

# EPA Flexible Permit Implementation Review: 3M Permit Review Report

**Source:** 3M Company - St. Paul, Minnesota Tape Plant

**Permitting Authority:** Minnesota Pollution Control Agency (MPCA)

**Flexible Permit:** Air Emission Permit No. 23GS-93-OT-1 (an air operating permit, not a title V permit); the permit was issued on March 4, 1993; the flexibility provisions (e.g., advance-approved changes) expired on March 4, 1998. The 3M St. Paul Tape Plant continues to operate under the limits established in this permit. 3M has submitted a title V permit application to MPCA, and is awaiting its draft title V permit.

## 1. BACKGROUND

### *General Questions for Permitting Authority*

**1.1 Agency name**

Minnesota Pollution Control Agency (MPCA)

**1.2 Number of major sources (title V)**

MPCA indicated that there are approximately 360 major sources in Minnesota that will require a title V permit.

**1.3 Number of permit actions per year**

**1.3.a Minor NSR**

**1.3.b Major NSR**

**1.3.c Operating permits**

- Title V issuance
- Title V revisions

**1.3.d Other permits**

[Note: These figures reflect agency activities in 2001, but do not reflect agency activity during the term of 3M's flexible permit.] MPCA writes approximately 50 to 60 minor NSR permits a year. MPCA writes approximately 4 major NSR permits per year. MPCA issues approximately 51 new title V permits per year. MPCA writes approximately 21 permit revisions a year. MPCA reported that the agency processes approximately 48 permit amendments per year.

**1.4 Number of permit writers**

**1.4.a Workload (permit actions per year per permit writer)**

As of September 2001, MPCA employs 18 staff in the in positions relating to air permitting (approximately 16 full-time equivalents taking into account part time staff). MPCA officials indicated that the agency currently faces severe budget and staffing constraints, which have resulted in significant delays associated with processing and issuing construction permits, air operating permit

renewals, title V permits, and permit amendments. For example, MPCA representatives indicated that it routinely takes more than 3 months for agency staff to pick up and review construction permit applications. They also indicated that major permit amendments (with public notice) can take more than 9 months to process. Although MPCA has an expedited permit processing program, where sources can pay a higher fee for expedited processing, agency staff reported that the large volume of permitting actions relative to staff capacity has constrained the agency's ability to rapidly process such applications or to reduce the permitting backlog. MPCA has lost 5 air permitting staff over the past two years. MPCA currently has four staff devoted to processing construction permits.

**1.5 Minor NSR provisions (summary of requirements, citation(s))** (Note: summary is of regulations as written when the 3M permit was written.)

*Applicability:* No person may construct, modify, reconstruct, or operate an emissions unit, emission facility, stationary source, or control equipment without obtaining an air emission permit from MPCA. Under Minnesota rules in 1993, a "modification" was defined as (1) any change that constitutes a title I modification (as defined in subpart 26 of Minnesota Rule 7007.0100); or (2) any physical change or change in the method of operation of an emissions unit, emission facility, or stationary source that results in an increase in the emission of a regulated air pollutant. The following changes, however, did not trigger applicability under Minnesota rules.

- a physical change or a change in the method of operation that is explicitly allowed under a permit, or allowed under a court order, consent decree, stipulation agreement, schedule of compliance, or order issued by the agency if the document states that no permit amendment is required;
- routine maintenance, repair, and replacement;
- an increase in the production rate of an existing emissions unit if that increase is not in violation of a permit condition, applicable requirement, court order, consent decree, stipulation agreement, schedule of compliance, or order issued by the agency;
- an increase in the hours of operation that does not increase the rate of emissions and is not in violation of a permit condition, applicable requirement, court order, consent decree, stipulation agreement, schedule of compliance, or order issued by the agency; and
- use of an alternate fuel if the source is ordered to switch fuels by the state or federal government.

*Exemptions:* The following includes a list of sources that *do not* need to obtain a permit:

- a stationary source with potential emissions of a single criteria pollutant of less than 25 tons/year, except: units subject to Control of Odors in the Ambient Air; a stationary source subject to NSPS; a stationary source with potential lead emissions of at least 1,000 pounds/year;
- fuel burning facilities with heat inputs less than indicated in the regulations;
- pressurized storage tanks/petroleum liquid storage tanks as indicated in the regulations;
- incinerators with maximum refuse burning capacity of less than 1,000 pounds/hour.

*Application:* Applications are to include: (1) the characteristics of the exhaust gas stream, before and after the emissions control equipment, including emission rates, concentrations, volumetric flow rates, and temperature; (2) the physical characteristics of particulate emissions; (3) the type and design specifications of the control equipment; (4) the location and elevation of the emissions point and the relation of the emissions point to nearby structures; (5) a general description of the materials

handled, processed, stored, or disposed of by the applicant that are pertinent to the application; and (6) additional information determined relevant, including plans, specifications, or other technical information. (See Chapter 7001, page 24 for full list of application requirements.)

*Special Permit Conditions:* Permits must include conditions necessary for the permittee to achieve compliance with all applicable Minnesota or federal statutes or rules, and any conditions that the agency determines to be necessary to protect human health and the environment. Permits may also include: (1) standards of performance for air pollutants from an emissions unit, facility, or stationary source; (2) operational requirements for situations where a standard of performance is not applicable; (3) testing and reporting requirements to ensure compliance with standards of performance; (4) notification and reporting requirements for shutdowns and breakdowns.

#### **1.6 Public participation provisions (summary of requirements, citation(s))**

Public notice and comment processes do not apply to permits for construction, modification, or reconstruction of a stationary source with a potential controlled net increase of a single criteria pollutant of less than 100 tons/year or to permits for operation of a facility or stationary source with an actual emission rate of a single criteria pollutant of less than 500 tons/year. (See Chapter 7001 page 22.) If subject to public notice requirements, the regulations recommend permit applications be submitted at least 180 days before the planned date of the commencement of facility construction/activity.

Public Notice of permit application and preliminary determination indicates that a draft permit has been prepared and can be mailed to any interested person upon written request. The public comment period is to be 30 days unless a different public comment period is specifically established by another agency rule. Notice is to be distributed to all persons who have registered their names and addresses on an agency mailing list. Public notice is also to be circulated within the geographical area of the facility or activity (note: circulation is not required for construction, modification, or reconstruction or a stationary source with a potential controlled net increase of a single criteria pollutant of 100 tons/year to 250 tons/year or to permits for operation of a facility or stationary source with actual emissions of a single criteria pollutant of 500 tons/year to 5,000 tons/year.)

If it is determined that a public informational meeting would help clarify and resolve issues regarding the commissioner's preliminary determination or the terms of the draft permit or if the commissioner has received a request, the commissioner is to hold a public information meeting.

Contested case hearings are to be held if material issues of fact have been raised, the agency has jurisdiction to make determinations on the issues of fact, and there is a reasonable basis underlying issues of fact or law raised.

#### **1.7 Reporting and feedback mechanisms (summary of requirements)**

Monitoring and testing requirements must specify the type and frequency of monitoring and testing activities that are sufficient to yield representative data to determine whether there is compliance with the terms and conditions of the permit or compliance with Minnesota and federal pollution control statutes and rules. As appropriate, the permit must contain requirements for the proper use, maintenance, and installation of monitoring and testing equipment or methods. The permit must require the permittee to keep accurate records of monitoring and testing activities and to submit periodic reports of monitoring results required by the permit and, as requested the results of other

monitoring and testing undertaken. The permittee is also required to retain the following items for at least 3 years: copies of all reports required by the permit; calibration and maintenance records and all original strip chart recordings for continuous monitoring; and records of the date, location, and time of monitoring and testing which is related to compliance with the terms and conditions of the permit.

**1.8 Requirements and/or ability to be more stringent than EPA rules**

MPCA representatives indicated that the agency does have the ability to impose more stringent requirements than required under EPA rules. They pointed to a number of rules that are more stringent than EPA rules. Examples include: (1) Minnesota Rule Chapter 7007, Permits, uses a potential to emit (PTE) of 25 tons/year for PM<sub>10</sub>, and 50 tons/year for SO<sub>2</sub>; (2) Minnesota Rule Chapter 7011.2300, limits the sulfur content of fuel oil used in combustion turbines to 0.5% compared to the 0.8% required under subpart GG in federal regulations; and (3) Minnesota Rule Chapter 7011.0060 - 7011.0080, the Control Equipment Rule, imposes control efficiencies in cases where they would not otherwise apply.

**1.9 Status of initial title V issuance (i.e., number issued, renewed, in process)**

As of May 2001, MPCA has issued 188 title V permits in Minnesota (52%). MPCA indicated that there are approximately 360 sources in Minnesota that have applied for title V permits. MPCA aims to complete their issuance of initial title V permits within two years (2003).

**1.10 Number of flexible permits written and public reaction to them**

MPCA reported that they have issued numerous permits that include flexibility provisions since the issuance of the 3M St. Paul Tape Plant flexible permit in 1993 (the State's first permit with flexibility provisions). 3M's Maplewood, MN, Research and Development facility received a flexible permit from MPCA that includes an advance-approved BACT determination. MPCA representatives also indicated that the agency and EPA are currently working with Andersen Windows to complete a flexible permit under EPA's Project XL program.

In addition, MPCA reported that the agency has issued "dozens" of air permits for minor and synthetic minor sources that utilize flexibility provisions such as emissions caps and advance approvals for various categories of operational and equipment change.

MPCA indicated that a few years ago the State of Minnesota engaged in a multi-stakeholder process with EPA and 3M to develop a multimedia flexible permit as part of EPA's Project XL. This effort was targeted at another 3M plant in Minnesota (Hutchinson), but was abandoned due to inability to reach agreement on permit design between 3M, MPCA, and EPA. MPCA also indicated that the agency had worked for several years to develop a flexible permit (e.g., containing a PAL) for Koch Industries' Pine Bend, Minnesota petroleum refinery. MPCA representatives indicated that it is unlikely that this flexible permit will be finalized and issued, in part due to environmental compliance enforcement actions that have been directed at the facility.

**1.11 Air quality status of area where flexible pilot permit was issued**

The 3M St. Paul Tape Plant is located in an attainment area for VOCs.

**1.12 Number of inspections that have occurred re: flexible permit**

Three annual compliance inspections were conducted during the permit term. The St. Paul Tape Plant received MPCA annual compliance inspections from 1992 through 1995. Specifically,

inspections were conducted on the following dates: 4/6/92, 9/9/93, 9/22/94, and 8/31/95 (the permit was issued in March 1993). In some cases, follow-up inspections were conducted within a month of an inspection to allow for additional review of records.

**1.13 Authority to impose P2 requirements and/or additional safeguards suggested by WPN3 (e.g., monitoring, notices, up-front magnitude limits)**

MPCA representatives indicated that they have the authority to impose P2 requirements and additional permit conditions and requirements, so long as they are not precluded in rules or statutes.

**1.14 Agency's overall orientation to P2 (e.g., how is P2 considered in permit writing?)**

Overall, MPCA is supportive of encouraging pollution prevention through the regulatory process. While MPCA has not issued permits that explicitly mention pollution prevention, MPCA representatives indicated that they are aware and supportive of the role that flexibility provisions (e.g., emissions caps, advance approvals) can play in promoting pollution prevention.

**1.15 Time required to issue flexible permit**

MPCA representatives indicated that the 3M Tape Plant flexible air operating permit took 26 months to develop and issue. The permit was finalized and issued on March 4, 1993. MPCA representatives estimated that about 1000 hours of MPCA staff time were devoted to development of the permit.<sup>1</sup> 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.

**1.16 Time required to issue conventional title V permits (on average)**

MPCA representatives indicated that multiple factors influence the time required to issue a conventional title V permit. Factors include the completeness of the permit application, the complexity of source operations and emissions, the need for source-specific determinations, availability of agency staff resources, among others. MPCA representatives indicated that they believe that any development of flexible permits by MPCA in the future is likely to require between 1.00 and 1.5 times the staff time needed to develop a conventional title V permit. They added that this additional time to develop a flexible permit is typically offset during the permit term by the reduced time needed to process notice of construction applications and permit revisions. (See response to section 8.7.)

**1.17 History of any deviations, violations and/or enforcement actions over the period before the effective date of the flexible permit**

Overall, both 3M and MPCA representatives indicated that 3M's St. Paul Tape Plant has an excellent historic record of compliance with environmental regulations. They did report, however, that MPCA had taken an enforcement action against the facility in the early 1990's related to commencement of construction without a permit for a voluntary control device (i.e., thermal oxidizers).

---

<sup>1</sup>The MPCA permit development time estimate (1000 hours) was reported by MPCA representatives during the EPA Permit Review site visit discussions conducted in June 2001. This estimate is consistent with the estimate reported in a draft report prepared by Industrial Economics, Incorporated in 1995, titled "*Innovative Environmental Permits: Case Studies and Lessons Learned*".

- 1.18 Compare characteristics of flexible permits vs. conventional permits.**
- 1.18.a Considering all the different types of sources for which you issue Title V permits, what are some examples of good candidates for flexible permits?**
  - 1.18.b What are some examples of sources that are not good candidates?**
  - 1.18.c Keeping in mind these two different groups of sources (one that contains good P4 candidates and the other that contains sources that are not good P4 candidates) consider the following characteristics. Which characteristics are similar between the two groups of sources? Which are different?**
  - 1.18.d Have you ever turned down a facility that asked for a flexible permit? If so, what reasons did you have for making this decision? What facility characteristics were important in making this decision? Could we get a copy of applications that were turned down?**

MPCA representatives indicated that they rely on a source's capacity (e.g., resources, technical competence) to fulfill the compliance obligations of a flexible permit as the primary consideration for determining the appropriateness of granting flexible permits. Agency staff indicated that they interpret capacity to mean that a source can demonstrate that it has effective systems and competent personnel in place to effectively (1) monitor and track facility emissions, and (2) manage and track operational and equipment changes. MPCA representatives stated that a facility's compliance history often provides a critical indication of a candidate source's capacity to meet compliance obligations. For new sources, agency staff indicated that it might be appropriate to look at the parent firm's compliance history at other facilities in Minnesota and/or other States.

MPCA indicated that their focus on the technical and change management capacity of the source resulted from an important aspect of flexible permitting. Monitoring, recordkeeping, and reporting (MRR) is typically more comprehensive with respect to inclusion of emissions units and/or activities at the source to support ongoing compliance with any caps utilized.

MPCA representatives also indicated that the "specificity" with which a source articulates its flexibility needs is also an important consideration in determining the appropriateness of source candidates for flexible permits. Sources that desire flexible permit provisions should be prepared to clearly articulate their need for flexibility so that appropriate flexibility tools can be applied and that the need for flexibility can be communicated effectively to the public.

