

**Evaluation of Ohio EPA's
Multi-media, Pollution Prevention (M2P2)
Inspection Pilot Project**



October, 1997

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U.S. EPA provided funding through the Pollution Prevention Incentives for States (PPIS) grant to the Office of Pollution Prevention, Ohio EPA, to evaluate and revise Ohio EPA's multi-media, pollution prevention inspection pilot project.

Jenny Tiell, Deputy Director of Programs, Ohio EPA, asked Districts and Divisions to develop the pilot project.

Kevin Clouse, Division of Emergency and Remedial Response, formally requested the Director's Office to consider multi-media activities.

Jeff Hines, Rod Mehlhop, Steve Skinner, Jeff Steers, and Bob Wysenski, Assistant District Chiefs, made it happen! They coordinated all aspects of their respective Districts activities, including planning, inspections, and follow up with facilities and Ohio EPA staff.

Special thanks to all of the inspectors and team leaders for taking the extra time to try a different approach to traditional environmental compliance inspections.

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Executive Summary

In August, 1995, Ohio EPA began a pilot project to test the feasibility of combining a multi-media focus and pollution prevention in environmental compliance inspections. Using funding from a U.S. EPA Pollution Prevention Incentives for States (PPIS) grant, the Office of Pollution Prevention reviewed compliance and pollution progress of inspected facilities and wrote this report to evaluate the pilot project.

The goals of Ohio EPA's pilot project include determining if M2P2 inspections improve compliance, avoid cross-media transfers, and increase the use of pollution prevention to achieve and maintain compliance. The Ohio EPA's five District Offices and the Office of Pollution Prevention (OPP) coordinated the multi-media, pollution prevention (M2P2) inspection pilot project. Each of the District Offices completed four M2P2 inspections between October, 1995 and September, 1996.

A team of inspectors for each relevant media program and a specialist from the Office of Pollution Prevention conducted compliance inspections using a process based approach and emphasizing pollution prevention options for compliance. Following each M2P2 inspection, the team wrote one letter to the facility summarizing compliance issues covering each program area, and included pollution prevention options for the facility to consider as a means to return to compliance, reduce waste generation, and/or achieve environmental improvement beyond compliance. Inspected facilities were also asked to complete a survey about their experience with the pilot project.

Ohio EPA employees' opinions about M2P2 inspections were mixed and covered a wide range of opinions from definite interest in continuation to negative opinions on usefulness of the inspection approach. Most staff were very willing to offer positive and negative comments, as well as suggestions for improving multi-media, pollution prevention inspections. Facility representative opinions were also mixed; however, 13 of 17 representatives who completed a survey would prefer to see this type of inspection continued at their facilities.

M2P2 inspections require more time from Ohio EPA staff for preparation and coordination; however, M2P2 inspections save time for some facilities because several inspections are completed in one day. M2P2 inspections provided good cross training in other environmental regulations for some Ohio EPA staff. Facility representatives liked being able to discuss all the regulatory requirements at the same time.

In their responses to a May, 1997 survey, facilities indicated M2P2 inspections emphasize Ohio EPA's interest in pollution prevention to facilities and encourage pollution prevention activities and projects. Some facilities have reduced waste generation and are no longer subject to some environmental regulations. Several companies provided case studies of pollution prevention projects and provided quantitative measures of waste reduction; however, only a few of the projects were directly related to compliance and/or pollution prevention information discussed in the M2P2 inspections.

The effect of these M2P2 inspections on environmental regulatory compliance is inconclusive. During and after M2P2 inspections, 12 facilities were not in compliance with environmental regulations. As of July, 1997, three facilities have not returned to compliance and/or new violations have been discovered.

This report provides the following recommendations for revising and improving M2P2 inspections:

- Choose facilities in the middle range of physical size of facility, number of employees, and complexity and number of plant processes.
- Ask inspectors that address each compliance area at the facility and a representative from the Office of Pollution Prevention to participate in the inspection.
- Meet before the inspection to discuss the facility and develop a specific agenda for the inspection.
- Provide informal cross training by and for inspectors throughout the inspection process.
- Consider conducting additional cross training for inspectors similar to training provided in other states.
- Encourage staff to conduct joint inspections with other programs more frequently.
- Encourage staff to discuss pollution prevention in all inspections.
- Consider providing additional pollution prevention training to inspectors.
- Include multi-media activities and pollution prevention in job descriptions and new employee training.
- Include specific language and commitments to M2P2 inspections and other M2P2 activities in administrative planning and Ohio EPA grants, such as the Environmental Performance Partnership Agreement, Ohio EPA's Strategic Management Plan, and Accountability Agreements.
- Develop specific measures for M2P2 inspections, including opinions of facility representatives and inspectors; number of unpermitted waste streams discovered; time to complete different activities; number of pollution prevention referrals; number of referrals from one program to another; compliance rate of facilities determined by follow-up inspections.; and comparisons to traditional inspections, decrease in compliance requirements (e.g., change from large quantity generator to small quantity generator of hazardous waste; change from Title V air permit to non-Title V permit); and changes in waste generation.

The Director's Office stated that formal multi-media activities will continue to be a part of Ohio EPA's work in Federal Fiscal Year 1998 and Federal Fiscal Year 1999. The Director's Office has asked the Assistant District Chiefs and the Office of Pollution Prevention to develop plans for future multi-media activities.

Introduction

In August, 1995, Ohio EPA began planning a pilot project to test the feasibility of combining a multi-media focus and pollution prevention in environmental compliance inspections. The Ohio EPA's five District Offices and the Office of Pollution Prevention (OPP) coordinated the multi-media, pollution prevention (M2P2) inspection pilot project. Each of the District Offices completed four M2P2 inspections.

Using funding from a U.S. EPA Pollution Prevention Incentives for States (PPIS) grant, the Office of Pollution Prevention reviewed compliance and pollution progress of facilities inspected in Federal Fiscal Year (FFY) 1996. OPP reviewed Ohio EPA's pilot project to determine if M2P2 inspections improve compliance, avoid cross-media transfers, and increase the use of pollution prevention to achieve and maintain compliance.

This report describes the M2P2 pilot project, including how the project got started, goals and objectives, and a summary of inspections. We analyze the facility representatives' and Ohio EPA employees' opinions and comments about the project. By looking at the current compliance status of facilities and their pollution prevention activities, we begin to answer questions about M2P2 inspections ability to improve compliance, avoid cross media transfer and increase the use of pollution prevention for compliance. We also make recommendations for revising and improving M2P2 inspections based on comments from all participants.

District Offices also conducted M2P2 inspections from October, 1996 through September, 1997. Districts modified their approach to M2P2 based on their experiences in 1995 and 1996. The OPP plans to summarize the results of Ohio EPA's M2P2 inspections at least once per year. Ohio EPA plans to continue to develop and perform multi-media activities.

Why did Ohio EPA decide to do this pilot project?

When trying to coordinate criminal investigations of environmental activities for the Divisions of Emergency and Remedial Response, Section Manager Kevin Clouse recognized Ohio EPA's need to approach the investigations from a multi-media perspective. He suggested to the Director's Office that Ohio EPA should try to do more Agency work using a multi-media approach.

Ohio EPA's Office of Pollution Prevention develops and implements pollution prevention initiatives that reduce pollutants in Ohio. OPP works with all Ohio EPA Divisions and Districts and approaches all projects from a multi-media perspective. OPP was aware of multi-media, pollution prevention efforts in other state environmental agencies and supported all Ohio EPA's activities that promote a multi-media, pollution prevention perspective, especially in Agency regulatory activities.

Ohio EPA's District Offices had also started some multi-media activities before this pilot project. Many Districts investigated complaints about possible environmental violations using a multi-media approach. The Northeast District Office started a pilot project using multi-media inspections checklists. The Division of Surface Water, the Division of Air Pollution Control, and the Division of Hazardous Waste Management developed a multi-media checklist with 17 questions. Inspectors from the Divisions received training on how to use the checklist. Inspectors voluntarily completed these checklists during their regularly scheduled inspections.

The Southeast District Office had a quality improvement group that developed procedures for handling multi-media complaints. The Southwest District Office had a quality improvement group that looked at all inspections to determine appropriate times for communications between Divisions during the inspection process. The Northwest District Office started a pollution prevention workgroup that is interested in working on multi-media issues.

As Deputy Director for Programs, Jenny Tiell was also interested in a multi-media approach. She works with all regulatory programs at Ohio EPA and understands the many benefits of a multi-media approach to environmental protection. At Jenny Tiell's request, Ohio EPA chose to voluntarily implement the M2P2 inspection pilot project; there were no federal or state requirements that mandated this project.

Project description

In August, 1995, the Director's Office, the Assistant District Chiefs and the Office of Pollution Prevention met to begin planning a pilot project to test the feasibility of combining a multi-media focus and pollution prevention in environmental compliance inspections. The group discussed goals and objectives, M2P2 work in other states, and how Ohio EPA might do M2P2 activities (Ohio EPA, 1995).

Goals and objectives

To provide guidance for the M2P2 pilot project, Ohio EPA developed the following goals in August, 1995.

Goal of M2P2 pilot project: Coordinate, develop and implement a multi-media pollution prevention (M2P2) project to determine the feasibility of conducting multi-media inspections and emphasizing pollution prevention in the effort.

General goal of multi-media inspections: Increase the effectiveness of inspections, both environmentally and administratively.

