Evaluation of Implementation Experiences with Innovative Air Permits

Results of the U.S. EPA Flexible Permit Implementation Review

SUMMARY REPORT

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EPA Office of General Counsel (OGC)
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Executive Summary

Background

In recent years, the U.S. Environmental Protection Agency (EPA) and some State and local permitting authorities recognized a change in the manufacturing landscape. This change arose in today's increasingly competitive global markets, requiring companies to respond rapidly to market signals and demand, while delivering products faster, at lower cost, and of equal or better quality than their competitors. As their market response and product development time frames shrank, companies in several industries perceived the potential administrative "friction" – costs, time, delay, uncertainty, and risk – resulting from operating under conventional air permitting approaches to increase. This raised an important question: how to provide these U.S. companies with the "flexibility" to compete effectively in global markets without decreasing environmental protection? At the same time, the EPA and others sought ways to align the regulatory framework to encourage emissions reduction and pollution prevention.

To address these challenges, the EPA and several State and local permitting authorities worked with selected companies over the past few years in the context of individual permit pilots to develop innovative approaches to air permitting. The EPA and the States launched these efforts to increase sources' operational flexibility while ensuring environmental protection and facilitating pollution prevention. Permitting authorities involved in these pilot initiatives designed permits within the existing regulatory framework to address all applicable air requirements. As interest in innovative approaches to air permitting increased, the EPA evaluated the implementation experience with "flexible" permitting techniques developed under pilot permitting efforts, such as the EPA's Pollution Prevention in Permitting Program (P4) and various State innovation initiatives. The EPA believes that careful evaluation of the implementation experience with such flexible permits can improve the effectiveness and efficiency of future efforts and help to inform evolving air policymaking activities in these areas. The EPA launched the Flexible Permit Implementation Review to meet these objectives.

What Is Flexible Air Permitting?

The term "flexible permit" is used in this report to describe air permits with conditions designed to reduce the administrative "friction" – costs, time, delay, uncertainty, and risk – experienced by sources and permitting authorities when implementing a permit or making certain changes under the permit. This is typically accomplished by allowing a source to make certain types of changes (e.g., modifications to a source's method of operation, equipment, raw materials, emission factors, or monitoring parameters) without requiring additional case-by-case permitting, provided the source meets certain criteria outlined in its operating or construction permit. Such criteria might include the maintenance of plant-wide emissions levels below enforceable caps. Over the past decade, the EPA and State and local permitting authorities have also piloted specific permitting techniques and tools to accomplish advance-approval for certain types of changes that might take place over the course of a permit term. While chosen solutions will depend on individual state permitting rules and requirements, such techniques typically include descriptions of advance-approved changes or categories of changes in the permit, procedures for testing pollution control device performance and updating emission factors or parameter values without requiring the permit to be amended or re-opened, elimination of redundant requirements by applying the most stringent applicable requirement, and provisions to explicitly encourage pollution prevention.

Flexible Permit Implementation Review Findings

The EPA launched the Flexible Permit Implementation Reviews to examine the implementation experience with innovative air permitting techniques. Under this initiative, the EPA assembled a Review Team, representing multiple EPA offices supplemented by contractor support, to conduct in-depth reviews of six pilot permits with innovative flexibility provisions and sufficient operating history. These pilot permits were developed for the following companies: 3M, DaimlerChrysler, Imation, Intel, Lasco Bathware, and Saturn. The reviews included detailed analyses of source and permitting authority experiences developing and implementing flexible air permits, based on review of information in the public record, discussions with source and permitting authority personnel, site visits to the source and permitting authorities, and verification of recordkeeping and emissions calculation requirements.

The EPA's review and analyses support the following findings for the six flexible permits covered in this review.

Finding 1: The flexible permits contain adequate measures to assure compliance with all applicable requirements.

Permitting authorities and the EPA found that the flexible permits contained monitoring, recordkeeping, and reporting mechanisms sufficient to assure that identified regulatory requirements are met and that appropriate measures are in place. The EPA Review Team did find, however, that certain topics related to renewal of flexible permits warrant further discussion and clarification. These topics include determining acceptable approaches for adjusting plant-wide emissions caps at permit renewal, and determining acceptable approaches to transition back to conventional permitting approaches if flexible permits are allowed to expire.

Finding 2: The flexible permits were considered to be enforceable by permitting authorities and EPA.

A key objective was to verify that the flexible permit provisions are enforceable by permitting authorities and the EPA. The six permitting authorities involved in the pilots all reported the ability to detect non-compliance with flexible permit conditions and to enforce the permit requirements, and expressed certainty that permit requirements could be enforced, had the need arisen. For all permits, the EPA was able to replicate the emissions calculations for selected time periods to demonstrate compliance. Permitting authorities reported that conducting inspections of sources with flexible permits is comparable to conducting inspections of sources with conventional permits.

Finding 3: The flexible permits facilitated and encouraged emissions reductions and pollution prevention.

The flexible permits contain mechanisms designed to facilitate and encourage emissions reductions and pollution prevention (P2). Five of the sources with flexible permits lowered actual plant-wide emissions during their permit terms, and the sixth source lowered its emissions per unit of production during the permit term. For example, using pollution prevention (P2), Intel lowered actual emissions of volatile organic compounds (VOCs) from 190 tons/year to 56 tons/year while increasing production. After a substantial voluntary reduction of VOC emissions from 10,000 tons/year, 3M further lowered its actual VOC emissions from 4,300 tons/year to below 1,000 tons/year. This reduction resulted primarily from increased pollution control device performance, greater use of voluntary controls, P2, and reduced production. DaimlerChrysler lowered its

actual VOC emissions from 1,400 tons/year to less than 800 tons/year, primarily through P2 associated with vehicle coatings and plant solvent usage.

The plant-wide emissions caps focused organizational attention on reducing plant-wide emissions. In many cases, the advance approved change provisions reduced the administrative "friction" associated with P2 changes, making such changes more attractive for sources to undertake. The flexible permits increased internal awareness and focus on pollution prevention at the sources through explicit P2 program, reporting, and/or performance requirements.

Finding 4: Companies with the flexible permits believe that air permitting is on their critical response path.

Each of the sources with flexible permits reported that conventional permitting approaches can constrain their ability to compete effectively. The combination of increasingly globalized competition and a shift to new modes of production substantially increased the pressure to operate highly flexible, nimble, and responsive research, development, and production operations. For example, competitive pressures and computer design advances in the automotive sector have compressed the new vehicle development process from five years to less than 18 months, requiring increasingly flexible production systems and time sensitive equipment changes. For products in the semiconductor and specialty tape industries, competitive pressures frequently cause certain products to become obsolete within six to nine months, as customers' specifications change and technology evolves. Advance production concepts, such as lean manufacturing, designed to help firms compete effectively, require rapid, and often iterative, operational and equipment changes for continuous improvement of resource productivity, operational efficiency, and product quality. For these reasons, companies report that conventional case-by-case permitting actions can be problematic due to the potential delay and uncertainty of final permit actions. Companies with flexible permits identified similar needs at other facilities and are interested in pursuing flexible permits for those facilities.

Finding 5: Companies with the flexible permits utilized their flexibility provisions.

Flexibility provision utilization during the permit terms exhibited rates and types of changes consistent with the needs expressed by the companies during permit development. The actual number of changes made using advance approval and other flexibility provisions varied by source, with Intel implementing the most changes (e.g., approximately 150 to 200 equipment and operational changes per year). Other companies implemented fewer changes (e.g., more in the range of 20 or fewer changes per year), but emphasized that the relative value of making certain critical changes can be more important than the number of changes made. Some companies did not utilize all of the flexible permit provisions, but generally anticipated using the flexibility provisions in the future. The flexible permits accommodated a substantial number of advance approved changes while providing sufficient clarity in describing the advance approved changes to ensure enforceability. Additionally, flexible permits facilitated an increase in the rate and a shift in the type of changes made, when compared to what might have occurred under a conventional permit.

Finding 6: The flexible permits enhanced information sharing between the companies and permitting authorities.

The flexible permits enhanced the permitting authorities' overall understanding of company activities and emissions as compared to conventional permitting approaches. The flexible permit development process provided the permitting authorities with a clearer understanding of the maximum emissions levels anticipated during the permit terms. During permit development, companies provided more information regarding the type of changes anticipated during the permit term. This provided a more comprehensive, up-front picture of

anticipated operational activities and associated environmental performance than a conventional permitting process.

During permit implementation, information about a company's specific changes under the advance approval provisions was generally comparable to information provided under a conventional permitting process. The flexible permits also required information about total source emissions and pollution prevention that is not typically required under conventional permitting.

Finding 7: The flexible permits generally provided to the public equivalent or greater information than conventional permits.

The flexible permits shifted the timing, type, and format of information made available to the public about emissions performance, operational and equipment changes, and P2 activities. The specific format, timing, and availability of certain types of information required by the flexible permits varied, particularly for advance approved changes. In all cases, the flexible permits provided more information up-front about operational changes (or categories of changes) that the sources anticipated making during the permit terms. This provided the public with an opportunity to understand and comment on the companies' anticipated changes. During permit implementation, four of the flexible permits provided equivalent or greater information for specific changes made under the advance approval provisions, although in a different format and timing than typically available under conventional permitting. In two cases, the pilot permits resulted in less information about certain changes implemented under the advance approval provisions. In the areas of total plant-wide emissions information and/or P2 information, all of the pilot permits increased the availability of information to the public for the companies' emissions and activities. For all six permits, the permitting authorities indicated that, on balance, the flexible permits improved the availability of information to the public, ensuring the flow of significant and meaningful information regarding the current status and future direction of operations and emissions.

Finding 8: The flexible permits produced or are anticipated to produce net financial benefits to companies and permitting authorities.

Companies and permitting authorities reported that the flexible permits resulted in net financial benefits or are anticipated to do so in the future. Companies and permitting authorities indicated that initial permit development costs exceeded those required to develop conventional permits because of the innovative nature of the permits and additional resources associated with developing site-specific flexible permit provisions. In each case, however, companies and permitting authorities reported that the flexibility provisions decreased, or are expected to decrease, the administrative costs of operating under the permit to more than offset the initially higher permit development costs. Companies reported that the potential opportunity costs of project delays from air permitting can be high, ranging as high as several million dollars in just a few days. In so far as flexible permits can minimize project delays, the economic benefits to companies can be correspondingly large. Permitting authorities typically reported that the additional permit development costs for flexible permits were offset by resource savings within the first three years of permit implementation.

Finding 9: Permitting authorities are generally supportive of flexible permits as an option.

The six permitting authorities involved in the flexible permits indicated that they are pleased with the environmental and administrative benefits of the permits. They believe flexible permitting techniques are useful tools to address some sources' operational flexibility needs, to foster environmental improvements through emissions reductions, and to reduce required permitting resources and backlogs for permitting. This increased permit efficiency allows the public agencies to focus resources on higher environmental

management priorities. Permitting authorities expressed interest in renewing the flexible permits and expanding the use of flexible permits within their jurisdictions and believed that finalization of EPA policy and/or guidance for flexible permits should increase national interest and efficiency in expanding their use. Additionally, permitting authorities stated that various forms of EPA outreach, training, and assistance would be useful to assist permitting authorities to develop effective flexible permits.

Finding 10: Permitting authorities indicated that flexible permit provisions should be matched with a company's need for flexibility and technical capacity to implement effectively its flexible permit requirements.

Permitting authorities believe that flexible permits meet applicable requirements and are fully enforceable. However, such permits may not be appropriate for all sources. Permitting authorities believe that two critical factors should be considered when determining the appropriateness of flexible permitting for a particular company. First, the company should be able to demonstrate that it has a sufficient need for the flexibility to justify the additional up-front permitting authority time and resources required to develop flexible permit provisions for the company. Second, the company should exhibit the technical capacity to operate effectively under a flexible permit. Factors such as a source's compliance history, commitment to pollution prevention, and ability to track and manage operational changes and emissions should be considered by permitting authorities when determining the appropriateness of a flexible permit for a company.

I. Introduction

A. Project Scope and Purpose

Over the last several years, the U.S. Environmental Protection Agency (EPA) and several State and local permitting authorities worked with several companies to develop innovative approaches to air permitting. The EPA and States launched these pilots to increase operational flexibility while ensuring environmental protection. Permit developers sought to encourage and facilitate emissions reductions and pollution prevention with the flexible permits. The permits were also designed to reduce the administrative "friction" – costs, time, delay, uncertainty and risk – associated with making certain types of operational and equipment changes. Additionally, permitting authorities desired to reduce the resources needed for case-by-case applicability determinations and for the approval process of subject minor and major New Source Review (NSR) permit applications and other permitting amendments. Permitting authorities designed these "flexible permits" within the existing regulatory framework (i.e., approaches were not precluded under any relevant Federal or State regulation) to address all applicable air requirements.[1]

As interest in flexible air permitting increased, the EPA saw the need to evaluate the implementation experience with flexible permits developed under pilot efforts such as EPA's Pollution Prevention in Permitting Program (P4) and State innovation activities. Particular interest has focused on flexible permitting techniques such as plant-wide emissions limits (e.g., plant-wide applicability limits, or PALs; potential-to-emit caps).

In response to this need, the EPA launched the Flexible Permit Implementation Review to conduct in-depth reviews of six flexible permits developed since 1993. The EPA's Office of Air Quality Planning and Standards (OAQPS) initiated this effort, in partnership with EPA's Office of Policy, Economics, and Innovation (OPEI). The EPA Office of Policy Analysis and Review (OPAR), the Office of General Counsel (OGC), and the Office of Enforcement and Compliance Assurance (OECA) provided support for this effort.

The purpose of the Flexible Permit Implementation Review is to help the EPA:

- Determine whether the flexible permits work as envisioned, providing the desired operational performance improvements and environmental protection.
- Obtain more detailed and better organized information regarding these efforts.
- Improve communication of the details and results of these efforts.
- Understand how such flexible permitting approaches might be improved.
- Assess the level of environmental benefit achieved under flexible permits.
- Learn how similar flexible permit development processes can be streamlined in the future.
- Provide input, as appropriate, into the final development of corresponding EPA policy.

[1]The term "flexible permits" has been primarily used to describe permits with conditions that enable permitted sources to make certain changes (e.g., modifications to operations, equipment, raw material, emission factors, monitoring parameters) without requiring further case-by-case review and approval or permit modifications from the permitting authority. The term also encompasses those approved permit conditions which are sufficient to enable a more expedited permit revision process, but not to accomplish a full advance-approval. This report and its appendices use the terms "flexible permits," "flexible permit conditions," and "flexibility provisions" to denote permits and permit conditions that include such provisions related to advance approval. See Section D for a discussion of flexibility provisions examined by the EPA's Flexible Permit Implementation Review.

B. Structure of this Report

This report presents the EPA's findings from the Flexible Permit Implementation Review. The Executive Summary briefly addresses the review's purpose, scope, approach, and findings. The Introduction includes a more detailed account of the project purpose and scope (Section A), the structure of this report (Section B), and the review approach and process (Section C). Section D introduces the primary types of flexibility provisions that are included in the six flexible permits reviewed in this evaluation. Section E summarizes the flexibility provisions contained in the six flexible permits, and briefly discusses the sources' operations, emissions, emissions sources, and emissions control equipment. The Findings Section presents the EPA's ten major findings from this flexible permit evaluation. Each finding is explored in detail, drawing on examples from the six Permit Review Reports.