MPCA representatives believed that they currently have clear authority to deny source requests for flexible permits. In practice, MPCA reported that they did not pursue a flexible permit with one source due to its poor compliance history and inability to demonstrate that it could competently manage the emissions and change monitoring requirements associated with a flexible permit. In addition, MPCA denied 3M Maplewood's request for flexible provisions associated with PM10, citing that monitoring needed for the flexibility provisions was not technically feasible at the time.

MPCA indicated that the agency is not currently soliciting additional applications for permits with flexibility provisions for major sources. MPCA does, however, continue to work on the Andersen Windows' flexible permit for Project XL. In addition, MPCA continues to issue a significant number of minor and synthetic minor source permits that contain emissions caps and advance-approved conditions. MPCA permit engineers stated that this practice has not increased staff time burden, and

that they believe that these flexible permits tend to place lower on-going demands on agency staff time (e.g., reduced need for permit modifications and minor NSR permitting).

### ***Questions Specific to the Pilot Source***

#### **1.19 Source description, types of operations, and applicable requirements**

##### *Facility Description/Operations:*

The Minnesota Mining and Manufacturing Company (3M) was incorporated as a manufacturer of coated abrasives and has since expanded into several additional markets such as home cleaning products, magnetic recording tape, and automotive molding. The St. Paul ITSD Manufacturing Plant, 3M's original tape plant, was built in the 1940's. During the permit term, the facility has manufactured a variety of specialty tape products, including automotive and medical tapes, graphics tape, offset printing tape, and foam and double-sided tapes. The St. Paul Tape Plant produces over 550 different products, predominately classified as pressure sensitive tape and label products. The facility manufactures hundreds of small-batch tape products each year, primarily targeted for industrial customers.

Operations at the St. Paul Tape Plant include four main processes:<sup>2</sup>

- *Mixing of Adhesives:* Adhesive solutions are mixed in churning and mogul rooms in large (500 gallon) vats and in smaller barrel batches. Adhesive formulations, including the amount and type of VOC-containing solvent, vary depending on the type of product being made.
- *Coating of Substrate:* The adhesive mixture is then mechanically applied to the tape backing, known as the substrate or "web". VOC-containing solvents are primarily used to thin the adhesives enough to make it possible for the coaters to apply the adhesive to the substrate.
- *Evaporation:* The coated substrate is fed on rollers through large evaporation ovens that volatilize excess solvent from the adhesives. Tape products are then typically wound into rolls.
- *Cutting/Converting:* Wide tape rolls are cut into smaller widths for packaging and shipment.

The stationary source has 13 coaters (down from 18) with associated drying ovens, five mogul rooms, and four churn rooms. In 1990, 3M voluntarily installed one thermal oxidizer and one catalytic oxidizer, as part of the 3M Pollution Prevention Pays (3P) program. Captured emissions from all of the coating line ovens are vented to the oxidizers or boilers.

##### *Applicable Requirements:*

(See Attachment 2 in title V application for more detail.) 3M did not have any NSR permits issued to this plant.

The 3M St. Paul Tape Plant is an existing major source of Volatile Organic Compound (VOC) emissions, and major changes are subject to federal Prevention of Significant Deterioration (PSD) regulations. PSD regulations would ordinarily require that 3M apply for and receive an air quality permit for any major modification which would have the potential to increase VOC emissions above

---

<sup>2</sup>Description of 3M tape manufacturing processes is primarily drawn from the IEC 1995 Draft Report.

federal significance levels prior to commencing construction of the modification. There is no State Best Available Control Technology (BACT) requirement in Minnesota. There is no air toxics rule in Minnesota, although the permit application and development process did include an air toxics analysis for the St. Paul Tape Plant.

**1.20 Actual and allowable source emissions (tpy) for every year since flexible permit issuance**

The actual emissions for the plant during the permit term (1993-1998) were reported in the facility's annual emissions inventories submitted to the MPCA:

**TABLE 1.20 3M St. Paul Tape Plant Emissions Inventory (1993-1998)**

Year	VOC	NOx	SOx	PM10
1998	639	57	97	11
1997	764	161 (combined and SOx)	NOx	12
1996	842	176 (combined and SOx)	NOx	9
1995	677	120 (combined and SOx)	NOx	55
1994	984	76	172	13
1993	204	7	0.04	0.2

In 1988, total actual VOC emissions from all sources at the facility was 10,600 tons. An upper bound on potential VOC emissions was estimated at approximately 65,000 tons/year (assuming that the most VOC-emitting tape product was produced all year at the facility and emissions were uncontrolled). Primarily due to the installation of voluntary control equipment (i.e., thermal oxidizers) in 1988, total annual VOC emissions in 1991 fell to about 4,300 tons. The initial allowable source emissions limit for the facility under the flexible permit (issued in 1993) was 4,596 tons/year of VOCs. The permit was amended in 1995 and the cap was lowered to 4,283 tons/year. During the permit term, VOC emissions remained significantly below the emissions cap. 3M representatives attributed this sizable reduction in VOC emissions, and the corresponding large margin of compliance, to several factors:

- Testing indicated that the capture efficiency of the thermal oxidizers was significantly higher than originally assumed (i.e., approximately 99% instead of 70-75%), meaning substantially more VOCs were being destroyed by the control devices than originally calculated;
- P2 activities during the permit term (e.g., upgrades to process control equipment) improved process yields, causing the amount of VOC emissions to drop on a per unit production basis;
- The pollution control equipment has, in practice, been operated more often than originally anticipated; and
- During the permit term, production at the facility dropped significantly due to low market demand for products manufactured at the St. Paul Tape Plant and some transfers of products to other 3M plants.

**1.21 Amount and nature of fugitive emissions**

Fugitive VOC emissions fall into three basic types at this facility:

- 1) coating emissions not captured by the coating line/oven capture system;

- 2) fugitive emissions from the process equipment (e.g., mixers) in the churn and mogul rooms; and
- 3) fugitive emissions from other sources (e.g., solvent cleanup and storage tanks).

The capture efficiencies of the coaters are determined through performance testing; the most recent capture efficiency (average for all coaters) was 99.3 percent. Virtually all emissions from the coaters are captured and directed to the control device; the fugitive emissions are negligible. Nonetheless, the fugitive emissions not captured are taken into account in the emissions calculation procedures and are included in the facility’s reported total emissions. Fugitive emissions from the equipment in the churn and mixing rooms are 1 to 2 percent of the total emissions from the facility that would occur without any air pollution control equipments in place. These fugitive emissions also are taken into account in the emissions calculations because the exhaust stacks from these rooms are monitored by CEMS and the emissions are quantified. Solvent usage for cleanup is tracked via the materials handling tracking system; consequently, these fugitive emissions also are quantified. Emissions from storage tanks are quantified using emission factors.

**1.22 Source flexibility needs**

**1.22.a Characterization of pre-flexible permit regulatory concerns**

**1.22.b Type and number of source changes potentially subject to air permitting**

**1.22.c Which changes incur an opportunity cost of being ‘late to market’ due to permitting “delays,” and the potential extent of that cost**

**1.22.d Why conventional permitting process may not be sufficient for certain types of changes**

At the time of permit issuance, MPCA was operating a construction permitting program based on very broad definitions of “modification” and “construction” with few exemptions. This approach meant that virtually all changes to equipment, irrespective of the emissions impact (increase or decrease), could require a permit action. This strict permitting program resulted in a substantial permit backlog in the 1980’s and 1990’s, imposing substantial delays for permittees awaiting approvals.

MPCA has since revised their NSR rules linking construction permitting actions more clearly to modifications with a (real) environmental impact. This has reduced, though not eliminated, the permit backlog (e.g., under their current capacity, MPCA indicated that they are still not always able to respond to a minor permit issuance or revision request within the allotted time frames). In response, MPCA has introduced several innovations. For example, MPCA has introduced a “pay for expediting” permit program where a permittee can, for a \$1,500 fee, obtain immediate action. The program, however, depends on the voluntary willingness of MPCA permit staff to work overtime. At the time of the interviews in June 2001, MPCA had all six of its currently pending expedited permits on hold for lack of volunteers. In addition, to address on-going workload constraints, MPCA has used flexible permitting extensively. At the time of the interviews, MPCA indicated that they had issued two flexible permits for Major PSD sources and “dozens” for minor and synthetic minor

sources.

### 3M Corporate Perspective on Operational Flexibility Needs

3M senior management indicated that, over the last 20 years, the company has experienced a substantial increase in competitive pressures. 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 markets with low cost product. In this context, “first to market” (where a week delay can be very significant) has become a critical business success factor and 6 to 9 month product life cycles have become common for 3M, particularly in specialty product markets (e.g., those serving automotive sector).

In response to these competitive pressures, 3M management indicated that, on a corporate-wide basis, it is involved in a major drive to reduce cycle times (the period from the receipt of raw materials into the factory to the completion and receipt of payment for final product) and to 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. 3M needs the flexibility to respond rapidly to changing market circumstances (e.g., introduce new products rapidly, alternate existing product runs in response to customer requirements) and engage in continual improvement of products and production processes to maintain an edge in the marketplace and continually reduce costs.

Moreover, from an overall strategic corporate orientation, 3M looks at its operations worldwide and strives for optimal asset and capacity utilization. 3M indicated that most of its production equipment is sized for specific volumes. As a result, 3M wants to move product production around among plants and equipment in a timely fashion to make the most cost-effective use of its equipment. 3M corporate also must make decisions about which plant capacity will receive investments. To attract investment dollars, therefore, it is important for individual plant operations to maintain the ability to implement production equipment and process changes on a timeline conducive to strategic business needs.

As a company that operates production facilities worldwide, 3M indicated that its decisions to direct production to certain locations is strongly influenced by the overall agility of individual plants (e.g., its ability to ramp up quickly for new product production). 3M indicated that, given declining trade barriers, the proximity of production activity to customers represents a declining competitive advantage. 3M cited the example of how, as a major supplier to the U.S. automotive industry, it previously looked to site production facilities close to automotive assembly operations. 3M indicated that today, from a locational perspective, they see little distinction between production based in the U.S. and that based, for example, in Mexico.

### St. Paul Tape Plant Perspective on Operational Flexibility Needs

The St. Paul Tape Plant is a specialty manufacturer characterized by quick turn around, low volume, short product production runs (e.g., it is not unusual for the plant to undertake product runs lasting for no more than 8 hours). The plant, built in the 1940’s as 3M’s first tape plant, is now one of three

like it for 3M worldwide. The plant has 16 divisions and produces 550 products primarily for the medical and automotive industries. Much of the plant's production is intermediate products (products to be used in other products rather than sold directly to retail customers). Because of the specialty nature of the plant's products, it is difficult to predict what products 3M corporate may ask them to produce.

From the plant management's perspective, they understand that 3M corporate looks globally to achieve optimal capacity utilization (3M has established plants on the basis of specific functional expertise), and that the company moves the production of products around to achieve this outcome. As a result, the plant's operations must have the flexibility to produce products on short notice and to coat in many different manners depending on product specifications. Also driving the need for flexibility is the semi-finished nature of the plant's products. This requires the plant to manage on a timely basis the flow of product between 3M plants.

Acutely driving the need for a flexible permit, the Tape Plant management, at the time of permitting, foresaw the immediate need to make a series of renovations to the plant's aging manufacturing equipment (e.g., 3M corporate had introduced a "coater rationalization program" that would require modifications to the plant's equipment). Plant management deemed these changes critical to the future viability of the plant and its near-term ability to continue participating in the 3M network of facilities. Plant management further believed that the most advantageous (cost-effective) time to make the equipment upgrades would be as the machines required maintenance and/or modifications to accommodate a different product line. Making equipment changes in this manner, however, would provide the plant management with a limited amount of advance notice as to when equipment modifications might be needed and/or could take place. This firm knowledge that on-going modifications to the plant equipment could take place without further approval from MPCA combined with the strategy to make changes at the time of need provided the basis for developing a flexible permit. Plant management, however, did not foresee the need to install any entirely new equipment at the plant. As a result, they did not request that MPCA include the installation of new equipment as part of the advance-approved operational changes.

As mentioned, in preparing the flexible permit, the plant management also desired to increase the certainty of under what operational circumstances major and/or minor New Source Review requirements would apply. During the interviews, 3M management and staff indicated that it is not always clear what type of operational change will trigger a permitting action. As an example, they cited electrical equipment upgrades that would allow production equipment to run more reliably (and therefore increase overall production). Discussions on this topic indicated that, under conventional permitting when the need for a permitting action is unclear, incentives (in the form of avoided delays and administrative costs) exist to rationalize why permitting is not needed. The plant management hoped, through development of the flexible permit, to address this uncertainty and eliminate any potential pressure to push regulatory interpretations. Accordingly, changes within the scope of the advance approval could occur over the term of the permit without further approval from MPCA.

**1.23 What has been the frequency of required NSR permits over the period before the effective date of the flexible permit?**

MPCA representatives indicated that no NSR permits were issued to the 3M St. Paul Tape Plant prior to the issuance of the flexible permit in 1993. Prior to the flexible permit, 3M's need for

construction permitting for the St. Paul Tape Plant was negligible due to the relative "steady-state" of facility operations. 3M's planned upgrades and renovations to the facility, however, were anticipated to trigger the need for NSR permitting, prompting the company to seek the flexible permit prior to embarking on this period of planned renovation.

#### **1.24 Flexible permit's inspection history**

The St. Paul Tape Plant received annual compliance inspections conducted by MPCA from 1992 through 1995, including three annual inspections during the flexible permit term which began on March 4, 1993. Specifically, inspections were conducted on the following dates: 4/6/92, 9/9/93, 9/22/94, and 8/31/95. In some cases, follow-up inspections were conducted within a month of an inspection to allow for additional review of records.

Each inspection and review of the facility's monitoring reports confirmed that the St. Paul Tape Plant operated with a large margin of compliance relative to its daily and annual emissions limits. The facility was found to be in compliance with applicable requirements during the 1992, 1993, and 1994 inspections. MPCA's 1995 inspection found recordkeeping deficiencies associated with temperature monitoring of the thermal oxidizer units. On October 2, 1995, MPCA issued a Letter of Warning (LOW) to 3M that addressed these concerns. The letter recommended no further agency action, due to 3M's response in addressing MPCA concerns. MPCA documented in the agency file that 3M sufficiently demonstrated that "it has operated the REECO (thermal oxidizer) unit above the tested temperatures despite its recordkeeping, and that at no time was the VOC emissions cap or minimum destruction efficiency it must maintain, ever compromised." (*MPCA correspondence to 3M, 10/2/95*). The 3M Tape Plant also received a Letter of Warning from MPCA on May 19, 1995 regarding the late submittal of an annual summary report of all physical and operational changes during the previous calendar year. No further action was taken by MPCA, and the agency indicated that all subsequent report submittals by 3M have been received on time.