General goal of prevention-based inspections: Agency interaction with the regulated entity should result in the implementation of pollution prevention options whenever feasible. The

regulated entity should move toward less need for regulation because of prevention-based environmental improvements, and Agency regulatory workload should be less and should avoid cross-media transfers.

Planning and conducting inspections

All District Offices chose to conduct team inspections of four different facilities in their respective Districts. Districts chose to inspect facilities that have compliance requirements for air, water and hazardous waste regulations at a minimum. Some facilities also have compliance requirements for solid waste, storm water, and drinking and ground water. Divisions participating in the inspections included Air Pollution Control, Hazardous Waste Management, Surface Water, Solid and Infectious Waste Management, Drinking and Ground Water, and Emergency and Remedial Response. Local air agencies, local health departments and local pretreatment authorities also participated in some inspections.

Each District formed an inspection team for every facility. Team members included an inspector for each relevant media program and a specialist from the Office of Pollution Prevention. Assistant District Chiefs met with each team to discuss the pilot project and help the team to begin to plan their inspection. In the Southeast District Office the Assistant District Chief also participated in the inspections.

Each team chose a leader to coordinate logistics, the inspection agenda, and correspondence and communication with the facility. Teams met before inspections to discuss the facility's processes, compliance requirements for all media programs, and pollution prevention opportunities.

Teams tried to develop inspection agendas focussed on processes instead of waste generation. Specific agendas were needed to coordinate the activities of several inspectors and to help the inspectors to effectively use the new M2P2 approach.

The Office of Pollution Prevention provided pollution prevention information to facilities and inspectors, and accompanied inspectors on each site visit. The main goals of an inspection are to ensure compliance and to identify violations, but these M2P2 inspections also provided technical assistance to facilities in their pollution prevention efforts. The M2P2 approach also helped inspectors learn to recognize transfers of pollutants from one medium to another (e.g., from water to air), and to recognize possible pollution prevention options for compliance problems.

Following each M2P2 inspection, the team wrote one letter to the facility summarizing compliance issues covering each program area, or one inspection report if no violations were found. The letter also included pollution prevention options for the facility to consider as a means to return to compliance, reduce waste generation, and/or achieve environmental improvement beyond compliance. Inspected facilities were also asked to complete a survey about their experience with the pilot project.

Summary of facilities and inspections

Each District Office conducted four M2P2 inspections in FFY 1996 for a total of 20 inspections. Facility profiles, including location, products manufactured, and number of employees are provided in Table 1. The majority of facilities manufacture goods in SIC codes representing primary metals industries, fabricated metal products, rubber and plastics, and industrial and commercial machinery. Facility size by number of employees ranges from 8 to 5000. Eight companies had less than 400 employees, six had between 500 and 850 employees, and five had more than 1600 employees. One facility, inspected as a result of a complaint investigation, is not included in this report's analysis.

Table 1. Profiles of facilities inspected in Ohio EPA's M2P2 inspection pilot project

Facility name	Location	Product	SIC Code	Sales \$MM	Number of employees
AEP Gavin	Cheshire	electric power generation	4900	NA	387
Bayer Corporation	Hebron	compound plastics	3087	5 - 10	85
Century 21	Youngstown	retail paint and wall covering sales, blend and repackage unused paint	5231	NA	10
Chrysler Dayton Thermal Products	Dayton	automobile air conditioning and heating	3585	100 - 499	1600
Dayco (Anchor Swan)	Bucyrus	extruded rubber and plastic hose (garden, automotive, industrial, hydraulic)	3052 3069 3089	50 - 99	770
Glacier Vandervell	Bellefontaine	copper lead powder, bimetal sleeve bearings and machinery	3568 3399	25 - 49	400
Goodyear Tire and Rubber Company	St. Marys	molded and extruded rubber products	3069 3061	50 - 99	850
Gould Electronics	McConnellsville	electro deposited copper foil	3497 3351	50 - 99	270
Holophane Company Inc	Newark	lighting equipment, glass reflectors, HID lighting fixtures	3229 3648 3641 3221 3645	50 - 99	504
ITT Automotive	Archbold	copper coated steel brazed tubing, electric resistance welded steel tubing	3498 3312	50 - 99	520

Facility name	Location	Product	SIC Code	Sales \$MM	Number of employees
Lancaster Electroplating	Lancaster	hard chrome and electroplating	3471	10 - 25	180
Mead Paper	Chillicothe	fine paper products, carbonless, form board, business papers	2621 2611 2671	over 500	2500
ProTec	Leipsic	galvanized steel	3479	25 - 50	124
Republic Engineered Steels	Canton	specialty steel	3312	over 500	>4000
Roxane Laboratories	Columbus	pharmaceuticals	2834	100 - 499	680
Senco Products	Cincinnati	pneumatic nails and staples	3315 3399 3452	100 - 499	1760
Sterling Foundry	Wellington	gray and ductile iron castings	3321 3322	25 - 49	190
Stolle Corporation	Sidney	appliance panels, auto bumpers, base plates for computer disks	2759 3444 3714	50 - 99	680
Wheeling Pittsburgh Steel	Steubenville	steel	3312	over 500	2810

Source for most of this data:

1996 Ohio Industrial Directory. Harris Selectory, Harris Publishing Company, Twinsburg, Ohio

Compliance-related communication is completed and the Agency plans no further action at 15 facilities; compliance issues are pending at the others. Some of the pending cases have only minor issues. A tabular presentation of the M2P2 inspections and results is found in Table 2.

Table 2. Summary of M2P2 inspections and facility compliance

Facility Name	Facility Contact	Facility Contact Phone	Date of Inspection	OPP Rcv'd Surv?	District	Ohio EPA Team Leader	Date of Ohio EPA Correspondence With Facility	OPP Contact	Notes
Sterling Foundry	Dan Curtis	(216) 647-3431	10/24/95	yes	NEDO	John Curtin	11/29/95	Andrea Futrell	Numerous violations discovered. Agency action under review.
Glacier Vandervell	Ben Ling	(513) 592-5010	11/15/95	yes	SWDO	Mark Hines	12/14/95	Jeff Lewis	No violations discovered. No further Agency actions planned.
Dayco	Leo Fowler	(419) 562-1011	12/15/95 and 1/11/96	yes	NWDO	Don North	1/17/96	Jeff Lewis	One hazardous waste violation discovered. RTC letter sent 3/15/96 to Dayco. No further Agency actions planned.
Roxane Labs	Mark Slaiman	(614) 276-4000 ext. 2320	1/4/96	yes	CDO	John Paulian	1/29/96	Andrea Futrell	No violations discovered on M2P2 visit. DHWM inspection on 2/8/96; several violations discovered. NOV sent 2/26/96. Roxane sent letter addressing violations 3/14/96. DHWM sent RTC letter 3/21/96. No further Agency actions planned.
Stolle Products	Robert Ostendorf/ Marc Kogge	(513) 492-1111	2/15/96	yes	SWDO	Matt Walbridge	3/12/96	Jeff Lewis	No violations discovered. No further Agency actions planned.
Holophane	Steve Burns / Louise Decker	(614) 345-9631	2/27/96	yes	CDO	John Paulian	3/20/96	Andrea Futrell	No violations discovered. No further Agency actions planned.

Facility Name	Facility Contact	Facility Contact Phone	Date of Inspection	OPP Rcv'd Surv?	District	Ohio EPA Team Leader	Date of Ohio EPA Correspondence With Facility	OPP Contact	Notes
ITT	Jamin Butel	(419) 445-8010	3/5/96	yes	NWDO	Mark Barber	3/22/96	Jeff Lewis	Some violations discovered which have been remedied by ITT. No further Agency actions planned.
Mead	Joe Lawson	(614) 772-3111	3/11/96 and 3/12/96	yes	SEDO	Dan Bergert	4/10/96	Andrea Futrell	No violations discovered. P2 facility planning assistance may be required. No further Agency actions planned.
Century 21	Emil Bertolini	(800) 852-9200	3/23/96	no (see notes)	NEDO	John Palmer	4/12/96	Jeff Lewis	DAPC violations have been remedied, but decision pending on permit status of paint blending (this matter was still pending as of March '97). DHWM did not cite any violations, but has several unresolved concerns regarding waste management at the site. DSW will issue Century 21 a storm water permit. DSIWM notified Century 21 of a violation but will pursue this at a later date on a revisit with the Mahoning County Health Department.
AEP Gavin	Don Anderson	(614) 367-7331	4/9/96	yes	SEDO	Ron Hancher	5/29/96	Jeff Lewis	Hazardous waste violation discovered, then remedied. No further Agency actions planned.
Senco Products	Bob Schmidt	(513) 388-2000	6/4/96	no (see notes)	SWDO	Bruce Smith	8/27/96	Jeff Lewis	Several violations discovered. No air violations discovered. DHWM needs to complete RTC inspection. DSW issues still under review.