C. Review Approach and Process

The EPA's Flexible Permit Implementation Review involved detailed analysis of company and permitting authority experiences implementing six flexible air permits. To structure the six permit reviews, OAQPS developed a "Flexible Permit Review Framework" that includes specific evaluation questions grouped into eight areas of inquiry. The Flexible Permit Review Framework was developed by OAQPS in consultation with other EPA offices, including OPAR, OECA, OGC, and OPEI.

C.1 Flexible Permit Review Framework

The areas of inquiry in the Flexible Permit Review Framework are listed below. Each of the six Permit Review Reports accompanying this report are structured based on this review framework, and they include the specific questions and areas of inquiry that were addressed by the reviews.

- **Background**: This section examines background information on the permitting authority's structure, capacities, and processes; the pilot source's operations and characteristics; and the company's need for flexibility.

- **Flexible Permit Design Features**: This section examines the specific flexibility provisions contained in the permit and the terms which assure compliance with them, including monitoring, recordkeeping, and reporting requirements.

- **Public Participation and Public Perception**: This section assesses the public's participation in the development of the flexible permit through examination of the public involvement process and the record of public comments. It examines the flows of information during development and implementation of the pilot permit, and compares these to what might have been experienced under conventional permitting.

- **Implementation of Flexible Permit Provisions**: This section examines when and how flexible permit provisions were actually utilized by the source during permit implementation. It explores how the flexible permit implementation might compare to the experience under a conventional permit. This section also assesses the quality and quantity of information generated under the flexible permit and discusses any problems that were encountered.

- **Design Adequacy of the Flexible Provisions**: This section assesses whether the flexible permit design features, such as advance-approved change provisions, were adequate to assure compliance with all applicable requirements.

- **Practical Enforceability of the Flexibility Provisions**: This section assesses the ability of the source and permitting authority to determine compliance with the permit conditions and applicable requirements. It also examines the ease of inspection associated with the flexible permit.

- **Permit Costs, Environmental Benefits, and Value Added**: This section assesses the relative costs and benefits of the flexible permit to the source and permitting authority, as compared to a conventional permit. In particular, this section examines whether the permit actually provided desired flexibility to the source as well as equivalent or better environmental protection.

- **Other Issues**: This section addresses ways in which flexible permits can be improved and how the EPA can support such improvements in the future.

C.2 EPA Review Team

The EPA assembled a core Permit Review Team consisting of representatives from various EPA offices, including OAQPS, OPEI, and OECA. Ross & Associates Environmental Consulting, Ltd., under subcontract to the EPA through Industrial Economics, Inc., provided overall team coordination services and compiled review results. In addition, representatives from Midwest Research Institute, under contract to the EPA, participated in the reviews to support the EPA's evaluation of the emissions monitoring, recordkeeping, and reporting requirements and practices. At least six representatives from this group participated in each of the six individual permit reviews and associated site visits. In some cases, the EPA Review Team was supplemented by representatives from the EPA Regional Office in which the pilot permit was developed.

C.3 Permit Review Process

The Flexible Permit Review Framework was completed for each of the six flexible permits. This was accomplished through extensive off-site research, on-site visits to the source and the permitting authority, and a review process for finalizing responses to the Flexible Permit Review Framework. Prior to each site visit, preliminary responses to many of the review questions were drafted by the EPA and its contractors based on information collected through pre-site visit conference calls with each company and permitting authority. Background research also included review of the flexible permits and other publicly available records, including permit applications, public comments received during permit review or implementation, inspection reports, monitoring data summaries, compliance certifications, notices, and other records.

The on-site reviews consisted of visits to the source and the permitting authority. The EPA Review Team's one to one-and-a-half day visits were designed to collect and verify evidence and data to complete the Flexible Permit Implementation Review Reports. The EPA on-site reviews were *not* conducted as compliance audits of the sources. Rather, they assessed the company and permitting authority's experience with developing and implementing the flexible permits, so as to help improve similar permits in the future. The site visits included discussions with company and permitting authority personnel and a walk-through of the plant, as well as a detailed examination of on-site records, including monitoring data. Representatives from the permitting authority participated in the source site visits and discussions. The plant site visits were typically followed by a half-day visit of the EPA Review Team to the permitting authority offices to discuss specific aspects of the review framework relevant to the permitting authority. Company personnel did not participate in meetings and discussions at the permitting authorities.

Following each site visit, extensive steps were taken to ensure the accuracy of information catalogued in the Flexible Permit Review Frameworks. EPA contractors prepared initial drafts of the Permit Review Reports. EPA contractors conducted follow-up discussions, as necessary, with the sources and the permitting authorities to complete these draft Permit Review Reports. The EPA Review Team provided preliminary review and comment on the draft Permit Review Reports. The revised Permit Review Reports were then forwarded to the relevant company and permitting authority contacts for review and comment. Companies and permitting authorities were asked to verify the accuracy and completeness of the responses contained in the Permit Review Reports. Based on these comments, the EPA contractors worked with OAQPS and OPEI staff to finalize the six Permit Review Reports. This Summary Report was prepared by OAQPS and OPEI, with support from contractors, and was reviewed and commented on by other members of the EPA Review Team.

C.4 Flexible Permit Selection

EPA selected six pilot permits for review based on the following criteria.

- Extent of permit implementation and/or duration since permit issuance.
- Likelihood of source and permitting authority voluntary participation in the review.
- Number and type of flexibility provisions in permit.
- Unique features of flexible permit.
- Diversity of emissions and applicable requirements.
- Number of inspections completed.
- Relevance of permit to inform ongoing EPA efforts to develop policy.

Table 1.1 lists the six flexible permits selected for inclusion in the Flexible Permit Implementation Review (see end of report).

D. What Are Flexible Permit Provisions?

The term "flexible permit" is frequently used to describe pilot permits with conditions that reduce the administrative "friction" – costs, time, delay, uncertainty, and risk – experienced by companies and permitting authorities when making certain changes under the permit. Such changes could include modifications to a source's method of operation, equipment, raw materials, emission factors, or monitoring parameters. The six flexible permits examined in this review contain flexibility provisions which advance approve such changes or categories of changes. While flexible permit solutions will depend on individual state permitting rules and requirements, a variety of flexible permit provisions have been developed by the EPA and State and local permitting authorities to accomplish advance approval for a category of changes. Several types of flexible permit provisions utilized in permits reviewed in this report are summarized below.

D.1 Description of Advance-Approved Changes

The six flexible permits include descriptions that enable the advance-approval of specific changes and/or categories of changes. Advance approved change descriptions typically allow companies to make a fairly broad spectrum of modifications, eliminating the need for additional case-by-case review and approval by the permitting authority at the time the plant makes the change. Changes that trigger new applicable requirements (i.e., requirements unaddressed by the advance approval provisions) or require modifications to monitoring, recordkeeping, and reporting requirements are not advance approved. To implement advance approved changes, sources must maintain plant-wide emissions below applicable limits. In addition, they typically must submit notice to the permitting authority and maintain on-site logs providing documentation of the changes

implemented under the advance approval provisions (e.g., the addition of a new emissions unit).

Some of the flexible permits contain provisions that only partially advance approve particular types of changes, providing a streamlined review and approval process. Permitting authorities believe this to be useful as an interim approach for certain types of changes and review requirements. For example, a flexible permit might advance approve a set of changes to which a source must apply best available control technology (BACT). The permit, however, could preserve the conventional process for public comment on the company's proposed BACT approach, as well as the permitting authority's opportunity to reject or comment on the proposed BACT approach at the time of the change.

D.2 Plant-wide Emissions Limits

All six flexible permits contain one or more plant-wide caps on emissions of Volatile Organic Compounds (VOC) and/or criteria air pollutants. These emissions caps typically included annual/12-month rolling limits (e.g., tons/year) and short-term limits (e.g., pounds/hour) that cover emissions from all emissions sources at a plant, including any that may be "grandfathered" under the Clean Air Act.

Emissions caps can function in different ways. First, caps can serve as a basis for ensuring new applicable requirements are not triggered. In other words, caps can be set in such a way that (as long as there is no violation of the limit) new applicable requirements will not be triggered. Potential-to-emit (PTE) caps typically establish "synthetic" minor source status for applicability purposes under one or more regulations by setting a limit on plant-wide emissions below the emissions threshold that would trigger major source status. In addition, for major sources, Plant-wide Applicability Limit (PAL) baselines are typically set at an average of the actual plant emissions for the previous two years (or another more representative period) plus 39 tons/year, an increment just under the Significant Emissions Rate (SER) for VOC emissions of 40 tons/year that would trigger major New Source Review.[2] In another variation, Oregon rules establish an annual and short-term Plant-Site Emissions Limit (PSEL) for sources in the State, based on each source's actual emissions in 1978, that is contained in the State Implementation Plan (SIP). The PSEL also functions to define the aggregate emissions level below which major NSR would not apply to changes made at the site. Short-term emissions caps, where required, also act to assure that the advance approved changes in combination with existing emissions do not adversely impact the National Ambient Air Quality Standards (NAAQS) (in attainment areas). Finally, emissions caps serve to bound the magnitude of advance approved changes so as to define them in a reasonably anticipated alternative operating scenario for title V permitting purposes. Often, when more than one cap was involved, these caps can be streamlined into one plant-wide emissions limit (i.e., combined into the most stringent form) so as to serve multiple functions at the same time.

D.3 Replicable Testing Procedures

Several of the flexible permits contain replicable testing procedures that enable sources to update the monitored parameter levels of concern (e.g., pollution control device efficiencies, emission factors), based on approved testing results, without requiring a permit modification. Permit provisions describe the replicable procedure to be used when testing and updating parameters, and the actual parameter values are documented in required correspondence between the permitting authority and company, which are maintained at the source and in the permitting authority's files along with the permit.

D.4 Applicable Requirement Streamlining

Pursuant to EPA guidance presented in White Paper Number Two, several of the flexible permits streamlined

[2]This assumes the sources is in an attainment area. SERs also differ depending on the pollutant in question.

applicable requirements to reduce permit complexity. In these instances, overlapping and redundant requirements were subsumed under the most stringent requirement(s). This technique was particularly effective when it was used as part of a "clean building" approach. A "clean building" is a separate structure or collection point within a plant site containing emissions units that are (or will be in the case of new units) routed to one or more dedicated, state-of-the-art air pollution control devices. To advance approve modifications or new unit additions in a "clean building" with respect to all technology-based requirements, the control device must assure compliance for all the advance approved changes (as well as for all unchanged existing operations in the same building) with the most stringent requirement that could apply to any of the activities being advance approved to occur within the "clean building."

D.5 Pollution Prevention Provisions

Several of the flexible permits contained explicit pollution prevention (P2) conditions designed to focus greater plant attention on P2 and to take full advantage of the P2 that often takes place when flexible permit provisions are established. These conditions ranged from P2 program development and reporting requirements to enforceable P2 performance targets.

E. Pilot Permit and Source Characteristics

While the flexible permits contain provisions to accomplish advance approval that are generally similar, each permit has a unique combination of conditions that are tailored to the company's flexibility needs, operations, and State-specific requirements. This section introduces the six flexible permits evaluated by the EPA's Flexible Permit Implementation Review. Table 1.2 highlights the key flexibility provisions in each permit (see end of report). The company operations, emissions sources, and emissions control equipment are summarized below. Detailed descriptions of source characteristics, flexible permit provisions, monitoring requirements, and other background information are available in the six Permit Review Reports.

3M Company - St. Paul, Minnesota

3M's St. Paul tape plant manufactures more than 550 specialty tape products, including automotive and medical tapes, graphics tape, offset printing tape, and foam and double-sided tapes. To produce tape products, adhesives are mixed at the plant and then applied to a tape backing, or "web", on one of 18 coaters. The coated web is fed through ovens to volatilize excess solvent from the adhesives, and is then wound into rolls and cut for packaging and shipment. VOC emissions result from volatilized solvents coming off the adhesive mixing areas and evaporation ovens and are controlled through a highly efficient regenerative thermal oxidizer (RTO). The flexible permit, issued in 1993, was needed to provide for an extensive program of renovations to maintain the long-term viability of this plant in 3M's network of plants.

DaimlerChrysler Corporation - Newark, Delaware

DaimlerChrysler's Newark Assembly Plant (NAP) began producing the Dodge Durango, a sports utility vehicle, in 1997. While vehicle production levels tend to be cyclical due to model changeovers and economic demand cycles, vehicle production in July 2001 was about 600 vehicles per day (200,000 vehicles/year). The NAP's initial flexible permit, issued in 1995, enabled the source to retool for Durango production and to construct a new vehicle coatings building adjacent to the assembly buildings. Most VOC emissions result from the various steps in the vehicle coating process (e.g., electro-coat dip tanks, paint booths, curing ovens), and are controlled through pollution prevention (P2) efforts and, to a lesser extent, by a regenerative thermal oxidizer. The NAP emits criteria pollutants (PM_{10}, SO_2, NO_x, and CO) from operation of the thermal

oxidizer, five boilers, paint curing ovens, and other combustion sources.

Imation Corporation - Weatherford, Oklahoma
Imation's Weatherford plant consists of two separate buildings. The North Building houses Printing and Publishing Division operations and manufactures products for the graphics arts and printing industries. Digital and conventional proofing systems are produced by coating thin films with colored, solvent-borne solids. The South Building contains Data Storage Division operations and produces data storage products such as computer diskettes. VOC emissions result from the solvent-borne coatings as they are mixed, applied to the film, and heated in curing ovens. Production areas are maintained with negative pressure and VOC emissions from the coaters and ovens are routed to voluntarily installed pollution control devices, including a regenerative thermal oxidizer, a catalytic oxidizer, and a carbon absorber. The pollution control equipment, two on-site boilers, and other miscellaneous combustion sources emit criteria pollutants. The design of the permit was critically needed for Imation to test new raw materials and processes in a timely manner.

Intel Corporation - Aloha, Oregon
Intel's Aloha, Oregon semiconductor fabrication plant produces semiconductor chips for use in computers and other electronic devices. An iterative sequence of steps, including application of photoresist, UV light exposure, developing, etching, rinsing with deionized water, doping, and rinsing with acid and solvent is employed to transform silicon wafers into semiconductors. Plant air emissions consist of VOCs and organic and inorganic hazardous air pollutants (HAPs) from production processes and cleaning activities, as well as criteria pollutants from on-site boilers. The flexible permit was designed to rely primarily on a campaign of P2 to advance approve a myriad of small equipment changes and process modifications.

Lasco Bathware - Yelm, Washington
Lasco's Yelm source produces fiberglass reinforced plastic (FRP) bathtubs, shower stalls, and whirlpools. The source operates a gelcoat line and an acrylic line. Coats of plastic and fiber-reinforced resins are sprayed in successive layers into molds (gelcoat line) or on preformed acrylic plastic sheets (acrylic line). Styrene emissions result from the spray booth operations. Lasco, through P2, limited its emissions per unit of production so as to allow greater overall production under its emissions cap. During the flexible permit term, Lasco also installed a regenerative thermal oxidizer to control these VOC emissions from various steps in the gelcoat line.

Saturn Corporation - Spring Hill, Tennessee
Saturn operates an integrated automotive production plant that produces a range of Saturn-brand vehicles. Production, which peaked in 1996 at 314,035 vehicles, has declined in recent years due to weakness in the subcompact car market segment. The flexible PSD permit, issued in June 2000, has enabled Saturn to retool to produce a new, fuel-efficient sport utility vehicle, the Saturn VUE™. VOC emissions result from the vehicle paint lines and the lost-foam aluminum foundry operations. VOC emissions are controlled by eleven recuperative thermal oxidizers, two regenerative thermal oxidizers, and a hybrid carbon adsorption/thermal oxidation system. Criteria pollutants arise from operation of the pollution control equipment, ovens, boilers, and other miscellaneous natural gas combustion sources. The Saturn PAL PSD permit is a hybrid permit consisting of a PSD permit for a major expansion with permitted emissions based on projected future actual emissions in combination with a PSD permit for existing emissions units with allowable emissions based on current actual emissions at the existing emissions units.