MPCA representatives indicated that while agency staff have visited 3M's St. Paul Tape Plant since 1995 for various matters (e.g., visits related to title V permit application), no formal inspections have been conducted of the facility since that time. MPCA officials did indicate that the facility's quarterly and annual monitoring reports are routinely reviewed by agency staff to ensure compliance with emissions limits and other permit requirements. MPCA further indicated that the reduction in agency inspections has been primarily due to agency resource shortages and that agency activities have been focused on title V permit issuance.

Although not identified during an inspection visit, MPCA did issue a Notice of Violation (NOV) to the 3M St. Paul Tape Plant related to the facility's state air operating permit on 11/5/93 for not having completed a particulate matter (PM) performance test on-time.

#### **1.25 Source's history of P2 commitment**

3M Company has a strong history in pollution prevention, formalized in the company's Pollution Prevention Pays (3P) Program. The company's web site reports that between 1975 and 1999 the 3P Program has prevented 807,000 tons of pollution and saved the company \$827 million. As of 2001, more than 4,700 3P projects have been completed that target product reformulation, process modification, equipment redesign, and recycling and reuse of waste materials. While significant pollution prevention activity at 3M focuses on in-production process improvements that improve yields

and reduce pollution, corporate R&D activities have played a central role in reducing pollution at the product design stage. 3M's development of solvent-free coatings in tape manufacturing processes have dramatically reduced solvent usage and VOC emissions across the company. In 1996, 3M's 3P Program won the President's Sustainable Development Award from the President's Council on Sustainable Development.

3M representatives indicated that while the St. Paul Tape Plant has reduced its VOC emissions over the past decade, these reductions are not commensurate with the company's overall P2 gains. They suggested that this is primarily due to the fact that the company has directed many of its remaining solvent-based coatings and tape manufacturing operations to the St. Paul Tape Plant as other more modern plants have converted to water-based (non-solvent) manufacturing processes. Due to the size and age of the St. Paul Tape Plant - as well as the presence of its control technology (e.g., thermal oxidizers) - the facility now has filled a niche for the company in producing specialty tape products that require solvent-based production processes (e.g., in some cases, solvents add functional qualities to the tape web that are required by customer specifications). Tape Plant personnel did indicate, however, that on-going P2 efforts at the facility continue to improve process yields and reduce emissions associated with each unit of production. In addition, the flexibility of the St. Paul Tape Plant to absorb solvent-borne production activities from other plants has enabled much of the P2 at these other 3M plants to occur.

## 2. FLEXIBLE PERMIT DESIGN FEATURES

### 2.1 What flexible permit tools contained within this permit accomplish advance approvals (ROPs, PTE limits, PALs, clean buildings, category of changes, etc.)?<sup>3</sup>

The primary flexibility provisions of the 3M St. Paul Tape Plant's permit include an advance-approved list of changes bounded by a PAL for VOC emissions. That is, 3M was authorized in advance to make physical or operational changes in certain pre-defined categories, or changes deemed "consistent with" those described in the permit, provided that the VOC emissions did not exceed stated limitations after the change was made. Flexibility provisions contained in the permit are described below.

#### Advance-approved Changes:

The following categories of changes were advance-approved by MPCA (see permit condition 2.3.4), provided that the facility remained below required plant-wide emissions limits and met all other permit requirements:

- *coater changes:* (1) updating drive mechanisms and electrical equipment components; (2) updating machine and tension controls; (3) updating oven temperature controls; (4) updating web transport idlers; (5) traming machines; (6) changing coating mechanism and including caliper gauging; (7) modifying coaters to allow quick changeovers; (8) replacing or updating laminators with power laminators; (9) replacing or updating steering with chase steering; (10) replacing or updating liner unwinds with dual liner unwinds; (11) replacing or upgrading

---

<sup>3</sup>Terms used in this document are defined in the draft guidance entitled "Design of Flexible Air Permits" (White Paper Number Three), August 7, 2000.

- coater ovens; (12) routine changeovers;
- *other emission unit changes*: (1) replacing or upgrading churns, moguls, or storage devices;
- *changes to oxidizers*: (1) control equipment process upgrades.

Notice of Advance-Approved Changes:

Ten days prior to beginning actual construction, 3M was required by the permit to provide:

- a description of the change;
- schedule for the change;
- NSPS applicability;
- emission calculations for all non-VOC criteria pollutants; and
- certification that the change will not result in emissions greater than authorized by the permit.

Note: In the May 1996 Permit Amendment No. 3, MPCA dropped this requirement for 10-day advance written notice of changes advance-approved under permit condition 2.3.4. MPCA representatives reported that the agency believed that the post-commencement notice for changes (see below) was sufficient to provide the agency and the public with a documented record of advance-approved changes actually made at the facility.

Two weeks after commencing operation of a change, 3M was required to submit to MPCA in writing a notice that:

- referenced the pre-construction notice that was submitted to MPCA;
- verification that the change was completed as described in the pre-commencement notice;
- the initial startup date.

Note: The May 1996 Permit Amendment No. 3 consolidated these two change notices into a single post-construction (submitted within 2 weeks of the actual change) notice. This notice was required to include the following:

- a description of the physical or operational change;
- identification on a layout diagram of the stationary source of the unit(s) affected by the change;
- a statement regarding whether NSPS is applicable to the change, along with a reason for this determination;
- emissions calculations for all criteria pollutants (except VOC) which demonstrate that the change will not result in a significant net emissions increase of any criteria pollutant;
- a certification that the change will not result in emissions greater than authorized by the permit (permit section 2.2.1.1.); and
- the initial startup date.

Other Changes:

In the event that 3M desired to undertake a physical or operational change that the company believed was “consistent with” the advance-approved changes in the permit, but the change was not explicitly listed in the permit, 3M could pursue a streamlined approval process (see permit condition 2.3.2.2.). In this situation, 3M was to provide a written notice to the MPCA which included all the information listed above (for advance-approved changes), plus justification for applicability of the change. The MPCA had 45 days from receipt of the written notice to inform 3M that the change is NOT consistent with the changes authorized in the permit. 3M could begin the proposed change prior to the 45 days, but ran the risk of denial and possible violation.

Changes not requiring notice included:

- upgrade tension controls and drive mechanisms on 2B coating line
- install programmable logic controller on 2B coating line
- update tension controls and electrical on 5B coating line

The permit required 3M to comply with any applicable New Source Performance Standard (NSPS) requirement that is triggered due to any physical or operational change. NSPS-applicable changes in the coatings building were assured compliance with NSPS control requirements since the building was controlled by the thermal oxidizers.

#### VOC PAL:

The annual VOC emissions cap (combined actual emissions) was initially set at 4,596 tons/year, rolled each day. The daily emissions cap was set at 30,600 lbs./day when the REECO oxidizer is not operating. Administrative Amendment No. 2 to the permit (April 5, 1994) lowered the annual VOC emissions cap to 4,283 tons/year, based on the results of a capture efficiency test that showed the capture efficiency of the REECO thermal oxidizer to be greater than originally calculated. 3M was subject to PSD modification if the annual cap were relaxed.

The permit also contained limits on other criteria pollutants applied to specific sources/emission points, to ensure compliance with NAAQS.

#### Replicable Testing Procedures:

The permit contains replicable testing procedures for determining the capture and destruction efficiency parameters for the pollution control equipment. These parameters are used by 3M in the company's calculation of daily VOC emissions. By including replicable testing procedures in the permit, as opposed to specific parameter values, 3M has been able to periodically adjust the parameters based on the latest testing results without the need for a permit revision, provided that MPCA approved the test results. Through this approach, the public continues to have access to current parameter information, available in the 3M St. Paul Tape Plant file at MPCA. Attachment 3 of the permit contains the detailed "Capture and Destruction Efficiency Testing Plan" that governs how the testing is conducted.

#### **2.1.a Describe the information and level of detail provided in the application to support these flexible permit provisions.**

MPCA and 3M representatives indicated that the state air operating permit application contained significant detail regarding the facility and planned operations. The EPA Review Team did not review the air operating permit application.

#### **2.1.b Describe the types of information needed in or required by the permit to support the ongoing implementation of the flexible permit provisions.**

- A calculation of the daily total VOC emissions from all emissions units; calculated and recorded within 41 hours (additional time is allowed for weekends and holidays) after the end of the day for which the calculation is being made;
- Quarterly reports which include the total amount of VOC emissions (tons) for each

day of the quarter plus the previous 364 days (i.e., a daily rolling 365 day total) and upon request by MPCA, a report of the total amount of VOC emissions (in tons) for any time period specified by MPCA;

- Written notice of facility's intention to implement a specific change covered under the advance-approved change categories in the permit, and/or written notice that the change has been implemented (see section 2.1 for a thorough discussion of the notice requirements associated with utilization of the advance approval permit provisions);
- Annual summary of all physical and operational changes during the previous calendar year;
- Written notice of any VOC emissions limit that is exceeded, within 24 hours of calculating the exceedance. This includes both the 365-day emissions limit and the daily emissions limit that applies when the thermal oxidizer serving Emissions Point No. 1 is not operating;
- THC Continuous Emissions Monitoring (CEMS) plan and certification test report;
- Quarterly report of downtime for the CEMS while the monitored process equipment is operating; and
- Report shutdowns and breakdowns.

See section 4.7 for a description of information required for inclusion in on-site logs.

**2.1.c How were any 18-month "commencement of construction" requirements met?**

Not applicable.

**2.1.d What were the processes, if any, for extending any BACT determinations (i.e., keeping them contemporaneous)?**

Not applicable. There is no State BACT requirement in Minnesota.

**2.2 If the flexible permit contains a PAL, how was the PAL baseline set?**

The 4,596 tons/year annual VOC emissions cap was set at the mean of actual VOC emissions for the stationary source for the two years prior to permit issuance (1991 and 1992). The VOC emissions cap was lowered in April 1994 to 4,283 tons/year, based on the results of another performance test on the capture systems for the coating operations. The source was not satisfied with the capture efficiency method previously used because of poor precision of the results; consequently, a performance test comparing two methods for determining capture efficiency was conducted. The results of this comparison test indicated that the method previously used yielded capture efficiency results that were biased low. The emissions data used for establishing the baseline were adjusted to account for the bias in the capture efficiency data from the old performance test. This resulted in a higher overall control efficiency and lower baseline emissions.

## **2.3 How was the PAL monitoring, recordkeeping, and reporting approach justified?**

**2.3.a What is the rationale for the monitoring approach and averaging time?**

**2.3.b What data conversions are required?**

**2.3.c What is the averaging time for each emissions cap and/or the duration of the cap?**

**2.3.d What is the rationale supporting the use of any longer (e.g., longer than one month) duration?**

Under the permit, 3M is required to monitor daily VOC emissions from all emissions units at the stationary source except the boilers (although the VOC emissions generated by the coaters and exhausted through the boilers must be included). Daily VOC emissions calculations are incorporated into a “rolling” 365 day total for determining facility compliance with the annual VOC emissions cap. The annual (365-day rolling) VOC emission limits were determined from the average of 1991 and 1992 VOC emissions. This is the level documented in the permit application.

The annual (365-day rolling) VOC emissions cap is complemented by a daily limit on VOC emissions (30,600 pound per day [ppd]) for days when the REECO thermal oxidizer is not operated for one or more of the following reasons: a) unforeseen operational problems with oxidizer, b) preventive maintenance is being performed on the oxidizer, or c) four or fewer coating lines are being operated and it is a weekend day or holiday. This daily emission limit ensures that a major emissions spike resulting from process operations, control device malfunction, or a control device bypass event cannot be long lasting and cannot aggravate seasonal ozone problems.

The calculation of daily total VOC emissions is also consistent with EPA policy, as outlined in the EPA Office of Air Quality Planning and Standards’ (OAQPS) January 20, 1984 Memorandum titled “Averaging Times for Compliance With VOC Emissions Limits - SIP Revision Policy.” This memorandum stipulates that VOC emission averaging periods must not exceed 30 days.

The monitoring approach is comprised of several different components and calculations for determining emissions from controlled emissions units, uncontrolled emissions units with CEMS, and uncontrolled emissions units without CEMS. The procedures provide the data necessary to determine emissions from all sources which are aggregated into a daily facility-wide total. (See permit Attachment 2 for detailed description of VOC emission calculation methodologies.)

The existence of 3M’s computerized material usage tracking system was a primary factor enabling daily VOC emissions monitoring using a chemical mass balance approach, since material usage information for the prior day is reconciled each night at midnight. This system provides an accurate account of the VOC-containing materials actually used during the previous 24-hour period (as opposed to the amount called for in product recipes). Since the accuracy of information in this system is critical to the facility’s core operations and business processes, both 3M and MPCA reported strong confidence in the system’s ability to deliver highly accurate material usage information.

The monitoring approach for the controlled emissions units utilizes a calculation that applies an overall control efficiency (capture and destruction) to the VOC input (based on the material tracking system) to determine the VOC emitted. The capture and destruction efficiency is determined through performance testing of the control system. This approach follows rule requirements for similar industries and VOC sources. The data conversions include volume (gallons) to weight (pounds) using

a density calculation for the VOC-containing materials used in the process. Also, capture/destruction efficiencies (percentage) for the control systems are calculated from stack gas concentrations (parts per million [ppm]) and flow rates (cubic feet per minute [cfm]) measured during the performance test.

The uncontrolled fugitive emissions from the churn and mogul rooms are monitored by CEMS located in the vent stacks from the rooms. The CEMS provide a quantitative measure of the emissions. The use of CEMS for these emission sources was a result of MPCA's conservative approach with their first flexible permit. MPCA stated they based their decision on the draft "enhanced monitoring guidance" which was being discussed at the time (1992). The THC CEMS on the uncontrolled churn and mogul rooms measure concentration in ppm, which is converted to mass emissions using measured flow rate [cfm].

Emissions from uncontrolled emission units without CEMS (e.g., use of cleaning solvents) are determined from the amount of material used (material usage tracking system) and assuming no control (100 percent of VOC used is emitted). The data conversions include volume (gallons) to weight (pounds) using a density calculation for the VOC-containing materials used.

