DOC. NO. 79/11
June, 1979

ECONOMIC IMPACT ANALYSIS OF CONSTRAINTS ON PARTICULATE CONTROL EQUIPMENT REPLACEMENTS, R79-3

by

Alan S. Cohen
CSI Resource Systems, Inc.
55 Union Street
Boston, Massachusetts 02108

Prepared for
Energy and Environmental Systems Division
Argonne National Laboratory
Argonne, Illinois 60439

PROJECT OFFICER: MICHAEL H. FRIEDMAN
Project No. 10.069

Frank Beal, Director

Peter Loquercio, Manager
Division of Environmental
Management

State of Illinois
Institute of Natural Resources
309 West Washington Street
Chicago, IL 60606

NOTE

This report has been reviewed by the Institute of Natural Resources and approved for publication. With the exception of the Opinion of the Institute's Economic Technical Advisory Committee, views expressed are those of the contractor and do not necessarily reflect the position of the IINR.

Printed by Authority of the State of Illinois

Date Printed: June, 1979
Quantity Printed: 325

This document has been cataloged as follows:

Cohen, Alan S.
Economic impact analysis of constraints on particulate control equipment replacements, R79/3 / by Alan S. Cohen (and) project officer: Michael H. Friedman. -- Chicago : Illinois Institute of Natural Resources, 1979.

37 p. ; 28 cm. -- (Doc. No. 79/11)

1. Economic impact statements - Illinois. 2. Economic impact studies - Illinois. 3. Air pollution control - particulates - Equipment - Illinois. 4. Air pollution control - particulates - Regulations - Illinois. 5. Air pollution control - particulates - Economics - Illinois. I. Title. II. Friedman, Michael H. III. Illinois Institute of Natural Resources Division of Environmental Management.

IINR Environmental Information Center

Illinois Institute of Natural Resources
309 West Washington Street
Chicago, IL 60606
(312) 793-3870

Opinion of the Economic Technical Advisory Committee

of the Illinois Institute of Natural Resources

The Economic Technical Advisory Committee has reviewed the economic impact study IINR Document No. 79/11, entitled Economic Impact Analysis of Constraints on Particulate Control Equipment Replacements, R79-3. The Committee finds the report to be generally responsive to the requirements of Section 6 of the Environmental Protection Act and recommends that it be forwarded to the Pollution Control Board so that public economic impact hearings may be held in conjunction with proposed regulation R79-3, which seeks to amend rule 105(a)(3) of Chapter 2: Air Pollution Regulations.

TABLE OF CONTENTS

LIST OF TABLES

1 INTRODUCTION

The Illinois Environmental Protection Agency (IEPA) submitted amended proposed revisions to Rules 101, 103, and 105 of Chapter 2, Air Pollution Control Regulations, to the Illinois Pollution Control Board (PCB) on March 19, 1979 [Ref. 1 & 2].* The Illinois State Chamber of Commerce submitted an alternative proposal on March 23, 1979 [Ref. 3]. The PCB issued an interim order to amend these rules on March 29, 1979 [Ref. 4].

The analysis reported in this document focused on Rule 105(a)(3)** as proposed by the IEPA and the Chamber of Commerce. These will be referred to as the Agency and Chamber proposals, respectively. The purpose of the analysis is to satisfy the economic impact statement requirements of Illinois Public Act 79-790 [Ref. 5].

The control strategies being considered by the PCB (R79-3) and evaluated in this report are those proposed revisions for Rule 105(a)(3) by the Agency and by the Chamber. The Agency's Proposed Rule 105(a)(3) states:

> *In the following townships, no person shall replace the air pollution control equipment on any source of particulate matter with a less effective kind of control equipment:*
>
> *Cook - All townships,*
> *Will - DuPage, Plainfield, Lockport, Joliet, Channahon, Peotone, and Florence,*
> *Macon - Decatur and Hickory Point,*
> *Madison - Alton, Chouteau, Collinsville, Edwardsville, Fort Russell, Godfrey, Granite City, Nameoki, Venice, and Wood River.*

The Chamber's proposed Rule 105(a)(3) states:

> *In the following townships, no person shall replace the air pollution control equipment on any source of particulate matter with a less effective kind of control equipment, provided, however, that this provision shall not preclude operation of the production facilities or air pollution control equipment in any manner which does not cause excess emissions as herein defined:*
>
> *Cook - All townships,*
> *Will - DuPage, Plainfield, Lockport, Joliet, Channahon, Peotone, and Florence,*
> *Macon - Decatur and Hickory Point,*
> *Madison - Alton, Chouteau, Collinsville, Edwardsville, Fort Russell, Godfrey, Granite City, Nameoki, Venice, and Wood River.*

---

*References are listed in Sec. 6.

**This is Rule 105(a)(4) in the PCB interim order.

The effect of the Chamber's proposal is to ensure that Rule 105(a)(3) does not affect the allowable emission limits for any source. The difference between the Agency and Chamber proposals may be only a legal concern whereby the Chamber's proposal clarifies the intent of the rule. If this is the case, then the Agency's rule may result in additional legal costs to obtain this clarification if it is promulgated. A significant difference in the economic impacts of the two proposals can only occur if the Agency uses proposed rule 105(a)(3) to alter the allowable emissions of a source.