II. Findings

Drawing on information collected through the Flexible Permit Implementation Review, the EPA identified the following findings. Where appropriate, specific examples are drawn from the six individual permit implementation experiences. Readers should refer to the six Permit Review Reports for the full details of the individual permit reviews.

Finding 1: The flexible permits contain adequate measures to assure compliance with all applicable requirements.

Evaluation of the design adequacy of the flexible permits requires consideration of the objectives of the permit developers. Permitting authorities generally had two primary objectives in mind. The first was to ensure that all applicable air requirements were met. This design objective meant that the flexible permits were developed to function within the current regulatory framework without new rulemakings. The permit design teams believed that it was imperative to address all substantive requirements (e.g., technology, emissions performance, or work practice requirements) and procedural requirements (e.g., public notification, review, and comment processes; and reporting and information availability requirements). If any applicable requirement were omitted, this could necessitate obtaining construction approval and/or revising the operating permit solely to address the missing applicable requirement. This would erode most, if not all, of the potential benefits from advance approval of the other applicable requirements. The design challenge was to do so through techniques and altered administrative practices that would improve company and permitting authority operational performance and promote P2. The second design objective focused on improving the performance, or outcomes, achieved under the permit when compared with performance that would likely be experienced under a conventional permit. Specific aspects of this performance improvement goal are addressed later in this report.

All of the permitting authorities stated that the flexible permits were fully supported by current Federal and State rules. They believed that no rulemaking was required to support any of the flexible permitting efforts. While many of the flexibility techniques are not explicitly described or addressed in existing rules, the permitting authorities determined that current rules accommodated the flexible permits, since no existing regulation expressly precluded them and because the approaches did not bypass established substantive and procedural regulatory requirements.

In several cases, rule interpretations were important to enable certain flexibility provisions.

- Oregon DEQ and OAPCA representatives both reported that their ability to interpret "emissions unit" as an entire production line or building, as opposed to a specific piece of equipment or process step, was instrumental to enabling the advance approval provisions.
- DNREC determined that it had the ability to allow advance approvals in a manner consistent with construction time limit requirements.

The EPA found no evidence indicating that any air-related requirements applicable to the sources and their advance approved changes were missed during permit development. The EPA also found that the flexible permits adequately identified all requirements applicable to the advance approved changes.

The flexible permits contained adequate monitoring, recordkeeping, and reporting mechanisms to ensure that regulatory requirements are met and that appropriate measures are in place.

Permitting authorities and the EPA found that the flexible permits included monitoring, recordkeeping, and reporting (MRR) approaches that are appropriate given source operations. They also found that MRR approaches used in the flexible permits are sufficient to determine ongoing compliance with the permit conditions and applicable requirements. Table 2.1 summarizes the MRR requirements contained in the flexible permits (see end of report). Please refer to the Permit Review Reports for a more detailed discussion on the design adequacy of MRR approaches used in the six flexible permits. In several cases, the permitting authorities required enhanced MRR requirements to ensure that plant demonstration of compliance with established emissions caps was performed on a more frequent basis. These measures were partly designed to enable sources and permitting authorities to quickly identify problems or trends that could result in potential emissions cap exceedances, reducing the risk and potential severity of permit violations.

- 3M's St. Paul tape plant was required to calculate daily and rolling annual emissions totals within 41 hours of the end of each day, comparing these totals with the established VOC emissions caps.
- DaimlerChrysler was required to submit monthly reports to DNREC documenting plant-wide VOC and NO_x emissions in tons per year for the previous 12 months, as well as plant-wide daily emissions totals for the month.

In all cases, plant-wide emissions totals and calculations that demonstrated the companies' compliance with applicable emissions caps were required to be maintained on-site and were available to agency inspectors upon request. The EPA did, however, identify areas in which several of the flexible permits could be improved to ensure that specific monitoring techniques are consistent with current EPA guidance. The EPA did not find that any of these areas for improvement affected the companies' abilities to monitor actual emissions, or to ensure compliance with the emissions caps or advance approved change provisions. However, the EPA Review Team recommends that these improvements be considered in subsequent versions of the permits. Several of these recommendations are summarized below.

- Although the monitoring requirements for the VOC scrubber for Intel's Fab 4 at the Aloha plant used an appropriate methodology (i.e., operating parameter monitoring), the elements of the monitoring approach, were they relevant to the companies' ability to assure compliance, could be improved by including an operation and maintenance requirement that relates water flow rate with the flow corresponding to the optimum VOC removal efficiency, as verified through source testing.
- The EPA found that Saturn is conducting appropriate monitoring for the emissions caps, and has submitted a complete monitoring protocol to TDEC, in accordance with permit condition C.2. The EPA recommends the addition of several specific monitoring procedures and performance indicator ranges in the final Title V permit. These recommended measures are associated with monitoring of the carbon bed adsorber control equipment.
- For the Imation permit, the EPA found that continuous measurement of the air flow rate from coaters 12W and 15W and going to the catalytic oxidizer is appropriate parametric monitoring for monitoring capture efficiency. However, the permit did not identify any indicator range for this parameter (i.e., an operating range outside of which a deviation would require corrective action and reporting was not identified). Current monitoring guidance would recommend establishing such an indicator range. The periodic monitoring of capture efficiency and control device performance using inlet and outlet THC measurements was identified as an appropriate technique.

Implementation of flexible permit monitoring, recordkeeping, and reporting provisions was consistent with that envisioned and intended during permit design.

Permitting authorities reported that the sources' implementation of monitoring, recordkeeping, and reporting (MRR) requirements was consistent with that intended during permit development. They also found that the scope, timing, and availability of MRR information was sufficient for the permitting authorities to monitor companies' compliance with permit conditions and applicable requirements. In two cases, adjustments were made to clarify or alter MRR requirements during permit implementation.

- During a 1995 inspection, MPCA identified potential deficiencies in the recordkeeping approach for temperature monitoring of the thermal oxidizer emissions control device at 3M's St. Paul Tape Plant. 3M was able to demonstrate that no violations of the control device temperature level or the VOC emissions cap had occurred. 3M and MPCA clarified and agreed on an acceptable approach for recording future control device temperature readings.
- In 1996, MPCA eliminated the requirement for a ten-day advance written notice from 3M of changes implemented under permit condition 2.3.4. MPCA reported that the agency believed that the post-commencement notice for changes (submitted within two weeks of an actual change) was sufficient to provide the agency and the public with a documented record of advance approved changes actually made at the source.

Certain topics related to the renewal of flexible permits warrant further thinking to clarify acceptable approaches.

While the flexible permits operated well during the initial permit terms, companies and permitting authorities identified two areas that could benefit from further thinking and clarification. The first involves clarifying acceptable approaches for updating PALs at permit renewal. Companies and permitting authorities indicated that revising PAL levels based on the average of actual emissions for the prior two years (or some similar approach) can create disincentives for emissions reductions and P2 if the correction is too extreme. At the same time, permitting authorities and companies acknowledged that some approach for revising PAL levels at permit renewal is important to address new considerations that may have arisen, such as new applicable requirements or changes in local air quality or attainment status.

The second area involves the clarification of acceptable approaches to transition back to conventional permitting approaches if flexible permits are allowed to expire and the company or permitting authority does not wish to renew the flexibility provisions. For example, in the case of the 3M St. Paul Tape Plant flexible permit, the advance approved change provisions expired at the end of the permit term, while the plant-wide VOC emissions cap has remained in place.[3] This has raised questions regarding what level of changes (if any) would be allowed before New Source Review (NSR) would be triggered.

[3]At the time of the EPA site visit in June 2001, the 3M St. Paul Tape Plant was operating under its State air operating permit, although the advance-approval conditions in the permit expired in March 1998. The plant has submitted its Title V permit application and is awaiting its draft Title V permit.

Finding 2: The flexible permits were considered to be enforceable by permitting authorities and EPA.

A key objective of the EPA's Flexible Permit Implementation Review was to verify that company compliance with the flexible permits is enforceable in a practical manner by permitting authorities and the EPA. Permitting authorities expressed their belief that the flexible permit provisions are practicably enforceable, and the EPA agrees with these permitting authority assertions based on the findings from the reviews of the six flexible permits.

The flexible permits contain sufficient monitoring, recordkeeping, and reporting requirements to enable permitting authorities and the EPA to assure compliance.

Permitting authorities believe that the flexible permits are enforceable in a practical manner. They believe that they have the ability to detect source compliance with the flexibility provisions, as well as all applicable requirements, based on the monitoring, recordkeeping, and reporting requirements established in the permits. Permitting authorities further reported that their experiences during implementation of the permits confirmed that the flexible permits are enforceable in practice. See Finding 1 above for additional discussion of the adequacy of permit design related to monitoring, recordkeeping, and reporting requirements.

The EPA agrees with the permitting authorities' statements regarding the ability to determine company compliance with permit conditions and applicable requirements based on the findings from this review. The EPA found the monitoring, recordkeeping, and reporting information implemented by the companies for calculating emissions and determining control equipment parameter values to be sufficient to determine compliance. The EPA Review Team was able to reproduce the exact compliance values for each flexible permit using actual emissions and monitoring data (e.g., material usage data, VOC content data, control device parameter data) and established emissions calculations procedures. The EPA found that all data necessary to perform compliance verification calculations was available and well-organized at the sources.

Permitting authorities reported that conducting inspections of sources with flexible permits is comparable to conducting inspections of sources with conventional permits.

While the number of inspections conducted by permitting authorities varied, permitting authorities generally indicated that inspecting sources with flexible permits was straightforward and comparable to conducting inspections for sources with conventional permits.[4] A few permitting authorities stated that some up-front education was required of permitting authority inspectors to ensure their familiarity with the flexibility provisions in the permits. They indicated such orientation was necessary since the flexible permits contained some requirements not typically required in conventional permits, such as on-site logs of alternate operating scenarios and changes implemented under the advance approval provisions, as well as plant-wide emissions calculations.

[4]The number of inspections conducted of sources with flexible permits by the time of the EPA's review varied primarily based on the length of time the source had been operating under the flexible permit. Permitting authorities typically reported that they conduct annual inspections of the sources, although in some cases (e.g., MPCA's inspection of 3M's St. Paul Tape Plant) the frequency of inspections was reduced as permitting authorities focused on higher priority activities (e.g., issuance of Title V permits).

In some cases, permitting authorities indicated that the flexible permits resulted in less difficult or time-consuming inspections. This was primarily attributed to the reduced need to verify compliance with numerous requirements for specific equipment or activities that are commonly included in conventional permits (e.g., limitations on production rates for process lines, equipment, or process level emissions). Instead, inspectors were able to direct attention to ensuring compliance with the plant-wide emissions limits.

Finding 3: The flexible permits facilitated and encouraged emissions reductions and pollution prevention.

The flexible permits were designed to bring sharper attention to the current level of actual plant-wide emissions and emissions per unit of production. While the permits generally did not require actual emissions reductions during the permit term, they contained provisions to facilitate and encourage emissions reductions and P2. The permit implementation experience, supported by statements from the sources and permitting authorities, indicates that the permits were effective in facilitating emissions reductions and P2. Of the five sources which had been operating under their flexible permits for three or more years, all five accomplished a significant lowering of actual plant-wide emissions and/or emissions per unit of production. Achieving such environmental benefits was attributed by the companies to several factors, as discussed below.

Companies accomplished a significant lowering of actual plant-wide emissions and/or emissions per unit of production during their flexible permit terms.

- 3M lowered its actual VOC emissions from 4,300 tons/year to 700 tons/year due to increased pollution control device capture of VOCs, greater use of voluntary controls, P2, and reduced production.
- DaimlerChrysler lowered its actual VOC emissions from 1,165 tons/year to 776 tons/year, primarily through P2 associated with vehicle coatings and plant solvent usage.
- Lasco tested its emission factor as part of developing its flexible permit, leading to a voluntary reduction in emissions of approximately 100 tons/year prior to obtaining the flexible permit. During the permit term, Lasco implemented P2 measures and installed a thermal oxidizer to increase production while remaining under the emissions cap. These efforts resulted in per unit emissions reductions of approximately 32 percent.
- Using P2 projects, Intel lowered its actual VOC emissions over three-fold, from 190 tons/year to 56 tons/year, to become a synthetic minor source while simultaneously increasing production.
- As Saturn had only operated under the flexible permit for 13 months (at the time EPA's review was conducted), it is difficult to determine trends in VOC emissions per unit of production. VOC emissions for the first year of the flexible permit implementation were about 580 tons/year, compared with 798 tons/year in the year prior to the issuance of the flexible permit (1999).
- Imation reported that it has achieved about an 11 percent reduction in the pounds of VOC emissions generated per unit of production in 2000 when compared with 1997 baseline levels.

Companies reported that the plant-wide emissions caps focused organizational attention on reducing plant-wide emissions.

Several of the flexible permits shifted the allowable level of plant-wide emissions downward.

- The flexible permit for 3M's St. Paul Tape Plant enforceably limited VOC emissions to less than half those previously emitted by this source. With respect to actual emissions, MPCA indicated that the State of Minnesota does not have a technology requirement (such as one for best available state-of-the-art technology) as part of their State minor New Source Review program. As a result, air pollution sources are in a position to maintain their historical emissions and to increase their emissions in 39-ton increments through minor changes on an ongoing basis. Under the flexible permit in 1993, 3M became subject to an annual VOC emissions cap of 4,283 tons. Prior to the flexible permit, 3M was "grandfathered" to emit up to 65,000 tons annually. In 1988, 3M had 10,600 tons of actual VOC emissions and then voluntarily installed controls, bringing emissions down to 4,300 tons/year in 1991.
- The establishment of VOC PALs for the Saturn plant was part of a PSD permit revision process to allow approximately a doubling of production capacity. Even with a substantial increase in production capacity, the new PSD permit (including incorporation of VOC PALs) sets maximum VOC emissions at a level of about 50 percent of the allowable VOC emissions under the original, superceded PSD permit for the plant.
- Imation's flexible Title V permit extended emissions limits to the 12W coating line that was previously "grandfathered" under the Clean Air Act. Without the voluntary emissions controls that Imation installed (prior to the flexible permit), the coating line had a potential to emit (PTE) of approximately 4,000 tons/year of VOC. The permit enforceably limited VOC emissions to one site-wide cap of 249 tons/year, creating "synthetic minor" status for purposes of PSD applicability. Imation could have requested two such caps since its operations at Weatherford involved two separate sources [i.e, different operations with different Standard Industrial Classification (SIC) codes].

While limits on allowable emissions do not necessarily affect actual emissions, several of the companies reported that the emissions caps had a "focusing effect," drawing company personnel's attention to managing activities so as to minimize plant-wide emissions. They added that conventional air permits typically contain a more diffuse set of emissions limitations on specific equipment or production lines that lack this focusing effect. With company attention focused on managing plant-wide emissions levels in relation to an emissions cap, several companies reported that this created structural incentives for the companies to pursue emissions reduction opportunities that increase the margin of compliance - the difference between the emissions cap and actual emissions. First, companies indicated that emissions reductions result in larger compliance margins that typically reduce the risk of non-compliance associated with emissions cap exceedances. Second, per unit emissions reductions can create room under the cap to accommodate future production increases.