Facility Name	Facility Contact	Facility Contact Phone	Date of Inspection	OPP Rcv'd Surv?	District	Ohio EPA Team Leader	Date of Ohio EPA Correspondence With Facility	OPP Contact	Notes
Goodyear	Ron Seibert	(419) 394-0452	6/18/96	yes	NWDO	Shara Soltis	6/28/96	Andrea Futrell	Hazardous waste violations discovered. RTC letter sent 12/11/96. No further Agency actions planned.
Wheeling-Pittsburgh Steel	Tom Bottorf	(614) 283-5542	6/18/96 and 6/19/96	yes	SEDO	Ralph Witte	7/31/96	Jeff Lewis	Numerous violations discovered. An ongoing strike which began in October 1996 by organized labor at the facility has ceased production. Agency action under review.
Republic Engineered Steels	Eric Howland	(330) 438-5416	6/25/96 and 6/26/96	yes	NEDO	Bryan Schmucker	7/25/96	Andrea Futrell	No violations discovered. Additional P2 technical assistance requested and completed. No further Agency actions planned.
Bayer	W. Buck Steorts	(614) 929-2015	7/9/96	yes	CDO	Brad Campbell	8/1/96	Andrea Futrell	Two hazardous waste violations discovered. Bayer has adequately demonstrated that it has eliminated the violations. No further Agency actions planned.
Lancaster Electroplating	Steven O'Toole	(614) 653-5025	7/30/96	yes	CDO	Harry Kallipollitis	9/4/96	Jeff Lewis	Several violations discovered. No hazardous waste violations and no surface water violations were discovered. Presently in compliance with all applicable air regulations. No further Agency actions planned.

Facility Name	Facility Contact	Facility Contact Phone	Date of Inspection	OPP Rcv'd Surv?	District	Ohio EPA Team Leader	Date of Ohio EPA Correspondence With Facility	OPP Contact	Notes
Allied Wrecking	John Ramun	(330) 744-0808	8/9/96	no (see notes)	NEDO	John Kwolek	(no letter was sent per this inspection)	none	Result of complaint investigation. Agency action under review regarding DSW discharge concerns.
Gould Electronics	Wally Olszewski	(614) 962-5252	8/20/96	yes	SEDO	Vicky German	9/23/96	Jeff Lewis	No violations discovered. No further Agency actions planned.
ProTec	Charles Hall	(419) 943-1287	8/27/96	yes	NWDO	Colleen Weaver	9/12/96	Andrea Futrell	Inspection letter was prepared. NOV letter sent. Return to compliance letter sent. No further Agency actions planned.
Acustar/Chrysler	Douglas Orf	(513) 224-2467	10/7/96 and 10/8/96	yes	SWDO	Chris Budich	10/28/96	Andrea Futrell	Inspection letter was prepared. No violations discovered. No further Agency actions planned. Accustar still working with City of Dayton to resolve issues of wastewater discharge.

CDO - Central District Office
 DAPC - Division of Air Pollution Control
 DHWM - Division of Hazardous Waste Management
 DSIWM - Division of Solid and Infectious Waste Management
 DSW - Division of Surface Water

NEDO - Northeast District Office
NOV - Notice of Violation
NWDO - Northwest District Office
RTC - Return to Compliance
SEDO - Southeast District Office
SWDO - Southwest District Office

Analysis of 1996 M2P2 inspections

Ohio EPA analyzed the 1996 M2P2 inspections in several ways. Ohio EPA surveyed facility representatives and Ohio EPA employees to ask their opinions about the inspections. We also looked at the inspections' effect on environmental regulatory compliance and on implementation of pollution prevention activities.

What do facility representatives think about M2P2 inspections?

Immediately after inspections, Ohio EPA surveyed representatives from the inspected facilities to evaluate the project's quality and effectiveness and to ask for comments. Table 3 lists the survey questions and responses from 17 facility representatives. Three facilities did not respond to the survey.

Of the 17 facilities completing the survey evaluations, thirteen facilities would prefer to see this type of inspection continued at their facilities. Twelve facilities indicated this type of inspection should be used more at other facilities in Ohio. Sixteen of the facilities have or were intending to use pollution prevention to address their compliance needs identified in the multi-media inspections. Fifteen facilities included comments written by the facility's contact person. Two favorably mentioned the efficiency of the single-day "multi-media" approach as opposed to many inspections on different days. However, one facility representative said the inspected facility was too large and complex to benefit from such an approach, and in order to better maintain compliance, would prefer more in-depth, media-specific inspections in the future.

Most facilities indicated it was desirable to deal with all environmental compliance issues during a single inspection rather than dealing with the issues on different days. Also, most facilities indicated it was desirable to communicate with a group of inspectors rather than a single inspector, and they indicated a team approach was effective in determining their compliance needs. However, as noted previously, some larger facilities indicated the multi-media team approach was inappropriate due to the size and complexity of their facilities. Also, some smaller facilities indicated they may feel "intimidated" by a team of inspectors when only one facility spokesperson is available to escort the inspectors.

Table 3. Results of survey of facility representatives

Based on 17 facility surveys received by OPP. Surveys were completed after facilities received inspection correspondence, two to four weeks after the M2P2 inspections. Average and range scores in Questions 3 through 10 were compiled from a 1 (less desirable) to a 5 (more desirable) response scale.

Question #1: Did the inspectors state their purpose clearly at the beginning of the inspection?		
	YES	NO
	17	0

Question #2: How many environmental inspections does your facility normally have each year?		
TOTAL	AVG	RANGE
53*	3.3	0-10

Question #3: Did you find it more or less desirable to have a team of inspectors on one day rather than individual inspectors on different days?		
TOTAL	AVG	RANGE
67	3.9	2-5

* One facility left this question blank on the survey.

Question #4: Did you find it more or less desirable to prepare information for all the inspectors together rather than individual inspectors at different times?		
TOTAL	AVG	RANGE
67	3.9	2-5

Question #5: Was it more or less desirable to deal with all issues during a single inspection rather than dealing with the issues on different days?		
TOTAL	AVG	RANGE
66	3.9	2-5

Question #6: Did you find it more or less desirable to communicate with a group of inspectors rather than with a single inspector?		
TOTAL	AVG	RANGE

Question #6: Did you find it more or less desirable to communicate with a group of inspectors rather than with a single inspector?		
61	3.6	2-5

Table 3. Results of survey of facility representatives (continued)

Question #7: Do you believe a team approach was more or less effective in determining your compliance needs and possible solutions?		
TOTAL	AVG	RANGE
61	3.6	1-5

Question #8: Do you believe the inspectors were more or less helpful as a group than individual inspectors on different days?		
TOTAL	AVG	RANGE
62	3.6	2-5

Question #9: Do you believe that having a group of inspectors in your business was more or less desirable, with respect to safety, during the inspection?		
TOTAL	AVG	RANGE
57	3.4	2-5

Question #10: During the inspection, were you comfortable with the ratio of inspectors to facility personnel?		
TOTAL	AVG	RANGE
64	3.8	2-5

Question #11: Did the inspectors address pollution prevention as an overall program at your facility?			
	YES	NO	N/A
	15	2	0

Question #12: Did they address pollution prevention as an option for each or most of your regulated processes?			
	YES	NO	N/A
	15	1	1

Question #13: Have you or do you intend to use pollution prevention to address your compliance needs that were identified in the inspection?			
	YES	NO	N/A
	16	0	1

Table 3. Results of survey of facility representatives (continued)

Question #14: Did you find the inspectors to be professional and courteous?			
	YES	NO	N/A
	17	0	0

Question #15: Did you feel the inspectors were knowledgeable and adequately prepared or trained to answer your questions?			
	YES	NO	N/A
	17	0	0

Question #16: Following the inspection, did you receive timely written correspondence from Ohio EPA regarding your compliance status?			
	YES	NO	N/A
	15	1	1

Question #17: Did this correspondence adequately clarify your compliance status?			
	YES	NO	N/A
	14	1	2

Question #18: Would you prefer to see this type of inspection continued at your facility?			
	YES	NO	N/A
	13	4	0

Question #19: Should this type of inspection be used more at other facilities in Ohio?			
	YES	NO	N/A
	12	2	2

Table 3. Results of survey of facility representatives (continued)

<i>General Comments</i>
Fifteen of the 17 surveys received included comments written by the facility's contact person.
Two favorably mentioned the efficiency of the single day "multi-media" approach as opposed to many inspections on different days.
One company representative said that the inspected facility was too large and complex to benefit from such an approach, and in order to better maintain compliance, would prefer more in-depth, media-specific inspections in the future.
One facility representative was unaccustomed to so many inspectors at once, but felt that future inspections would go more smoothly.
One representative said that each member of the team should confirm any necessary follow-up meetings at the time of the initial M2P2 inspection.
One commentator stated "inspectors should prepare a single response, not individual response for overlapping issues."
One commentator stated "the "group" wanted to split up and do their own thing which caused some problems as to who was where."
Two commentators expressed surprise at the nature of citations in correspondence received after the inspection.
One praised the mutually agreed-upon agenda that existed prior to the inspection. Two appreciated the constructive, educational element of the inspections, and three were very pleased and look forward to similar inspections in the future.

<i>Some of the comments from individual facilities (each paragraph is a separate facility's comments):</i>
"This type of inspection is well suited for a small plant with limited environmental staff like ours. Often, small plants have environmental personnel with multiple job responsibilities. Such is the case here at Bayer-Hebron. It is much easier for me to schedule and prepare for a single audit than it is to prepare for several audits at

Table 3. Results of survey of facility representatives (continued)

different times. I believe that a positive synergy occurs with multiple auditors present. The collective ideas and experience of an audit team have a great deal of value for me because of the range of compliance issues I am responsible for. I believe it also enhances the consistency of regulation interpretation."

