi-media permits that combined individual air, water and hazardous waste permitting requirements into a single document for a set of volunteer industrial facilities to attempt to develop a coordinated, holistic approach to reviewing and issuing permits. This Facility-Wide Permit (FWP) Program tested the extent to which a single, multi-media facility permit could:

- result in improved environmental results, particularly with regard to P2;
- provide facilities with greater operational flexibility
- streamline the regulatory process to encourage P2;
- improve public accountability on industrial environmental performance by involving all stakeholders in the permitting process; and,
- provide a model for improving the media-specific permitting process

Improved Environmental Results

The single greatest factor that distinguished the FWP Program from traditional Department permitting programs was the process, or model that was developed during the pilot program. This model requires that participating facilities conduct in-depth P2 materials accounting across all media, and use the results to establish reality-based release limits. All FWP facilities were required to develop P2 Plans as part of their FWP application. P2 Plans are based on a process-level materials accounting, yielding a quantitative measure of materials use, and the generation and release of multi-media waste, termed non-product output (NPO). The data obtained was used in conjunction with existing permit data to achieve enhanced environmental results, particularly the identification of unregulated emissions, multi-media transfers of pollutants, and human health risks. Two specific examples of the beneficial results are:

- Under an existing air pollution control permit, a facility was allowed to emit 2000 pounds per year of trichloroethylene (TCE), a hazardous air pollutant from a degreasing unit. The materials accounting data developed by the facility revealed actual TCE releases of 94,000 pounds per year, with the majority being reported as fugitive emissions. The facility ultimately implemented P2 measures that allowed for the removal of the degreasing unit.
- One facility treated a wide range of volatile organic compound (VOC) air emissions using a dual carbon bed adsorption system. While one carbon bed was being used to treat the air emissions, the other bed was being steamed cleaned. The VOCs driven off by the steam cleaning were condensed and sent to a publicly owned treatment works (POTW). The materials accounting data developed by the facility, corroborated by sampling data, showed VOC levels between 25 and 100,000 micro-grams per liter (ug/l) when the waste stream entered the sewer but less than 2 ug/l at the POTW. This led to the discovery that most of the VOCs that should have been treated at the POTW were actually being released back into the air via an open catch basin. Unable to implement P2 measures,

the facility greatly reduced the discharge of VOCs by installing an additional air pollution control device.

This model is also unique in that it requires multi-media process flow diagrams (PFDs) as an integral component of every permit and establishes a single point of contact for each facility. Examples of PFDs are included in Appendix C.

Operational Flexibility

Because the development of materials accounting on a facility basis leads to a better understanding of production processes, it enables permitting staff to entertain options that are not obvious under traditional permitting guidelines. One specific example of this is that of a facility that produced vinyl chloride monomer. This facility had an existing air pollution control permit that included an annual production limit. During the FWP development, the facility approached the Department about the possibility of removing this limit. The Department and the facility worked together to conduct a facility-wide risk assessment for all sources of vinyl chloride monomer releases. Using the results of the risk assessment, the Department and the facility agreed that increases would be allowed in annual production providing that there was a concomitant reduction in air releases as measured by utilizing the pounds of release per unit of product efficiency limits unique to FWPs. This allowed the facility to increase production while maintaining process efficiency and avoiding additional air pollution.

Each FWP consisted of a number of "process packages" designed to mirror the actual production processes at a facility. Each process package contained process-level tons per year emission "caps". These caps were developed to allow facilities to move equipment between processes and to add equipment without having to undergo NJDEP review. The development of these process caps utilized screening methods to ensure that they were protective of human health and the environment.

The Department also promulgated a revision to the Air Pollution Control regulations whereby a facility with an approved FWP could alter existing equipment, or install and operate, new equipment or control devices without Department pre-approval provided that the alteration or installation did not result in an increase in the generation of NPO, an exceedance of permit limits and was documented in a P2 assessment. Facilities were required to notify the Department 120 days after the alteration or installation. This allowed facilities time to verify if a P2 technique was achieving the desired results. The Department was able to determine if there were any increases in NPO via the introduction of the process-level pounds per unit of product efficiency limits.

Streamline the Regulatory Process

Incentives intended to enhance voluntary participation in the FWP program resulted in a streamlined permitting process. The Department:

- As mentioned above, promulgated a change in the Air Pollution Control regulations to allow volunteer facilities to make certain process-level changes without prior Department approval;

- assigned a single point of contact for each facility to coordinate the multi-media permitting needs of the facility;
- provided confidential technical assistance to the facilities by providing an outside consultant to assist in the development of the facilities' P2 plans;
- the facilities were provided opportunities to discuss any regulatory issues with the Department's upper management;
- each facility had the ability to withdraw from the program at any time without prejudice
- the facilities could combine their air, water and hazardous waste permitting application requirements into a single document
- the Department also committed to identify and possibly reduce or eliminate barriers to P2 implementation, operational flexibility and streamlined permitting.

Improve Public Accountability

Because the FWP model requires a review of permitting data on a multi-media level in conjunction with the P2 materials accounting data, the model provides greater transparency with regards to a facility's operations and potential impacts on the surrounding community. The model is able to uncover permitting discrepancies, unpermitted sources, environmental and human health risk issues, and areas where cross-media shifts of pollution occur. It was the ability to permit a facility as a whole instead of permitting a single piece of equipment or a single discharge point that was the true success of the program. The incorporation of P2 materials accounting data into the FWP model provided the Department and the facility with a clear understanding of the sources and impacts of pollution at the facility from a multi media standpoint.

Findings

The main findings of the FWP Program are:

- The FWP model:
 - provides a coordinated, holistic approach to permitting;
 - provides greater transparency in facility operations;
 - Led to the identification of P2 options and to reductions in hazardous substance use and generation of NPO.
 - Provides a common source from which permit data can be derived, allowing an FWP to identify unpermitted emissions and correct existing emissions data to be more consistent with actual activities at a facility.
- The process of developing the FWP model is more important than the finished product because aspects of the model can be applied to select facilities;
- The value of the product is that it provided a mandate to establish the FWP model;

- The initial step of properly defining production processes is critical to P2 planning and the subsequent development of an FWP.
- The New Jersey design of an FWP allows for the identification of total facility risks and environmental impact.
- Process level emission “caps” in an FWP offer facilities significant operational flexibility compared to traditional permit requirements and promotes P2 and multi-media emission reductions.

Recommendations

- Much of what was determined to be beneficial in the FWP model can be incorporated into existing single-media programs. Specifically the Department could:
 - Integrate P2 multi-media materials accounting procedures where appropriate in permitting programs to ensure better accountability and data collection.
 - Identify facilities where cross media shifts of pollutants can be reduced or eliminated.
 - Use the FWP model with facilities that are out of compliance with permit conditions as the means to come into compliance.
 - The Department should investigate the possibility of utilizing the "ratcheting down" authority contained in the P2 Act.

1. Introduction

In addition to creating the P2 planning and reporting program, the New Jersey P2 Act also established a pilot program for Facility-wide Permitting. The pilot program was designed to test the concept of incorporating individual air, water and hazardous waste permit requirements into a single document.

1.2 Background

The P2 Act directed the Department to undertake a pilot program with ten to fifteen industrial facilities. It provided the Department with statutory authority to revoke a facility's existing permits so that an FWP can be issued. In addition, the P2 Act provided the Department with authority to issue more stringent limits in permits as a result of the implementation of P2 options.

The P2 Act defines an FWP as a single permit incorporating a facility's air, water and hazardous waste requirements and the appropriate provisions of a P2 Plan. In developing the FWP Program, the Department set the following five goals:

- To develop a permitting model that would maximize a facility's opportunities for P2 based on a sound P2 Plan developed by the facility itself;
- To improve overall environmental quality through reductions in multi-media pollution.
- To provide facilities with additional operational flexibility;
- To streamline permitting and compliance requirements;
- To identify any statutory and regulatory barriers to P2;

Prior to enrolling facilities in the pilot program, the Department made two key regulatory decisions regarding how it would carry out the pilot:

- Although the P2 Act provides the Department with the authority to require facilities to participate in the pilot program, the Department chose to encourage voluntary participation in the program. As a voluntary program, the facilities could withdraw from the program at any point up to 30 days after the issuance of a facility's draft FWP.
- The P2 Act gives the Department authority to issue permit conditions in an FWP, based on components of a P2 Plan, that are more stringent than applicable regulatory requirements. However, in an effort to get more facilities to volunteer for the FWP Program, and to encourage these facilities to develop robust P2 Plans, the Department chose not to utilize this authority during the pilot program. By not utilizing this authority, the FWPs were restricted to the standards of existing regulatory permit programs. In some cases, unless an unacceptable risk was uncovered, the only way the Department was able to issue FWPs with more stringent permit conditions was if a facility voluntarily agreed to do so.