- Lasco representatives indicated that the 249 tons/year PTE cap on VOC emissions created a strong P2 and emissions reduction incentive, particularly since the source's margin of compliance was not large (e.g., actual emissions were 244.5 in 1998) and since the cap created a real production constraint.
- DaimlerChrysler representatives reported that the flexible permit conditions are easier to communicate to operations personnel since the focus on a plant-wide emissions cap and P2 is more intuitive and provides more "clarity of focus" than specific equipment or production line requirements. As a result, it has been easier to engage operations personnel in exploring and implementing P2 projects under the flexible permit. By eliminating numerous requirements on individual emissions sources at the plant, the flexible permit has also complemented DaimlerChrysler's lean manufacturing initiatives designed to reduce complexity throughout the plant.

While emissions caps, in general, can encourage emissions reductions, certain permit designs can also create disincentives for reducing emissions. As mentioned above, several companies voiced a major concern that

their over-control and/or use of P2 to create emissions "head room" under an emissions cap could be lost due to five year contemporaneous "ratcheting." A significant compliance margin between actual emissions and applicable emissions caps is desired by sources to buffer against risk of emissions cap exceedances and to accommodate production fluctuations linked to changing market demand for plant products. Companies indicated that a counter-productive "ratcheting" situation can arise if a PAL is totally adjusted downward at permit renewal to reflect recent actual emissions levels (e.g., average of prior two years actual annual emissions).

Advance approved change provisions reduced the administrative "friction" associated with P2 changes, making such changes more attractive for companies to undertake.

Advance approval provisions for selected operational, equipment, and raw material changes can significantly reduce the administrative "friction" of making changes, including delay and costs for undertaking modifications that have P2 benefits. Companies indicated that under conventional permits, administrative friction often arises from two activities. First, desired changes are typically evaluated by company environmental personnel to determine whether any regulatory requirements apply to or are triggered by the desired modification. Several companies reported that such applicability determinations are often not straightforward, and that they frequently require careful interpretation and necessitate seeking guidance or clarifications from the permitting authority. Second, changes triggering minor NSR are typically subjected to a notice of construction permitting process to seek approval from the permitting authority in advance of initiating the modification. Staff time needed to conduct applicability determinations and individual permit applications increases transaction costs for each modification. Additionally, the time frame between when the desired change is first identified and when it is reviewed and permitted can extend beyond the company's desired implementation time frame, resulting in a disincentive to change.

Companies reported that modifications designed to improve resource productivity, process efficiency, or reduce pollution are often implemented in an iterative manner, as source personnel initiate a modification, observe and measure results, and then make further refinements to optimize system performance. This could involve trying multiple raw materials to find one with optimal product quality and emissions performance characteristics. Several companies indicated that under such iterative change processes, increased transaction costs and time delays - or even perceived uncertainty about such costs and delays - can produce significant "barriers to entry," causing the plant to forego modifications with positive environmental outcomes that lack significant strategic, operational, or competitiveness advantages.

- For example, Intel representatives indicated that operations personnel are less willing to engage with environmental staff in exploring potential P2 opportunities if they perceive that there is a significant potential for delay or time intensive regulatory evaluations and communications. Due to the iterative nature of many P2 projects, operations personnel typically need to conduct a series of experiments on a manufacturing process to see if the changes produce the desired results. Intel indicated that many of these individual changes could be subject to individual construction permitting actions thus imposing a very jagged, stop-and-go aspect to the experimentation process. Intel indicated that, under such conditions, operations personnel might well view experimentation for purposes of pollution prevention as being too disruptive of the manufacturing process to proceed.

Even when emissions-reducing projects "pay" (e.g., exhibit a positive return on investment), increased transaction costs, time delays, and uncertainty can reduce the projects' ability to compete effectively for internal resources and organizational attention. The net result can be environmental benefits left on the table.

Companies reported that advance approval provisions can significantly improve the attractiveness of making modifications that result in reduced emissions by reducing their transaction costs and the potential for time delays. The examples below illustrate ways in which utilization of advance approved change provisions facilitated P2 activities at several of the sources with flexible permits.

- Between 1994 and 1998, Intel's Aloha plant made at least 18 P2-related equipment and material changes, utilizing the permit's advance approval provisions, that resulted in VOC emissions reductions of over 100 tons/year.
- DaimlerChrysler's NAP has undertaken numerous P2 activities utilizing the advance-approved change provisions in their flexible permit, including steps to reduce VOC and HAP emissions from vehicle coating processes. DaimlerChrysler representatives reported that, in the absence of a flexible permit, the source might have still pursued some of these P2 initiatives, but that they may well have been delayed to coincide with permit renewal time frames due to the cost and staff resources required to secure case-by-case permit approvals. They emphasized that the flexible permits significantly reduce the regulatory friction associated with making P2 changes, increasing incentives for P2.
- Lasco representatives stated that the flexibility provisions allowed the Yelm plant to test and undertake changes that reduced styrene emissions without having to wait for conventional case-by-case permit approval. The advance approved change provisions substantially increased the likelihood that Lasco would actually research and implement such changes, due to Lasco's corporate reluctance to undertake changes that would trigger NSR permitting actions. Lasco has implemented several changes utilizing the advance approval provisions that have reduced emissions, including installation of a new putty station and expansion of emissions control capacity.

Several flexible permits increased company awareness and focus on pollution prevention through explicit P2 program, reporting, and performance requirements.

Four of the flexible permits contained explicit conditions requiring the companies to implement formal P2 programs, report on P2 performance, and/or meet certain P2 performance targets. While these companies had histories of P2 accomplishment prior to issuance of the flexible permits, the companies generally reported that the explicit P2 permit conditions served to increase the visibility of P2 among plant personnel. When combined with the new focus on managing plant-wide emissions against a cap and the relative administrative ease for accomplishing such changes under the advance approval provisions, the P2 commitments and programs have empowered some company environmental personnel to expand P2 activities.

- Intel found that the flexible permit provided clear incentives to favor P2 over new emissions control technology for meeting the required source-specific, performance-based VOC Reasonably Available Control Technology (RACT) determination (permit condition 14). The explicit focus on P2 in the permit increased environmental personnel's leverage in their efforts to engage operations personnel in exploring and implementing P2 efforts.
- The P2 performance requirement included in the DaimlerChrysler NAP's flexible permit has prompted a clear organizational focus on reducing VOC emissions associated with vehicle coating operations. DaimlerChrysler is to begin utilizing a powder clearcoat by September 2003 if it is commercially available; if not, the company is to employ P2 measures that will reduce topcoat VOC emissions to below seven pounds of VOCs per gallon of applied coating solids on a daily weighted basis until a powder clearcoat option is commercially available.
- Even though a Washington State P2 expert familiar with the RFP industry identified Lasco as a "first

in class" pollution preventer, Lasco found that the flexible permit encouraged and facilitated company efforts to pursue additional P2 opportunities. To fulfill the flexible permit's P2 program requirement (which is linked to Lasco's BACT determination for advance approved changes), Lasco instituted a "P2 Task Force" at the Yelm plant. The task force is charged with identifying P2 opportunities and coordinating P2 activities throughout the plant. Lasco representatives stated that its employees are now more cognizant of how source emissions affect the community and of the importance of P2 as a result of the flexible permit development process and the increased organizational focus on P2.

- As part of its required P2 program, Imation conducted routine P2 meetings with a cross-functional team of plant managers and personnel at the Weatherford plant. P2 training for plant employees and research and development staff further heightened organizational focus on identifying P2 opportunities. Imation representatives also reported that the formal tracking of progress towards the plant's ten percent emissions reduction goal (i.e., based on emissions per unit of production) has increased plant personnel's awareness of and attentiveness to P2.

Finding 4: Companies with the flexible permits believe that air permitting is on their critical response path.

Companies participating in the review reported that conventional permits can constrain their ability to compete effectively. Though the factors differ somewhat for each source, the companies indicated that the combination of increasingly globalized competition and a shift to new modes of production substantially increased the pressure to operate highly flexible, nimble, and responsive research, development, and production operations. In this context, conventional, case-by-case air permitting, which the companies state can cause delay and uncertainty, can act as a mission-critical bottleneck to their operations.

Global competition across multiple industry sectors has shortened product life-cycles and increased the importance of moving new products quickly from development to market.

Companies report that global competition, which intensified during the 1990s through the integration of financial markets, reductions in trade barriers (e.g., NAFTA), increased industrial development in Asia and other regions, and substantially shortened product development time frames, has exposed U.S.-based operations to more and often lower cost producers. Examples of specific company competitiveness needs include the following.

- Intel reported that it operates in a highly competitive market and needs to meet aggressive product development schedules. Intel currently introduces a new generation of semiconductor chips every 12 to 24 months, with each new product cycle supported by a major "fab revamp." These operational changes are very time sensitive, to meet product release schedules from computer and electronics manufacturers, and involve highly interdependent and sequenced steps.
- 3M management indicated that the reduction in trade barriers associated with NAFTA and other international trade agreements, combined with the overall globalization of competition and the ability of potential competitors to purchase and install rapidly "off-the-shelf" production equipment, enables other companies to reach rapidly into 3M's market share with low cost product. In this context, 3M reports that "first to market" (where a week delay can be very significant) has become a critical business success factor, particularly in specialty product markets, such as the automotive and medical sectors. 3M reported that many specialty tape products become obsolete, and are replaced by newer

products, within six to nine months of initial production.

- DaimlerChrysler indicated that its vehicle development process, in part due to advances in computer-assisted design, has decreased from five years to about 18 months, substantially reducing its ability to accommodate conventional permitting time frames while meeting product development schedules.
- Saturn indicated that the automotive market has shifted significantly in recent years, necessitating more rapid responsiveness to market demands. In this context, Saturn has recently expanded its available product line and expects further changes in the near future, each of which requires significant production line retooling and process adjustments. Saturn also indicated that the vehicle development process has significantly shortened from five years to about 18 months. Previous lead times allowed ample time, in most cases, to secure needed permits while remaining on product development and release schedules. Under the new time frames, air permitting is now on its critical path.

Advance production concepts, designed to help firms compete effectively, encourage rapid, and sometimes iterative operational and equipment changes to continuously improve resource productivity, operational efficiency, and product quality.

Production theory and techniques have undergone substantial revision with emphasis placed on continuous resource productivity improvements. This emphasis - as reflected in such advanced production concepts as Lean Manufacturing and Six Sigma - substantially influences the day-to-day operating environments at many companies. These systems are characterized by a major drive to increase the velocity of production processes (reduce the time required to transform raw materials into product), increase asset utilization and cash flow, substantially shorten research and development time frames, continually improve process yields, and respond to heightened customer expectations for quality, product features, and delivery responsiveness. Specific examples from the permit reviews include the following.

- Intel reported a need to make rapid (and sometimes iterative) process and equipment adjustments in production processes to improve yield, lower costs, reduce chemical usage, and otherwise improve operations. Many of these changes involve switching chemicals used in tools and process chemical formulations, adjusting gas flow rates, and moving or adding tools (e.g., photo lithography equipment, plasma etchers, liquid acid baths).
- 3M indicated that, in response to competitive pressures, it is involved in a major corporate-wide drive to reduce cycle times and improve asset utilization and cash flow. These initiatives require for their success an in-plant culture of continual improvement and substantial flexibility for production operations.
- Lasco indicated that the key focus in the bathtub industry is making minor product modifications on an ongoing basis (rather than launching major new products like in the semiconductor industry). In this context, Lasco's competitive strategy focuses on continually increasing material yields, which requires seeking ways to utilize less and/or increase the capture of its input materials on a per unit basis. Lasco also needed flexibility to change production lines rapidly to accommodate different product types as short-term demand fluctuated among them.
- Saturn identified factory “agility” as a key to its ability to compete within the General Motors network of plants for new product lines, citing its flexible permit (and the factory responsiveness it provided) as a critical factor in its selection to produce the L850 “world engine.”
- Imation representatives indicated that the company desired to use the Weatherford plant to experiment with and pilot new coating technologies and product recipes to respond quickly to changes

in customer demand, as well as new production innovation opportunities. These changes involve short-term experimental use of manufacturing equipment, at times requiring changes to equipment configurations and the emissions profiles of the equipment. Imation further indicated that market demands frequently require rapid process changes, including substituting or introducing new raw material, relocating, modifying or adding new equipment, and/or interchanging pollution control devices.

Companies indicated that responding effectively to increasingly industry competitiveness requires operating environments capable of responding rapidly to changing market circumstances (e.g., develop and introduce new products rapidly and adjust production to address customer requests), moving production rapidly among facilities to achieve optimal asset utilization, and generally engendering a culture of continual operational improvement. The companies indicated that this results in an operating environment where changes to equipment, operating parameters, equipment configurations, and locations are more common and are often subject to tight deadlines.

Companies report that conventional permitting can be problematic due to the potential delay and uncertainty associated with such actions.

Although some variability exists, Federal and State and local air permitting rules generally prohibit an air pollution source from constructing, modifying, reconstructing, or operating an emissions unit, stationary source, or control device without explicit approval (typically in the form of an air permit or permit modification undertaken on a case-by-case basis at the time a source desires a change). The typical process for obtaining any needed New Source Review (NSR) approval involves the following:

- Communicating the nature of prospective changes to the permitting authority and discussions to determine if NSR would apply.
- Determining all the applicable regulatory requirements that the desired change would "trigger."
- Preparing and submitting any necessary permit application providing the details of the desired change. In many cases, permitting authorities may request additional information before a source's permit application is considered to be complete.
- Reviewing the application at the permitting authority and framing a draft permit (to ensure all applicable requirements are met, air quality protection is maintained, and needed technology requirements are imposed).
- Seeking and addressing public comments on the draft permit or permit modification, if required by Federal, State, or local rules governing the applicable requirements. In some cases, this step may involve public hearings.
- Issuance of the permit or revision required to undertake the change.

Permitting authorities reported that this process can take as little as 30 days (for a minor change that does not require public comment), but can extend to six or more months depending on the type of change, environmental impacts, applicable requirements, and public concerns. A typical time frame (required or strongly suggested by agency rules) for most minor source construction permit actions is 90 to 180 days, although certain permitting authorities indicated that past or current permit back logs inhibit their ability to respond within these time frames. Some states such as Oregon have provisions that allow "minor" operational changes (as defined by their specific rules) to proceed in parallel with the permitting process. Companies indicated that they utilize this option with some hesitancy since the outcome of the review is uncertain and the consequences of failing to obtain the permit (or be subject to an unexpected requirement) can be

substantial.

Companies indicated that this case-by-case permit process can introduce significant delay and uncertainty into their operational decision-making and research, development, and production activities. Although case-by-case permitting actions can impose administrative costs from applicability determinations and permit application development, companies' concerns focused on the potential opportunity costs and competitiveness costs associated with delay and uncertainty in the permit process.

Companies reported that operational change delay results from the need to obtain a permit prior to "constructing" each planned operational change (or aggregated group of changes). In the new competitive environment described by the companies, they often do not have substantial advance notice of the specific operational changes needed to address customer demands or market opportunities. As a result, the need to delay implementation of the change to meet conventional permitting requirements can lead to lost market opportunity. Companies further indicated that many of the continual resource productivity improvements they desire to undertake require experimentation and highly iterative process changes. In this context, the need to obtain a permit before each iterative step turns continual improvement into an uncertain process that operations managers are disinclined to undertake.