"Preparation for the multi-media was more extensive than if the inspectors conducted individual inspections during the year. I feel more attention and awareness by other plant personnel was one of the benefits of this program. I also feel that inspectors and plant personnel could see how many of the environmental programs are interrelated and overlap. As an example, waste streams from air scrubbers feed the waste stream covered by the NPDES permit. This type of interaction has not been discussed during past inspections. Pollution prevention - the EPA has been made aware of efforts Gould has made since 1989. No inspector has evaluated the program in the past. Overall, I feel this is an excellent program that has many benefits."

With regard to Question 9 concerning this model being better for safety, "provided that inspectors remain within group and do not disperse to areas of particular interest."

"The pollution prevention based multi-media program was well received by our company. We appreciate the constructive suggestions and will strive to continue improving our plant operations."

"The most important benefit to the multi-media team approach inspection from Roxane Laboratories' perspective is the time element. It is extremely efficient to spend an entire day with a group of inspectors."

"The major problem with this type of inspection at our facility is the fact that there is only one of me and four of them. It was difficult to address each inspector's concerns. I do feel, however, that the next visit will go better now that I know what to expect."

"Stolle Products is very pleased with this new inspection program and looks forward to future multi-media pollution prevention inspections."

"I was extremely satisfied with the inspection and the level of professionalism shown to me and my staff. I appreciate the "educational" theme as opposed to an "enforcement" theme."

Table 3. Results of survey of facility representatives (continued)

"First of all, let me say that in terms of efficiency and demands on company time, a multimedia approach makes sense. It's much "easier" to deal with than separate inspections. However, due to the size and complexity of Mead operations, I don't feel the 2 day multi-media approach is appropriate. Frankly, the quality of the inspection was compromised due to time demands. This was particularly true on the air and hazardous waste side. Perhaps it would make sense (in Mead's instance) to inspect single medias but allow Agency representative(s) from other functional areas to observe and/or participate. Large groups can present safety or logistics problems but certainly cross training opportunities are manageable. Again, annual all encompassing inspections are efficient and in many ways were easier to deal with, in our case. But in the interest of candor, I personally feel the Agency can better ensure compliance by doing more in-depth, media specific inspections."

"It was difficult to talk to (5) people at one time in the noisy plant environment. Sometimes adequate space was not possible for safety reasons when showing or describing an operation--did not want inspectors in the aisle way. I believe that most plants have the same concerns that I described."

"The multi-media inspection team conducted themselves in a very professional manner. They provided valuable insights in hazardous waste handling, waste minimization, and air permitting requirements."

What do Ohio EPA employees think about M2P2 inspections?

Ohio EPA employees opinions about M2P2 inspections were mixed, ranging from definite interest in continuation to negative opinions of their usefulness. Most staff were very willing to offer comments and suggestions for improving M2P2 inspections. The following comments from the Southeast District Office employees provide an overview of these opinions.

Southeast District Office comments

Each SEDO inspector was asked to complete a questionnaire concerning their M2P2 inspection. Table 4, "Summary of SEDO M2P2 inspector questionnaire results," summarizes their comments.

A group consisting of team leaders from the four SEDO inspection teams, three OPP representatives and the SEDO Assistant District Chief reviewed the facility evaluation summary and the inspector questionnaire summary. Based on these reviews and their experience with these inspections, this group developed the following advantages and disadvantages of the M2P2 inspections.

Main advantages

- Multi-media focus
- Cross training
- Possible pollution prevention assistance to facility
- Can promote positive relationship between company and Ohio EPA.
- Less total company person-hours devoted to inspections
- Pollution prevention communication and integration with staff

Main disadvantages

- More total Ohio EPA person-hours
- Large number of inspectors at some inspections, contributing to awkwardness, communication, coordination and transportation problems
- Inspection not as detailed
- Advance notice usually must be given

The SEDO group also had recommendations for improving M2P2 inspections. These are included in the last section of this report under "Recommendations for revising and improving M2P2 inspections."

Table 4. Summary of SEDO M2P2 inspector questionnaire results

The questionnaire was given to all 25 inspectors involved in one of the four pilot multi-media team inspections in the Southeast district during FFY 96. Inspectors represented all six district program areas, OPP, a Local Air Agency and a Local Health Department. Twenty-four inspectors returned the questionnaire. The following is a summary of the questionnaire results:

1) Did the M2P2 inspection meet your program needs as an inspector?

Yes	14	No	7	Blank	3
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2) Did the M2P2 inspection provide a useful cross-training tool for you?

Yes	19	No	3	Blank	2
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3) Did the M2P2 inspection encourage pollution prevention?

Yes	18	No	5	Blank	1
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4) Do you think the M2P2 inspection provided you with an adequate overview of the companies environmental compliance?

Yes	18	No	5	Blank	1
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5) Was the M2P2 inspection process an efficient use of your time?

Yes	7	No	15	Blank	2
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If not, how could it be improved to make it more efficient?

<p>The most often mentioned efficiency improvement suggestions were:</p> <ul style="list-style-type: none"> ● choose smaller facilities ● reduce number of inspectors to two or three (less media) ● reduce time spent at pre-inspection planning meetings ● select facilities with limited P2 activities in the past

6) Please list the three most important advantages of your M2P2 inspection. The most often mentioned advantages were:

<ul style="list-style-type: none"> ● cross training to staff ● multi-media focus to inspection, violations and recommendations ● possible P2 assistance to facility ● fostered a positive cooperative spirit with company

Table 4. Summary of SEDO M2P2 inspector questionnaire results (continued)

7) Please list the three most important disadvantages of your M2P2 inspection. The most often mentioned disadvantages were:

- time: more man-hours spent than for individual inspections
- large number of inspectors can cause awkwardness, communication and coordination problems
- advance notice given to company
- inspection not as thorough as individual inspections

8) Should M2P2 inspections be utilized in the future?

Yes	19	No	4	Maybe	1
-----	----	----	---	-------	---

- a) **If not, why?** Not efficient, not a true picture of compliance, takes too long, too many people.
- b) **If so how many per district per year?** Answers ranged from as needed to 1 per year to 12 per year.
- c) **If so how many per person per year?** Answers ranged from one to four per year.
- d) **If so how should the entities be selected?**
 - randomly
 - select small or medium sized entities
 - select places with cross media or multi-media issues
 - use judgement of inspectors
 - select entities with limited P2 in past
 - select entities with compliance problems
 - ask for suggestions from staff and managers
 - do not use a quota-type system

Table 4. Summary of SEDO M2P2 inspector questionnaire results (continued)

9) Final comments or suggestions?

- excellent training
- continue and increase the number
- pick facilities with compliance problems
- M2P2 should make their own inspections
- takes to long at large facilities
- inspection team needs to pre-meet prior to any contact with company
- good means to become familiar with whole facility and do inspection as well
- process can be informal (i.e. inspectors just get together)
- good learning experience
- limit team size
- address inspection detail
- increase staff training for M2P2 efforts
- develop specific M2P2 goals
- reduce pre-meetings
- one on one cross training is better
- give less advanced notice
- pick small less complicated facilities
- more media specific regulatory training
- more P2 training
- use only two or three divisions
- good idea

OPP compilation of Ohio EPA employee opinions

From August, 1995 to May, 1996, OPP compiled opinions from several Ohio EPA employees participating in the M2P2 project. These representatives included inspectors, team leaders and managers. Specific comments are listed in Table 5, "Partial summary of Ohio EPA employee opinions about M2P2 inspections, May 24, 1996." These opinions are similar to the SEDO employees opinions.

Table 5. Partial summary of Ohio EPA employee opinions about M2P2 inspections, May 24, 1996

These comments are a compilation of some of the comments from Agency employees recorded by OPP during pre-meetings, inspections, post-meetings, and the DHWM Retreat. Comments have not yet been solicited from all staff participating in the M2P2 pilot project. Also, please note that most staff have been very willing to offer positive and negative comments, as well as suggestions for improving multi-media, pollution prevention inspections.

Negative comments

- Resource intensive, coordination and cooperation are not cheap
- Potential for inefficient resource utilization, stand around time
- Facility may have difficulty addressing several inspectors concurrently
- Facility may perceive that Agency is throwing everything at them, impression of SWAT team by facility
- Because the inspections are resource intensive and resource might not be utilized efficiently, not as many facilities receive inspection or compliance assistance
- Surveys completed by facilities don't reflect true facility opinions. Facilities will fill out survey to please Ohio EPA
- Some staff stood around waiting while one inspector covered one area in detail
- Follow up inspection (single medium) found additional violations (mostly paperwork)
- Not enough opportunity for cross training
- Fast pace of inspection did not allow for good cross training opportunities
- Goals or methods to facilitate cross-training were not established before the inspection
- Too violation oriented
- Communication at the facility with a large group was difficult, too noisy
- Pre-inspection notice to facility is too long
- Time to draft and send out notice of violation letter was too long
- Require increased time by inspectors to conduct the inspections and coordinate schedules (including time spent in pre-meetings, post meetings, and follow-up meetings)
- Not able to consult in-depth with facility about environmental regulatory issues
- Quality of inspection was compromised

Table 5. Partial summary of Ohio EPA employee opinions about M2P2 inspections, May 24, 1996 (continued)