**2.4 Where applicable, describe the following aspects of the permit that are used for purposes of tracking emissions under a PAL or an emissions cap:**

**2.4.a Details regarding source emission factors and processes for changing emission factors**

**2.4.b Tracking emissions from startups, shutdowns, and malfunctions of monitoring, control, and/or process equipment**

**2.4.c Requirements for tracking emissions from insignificant emissions units**

**2.4.d Requirements for quantifying fugitive emissions**

Emission factors are used for VOC emissions from the storage tanks, which comprise a relatively minor part of the total emissions.

3M gets oxidizers up to temperature before running coaters and does not make a separate startup calculation. In general, 3M runs oxidizers until coaters are finished so there is no shutdown calculation. Malfunctions are handled as a percent of the day calculation. Vent time is tracked for each coater, which is zero if there are no malfunctions. If a malfunction occurs, then the percent of the day that is vented translates into the percent with no capture and destruction (i.e., 100 percent of VOC input emitted to the atmosphere). If there is an oxidizer malfunction, the coater(s) are shutdown immediately.

There are no requirements for tracking emissions from insignificant emissions units.

Fugitive emissions from the controlled emissions units are quantified by conducting periodic performance tests to determine the percent capture efficiency. Fugitive emissions from the churn and mix rooms are quantified using CEMS. Fugitive emissions from miscellaneous materials handling (e.g. use of cleaning solvents) are quantified using the mass balance from the materials tracking. See number 2.3, above for more discussion on these monitoring approaches. Storage tank emissions are quantified using emission factors.

### *Additional Permitting Authority Inquiries*

**2.5 How did the source articulate its need for flexibility?**

See section 1.22.

**2.6 What were your key rule interpretations?**

MPCA relied upon a fundamental interpretation that a rule can allow a particular approach if the rule does not expressly preclude the approach and the enabling interpretation reasonably fits within the rule. The advance approval and PAL condition were thus deemed approvable.

**2.7 Was there a need for follow-up rulemaking?**

MPCA representatives indicated that no rulemaking was required to issue the 3M flexible permit, or other flexible permits issued by the State.

**2.8 Might you include additional flexible approaches for this source in the future?**

MPCA representatives reported that they have interest to continue to employ flexible permitting techniques for the 3M St. Paul Tape Plant in the future. At present time, however, 3M has been unwilling to accept flexibility provisions in its title V permit (forthcoming) if it means that the annual VOC PAL will be “ratcheted” down to recent actual emissions levels. This ratcheting effect might lower the facility’s annual VOC emissions cap from 4,283 tons/year to less than 1,000 tons/year. Due to their expressed need for the St. Paul Tape Plant to be prepared to respond to changes in market needs (e.g., a stronger economy, relocation of product lines from other 3M facilities), 3M management has been reluctant to limit emissions at a level corresponding to the facility’s current low production level. There was discussion during the June 2001 EPA Permit Review meetings about how a “clean building” approach may offer an appropriate means of continuing to provide the source with operational flexibility while protecting environmental quality and satisfying all applicable requirements. This approach would rely upon the state-of-the-art controls dedicated to the coating lines to advance approve another series of changes limited by a defined growth increment.

### 3. PUBLIC PARTICIPATION AND PUBLIC PERCEPTION

**3.1 Were comments received from the public? Please provide a summary of any comments and of your response(s) to them.**

**3.1.a In what venues/times were public comments received? (formal permit process, public information sessions not required by the permit process, permit implementation, etc.)**

**3.1.b How many public meetings/information sessions were requested and subsequently held?**

MPCA and 3M representatives reported that there has been little (if any) public interest in the St. Paul Tape Plant's flexible permit, despite agency and company efforts to enhance public involvement. MPCA indicated that the required 30-day public comment period was held once the draft permit had been approved by MPCA, EPA Region V, and 3M. MPCA officials reported that no public comments were received during this period.

While MPCA representatives reported that the agency did not receive any public comments related to the permit, MPCA did indicate that the local public had a significant on-going interest in the operation of this plant. For example, the agency received approximately 15 odor complaints in the vicinity of the 3M Tape Plant from 1993 to 1998. This suggests in part that the local community continues to be aware and interested in the operations of the St. Paul Tape Plant. MPCA officials indicated that several of the complaints related to odors from an adjacent 3M abrasives plant and that some others likely emanated from other neighboring facilities (e.g., a building materials manufacturer, a brewery, a roofing company). 3M representatives acknowledged that some odor complaints related to Tape Plant operations have been received since 1993 and that the company has been taking steps to reformulate or phase-out certain products that have been linked to odors.

Following the public comment period, MPCA and 3M held an open public meeting prior to issuance of the permit. While this meeting was not required nor requested by members of the public, MPCA believed that supplementary public involvement activities were warranted due to the innovative nature of the flexible permit and the level of interest that the local community has in the plant's operations. MPCA officials indicated that no public meeting participants came forward to criticize or suggest modifications to the permit. 3M representatives recalled that 4-5 citizens, including representatives from at least one local environmental organization, attended the public meeting. MPCA representatives reported that the public comment period and hearing were publicized using the agency's standard public notification operating procedures. They also reported that the agency's newspaper notices included a description of the permit that indicated the innovative nature of the permit and its inclusion of flexibility provisions (e.g., emissions cap, advance approval of selected changes).

3M representatives indicated that the company initiated additional activities to inform and involve the local community during the permit development period. 3M reported that the company distributed a newsletter (called *Eastside Link*) containing information on the flexible permit development effort to over 10,000 homes in the surrounding area. 3M also indicated that its Eastside Community Outreach Team, composed of facility personnel representing multiple business functions, met with

some neighbors and members of a local community organization to discuss the flexible permitting effort.

Following issuance of the permit, Minnesota Governor Arne Carlson made an appearance at the 3M St. Paul Tape Plant to announce the issuance of the permit, to recognize the need for improved operational flexibility in the implementation of environmental regulation, and to demonstrate his support for the flexible permitting effort. One of Minnesota's major newspapers, the *Saint Paul Pioneer Press*, ran an article that described the flexible permit and its anticipated benefits (April 20, 1993). The article quotes the Governor as saying that "this is outcome-based permitting. We [the State of Minnesota] are concerned with the results. They get flexibility and very little harassment. We get the elimination of almost 5,000 tons of hydrocarbons." The *Saint Paul Pioneer Press* also ran an editorial supportive of the flexible permit, titled *3M-PCA Agreement Makes Good Sense*.

Others quoted in the April 20, 1993 newspaper article, representing the State of Minnesota, MPCA, and 3M, were highly supportive of the flexible permit, except for one environmental group representative (Lisa Doerr, Minnesota director of Citizens for a Better Environment). Therein, she "questioned whether the 4,600 tons of pollution the company can put in the air is based on health standards or just the best the company says it can do". The EPA Review Team found no other record of public comments or criticisms related to the flexible permit.

**3.2 Was there a discussion in notices, meetings and/or public comments of the source's need for flexibility, possible environmental benefit, and/or administrative burden from getting additional permit(s) or permit revisions?**

MPCA and 3M representatives indicated that the source's need for flexibility and the anticipated benefits to the environment, 3M, and MPCA were presented during the public hearing and during post-issuance announcements by MPCA. MPCA prepared a three-page *Synopsis: MPCA Air Quality Division "Flexible" Permit for 3M Bush Street Facility* that briefly describes the permit features, requirements, and anticipated benefits.

**3.3 Were there any environmental justice issues? If so, how were they addressed?**

No environmental justice issues have been reported to MPCA or EPA related to the 3M St. Paul Tape Plant. The facility is located on the Eastside of St. Paul, in an older industrial area that has included other manufacturing companies and facilities. Since the plant was built in the 1940s, several working class neighborhoods have grown up around these facilities. Economic transition during the 1970s and 1980s occurred as several manufacturing companies and facilities (e.g., Whirlpool) closed their Eastside operations, leading to significant declines in local employment. Housing in the Eastside area now has high rates of absentee landlords. 3M representatives indicated that they have routine contact with neighbors through their employee-led Eastside Community Outreach Team activities and participation in monthly community meetings. 3M representatives reported that they primarily receive community comments and interest related to job and education topics.

**3.4 Were there any CBI issues? If so, how were they addressed?**

No confidential business information related to the flexible permit was identified by 3M or MPCA. Prior to the EPA Permit Review in June 2001, MPCA officials reviewed the agency files to ensure that there were no CBI issues on record. No CBI issues were identified during this file review.

**3.5 What was the ongoing level/adequacy of information flow to the public?**

**3.5.a What was the amount and type of information available during the title V permit development and public notice/comment period?**

**3.5.b What input was obtained back from the public beyond initial comments?**

**3.5.c What level of detail of source activity was provided to the permitting authority, and/or the public for flexible permit changes that took place during the permit term (e.g., logs and other records)?**

- **What required information was submitted directly to the permitting authority?**
- **What and how much information submitted by the source was claimed as CBI?**
- **What additional information was available to the public only through FOIA requests?**

**3.5.d What was the timing of the availability of relevant information to the public during permit implementation and development?**

**3.5.e What was the level of interest in annual P2 reports provided?**

**3.5.f Were advance notices circulated or made publicly available?**

MPCA officials reported that the availability and flow of information to the public during the development of the 3M St. Paul Tape Plant flexible permit was adequate and that it satisfied or exceeded all requirements associated with the agency's standard operating procedures for permit development. The permit application and draft flexible permit were made available for public review during the comment period. The public also had access to the 3M facility's file at MPCA that included information associated with the implementation of previous air operating permits (e.g., correspondence between MPCA and 3M, inspection reports). As mentioned, despite receiving no public comments on the proposed permit, the MPCA held a non-requested public hearing prior to issuance of the permit, as well as a press conference with the Governor of Minnesota to announce issuance of the permit. No letters or calls were obtained from the public by MPCA during the subsequent term of permit implementation.

MPCA representatives indicated that, during the permit term, information flows to the agency (and accessible to the public) provided agency personnel with a solid understanding both of the compliance status of the facility and of the changes being made at the facility. During the permit term, 3M submitted all required reports to MPCA, including quarterly emissions monitoring and annual change implementation reports (see section 2.1.b above for a list of required reports). All reports submitted to MPCA by 3M are available to the public in MPCA's files at the agency's St. Paul office.

Under the permit conditions, 3M was required to provide written notice to MPCA for each change implemented by the facility that utilized the advance approval flexibility provisions contained in the permit (see section 2.1 for a detailed description of the specific notification requirements associated with utilization of the advance approval permit provisions). Initial written notice of the facility's intent to make an advance-approved change was required at least ten days prior to beginning actual construction. A subsequent written notice was required to be submitted by 3M within two weeks after commencing operation (e.g., implementing the advance-approved change). A permit amendment in May 1996 modified the change notice requirement to consolidate the notice requirement so that 3M was required to submit one written notice for each change within two weeks of commencing operation (see sections 2.1 for additional details on this change). In addition, all

advance-approved changes made in a year were also required to be listed in an annual summary report of changes.

All change implementation notices were made available to the public in the facility's files at MPCA. 3M and MPCA representatives indicated that none of the monitoring and change implementation information reported by the facility contained CBI, and that all of this information is accessible to the public through file review at MPCA without utilizing the U.S. Freedom of Information Act (FOIA) request process. The permit did not require 3M to submit P2 reports to MPCA, although some of the advance-approved changes implemented by 3M and listed in the notices and annual summary of changes reports did result in emissions reductions (e.g., overall emissions reductions and/or per unit of production emissions reductions).

**3.6 Based on document/record review, compare conventional regulatory permitting versus flexible permits in terms of:**

**3.6.a How provisions are described to the public**

**3.6.b Number of comments received**

**3.6.c Number of complaints received**

**3.6.d Level of ongoing public interest**

**3.6.e Amount of information (if any) not available to the public (e.g., logs) and how this may or may not contribute to the public's understanding of the permit**

**3.6.f Amount of P2 information made available**

MPCA representatives stated that they believe that the 3M flexible permit (and each of the other flexible permits issued by MPCA) provides both the agency and the public with more comprehensive and more useful information than that provided under a conventional permit. MPCA officials referenced the following points to support this assertion:

- The 3M flexible permit required more frequent, comprehensive, and useful emissions monitoring information than would be required under a conventional permitting scenario. The permit included all facility emissions sources, including those that had been "grandfathered" by the Clean Air Act, into the facility emissions monitoring activities and enforceable compliance limits. Daily and annual rolling totals of VOC emissions provide near "real time" information on actual facility-wide emissions.
- The flexible permit development process, through the specific categories of advance-approved changes, provided MPCA and interested members of the public with a clear advance understanding of the types of modifications that 3M planned to make at the facility over the 5-year permit term.
- The annual summary of changes report provides, in a single document, a list of all changes actually made by the facility (e.g., changes that utilized the advance approval permit provisions) to supplement individual change notices. MPCA representatives reported that 3M included some changes in the annual summary of changes reports for which they were not required to obtain approval or to include in the report.

MPCA representatives reported that they noticed little, if any, difference between the number of comments and/or complaints received, or the level of ongoing public interest, related to flexible permits when compared with conventional permits.

## 4. IMPLEMENTATION OF FLEXIBLE PERMIT PROVISIONS (ON-SITE VERIFICATION)

### *Utilization*

#### **4.1 What was the source's overall flexibility provision utilization throughout the permit term?**

##### **4.1.a How often were the flexible approaches used?**

- Describe the nature of the changes that occurred at the facility under the flexibility provisions.
- Identify which changes took advantage of which flexibility provisions (e.g., new unit A was added pursuant to advance approval and within a PAL emissions limit).

From 1994 to the end of 1997, the 3M St. Paul Tape Plant reported undertaking 34 equipment and operational changes that utilized the flexibility provisions of their permit. These changes are listed in the "summary of changes" reports submitted annually to MPCA and they are listed in Table 4.1 below. MPCA representatives indicated that all of these changes are consistent with the categories of advance-approved changes established in the permit (see section 2.1). Each of these changes also has a corresponding notice letter, submitted by 3M to MPCA, in the facility's file at MPCA (see section 2.1 for a description of the contents of the notice letters). The majority of changes reported by 3M involved equipment replacements or upgrades to the various coating lines in the facility. For example, the 1994 summary of changes report identifies that there was a "replacement of a portable laminator with a permanently installed laminator on the 3B coating line (December 13, 1994 change notification)". Another notable change made under the advance approval conditions and PAL was the "removal of an old burner and replacement with two smaller burners on the 5B Thermal Oxidizer (completed June 23, 1997)".