- Intel identified 150 to 200 changes per year that they believe would have triggered minor NSR permitting. This number of changes, combined with the Oregon DEQ approval time frame of up to 60 days per change, suggest that there would likely have been significant delay under a conventional permit. Even if few delays would have resulted in production downtime or missed market opportunities, the costs would likely have been significant under a conventional permitting scenario, as many of the changes improved the cost-competitiveness of Intel's products through resource productivity improvements. Industry estimates of the opportunity costs of production downtime and time delays run as high as several million dollars in just a few days, due to lost sales to computer makers and other factors. Intel representatives indicated that the impact of continued time delays would likely be to redirect Intel's production investment and operating facilities to locations where changes could be accommodated within existing environmental regulations (e.g., other U.S. States or to other countries where Intel operates, such as Ireland or Israel) as they had done prior to receiving their flexible permit.
- DaimlerChrysler and General Motors (Saturn's parent company) reported that they have experienced PSD review processes lasting more than 2 years.

Several of the companies indicated that uncertainty in the permitting process creates "friction" for the operational change process because it increases risk. Companies indicated that uncertainty emerges from a number of aspects of the permitting process. First, companies reported that they are at times unsure about the applicability of permitting requirements to maintenance, repair, and replacement activities. Second, future permit requirements can be unpredictable due to the discretion inherent in setting emissions limits, making technology determinations, and establishing monitoring, recordkeeping, and reporting requirements. Third, the length of the permit review and approval process can be unpredictable, due to such factors as permitting authority backlogs and the degree of public interest. According to the companies, these factors combine to make it difficult for a company to accurately estimate the time frame and cost of a permitting action and, therefore, how the need to permit will affect the financial attractiveness and overall viability of an operational change.

Companies with flexible permits stated that they have similar needs at other facilities and are

interested in pursuing flexible permits for those facilities.

The six companies reported that they have identified similar flexibility needs at other facilities, and they expressed interest in pursuing flexible permits for those facilities. For example:

- Imation's Camarillo, California source has been issued a flexible permit through the EPA's Project XL initiative, modeled in several respects on the Weatherford permit. Imation representatives stated that they believe the flexibility techniques used in the Weatherford permit would be beneficial to other Imation facilities as well.
- DaimlerChrysler pointed to a plant in the Midwest as a primary example of the company's need to expand the use of flexible permitting approaches to other facilities. The plant's eight existing permits have multiple, unit-specific technology limits, emissions limits for different time periods, and a variety of operating conditions specific to each emissions unit, for a total of 128 specific permit conditions (as compared to only 16 for the Newark Assembly Plant's permit). Since the late 1980s, the source has been addressing permit modifications and other concerns on a continuous basis. More specifically, since 1992 the plant obtained 12 permits or permit revisions, with two involving Federal NSR. Three recent amendments took, on average, over a year to complete. DaimlerChrysler believes that had the plant been operating under a flexible permit, this number of permit transactions could have been reduced to only two, saving time and money as well as facilitating timely completion of P2 activities. DaimlerChrysler representatives indicated that the company has set a goal of having flexible permits for all DaimlerChrysler facilities in the U.S. within two years. However, DaimlerChrysler reported that permitting authorities in several other States are opting to hold off on negotiating such permits until EPA guidance and/or rulemaking are complete.

Finding 5: Companies with the flexible permits utilized their flexibility provisions.

Flexibility provision utilization during the permit terms exhibited rates and types of changes consistent with the needs expressed by the companies during permit development.

All of the companies have utilized advance approval provisions contained in their flexible permits.

- As mentioned, Intel reported that the Aloha plant made an average of approximately 150 to 200 operational and equipment modifications per year during the Title V permit term that would likely have been subject to Oregon's case-by-case Notice of Construction approval process under a conventional permit. These changes, primarily associated with "fab revamps" to scale-up production of new semiconductors and iterative changes to optimize existing production processes (including P2-driven changes), were implemented using the advance approval provisions in the Title V permit.
- 3M made 34 equipment and operational changes that utilized the advance approval conditions. 3M estimated that 15 to 20 of the changes would likely have required some form of permitting action under Minnesota's conventional permitting process, with two of these changes likely having triggered at least case-by-case PSD permitting analyses. 3M indicated that the advance approval provisions accommodated all of the source's change needs (i.e., no additional construction permitting actions were necessary), enabling the company to upgrade aging equipment and improve the yield and per unit emissions performance associated with coating lines.

- DaimlerChrysler's NAP made over 90 operational and equipment changes utilizing the permits' advance approval provisions between 1995 and 2000. Advance approved modifications were made to coating system components, coatings, cleaning activities, fuel-fired sources, source locations, ventilation systems, and emissions control systems.
- Lasco made five changes during the Title V permit term (as of July 2001) that utilized the advance approval provisions. The advance approvals enabled Lasco to add two new emissions units, increase its stack height to remedy odor concerns, modify its emission factor to account for improved emissions performance, and modify its control technology without requiring case-by-case permitting actions.
- Despite only having about one year of implementation experience under its flexible permit, Saturn has made several of the changes outlined in its PSD permit application, including construction of the L850 engine line and the second assembly line in General Assembly. Saturn reported that it is likely that changes to existing emissions units have been made during the first year of the permit term (i.e., June 2000 to August 2001) that utilize the advance approval provision in permit condition B.10.1. Saturn is not required to maintain records of these changes, provided the changes meet established criteria in the permit and plant-wide emissions remain below established caps.
- Imation and Oklahoma DEQ reported that the Weatherford plant has made frequent use of the flexibility provisions that advance-approve the use of alternative raw materials. In at least four cases, this included a streamlined toxics evaluation by the State, allowing the source to rapidly implement raw material changes at the source. Imation also utilized the advance approved alternative operating scenarios for control devices and methods on three occasions.

In addition, some companies stated that the number of changes made is not the only indicator or importance to them. Equally important to them is the ability to make certain critical changes when other business factors dictate.

Companies reported that the advanced approval provisions in the flexible permits fully addressed their operational change needs. With the exception of Lasco, the companies did not need to undertake any non-advance approved construction permitting actions (e.g., minor NSR and major NSR) during their flexible permit terms (i.e., typically a 5 year period). Also, the permitting authorities indicated that the sources did not make any changes under the advance approval provisions that were not authorized under the advance approval provisions.

- Lasco was required to submit a Notice of Construction permit application and seek a Title V permit amendment to install a regenerative thermal oxidizer during the flexible permit term. This was necessary since this change was not advance approved in the permit, and since the change required new MRR requirements.

Some companies did not utilize all of the flexibility provisions in their permits, but they anticipated using these flexibility provisions in the future.

While all six companies utilized at least some of the flexibility provisions in their permits, not all flexibility provisions had been used at the time of this review (with the exception of Intel). Several sources indicated that, while they can reasonably anticipate desired operational and equipment changes (or types of changes) well in advance, the exact timing of change implementation is often influenced by multiple factors, such as changing organizational investment priorities and resources and fluctuations in customer demand. Companies typically reported that they anticipate using their unused flexibility provisions later in their permit terms or

following permit renewal. For example:

- During the first 14 months under the flexible permit, Saturn did not implement the advance approval provisions which allow construction of new emissions sources (i.e., permit condition B.10.2). Saturn and TDEC anticipate that this provision will be useful in the future to accommodate changes associated with vehicle model year changeovers.
- As of December 2001, the Weatherford site had not implemented two changes that were specifically described in the advance approved minor NSR change provisions (i.e., permit condition Section H, Subsection 2, Requirement 1b and 1c). Imation indicated that the source may undertake these changes in the future.

The flexible permits appear to accommodate a substantial number of advance approved changes while providing sufficient clarity to support practical enforceability.

The permitting authorities indicated that the actual changes made under the flexible permits were fully consistent with those envisioned during permit design and that the changes were made in a manner consistent with the constraints imposed by the permits. The flexible permits vary in the degree of specificity with which advance approved modifications are described in the permits. Each of the permits, however, imposes clear boundaries for determining which changes would not be covered under the advance approval conditions. Changes triggering new applicable requirements, including new or modified MRR requirements, that were not already addressed in the permit, are subject to conventional permitting and approval procedures.

- Changes advance approved in Intel's Title V permit were clearly defined categorically and by conditions documented in the permit. For example, advance approved changes could only be made at the stationary sources comprising Emissions Unit 1 (EU1); construction of entirely new stationary sources are not covered; changes to a pollution control device are not covered; and no new applicable requirement can be triggered by an advance approved change. In addition, advance approved changes must not result in source non-compliance with the VOC RACT requirement and the source PSELs.
- 3M's flexible permit contained specific categories of changes advance approved by the permit, such as updating drive mechanisms and electrical components on coating equipment and replacing or upgrading coater ovens, provided that 3M satisfied specific requirements described in the permit (e.g., remain below emissions caps and meet applicable New Source Performance Standards). If 3M desired to make a change not specifically covered by the listed advance approved categories of changes, they would be required to proceed with a conventional permitting process for the modification, unless MPCA agreed that the change was "consistent with" the changes advance approved by the permit.
- For DaimlerChrysler, some changes made under the flexible permit were not fully advance approved, but were eligible to go through an expedited review process if all applicable requirements were met and if no public hearing was requested during the public notice period.

Several companies reported that they did feel a need to contact their permitting authority during the permit term to discuss or clarify whether a particular modification would be allowed under the advance approval provisions in their pilot permit.

- 3M indicated that on two or three occasions, they contacted MPCA to discuss planned changes that were not explicitly addressed by the permit but appeared to be covered by the "consistent with"

phrasing included in the permit. In each of these instances, MPCA indicated that the planned change would not require a permitting action.

- On one occasion, Lasco filed a Notice of Construction permit application to change the venting of the regenerative thermal oxidizer (RTO). After the application was submitted, OAPCA informed Lasco that the proposed change was covered by the advance approval provisions and the application was unnecessary.

Some companies indicated the flexible permits have facilitated an increase in the rate and a shift in the type of changes made, when compared to a conventional permitting approach.

Some of the companies indicated that they would not have made certain changes, had such changes not been advance approved in their flexible permit. They typically stated that the time frames associated with conventional minor NSR and other types of air permitting, as well as uncertainty regarding the applicability of certain regulatory requirements, often creates sufficient "friction" (e.g., cost, delay, and risk) to make a proposed change unattractive. The EPA found evidence that proposed P2 changes are particularly vulnerable to being shelved under a conventional permitting approach, since they often involve iterative experimentation that could heighten regulatory transaction costs. In addition, P2 modifications often receive lower organizational investment priority unless they simultaneously address an important operational need. Advance approval provisions facilitated research and development into alternative processes. When research uncovered a promising process technique, the company could implement the change without waiting for case-by-case approval and permitting.

- Intel reported that successful pollution prevention initiatives directed at ongoing processes can be iterative in nature. The company typically conducts a series of experiments on its manufacturing process to see if the changes produce the desired results. Many of these individual changes could be subject to construction permitting actions, thus imposing a stop-and-go aspect to the experimental process. Intel indicated that, under such conditions, operations personnel might well view experimentation for purposes of pollution prevention as being very disruptive of the manufacturing process and therefore recommend that it not proceed.
- Lasco reported that the company is inclined not to make changes that have potential to trigger additional air permitting requirements, attributing this reluctance to potential costs, delay, and uncertainty associated with permitting actions. For example, Lasco installed more complex putty systems for attaching boards to the inside of bath units at other Lasco facilities to prevent the systems from triggering air permitting requirements. The advance approval provisions enabled Lasco to incorporate a new putty station design into the product production line at the Yelm site in a streamlined manner, resulting in material savings and VOC emissions reductions.

Finding 6: The flexible permits enhanced information sharing between the companies and permitting authorities.

All six permitting authorities stated that the flexible permits enhanced their overall understanding of company activities and emissions as compared to conventional permitting approaches. The flexible permits did, however, alter the timing and format of certain types of information, such as information regarding changes implemented under advance approval provisions, when compared with information available under conventional permits. In several areas, such as plant-wide emissions performance and P2 performance, the

flexible permits typically required information that is not required by conventional permits.

The flexible permit development process provided permitting authorities with a clearer understanding of the maximum plant-wide emissions levels anticipated during the permit terms.

The flexible permits provided clear information regarding the maximum level of emissions that would be allowed during the permit term, in the form of established emissions caps. If a source desired to exceed its emissions cap, it would thereafter be required to undergo a major NSR permitting process that would require public comment. For example, in accepting the PTE cap of 249 tons/year of VOC emissions, Lasco had to reduce its actual emissions, providing assurances to local residents that plant-wide emissions would thereafter be held relatively steady, despite company plans to increase production during the permit term.

During permit development, companies were required to share more information regarding the type of changes anticipated during the permit term, providing a more comprehensive, up-front picture of anticipated operational activities and associated environmental performance than a conventional permitting process.

The permitting authorities believe that the flexible permit development process, through the discussions of advance approved changes, provided them with a clear advance understanding of the types of modifications that the companies anticipated during the permit term. Under a conventional permitting approach, change information would typically only be available in a more fragmented, incremental manner, as companies pursued approval to make changes on a case-by-case basis. Under the flexible approach, applicable requirements associated with each advance approved change are identified up-front in the permit, affording a long-term view of potential applicable requirements, resulting emissions control requirements, and environmental outcomes. This enabled the permitting authority to have a more comprehensive picture of changes, and associated environmental performance outcomes, that would likely occur over the permit term (e.g., 5 years).

During permit implementation, information regarding changes made by the companies using the advance approval provisions varied among the flexible permits but was generally comparable to or greater than that produced under a conventional permitting process; the flexible permits did alter the timing and format of change information, as compared to conventional permitting approaches.

Variability is evident across the six flexible permits with respect to how advance approved changes were required to be documented and reported. Most of the flexible permits required some form of notices and/or summary lists of advance approved changes made to be submitted to the permitting authority, in addition to maintenance of an on-site log of advance approved changes. At one end of the range, 3M was required to submit advance notices and post-construction notices to MPCA for each change implemented using the advance approval provisions (note: during the permit term, MPCA eliminated the advance notice requirement, streamlining relevant information into the post-construction notices). 3M was also required to submit annual summaries of advance approved changes made during the year. At the other end of the range, Intel's permit did not require the company to report information on specific changes implemented using the advance approval provisions for a given six-month period if the maximum capacity to emit for the source declined through P2 or other means during this period, when compared to the previous six-month period. Saturn's permit requires the source to register new advance approved emissions sources with TDEC, although reporting on specific advance approved changes to existing emissions sources listed in the permit is not

required. Under the Intel and Saturn pilot permits, it is likely that less information on certain specific advance approved changes was available to the permitting authorities, when compared with a conventional permitting approach, in cases where such changes would have triggered the need for a NSR permit application. This assessment assumes that these advance approved changes would have been undertaken by the companies under a conventional permitting approach. The permitting authorities indicated that the information available under the flexible permits was, at a minimum, sufficient to verify compliance with all applicable requirements and to keep them appropriately informed of source activities.

Permitting authorities generally indicated that some form of recordkeeping and reporting regarding source implementation of advance approved changes is important. Inspectors with DNREC and OAPCA reported that it is helpful to have information on changes made using advance approval provisions during their inspections, whether this information was reported in advance or maintained in logs at the source.