<p>Positive comments</p> <ul style="list-style-type: none"> ● Improved coordination/cooperation among Divisions ● Agency obtains big picture overview of facility, i.e. increased awareness of facility's overall compliance status/problems ● Agency and facility both review pollution prevention as portion of potential solution(s) ● Inspectors like learning more about pollution prevention opportunities ● Agency can provide better direction/recommendations to facility, because the problem(s) is better defined, better solutions can be developed, or at least better prioritization of problems to be addressed with limited facility resources ● The facility will gain a recognition for the need for overall environmental planning including pollution prevention and sound waste management/control ● Better coordinated enforcement response ● Like cross training opportunity ● Liked opportunity to learn more about and work directly with other Ohio EPA regulatory programs (local air agency/pretreatment authority/county health department perspective) ● M2P2 inspection helped to identify all waste streams ● Liked M2P2 approach ● Inspectors helped each other with single medium part of inspection, e.g. reviewing paperwork ● Opportunity to interact with different Divisions was the best part ● CDO modified checklists could be used for all single media inspections ● The program has provided an outstanding forum for interdivisional cooperation and for individual staff "cross-training" ● The program holds great promise for facilities who are in substantial compliance, but want to go that extra yard for "green" reasons, good PR, loss control, PP, economic reality, etc. ● "It was fun!"
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<p style="text-align: center;">Suggestions for improvements</p> <ul style="list-style-type: none"> ● Increase training for inspectors ● Take fewer inspectors on M2P2 inspections ● M2P2 inspections could be more effective at smaller facilities ● Need to clearly define the role of each inspector ● Might do M2P2 inspection in year one at a facility, then do single media inspections in subsequent years, then return to M2P2 approach after 2 or 3 years.

Table 5. Partial summary of Ohio EPA employee opinions about M2P2 inspections, May 24, 1996 (continued)

- Might conduct facility tour with several inspectors, the return for single medium inspections at a later time
- Possibly use M2P2 for facilities that have not been inspected before
- Improve cross training benefits
- Management support and direction needed
- "Busload" approach doomed to failure - get team size down to 2 or 3 people
- Every program should collect and record process data
- Modify greatly according to environmental improvement goal
- "... we ought to be able to sort through without a whole lot of trouble what was good and what was not good about the inspections, especially since a variety of approaches was used to conduct them. The result should be a better M2P2 inspection."
- Inspectors need to volunteer to help each other out during the inspection
- Determine how to prioritize violations needing action by facility when numerous violations are identified
- Inspections can be unannounced
- Smaller industry types, such as dry cleaners, could be more efficiently inspected via an M2P2 approach because inspectors could become well enough versed in air, waste water and hazardous waste issues without being overwhelmed
- "Super" or at least "semi-super" inspectors are a viable alternative in today's Agency. An individual or pair of well-rounded inspectors should be able to conduct a moderate investigation of multiple program compliance status----the industry we inspect often have only one person responsible for ensuring compliance with multiple programs.
- "... the greatest hope for the program lies in developing "super inspectors," one person or a team of two at most who can go in to a facility and do a full blown M2P2 inspection. Consultants have to do this all the time... they not only have to know all of our rules, but also ODH, OSHA, DOT, FAA, PUCO, local authorities, etc. Why should we hold our people to a lower standard?"
- Individuals/pairs of inspectors could obtain particular industry type expertise/specialization over time hence be able to identify P2 opportunities more readily.
- Need for better determining what facilities (size, type, compliance history) are more appropriate for M2P2 efforts
- Consider selecting team members based on experience and interest in multi-media and in pollution prevention
- Need to identify more opportunities to "hook" pollution prevention with compliance, permitting issues

Effect of M2P2 inspections on environmental regulatory compliance

Assistant District Chiefs, teams leaders, and inspectors checked the current (July, 1997) compliance status of M2P2 facilities. They reviewed the facilities compliance with regulations and permits for air pollution, water pollution (including storm water), hazardous waste, solid waste, and drinking and groundwater. Central Office contacts reviewed the facilities compliance with regulations for Toxic Release Inventory reporting, Spill Prevention Control and Countermeasures plans, and polychlorinated biphenyls (PCBs), and Community Right to Know reporting. The facilities compliance status is current to July, 1997, and/or to the date of the last inspection for each set of regulations (note this date has a wide variation from July, 1997 to 1983).

During and after M2P2 inspections, 12 facilities were not in compliance with environmental regulations. As of July, 1997, three facilities have not returned to compliance and/or new violations have been discovered. One facility has a solid waste landfill that requires closure; one facility had a lengthy workers' strike and compliance issues were not resolved; and one facility installed new air emission units after the M2P2 inspection and did not submit permits to install before installation.

The effect of M2P2 inspections on environmental regulatory compliance is inconclusive. Some inspectors and some facility representatives thought the M2P2 inspection format was not as thorough as a traditional single medium inspection. If this perception is correct, some compliance violations might not have been cited. When inspectors determined facility compliance in July, 1997, they used whatever information was readily available. Facilities were not re-inspected to determine their current compliance status, although some have been inspected after their initial M2P2 inspection. Some Districts chose facilities that the Assistant District Chiefs thought would probably be in compliance to reduce the complexity of trying a new inspection approach.

Some inspectors thought the M2P2 inspections improved their understanding of other regulatory programs and that this knowledge might allow them to assist facilities in overall environmental compliance in the future. This knowledge might also allow the inspectors to make better referrals to other programs in the future. The facility representatives thought they had a better understanding of their own facility's overall environmental compliance, although this might not affect their compliance status. For an overview of facility representatives opinions on the compliance benefits of pollution prevention, refer to the section, "Compliance benefits of pollution prevention."

May, 1997 pollution prevention survey of facility representatives

The Office of Pollution Prevention surveyed 17 facilities in May, 1997 about the facilities' environmental compliance and pollution prevention activities after M2P2 inspections were

completed. Facilities were inspected from 8 to 19 months before they received the survey. Survey questions are listed in Table 6. Sixteen of the seventeen facilities responded to the survey.

From facility responses to the survey, the Office of Pollution Prevention was trying to measure compliance activity, pollution prevention activity, and actual pollution reduction at each facility.

**Table 6. Evaluation of Ohio EPA's M2P2 Pilot Project
Questions for participating companies, May, 1997**

Ohio EPA's definition of pollution prevention is: the use of source reduction techniques to reduce risk to public health, safety, welfare and the environment and, as a second preference, the use of environmentally sound recycling to achieve the same goals. Pollution prevention avoids cross-media transfers of waste and/or pollutants and is multi-media in scope. It addresses all types of waste and environmental releases to the air, water and land.

Source reduction means: any effort to reduce, at the source, the quantity of waste generated, toxic chemical use, or any release into the environment. Source reduction measures include, but are not limited to, process modifications, feedstock purity, good operating and management practices, increases in the efficiency of machinery, and recycling within a waste generating or other production process.

Please refer to these definitions when you are answering the following questions.

- 1)** What pollution prevention projects has your company implemented? Please concentrate on projects and results of the past two years. If any of the pollution prevention projects were implemented because of suggestions made by Ohio EPA staff during or after your M2P2 inspection, or because of the general emphasis on pollution prevention, note this in your description.
- 2)** Over the past two years, have you experienced any barriers or obstacles to implementing pollution prevention projects? Briefly explain your answer.
- 3)** Does your company track the progress of each pollution prevention project? What types of data and/or measurements does your company use to document pollution prevention progress? Please provide any quantitative data you have about your pollution prevention projects, or about your companies overall environmental progress. Please concentrate on projects and result of the past two years.

Table 6. Evaluation of Ohio EPA's M2P2 Pilot Project
Questions for participating companies, May, 1997 (continued)

- 4) What benefits has your company realized from implementing pollution prevention? (Some examples of benefits include, but are not limited to, reduced operating costs, reduced compliance costs, improved worker safety, increased productivity, reduced exposure to future liability, improved company image.)
- 5) Did you or someone at your company contact Ohio EPA's Office of Pollution Prevention or another organization for pollution prevention information and/or assistance after your M2P2 inspection? Briefly describe this contact and outcome.
- 6) If violations were noted during the inspection, were you able to correct the violations using: source reduction, recycling, treatment, disposal, cross-media transfer, or some other mechanism? Briefly explain your answer, including the violation and waste type.
- 7) Did this type of inspection heighten your awareness about using pollution prevention to help your company with environmental compliance? If yes, briefly explain how.

Specific pollution prevention projects

The survey asked facilities about pollution prevention projects they had implemented in the last two years. Many facilities had active pollution prevention programs and/or projects before their M2P2 inspections. However, a few projects were implemented as a result of the inspections and several companies thought the inspections pollution prevention emphasis helped to stimulate their pollution prevention programs. Some facilities have not had enough time after the inspections and before completing the survey to research, approve and implement pollution prevention projects. Also, note that activities listed here might not represent all pollution prevention activities at a facility.

AEP, Gavin

AEP has installed baffles in the sewage treatment plant to trap solids. This also protects sand filters and reduces the number of times filters must be cleaned. Solid waste generation has decreased from 80 tons/year in 1995 to 20 tons per year in 1996. AEP estimates 1997 clean outs will generate only 5 tons.

AEP has eliminated 20 tons per year of chlorine for treating cooling tower water, switching to a liquid biocide. AEP worked with Mobil to reduce oil inventories stored on site, reducing their potential for a spill. AEP works with Galco Industries, the Gallia County adult workshop, to recycle cardboard, paper and aluminum cans.