The FWP Program was managed within the Department's Office of Pollution Prevention and Right to Know (P2RTK). The FWP Program staff were responsible for developing the FWPs, maintaining oversight of the FWPs, and interacting with facility representatives. The FWP

Program staff worked with other permit and enforcement staff throughout the Department to ensure the regulatory compatibility of the FWP and to resolve regulatory issues.

When a facility entered the FWP Program a staff member was assigned to serve as that facility's single point of contact within the Department. The FWP Program staff worked with the single media permit programs in reviewing technical data provided in FWP permit applications, and in establishing permit limitations and conditions. The single media permitting programs provided technical and regulatory advice to the FWP Program staff, and reviewed all draft and final FWPs. Directors of the air, water and hazardous waste permit programs jointly signed final FWPs. This process ensures that all FWPs were written consistent with the regulations and policies of the single-media programs.

The FWP pilot program was initiated at approximately the same time that the Department was beginning the Title V Air Operating Permit (Operating Permits) Program, managed within the Bureau of Operating Permits. The Operating Permit Program also chose to permit all the air emissions at major air facilities into a single Operating Permit. Because this was similar to the FWP concept, the FWP program believed that the FWPs could be considered equivalent to Operating Permits. In 1997, staff from the FWP Program and the Department's Bureau of Operating Permits began work on the creation of a permit addendum. It was agreed that the FWP format would remain intact and any specific Title V requirements not addressed in the FWP design would be added via this addendum to the FWP. The Department was able to obtain US EPA's concurrence with this approach, although USEPA insisted that it would need to review every FWP to determine Operating Permit equivalency.

While the advancement of these two programs was occurring, the Department was developing its department-wide computer system, the New Jersey Environmental Management System (NJEMS). The resulting Operating Permit NJEMS module increased the differences between the FWP and Operating Permit formats. Additionally, the Department made the decision that all permits would be written utilizing NJEMS; thus rendering the addendum obsolete. Therefore, it was determined that each applicable FWP would be updated to be consistent with the Operating Permits being issued by the Bureau of Operating Permits.

The conversion of the FWPs to Operating Permits was completed in January 2006. One of the unforeseen outcomes of this conversion was the inability to maintain one issuance and expiration date for the air and water components of the FWPs. For this and other reasons, the FWP Program transferred management of the FWPs to the applicable single-media program(s), thus ending the FWP program.

1.2 Establishing the FWP Program

February 1992: Memoranda of Understanding with Three "Pre-Pilot" Facilities - Prior to the enactment of the P2 Act in 1991, three industrial facilities volunteered for the FWP Program. The "pre-pilot" component of the FWP Program allowed the Department to gain P2 experience, which assisted in the development of regulations, provided background information for development of the Department's P2 guidance document, Industrial Pollution Prevention Planning, and helped the Department develop administrative procedures for issuing FWPs.

May 1992: Memorandum of Understanding with the United States Environmental

Protection Agency – The Department entered into an agreement with USEPA for the implementation of the FWP Program. This agreement defined the working relationship between the two agencies in implementing the FWP Program and demonstrated USEPA’s support for the Program. This allowed the Department to offer industry the possibility of the FWP serving as the facilities’ Title V Air Operating Permit as an incentive.

February 1993: Adoption of P2 Rules - The Department adopted P2 regulations on February 1, 1993 that included rules governing the FWP Program..

July 1993: Distribution of Industrial Pollution Prevention Planning guidance document -

The Department’s guidance document was developed not only to assist facilities complying with industrial P2 planning requirements, but also to assist FWP facilities in developing P2 Plans which were integral in building the FWPs.

September 1993: Revision of air pre-approval regulations for FWP participating facilities.

One of the regulatory barriers to implementing P2 identified by the pre-pilot facilities was the Department’s air program requirement that facilities obtain approval prior to constructing and operating equipment or control devices covered under its rules and regulations. These pre-pilot facilities felt that it was imperative that time be given to test P2 options to verify if expected reductions would be achieved. Therefore, the Department adopted a change in air permit regulations allowing a permittee to invest time in conducting P2 evaluations to reduce emissions rather than complete a standard air permit application. The regulatory change applies only to FWP facilities. It allows the facilities to make operational changes without prior Department approval as long as multi-media emissions and nonproduct output are not increased and a P2 assessment is conducted. It should be noted that with the advent of Title V Air Operating Permits, this flexibility was diminished. Part 70 of the Clean Air Act contains no provision for post notification. The Department included language in its Air Operating Permit regulations that allowed FWP facilities with Operating Permits to make operational changes as long as they notified the Department within seven days prior to making the change. However, discussion with USEPA conducted in late 2005 revealed that USEPA misinterpreted this rule language, believing that a public notice component was inherent with all seven-day notice changes for FWP facilities. Since this was not the case, USEPA indicated that they would raise objections to allowing FWP facilities to make the majority of changes contained in the rule language.

September 1993: Deadline for facilities to volunteer for FWP Program

The Department sent information regarding the FWP Program to 70 facilities identified as good candidates for the program. Highlighted within this information were the incentives that the Department could offer to facilities volunteering to participate in the FWP Program (see table below). Follow up phone calls were made to all facilities. Eventually, thirty-five facilities expressed interest in the FWP Program. The Department met individually with representatives of these 35 facilities. This effort resulted in 26 facilities volunteering for the FWP Program.

**Incentives Offered to Facilities
Participating in the Facility-wide Permit Program**

1. Change to air permitting regulation that stipulates that FWP companies will not be required to gain prior Department approval for certain process-level facility changes.
 2. An openness on the part of the Department to experiment with other regulatory changes to promote P2, operational flexibility, and streamlined permitting.
 3. Commitment on the Department's part to encourage USEPA to accept the FWPs as Title V Air Operating Permits.
 4. Single point of contact within the Department.
 5. A single application for all air, water and hazardous waste permitting requirements.
 6. State contracts established with two private vendors to provide confidential technical and environmental cost accounting assistance, respectively, to FWP companies.
 7. Ability to withdraw from FWP Program at any time up to 30 days after the issuance of a draft FWP.
 8. Positive public recognition.
 9. Access to the Department's upper management.
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December 1993: Designation of 15 facilities for participation in the FWP Program - The Department compared the 26 facilities that volunteered for the FWP Program to the criteria included in the P2 regulation for selection of FWP facilities, designating 15 for participation.

For a chronological listing of permit issuance and brief facility summaries, see Appendix A.

1.3 Developing the FWPs

The Department worked closely with the designated facilities to develop P2 Plans that contained the data needed to develop complete FWP applications. These data included process definitions, materials accounting, process flow diagrams, sources of multi-media non-product output within the processes and P2 options. The development and analysis of these data proved to be critical to the quality of the FWPs for a number of reasons.

- Facilities are required by regulation to prepare P2 Plans only for production processes that involve Toxic Release Inventory (TRI) listed hazardous substances above specified thresholds. Thus, for many FWP facilities, the key data included in their P2 Plan would only be available for a subset of the processes included in their FWP. To prompt companies to voluntarily expand their P2 Plans to include all processes in their FWP, including non-TRI substances, the Department offered the facilities the option of finalizing their P2 Plans at the time their FWP application was submitted, rather than the July 1, 1994 regulatory deadline.
- An unanticipated benefit of combining the multi-media, process-level materials accounting data contained in the P2 Plan to permit limits and compliance data was the ability to identify discrepancies in data, unregulated emissions, and multi-media transfers of pollutants. Once these issues were identified, it was necessary to determine how to address them within the regulatory framework.
- The FWP facilities in general had not previously developed the process-level materials accounting data required for a P2 Plan. Since their P2 Plans essentially established the structure of their regulatory requirements via the FWP, their P2 Plans had even greater significance to the facilities.
- In addition to developing the process-level data in their P2 Plans, it was necessary for the FWP facilities to relate these data to existing permit and compliance data. Many of the FWP facilities found it difficult to undertake this additional work at the same time they were expected to continue to meet regulatory requirements.