Under a conventional permitting approach, a company typically submits a notice of construction or other such permit application to the permitting authority for approval prior to implementing a change that triggers NSR. These applications typically include specific information on proposed modifications. In addition, companies are generally required to submit a notice of completion to the permitting authority once the company has finished "construction" of the change. While the same type of change information is typically made available under a flexible permit, the timing and format of the information differs from that required under a conventional approach. First, the advance approval provisions in flexible permits provide some information at the beginning of the permit term regarding specific changes or categories of changes that are anticipated during the permit term. No such advance information is required under conventional permitting approaches. Second, under flexible permits, companies generally do not submit permit applications for individual changes, unless the changes are only partially advance approved. Instead, information on actual changes made that fit the advance approval descriptions is typically provided to the permitting authority soon after the change is implemented, typically in the form of a post-construction notice. In addition, most pilot sources operating under flexible permits are required to record information on changes made using the advance approval provisions in an on-site log that is available to agency inspectors. Third, the flexible permits frequently require some form of aggregated summary reporting on changes made using the advance approval provisions. The companies are typically required to list all advance approved changes made during a particular reporting period, such as the past month, quarter, or year. Permitting authorities indicated that the summary reporting further helps to create an aggregated picture of changes made at the source, when compared with a series of case-by-case permit applications in the agency file.

The section below discusses more detail regarding the timing, type, format, and accessibility of change information available under the flexible permits.

- 3M's permit required the company to provide written notice to MPCA for each change implemented by the plant that utilized the advance approval provisions in the permit. A written notice was due to MPCA ten days prior to beginning actual construction and a subsequent notice was required to MPCA two weeks after commencing operation. In May 1996, MPCA representatives reported that the agency believed that the post-commencement notice for changes was sufficient to provide the agency and the public with a documented record of advance approved changes actually made at the source. 3M was also required to submit an annual summary report of advance approved changes implemented during the past year.
- Imation is required to submit a notice of completion 30 days after the completion of construction of advance approved changes.

- Lasco's flexible permit required the company to submit notices of construction completion to OAPCA for each advance approved change undertaken. Lasco is also required to maintain an on-site log of changes implemented under the advance approval provisions. The permit also requires Lasco to submit a semi-annual summary of advance approved changes undertaken.
- DaimlerChrysler is required to submit monthly reports listing changes made using the advance approval provisions during the prior month. The NAP is also required to maintain an on-site log of changes made under these provisions and to submit an annual summary list of advance approved changes implemented.
- Saturn is required to register with TDEC new emissions sources constructed under the advance approval provisions of the permit. This registration includes the submission of a completed application form, a brief process description, documentation of BACT or minor source BACT (for sources below established emissions threshold levels) for the new source, and periodic monitoring parameters for any control equipment. The permit also requires Saturn to submit a plan to assess the emissions of toxic, volatile pollutants from the source within two years of permit issuance.
- Intel's permit required the company to submit a list of advance approved changes made during each six-month period, if there was a net increase in the maximum capacity to emit at the source for that period, when compared with the maximum capacity to emit for the previous six-month period. This occurred once during the five-year permit term.

Several permitting authorities reported that they received more change information from companies operating under the flexible permits than would have been available under a conventional permitting approach. These permitting authorities reported that the flexible permits encouraged sources to report on operational and equipment changes, even if these changes would not have triggered minor NSR applicability under a conventional approach. Since the advance approval provisions removed the need to make case-by-case determinations of NSR applicability for individual changes implemented during the permit term (companies only needed to determine whether the changes satisfied the advance approval criteria specified in the permit) companies tended to report more changes. For example, 3M indicated that the company viewed the permit as a valuable asset, and they indicated that they desired to protect this asset by ensuring a high level of communication with MPCA. Some permitting authorities indicated that the conventional NSR program may sometimes create disincentives for companies to report changes for which the applicability of NSR is uncertain, since such discussions with the permitting authority to determine applicability could prove time intensive and lengthy. Permitting authorities indicated that the flexible permits remove any incentive for companies to "push the interpretation" of applicability determinations in a direction that would result in less change reporting.

- MPCA representatives reported that 3M reported information on changes that would not have triggered minor NSR applicability under a conventional permitting approach, providing MPCA inspectors and the public with more information on changes implemented at the source.
- DNREC inspectors indicated that DaimlerChrysler reported information on changes beyond those that would have been required under a conventional permitting approach. The inspectors indicated that this enhanced their understanding of company activities.

During permit implementation, the flexible permits required the provision of more comprehensive and useful information on plant-wide emissions performance to permitting authorities.

Permitting authorities reported that the plant-wide emissions reporting required under the flexible permits provides more comprehensive and easy-to-understand information on actual environmental performance

during the permit term. In some cases, such as for the DaimlerChrysler and 3M permits, the frequency of emissions reporting information was also greater than that typically required under a conventional permit. Even when more frequent emissions reporting was not required, however, the companies were required to maintain current emissions calculations on-site to demonstrate compliance with the established plant-wide emissions caps. The flexible permits all require companies to make these emissions calculations available to permitting authority inspectors and personnel upon request. Conventional permitting approaches typically require preparation of an emissions inventory by the source on an annual basis.

- DaimlerChrysler is required to submit monthly emissions reports to DNREC that include comprehensive, plant-wide information on VOC and NO_x emissions. The monthly frequency of these reports is greater than what would typically be available under conventional permits.
- The 3M flexible permit required the St. Paul Tape Plant to submit quarterly reports to MPCA on the source's plant-wide emissions. The permit required 3M to report on all plant emissions units, including those that had been "grandfathered" by the Clean Air Act. These previously "grandfathered" emissions units were also required to be included in the plant's emissions monitoring activities and enforceable compliance limits. MPCA indicated that daily and annual rolling totals of VOC emissions provided near "real time" information on actual plant-wide emissions.
- The Intel Title V permit retained Intel's original PSELs, pollutant-specific, plant-wide short-term and annual caps on actual emissions. Intel submitted semi-annual monitoring reports to Oregon DEQ containing semi-annual compliance certification, emissions statements, and excess emissions upset log. Since Oregon regulation required PSEL, Oregon DEQ stated that their emissions reporting was very similar to that required by other Title V facilities in the State.
- Oklahoma DEQ indicated that Imation's flexible permit requires annual emissions reporting, similar to that required under a conventional Title V permit, including annual compliance certification and an annual emissions inventory. Oklahoma DEQ indicated that the flexible permit incorporates a previously "grandfathered" source that would not have been included in compliance reporting under a conventional permit.
- Under its flexible PSD permit, Saturn is required to monitor and log monthly plant-wide emissions data which are maintained on-site and available for TDEC inspection. Saturn and TDEC indicated that plant-wide emissions reporting will be required in the forthcoming Title V permit for the source.

During permit implementation, four of the six flexible permits required companies to share information regarding P2 activities and performance with the permitting authorities. Conventional permits do not typically require companies to share P2 information with the permitting authority or public.

The flexible permits developed for Intel, Imation, and Lasco under EPA's P4 program each require the companies to implement P2 programs. The companies were required to report information on their P2 programs to the permitting authority, in addition to periodic reports on P2 activities, accomplishments, and performance. DaimlerChrysler is also required to submit routine reports documenting P2 activities.

- Imation's implementation of a P2 program is voluntary, but there is an explicit link in the permit between adoption of an approved pollution prevention program and the BACT determination for advance approved changes. Therefore, to access advance approvals that require BACT, Imation must have an approved P2 program in place, which Imation did implement during the permit term. The Lasco permit contained a similar connection between BACT and a P2 program. The flexible permit requires Imation to submit an annual P2 executive summary describing the pollution prevention activities and programs adopted on site, as well as progress against a P2 target of 10 percent per unit

emissions reduction during the permit term.

- Intel was required to submit an annual P2 progress report to Oregon DEQ, and a final report at the end of the permit term.
- DaimlerChrysler is required to report annually on their P2 activities as part of the annual compliance certification.
- Lasco is required to submit an annual P2 progress report, which documents P2 techniques, goals and accomplishments. Additionally, prior to the end of the third and fifth year of the permit term, Lasco is to submit a report demonstrating compliance with the P2 Program.

Finding 7: The flexible permits generally provided to the public equivalent or greater information than conventional permits.

The EPA's examination of the public record and the availability of information to the public during the development and implementation of the flexible permits indicates that the permits shifted the timing, type, and format of information to the public on emissions performance, operational and equipment changes, and P2 activities. As discussed in Finding 6 above, the six permits vary in the specific format, timing, and availability of certain types of information required, particularly related to certain specific advance approved changes implemented under the permits. In areas such as plant-wide emissions performance and P2 information, most of the flexible permits clearly increased the availability of information to the public. In all six cases, the permitting authorities indicated that, on balance, the flexible permits improved the availability of information to the public.

During permit development, the flexible permitting efforts followed or exceeded the permitting authorities' conventional communications and public involvement procedures.

Permitting authorities indicated that the availability and flow of information to the pubic during the development of the flexible permits satisfied or exceeded all requirements associated with the agency's standard operating procedures for permit development. This procedure typically includes making the draft permit available to the public at the permitting authority offices and at a local public library, publishing notice of the draft permit and public comment opportunities in one or more newspapers, holding a public comment period (e.g., typically 30 days), and conducting a public hearing if requested by the public. Some permitting authorities also publicize draft permits on their website or through other communication mechanisms.

In four of the flexible permit development efforts, including the three permits developed under the EPA's P4 program, the permitting authorities and companies voluntarily conducted one or more public meetings (i.e., in addition to any opportunity to hold a public hearing as part of the formal review process). While these meetings were not requested by the public, the permitting authorities and companies believed that the innovative nature of the permits increased the importance of taking active steps to inform local communities about the efforts. In addition, several of the permits experienced local media coverage about the innovative nature of the permits.

- At the beginning of the flexible permit development effort in 1996, citizens of Yelm, Washington did not view Lasco as a "good cooperate neighbor" due to past odor issues. The subsequent level of information flow to the public surrounding the Lasco permit development consisted of several meetings, many public notices, and extensive communication between Lasco and OAPCA. At the

end of the permit development process, the Sierra Club submitted a letter supporting Lasco's flexible permit and thanking EPA Region 10, OAPCA, and Lasco for their proactive efforts to involve the community in the permit development process.

- Companies and permitting authorities involved in the development of the Imation, 3M, and Intel flexible permits each deemed an up-front public meeting in conjunction with the public comment period to be helpful in communicating to the public about the flexible permits, due to their innovative nature. In addition, the companies and permitting authorities were interested to understand early on any potential public questions or concerns about the permits. No adverse comments were subsequently received from the public for any of these permits.

The flexible permit development process increases the availability of information to the interested public regarding anticipated changes and emissions levels, as compared to a conventional permit development process.

As discussed in Finding 6 above, the flexible permit development processes provided clear information to the public regarding the maximum level of source emissions that would be allowed over the permit term, in the form of established emissions caps. Permitting authorities indicated that the emissions cap requirements in the draft permits and communicated during public meetings (when held) provide useful information to interested members of the public. If a source desires to exceed its emissions cap, it would thereafter be required to undergo a major NSR permitting process that would require public comment. The Lasco example demonstrates how such up-front information on total allowable plant-wide emissions can increase public understanding of the permit and anticipated environmental performance. In accepting the PTE cap of 249 tons/year of VOC emissions, Lasco had to reduce its actual emissions, providing assurances to local residents that emissions would thereafter be held relatively steady, despite company plans to increase production during the permit term. This awareness allayed one of the key concerns voiced by members of the Yelm community.

During development of the flexible permits, more information was available to interested members of the public regarding the type of changes the sources anticipated making during the permit term, when compared to a conventional permit development process. As discussed in Finding 6, the permitting authorities believed that the flexible permit development process, through the discussions of advance approved changes, provided them and interested members of the public with a clear advance understanding of the types of modifications that the sources planned to make during the permit term. Under a conventional permitting approach, change information would typically only be available in a more fragmented, incremental manner, as companies pursued approval to make changes on a case-by-case basis. Under the flexible approach, applicable requirements associated with each advance approved change are identified up-front in the permit, affording a long-term view of potential applicable requirements, resulting emissions control requirements, and environmental outcomes. This enabled the permitting authority and interested members of the public to have a more comprehensive picture of changes, and associated environmental performance outcomes, that would likely occur over the permit term.

During permit implementation, the flexible permits varied in the availability of information to the public about plant-wide emissions, operational and equipment changes, and pollution prevention activities; all permitting authorities indicated that, on balance, the flexible permits enhanced the availability of information to the public as compared to information typically available under conventional permitting approaches.

During permit implementation, the flexible permits required the provision of more comprehensive and, from several of the permitting authorities' perspectives, more useful information on plant-wide emissions performance to permitting authorities. As discussed in Finding 6, permitting authorities reported that the plant-wide emissions reporting required under the flexible permits provides more comprehensive and easy-to-understand information on actual environmental performance during the permit term. In some cases, such as for the DaimlerChrysler and 3M permits, the frequency of emissions reporting information was also greater than that typically required under a conventional permit. In other cases, such as for Imation and 3M, the flexible permits required the companies to report emissions from previously "grandfathered" emissions sources in their plant-wide emissions reporting. For all the flexible permits, the reports containing information on plant-wide emissions were available to the public in the permitting authorities' files.

The EPA found that there are a variety of techniques for making information available to the public regarding changes made using the advance approval provisions. These techniques include advance notices, post-construction notices, change registration, and periodic summaries of changes made (e.g., monthly, quarterly, or annual). For changes that do not meet the advance approval provisions, or that would cause a company to increase its emissions caps, the company would be required to undergo a conventional permitting process that would include submission of required application materials and completion of required public notice and comment procedures. When combined with the information on anticipated changes identified during the permit development process, as well as information on plant-wide emissions and P2 activities, the permitting authorities believe that flexible permits ensure the flow of sufficient information to enable the permitting authorities to effectively enforce for all applicable requirements, to ensure that air quality is protected in accordance with their SIPs, and to ensure consistency with the Clean Air Act's intent to provide for effective opportunities for public input into air permitting decisions.

As discussed in Finding 6, there was variability in the reporting requirements for changes implemented using the advance approval provisions. For four of the flexible permits, including those for 3M, DaimlerChrysler, Imation, and Lasco, the EPA found that approximately equivalent information on advance approved changes made was available to the public under the flexible permits, as compared to what permitting authorities indicated would have been available under conventional permitting approaches. In these cases, the timing and format of the advance approved change information was shifted when compared to conventional permitting approaches. In general, more general information on advance approved changes was available up-front during permit development, and more detailed information on specific changes made was available in the form of notices and lists of changes made, as opposed to minor NSR construction permitting applications. In addition, MPCA and DNREC found that the companies reported changes in addition to those that would likely have triggered minor NSR permit applications under a conventional permitting approach. For the Intel and Saturn flexible permits, as discussed in Finding 6, more general information on anticipated changes was available up-front during permit development, but less information on individual changes implemented using the advance approval provisions was available during permit implementation when compared to a conventional permitting approach, assuming that these changes would have been made under a conventional permitting approach.

During permit implementation, four of the flexible permits required companies to report information regarding P2 activities and performance to the permitting authorities. This information is available to interested members of the public through the permitting authority files for these sources. P2 information would not typically be available to the public under a conventional permitting approach.

- The Imation pilot permit required the company to submit annual P2 reports to Oklahoma DEQ describing the P2 activities and programs adopted at the site, as well as progress against an

established P2 target. This information is available to the public in the permitting authority's files.