During interviews, 3M indicated that the plant did not need to obtain any case-by-case source permits during the permit term (i.e., the flexibility provisions fully met their need for addressing anticipated operational changes during the permit term). On two or three occasions, 3M indicated that 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 (see permit condition 2.3.2.2). In each of these instances, MPCA indicated that the planned change would not require a permitting action.

3M representatives reported that company management decided that modernizing existing equipment at the St. Paul Tape Plant that allowed for production flexibility (e.g., ability to make multiple products on a single process line) and quick changeovers was more economical and efficient than installing new coating lines. 3M representatives stated that the flexible permit allowed the plant to make changeovers and replace coating heads to maximize the versatility of each coater. The facility used its existing equipment and made many different products on each line by changing the method of coating. 3M representatives indicated that since the relevant permit analyses for all anticipated facility changes had occurred at the time of permit issuance, the flexible permit allowed the plant to make these changes without requiring permit amendments.

Table 4.1

**3M Summary of Operational Changes**

<i>Year</i>	<i>Notification Date</i>	<i>Description of Change</i>
1994	August 30	5B Coating Line <ul style="list-style-type: none"> <li>• Update drive mechanisms and electrical components</li> <li>• Drive gear changes to the main web transport drive</li> <li>• Update web transport idlers</li> <li>• Relocate idler roll</li> <li>• Upgrade process control equipment</li> <li>• Re-ducting of 5B coater oven exhaust to provide option of controlling with REECO oxidizer</li> </ul>
1994	August 31	4C Coating Line <ul style="list-style-type: none"> <li>• Replacing or upgrading churns, moguls, or storage devices</li> <li>• Pipeline connection to the adhesive storage tank</li> </ul>
1994	December 13	3B Coating Line <ul style="list-style-type: none"> <li>• Replacement of a portable laminator with a permanently installed laminator</li> </ul>
1994	Notification not required	1B Coating Line <ul style="list-style-type: none"> <li>• Remove 1B coating station</li> </ul>
1995	Notification not required (Started - Early January)	1B Coating Line <ul style="list-style-type: none"> <li>• Remove 1B oven</li> </ul>
1995	Notification not required (Started -January)	1C Coating Line <ul style="list-style-type: none"> <li>• Remove 1C coating line</li> </ul>
1995	January 5	2B Coating Line <ul style="list-style-type: none"> <li>• Update web transport idlers</li> </ul>
1995	May 12	4C Coating Line <ul style="list-style-type: none"> <li>• Replace/update laminator</li> </ul>
1995	Notification not required (Started - June)	5D Coating Line <ul style="list-style-type: none"> <li>• Remove 5D coating line</li> </ul>
1995	July 21	4A Coating Line <ul style="list-style-type: none"> <li>• Update drive mechanism</li> <li>• Change coating mechanism</li> <li>• Update coater oven</li> <li>• Upgrade churns and storage device</li> </ul>
1995	August 10	2B Coating Line <ul style="list-style-type: none"> <li>• Modify coater to allow quick changeovers</li> </ul>
1995*	August 10	4C Coating Line <ul style="list-style-type: none"> <li>• Replace/update laminator</li> </ul>
1996	Notification not required (started third quarter)	1J maker <ul style="list-style-type: none"> <li>• Replace 1J resin dryer</li> </ul>
1996	November 18	4F Coating Line <ul style="list-style-type: none"> <li>• Replace/update coater ovens</li> </ul>
1996	November 18	1D Coating Line <ul style="list-style-type: none"> <li>• Remove coating line</li> </ul>
1997	March 19	5B Coating Line <ul style="list-style-type: none"> <li>• Removal of non-contact coating unit, completed March 13</li> </ul>

<i>Year</i>	<i>Notification Date</i>	<i>Description of Change</i>
1997	April 25	4F Maker <ul style="list-style-type: none"> <li>Installed a lab hood in 4F production area, completed April 18</li> </ul>
1997	May 13	L Calender <ul style="list-style-type: none"> <li>Removed machine, completed May 13</li> </ul>
1997	May 23	3B Coating Line <ul style="list-style-type: none"> <li>Replaced winder and changed coating mechanism, completed May 23</li> </ul>
1997	June 27	5B Thermal Oxidizer Burner <ul style="list-style-type: none"> <li>Removed old burner and replaced with two smaller burners, completed on June 23</li> </ul>
1997	August 6	Building 18 Churn Room <ul style="list-style-type: none"> <li>Room was taken out of service on August 5</li> </ul>
1997	August 7	#8 Rewinder <ul style="list-style-type: none"> <li>Installation of non-contact coating unit from 5B was completed on August 1</li> </ul>
1997	August 15	SLA system <ul style="list-style-type: none"> <li>A control system upgrade was completed on August 8</li> </ul>
1997	September 22	4J Maker <ul style="list-style-type: none"> <li>Updated machine controls, tension controls and winder, completed on September 22</li> </ul>
1997	October 7	1J Maker <ul style="list-style-type: none"> <li>Updating winder was completed on October 7</li> </ul>

\* This notification was only to change the date of the work to be done as indicated in the original notification of this activity was made by letter of May 12, 1995.

**4.1.b How many minor NSR permits and/or title V permit revisions were necessary (i.e., not covered under the advance approval)?**

3M representatives reported that no minor NSR permits were required during the permit term, and they indicated that the flexibility provisions of their permit fully addressed the changes made by the facility during the permit term.

During the permit term, four amendments were made to the 3M Tape Plant air operating permit. Amendment No. 1 was issued on April 8, 1993, and included the following changes:

- Corrects typographical errors, and allows 3M to shutdown the REECO and 5B oxidizers (control equipment) for preventive maintenance for periods longer than 12 hours.

Amendment No. 2 was issued on April 6, 1994, and included the following modifications:

- Lowers the annual plant-wide VOC emissions cap from 4,596 tons/year to 4,283 tons/year based on a capture efficiency test that showed the capture efficiency of the REECO oxidizer to be greater than originally calculated when establishing the cap.

Amendment No. 3 was issued on May 2, 1996, and included the following modifications:

- Eliminates the requirement for 10-day advance written notice of changes advance-approved

under permit condition 2.3.4. 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 facility. Amendment No. 3 consolidated these two change notices into a single post-construction (submitted within 2 weeks of the actual change) notice. See section 2.1 for a detailed description of these modifications;

- Revises the frequency of capture efficiency testing required in Attachment 3 for the 5B oxidizer to be consistent with the requirements for the REECO oxidizer. Testing can be performed every two years, instead of every year, provided certain conditions are met.

Amendment No. 4 was issued on October 2, 1997, and included the following changes:

- Revises Table E, Required Actions and Submittals in the permit. The table previously had several errors. Specifically, the listed emission points in column 2 were incorrect or incomplete for several items, the CEM quarterly reporting requirement was not clear, and one quarterly reporting requirement was missing from the table. No emissions changes are associated with this amendment.

#### **4.1.c Contrast these results with implementation under a conventional permit design for the same source.**

- **What approach would the source have taken for each change that utilized a flexible permit provision, absent that provision?**
  - S not made the change**
  - S taken steps to avoid triggering requirements (e.g., netted out of major NSR)**
  - S complied with full major/minor NSR permitting**
- **Were any other conditions taken to avoid applicable requirements other than NSR? If so, which ones?**
- **How much time & resources were saved by utilizing the flexible permit provision(s), compared to the option you would have chosen above?**

Of the 34 changes made by 3M from 1994 through 1997 under the advance approval conditions of the permit, 3M and MPCA representatives estimated that at least 15-20 of the changes would have required some form of permitting action (e.g., minor NSR/notice of construction approval application) or permit modification under a conventional permitting approach. 3M indicated that, for the most part, the changes undertaken during the permit term primarily fell below Major New Source Review (PSD) permitting thresholds. 3M did identify two changes that may have involved at least a case-by-case PSD permitting analysis:

- replacement of the winder and changed coating mechanism on the 3B Coating Line [completed May 23, 1997]; and
- removal of an old burner and replacement with two smaller burners on the 5B Thermal Oxidizer [completed June 23, 1997].

3M representatives indicated that these changes (that potentially involved PSD permitting) likely would not have been undertaken if handled on a conventional basis.

Both 3M and MPCA representatives indicated that the flexible permit very effectively allowed both organizations to avoid fully delays associated with operational change and permitting actions. From MPCA's standpoint, the flexible permit kept 34 potential permitting actions out of their queue, allowing permit engineer resources to be applied to other permitting actions (thereby lowering their overall backlog). From 3M's perspective, the flexible permit allowed them to proceed as needed with operational change. This was critical from two perspectives: (1) it allowed the permit to avoid acting as a bottleneck along the critical path of any particular product line that would be moving among 3M plants; and (2) it allowed the plant to remain highly responsive to its marketplace and avoid either lost sales and/or permanent loss of market share. 3M reported that the change delays that are likely to incur an opportunity cost and would potentially have caused a product to be late to market due to permitting delays are typically associated with coater modifications that, under the flexible permit's design, allow for quick changeovers.

The approach that would have been made if the flexibility provisions were not present would have depended on the projected business growth that would have been associated with that change. The St. Paul plant would have either not made the change, if it required exhaustive resources and time, *or* complied with full major/minor NSR permitting and proceeded as necessary. Moreover, the company stated that in general it would have been reluctant to make any changes reported under the advance-approved change conditions that would have triggered PSD (or any other changes at the same affected unit), and instead would have just made changes at other units. If the St. Paul plant had been operating under the conventional permitting program available at the time, each of the certain types of facility changes would have required issuance of a separate permit or modification of an existing permit. Since the plant at that time had 18 coating lines, five churn rooms, and six moguls rooms, multiple conventional permits/modifications might have been required over the term of the flexible permit, depending on the nature of the proposed facility changes. 3M stated that such delay resulting from permitting in some instances costs significant market opportunities and may have caused 3M to abandon the related changes.

### *Documentation*

#### **4.2 What problems, if any, did you encounter regarding the following:**

**4.2.a Tracking of fugitive emissions**

**4.2.b Inclusion of emissions from startups, shutdowns, and malfunctions**

**4.2.c Inclusion of emissions from insignificant emissions activities**

**4.2.d Missing data**

**4.2.e Use of/updates to emission factors**

**4.2.f Application of ROPs (amount of errors noted) and missing critical assumptions**

**4.2.g Required content of logs**

**4.2.h Use of advance notices**

The EPA Review Team did not identify any documentation problems related to the permit or associated recordkeeping requirements. No monitoring problems were identified regarding tracking of fugitive emissions or emissions from startups, shutdowns, and malfunctions. All emission sources, including fugitives, storage tanks, and general mixing areas, are accounted for in 3M's General Emissions Tracking Approach. The control devices are operated during startups, shutdowns, and malfunctions of the coating lines and ovens. Therefore, there are no emission tracking problems associated with startups and shutdowns. Also, the REECO thermal oxidizer was designed to include extra capacity to allow up to two of the six burners to be taken off-line for repairs or maintenance.

See Section 1.21 for a more detailed discussion of the emissions tracking approach. 3M's documentation and recordkeeping associated with the permit appeared to be thorough and well-organized.

3M's flexible permit includes provisions to handle missing data. Most notably, the CEMS QA/QC includes provisions for going back and using average data from the last five similar time periods. 3M had no problems with the updates to emission factors. 3M's flexible permit allows the Tape Plant engineers to use the emissions data collected over the past several years to update/improve emission factors from several of the emissions points throughout the plant. This has led to lower and more accurate emissions and room under the emissions cap. 3M representatives noted no problems with the application of replicable operating procedures (ROPs) for determining monitoring parameters. Advance notices were submitted by 3M to MPCA prior to testing based to adjust control equipment monitoring parameters (e.g., capture and destruction efficiencies). No problems were reported or observed related to these advance notices. Example log sheets and checklists were well organized and up-to-date.

MPCA inspection reports did indicate that a recordkeeping problem was identified by MPCA in 1995 related to temperature monitoring of the thermal oxidizer units (see section 1.24). MPCA representatives reported that this problem was promptly addressed by 3M and that no enforcement actions were taken.

### ***Quality/Quantity of Information***

#### **4.3 What was the quality and the quantity of monitoring data received?**

**4.3.a. Are CEMS in place? If yes, were data provided?**

**4.3.b. Were stack tests performed? If yes, were results provided?**

**4.3.c. Was parametric monitoring performed? If yes, were results provided?**

**4.3.d. Were any other monitoring approaches used? If yes, were data provided?**

MPCA representatives indicated that they believe that the quantity and quality of monitoring data required by the permit and received from 3M was sufficient to determine compliance with permit conditions, and was of greater quantity than would have been required under a conventional air operating permit. MPCA's 1993 "Synopsis" document on the 3M Tape Plant Permit states that MPCA "believes the emissions tracking system and compliance determination portions of this permit represent as high a degree of sophistication as exists anywhere for this type of source."<sup>4</sup> All monitoring approaches required by the permit received EPA approval prior to permit issuance and were deemed to be consistent with EPA monitoring policy and guidance by EPA and MPCA. See sections 2.1.b and 2.4 for descriptions of monitoring requirements and the type, quantity, and frequency of data required by the air operating permit.

The monitoring at 3M utilizes a General Emissions Tracking Approach which involves a tracking and accounting system to calculate the daily amount of VOC used and emitted from the various emissions sources. Daily usage and production reports, THC CEMS data, performance (stack) test

---

<sup>4</sup>MPCA. *Synopsis: MPCA Air Quality Division "Flexible" Permit for 3M Bush Street Facility*. 1993.

information, and periodically reviewed/revised constants (emission factors) are used as the inputs for calculating daily and annual (365-day) VOC emissions. Parameter monitoring also is conducted.

Some VOCs are emitted when the facility prepares and mixes adhesive and solvent mixtures in the churn rooms and mogul rooms. The facility maintains negative pressure in the churn and mogul rooms (monitored and logged daily through visual inspection) to ensure that emissions from these sources are vented to the CEM-monitored stacks. CEMS were installed on the exhaust stacks in accordance with the permit requirements for monitoring uncontrolled VOC emissions from the churn and mogul rooms. The CEMS have met specific performance specifications, including relative accuracy test requirements. Periodic relative accuracy test audits (RATA) are conducted and all reported CEMS data are from monitors which met the RATA requirements.

MPCA representatives indicated that, in retrospect, the use of CEMS was probably “overkill”. MPCA representatives supported this view by pointing to several reasons: (1) the relatively small contribution that the CEMS-monitored emissions make to the source’s total emissions, (2) the relatively consistent amount of VOC emissions from the churn and mogul rooms, and (3) the ability to accurately track emissions from the churn and mogul rooms using significantly less expensive methods than CEMS (e.g., emission factors, chemical mass balance, parametric monitoring). 3M reported that the initial capital expenditure for CEMS at the St. Paul Tape Plant was approximately \$1.5 million. 3M estimated annual routine operating and administrative costs associated with the CEMS to be approximately \$96,500 per year, including labor and material costs associated with bi-annual testing, routine maintenance and supplies, daily systems technician monitoring, and quarterly reporting.