All of these factors led to a much more deliberative, extensive process in the development of the FWPs than had been previously anticipated. While this process of FWP development led to successful results, the effort and commitment needed on the part of the agency and the company should not be underestimated.

2. Design of a Facility Wide Permit

There were many ways to structure the FWP model. At one extreme, it might be simply coordinating administrative permit requirements (public notice, public hearings, etc.). At another, the FWP model might consolidate and amend technical permit standards as well as administrative requirements. The Department worked toward the latter approach by redesigning the permit structure to relate directly to the materials accounting data contained in a facility's P2 Plan.

2.1 Production Process Focus

The FWP model is based on production processes at a facility. The first step is the development of the facility's P2 Plan, which defines the production processes. Through process-level materials accounting, the P2 Plan provides numeric measures of material use, generation and release information. Materials accounting eventually drives the establishment of air, water, and hazardous waste permit conditions and allows for the monitoring of P2 progress. The Department focused on the process level because:

- Much of P2 involves changing production processes to reduce hazardous substance use and releases. Basing the FWP on the process-level promotes a more in-depth examination of production processes, thus leading to enhanced P2.
- A facility's product is the result of a production process. Basing the FWPs on a production process level makes the permit more relevant to the facility's operations and bottom-line decision making.

The FWP sets a production "process-level cap" under which facilities have greater flexibility to make operational changes without prior Department approval.

- Facility-level limits result in aggregation of releases from various production processes and sources within a facility. This aggregation could result in fewer opportunities to focus on the most important sources of pollution at the facility.
- Facility-level limits could eliminate the natural advantage that a production process-level focus has on a facility's ability to change production processes for P2 purposes. Instead of driving production process P2, facility-level permit limits could drive emissions trading or other, less desirable forms of pollution abatement.
- Instituting facility-level limits could hamper regulatory agencies' and the public's ability to independently verify a facility's emissions.

By providing a focus at the process level, the FWP model forces air and water permit decisions to be made from common reference points in terms of accurate measurements at consistent locations within the facility. The Department's air pre-construction permitting program typically focuses on individual pieces of equipment that could number 100 or more at a medium-sized facility. The water permitting program on the other hand, focuses on discharges at a facility-

level. Under the existing single media permitting system, it is difficult, if not impossible, to correlate information on air releases to information on water releases even if they are for the same chemical at the facility. Water discharge data are often collected after waste streams are commingled and treated. Water permits provide no way to determine the source of the contaminants. In reality, the chemicals in air and water releases may come from common activities associated with making products at the facility.

In practice, it was realized that the design of New Jersey's FWP model was heavily biased toward the air medium. The equipment-based nature of air permitting, with the level of detail and amount of work involved, can overshadow the work required for a typical water permit. While a cursory review of an FWP may lead to the conclusion that it is "one big air permit," a closer look reveals the underlying multi-media focus. A process flow diagram (PFD) identifies pieces of equipment that contribute wastewater to on or off site effluent treatment systems, where water permit limitations are imposed. Although this equipment does not have water limitations imposed directly on them, the raw materials identified for this equipment and the related air emissions are useful in identifying the source that contributes releases to the water.

More importantly, the FWP model shows the inherent focus on P2 and multi-media releases.

An FWP is essentially a compendium of production processes. If a facility defines itself as being comprised of 12 production processes, then its FWP essentially has 12 process packages, one for each process. Each FWP has a similar format for describing the range of activities used to make products and the associated generation, treatment and ultimate release of contaminants to the environment from the facility. This format includes five sections: a Fact Sheet, a Facility-Level Section, an Administrative Section, a Technical Section and a Compliance Section. Some FWPs may have a Special Conditions Section.

2.2 Developing the Fact Sheet Section

The Fact Sheet Section covers three general areas. First, it discusses the basics of the facility operations: what products are made, how they are made, what releases occur, general size of the facility, the location of the facility and facility contacts. Second, it provides the P2 accomplishments of the facility and how they relate to emission reductions are highlighted. Future plans for P2, including the facility's P2 goals are discussed. Third, the basis for the various permit requirements for air, water and hazardous waste is discussed. Information in the Fact Sheet is not considered enforceable and is included to provide a user-friendly introduction to the facility and the basis of the permit.

2.3 Facility-Level Section

The Facility-Level Section includes a summary of facility release limits, standard requirements, and, in some instances water discharge limits. The facility release sums up the tons per year (TPY) limits from each process in the FWP. For each category and subcategory of contaminants, a facility TPY release limit is calculated. This facility TPY limit establishes two important regulatory triggers. First, it establishes a new potential to emit (PTE) for the facility. PTEs are enforceable at both the federal and state levels. They are used to determine if facility

emissions trigger requirements such as major facility status, Prevention of Significant Deterioration in attainment areas and Emission Offsets/Lowest Achievable Emission Rate in non-attainment areas. If a new PTE is above any of the thresholds established in these regulatory requirements that typically apply on a facility-wide level, the FWP must contain conditions assuring compliance with those requirements.

The summary of facility release limits also presents the facility's previous potential for air emissions before the FWP was issued and the most current actual emissions of contaminants from the facility. This information is included for comparison purposes and for documentation of any changes being made in the FWP. This comparison is useful since one objective of the FWP is to bring a facility's permitted releases more in line with their actual releases. A process summary is also presented to show how each process contributes to emissions from the facility.

The second area in the Facility-Level Section contains standard language that each permit program includes in its permit. The FWP attempts to consolidate and clarify how these requirements affect facility operations and what additional requirements will apply. Items included in this section include duty to reapply for the permit, modification procedures and emergency reporting requirements.

The third area, if applicable, includes water requirements not directly associated with production processes. These are typically applied at a facility-level instead of at a process level. For example, stormwater discharge requirements that are not tied to any production process are addressed here. These requirements usually include Best Management Practices (BMPs) and not specific limitations.

2.4 Administrative Section

The Administrative Section covers the basics of the production process: the how, what and where issues. It includes a general process description, a listing of equipment and control devices, a listing of materials used and released and the location (stack and outfall pipes) where pollutants are discharged.

An important part of the administrative section is a basic Process Flow Diagram (PFD). The goal of the PFD is to establish a framework for the permit that is based on the day to day operations of the facility. A PFD is able to convey considerable information about a facility's operations in a concise format. It can help explain a complex process, which can include 20 to 30 or more pieces of equipment, by reducing it into its component parts. More importantly, the PFD is a direct link to a facility's P2 Plan. It identifies the steps in the production processes and the sources of releases on a multi-media basis.

2.5 Technical Section

The Technical Section establishes the process-level enforceable limits for all releases from the process. The format for these limits has four key components: (1) categories and subcategories of contaminants; (2) tons/year emission caps; (3) pounds per hour (lb/hr) emission limits; and (4) pounds of emissions per unit of production (lb/product).

The categories and subcategories of contaminants are based on the regulatory lists of chemicals used in the single-media programs. A limit is established for any combination of substances within the category.

A series of lb/hr limits is established for individual pieces of equipment or groups of sources within the process. Sources can be grouped based on the functions they perform, the type of controls used, equipment size, or category of contaminant emitted. The assumptions used in developing these limits follow a “worst-case” approach.

Discharges to surface water are incorporated into the FWP as an individual process package. Sources of wastewater generated in the manufacturing processes are identified here. The water limits still apply at a facility level and are generally expressed as a concentration limit in parts per million and a mass loading limit in pounds per day. Limits are usually expressed as a daily maximum and monthly average. This is different from the air limits, which are reported as maximum hour and annual total. The mass limits provide for common units for comparing air and water releases.