AEP has minimized hazardous waste generation by having better inventory control, especially in buying paint. This program has helped AEP Gavin to stay at the small quantity generator level for hazardous waste for the past year.

Bayer Corporation, Newark

Bayer conducted an optimization program to regulate the face velocities at particulate pick up points in ventilation equipment to prevent unnecessary loss of raw materials. They also redesigned the particulate collection system to segregate and capture the two largest contributors to this waste stream. In new process lines, in-line particulate filters capture particulates and return them to the process.

Bayer also modified their wastewater pretreatment system to reuse 50% of the water intake.

Chrysler Dayton Thermal Products

Chrysler Dayton Thermal Products eliminated a chlorofluorocarbon, Freon 113, parts degreaser and replaced it with a vacuum deoiling process that does not employ chemicals for removing oil. The plant also eliminated a 1,1,1-trichloroethane degreaser and replaced it with an aqueous degreaser. Dayton Thermal Products replace solvent based maintenance paints with water based paints. These efforts eliminated the air emissions from these sources, the TRI emissions, and also eliminated the hazardous wastes associated with these operations.

Chrysler tracks the progress of pollution prevention projects primarily through the results of the TRI report. From 1994 to 1996, Dayton Thermal Products reduced TRI emissions by 74.4%, from 271,796 pounds in 1994 to 69,632 pounds in 1996.

Dayco, Bucyrus

Dayco has eliminated the use of cyclohexanone in one phase of plastic hose production. Cyclohexanone was used to adhere the plastic hose to itself. Now Dayco uses a heat tunnel to glue the hose. Cyclohexanone use has been reduced from 2750 gallons per year to zero. Worker safety is improved and the product quality improved. The heat tunnel provides uniform heat application and adhesion resulting in fewer hose separations.

Dayco replaced flow meters to monitor water flow and has reviewed water consumption to reduce water use. Dayco has reduced water consumption by 30,000 gallons/day, reducing water use charges and assisting the Bucyrus wastewater treatment plant because less water is discharged.

Glacier Daido America, Bellefontaine

Glacier Daido worked to reduce fresh water consumption and generation of electroplating sludge from wastewater treatment. Three evaporative separators were installed to recover lead plating bath from rinse waters. Seven cooling towers were installed, recycling 5.3 million gallons of water per day. A computer controlled cascade rinse water system was installed to conserve water and optimize the rinse process. A new computerized system was installed in the pretreatment system to control and minimize chemical addition and monitor performance.

By combining the reduction of water with improvement to the pretreatment process, Glacier Daido has reduced water consumption by 48 million gallons/year and reduced the generation of hazardous waste by 320,000 pounds/year. Glacier has reduced stack emission of particulate by 1388 tons/year and has initiated research into alloys that will potentially eliminate the need for lead in its products.

Goodyear Tire and Rubber Company, St. Mary's

Goodyear converted three high volume chemicals to semi-bulk, returnable containers, reducing scrap paper used in packaging by 30,000 pounds/year. They are expanding their packaging reduction program by working with material suppliers. Goodyear also changed from wood pallets to returnable containers for shipping, decreasing wood waste generation by 200,000 pounds in 1995 and 820,000 pounds in 1996.

By changing to a non-lead, water-borne paint, Goodyear eliminated 18,000 pounds of paint filters that were shipped off-site as hazardous waste. This change also reduces worker exposure to lead.

Goodyear recycles about 50 tons/month of cured scrap rubber and has purchased equipment to ensure the material is acceptable to recyclers.

The plant environmental coordinator tracks waste data monthly. Using 1991 as a base year, the plant has reduced solid waste generation by 48%.

Gould Electronics, McConnelsville

Gould uses plating baths in one step of manufacturing copper foil. Some rinsing steps have been eliminated, and rinse water that is generated now feeds process baths. Gould reduced rinse water generation by 100,000 gallons/month and saves copper, a raw material, by 15,000 pounds/month.

Filter packs filter water in plating baths. Gould installed pressure gauges to determine when filter packs needed to be cleaned. Filter pack life has been increased and waste filter pack generation has decreased from 40,000 pounds/month to 27,000 pounds/month.

Gould tracks waste generation and correlates it to square feet of foil produced. In 1989, producing 6000 square feet of foil generated one cubic foot of wastewater treatment sludge. In 1997, producing 30,000 square feet of foil generates one cubic foot of wastewater treatment sludge. Because Gould completed several pollution prevention projects, they did not have to install a new wastewater treatment plant.

Holophane, Newark

Holophane's Energy Conservation Team has broadened its scope to include in-house recycling opportunities. Holophane now uses wire baskets (returnable containers) to transport materials to and from their satellite plants and a few select customers. By installing several closed loop systems, Holophane has reduced water use from 524,000 gallons/day in 1995 to 127,000 gallons/day.

ITT Automotive, Archbold

In 1996, a consultant conducted a waste minimization assessment for ITT Automotive. The consultant assessed annual waste streams by cost and quantity, and found ways to reduce discharges of water and raw material to the sewer by evaluating appropriate methods and technologies to reduce, treat and reuse wastewater. ITT reduced wastewater generation by installing drain boards and flow restrictors increasing the use of counter current flow rinses, and fixing leaks.

Mead, Chillicothe

Mead has converted 31 parts washers from solvent to aqueous based cleaners, reducing hazardous waste generation by 31,000 pounds/year. Mead is trying to reduce their hazardous waste generation status from large quantity generator to small quantity generator. The parts washers were the largest source of hazardous waste.

Mead has made several raw material substitutions to reduce VOCs, especially in coatings for paper. By reducing VOC use, Mead hopes to reduce their air permit requirements.

Mead installed a fiber recovery system on deinkers for recycling paper and pulp. The system recovers 6 air dry tons/day of fiber from the effluent. The wastewater treatment plant does not have to handle this fiber, sludge volume is reduced, and raw material costs decrease by one million dollars.

By installing energy efficient lighting in part of the facility, Mead has reduced lighting energy consumption by 30%, and reduced cost by \$37,420 per year. At the power plant reductions in air emissions are: carbon dioxide, 811 tons/year; sulfur dioxide, 5376 tons/year, and nitrogen oxides, 2840 tons/year. Mead plans to implement lighting upgrades throughout the rest of the mill.

Pro-Tec, Leipsic

Pro-Tec started operation in Leipsic in January, 1993. The facility was designed with state of the art equipment and process design that also minimizes waste generation. Pro-Tec installed a cardboard baler in 1996 and reduced solid waste generation by 33%.

Republic Engineered Steels, Canton

Republic has started 40 new pollution prevention and energy reduction projects in 1997, with a potential cost savings of \$170,000. One project recovers boiler flue gas heat and preheats the boiler feed water. The boilers use less natural gas and less chemical additives, and generate less blowdown and less air pollutants. Republic is considering a different style of refractory ladle lining that will double the life of the lining. Republic partners with East Ohio Gas to reduce energy use through numerous energy efficiency projects. Other projects include energy efficient lighting and using graphite burners to heat pickle liquor.

Roxane Laboratories, Columbus

Roxane implemented a maintenance program to determine when oil in machines needs to be changed. The oil is sampled and analyzed. Oil changes have been reduced from once every 3 months to once every 6 months, reducing waste oil generation by 50%.

Before new chemicals or maintenance cleaning products are purchased, purchases are reviewed to minimize hazardous chemical purchases and limit amounts purchased. This has reduced the generation of hazardous materials that have special disposal requirements.

Senco Products, Cincinnati

Senco Products is a manufacturer of collated staples and nails. Senco Product has had a strategic plan for pollution prevention since 1987 with the objective to reduce all air emissions to zero. For several years Senco has been working to modify one of its staple processes to replace an adhesive containing VOC's of 5.63 pounds per gallon with technology utilizing 0.5 pounds VOC per gallon. Despite technical problems, this technology is being implemented. Once this technology has been fully implemented, the next objective is to incorporate zero VOC technology. All nails are currently manufactured with processes utilizing 0.5 pounds of VOC per gallon or less which replaced 5.63 pounds of VOC per gallon in the early 1990's. Another part of the strategy is to reduce hazardous air pollutant (HAP) usage to zero, and currently an 80% reduction has been achieved. Numerous solvent cleaning tanks have been replaced by water based systems. The remaining methyl ethyl ketone cleaning tanks have been replaced with an n-methylpyrrolidone based system that not only resulted in a 95% emissions reduction but extended floor usage from two weeks to eight months.

Stolle Products, Sidney

Stolle Products used cation/anion exchange to generate deionized water. Resins were regenerated with hydrochloric acid and sodium hydroxide. Stolle replaced the unit with a reverse osmosis unit. Hydrochloric acid waste generation has decreased from 1200 gallons/month to 100 gallons/year, and sodium hydroxide waste generation decreased from 500 gallons/month to zero. The volume of regenerate water that is rejected has also decreased by 10,000 gallons/month.

Total water use in the plant has decreased 22% from 1996 to 1997. Use of lubricants containing VOCs has decreased by 30% for the same period.

Quantitative measures of reduced waste generation

Quantitative measures of reduced waste generation are difficult to find and sometimes difficult to interpret. For the pilot project time frame of October, 1995 through September, 1996, almost no quantitative measures can be gathered from reports that M2P2 facilities are required to complete for Ohio EPA. Facilities reported data for 1996 waste reductions in March, 1997 (generator annual reports for hazardous waste, waste minimization) and September, 1997 (Toxic Release Inventory, Section 8, source reduction activities). U.S. EPA and Ohio EPA are compiling this data but it was not available for this report.