This study does not address the possibility that there is a substantive difference between the Agency and Chamber proposals. Rather the main focus of the analysis is to compare the economic impacts of promulgating each of the proposed rules under various sets of circumstances. The reader can then evaluate the possible economic impacts of each proposal using whatever applicable interpretation of the Agency or Chamber proposal desired.

2 DEFINITIONS

The following words or phrases are defined to avoid ambiguity and to clarify issues.

1. Control equipment (device): Any equipment or facility of a type intended to eliminate, prevent, reduce or control emissions of specified air contaminants to the atmosphere.

2. Emission level: Amount of pollutant actually emitted into the atmosphere for a given unit of production or input product such as pounds of particulate matter per million British thermal units (Btu) of heat input.

3. Emission limit or standard (allowable emissions): Allowable emission level or rate.

4. Emission rate (emissions): Amount of pollutant emitted into the atmosphere in a given time period such as pounds of particulate matter per hour.

5. Emission source: Any equipment or facility of a type capable of emitting specified air contaminants to the atmosphere.

6. Firm (plant): Any building, structure or installation that contains an emission source and is located on one or more continguous or adjacent properties and which is owned or operated by the same person (or by persons under common control).

7. Less effective: For any fuel or process used by a firm, current average and maximum emission rates are not increased; for any fuel or process used by a firm, current average and maximum emission levels are not increased; or for any fuel or process used by a firm, the design (rated) efficiency of the control equipment is not reduced.

8. Replace control equipment: To substitute new control equipment for old equipment. The substitution may be as a unit or by substituting all or most of the major components of the equipment over a short period of time.

The ambiguity of the phrase "less effective" affects the economic impact analysis. To illustrate the point, consider the following interpretations of "less effective":

(a) For the current fuel or process being used by the source, the average (maximum, design or rated)* control efficiency (percent removal of particulate matter emissions) of the equipment cannot be reduced.

---

*To make alternate definitions substitute the word(s) in parentheses for the word preceding it.

(b) For any fuel or process used by the source, the average (maximum) design or rated control efficiency of the equipment cannot be reduced;

(c) For the current fuel or process being used by the source, average (maximum) emission rates (levels) cannot be increased;

(d) For any fuel or process used by the source, average (maximum) emission rates (levels) cannot be increased;

(e) For current (any) fuel or process being used, the average control efficiency cannot be reduced and its variance cannot be increased;

(f) The reliability of the system to avoid malfunctions and breakdown cannot be reduced; and

(g) Any combination of the above.

This list is not intended to be exhaustive. Some of these definitions are more reasonable than others, but all of them are plausible.

The problem with defining less effective is exasperated when considering the time at which the effectiveness of the control equipment is measured. Time refers to calendar date or the production cycle of the firm.

The calendar date is important because the effectiveness of a device may change as it ages. A relevant question is whether the effectiveness measured at the time the device is replaced, at the time the rule was promulgated, or at the time the device was installed, is the proper reference point for the rule.

The production cycle, both annual and seasonal, is important because the effectiveness of the control equipment may depend on its emission loading. During peak periods of production the device may operate differently than during normal or low periods of production. Again, the appropriate reference for applying the regulation is not defined.

To facilitate the economic analysis the definitions of less effective presented above are used in this report. The intent of these definitions is to bound the possible economic impacts.

Through changes in production methods or output levels, or in the operation and maintenance procedures for the control equipment, emission rates and levels may be adjusted up to applicable emission limits without physically replacing the control equipment. If the effectiveness of the control equipment is measured during such periods of operation, it would have the effect of circumventing proposed Rule 105(a)(3). Since the economics of this scenario are not very interesting, a definition of less effective that would render the rule moot is not considered. It is mentioned here to point out that this possibility may exist.

The difficulty presented by the word "replace" in Rule 105(a)(3) is that a distinction between maintain, repair, modify, rebuild, and replace must be made. Control equipment is repaired, rebuilt, and parts are replaced during normal maintenance operations. The relevant question for analyzing and implementing Rule 105(a)(3) is when, if ever, do such maintenance activities constitute the replacement of an existing control device.

For the purpose of this study, the definition of replace, as provided, is intended to exempt normal maintenance activities from the rule while ensuring the rule is not circumvented by replacing individual components over a short period of time with the effect of building a new control device.

The other definitions are provided to clarify the use of these terms in this document. An attempt was made to keep these definitions consistent with those used in existing and proposed environmental regulations in Illinois [Ref. 1, 2, and 6].

3 ANALYTICAL APPROACH

Quantification of the economic impacts of Rule 105(a)(3) is extremely difficult. Absolute estimates of the costs and benefits would require estimating the number of firms at any given time that are over complying in regard to their applicable particulate standard and limits, and then estimating the likelihood of replacing their control equipment. Information for making these estimates is not readily available.

Historical data on particulate control device replacements, if available, would not be very helpful because many or most of these replacements over the past ten years have been in response to changes in environmental regulations and not as a result of normal replacement decisions.

Although the number of sources over complying in 1975 with the particulate regulations and subject to Rule 105(a)(3) can be easily identified (see Appendix A), all existing and new sources located in the counties and townships identified are potentially affected by the rule.