The lb/product limits are deemed the P2 limits within the FWP. These limits are not enforceable and are not required to be monitored. While there is no penalty for violating these limits, they are considered as triggers for obtaining operational flexibility. These additional limits quantify the pounds of emissions associated with manufacturing one unit of product in the process. The lb/product figures are linked to the facility’s P2 Plan where actual emissions and actual production quantities are used. These limits create an efficiency baseline for a production process. Therefore, the FWP requires that a facility maintain this efficiency when new equipment is added or modifications are made to the process (such as increases in production) in return for the flexibility provided for making changes without prior approval from the Department. The intent of establishing lb/product quantities is to encourage a facility to implement P2 measures to ensure the production efficiency is maintained or improved.

2.6 Compliance Plan Section

The Compliance Plan Section lists the applicable regulatory requirements and citations that form the legal basis for imposing emission limits and other requirements in the permit. It also establishes operational limits and specifies monitoring, recording and reporting requirements.

Operational limits may include the quantity of products produced, raw material processed, hours of operation of a particular piece of equipment or other parameters specific to the process. These operational limits are developed in conjunction with the emission limits and may have the effect of a surrogate for compliance with emission limits. For example, if an operational limit is met, it may be assumed that the emission limit is likewise being met. Other types of limits may be imposed to ensure that equipment and controls are operated and maintained appropriately. These may include limits on operating parameters such as pressure drops, temperatures or flow rates.

The Compliance Plan Section specifies the monitoring, record keeping and reporting requirements for documenting compliance with the release and operational limits in the permit. This may vary from a continuous emission monitor (CEM) for continuously reporting

compliance with a lb/hr limit to simply maintaining records on-site of the quantity of materials used and making them available for inspection.

One important aspect of the Compliance Plan Section is the inclusion of conditions that either do not fit well with the standard permit conditions or are important enough to highlight in a separate section. This is called a Special Conditions section. Examples of conditions included in this section are compliance schedules for installing P2 equipment or additional control or special monitoring or reporting requirements.

3. Findings of the Facility-Wide Permit Pilot Program

The Department believes that the FWP Program's positive results are due to collection and utilization of the process level data inherent in a P2 plan, including:

- Definitions of a facility's production processes with units of production.
- Production process-level measures of the amount of each hazardous substance contained in products, consumed, used, generated as nonproduct output, released, and sent for recycling outside the process.
- Production process-level, chemical-specific, goals for P2 reductions.

When linked with other environmental permit and compliance data, these data provided the Department and the facility with a clear understanding of the sources and impacts of pollution at the facility. The FWP essentially became the vehicle to assess the environmental impact of the whole facility through collection and analyses of these data. This led to the main findings of the program.

3.1 Basing an FWP on Process-Level Materials Accounting Leads to P2

Materials accounting helped identify P2 options and led to reductions in hazardous substance use and release. Appendix B lists the P2 goals of the FWP facilities. The FWP Program strove to capitalize on the benefits of the materials accounting by providing incentives for companies to conduct P2 planning on production processes not regulated by the P2 Act. For several facilities, this expansion resulted in the reduction of substances not regulated by the P2 Act.

3.2 Basing an FWP on Process-Level Materials Accounting Identifies Previously Unregulated Emissions

Information used to develop air, water, and hazardous waste permit limits and determine compliance with those limits, is typically derived from a variety of sources and approaches. The materials accounting data provides a common source from which other permit data can be derived. This link has allowed the FWP Program to identify and correct unpermitted/incorrectly permitted releases. Some emissions were those that should have received permits or been included in permits as either new construction or alterations. Some of the emissions were from grandfathered sources being permitted for the first time. Other emissions were new categories of contaminants being added to existing permitted sources. An example is that one facility found that 90 percent of its volatile organic compound (VOC) emissions were not previously regulated

because the facility believed they were fugitive emissions and, therefore, no permits were necessary. Upon closer inspection of the materials accounting data and process descriptions, where the actual sources and quantities of emissions were a bit clearer, this facility developed options to reduce these VOC emissions.

3.3 Basing an FWP on Process-level Materials Accounting Identifies Multi-media Transfers of Pollutants

Using process-level materials accounting data enables the FWP Program to follow the path of air, water and hazardous waste releases from where they enter or are generated in the process and treated, to where they ultimately leave the process and enter the environment. For example, in one FWP, a twin carbon adsorption bed was used to remove volatile organic compounds (VOCs) from an air stream. The carbon bed was regenerated through steam stripping. The steam was condensed and the condensed wastewater was discharged to the sewer where it was sent to a publicly owned treatment works (POTW). A comparison of the materials accounting data with the wastewater sampling data for the POTW discharge identified an unaccounted loss of VOCs. It was determined that these losses were occurring in the onsite sewer system prior to entering the POTW. The emissions removed for compliance purposes from the air stream and transferred to the water were unknowingly being released back into the atmosphere. This also created a potential human health risk. Although P2 was investigated to eliminate this transfer of pollution from the water waste stream to the air, ultimately, the permittee replaced the carbon beds.

Encouraging the FWP facilities to disclose the unregulated emissions, data discrepancies and multi-media transfers identified in the FWP development posed a challenge to the Department. To address this issue, the Department sent a letter to all FWP facilities outlining our intent to not issue penalties for information voluntarily identified and disclosed during the course of the development of the FWP.

3.4 The Initial Step of Defining Production Processes is Critical to P2 Planning and the Subsequent Development of an FWP

The first step of P2 planning is to divide a facility's operations into discrete, individual production processes. The definition of a facility's production processes drives the structure of the FWP. If the initial process definition step is flawed, the resulting FWP will be flawed.

One of the problems discovered is that many facilities tend to over generalize their production processes. This overgeneralization is desirable to facilities because it results in identifying a smaller number of production processes, resulting in less public reporting since the information facilities publicly report to the Department under the P2 program is for each production process. However, using this methodology can make an FWP ineffective from a P2 standpoint.

3.5 The New Jersey Design of an FWP Allows for the Identification of Total Facility Risks and Environmental Impact.

Combining multi-media process-level data with environmental permit and compliance data provided a more realistic view of a facility's releases. This view provides a better understanding

of a facility's overall impact on the environment, rather than the piecemeal view obtained by analyzing a facility's individual environmental media contributions. For example, one facility had two sources that were deemed grandfathered sources within the air program and therefore did not have permitted emission limitations. However, the review of the materials accounting data revealed that the emissions from these grandfathered sources posed a significant risk to human health. The Department and the facility worked together to reduce the risk to negligible levels through the implementation of P2 options.

3.6 Process Level “caps” Offer Facilities Greater Operational Flexibility Compared to Current Permit Requirements.

Since the FWP model was based on a process-level structure instead of on a source-level structure, it provided facilities with additional operational flexibility and promoted P2 and multi-media emissions reductions. The production process-level structure included in the FWP design offer two positive findings related to operational flexibility:

- The process-level FWP design encourages facilities to integrate their long-range business plans for their production processes into the upfront development of the FWP. For example, one facility was able to restrict its permitted emissions to be more consistent with their actual emissions in production processes where operations were expected to be constant. This enabled the facility to increase process “caps” for processes where production was expected to increase over the life of the FWP.
- Once the process-level “caps” are established in the FWP, companies can change those production operations without prior Department approval in accordance with the revised air rule. For example, one facility was able to add new raw materials in one process, and install new equipment in other processes since these changes did not increase their production process level caps and were consistent with the revised air rule.

3.7 Timeframe for Issuing FWPs

In its current form, the FWP Program does not foster timely permit issuance. The time to issue a final FWP ranged from one to ten years. Although the Department's FWP Program is the only program in the nation to issue multi-media permits, it is clear that improvements must be made in the application, construction and developmental processes for the issuance of multi-media permits. Major obstacles to the timely issuance of FWPs include:

- The FWP process involves the development of materials accounting data to identify P2 opportunities and to structure the FWP. In addition, the process requires relating the materials accounting data to air, water and hazardous waste permit application and compliance data so as to link all facility information to produce an integrated permit. To a large extent, the process of developing the FWP requires a complete reevaluation of a facility's operations.

This kind of in-depth examination takes significant time and effort on the facility's part. The Department found that most of the FWP companies did not previously develop

materials accounting data. From the facility's perspective, developing the materials accounting data, plus relating it to permit limits and compliance data, plus projecting long-range trends in P2 and production created a significant amount of work.