The adhesive-solvent mixture is ducted to the coating rooms where it is applied to the substrate and sent through ovens to cure and evaporate solvents from the tape products. VOC emissions in the coating rooms and ovens are vented to the pollution control equipment (thermal oxidizers). Airflow direction to these rooms is monitored continuously and verified daily to ensure that the rooms are maintained under a negative pressure and emissions are being captured and vented to the thermal oxidizers for destruction. The permit requires 3M to periodically test the capture and destruction efficiencies of the control equipment and to maintain these efficiencies.

Stack testing is required every two years, and by coincidence, stack testing on the REECO oxidizer was being conducted during the EPA Review Team’s site visit in June 2001. The results from the previous tests showed very high destruction efficiencies (e.g., average of 95+ percent) which provided an additional margin of compliance with the VOC emissions limit. Previous testing done on the REECO oxidizer allowed 3M to lower the operating temperature while maintaining the permitted destruction efficiency.

Parametric monitoring of selected control system operating parameters is conducted. The combustion temperature and an indicator of exhaust gas flow to the thermal oxidizers are monitored continuously and documented; monitoring these control system operating parameters assures the control system continues to operate in a manner consistent with the performance test. Also, as mentioned above, the direction of airflow at all openings (doors) to the coating rooms is monitored continuously and checked periodically (daily) to verify that a negative pressure is maintained within the room and that the direction of air flow is into the room.

Emission factors are used to quantify tank VOC emissions; these emissions are a minor source relative to the total VOC emissions from the facility.

During EPA's June 2001 site visit, 3M provided the EPA Review Team access to data associated with its monitoring procedures (i.e., material balance data, stack test reports). The EPA Review Team agreed with MPCA's assessment that the quantity and quality of monitoring data was sufficient to determine compliance on a continuous basis.

**4.4 What was the percentage/amount of site-wide emissions subject to enhanced monitoring, recordkeeping, reporting and/or controls that were greater than required by applicable requirements under a conventional permitting approach?**

The use of CEMS on the uncontrolled churn and mogul rooms exhaust stacks is enhanced monitoring that exceeds the traditional approach. The churn and mogul room emissions account for 1 to 2 percent of the total uncontrolled VOC emissions and about 15 percent of the controlled VOC emissions.

**4.5 Did actual changes made match their up-front descriptions? If not, why not and how were the discrepancies addressed?**

As discussed in section 4.1 above, MPCA and 3M reported that all changes made utilizing the advance approval permit conditions fit within the advance-approved change categories listed in the permit (see permit condition 2.3.4). As mentioned, the permit included a provision (permit condition 2.3.2) that allowed for 3M to seek from MPCA advance approval status for changes deemed to be "consistent with" the advance-approved change types included in permit condition 2.3.4. (See section 2.1 for a discussion of this permit provision.) This permit condition provided 3M and MPCA with the opportunity to apply the flexibility provisions to changes that did not exactly match the advance-approved change descriptions in the permit, but that met the general intent of the flexibility provisions. In practice, this provision resulted in a few initial phone calls from 3M to MPCA to determine its usefulness for addressing particular changes. This permit condition was never utilized, however, since all changes made were covered directly by the advance-approved list of changes.

**4.6 How many changes (e.g., potential NSR triggering events) are identified in the logs?**

See sections 4.1.a and 4.1.b.

**4.7 What types of information and level of documentation detail are included in the logs?**

3M was not required to maintain a log of changes undertaken utilizing the advance approval permit conditions, although the facility was required to submit to MPCA notices concurrent with change implementation (see sections 2.1 and 4.10) and to submit annual reports summarizing advance-approved changes made during the previous calendar year. 3M representatives indicated that the company has implemented a rigorous internal change management process to ensure that physical and operational changes are identified, approved, and managed in a manner that appropriately addresses environmental, health, and safety issues associated with changes. The company has developed an information system tool in Lotus Notes® to automate this process (e.g., record changes, track action items associated with changes).

The source was required to maintain on-site logs documenting the following (see permit condition 2.4.5), in addition to emissions monitoring data:

- the amount of natural gas used by each thermal oxidizer control device during the previous 24-hour period (daily);
- the direction of air flow into (or out of) each coating, churn, or mogul room to verify that negative pressure exists (daily);
- the pressure drop across each filter (daily);
- the operating temperatures of the oxidizer control devices (continuously, when in operation);
- detailed information (see permit condition 2.4.5) related to emissions calculations performed when the thermal oxidizers were not operated (see special permit condition 2.4.6 part 1 for additional information) (event-triggered);
- the reason for and duration of all periods when the monitoring equipment for the air pollution control equipment is down unless the emissions units that vent to the equipment are also not operating (event-triggered).

**4.8 Was there any confusion over the location of new emissions units and what requirements are applicable to them? If so, please describe the confusion and how it was resolved.**

Not applicable, since new emissions units were not included in the list of advance-approved changes.

**4.9 What types of information and level of documentation detail are included in the notices?**

MPCA representatives reported that 3M's notices related to utilization of the advance-approved change provisions of the permit consistently included the required information (see section 2.1).

**4.10 Were the calculations required by the permit included in or attached to the on-site log?**

3M maintained paper copy records of data and calculations required by the permit, as well as the partially automated electronic files (e.g., spreadsheets, materials inventory information system, PRISM MSDS database) used to generate most paper copy files and the quarterly and annual monitoring reports submitted to MPCA.

3M's emissions monitoring information was available to MPCA inspectors for on-site review upon request. During the flexible permit review site visit in June 2001, 3M made sample data available to EPA Review Team members for examination and to enable the Review Team to replicate emissions calculations for a representative day and chemical.

## **5. DESIGN ADEQUACY OF THE FLEXIBLE PERMITS**

*General inquiries based on subsequent implementation of the flexibility provisions*

**5.1 Were any applicable requirements omitted?**

The EPA Review Team did not find evidence of any currently applicable requirements that were omitted from the permit. The permit, however, will require revision to address any MACT standard that becomes applicable.

## **5.2 Was monitoring sufficient?**

### **5.2.a Does the permit utilize appropriate monitoring methodologies based on the types of emissions units involved?**

MPCA representatives reported that they believe that the monitoring methods utilized in the 3M St. Paul Tape Plant's air operating permit were sufficient to demonstrate compliance accurately and consistently with all applicable requirements and to ensure that the permit was practicably enforceable. See section 4.3 for a more detailed discussion of MPCA's perspective on the adequacy of the selected monitoring approach.

The EPA Review Team monitoring assessment found that the permit utilized appropriate monitoring methodologies based on the types of emissions units involved. For the main emissions points (e.g., the coating lines and ovens), the monitoring of coating usage in combination with the capture and destruction efficiencies of the control devices, and parametric monitoring of the control devices' operating parameters is appropriate. 3M continuously monitors and records the thermal oxidizer and catalytic oxidizer operating temperatures which are the appropriate parameters. 3M continuously monitors the direction of air flow at all entrances and exits to the coating rooms as an indicator of capture efficiency. Although this parameter is continuously monitored, the permit requirement is to record this parameter only once per day. This facility operates with a large margin of compliance (VOC emissions are approximately 25 percent of the cap) and the capture efficiency of the system has been demonstrated to be very high (99%), indicating a well designed and operated system. Consequently, this monitoring/recording of the capture system operating parameter is sufficient for this source. Note, however, that more recent guidance (e.g., certain NESHAP and the CAM rule promulgated in 1997) would also require, in some cases, continuous recording of the selected capture system operating parameter.

The CEMS requirement for the uncontrolled emission points (churn rooms and moguls) is more rigorous than what is typically done for sources which account for only 1 to 2 percent of the uncontrolled emissions from the facility. More typically, emission sources are required to have parametric monitoring correlated to emission factors, mass balance, modeling, or preliminary test data. Based on more than 7 years of CEMS data which suggest that the emissions are consistent and do not change significantly with process changes or upsets, MPCA is considering a shift to an emission factor-based approach. Other monitoring options that could be considered include emission monitors with less stringent calibration and QA/QC requirements, emission factors based on process activity, or mass balance. For example, emission factors could be based on material usage or production rates, with periodic (e.g. semi-annual or annual) monitoring or testing to verify the continued validity of the factors.

## **5.3 Were there any problems translating the advance approval concepts into actual permit provisions?**

No difficulties were identified regarding translation of advance approval concepts into actual permit provisions. 3M representatives indicated that it did take some time to determine the appropriate level of specificity for identifying the advance-approved categories of changes. 3M indicated that the facility's engineering staff could have easily identified more than 200 types of changes to include in the permit for advance approvals, 3M and MPCA chose to go with 14 primary categories of changes, supplemented by the permit condition that provided for changes "consistent with" these categories to be considered for advance approval status. Overall, 3M and MPCA believed that the development

of a highly specific, detailed list of advance-approved changes or change categories would not provide extra benefit (i.e., the applicability of no applicable requirement depended on a more specific change description), and would be overly time-consuming and cumbersome to develop and maintain. Both 3M and MPCA representatives indicated that, in practice, the approach used to translate the advance approval concepts into the permit worked very well.

**5.4 Were the advance-approved categories of changes sufficiently well-defined to cover the actual changes made? If not, how were these changes made?**

MPCA representatives indicated that they believe that the advance-approved change categories were sufficiently well-defined to cover the actual changes made and connect them to the relevant applicable requirements and control approaches contained in the permit. In practice, during the permit term, the advance-approved change categories fully met 3M's change needs at the facility (e.g., no other permitting actions were necessary). See section 4.1 for more detailed discussion of 3M's use of the advance approval permit conditions.

The permitting effort produced a permit that substantially increased the clarity both for MPCA and 3M with regard to the Clean Air Act regulatory status of 3M's operational changes. The permit accomplished this by focusing on outcomes (desired maximum emission levels) and then instituting monitoring, reporting, and recordkeeping (MRR) to assure compliance with this outcome. In effect then, the permit treated all 3M physical and operational changes that fit within the constraints of the advance approval identically irrespective of whether or not they would have, under a conventional permit, triggered case-by-case Notice of Construction Approval. As a result, the relevance of the "grey zone" surrounding the minor NSR applicability determination was eliminated (providing 3M and MPCA with certainty) and any incentive to "push the envelope" on an applicability determination in favor of not submitting notification was removed.

**5.5 Did the permit contain all calculation procedures (or replicable operating procedures [ROPs]) needed by the source to determine applicability and assure practical enforceability? If not, how did the source determine applicability and assure practical enforceability?**

MPCA representatives reported that the permit contained clear and replicable calculation procedures necessary to determine compliance and assure regulatory enforceability, based on the monitoring methods selected for use in the permit. The EPA Permit Review Team also found that the calculation procedures identified in the permit were replicable and appropriate given the selection of monitoring techniques. For example, the permit contained information regarding the use of testing ROPs for adjusting control device efficiencies without requiring permit revisions, provided MPCA approved the testing results. Refer to section 2.3 for justification by MPCA of the monitoring approaches employed in the permit. Attachment 2 of the air operating permit contains detailed instructions for the steps required of 3M (an enforceable condition of the permit) to calculate VOC emissions from controlled units, uncontrolled units without CEMS, and uncontrolled units with CEMS.

The permit includes the calculations for the mass balance from the coating lines. The CEMS QA/QC Plan provided the framework for calculating VOC emissions from the uncontrolled point sources, the mix rooms (churn rooms and mogul rooms). The uncontrolled VOC emissions from the mix rooms are monitored continuously and the resulting data are used in an approximate "real-time" calculation for daily and annual VOC emissions.

**5.6 Were all critical assumptions for ROPs use and/or emissions tracking also included in the permit? If not, how were these gaps addressed?**

All the critical assumptions for ROPs use and/or emissions tracking were included in the 3M permit. See section 5.5 above.

*Tool Specific Inquiries*

**5.7 Clean Buildings**

**5.7.a What safeguards were imposed to prevent the overloading of the control equipment?**

**5.7.b Were any emissions excluded from the central control device? Were they subject to any applicable requirements, and, if so, how were they accounted for in the permit?**

No clean building technique was formally utilized in the 3M air operating permit, but the control approach for the coating line operations potentially could qualify.

**5.8 Replacement Conditions**

**5.8.a Were the mass balance based formulae adequate to limit actual emissions? If not, what were the inadequacies and how were they corrected by the source and permitting authority?**

**5.8.b Were all critical assumptions for using the formulae contained in the permit? If not, what were the inadequacies and how were they corrected by the source and permitting authority?**

Not applicable to the 3M air operating permit.

**5.9 P2 Provisions**

**5.9.a Was P2 adequately recognized and encouraged by the design of the permit? If not, why not and what changes could be made to better recognize and encourage P2?**

MPCA and 3M reported that the permit provisions effectively recognized and encouraged pollution prevention. Although no explicit P2 requirements (e.g., P2 program development and reporting requirements, as contained in the Intel P4 permit) were included in the 3M Tape Plant permit, 3M and MPCA indicated that the design of the permit encouraged and facilitated P2 activities. The advance approval provisions created a “low friction” environment for making equipment and process upgrades that increased performance and yields of the coater lines, resulting in lower costs and reduced pollution per production unit.

**5.10 Fugitive Emissions**

**5.10.a How dependent on changes in fugitive emissions was the ability of the source to comply with any cap?**

Changes in fugitive emissions have not affected the source’s ability to comply with its VOC emissions caps. First, during the permit term, the 3M facility has operated significantly below its annual VOC emissions cap (i.e., actual emissions at less than 25% of emissions cap). Second, fugitive emissions comprise a relatively minor portion of overall facility VOC emissions. See section 1.21 for additional discussion of the nature of fugitive emissions at the 3M Tape Plant. Third, the level of fugitive emissions does not fluctuate significantly from day-to-day.