OPP anticipated little quantitative data would be available for this report. In OPP's May, 1997 survey of M2P2 facilities, one question asked, "Does your company track the progress of each pollution prevention project? What types of data and/or measurements does your company use to document pollution prevention progress? Please provide any quantitative data you have about your pollution prevention projects, or about your companies overall environmental progress. Please concentrate on projects and result of the past two years." Facilities responses to this question varied from no tracking to extensive systems for documenting waste reduction. One company tracks waste generation and compares it to the amount of product manufactured.

Facilities described specific pollution prevention projects in their response to OPP's May, 1997 survey. Most of the facilities measure waste reduction in these projects (see "Specific pollution prevention projects" above). Also, some facilities can provide waste reduction measures for general waste streams by medium (solid waste, air, wastewater). Specific comments from facilities are listed here to provide an overview of responses.

"Our facility has a strategic plan for pollution prevention. We track overall progress toward the plan."

"We use Excel spreadsheets to track monthly costs and share the information with employees."

"Waste reduction is tracked by the reduction in number of waste disposal loads."

"We track progress by hazardous waste volume reduction."

"DTP and Chrysler track the progress of pollution projects primarily through the results of the TRI report."

"Pollution prevention projects are tracked by more qualitative measurements than quantitative measurements."

"Due to changes in personnel and processes, we have not been able to continuously track the progress of projects"

Benefits of pollution prevention

The survey asked the facilities, "What benefits has your company realized from implementing pollution prevention? Many facilities cited reduced operating costs as the most important benefit of implementing pollution prevention projects. The following list describes reported benefits and includes quotes illustrating benefits.

- Reduced operating costs
- Reduced raw material consumption, lower costs for raw materials
- Reduced treatment and disposal costs
- Reduced environmental compliance costs
- Product quality "The pollution prevention projects have improved the quality of our products. It's been phenomenal."
- Improved company image in the local community "We can report to the community that we are doing everything we can to reduce emissions."
- Increased worker safety - for example, one company had no lost time accidents in 1996
- Reduced exposure to any future liability
- Increased regulatory compliance "If our pollution prevention projects are successful, we can move production anywhere in the world and meet environmental regulations."
- Increased awareness of recycling opportunities and amount of waste generated at the facility

Compliance benefits of pollution prevention

Reducing waste generation through pollution prevention projects has the potential to help companies maintain compliance with environmental regulations. In some cases the requirements no longer apply to the company because they have reduced their waste generation. Refer to the section, "M2P2 inspection influence on pollution prevention behavior" for additional other benefits of pollution prevention projects.

The following examples illustrate some compliance benefits of implementing pollution prevention. The facilities completed these projects before their M2P2 inspections. However, some facilities have not had enough time after the inspections and before completing the survey to research, approve and implement additional pollution prevention projects that could reduce waste generation and improve compliance.

The hazardous waste inspector asked AEP Gavin to have a more specific contingency plan, especially to include the specific hazardous waste, paint, on site. AEP has reduced their hazardous waste generation of paint by better inventory control and reduced their generator status to small quantity generator. Small quantity generators are not required to have a detailed contingency plan.

Mead has converted 31 parts washers from solvent to aqueous based cleaners, reducing hazardous waste generation by 31,000 pounds/year. Mead is trying to reduce their hazardous waste generation status from large quantity generator to small quantity generator. The parts washers were the largest source of hazardous waste.

Because Gould completed several pollution prevention projects, they did not have to install a new wastewater treatment plant.

Chrysler Dayton Thermal Products had these comments: "The M2P2 inspection did provide DTP with a more heightened awareness about using pollution prevention as a means of environmental compliance. During the wrap-up meeting and during the inspection, the inspectors provided DTP with suggestions concerning additional processes within the plant that should be investigated for pollution prevention initiatives. DTP realizes that any method to reduce pollution similarly reduces the potential for exceeding compliance requirements."

Barriers to pollution prevention

The survey also asked the facilities, "Over the past two years, have you experienced any barriers or obstacles to implementing pollution prevention projects?" Some facilities report they had no barriers to implementing pollution prevention projects in the last two years. Other facilities reported the following barriers.

- Capital investment (you have to spend to save)
- Not enough qualified personnel to evaluate and monitor process changes and improvements
Manpower and funds are limited to effectively pursue pollution prevention projects
- Difficult to design pollution prevention projects that include life cycle analysis considerations
- Existing technology is not appropriate for specific projects
- Any changes to the product must be transparent to the customer
- Product is more expensive now
- Motivating employees to cooperate, change behavior, and volunteer ideas
- Keeping contamination out of materials that will be sent for recycling
- Regulatory requirements (other than environmental) such as Food and Drug Administration, Housing and Urban Development, building codes

M2P2 inspection influence on pollution prevention behavior

Some facilities have had an active pollution prevention program for many years. Because they have been active in pollution prevention and implemented waste reduction projects, these facilities did not think the M2P2 inspections substantially influenced their pollution prevention activities. Other facilities implemented pollution prevention activities suggested during the M2P2 inspection or suggested in compliance letters. One facility broadened the scope of the plant's energy conservation team to include in-house recycling opportunities. The following quotes provide an overview of facility representatives comments.

"The M2P2 inspection made us place more environmental importance on the use of pollution prevention, and as such all environmental activities are being reviewed with this in mind."

"The M2P2 inspection emphasized that Ohio EPA is pushing pollution prevention more than pollution control."

"The M2P2 inspection was very informative in terms of compliance help and pollution prevention efforts. We will continue to look at ways to reduce waste and recycle and will call on the Ohio EPA for information and/or assistance."

"The M2P2 inspection caused us to formalize our pollution prevention program and to follow through on past commitments to reduce waste and energy use."

"It was helpful to have an extra set of eyes specifically looking for pollution prevention possibilities and asking if we had ever considered changes to reduce waste. Some compliance inspectors are very busy looking for compliance issues and we don't talk about pollution prevention."

"This type of inspection heightens our awareness about using pollution prevention to help our company. Also, this type of inspection involves upper management which helps to implement pollution prevention projects."

"Having someone from the Ohio EPA's Office of Pollution Prevention provided valuable insight into the large amount of information available regarding pollution prevention throughout industry. Some of this information involving solvent replacement is being used in our TRI emission reduction program."

"Bayer's charter and goals have always included being an environmentally friendly organization. Our primary goal is compliance, but beyond that we recognize that sound operating principles and pollution prevention go "hand-in-hand." It's not only good for the environment, it's good for business. The multi-media audit gave us an opportunity to evaluate ourselves using the expertise of Ohio EPA. Given the fact that we are a small site with limited resources, this sort of inspection was very helpful to us. We were able to focus our efforts in a precise time frame."

Recommendations for revising and improving M2P2 inspections

Ohio EPA's initial goals for the M2P2 inspections were to see if conducting the inspections was feasible, to improve the environmental and administrative effectiveness of inspections, and to convince facilities to implement pollution prevention activities. The following recommendations for revising and improving M2P2 inspections should help future inspections attain the original goals.

Choosing facilities

What facilities are good candidates for M2P2 inspections? This is probably one of the most difficult issues to address. Assistant District Chiefs and staff used their best professional judgement to try to choose facilities for M2P2 inspections. Here are some suggestions for selecting facilities.

Size - Consider the physical size of the facility, the number of employees, and the complexity and number of plant processes. M2P2 inspections seem to be most successful at facilities in the middle range of each of these factors. At large facilities inspections might not be thorough, it is more difficult to completely understand all the processes (for compliance evaluation and pollution prevention opportunities), and it is hard to complete an inspection in one day. Small facilities can be overwhelmed by several inspectors, and may not have compliance and pollution prevention issues in more than one medium.

Multiple compliance requirements - Try to choose facilities that have compliance requirements in air, water and hazardous waste regulations. Look for facilities that also have compliance requirements for solid waste, storm water, and drinking and ground water regulations.

Pollution prevention opportunities - Choose facilities that have the potential for reducing waste generation through pollution prevention. Look at the size of the facility, the number of compliance requirements, and the processes at the facility. Determine if the facility has been active in pollution prevention and/or seems willing to accept suggestions about waste reduction.

Selecting an inspection team and determining an agenda

Ask inspectors that address each compliance area at the facility to participate in the inspection. Ask someone from the Office of Pollution Prevention to participate. However, limit the total number of Ohio EPA employees to no more than four people. Both facilities and inspectors have stated that the entire M2P2 inspection process is more effective when team size is limited. If possible, one person should have previously participated in an M2P2 inspection.

Inspectors should meet at least once before the inspection to talk about facility processes, waste generation, pollution prevention opportunities, and logistics. The group should try to develop a specific agenda for the inspection.

Cross training

In the pilot project model, inspectors can informally provide cross training for each other during the pre-meeting, during the inspection, and through discussion of the correspondence to the facility. During the pre-meeting, each inspector can discuss compliance requirements for the facility and what the inspector normally looks for and does during their inspection. To do cross training during the inspection, inspectors will need to actively include everyone in discussions and ask questions of other inspectors. Inspectors can also review the post-inspection correspondence and discuss issues with other inspectors.