From the Department's perspective, relating materials accounting data to permit limits and compliance data provided never-before seen details of a facility's multi-media obligations. This led to the discovery of cross-media shifts of pollutants and discrepancies and inaccuracies in existing permit information. Significant time and effort was required by both the facility and the Department to resolve these cross-media shifts and permit discrepancies/inaccuracies. It should also be noted that uncovering permit discrepancies/inaccuracies often times masked an environmental benefit, in that the Department became aware of actual releases from a facility.

- Staffing changes within facilities and the Department contributed to setbacks in the issuance of FWP's. Within the Department, staffing changes greatly contributed to a loss of expertise, vision and morale.

Several facilities went through multiple staffing changes during their permit development. This led to a break in permit development to allow for the new staff to become familiar with the project. Layoffs at several facilities left the facility contact person with more work responsibilities, thus reducing the time spent on the FWP project.

- The FWP Program also worked to establish integration of FWP and P2 concepts within the single media programs. These issues often required resolution before an FWP could be issued. Issues requiring coordination with one or more of the single-media permitting programs included facility-wide risk, emissions from on-site sewer systems, cross-media shifts, unpermitted air sources, and existing permit limitations inconsistent with actual emissions.
- Since the FWP process looked in greater depth at the releases from a facility, it was not uncommon for the FWP Program to uncover a situation that was not covered in existing Department policies. Often the FWP process was delayed for a policy to be developed. In most instances, more than one program was involved. Examples of this are the application of surface water criteria for total dissolved solids, permitting of on-site wastewater sewer systems with respect to air emissions, and cross-media shifts where pollutants enter designated Publicly Owned Treatment Works.
- A facility's P2 Plan may contain sensitive information about a facility's production processes. Respecting confidentiality in the overall P2 planning program was an important issue to the Department. However, using a P2 Plan as the basis for structuring an FWP raises even more complicated issues regarding confidentiality. In short, basing the FWP on a P2 Plan involves taking sensitive, often confidential documents and using them to structure a public, enforceable permit. To address this issue during the development of the FWP for certain facilities, the FWP Program conducted all of its review of a facility's P2 Plan on-site at the facility. While this approach provided the

confidentiality needs of the facility, it added an increased level of effort and time to develop an FWP.

Since these issues are largely resolved, the Department is now in a position to tailor any future multi-media projects to be less time consuming and more resource efficient.

4. Recommendations

Many of the environmental benefits realized by the FWP Program were the result of the actual process of developing the multi-media documents. Because the FWP staff reviewed permitting data on a multi-media level in conjunction with the P2 materials accounting data, they were able to uncover permitting discrepancies, unpermitted sources, environmental and human health risk issues, and areas where cross-media shifts of pollution occur. Site visits by the FWP staff at the facilities were also conducted with a multi-media focus. This was useful in making the connection between the P2 planning data and the multi-media permitting data, allowing the FWP staff and the facilities to link process NPO to permitted releases. The following recommendations are derived from these experiences:

4.1 Integrate P2 Materials Accounting Concepts Throughout the Department

Materials accounting data was instrumental and beneficial during the FWP development and is a tool available to all permit programs. However, some programs may not have the resources to perform the additional review. The FWP Program could review the materials accounting data for selected facilities submitted on the Department's Release and Pollution Prevention Report (RPPR). Initially, this review could be limited to renewal applications for major facilities and/or applications for significant/major modifications. The review could also be limited to sector-based industrial categories, such as the pharmaceutical industry or the organic chemical industry. The emphasis of the review would be on comparing requested release limits with actual releases to identify any cross-media shifting of pollutants and discrepancies in data to ultimately reduce the releases to the environment. The FWP Program would make recommendations to the applicant regarding the implementation of P2, if applicable. To assist in this endeavor, the FWP program could develop P2 Fact Sheets to be used internally and attached to permit applications. These P2 Fact Sheets which would include PFDs and the identification of sources of NPO on a multi-media level, could be used by permit writers when developing permits.

4.2 Expand the FWP Model for Facilities with Compliance Issues

The Department would identify those facilities that are substantially out of compliance with environmental regulations by using data from various sources, such as materials accounting and the National Air Toxics Assessment (NATA). The Department would require these facilities to undergo materials accounting and would issue an FWP to these facilities utilizing the authority to issue more stringent limits contained in the P2 Act. It should be noted that the Legislature must authorize the Department to issue additional FWPs.

4.3 Pursue Integrated Reporting

The Department should pursue an integrated reporting project that builds on the work done by Tellus Institute. This project would utilize materials accounting to streamline and improve how data is generated and reported at facilities. An integral component of this project must be to ensure that the template is compatible with the Department's NJEMS database. One benefit of the production process-level materials accounting contained in a facility's P2 Plan is that it can be used to establish a common point of reference for the various environmental compliance and monitoring data that facilities collect and report to the Department.

4.4 Implement Facility-wide Approach for New Source Review (NSR) Permits

One of the beneficial aspects of the FWPs was the assignment of a single project manager for each facility. Having this single point of contact ensured that permit limits and operating conditions were consistent throughout the FWP, facilitated the review of potential cross media shifts of releases, and facilitated a consistent review of potential emissions offsets. Additionally, the Department is exploring the potential of instituting cumulative risk assessments. One of the early findings of the cumulative risk study is that permits issued that represent releases on a facility-level provide better representation of actual risks from a facility. Therefore, the Department should consider replacing the current piecemeal approach of issuing permits for individual sources, utilized in the Bureau of Preconstruction Permits, with a facility-wide approach either through issuance of a single permit or by assigning one project manager to handle all permits for a facility.

5.0 Summary

The environmental benefit of the FWP program was achieved primarily through the process of developing multi-media FWPs. The process level approach allowed staff to view a facility as a whole, instead of as a single piece of equipment or a single discharge point. This allowed the staff to not only identify unpermitted sources and releases, but to identify area for pollution prevention. The lessons learned during the experiment can be expanded upon. It will only be through continued exploration and evolution of FWP type analyses that the true P2 benefit of the FWP Pilot Program will be realized.

APPENDIX A

CHRONOLOGY OF PERMIT ISSUANCE/FACILITY DESCRIPTION

December 1994: first final FWP issued - The first final FWP was issued in December 1994 to Schering, Corp. of Kenilworth, New Jersey. This facility's operations consist of all phases of pharmaceutical production, ranging from full scale manufacturing to small-scale pilot plants, and utilities.

The facility eliminated the use of one hazardous substance (1,1,1-trichloroethane) in one process by replacing existing equipment with equipment that does not use any hazardous substances. The facility also achieved a 61 and 64 percent reduction of the generation of nonproduct output (NPO) per unit of product for two hazardous substances, trichlorofluoromethane (Freon-11) and dichlorodifluoromethane (Freon-12), respectively. These reductions were achieved through improved housekeeping measures, product transfer piping upgrades and the installation of an in-process recycling system.

November 1995: Electrolux Home Products North America (formerly Frigidaire Home Products Company), Edison, Middlesex County

This facility's operations consisted of the manufacturing of all phases of room air conditioner and dehumidifier divided into three general categories: fabrication and assembly of air conditioner units, fabrication and assembly of dehumidifier units and utilities.

Through the preparation and implementation of their P2 Plan, the facility eliminated the use of trichloroethane (TCE) by removing a TCE degreaser and TCE storage tank. The elimination of this equipment resulted in a use and NPO reduction of 87,889 lbs/year of TCE.

This facility ceased operations in the fall of 2003 and subsequently terminated its FWP.

December 1995: Huntman Polypropylene, West Deptford, Gloucester County

This facility manufactured polypropylene by polymerizing propylene in a Wet-End Process. The resulting powdered plastic is conveyed to the Dry-End Process where it is blended, extruded, formed into polypropylene pellets and packaged for shipment.

This facility ceased manufacturing operations in 2000 and subsequently terminated its FWP.