## 6. PRACTICAL ENFORCEABILITY OF THE FLEXIBILITY PROVISIONS

- 6.1 Assess the overall practical enforceability of the permit's flexibility provisions.**
- 6.1a Does the permit require monitoring, recordkeeping and reporting in appropriate time intervals (e.g., daily records for daily limits)?**
  - 6.1b Can an inspector visiting the site determine historical and contemporaneous compliance with the flexible permit from records maintained on site?**
  - 6.1c Does the permit contain a legal obligation for the source to adhere to the terms and conditions of the limitation?**
  - 6.1d Does the permit rely on the efficiency of an air pollution control device for compliance with an emissions limit? If so, how is that efficiency determined and shown to be accurate?**

MPCA representatives indicated that inspectors were able to determine 3M's compliance with the air operating permit during on-site inspections using monitoring, reporting, and recordkeeping information prepared and maintained by 3M, as required under the permit. MPCA representatives reported that agency staff would routinely review the monitoring reports submitted to MPCA by 3M to verify that daily and rolling annual VOC emissions totals were below the established emissions caps. MPCA representatives expressed confidence that they could determine current and historical compliance based on the records required by the permit. Real-time data analysis is required for the daily VOC emission limit. Data must be available within 41 hours for review after the end of the day for which the calculation is being made (additional time is allowed for weekends and holidays), if requested. See section 1.24 for a discussion of the annual compliance inspections conducted by MPCA during the permit term and associated findings.

The permit relies on the efficiency of two air pollution control devices for compliance with VOC emissions limits. Permit condition 2.4.2 outlines requirements related to temperature, retention time, capture efficiency, and destruction efficiency for the thermal oxidizer control devices. MPCA inspection reports indicate that inspections always included review of logs and records associated with the pollution control equipment and activities, including temperatures, pressure drops, and air flow checks. Initial requirements for VOC capture efficiency (68 percent by weight) and destruction efficiency (95 percent by weight) were presented in condition 2.4.2 of the permit. Attachment 3 of the permit outlines a plan for conducting tests to revise these efficiencies to more accurately reflect actual operating performance. The scheduling of performance tests were reported to MPCA in advance, and the agency would typically send an agency representative to observe the performance testing. Following performance tests, 3M was required to send MPCA a copy of the test report. MPCA would then respond with a letter assessing the test results and providing direction to the source (e.g., approval to use revised efficiencies).

Performance testing is required every two years for both capture efficiency and destruction efficiency. Testing is done using EPA approved test methods – example test reports were provided and reviewed during the June 2001 EPA site visit. Control device operating parameters are monitored on a continuous basis to assure proper operation on an on-going basis.

During the June 2001 site visit, the EPA Review Team was able to fully reproduce 3M's calculations for a selected period during the permit term. As required, 3M maintains historical data related to

material usage, CEMS monitoring, pollution control equipment operating parameters (e.g., temperature) that can be used to recalculate daily VOC emissions reported in the monitoring reports. The EPA Review Team determined that the daily and rolling annual VOC emissions calculation approach provides adequate monitoring and recordkeeping for practical enforceability of the emissions caps. From the records kept on-site, the EPA Review Team found that an inspector could determine historical and contemporaneous compliance with the 3M flexible permit.

The permit does contain a legal obligation for the source to adhere to the terms and conditions of the limitation. General permit conditions are included in Exhibit A to the air operating permit.

**6.2 Does the permit require the correct type and amount of information (in logs, notices, monitoring data, etc.) to determine the number and duration of any deviations?**

MPCA representatives indicated that they believe that the monitoring, reporting, and recordkeeping requirements specified in the permit and associated information contained in 3M's emissions reports, change notices, and logs were sufficient to determine compliance status and to detect and characterize potential deviations.

The EPA Review Team monitoring assessment determined that the permit requires the correct type of information for conducting and documenting the material balance, calculating total VOC emissions, and for reporting the results and any deviations. The quarterly compliance reports include the necessary details on all deviations for the enforcement agency to fully understand the nature and scope of any deviation.

**6.3 What was the nature and duration of any deviations?**

MPCA and 3M reported 15 breakdowns related to pollution control devices and/or monitoring equipment from January 1, 1992 to December 31, 1998. 3M was required to notify MPCA of these instances, and the agency maintains a log of the reported breakdowns and malfunctions. Several of the breakdowns were associated with control equipment failures or malfunctions. Although several of these breakdowns resulted in increased VOC emissions, MPCA reported that emissions limits were not exceeded at any point for any of the breakdowns. Several of the breakdowns involved paper jams in monitoring equipment. Most breakdowns and malfunctions lasted for a few hours, although a few had durations of 1-2 weeks. In some cases, the longer durations resulted from time involved with obtaining repair parts. Shutdown and breakdown requirements (e.g., response, notification) are established in condition 2.4.1 of the 3M air operating permit.

**6.4 Can all calculations required by the permit, including ROPs, be duplicated? Can anybody understand and apply them consistently?**

MPCA personnel familiar with the permit did not report any problems with understanding the calculations or with being able to duplicate calculations during inspections.

The EPA Review Team monitoring assessment determined that all calculations required by the permit are sufficiently documented and can be duplicated. (See section 5.5 for additional information related to the permit and monitoring replicability.) Once one understands the General Emissions Tracking Approach which follows a general IN - OUT unit operations process emissions summary (i.e., raw materials - process emissions - waste materials), one can easily follow all of the calculations and the required data that go into each calculation.

**6.5 Does the permit clearly set forth the applicable requirements for every change made by the source? If not, what additional information is necessary**

MPCA representatives indicated that they believed that the permit clearly established the applicable requirements for the advance-approved changes identified in the permit. Condition 2.3.6 in the permit states that “if any physical or operational change results in an increase in the emission rate (in kg/hr) to the atmosphere of any pollutant from the affected facility to which a New Source Performance Standard (NSPS) applies, the Permittee must comply with all applicable parts of the NSPS and the General Provisions in 40 CFR 60 Subpart A.”

**6.6 Were there any issues associated with off-permit notices (e.g., adequacy of descriptions)?**

No issues associated with off-permit notices were reported by MPCA or identified by the EPA Review Team.

**6.7 Compare the “ease” of inspecting sources with flexible provisions to that of inspecting similar sources with conventional permits. For the units affected by flexibility provisions, what worked well and what posed difficulties?**

MPCA representatives expressed that there seemed to be no significant difference between inspecting the 3M flexible permit, when compared with inspecting air operating permits for other similar sources. MPCA representatives also reported that they believe that the additional reporting requirements necessary to demonstrate compliance with the facility-wide emissions cap, including the reporting of daily and 365-day rolling annual facility-wide VOC emissions and notification of advance-approved change implementation, provide them with more information about source operations and emissions than they typically receive under conventional air operating permits.

MPCA representatives reported that the number of inspections conducted of the 3M St. Paul Tape Plant during the flexible permit term generally corresponds with the number and frequency of inspections conducted for other comparable sources in the State of Minnesota. Annual compliance inspections were the norm for major sources until about 1996. At this time, MPCA was directed to shift agency resources to the development and issuance of title V permits.

**6.8 Compare the compliance rate (to date) of flexible provisions within the permit with compliance rates of conventional regulatory permits governing the same types of changes at similar sources, and for similar types of changes with the same source under previous conventional permits.**

MPCA representatives indicated that the 3M Tape Plant has a very good compliance history. While MPCA did issue one Notice of Violation (NOV) and two Letters of Warning to the facility during the permit term, agency officials indicated that 3M has demonstrated a commitment complying with regulatory and permit requirements, and to promptly addressing non-compliance issues if and when they arise. See section 1.24 for a discussion of the compliance history of the 3M St. Paul Tape Plant during the flexible permit term. MPCA representatives also reported that they believe that the 3M facility has consistently demonstrated that the source has the capacity to effectively manage and monitor its emissions and changes, and to comply with the flexibility provisions in the air operating permit.

MPCA officials indicated that while such comparisons can be difficult, the compliance rate of the 3M Tape Plant under the flexible permit compares favorably with the compliance rates of other similar sources operating under a conventional air operating permit.

## 7. PERMIT COSTS, BENEFITS & VALUE ADDED

### 7.1 **Did the flexible permits provide you with benefits in terms of: practical enforceability; information flow; environmental/emissions results; economic results; etc.?**

Representatives from MPCA and 3M both reported that they were pleased with the benefits derived from the flexibility provisions in the St. Paul Tape Plant's air operating permit during its five year lifetime. The following benefits were identified by MPCA and 3M.

MPCA representatives identified the following benefits associated with the 3M air operating permit:

- *Lower Allowable Emissions:* The permit created a framework in which VOC emissions were enforceably limited to less than half those previously emitted by this facility. With respect to actual emissions, MPCA indicated that the State of Minnesota does not have a technology requirement (such as BACT) as part of their State minor new source review program. As a result, air pollution sources are in a position to make minor changes and increase their emissions in 39-ton increments on an on-going basis. Under the flexible permit, 3M became subject to an annual VOC emissions cap of 4,283 tons and a daily limit of 30,600 lbs./day (when the REECO oxidizer is not operating). 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 then voluntarily installed controls bringing emissions down to 4,300 tons/year in 1991. The caps, which essentially "lock in" the emissions profile of the source, provided the basis for advance approving operational changes. 3M essentially agreed to forego its ability to increase emissions in the future (without a major permit action) to obtain the operational flexibility it needed. During the permit term, actual annual VOC emissions totaled less than 1,000 tons/year.
- *Agency Backlog Reduction and Resource Targeting:* As indicated earlier, MPCA, at the time of creating the 3M permit, was experiencing substantial permitting action delays for all forms of permitting actions. These delays resulted from a substantial permit action backlog. MPCA also indicated that major permit modifications require approximately 100 hours of effort and that the entire permitting process requires 9 months or more. Both 3M and MPCA indicated that the flexible permit very effectively allowed both organizations to avoid fully delays associated with operational change and permitting actions. From MPCA's standpoint, the flexible permit kept 34 potential permitting actions out of their queue, allowing permit engineer resources to be applied to other permitting actions (thereby lowering their overall backlog) and other environmental and administrative priorities.
- *Resource Savings:* 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 a 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.

- *Enhanced Information Flow:* Overall, 3M and MPCA indicated that the amount and scope of information produced and made available by 3M under the flexible permit exceeded what would be expected under a conventional permit. In particular, 3M and MPCA indicated that more emissions monitoring and more operational change data were made available. MPCA indicated that, under a conventional minor NSR permit action they receive basic application information but this type of action is not subject to public notice and there is little or no reporting on actual emissions or of the actual changes. In this process, MPCA is just looking at potential emissions. Under the flexible permit, MPCA received detailed data on actual emissions, both daily and annual. With respect to operational change, the flexible permit required 3M to notify MPCA at the time of the change and to produce an annual summary of actual operational changes. Because a number of the listed changes likely would not have been permitted and most would not have gone to public notice if 3M and MPCA had addressed them as conventional permitting actions, a much more limited picture of operational change activities would have been available under a conventional permit approach. MPCA also reported that the 3M permit's "sophisticated emissions tracking and compliance determination methodology provides for near "real time" (within 48 hours) documentation of noncompliance. Heightened monitoring allows for more expeditious correction and less environmental damage."<sup>5</sup> MPCA indicated that the monitoring and reporting requirements in the permit have made it straightforward for the agency to conduct inspections, determine compliance, and practicably enforce the permit conditions.
- *Replicability:* MPCA representatives indicated that, based on their experience with the 3M flexible permit, the agency has expanded the use of flexible permitting techniques (e.g., facility-wide emissions limits, advance-approved changes) to other sources, thus multiplying the benefits realized under the 3M flexible permit.

3M representatives identified the following additional benefits associated with the 3M flexible permit:

- *Increased Market Responsiveness:* From 3M's perspective, the flexible permit allowed them 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 market place 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.

---

<sup>5</sup>MPCA. *Synopsis: MPCA Air Quality Division "Flexible" Permit for 3M Bush Street Facility.* 1993.

- *Regulatory Predictability:* 3M indicated that the flexible permit eliminated almost entirely the uncertainty associated with a conventional permit. Under this permit, 3M had received advanced approval for its planned changes and the monitoring, recordkeeping, and reporting were established to cover these situations. 3M found that they no longer had to dwell on whether or not a proposed change triggered permitting and on how to control it as appropriate. It was reasonably straightforward for them to consider a change as included under the permit and list it as a change. It was much easier to call MPCA to discuss the coverage of the advance approval and the “consistent with” provision than to proceed with a permitting action. As a result, 3M listed 34 changes in their reports to MPCA, although they believed that, under a conventional permit, potentially as few as 15 to 20 changes would have actually required a case-by-case permitting action. 3M further stated that the flexible permit eliminated any incentive to push the interpretation of permitting requirements. Alternatively, the flexible permit encouraged 3M staff to communicate with MPCA staff both because they had an “asset to protect” (their flexible permit) and because the consequences of discussions with MPCA were known in advance and unlikely to produce operational delay for the source. 3M indicated that this change in the incentives associated with the flexible permit led to an increase in the informal communication between 3M and MPCA during the permit term.
- *Greater Compliance Assurance:* 3M representatives indicated that the near “real time” monitoring and compliance determination under the flexible permit (i.e., daily emissions calculations generated within 41 hours) provided a framework that would enable the facility to quickly react to situations trending towards noncompliance, thereby reducing liability associated with regulatory or legal action. In practice, the facility operated with a large margin of compliance.
- *Facilitated Pollution Prevention:* With respect to pollution prevention, 3M indicated that the flexible permit, by creating a more operational change friendly environment, lowered the administrative “friction” associated with undertaking iterative operational change needed to increase the resource productivity of its operations. 3M indicated that their operational changes typically produce a range of pollution prevention benefits (fewer emissions per unit of product, less scrap, lower energy requirements) as many changes are geared to improving the reliability and/or material utilization associated with a piece of production equipment.
- *Resource Savings:* 3M representatives indicated that the flexible permit reduced the EHS staff time necessary to conduct regulatory applicability determinations associated with changes made during the permit term. The advance approval conditions in the permit eliminated the need to prepare construction permit applications for 15-20 changes made during the permit term. 3M representatives indicated that these labor savings enabled facility EHS personnel to focus on other environmental priorities at the facility.

**7.2 Did the flexible permit allow you (the source) to better plan your operations (e.g., longer planning horizon)? If so, how? Please give examples of activities that could be planned better with flexible permit, with details as to how typical permits do not allow similar planning.**

3M staff and management indicated that their flexible permit provided them with a high degree of regulatory and, therefore, operational predictability (i.e., the certainty required to manage change). 3M indicated that the viability of operational change activities depends on the timing (e.g., will it be completed in time to meet product marketing requirements) and the cost of the project. 3M Environmental Health and Safety (EHS) staff explained that, under a conventional permit, they often must tell operations personnel making inquiries about the environmental regulatory implications of a proposed change “it depends”. 3M EHS staff indicated this is both considered unhelpful by operations and leaves operations with a high degree of uncertainty about the costs and consequences of the project, increasing the risk profile of the investment. 3M cited the example of the update of the drive mechanism on a coater. This operational change might allow 3M to run the machine faster or apply more coating material to a substrate. This, in turn, could create a (significant) potential or actual emissions increase and might trigger the need for a permit analysis without a “bright line” test for deciding whether a permit amendment is needed.