Even if the analysis is limited to only those firms currently over complying, the rule does not affect them until they contemplate replacing their control equipment. To estimate the likelihood of a firm replacing its control equipment would require detailed information on the age of the plant, age of the pollution control equipment, expansion plans for the firm, operating and maintenance costs of the control equipment, and operating, maintenance, and capital costs of replacement equipment. Most of this information is not readily available.

Making the assumption that all of the firms currently over complying in regard to their applicable particulate standards and limits would eventually replace their control equipment does not eliminate the problem of trying to determine when the replacement would occur. The timing of the replacement is important because the time value of money should be included in the analysis.

Additional assumptions such as the replacements occur uniformly over time and are distributed geographically in some systematic fashion would be required to obtain any absolute estimate of costs and benefits. However, such an analysis would have little value because it has assumed away the basic decision process that determines the costs and benefits of the proposed rule, i.e., the costs and benefits are indirectly assumed.

Because of the difficulties in estimating the absolute costs and benefits of Rule 105(a)(3) the analysis conducted considers only the direction of change of costs and benefits for predefined circumstances or scenarios. In some instances the relative cost and benefit impacts are discussed. No attempt is made to quantify the likelihood of each scenario occurring or the number of sources affected.

The analysis considers the economic impacts of the proposed rule for the following set of circumstances.

Scenario 1: The firm would not replace its control equipment in the absence of Rule 105(a)(3).

Scenario 2: The firm would replace the control equipment in the absence of Rule 105(a)(3).

Scenario 3: The firm is a new source.

Scenario 4: The firm is located in or subject to any environmental regulation of the State of Illinois.

The economic impacts for each scenario are discussed in the following section. This is followed by discussions of the distributional impacts. The implications of the analysis are summarized in Section 5.

4 RESULTS

ENVIRONMENTAL COST AND BENEFITS

Scenario 1: The firm would not replace its control equipment in the absence of Rule 105(a)(3).

This situation could occur if the useful life expectancy of the control equipment is equal to or greater than the useful life of the plant. Under this circumstance the proposed rule would have no impact on the firm because it never replaces its control equipment. Therefore, there are no economic impacts.

Although the economic analysis of this case is not very interesting, its importance cannot be over emphasized. If most of the firms potentially affected by the proposed rule would not replace their control equipment without the rule, then the economic impacts of the rule will be small or only affect a few sources. It is not possible with the available data to estimate how many firms over complying with their applicable particulate emission standards would not be affected by the proposed rule. However, the life expectancy of properly maintained particulate control equipment can be discussed.

Unfortunately, the subject of equipment replacement is discussed infrequently, or not at all, in the literature. The author was unable to find any secondary source of information on the life expectancies of particulate control equipment. However, discussions were held with a number of experts in the field of particulate matter control technology [Ref. 7, 8, 9, and 10]. All of the individuals contacted agreed that a properly maintained piece of control equipment could be used for the life of a pollution source. Therefore, control equipment is generally not replaced due to age.

A properly maintained piece of control equipment involves periodic replacement of various components so that the device may be rebuilt during its lifetime [Ref. 11]. Furthermore, the fact that equipment usually will not be replaced due to age does not eliminate the possibility of equipment replacement.

Some of the reasons why equipment may be replaced are:

(a) Explosions and fires that damage the equipment beyond repair;

(b) Advances in control device technology that produce economic (usually reduced operating and maintenance costs) advantages over the old equipment;

(c) Production process changes requiring control equipment replacements or modifications; and

(d) the control equipment is used to capture valuable materials and replacement is warranted to improve recovery efficiency.

The likelihood of events (a) and (b) occurring is probably small. One expert stated that in his many years of experience in the Chicago metropolitan area, replacements for these reasons were rare [Ref. 9]. The reasons for this seem straight forward. Explosions and fires are rare events and there has been no significant advancement in the state-of-the-art of particulate control equipment over the past 20 to 30 years.

Situations described in (c) and (d) are industry specific. For example, production changes occur frequently in the adhesives, plastics, paint and varnish manufacturing and food processing industries and very infrequently in the primary and secondary metals and the paper pulp industries. Some industries such as copper smelting, asphalt and roofing, cement manufacturing, grain elevators, stone and gravel companies, and kraft paper milling use control equipment to capture valuable materials. However, control equipment replacements to capture valuable material most likely occur if the new equipment is more effective than the old equipment. Under this situation Rule 105(a)(3) would have no impact on the replacement decision.

If a control device replacement occurs the proposed rule may influence the replacement decision resulting in changes of costs and benefits. The possible impacts of replacement are discussed under Scenario 2.

Scenario 2: The firm would replace the control equipment in the absence of proposed Rule 105(a)(3).

The impact of Rule 105(a)(3) on a firm that would make a control device replacement in the absence of the rule depends on a number of important interrelationships and concepts. These include definitions used for less effective, replacement and modification; rules and regulations pertaining to new and modified sources, and process or capacity alterations occurring simultaneously with the control equipment replacement.