Ohio EPA could consider conducting additional cross media for inspectors, similar in concept to training provided at Massachusetts Department of Environmental Protection and New York Department of Environmental Conservation. Washington Department of Ecology provided cross program, multi-media training to field staff covering the basic regulatory structure and top five

common violations, compliance issues, and jurisdictional framework of air, water, hazardous waste regulations and underground storage tanks.

Ohio EPA could consider including multi-media activities in new employees' position descriptions. If managers define multi-media activities as an important part of job duties, new staff will be more likely to participate in these activities. If M2P2 activities are not included in job descriptions, the Director's Office could consider formally defining all employees' roles for implementing M2P2 activities, possibly through a memo from the Director.

Division and District Chiefs could encourage staff to conduct joint inspections with other programs more frequently. Currently, some individual staff routinely perform inspections with other programs. Ohio EPA could explore ways to have one Agency staff person carry two program messages. Ohio EPA could also consider conducting a formal evaluation of joint inspections.

Promoting pollution prevention

An environmental specialist from the Office of Pollution Prevention provided pollution prevention training and information to inspectors in pre-meetings, during the inspection, and during the drafting of facility correspondence. OPP discussed general and process specific pollution prevention information. Although the OPP person usually actively participates, inspectors are encouraged to discuss pollution prevention and offer ideas to the facilities during the inspections.

OPP plans to complete a pollution prevention training plan in September, 1997. The plan will outline Agency-wide and Division specific pollution prevention needs and provide details on how Ohio EPA staff might be trained. Training about multi-media pollution prevention inspections could be included in the training plan. For example, DHWM is currently training inspectors on how to conduct industrial pollution prevention assessments. The training also has a multi-media focus. Although inspectors will not be expected to conduct assessments, DHWM plans to require more pollution prevention activities as regular job duties for inspectors.

Discussing pollution prevention in the inspection and in correspondence with the facility provides additional emphasis about the importance of pollution prevention to Ohio EPA. Facilities that are active in this area were glad to see Ohio EPA recognizing their efforts, and some facilities used Ohio EPA's emphasis to revive or begin pollution prevention activities. Some inspectors and facilities recognize that achieving or maintaining compliance by doing pollution prevention activities has many benefits.

OPP staff noted the M2P2 model limited their ability to do extensive discussions or research on pollution prevention options for the facility. Because inspectors determine facility compliance with numerous environmental regulations during these inspections, less time is available to discuss pollution prevention.

Including M2P2 inspections and other M2P2 activities in planning and grants

Ohio EPA's FY 97 Environmental Performance Partnership Agreement (EnPPA), December, 1996, states that multi-media activities are the main focus of the Agreement. "The purpose of this EnPPA is to lay out a basic framework for changing the existing regime focused on media specific environmental programs where success is measured by the number of activities completed, to a multi-media system where success is measured by improvements in environmental quality." Ohio EPA could consider including more specific language and commitments to multi-media activities in future agreements.

Ohio EPA has developed a Strategic Management Plan to direct all Agency activities. The plan defines Ohio EPA's vision, mission and long term goals. Each Division, District and Office developed its own plan to achieve the Agency's goals. Many Divisions, Districts and Offices mentioned multi-media and pollution prevention activities in their plans.

Ohio EPA could consider including specific language in all Division and District strategic plans about multi-media, pollution prevention activities, and could consider including specific language in Accountability Agreements that discuss how the work will actually be accomplished. The Assistant District Chiefs and the Office of Pollution Prevention could draft this language when planning for FFY 1998 multi-media activities. This is especially important because M2P2 activities are not mandated or required by federal or state requirements. The language could identify the separate and complementary roles and responsibilities of the Director's Office, Assistant District Chiefs, Office of Pollution Prevention, and the Divisions.

If multi-media activities are included in grants and strategic plans, Ohio EPA could also consider adding some measure of these activities in the Agency's new time accounting system..

Measuring the success of M2P2 inspections

Ohio EPA, U.S. EPA, and the inspected facilities would like to be able to measure the success of Ohio EPA's multi-media, pollution prevention inspections pilot project. However, the Assistant District Chiefs and the Office of Pollution Prevention did not design specific measurements for compliance and pollution prevention for the FFY 1996 M2P2 inspections before the project began. Some measures that we did develop included a facility survey immediately after inspections, soliciting comments from Ohio EPA employees, and a facility survey in May 1997 to determine compliance, pollution prevention implementation and waste reduction.

To try to determine additional measures for future M2P2 inspections, Ohio EPA could review the work and results of compliance assistance projects in the Division of Hazardous Waste Management (DHWM). DHWM has measured the effectiveness of their projects with dry cleaners (Central Office) and hazardous waste generators in specific counties (DHWM, Southwest District Office). Ohio EPA could also compare M2P2 inspection results to similar facilities that were not inspected using M2P2 model, and review compliance rates, number of cross-media transfers, pollution prevention activities, and amount of waste reduction.

Some specific measures for future M2P2 inspections could include: opinions of facility representatives and inspectors; number of unpermitted waste streams discovered; time to

complete different activities; number of pollution prevention referrals; number of referrals from one program to another; compliance rate of facilities determined by follow-up inspections; decrease in compliance requirements (e.g., change from large quantity generator to small quantity generator of hazardous waste; change from Title V air permit to non-Title V permit); and changes in waste generation.

Different models for M2P2 inspections

When planning for future M2P2 activities, Ohio EPA could consider other models for inspections, such as sector based inspections, geographic based inspections, specialized inspectors, and M2P2 checklists (see "Planning for future M2P2 activities" below). Sector based inspections could target specific industries such as electroplating, dry cleaning, plastics manufacturing, etc. Geographic based inspections could target specific cities and counties, and/or specific watersheds. Specialized inspectors could inspect certain industrial sectors and/or be familiar with two or more regulatory programs. M2P2 checklists can be developed for one inspector to determine compliance with several regulatory programs during a single inspection.

Recommendations from the Southeast District Office

Steve Skinner, Assistant District Chief at SEDO, met with SEDO managers and staff and OPP after SEDO completed their first year of M2P2 inspections. The group discussed many aspects of the inspection process and developed the following recommendations for revising and improving the inspections.

- Continue a limited formal M2P2 team inspection program with some changes to enhance the advantages and decrease the disadvantages.
- Limit the inspections to no more than three program areas and OPP. This will limit the inspection team to four.
- Select smaller less complicated facilities which can be inspected in one or two days at the same level of detail as if there were separate inspections.
- Try to provide the same advance notice, if any, as we would for separate inspections.
- Encourage pollution prevention training for staff so that we can promote and assist companies as we do regular inspections.
- Make sure that staff know that they can always get together informally with another inspector when appropriate to do a joint inspection. This can make sense for joint cross-training or when there are cross-media issues. Also an OPP representative may be able to attend a limited number of regular inspections when pollution prevention issues are important.

M2P2 activities from October, 1996 to September, 1997

Inspectors and OPP staff have continued to conduct multi-media pollution prevention inspections in FFY 1997. SEDO, CDO, NWDO and NEDO chose to perform inspections using the FFY 1996 pilot project model. SWDO created a multi-media checklist for inspectors to use in

conjunction with regular single medium inspections. Their effort targeted small and medium size facilities.

Some recommendations listed in this report for revising and improving M2P2 inspections were used in FFY 97 inspections. For example, fewer inspectors participated in each inspection.

Conclusions and planning for future M2P2 activities at Ohio EPA

The goals of Ohio EPA's pilot project include determining if M2P2 inspections improve compliance, avoid cross-media transfers, and increase the use of pollution prevention to achieve and maintain compliance. Ohio EPA employees' opinions about M2P2 inspections were mixed and covered a wide range of opinions from definite interest in continuation to negative opinions on usefulness of the inspection approach. Facility representative opinions were also mixed; however, 13 of 17 representatives who completed a survey would prefer to see this type of inspection continued at their facilities.

M2P2 inspections require more time from Ohio EPA staff for preparation and coordination; however, M2P2 inspections save time for some facilities because several inspections are completed in one day. M2P2 inspections provided good cross training in other environmental regulations for some Ohio EPA staff. Facility representatives liked being able to discuss all the regulatory requirements at the same time.

Facilities indicated M2P2 inspections emphasize Ohio EPA's interest in pollution prevention to facilities and encourage pollution prevention activities and projects. Some facilities have reduced waste generation and are no longer subject to some environmental regulations. Several companies provided case studies of pollution prevention projects and provided quantitative measures of waste reduction; however, only a few of the projects were directly related to compliance and/or pollution prevention information discussed in the M2P2 inspections. The effect of these M2P2 inspections on environmental regulatory compliance is inconclusive.

The Director's Office stated that formal multi-media activities will continue to be a part of Ohio EPA's work in Federal Fiscal Year 1998 and Federal Fiscal Year 1999. The Director's Office has asked the Assistant District Chiefs and the Office of Pollution Prevention to develop plans for multi-media activities.

The Director's Office and the Division Chiefs would like the M2P2 planning activities to include the development of a list of inspection alternatives. These alternatives should focus on multi-media and pollution prevention, and allow the District to decide what alternative is most appropriate for the facility being inspected. Some Chiefs would also like the Districts to pilot and evaluate M2P2 approaches other than the FFY 1996 pilot project model of multiple inspectors in one inspection (see "Different models for M2P2 inspections" above).

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