- Intel was required to submit an annual P2 progress report to Oregon DEQ, and a final report at the end of the permit term. This information is available to the public in the permitting authority's files.
- DaimlerChrysler is required to report annually on their P2 activities. This information is available to the public in the permitting authority's files.
- Lasco is to submit an annual P2 progress report, which documents P2 techniques, goals, and accomplishments. Additionally, prior to the end of the third and fifth year of the permit term, Lasco is to submit a report demonstrating compliance with the P2 Program. This information is available to the public in the permitting authority's files.

Finding 8: The flexible permits produced or are likely to produce net financial benefits to companies and permitting authorities.

Companies and permitting authorities reported that the flexible permits have resulted in net financial benefits, or that they anticipate that this will be the case. Companies and permitting authorities indicated that initial permit development costs exceeded those required to develop conventional permits, due to factors related to the pilot nature of the permits, as well as to factors inherent to developing flexible permitting techniques. In each case, however, companies and permitting authorities reported that the flexibility provisions have decreased, or are expected to decrease, the administrative costs of operating under the permit sufficiently to more than offset the higher initial permit development costs.

Permit development costs for the flexible permits were significant, but these higher costs were largely attributed to the pilot nature of the permits.

Companies and permitting authorities involved in the flexible permitting efforts reported that the costs, primarily resulting from staff time devoted to development of the flexibility provisions, were greater than those typically experienced in the development of conventional permits.

- MPCA representatives estimated that about 1000 hours of MPCA staff time were devoted to development of the permit. MPCA representatives noted that a primary factor contributing to the length of the permit development was that this was the first flexible permit developed in Minnesota, as well as one of the first developed and issued in the U.S.
- The development of Lasco's flexible Title V permit spanned approximately 16 months, from initiation of discussions (e.g., P4 group discussions) until the permit was issued. However, in addition to this being a team-oriented "demonstration" project necessitating additional review and public participation (see below), this was OAPCA's first Title V permit. OAPCA representatives reported that these factors contributed to the overall length of the permit development process. In the future, OAPCA indicated that flexible Title V permits will likely take only slightly more time to develop and issue than conventional Title V permits (e.g., approximately 180 hours versus 160 hours).

Permitting authorities indicated that a substantial amount of the higher permitting costs were attributable to the pilot nature of the permits. These pilot costs stemmed partly from the need for frequent conference calls or meetings between the permitting authorities, the EPA Regional Offices, and the EPA headquarters to ensure the flexible permitting techniques would be approved by the EPA in the absence of guidance on flexible permitting. Additional costs also resulted from the fact that each of the six flexible permits were the first developed under these permitting authorities' jurisdictions, and there was limited national experience with

specific flexibility provisions from which to draw upon. Permitting authorities indicated that the pilot-related transaction costs would likely be reduced significantly or eliminated if the EPA were to issue guidance and/or rulemaking that clarified the flexible permitting approaches and techniques that are acceptable to the EPA.

Some portion of the higher permit development costs, however, were associated with tailoring of flexible permitting techniques to address the specific applicable requirements, needs, and circumstances of the sources. Permitting authorities and companies indicated that these costs would be incurred in the development of any new permit containing flexibility provisions, even if the use of flexible permitting techniques becomes routine and is supported by EPA guidance or rulemaking. For example, communications between the companies and permitting authorities regarding the changes that companies' anticipate making during the permit term are typically necessary to develop advance approval provisions. Other flexible permitting techniques, such as the development of replicable operating and testing procedures and streamlining of applicable requirements, also entail more significant interactions between a company and permitting authority during permit development.

- 3M and MPCA reported that additional time was required during permit development to develop the advance approval descriptions. This involved discussions to identify the specific changes and categories of changes that 3M anticipated making during the permit term.

Companies and permitting authorities that have renewed their flexibility provisions in subsequent permits indicated that the renewal costs have been minimal, as compared to costs required under a conventional permit renewal process. While some advance approval provisions may need to be updated at permit renewal, to accommodate new change needs anticipated by the company over the subsequent permit term, this process generally requires significantly less company and permitting authority resources than were required for the initial development of flexibility provisions for the source. This means that potential financial benefits for companies and permitting authorities can be extended to subsequent permit terms.

- Oregon DEQ incorporated many of Intel's flexibility provisions into the company's subsequent synthetic minor air permit without requiring additional permitting authority resources.
- DNREC reported that it was able to incorporate the flexibility provisions in DaimlerChrysler's original pilot flexible permit into the company's Title V air operating permit without requiring resources beyond those necessary to issue a conventional Title V permit.

Companies and permitting authorities reported that they experienced financial benefits from implementation of the flexible permits that more than offset the higher up-front permit development costs.

Companies and permitting authorities reported that financial benefits arose during permit implementation from the reduced administrative costs associated with company operational and equipment changes made under the advance approval provisions. Companies indicated that the advance approval provisions reduced the staff time and resources necessary to implement changes covered by these provisions. Company personnel found that they did not need to perform detailed applicability determinations for individual changes, provided that the changes satisfied the advance approval conditions listed in the permit. Such applicability determinations for advance approved changes were performed during permit development and clarified in the permit. Companies indicated that this streamlined applicability determination process and the improved certainty related to how changes would be addressed under the permit reduced the companies' staff time needed to process changes. Further savings resulted from the companies' reduced need to prepare applications for

construction permits and/or permit modifications for individual changes, due to the advance approval provisions. Companies indicated that the time necessary to complete permitting authority notifications of advance approved changes and/or to record such changes in on-site logs was significantly less than the staff time necessary to prepare permit applications under a conventional permitting approach.

- DaimlerChrysler representatives estimated that the flexible permits save the company significant staff time that would have been associated with applicability determinations and permit actions for changes made using the advance approval provisions. They estimated that approximately 505 hours of staff time were saved under the initial flexible permit. These savings are projected to increase in the future as the company makes more changes utilizing the advance approval provisions in the permit.
- Under a conventional permit, Intel would have needed to prepare approximately 150 to 200 notice of construction applications per year (that were not required under the flexible permit). Intel estimated that each application would have required an average of approximately 8 hours, resulting in 1,200 to 1,600 hours of staff time per year.
- Lasco estimated that to execute a construction permit requires approximately 50 staff hours. Additionally, to process a permit modification, Lasco would need to submit a pubic notice (with an estimated cost of $350) and to hold a public hearing (with an estimated cost of $400). For all five changes made using the advance approval provisions, Lasco estimated a cost savings of more than $20,000.

Permitting authorities also reported that they have experienced, or anticipate experiencing, administrative cost savings during permit implementation.

- MPCA representatives indicated that they view flexible permits as saving agency resources by reducing the number of case-by-case change reviews and permitting actions. MPCA estimated that each of their minor NSR permit actions (if straightforward) require an average level of effort equivalent to approximately $1,000, and 3M estimated that approximately 15 to 20 of the 34 changes undertaken likely would have required a minor permitting action. From MPCA's standpoint then, the flexible permit provided an administrative savings benefit of between $15,000 and $20,000. Further, 3M indicated at least two of their changes may have been major permit actions requiring approximately 100 hours of processing by MPCA. At $125 per hour, this would represent an additional savings to MPCA of $25,000.
- Oklahoma DEQ representatives stated that the Imation permit has saved time for DEQ personnel, enabling them to "operate more effectively" with their limited staff. They indicated that most of the time savings result from the reduced need for administrative processing of case-by-case construction permitting actions and air toxics approvals. DEQ representatives stated that they have identified at least five changes made under the advance approval provisions that would have required a permitting action under a conventional permitting approach, but that only required written notices under the flexible Title V permit. They indicated that, minus the flexibility provisions, each of these permitting actions would have required a 45-day review and approval process that could have extended well beyond that in some cases. They further indicated that this resource savings enables DEQ to focus scarce resources on inspections and other environmental and permitting priorities.
- The Intel permit saved Oregon DEQ significant staff time associated with processing notice of construction applications from Intel. Intel estimated that in the absence of the flexible permit, Oregon DEQ would have needed to process approximately 150 to 200 additional notice of construction applications per year. Even at a very low estimate of two staff hours per application, the staff time implications are significant (e.g., 300 to 400 hours).

- During the flexible permit term, Lasco made five advance approved changes that would have otherwise triggered case-by-case minor NSR permit actions. OAPCA estimated that Lasco's flexible permit saved them approximately 20 to 40 staff hours per advance approved change. The time savings includes time spent drafting a permit to construct, ensuring NAAQS compliance, modifying the Title V permit, and conducting the change-specific public review process. At $75/hour, the estimated administrative costs saved by the flexible permit for all five advance approved conditions ranges from $7,500 to $15,000.
- TDEC reported that the Saturn flexible permit has reduced agency paperwork associated with processing individual construction permit applications and permit modifications, allowing agency staff to focus on higher environmental priorities. They further indicated that the permit saved TDEC significant staff time associated with processing notice of construction applications from Saturn. The permit eliminates the need for full minor NSR permitting. Traditionally, permitting for minor NSR takes approximately 24 to 40 staff hours, plus issuance of a public notice and a town meeting or public hearing. This process has been streamlined to a State control technology review for new unit additions not subject to major BACT. TDEC representatives believe that during the life of the permit, TDEC will need to invest less hours of staff time to address the future air permitting needs associated with the Saturn plant, due to the anticipated future use of the advance approval provisions.

It should be noted that companies and permitting authorities cautioned that it is difficult to precisely estimate cost savings and financial benefits associated with flexible permit implementation, since it involves comparison with hypothetical experience under a conventional permitting approach. Companies and permitting authorities noted that the flexible permit provisions sufficiently altered the applicability determination for individual changes so as to make it difficult to retrospectively determine the precise level of effort and timing that would have been necessary to accommodate the changes under a conventional permitting approach. That said, companies and permitting authorities indicated that the estimated financial benefits identified in this report provide a reasonable approximation of the financial benefits that resulted from implementation of the flexible permits, compared to those costs that would likely have been expected had the companies been operating under conventional permits.

In additional to administrative cost savings, several companies identified financial benefits stemming from the ability to implement advance approved changes without the potential delay associated with conventional permitting time frames. Several companies indicated that this streamlined ability to implement advance approved changes improved the predictability of change implementation time frames for project planning and avoided what can be substantial opportunity costs. They further reported that this predictability and elimination of potential delay from air permitting provided important competitive advantages that enabled them to compete more effectively.

- From 3M's perspective, the flexible permit allowed the company to proceed as needed with operational change. This was critical from two perspectives: it allowed the plant to avoid acting as a bottleneck along the critical path of any particular product line that would be moving among 3M plants; and it allowed the plant to remain highly responsive to its marketplace and avoid either lost sales and/or permanent loss of market share. 3M did indicate that the changes made that potentially involved PSD permitting likely would not have been undertaken if handled on a conventional basis.
- DaimlerChrysler representatives indicated that the permit has increased the company's ability to respond to short-term changes in market demand, as well as to accommodate the tight project time lines associated with periodic model changeovers. DNREC and DaimlerChrysler representatives reported that under a conventional permitting approach, some of these changes would likely have triggered case-by-case applicability determinations and potential permitting actions that could have

extended to 6 to 9 months each.

- The advance approved changes in Intel's flexible permit likely saved the Intel Aloha plant hundreds of business days associated with making operational and process changes to ramp up production for new products, respond to market demands, and optimize production processes. Industry estimates of the opportunity costs of production downtime and time delays run as high as several million dollars in just a few days due to lost sales to computer makers and other factors. The estimated 150 to 200 changes per year[5], combined with the Oregon DEQ approval time frame of up to 60 days per change[6], indicate that there would likely have been significant delay under a conventional permitting approach. Even if few delays would have resulted in production downtime or missed market opportunities, the costs would likely have been significant, as many of the changes improved the cost-competitiveness of Intel's products. Intel representatives indicated that it is likely that the impact of continued time delays would be to redirect Intel's production investment and operating facilities to locations more conducive to change.
- Imation representatives reported that the flexibility provisions in the Title V permit enabled the company to experiment with new materials and to introduce the production of new products at the Weatherford plant with minimal delay associated with air permitting and material toxicity assessments. Under the flexibility provisions, Imation is authorized to use alternative raw materials without receiving case-by-case approval or permit modifications that typically can take two to three months, provided that they follow established procedures and ensure emissions remain below specified limits. Even for materials for which Oklahoma had not previously reviewed, DEQ agreed to complete toxicity evaluations and establish MAAC limits within 72 hours of receiving a request from Imation. Imation representatives stated that these streamlined administrative procedures for addressing Oklahoma's air toxics requirements have eliminated air permitting delay associated with raw material changes. Among other product transitions, the flexibility provisions in the Title V permit have facilitated Imation's development of digital proofing films for graphic design applications. In addition to various product quality benefits, digital proofing films also require fewer coating layers during manufacturing than conventional proofing films. This results in fewer VOC emissions from solvents per unit. While customer demand for digital proofing materials is increasing, it is likely to take several years before digital proofing technology is in widespread use, due to the cost of converting to digital proofing hardware.
- Lasco engaged in a series of advance approved changes, updated its emission factor, and voluntarily installed an RTO. These actions combined to create "head room" under Lasco's cap, which Lasco then used to increase production. Lasco indicated that typically (and as reflected by the Yelm plant's lack of operational change prior to the flexible permit and experience at other Lasco facilities) the company is very averse to making changes that trigger permitting actions. At most, they wait to undertake such changes at the time of permit renewal. Contrary to its typical corporate behavior, Lasco Yelm engaged in a series of modifications that created the opportunity to increase production from 126,045 units/year (in 1997) to 132,548 units/year (in 2000) generating a significant annual increase in profit. In 2001, after the RTO was installed, Lasco decreased emissions per unit further to 3.13 lbs./unit, allowing production to increase to 147,429 units and reducing costs associated with

[5]Estimates from Intel of the number of changes made per year under the flexible permit that would have triggered the need for notice of construction approval under a conventional permit.

[6]Under Oregon rules, ODEQ has up to 60 days to process notice of construction approval applications. Twenty-one days was selected as a reasonable estimate of the average actual time associated with receiving notice of construction approval from ODEQ.

styrene loss.

- Saturn indicated that the flexible permit was a principle factor in General Motors' selection of the source to manufacture the L850 engine, leading to the creation of 700 jobs. Saturn was awarded the contract primarily because it could implement the necessary changes within 24 months and accommodate future changes with minimal delay. The flexible PSD permit is enabling Saturn to add and modify coating, assembly and machining lines in a timely manner, while ensuring that best available pollution control technologies are installed and that air emissions remain under approved limits. Using a combination of the PAL emissions caps and advanced approvals, the flexible permit will allow Saturn to upgrade the plant over the next few years, with minimal delays, to produce several new vehicles, including Saturn's new fuel-efficient sport utility vehicle, the Saturn VUE™. Saturn representatives stated that the flexible permit avoids a potential NSR backlog associated with the conventional permitting process, thereby providing a competitive advantage to Saturn.

Finding 9: Permitting authorities are generally supportive of flexible permits as an option.

The permitting authorities reported that they are pleased with the benefits from the flexible permits. Additionally, they believe flexible permitting techniques are useful tools to address some companies' operational flexibility needs, to foster environmental improvements through emissions reductions, and to lessen permitting authority resource needs and backlogs associated with construction permitting, so that these public agencies can focus resources on higher environmental management priorities. Finding 10 discusses permitting authority perspectives on matching flexibility provisions with appropriate source candidates.

Permitting authorities are supportive of flexible permits, and they expressed their interest to renew the pilot flexible permits and to expand the use of flexible permits in their jurisdictions.

Permitting authorities demonstrated their support of flexible permits by retaining the flexibility provisions in the subsequent permit for the source, or by indicating their interest to do so.