However, several P2 options identified and incorporated into the facility's modernization efforts during the development of the FWP should be noted. These options included improved housekeeping measures, product transfer upgrades, equipment replacements and the installation of an in-process recycling system. In the last case, Huntsman's P2 team found a simple and inexpensive way to reduce the VOC emissions from the wastewater treatment system by an estimated 43 percent.

January 1996: Bond Adhesives Company, Newark, Essex County

Bond Adhesives is a small company that formulates and packages a variety of adhesive products. Site operations are broken down into two production processes, solvent and water-based adhesives production, that have the potential to release air contaminants and generate small quantities of hazardous waste. These production processes include all operations needed for the formulation and packaging of adhesive products.

An important aspect of the planning process was that it allowed the facility to take a holistic view of operations, which resulted in a major overhaul, from looking at ways to reduce solvent usage to complete regulatory integration and compliance. New tracking systems were developed for all aspects of plant operations.

January 1996: Tekni-Plex, Inc., Flemington, Hunterdon County

Tekni-Plex manufactures laminated foil, paper, and other substrates. The products are manufactured on a variety of printers, coaters, extruders, and laminators. Tekni-Plex's products are used for packaging food, beverage and pharmaceutical products. They also manufacture a plastic coated foil product that is used by the telecommunications industry for encasing fiber-optic cable.

Tekni-Plex identified numerous P2 options that will decrease the use, NPO and releases of the hazardous substances and additional chemical substances it uses. Some of these options included increasing the use of water based coatings to minimize the use of solvents; installing new extrusion dies to produce a beadless product; and implementing several chemical-handling techniques to decrease evaporative losses and hazardous waste generation.

June 1996: Fisher Scientific Company, Somerville, Middlesex County

The facility's operations consist of chemical re-packaging. The facility receives, transfers and repackages bulk, high purity chemicals and solvents into batch quantities. The FWP included all air sources and hazardous waste generator-reporting requirements. Because of the FWP, the facility terminated its Resource Conservation Recovery Act (RCRA) requirements by reducing its hazardous waste storage to less than 90-days. The stormwater permit was also terminated since it was only required due to the active RCRA permit.

The P2 options implemented at this facility included installation of an electronic surveillance system over the tank farm. Previously, the tank lines had to be disconnected each night. Upon reconnection, the lines had to be flushed to maintain product quality. However, the surveillance system eliminated the need to disconnect tank lines and therefore eliminated approximately 30 gallons per railcar of product waste. The facility also installed a dedicated line for methylene chloride transfer from a truck to a packaging line. This resulted in a reduction of 300 gallons/year of waste. Additional dedicated lined have also been implemented. Previously, xylene and toluene shared a pump line. The facility decided that xylene would only be received in tank trucks and a tank was dedicated to xylene only. Since xylene and toluene both had their

own dedicated lines, this reduced the amount of rail car line and pump flushes for both toluene and xylene. This resulted in a reduction of 80 gallons per year each for xylene and toluene.

July 1996: Fabricolor, Inc., Patterson City, Passaic County

This facility was involved in the manufacture of dyestuffs and pigments for use in the textile dyeing, textile printing and ink manufacturing industries. Approximately 300 products were manufactured in six of the nine processes identified in their P2 Plan. The remaining three processes were not involved in the production of product but served in product support functions. Their releases associated with the facility include air and water. Only air sources were permitted in the FWP.

The P2 options implemented at Fabricolor included in-process recycling of sulfuric acid from spent mother liquor and using it as a replacement for hydrochloric acid in certain processes. The facility also reduced the amount of copper sulfate, alkanolamines and metallization agents used in excess quantities to drive chemical reactions; the amount of oleum (sulfuric acid) used by increasing batch sizes; and the amount of ammonia used in the plant production by changing production methods.

This facility ceased operation in 2002 and subsequently terminated its FWP.

January 1997: PolyOne Company (formerly Geon Company), Pedricktown, Salem County

This facility's operations consist of all phases of PVC manufacturing.

P2 highlights at this facility included utilizing a closed loop system of their design that enabled the facility to reduce the generation of vinyl chloride NPO. The facility also eliminated the use of the hazardous substances 1,1,1 trichloroethane, tetrachloroethylene and xylene in cleaning operations by substituting non-solvent cleaners. This resulted in a 16,600-pound/year reduction in the generation of NPO of 1,1,1 trichloroethane and a 1,800-pounds/year reduction in the generation of NPO of tetrachloroethylene and xylene.

By streamlining operations and improving the efficiency of the Wastewater Treatment Process, the facility has achieved over a 2-million pound/year reduction in the generation of NPO of sulfuric acid. Also, by utilizing good operating practices, process modifications and chemical substitution, chlorine usage in the Wastewater Treatment Process has been reduced from approximately 27,000 pounds/year to less than 10,000 pounds/year. Chlorine dioxide has been substituted for chlorine, which represented a yearly NPO reduction of almost 50 percent for chlorine.

September 1997: Oxford Textiles, Inc., Oxford, Warren County

This facility's operations consisted of all phases of fabric preparation. Site operations were broken down into eight production processes. These production processes included all

operations needed for the sale of dyed and printed fabric, the preparation and sale of fabric detergents, as well as the operation of the wastewater treatment plant and boilers at the facility.

P2 options investigated included the repair of steam lines insulation, which reduced the amount of oil or gas consumed in the boilers, thereby lowering emissions to the atmosphere; and the implementation of a water usage plan for all processes to minimize water waste.

This facility ceased operations in the fall of 2003 and subsequently terminated its FWP.

June 1998: Ferro Corporation (formerly Degussa Corporation), South Plainfield, Middlesex County

Ferro produces and recycles precious metal products. Primary products produced include silver powder and silver flake used in the microelectronics industry; silver and silver alloy strip and wire; specialty catalyst recovery and other precious metal compounds made from gold, platinum and palladium.

Through preparation of their P2 Plan, Ferro identified numerous P2 options that decreased the use, NPO and releases of hazardous substances including, installation of new strip and wire processing equipment in metallurgy processes; in process recycling of isopropanol and nitric acid; using ascorbic acid as a reducing agent instead of formaldehyde in metal refining processes; and, process changes to reduce the use of chlorine.

December 1998: Chevron Products Company, Perth Amboy, Middlesex County

The facility processes crude oil into asphalt and unfinished petroleum products and stores and ships intermediate and final products. The facility covers about 368 acres. It has a maximum rated throughput of 80,000 barrels per day.

April 1999: Ferro Corporation (formerly Solutia, Inc.), Bridgeport, Gloucester County

This facility is a chemical manufacturer involved primarily in the manufacturing of organic intermediates such as tetrathal, benzyl chloride, phosphate esters, and benzyl phthalates. The benzyl chloride also produces hydrochloric acid as a sellable commodity.

The facility's P2 Plan included a comprehensive analysis of the use and generation of 17 listed hazardous substances and 22 other substances in the affected processes. The 17 listed substances are the same as those reported on the Federal Toxic Release Inventory (TRI). The additional 22 substances were included as part of a more thorough review of the facility.

May 2000: Johnson & Johnson Consumer Products, Inc., North Brunswick, Middlesex County

The applicant manufactures consumer products for both the health and general consumer industries. Prior to 1995, solvent-coating operations that used solvent-based coating were

discontinued in favor of reformulated coating operations and product modifications.

Ethylene oxide was targeted for P2 measures at the facility, since this substance accounts for approximately 93 percent of the facility's total releases. Johnson & Johnson has decreased releases of ethylene oxide due to the capture of fugitive emissions, which were not captured prior to P2 planning.

June 2001: Sybron Chemicals, Inc., Birmingham, Burlington County

The Sybron Chemicals facility is involved in the manufacture of synthetic resins, plastic materials, nonvulcanizable elastomers, and chemicals and chemical preparations.

The facility implemented several P2 options. Sybron successfully eliminated the use of zinc chloride by substituting a less hazardous chemical as a catalyst in one process. This resulted in the reduction of 109,000 pounds per year of zinc chloride as a raw material. This elimination resulted in a substantial removal of zinc from the wastewater system and an overall reduction in wastewater sludge from the site disposed as solid waste.

Sybron reduced the use of styrene by mechanizing procedures in two processes. This resulted in an increased product yield, cleaner work environment, reduced worker exposure, reduction in use of styrene by 50,000 pounds, and reduction in pollutants contained in the process wastewater treated at the on-site wastewater treatment plant.