An attempt is made to identify many of these interactions to determine their affects on the marginal or additional economic impacts of Rule 105(a)(3). The definitions used were selected to identify certain complexities and to bound the economic impacts. Assumptions are made to focus on specific types of interactions. These definitions and assumptions are not intended to imply that Rule 105(a)(3) will or should be implemented in a specific manner. Rather they clarify situations and identify areas where policy decisions on applying the rule need to be made. An important conclusion from the analysis is that the marginal economic impact of Rule 105(a)(3) is highly dependent on these definitions and assumptions.

To understand the possible impacts of Rule 105(a)(3) on a firm that would replace its control equipment in the absence of the rule, the reasons for over compliance with emission limits as well as the reasons for replacing the control equipment (discussed previously) must be considered. Firms over comply with emission limits for a number of reasons. Some of these are:

(a) The least cost control option results in over compliance;

(b) The firm over complies to allow for possible changes in the emission standards. The over compliance reflects the firm's uncertainty about future control regulations;

(c) The firm over designs the equipment to allow for uncertainties of equipment performance;

(d) The firm designs the equipment to comply with the regulation under worst-case situations. Variables included in the analysis might be the variability in control efficiency of the equipment, production scheduling, growth of the firm, etc.;

(e) The firm desires flexibility to allow for changes in production mixes and cycles, growth, changes in fuel and raw material characteristics, etc.; and

(f) The firm has a strong community interest or image and over complies because of social awareness or to generate goodwill.

The promulgation of Rule 105(a)(3) affects the replacement decision by eliminating control equipment options that would satisfy current emission limits but are less effective than the current equipment being used. This does not necessarily result in increased costs to the firm or alter the replacement decision. The reasons for over complying with a regulation are still valid with Rule 105(a)(3).* It is possible that without the rule the optimal replacement decision would result in the use of control equipment that is at least as effective as the old equipment, i.e., the rule is not a binding constraint. Under this situation there would be no economic impact. Furthermore, the direct cost of the control equipment may be reduced as a result of the rule. In this situation the firm would lose a perceived, possible nonmonitary advantage of the foregone equipment. However, if all of the impacts are monitorized, then it can be concluded that the promulgation of Rule 105(a)(3) cannot reduce the cost of complying with the particulate matter rules and regulations and may increase this cost.

The benefits of Rule 105(a)(3) would be positive if the replacement occurs and results in reduced emissions as compared to the emissions that would have occurred without the rule. However, this situation is not guaranteed. It is possible and likely that emissions will increase as a result of Rule 105(a)(3) under special sets of circumstances. For example, this could occur if the replacement of the control equipment is delayed if the incentive for over compliance is reduced by the rule. More details on these points are provided later.

The impacts of Rule 105(a)(3) are also affected by standards and limits pertaining to new or modified sources. The regulations for new and modified sources are proposed rules for issuance of permits to new or modified air pollution sources affecting nonattainment areas [Ref. 6] and emission limitations pertaining to new and modified sources in the State of Illinois Air Pollution Control Regulations [Ref. 2].

---

*The rule may reduce the incentive to over comply. This situation is discussed under Scenario 3.

The definition of a modification in the above is:

Modification is any addition of, physical change to, or any change in the running (including changes in maintenance practices) or functioning of equipment or operations at a source which increases the actual or potential emission rate of any specified air contaminant (regardless of any emission reduction achieved elsewhere in the source).

The following activities are specifically not considered to be modifications, provided that they do not interfere with reasonable further progress toward attainment of air quality standards.

1) Routine maintenance and repair of equipment;

2) Any change incorporated within the operating design of an item of equipment and described in its permit application, unless specifically limited by a condition to a permit;

3) Increase in hours of operation, unless specifically limited by a condition to a permit;

4) Use of an alternate fuel, if on December 21, 1976, the source was capable of accommodating such fuel;

5) Use of an alternative fuel or raw material by reason of an order in effect under Sections 2(a) and (b) of the Energy Supply and Environmental Coordination Act of 1974 (or by any superceding legislation), or by reason of a natural gas curtailment plan in effect pursuant to the Federal Power Act;

6) Use of alternate fuel by reason of an order or rule under Section 125 of the Clean Air Act, as amended; and

7) Use of refuse derived fuel generated from municipal solid waste.

Notwithstanding any other provisions of this definition, the Agency may specify activities which do not constitute modifications as herein defined. Normal cyclical variations in emission rates shall not be considered modifications. Minor variations in emissions due to changes in fuel characteristics shall not be considered modifications [Ref. 6, pages 5-10].

Modification: Any physical change or a change in the method of operation of an emission source or of air pollution control equipment which increases the amount of any specified air contaminant emitted by such source or equipment or which results in the emission of any specified air contaminant not previously

emitted. It shall be presumed that an increase in the use of raw materials, the time of operation, or the rate of production will change the amount of any specified air contaminant emitted. Notwithstanding any other provisions of this definition, for purposes of permits issued pursuant to Rule 103, the Agency may specify conditions under which an emission source or air pollution control equipment may be operated without causing a modification as herein defined, and normal cyclical variations, before that date operating permits are required, shall not be considered modifications [Ref. 2].