- Oregon DEQ retained the advance approval provisions in Intel's synthetic minor air operating permit that replaced the Aloha plant's Title V permit in 1999.
- MPCA indicated that the agency is supportive of renewing 3M's flexibility provisions in the forthcoming Title V permit. In discussing options for the plant's Title V permitting application (under consideration by MPCA at the time of the EPA review), however, 3M management decided not to pursue such provisions due to uncertainty surrounding how the next VOC emissions limit would be defined. 3M voiced concerns that significantly lowered emissions caps could constrain the plant's ability to accommodate increased product demand or transfers of product lines from other 3M facilities.
- DNREC supported the renewal of all flexibility provisions from DaimlerChrysler's initial flexible construction and air operating permit into the plant's Title V permit, issued in October 1999.

Two permitting authorities further demonstrated their support of flexibility provisions by incorporating flexibility techniques into permits for other sources within their jurisdiction.

- MPCA reported that the agency has issued "dozens" of minor source and synthetic minor source

permits that include flexibility provisions (e.g., plant-wide emissions caps and advance approval provisions) since the issuance of the 3M St. Paul Tape Plant pilot permit in 1993. MPCA also issued a permit to 3M's Maplewood, Minnesota research and development plant that included an advance approved BACT determination.

- DNREC has issued a Title V permit for DuPont's Edge Moor, Delaware plant that includes PALs and advance approval provisions, as well as several permits containing alternate operating scenarios.

Permitting authorities indicated that finalization of EPA policy and/or guidance on flexible permitting would increase their interest and efficiency in expanding the use of flexible permits.

Permitting authorities indicated that finalization of rulemaking and/or guidance related to flexible permitting is desired to provide greater clarity and certainty around the EPA's expectations. Most permitting authorities stated that, while they are supportive of flexible permitting approaches, they are somewhat hesitant to invest resources of any significant amount into new flexible permits in the absence of increased clarity regarding approaches that are acceptable to the EPA. Permitting authorities generally did not want to find themselves in a position where they have developed numerous flexible permits based on an approach or regulatory interpretation that does not correlate with the EPA's approved flexible permitting rules and/or guidance developed at some point in the future.

Several permitting authorities also noted the high transaction costs associated with developing "pilot" permits as an additional deterrent to expanding the use of flexibility techniques without EPA policy or guidance. Pilot initiatives typically demand a high level of interaction between the permitting authority, EPA Regional Offices, and various offices within the EPA headquarters to verify that the pilot approaches are acceptable. Permitting authorities indicated that EPA policy and/or guidance could reduce the amount of time spent in conference calls and meetings, and in the development of flexible permit language that does not meet the EPA's expectations, while also reducing the overall time frame for developing a flexible permit. One permitting authority believed that additional guidance was not needed for it to act but agreed with the other permitting authorities that EPA rules and/or guidance on flexible permitting might serve to improve the consistency of regulatory interpretations, expectations, and comments communicated by various EPA offices and regions.

While permitting authorities supported promulgation of EPA policy and/or guidance on flexible permitting, they hoped that any such policy would be accommodative of the approaches employed in the pilot flexible permits. In addition, DNREC representatives urged the EPA to not be overly prescriptive in any policy or guidance and to allow permitting authorities reasonable discretion in the implementation of approved flexibility techniques.

Permitting authorities stated that various forms of EPA outreach, training, and assistance would be useful to assist permitting authorities to develop effective flexible permits.

Permitting authorities and companies emphasized that the EPA could take several steps, in addition to promulgation of flexible permitting policy and/or guidance, to support the implementation of effective flexible permits. Suggestions included:

- Make documentation available regarding flexible permitting techniques. Materials should include examples of flexible permits, fact sheets on various flexible permitting approaches and tools, draft permit language related to various flexibility approaches, training materials, and other resources.
- Formalize a network of EPA flexible permitting experts who would be available to support permitting authorities interested to develop permits containing flexibility provisions.

- Conduct workshops and training sessions for EPA and permitting authority personnel who are interested to learn about flexible permitting techniques. Similar workshops or training sessions could be designed for sources to help them determine whether or not they may be appropriate candidates for flexible permitting techniques.
- Develop a tool to assist sources and permitting authorities to determine the appropriateness of flexible permitting techniques to potential source candidates.
- Develop an EPA website clearinghouse for information on flexible permitting techniques.

Finding 10: Permitting authorities indicated that flexible permit provisions should be matched with a company's need for flexibility and technical capacity to implement effectively its flexible permit requirements.

Permitting authorities indicated that while they believe flexible permitting techniques to be appropriate and beneficial for use with some companies, they may not be appropriate for all companies. They indicated that there are two critical factors that should be considered when determining the appropriateness of flexible permitting for candidate sources. First, the company should be able to demonstrate that it has a need for the flexibility. Second, the permitting authority should be confident that the source has sufficient capacity to operate effectively under a flexible permit, which typically includes additional monitoring, recordkeeping, and reporting requirements.

Permitting authorities believe that a candidate company should be able to demonstrate sufficient need for flexibility to justify the additional up-front staff time and resources needed for the permitting authority to tailor flexible permitting techniques to the source.

Permitting authorities indicated that they want to have some assurance that any additional up-front investment will result in benefits for the company, permitting authority, and/or environment before investing in the development of a flexible permit. Such need could be demonstrated by a company's ability to clearly articulate its operational change needs. Permitting authorities indicated that some companies seldom implement changes that trigger air permitting requirements, making them less appropriate candidates for flexible permits.

Permitting authorities indicated that a candidate company should exhibit the technical capacity to operate effectively under a flexible permit, as indicated by factors such as the source's compliance history, attentiveness to pollution prevention, and ability to track and manage operational changes and emissions.

Permitting authorities indicated that while they believe company compliance with flexible permits to be fully verifiable and enforceable, they believe that companies lacking sufficient capacity to operate effectively under a flexible permit could be at an increased risk of non-compliance. Additional monitoring, reporting, and recordkeeping conditions, such as the calculation of plant-wide emissions and maintenance of logs documenting operational changes and alternate operating scenarios, are typically required to assure compliance with flexible permit provisions. Permitting authorities indicated that some companies may not have sufficient capacity and capabilities to effectively meet such permit requirements on a sustained basis.

Permitting authorities stated that they view a company's past compliance history as the primary indicator of the company's capacity to operate under a flexible permit. Past patterns of compliance violations often signal that a company is not sufficiently able to handle additional monitoring, recordkeeping, and reporting

requirements necessary under a flexible permit. Permitting authorities pointed to several other indicators of a company's capacity to operate effectively and in compliance under a flexible permit. These include:

- A company's capacity to track and manage operational and equipment changes.
- A company's ability to accurately monitor plant-wide emissions.
- A company's track record of communication and openness with the permitting authority.
- The presence of trained personnel at the source who understand air requirements.
- The presence of a P2 program and/or a track record of P2 accomplishment.

Permitting authorities indicated, however, that rigid criteria for determining the appropriateness of flexible permitting techniques for a company candidate, such as the complete absence of historic compliance violations, should not be established. They indicated that permitting authority personnel are accustomed to matching appropriate permitting techniques and requirements to address individual sources' applicable requirements and circumstances.

Table 1.1 Pilot Flexible Permits Evaluated in the EPA Flexible Permit Implementation Review

Source	Permitting Authority	Permit Type & Permit #	Permit Issuance	Permit Expiration
3M Company - St. Paul, Minnesota Tape Plant	Minnesota Pollution Control Agency (MPCA)	State Air Operating Permit (not a Title V permit); (Permit No. 23GS-93-OT-1)	March 4, 1993	March 4, 1998
DaimlerChrysler - Newark, Delaware Automobile Assembly Plant	Delaware Department of Natural Resources and Environmental Control (DNREC)	Construction/Operation Permit; (APC-95/0569-Construction/Operation)	September 1995	October 1999
		Title V Air Operating Permit; (AQM-003/00128)	October 1999	October 2004
Imation Corporation - Weatherford, Oklahoma Plant	Oklahoma Department of Environmental Quality (Oklahoma DEQ)	Title V Air Quality Permit; (Permit No. 97-380-TV)	June 9, 1998	June 9, 2003
Intel Corporation - Aloha, Oregon Semiconductor Fabrication Plant	Oregon Department of Environmental Quality (Oregon DEQ)	Title V Permit; (Oregon Permit No. 34-2681)	October 1995	October 1999
Lasco Bathware Corporation - Yelm, Washington Plant	Olympic Air Pollution Control Authority (OAPCA)	Title V Air Operating Permit; (Permit No. 01-97)	June 7, 1997	July 7, 2001
Saturn Corporation - Spring Hill, Tennessee Automobile Manufacturing & Assembly Plant	Tennessee Department of Environment and Conservation (TDEC)	Permit to Construct or Modify an Air Contaminant Source; (Permit No. 952233)	June 6, 2000	December 31, 2005[7]

[7]The permit expires on December 31, 2005, but the plant-wide applicability limits (PALs) extend to July 2010.

Table 1.2 Flexibility Provisions in Pilot Permits Reviewed by the EPA

Source	Key Flexibility Provisions
3M St. Paul, Minnesota	• Plant-wide emissions limits for VOC (4,596 tons/year; 30,600 lbs./day). • Advance-approvals for specified categories of renovations and other changes deemed to be "consistent with" the specified change categories. • Replicable testing procedure enabling updates to capture and destruction efficiency parameters for pollution control devices without requiring perm modifications.
DaimlerChrysler Newark, Delaware	• Plant-wide applicability limits (PALs) for NO_x (150.71 tons/year; 4.86 tons/day) and VOC (1,112.8 tons/year; 5.3 tons/day). • Advance-approvals for specified projects and categories of changes. • Case by case technology determination for significant new units. • Enforceable P2 performance requirement for topcoat emissions and P2 reporting requirements. • Replicable testing procedure for updating pollution control device parameters. • Permit conditions streamlining.
Imation Weatherford, Oklahoma	• Plant-wide PTE limit for VOC emissions (249 tons/year). • Advance-approvals for specified changes and classes of changes. • Advance-approvals for raw material changes, including streamlined determinations under State Air Toxics Program. • Alternative control device operating scenarios that provide flexibility in controlling or otherwise reducing VOC emissions. • Permit conditions streamlining, including streamlining of applicable MACT standards. • P2 Program and reporting requirements.
Intel Aloha, Oregon	• Plant Site Emissions Limits (PSELs) for VOC (190 tons/year; 8 tons/week) and CO (32 tons/year). • Potential-to-emit (PTE) limits on organic and inorganic hazardous air pollutants (HAPs). • Advance-approvals for a broad class of changes, provided no new applicable requirements and MRR requirements not covered in the permit. • Source-specific RACT limit based on units of production, designed to encourage P2. • Pollution Prevention (P2) Program and reporting requirements.
Lasco Bathware Yelm, Washington	• Plant-wide PTE limits for VOC emissions (249 tons/year; 1.71 tons/day). • Advance-approvals for categories of changes, including BACT and P2 requirements to address minor NSR requirements. • Replicable testing procedures for updating emission factors without requiring permit modifications. • P2 Program with goals and reporting requirements.
Saturn Spring Hill, Tennessee	• Variable PALs for VOC based on production (1,563 tons/year at 500,000+ vehicles per year; 198.5 tons/month). • PALs for NO_x, PM, SO, and CO (PALs are hybrids based on actual and allowable source emissions). • Advanced approvals for changes to existing emissions sources and construction of new emissions sources (with conditions). • BACT for all existing emissions units. • Case by case BACT determination for all new units. • Permit conditions streamlining.

Table 2.1 Key Emissions MRR Requirements in Pilot Permits Reviewed by the EPA

Source	Key Emissions Monitoring, Recordkeeping, and Reporting Requirements
3M St. Paul, Minnesota	• Mass balance approach to VOC emissions measurement; applies an overall control efficiency (capture and destruction) to the VOC input (deriv material usage tracking system); parametric monitoring is conducted of selected control system operating parameters (e.g., combustion temper exhaust gas flow). • Control device performance testing is required every two years for both capture efficiency and destruction efficiency. • Uncontrolled fugitive emissions from churn and mogul rooms measured by CEMS. • Daily calculation of VOC emissions from all emissions units (required within 41 hours) are maintained on-site. • Quarterly reporting to MPCA of daily plant-wide VOC emissions and 365-day rolling totals.
DaimlerChrysler Newark, Delaware	• Mass balance approach to VOC emissions measurement, based on EPA's "Protocol for Determining the Daily Volatile Organic Compound Emi of Automobile and Light-Duty Truck Topcoat Operations" (EPA-450/3-88-018, December 1988); parametric monitoring is conducted of selected co system (RTO) operating parameters (e.g., combustion temperature, inlet pressure); booth/oven splits, transfer efficiency, and incinerator effici in calculations are based on the most recent tests completed using the protocol. • Compliance with EDP primecoat operations is demonstrated pursuant to procedures in New Source Performance Standards (40 CFR 60.393 (c)(2)) through the use of capture and control. VOC RACT standards apply to the miscellaneous metal parts coating and final repair operations and dictat compliance method. Compliance with these limits is demonstrated through the use of complying coatings or daily weighted averages. • Oven burners and miscellaneous NO_x sources use AP-42 emission factors in conjunction with monitored parameters to calculate emissions; source-emission factors were developed for the antichip, topcoat and EDP primecoat incinerators and the boilers. • Monthly reporting to DNREC of plant-wide VOC and NO_x emissions (daily, monthly, and 12-month rolling totals).
Imation Weatherford, Oklahoma	• Mass balance approach to VOC emissions measurement; parametric monitoring is conducted for all capture and control devices (RTO, catalytic oxid and carbon adsorber). • Criteria air pollutant emissions are determined using fuel type, monthly fuel usage to the boilers and oxidizers, and appropriate AP-42 emission facto • Daily and monthly calculation of VOC emissions (prorated hourly, daily, and 12-month rolling totals) are maintained on-site.
Intel Aloha, Oregon	• Mass balance approach to VOC emissions measurement; bi-monthly VOC emissions based on actual solvent monitoring; bimonthly emissions data production activity data (i.e., total surface area of wafers processed, square centimeters[cm^2]) provides the information necessary to calculate an ov emission factor (EF) for the fab. Using the recent bimonthly EF with weekly production data provides total weekly VOC emissions (tons/wk). • Criteria air pollutant emissions are determined using fuel type, monthly fuel usage to the boilers and oxidizers, and appropriate AP-42 emission facto except for Emission Unit 3 boiler's NO_x and CO emission factors which are based on manufacturer's data and verified by source test.
Lasco Bathware Yelm, Washington	• VOC emissions calculations based on raw material usage, VOC (styrene) content of the raw materials, and site-specific emission factors (pounds [lb emissions per lb. of styrene); site-specific emissions factors are based on source testing; material usage is calculated on a daily basis. • Monthly plant-wide VOC emissions are calculated each month, along with 12-month rolling totals.

Source	Key Emissions Monitoring, Recordkeeping, and Reporting Requirem
Saturn Spring Hill, Tennessee	• Mass balance approach to VOC emissions measurement, based on EPA's "Protocol for Determining th Emission Rate of Automobile and Light-Duty Truck Topcoat Operations" (EPA-450/3-88-018, Decembe conducted of selected control system operating parameters (e.g., combustion temperature, exhaust ga transfer efficiency, and incinerator efficiencies used in calculations are based on the most recent tests • Criteria air pollutant emissions are determined using monthly natural gas usage data and appropriate A • Monthly calculation of monthly and 12-month rolling plant-wide VOC emissions totals.