### **7.3 What P2 activities did you undertake during the term of the flexible permit?**

**7.3.a Which P2 activities, if any, would you have performed even without the flexible permit?**

**7.3.b Did having the flexible permit change the timing or extent of your P2 efforts?**

**7.3.c What emissions reductions were achieved as a result?**

**7.3.d How much environmental benefit do you perceive in P2 provisions?**

**7.3.e Have P2 provisions helped enhance permit flexibility and/or efficiency?**

As previously mentioned, 3M representatives indicated that the flexibility provisions in the permit (i.e., advance-approved changes coupled with emissions limits) created a “low friction” environment for making physical and operational changes that had associated environmental benefits. 3M representatives stated that many of the changes made utilizing the advance approval permit conditions resulted in process improvements that improved environmental performance on a per production unit basis (e.g., less energy, less waste, less emissions). Because these changes were made for business reasons (e.g., improved product yields, reduced manufacturing costs, increased manufacturing versatility), the environmental benefits associated with each change were not separately calculated. The resultant impacts of these changes on VOC emissions is captured in the daily and rolling annual emissions calculations, but they are co-mingled with emissions fluctuations resulting from other factors (e.g., changes in production levels).

3M did indicate, however, that the St. Paul Tape Plant is inherently limited in the amount of air emissions pollution prevention likely to occur. A number of factors contribute to this limit: 1) product specifications are established at the Research and Development facilities, separate from the plant site; 2) the St. Paul Tape plant presently has a solvent-based products focus with limited opportunity to drive solvent emissions down through substitution, limiting capacity to drive solvent emissions below major permitting thresholds; 3) the St. Paul Tape plant is low volume, speciality product manufacturer thus having limited financial incentive to modify processes for pollution prevention. Companies typically focus pollution prevention efforts on high volume products which can provide the greatest environmental and financial benefits.

Section 1.25 addresses 3M’s overall approach to P2, as well as how the St. Paul Tape Plant is impacted by corporate 3M P2 activities.

#### **7.4 How useful is the annual P2 report?**

##### **7.4.a How useful was it to have the source track P2 activities and their results?**

The permit did not require the source to prepare an annual P2 report or to quantify the environmental benefits associated with specific changes implemented using the advance approval permit provisions or with other specific P2 activities. As mentioned under section 7.3, the resulting changes in VOC emissions from P2 activities would, however, be captured in the daily and rolling annual VOC emissions calculations.

Neither MPCA nor 3M expressed interest in adding explicit P2 reporting provisions to future permits. Both indicated that the primary environmental benefit is likely to stem from the P2 incentives created by the advance approval and emissions limit permit provisions, and not necessarily from requirements associated with separate reporting requirements focused on P2 program development or activities.

#### **7.5 Describe the type and amount of emissions reductions made to comply specifically with emissions caps/PALs (e.g., when you added or expanded units, or increased use of units, how did you ensure that emissions would stay below the PAL or emissions cap?).**

**7.5a Did your emissions per unit of production (e.g., lbs/widget or lbs/mmBTU) go down, stay the same or go up during the term of the flexible permit?**

**7.5.b In the absence of a PAL or emissions cap, please explain how you would have accommodated those same expansions or increases in use.**

**C Would emissions have differed?**

**C Would you have been able to net out of NSR/PSD review?**

**C Would you still have triggered Title V permit modification tracks?**

**C Would you not have made the change?**

As discussed in section 1.20, the large compliance margin between the emissions cap and actual facility emissions meant that, in practice, the facility was able to make desired production increases and decreases without jeopardizing compliance with emissions limits. During the permit term, annual VOC emissions fluctuated between a low of 204 tons/year (1993) and a high of 984 tons/year (1994). 1998 emissions were 639 tons/year. Factors contributing to the large compliance margin, as well as a summary of actual facility emissions during the permit term, are discussed in section 1.20.

3M representatives indicated, however, that overall decreases in emissions per unit of production likely resulted from the equipment and process upgrades implemented during the permit term. Specific data on emissions decreases per production unit were not feasible to determine due to the large number of product types and the high frequency of product run changeovers.

#### **7.6 Did the timing and/or design of the PAL influence the timing of additional control equipment and/or pollution prevention? If so, how and why?**

3M representatives reported that the advance approval permit provisions facilitated the implementation of process and equipment upgrades that resulted in per unit pollution prevention gains. 3M representatives indicated that these P2 activities would have been delayed, or in some cases canceled, under a conventional construction permitting process that required case-by-case agency approval and/or permit modifications.

**7.7 Do you believe any of the flexible approaches are transferable to other jurisdictions/sources? If so, which ones? For what sources? Why are these approaches transferable?**

MPCA representatives stated that they believe that the flexible approaches used in the 3M Tape Plant permit are transferable to other sources in Minnesota. Section 1.10 above summarizes MPCA's flexible permitting activities for other sources in the state, including the issuance of "dozens" of minor and synthetic minor source flexible permits. The flexibility approaches most commonly used by MPCA have been emissions caps and advance approvals for defined change categories. Section 1.18 describes MPCA representatives' comments on sources that are appropriate for receiving permits containing flexible permitting techniques.

3M representatives stated that they believe that the flexible permitting techniques utilized in the St. Paul Tape Plant would be generally beneficial and transferable to other 3M facilities in the U.S. Despite the collapse of discussions with EPA and Minnesota related to a Project XL flexible permitting project for 3M's Hutchinson, MN facility (see section 1.10), 3M has recently expressed interest to EPA in developing flexible air operating permits for several other 3M facilities throughout the U.S.

**7.8 Compare a conventional permitting approach to that taken under the flexible permits in terms of:**

**7.8.a Environmental performance, including emissions trends, emissions increases/reductions, emissions gaps between actual and allowable emissions, and other notable environmental results;**

**7.8.b Overall development effort and ongoing maintenance costs (what were/ have been the investments of both the permitting authority and the source?)**

**C Which type of permit has more up-front costs (uses more resources)?**

**C What is the difference in up-front transaction costs?**

**C Which type of permit has fewer implementation costs?**

**C What is the difference in the implementation costs?**

**7.8.c Number of permit actions/modifications required, as well as associated transaction costs or costs avoided (e.g., source reductions in opportunity cost, permitting authority value added for advance notice, of MRR, control devices, etc.)**

See section 7.1 for a summary of the key comparisons between flexible and conventional permits.

## **8. OTHER ISSUES**

### *Future Flexible Permit Development*

**8.1 Do you anticipate any changes in the next version of the flexible permit?**

**8.1.a If so, what changes would you request/make (e.g., additions and subtractions) and why?**

**8.1.b Do you believe the existing regulations already provide for such changes? If so, how? If not, why not?**

Upon reflection of their 5 year flexible permit, 3M representatives expressed a strong interest in including flexibility provisions in future air permits for the facility, such as a continuation of their plant-

wide emissions cap as a PAL and of advance approval provisions expanded to cover certain new units. In discussing options for the facility's title V permitting application (currently under consideration by MPCA), however, 3M management decided not to pursue such provisions due to uncertainty surrounding how the next VOC emissions limit would be defined. 3M was potentially faced with the prospect of its emissions cap being significantly reduced, or "ratcheted down", to somewhere near the level of actual facility emissions during the prior two years. This could mean that the company would have a new annual emissions cap of less than 25% of the current VOC emissions cap level of 4,283 tons/year. 3M management believed that such a "ratcheting down" of the cap, if required, would not accommodate potential needs to increase future facility production levels to respond to changes in market demand.

The expiration of the permit in 1998 meant that the advance approval provisions expired, although the plant-wide emissions limits remain in place. Based on current rule interpretations by MPCA, all non-exempted changes made to emissions points at the 3M facility, including those that involve emissions increases of less than 40 ton/year of VOCs (based on future PTE minus past actual emissions), now necessitate major permit amendments. This determination was documented in a memorandum issued by MPCA on July 17, 1997 titled "Summary of the July 7, 1997 Conference Call Between EPA Region 5, MPCA, and 3M Regarding the 3M Flexible Permit". More specifically, the memorandum states the following.

- If an existing unit triggered NSR, it would be removed from the cap by subtracting the baseline emissions from the cap, the cap stays in place for the remaining equipment, and the existing unit would be limited separately. This requires a major permit amendment....
- New equipment that triggers NSR could be added outside the cap through a major amendment....
- The addition of new units that have a VOC PTE greater than zero and less than 40 (a modification that does not trigger NSR) would also need to go through a major amendment to be covered under the existing cap. Even though under Minnesota rules, the emission increase alone seems to qualify as a minor amendment or perhaps not even need an amendment, in order to make the new unit subject to the cap (and it must be since the facility PTE cannot exceed the cap without going through major NSR), this would require a major amendment - since we are changing the units which are subject to a Title I limit.

Representatives from MPCA and 3M indicated that additional attention will likely be needed to clarify the potential options available for removing the use of flexibility provisions from new permits that replace flexible permits.

During the June 2001 EPA Permit Review, 3M, MPCA, and EPA representatives briefly discussed that if such a ratchet were required, then, if allowed as an alternative, a "clean building" approach might well alleviate the potential business constraints posed by renewal of the existing flexibility provisions.

## **8.2 Do you believe there be any value added by EPA's finalizing guidance in this area? If not, why not? If so, how?**

MPCA representatives indicated that finalization of EPA guidance related to flexible permitting techniques would likely help to reduce the transaction costs associated with developing and issuing

new flexible permits in Minnesota. Agency officials indicated that this is likely to be particularly true for flexible permitting techniques that have not been previously utilized in the State (e.g., clean building technique, PM10 emissions caps).

3M representatives stated that they believe that finalization of EPA guidance on flexible permitting is important for several reasons. First, EPA guidance would likely facilitate development of flexible permits for 3M facilities throughout the U.S. Second, finalization of guidance would provide greater clarity and certainty around EPA's expectations associated with flexible permitting techniques, which could reduce permit development time, particularly related to EPA review of permits and response to EPA comments. Third, finalized guidance could address and communicate learnings from the multiple flexible permitting pilot initiatives that have been implemented across the U.S., making permitting authorities and sources aware of innovative permitting techniques and appropriate safeguards and of EPA's overall support for these approaches.

**8.3 Will you have any flexible permit writing/implementation training needs?**

MPCA representatives indicated that EPA training on the use of flexible permitting techniques could be beneficial for both agency and company personnel. They suggested, however, that hands-on involvement with the development of a flexible permit is one of the most effective ways to learn. Some state environmental agencies, such as MPCA, have significant resource constraints that limit the availability of staff time and travel funds for participating in training activities.

**8.4 Do you have recommendations for web-site materials?**

No specific recommendations for web site materials were provided by MPCA or 3M.

**8.5 What else could EPA do to limit the up-front design costs?**

Aside from issuing finalized EPA guidance related to flexible permitting techniques, no other suggestions were made regarding options for limiting up-front permit design costs.

**8.6 How do you predict your up-front transactions costs would have compared if you had undertaken the same flexible permit for the same source with EPA guidance and the mentioned support structure already in place?**

MPCA representatives indicated that this is difficult to estimate. MPCA officials reported that prior experience with flexible permitting techniques is a major factor leading to reductions in transaction costs. To the extent that permitting authority personnel have become familiar with particular flexibility techniques, and interacted with EPA during review of them, the permit development costs have lessened dramatically. State familiarity with EPA expectations and support of the flexible permitting techniques can make it easier to initially design a permit that addresses EPA concerns and expectations. MPCA representatives indicated that guidance could facilitate this understanding.

**8.7 How much time do you believe must pass before the reduced costs of overseeing the flexible permit would compensate for the higher up-front design cost?**

MPCA representatives indicated that they believe, in general, that flexible permits can save agency staff time over the course of the permit. MPCA representatives indicated that "payback" periods can vary significantly based on the time required for permit development and the frequency and the source's utilization of permit flexibility provisions. They attributed the potential savings to changes

made using advance approval provisions that address the physical and operational changes and associated applicable requirements during permit development, rather than through construction applications and permit amendments. MPCA representatives estimated that approximately 1000 hours of staff time were spent on developing the 3M permit over the course of 26 months (see section 1.15). Although 3M and MPCA considered the up-front administrative costs high, they have estimated these costs were paid back within the first 22 months of the permit term, due to savings associated with avoided case-by-case permit application reviews, consultation, and permit and amendment processing. Subsequent MPCA flexible permitting efforts, particularly for synthetic minor and minor sources, have had shorter “payback” periods. MPCA permit writers attributed this to more streamlined permit development activities that have resulted from increased agency experience with flexible permitting techniques.

### *Source Screening Criteria*

**8.8 What criteria should be used to reject inappropriate flexibility proposals from sources (e.g., relevance of compliance history, P2 commitment, potential for environmental benefit, sustainable compliance over the long term)?**

MPCA representatives identified several criteria that they believe are important for consideration related to the use of flexible permitting techniques. See section 1.18 for a detailed discussion of these criteria.

### *Public Outreach*

**8.9 How can these permits be better communicated to the public (e.g., consistency with air program goals; potential improvements to monitoring, recordkeeping, reporting, etc.)?**

MPCA representatives indicated that significant efforts were made to communicate with the public regarding the approach, goals, and benefits of the 3M flexible permit in conjunction with the development and issuance of the permit in 1993. No additional public communications suggestions or approaches were identified by MPCA during the permit review.

**8.10 What fact sheets would be useful to the permitting authority, source and the public?**

No specific recommendations for fact sheets were provided by MPCA or 3M, although discussions indicated that it would probably be useful for EPA to prepare fact sheets that clearly describe various flexible permitting tools (e.g., clean building technique). These fact sheets could include discussions regarding when various tools are most appropriate, as well as examples of tool design and implementation. The fact sheets could also discuss specific safeguards that may be warranted to ensure practical enforceability and adequate flow of information to the public.

**8.11 When and how should up-front meetings (i.e., before the public comment period) be used to address potential public concerns? How should concerns from those meetings be addressed?**

MPCA representatives indicated that where there is public concern about emissions, often regarding air toxics, there will be public concern about plant modifications and expansions. MPCA representatives indicated that up-front meetings are appropriate in such instances. For example, up-front public meetings are being held as part of the current Andersen Windows permit development under EPA’s XL Project. Meeting summaries and other information from such public meetings are posted on MPCA’s web site.