A firm that replaces a control device and increases its *emission rate* could be classified as a modified source under both definitions. However, the Agency has indicated that "the replacement of a control device is not a modification in these rules as it would be considered routine maintenance" [Ref. 6, p. 5-23]. Since the rules for issuing permits in nonattainment areas are currently under review and control device replacements, if made, are often not routine maintenance functions, the analysis assumes both options, i.e., control equipment replacements are considered modifications or routine maintenance. The IEPA may rule that altering the method of operation of an existing device that increases emissions is a modification under the later definition. Such changes are not considered replacements in this analysis and are not affected by Rule 105(a)(3).

Table 1 summarizes the situations when Rule 105(a)(3) has a possible impact. The table reflects the most general assumptions about process and capacity changes. Unfortunately, Table 1 does not provide any additional insights into the economic impacts of Rule 105(a)(3). The results in Table 1 follow directly from the definitions used for less effective. To obtain additional insights more specific situations must be considered.

An important special case is to hold the capacity (load factor) of the firm constant but allow process changes to occur simultaneously with the control device replacement. Often the desire or need for a process change is the impetus for replacing the control equipment. The new process may be cleaner or dirtier than the existing process. Control device efficiencies and their applicability may also be affected by the process change.

Holding capacity and load factors constant results in the emission rate and emissions level definitions of less effective becoming equivalent. That is, if the units of production are not changed then emission rates will increase if and only if emission levels increase. Table 2 summarizes the situations when Rule 105(a)(3) has a possible impact and there is no change in capacity or load factors.

Tha table could be interpreted as indicating that there is no distinction between major and minor sources of pollution. This, however, is not the case. If major sources of pollution increase their emission rates as a result of a process change they are subject to the rules for issuing permits in nonattainment areas [Ref. 6]. Therefore, they must "install constant emission controls so that the lowest achievable emission rate (LAER) results" [Ref. 6, p. 5-13]. Since all sources affected by Rule 105(a)(3) are in nonattainment areas, the rule can only impact major sources of pol-

Table 1. Situations When Rule 105(a)(3) Has a Possible Impact

	Definition of Less Effective[d]		
	Emission Rate	Emission Level	Design Efficiency
Major and Minor Sources[a]			
Emission Rate and Level Increase[b,c]	Yes	Yes	Yes
Emission Rate Increases, Emission Level Does Not Increase	Yes	No	Yes
Emission Level Increases, Emission Rate Does Not Increase	No	Yes	Yes
Neither Emission Rate or Level Increase	No	No	Yes

[a]Major sources are defined in Ref. 6, pages 5-11. Sources that are not major sources are referred to as minor sources in this document.

[b]Emission rates and emission levels are defined on pages 2 and 3.

[c]Emission levels are assumed to satisfy New Source Performance Standards after the modification of replacing the control device is made whenever applicable.

[d]Definitions of less effective are provided on page 3.

Table 2. Situations when Rule 105(a)(3) Has a Possible Impact and There Is No Simultaneous Capacity Change but There Can Be a Process Change

	Definition of Less Effective[d]		
	Emission Rate	Emission Level	Design Efficienty
Major and Minor Sources[a]			
Emission Rate and Level Increase[b,c]	Yes	Yes	Yes
Neither Emission Rate or Level Increase	No	No	Yes

[a]Major sources are defined in Ref. 6, pages 5-11. Sources that are not major sources are referred to as minor sources in this document.

[b]Emission rates and emission levels are defined on pages 2 and 3.

[c]Emission levels are assumed to satisfy New Source Performance Standards after the Modification of replacing the control device is made whenever applicable.

[d]Definitions of less effective are provided on page 3. The emission rate and emission level definition of less effective are equivalent when there is no capacity change.

lutions if the new process is dirtier (i.e., has a higher uncontrolled emission level) than the existing one or all applicable control equipment with the new process is less efficient than the existing control device.

If the new process is dirtier, then the application of LAER may still result in increased emission rates and levels. In this case Rule 105 (a)(3) may be used to restrict the process change when the emission rate or level definition of less effective is used. Furthermore, if the maximum control efficiency using LAER is less than the efficiency of the existing device, then Rule 105(a)(3) could be used to restrict the process change using the design efficiency definition of less effective. The application of the rule in this way would result in increased costs because the firm cannot pursue a presumably cost minimizing or profit maximizing process change. Since emission rates would have increased with the process change it is likely there would be an environmental benefit. However, an emission offset would have been required in the absence of Rule 105(a)(3) and the environmental benefit is not guaranteed under this circumstance.

Whenever a process change and control device replacement is made that results in increased emission rates and levels and Rule 105(a)(3) has a marginal economic impact, the firm affected could argue that the process change reflects the closing down of the existing source and the starting up of a new source of pollution. If this argument is valid, then Rule 105 (a)(3) would have no effect under Scenario 2 because there is no control device being replaced. The effects of the rule would be those discussed under Scenario 3.

It is interesting to point out that using the design efficiency definition, any source that replaces its particulate control device and simultaneously changes the production process such that both total emissions and the emission levels from the source *do not* increase *could* be affected by Rule 105(a)(3). If this process and equipment change happens to include the use of a device that is as efficient as the old device, then Rule 105(a)(3) has no impact on the source. However, if the planned change would have used a less efficient device, Rule 105(a)(3) would have the likely effect of increasing the cost of production to the firm. Costs would most likely increase because the regulation restricted the firm from pursuing a presumably cost minimizing or profit maximizing production process, causing the firm to use a suboptimal process.