The use of toluene for reactor cleanings was eliminated in one area by replacing the process with a highly pressurized water cleaning method. This P2 measure resulted in the elimination of 15,500 pounds of toluene.

Sybron reduced material losses during loading of paraformaldehyde by refurbishing and updating a screw feeder. Switching from a dry raw material to a liquid further reduced worker exposure. This also resulted in a reduction in process maintenance and batch processing time.

Sybron actively employs the use of in-process recycling habits by reusing acidic or basic solutions for neutralization purposes in the WWTP and as scrubber liquid in the air pollution control units.

April 2005: DSM Nutritional Products and Dietary Supplements, Inc. (formerly Roche Vitamins and Fine Chemicals), White Township, Warren County

The DSM Nutritional Products and Dietary Supplements, Inc., facility (formerly Roche Vitamins and Fine Chemicals) manufactures pharmaceutical products including Vitamin C and derivatives, animal antibiotics, dry vitamin products, and sodium sulfates.

Due to the timing of the Title V/FWP conversion, the FWP for this facility was written as the Title V Air Operating Permit.

January 2006: API Foils (formerly Dri-Print Foils), Rahway, Union County

Operations at API Foils, Inc. consist of all phases of surface coating of polyester film and foil. Site operations are broken down into the following processes: Coating, UV Coating, Mixing, Finishing, Energy, Coater Mix Drums and Electroforming.

Due to the timing of the Title V/FWP conversion, the FWP for this facility was written as the Title V Air Operating Permit.

Ausimont, Inc., Thorofare, Gloucester County

Miller and Son Electroplating, Belleville, Warren County

Ausimont, Inc. and Miller and Son Electroplating withdrew from the FWP Program in 1996, before receiving a FWP.

APPENDIX B

**FACILITY-WIDE PERMIT PROGRAM
SUMMARY OF EMISSION LIMITS BEFORE AND AFTER (Tons Per Year)**

Facility	Contaminant	Potential to Emit Prior to FWP (tons/year)	Actual Emissions * (tons/year)	Potential to Emit After FWP (tons/year)	Emission Increase or Decrease** (tons/year)
Bond Adhesives	Particulates	0.2	****	0.03	-0.17
	Total VOC	1.93	****	5.1	3.17
	HAP VOC	0	****	1.5	1.5
	CO	0	****	0	0
	NOx	0	****	0	0
	SOx	0	****	0	0
	Other	0	****	0	0
Chevron	Particulates	74.8	14.63	74.8	0
	Total VOC	1562.9	179.41	1562.9	0
	HAP VOC	NA	***	1562.9	NA
	CO	118.2	15.86	118.2	0
	NOx	363.8	117.99	363.8	0
	SOx	227.4	21.45	228	0.6
	Other	NA	NA	NA	NA
Fabricolor	Particulates	10.72	****	6.93	-3.79
	Total VOC	13.8	****	4.47	-9.33
	HAP VOC	0.02	****	0.057	0.037
	CO	0.312	****	5.29	4.978
	NOx	47.58	****	22.41	-25.17
	SOx	26.08	****	0.72	-25.36
	Other	NA	NA	NA	NA
Ferro (Formerly Degussa)	Particulates	15.29	2.09	12.22	-3.07
	Total VOC	23.69	14.04	22.1	-1.59
	HAP VOC	8.92	13.45	20.78	11.86
	CO	1.66	0.58	1.32	-0.34
	NOx	47.86	13.57	22.58	-25.28
	SOx	0.33	0.4	0.42	0.09
	Other	0.39	3.65	0.743	0.353
Ferro (Formerly Solutia)	Particulates	7.52	1.68	17.68	10.16
	Total VOC	64.12	153.44	100.3	36.18
	HAP VOC	29.67	***	32.01	2.34
	CO	1.30	1.38	24.70	23.4
	NOx	6.1	4.74	100.96	94.86
	SOx	0.32	1.45	25.42	25.1
	Other	24.36	NA	22.03	-2.33

Facility	Contaminant	Potential to Emit Prior to FWP (tons/year)	Actual Emissions * (tons/year)	Potential to Emit After FWP (tons/year)	Emission Increase or Decrease** (tons/year)
Fisher Scientific	Particulates	1.15	****	1.86	0.71
	Total VOC	8.04	****	4.39	-3.65
	HAP VOC	1.33	****	3.45	2.12
	CO	3.27	****	3.56	0.29
	NOx	14.36	****	15.13	0.77
	SOx	0.072	****	2.21	2.138
	Other	NA	NA	NA	NA
Frigidaire	Particulates	8.6	0.42	2.8	-5.8
	Total VOC	9.7	113.7	59.5	49.8
	HAP VOC	2.1	43.1	1.9	-0.2
	CO	8.9	2.6	2.8	-6.1
	NOx	88.1	10.7	11.5	-76.6
	SOx	64.2	0.35	0.31	-63.89
	Other	NA	NA	NA	NA
Huntsman	Particulates	46.3	13.8	44.1	-2.2
Polypropylene	Total VOC	22.7	224.1	147.2	124.5
	HAP VOC	0	***		0
	CO	62.8	10.2	83.3	20.5
	NOx	237.1	75.1	238.6	1.5
	SOx	403.2	76.5	403.2	0
	Other	NA	NA	NA	NA
Johnson & Johnson	Particulates	30.18	7.19	36.59	6.41
	Total VOC	9.8	4.31	8.84	-0.96
	HAP VOC	NA	NA	0.42	0.42
	CO	13.27	3.78	16.7	3.43
	NOx	54.57	13.71	24.9	-29.67
	SOx	115.52	5.39	1.61	-113.91
	Other	2.63	NA	36.8	34.17
Oxford Textile	Particulates	8.21	5.39	1.05	-7.16
	Total VOC	3.68	1.48	4.7	1.02
	HAP VOC	NA	***	0.2	NA
	CO	4.51	5.22	9.67	5.16
	NOx	40.82	29.65	50.07	9.25
	SOx	53.3	43.66	31.16	-22.14
	Other	NA	NA	NA	NA