Although the direction of the change of the costs is fairly certain, the direction of change in benefits (reduced damages due to air pollution) is not clear. If a more efficient control device is used without any other modifications in the original (optimal) production change, then environmental benefits would result from the imposition of Rule 105(a)(3). However, if the firm abandons the production change, the benefits that would have occurred would be lost. The result is a double cost that can be attributed to the rule: 1) the direct cost to the firm resulting from the constraint on its operations, and 2) the lost benefits that would have occurred with the changes.

The situations and arguments are similar for minor sources of pollution except they are not subject to LAER [Ref. 6, Sec. 4.2, p. 5-14].

Therefore, Rule 105(a)(3) could affect more minor sources of pollution than it would major sources whenever process changes are coupled with control equipment replacements.

Table 3 summarizes the situations when Rule 105(a)(3) has a possible impact on a firm that does not alter its process but might change its capacity or load factor. For this situation the design efficiency and emission level definitions of less effective are equivalent. Emission rates can only increase if the capacity or load factor increases, or a less efficient control device is used. If a less efficient control device is used, emission levels must increase.

If emission rates increase for major sources of pollution and LAER is applicable, Rule 105(a)(3) has no marginal impact unless the capacity of the source increases, emission levels do not increase (a condition of LAER) and the emission rate definition of less effective is used. Under this special case, the emission rate increase is actually due to the capacity or load factor increase and not the replacement of the control device. A strict interpretation of Rule 105(a)(3) may, however, result in the firm having to alter its expansion plans. This would most likely result in increased costs and environmental benefits. The environmental benefits may not be positive or significant because the firm would be required to obtain an emission offset in the absence of Rule 105(a)(3).

If an emission source reduces its capacity or load factor simultaneously with a control device change, then emission rates could decrease while emission levels increase (i.e., a less efficient control device is used). Using the emission level or design efficiency definition of less effective would require the firm to use a more efficient control device or alter its capacity reduction and control replacement plans. This would result in increased costs but benefits may be positive or negative. If a more efficient device is used there would be a positive environmental benefit. If the plans of the firm are altered the benefits that would have occurred with the original change may be lost. The effect is a negative environmental benefit or an environmental cost.

Since emission levels can only decrease if a more efficient control device is used, Rule 105(a)(3) has no economic impact if the control equipment replacement would have resulted in reduced emission levels and rates in the absence of the rule.

The difference between minor and major sources of pollution is the possible interaction between Rule 105(a)(3) and rules for issuing permits in nonattainment areas. Rule 105(a)(3) may have marginal increased costs and benefits when applied to minor sources, since LAER does not apply. If control device requirements are considered to be normal maintenance, then the results for minor sources apply to major sources. This would significantly increase the marginal economic effects of Rule 105(a)(3).

Table 4 summarizes the situations when Rule 105(a)(3) has a possible impact when there are no simultaneous changes in capacity, load factor, or the process. Under these circumstances all the definitions of less effective are equivalent and emission rates and levels change in the same direction.

Table 3. Situations when Rule 105(a)(3) Has a Possible Impact and There is No Simultaneous Process Change but There Can be a Capacity Change

	Definition of Less Effective[d]		
	Emission Rate	Emission Level	Design Efficiency
Major Sources[a]			
Emission Rate and Level Increase[b,c]	No[e]	No[e]	No[e]
Emission Rate Increases, Emission Level Does Not Increase	Yes	No	No
Emission Level Increases, Emission Rate Does Not Increase	No	Yes	Yes
Neither Emission Rate or Level Increase	No	No	No
Minor Sources			
Emission Rate and Level Increase	Yes	Yes	Yes
Emission Rate Increases, Emission Level Does Not Increase	Yes	No	No
Emission Level Increases, Emission Rate Does Not Increase	No	Yes	Yes
Neither Emission Rate or Level Increases	No	No	No

[a]Major sources are defined in Ref. 6, page 5-11. Sources that are not major sources are referred to as minor sources in this document.

[b]Emission rates and emission levels are defined on pages 2 and 3.

[c]Emission levels are assumed to satisfy New Source Performance Standards after the modification of replacing the control device is made whenever applicable.

[d]Definitions of less effective are provided on page 3. The emission level and design efficiency definitions are equivalent when the process does not change.

[e]Analysis assumes the replacement of a control device is not considered a normal maintenance operation. Without this assumption the results for minor source apply to major sources of particulate emissions.

Table 4. Situations When Rule 105(a)(3) Has a Possible Impact and There Are No Simultaneous Process or Capacity Changes

	Definition of Less Effective[d]		
	Emission Rate	Emission Level	Design Efficiency
Major Sources[a]			
Emission Rate and Level Increase[b,c]	No[e]	No[e]	No[e]
Neither Emission Rate or Level Increase	No	No	No
Minor Sources			
Emission Rate and Level Increase	Yes	Yes	Yes
Neither Emission Rate or Level Increase	No	No	No

[a]Major sources are defined in Ref. 6, page 5-11. Sources that are not major sources are referred to as minor sources in this document.

[b]Emission rates and emission levels are defined on pages 2 and 3.

[c]Emission levels are assumed to satisfy New Source Performance Standards after the modification of replacing the control device is made whenever applicable.

[d]Definitions of less effective are provided on page 3. All three of the definitions are equivalent when there are no simultaneous process or capacity changes.

[e]Analysis assumes the replacement of a control device is not considered a normal maintenance operation. Without this assumption the results for minor source apply to major sources of particulate emissions.

If emission rates and levels increase, the firm is a major source, and equipment replacements are not considered normal maintenance, the Rule 105 (a)(3) has no marginal economic impact. The requirement to use LAER ensures that the most efficient control device is used. Since the capacity, load factor and process are not changed, an increase in emission rate is impossible. If equipment replacements are considered normal maintenance and the firm is not subjected to LAER, Rule 105(a)(3) would result in increased costs and benefits for major sources making only a control device replacement. However, if the replacement decision is delayed and the existing device is not operating at its design efficiency due to deterioration, Rule 105(a)(3) may result in loss of environmental benefits that might have occurred if the replacement decision was not constrained.

The arguments presented under Scenario 2 imply that if control equipment replacements are not considered normal maintenance, then Rule 105(a)(3) will only impact major sources of pollution if there are significant process changes or capacity (load factor) increases coupled with the replacement. Impacts to major sources when process changes are made may be minimal because a source may argue that the process change and control device replacement represents a new source of pollution and is not a control device replacement subject to Rule 105(a)(3). Furthermore, a very strict interpretation of less efficient is needed if Rule 105(a)(3) is to impact a major source when capacity increases are coupled with control device changes. It can also be concluded that Rule 105(a)(3) may result in increased costs but benefits may be positive or negative.

Scenario 3: The firm is a new source.

Of course Rule 105(a)(3) has no direct impact on new sources because a control device is not being replaced. However, it may have an impact on the control decisions made to comply with NSPS.

If the firm perceives that Rule 105(a)(3) may impose additional costs to the firm at some future date, the incentives to over comply with NSPS for particulate matter will be reduced. If the firm can technically and economically avoid over compliance it will do so. The result is a possible increased cost of complying with the NSPS and *increased* environmental damages because the firm has avoided over complying with the regulation.

Once the plant is built and operating the impacts discussed under Scenarios 1 and 2 are relevant for this firm.

Rule 105(a)(3) may also have an indirect impact on new sources because the rule is considered a "cap" rule by the Agency. An impact exists because Sec. 9.3 of the proposed rules for issuing permits in nonattainment areas states:

> *The allowable emission standard for existing sources of particulate matter may be reduced pursuant to a "cap rule" (a rule restricting emissions in a nonattainment area to actual emission levels as of a certain time), thereby reducing available emission offset* [Ref. 6].

If Rule 105(a)(3) is considered a "cap rule," then for major new or modified sources the cost of obtaining an emission offset will be increased. Positive benefits should occur since the source cannot use offsets that have already been banked as a result of over compliance with existing particulate emission limits.

Scenario 4: The firm is located in or is subject to any environmental regulation of the State of Illinois

This situation is a direct extension of Scenario 3. The promulgation of Rule 105(a)(3) will have the effect of reducing the incentive to over comply with particulate matter regulations. In addition, the promulgation of a regulation which applies only to sources of pollution that have acted in good faith and not only complied with an existing regulation but over complied, can cause a firm subject to any Illinois environmental regulation to rethink its control decision.

This coupled with the fact that many firms that have not complied with applicable environmental rules are seeking modification in the rules to allow them to operate without additional emission controls [Ref. 12 and 13] can create an atmosphere that is detrimental to effective and efficient environmental control. The result would be higher costs of enforcement and/or reduced environmental benefits.

ECONOMIC IMPACTS TO RESIDENTS OF ILLINOIS

Since Rule 105(a)(3) does not require any additional emission reductions, its economic impact will be to reduce possible cost saving or profit increases resulting from control equipment replacements. Therefore, its effect on cost and availability of goods and services and employment will be negligible at this point in time. Future effects are expected to be small because the number and size of affected sources are limited, the number of control device options available are small, and current operating and control practices are not affected.

ECONOMIC IMPACTS ON AGRICULTURE

There are no anticipated direct costs to farmers. Grain elevator operators and food processing plants may be affected. However, the potential number of these sources affected is small resulting in a relatively small total impact.

If environmental quality benefits result from the rule, then there could be a positive economic impact to the agriculture sector. However, total benefits are expected to be small and benefits to agriculture would be significantly smaller.

ECONOMIC IMPACT ON LOCAL GOVERNMENT

Except for local expenditures for enforcement of the rule and costs associated with compliance by local government-owned facilities, there

should be no impact of the rule on local governments. In particular, it is not anticipated that there will be any effect on taxes, local services or community expansion.

ECONOMIC IMPACTS ON COMMERCE AND INDUSTRY

The listing of sources potentially affected by Rule 105 (a)(3) in Appendix A provides some insights into the distributional effects of the rule on commerce and industry.