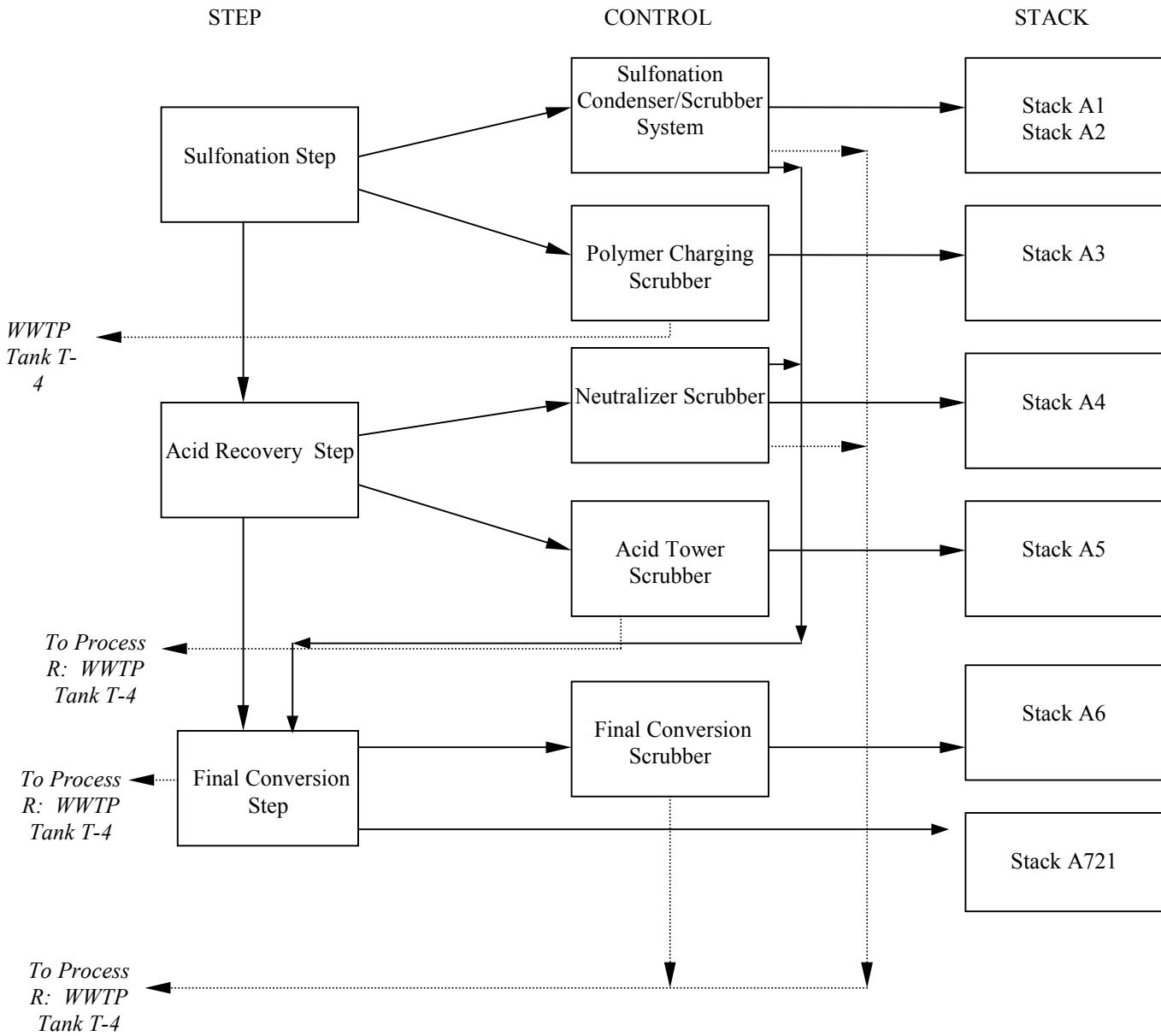
Facility	Contaminant	Potential to Emit Prior to FWP (tons/year)	Actual Emissions * (tons/year)	Potential to Emit After FWP (tons/year)	Emission Increase or Decrease** (tons/year)
PolyOne	Particulates	264.7	78.7	132.93	-131.77
(Formerly Geon)	Total VOC	79.21	52.3	80.54	1.33
	HAP VOC	37.47	14.99	25.11	-12.36
	CO	43.18	9.3	43.35	0.17
	NOx	251.86	37.61	152.38	-99.48
	SOx	225.23	0.7	7.32	-217.91
	Other	NA	NA	NA	NA
Schering	Particulates	63.8	11.6	75.1	11.3
	Total VOC	175	63.8	173.3	-1.7
	HAP VOC	11.6	1.55	9.8	-1.8
	CO	65.1	14.9	103.6	38.5
	NOx	295.4	63.8	184.2	-111.2
	SOx	385.2	9.4	130.8	-254.4
	Other	NA	NA	NA	NA
Sybron Chemicals	Particulates	5.68	4.51	19.2	13.52
	Total VOC	97.54	85.35	61.38	-36.16
	HAP VOC	39.58	***	47.55	7.97
	CO	3.31	2.65	5.07	1.76
	NOx	36.2	29.1	54.6	18.4
	SOx	53.2	41.6	75.5	22.3
	Other	NA	NA	NA	NA
Tekni-Plex	Particulates	2.9	1.4	5.62	2.72
	Total VOC	243.9	131.5	327.5	83.6
	HAP VOC	66.2	***	88.9	22.7
	CO	53.5	0.77	56.98	3.48
	NOx	39.1	3.6	3.6	-35.5
	SOx	4.9	0.34	8.7	3.8
	Other	NA	NA	NA	NA

- Notes:
- NA indicates Not Applicable.
 - * As indicated on Air Emission Statements at time of issuance of the FWP.
 - ** Emission decreases indicated by a minus (-) sign.
 - *** The actual emissions data for this facility was obtained from air emission statements that did not speciate HAP VOC from Total VOC.
 - **** These facilities are not required to submit air emission statements.

DSM and API Foils are not included in this analysis since their FWP's were written and issued as their Title V Air Operating Permits.

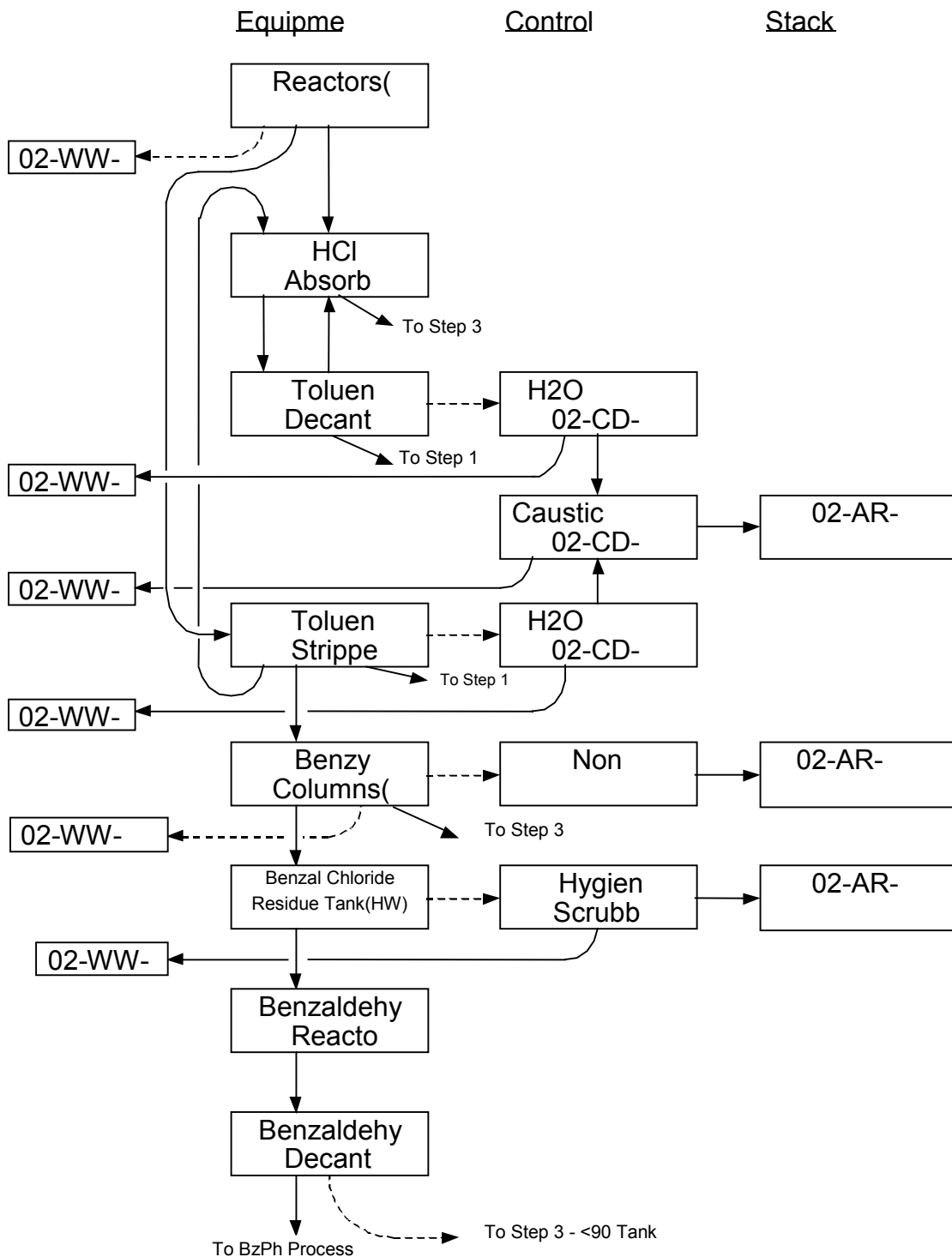
APPENDIX C
PROCESS FLOW DIAGRAMS

Process Flow Diagram - General Process



* Typical Process Diagram - There are alternate procedures where different equipment can operate.

Reactor/Refining/Recovery



B3. Step 2 Flow Diagram—Coating, Printing, Laminating & Corona Treating