New industries may be affected if they perceive the rule as reflecting a generally adverse atmosphere in Illinois relative to environmental control. If thought to be significant it could deter new sources from locating in Illinois. It may also affect their decisions on complying with NSPS. If Rule 105(a)(3) is considered a "cap rule," it will impact new and modified sources by increasing the cost of obtaining emission offsets. These impacts are discussed to identify them as being possible and not necessarily being likely to occur.

Since the costs of goods and services and their availability are not expected to be appreciably affected by the rule, price impacts of the rule are expected to be minimal.

5 CONCLUSION

The following conclusions can be reached concerning the economic impact of Rule 105(a)(3):

(a) Quantification of the costs and benefits of the proposed rule is not economically feasible;

(b) The proposed rule has no direct impact on any source that would not replace its control equipment in the absence of the rule;

(c) Regulations for new and modified sources can significantly affect the economic impacts of the proposed rule;

(d) Rule 105(a)(3) may result in increased costs of complying with particulate matter emission limits. The benefits of the rule may be positive or negative;

(e) If control equipment replacements are not considered normal replacement, then only a few major sources of pollution may be affected by Rule 105(a)(3). Major sources can only be affected if the control device replacement is coupled with process changes or capacity (load factor) increases;

(f) If process changes can be argued to constitute the opening of a new source, then Rule 105(a)(3) does not directly impact control device replacements coupled with these process changes;

(g) A strict interpretation of less effective is needed before Rule 105(a)(3) can have an impact on major sources of pollution that couple control device replacements with capacity expansions;

(h) Using the design efficiency definition of less effective can theoretically result in increased costs and reduced benefits for sources that couple a control device replacement with a process change;

(i) New sources may avoid over compliance with NPSP as a result of Rule 105(a)(3);

(j) New sources may have increased costs for obtaining offsets if Rule 105(a)(3) is considered a "cap rule";

(k) Any source of pollution in Illinois may be inclined to reduce its pollution regulation compliance efforts in response to Rule 105(a)(3); and

(l) No significant adverse distributional effects are expected if Rule 105(a)(3) is promulgated. This includes effects on prices, employment, local government services and agriculture.

6. REFERENCES

1. *Proposed Revisions to Rules 101, 103, and 105 of Chapter 2, Air Pollution (Permit Conditions and Maintenance Programs)*, Agency File #4780-F, I, submitted to the Illinois Pollution Control Board (March 19, 1979).

2. *State of Illinois Air Pollution Control Regulations*, printed by Illinois Environmental Protection Agency, Revised (Sept. 1978).

3. *Proposed Revisions to Rules 101, 103, and 105 of Chapter 2, Air Pollution*, Illinois State Chamber of Commerce, Testimony by Raymond J. Bodnar before the Illinois Pollution Control Board (March 23, 1979).

4. *Proposed Revisions to Rules 101, 103, and 105 of Chapter 2, Air Pollution (Permit Conditions and Maintenance Programs)*, Interim Order of the Board (by Mr. Goodman), R79-3 (March 27, 1979).

5. *Institute for Environmental Quality - Economic Impact Study*, Public Act 79-790, Senate Bill 805 (Sept. 1975).

6. *Rules for Issuance of Permits to New or Modified Air Pollution Sources Affecting Nonattainment Areas*, proposed by the Illinois Environmental Protection Agency (March 30, 1979).

7. Paul Farber, Staff Member, Environmental Technology Assessment Program, Argonne National Laboratory, Argonne, Ill., personal communication (April 1979).

8. Sidney R. Orem, Technical Director, and Stephen Kaffee, Industrial Gas Cleaning Institute, Alexandria, Va., personal communication (April 1979).

9. Richard A. Young, Editor, Pollution Engineering Magazine, and lecturer, Operation and Maintenance of Air Pollution Particulate Control Equipment, U.S. EPA and Pollution Engineering, Barrington, Ill., personal communication (April 1979).

10. Steve Beyers, G.O. Plant Engineer, Caterpillar Tractor Co., Peoria, Ill., personal communication (May 3, 1979).

11. *Handbook - Industrial Guide for Air Pollution Control*, prepared by PEDCo Environmental, Inc., for the U.S. Environmental Protection Agency (June 1978).

12. Proposed Amendment to Rule 204(c)(1)(A) by Ashland Chemical Company Pollution Control Board Document no. R77-15 (Nov. 16, 1970).

13. Proposed Amendment to Rule 203(g)(1) by the City of Rochelle, Pollution Control Board Document No. R78-15 (Nov. 30, 1979).

APPENDIX A

LIST OF CURRENT SOURCES POSSIBLY AFFECTED BY RULE 105(a)(3)

Table A1. Sources Potentially Affected by Rule 105(a)(3) in Cook County, Illinois, in 1975

Sequence No.	Plant Name	TSP in Ton/Yr Allowable	Actual
1.	Trumbull Asphalt Co.	1,280	85
2.	Cornell Forge Company	49	4
3.	H.P. Smith Paper Co.	633	4
4.	Johnson and Johnson	172	14
5.	Miles Laboratories	203	26
6.	Nalco Chemical Co.	695	109
7.	3M Co - Industrial Tape Div.	92	25
8.	CPC - Industrial Division	9,025	2,246
9.	W. R. Grace Construction Products Div.	16	5
10.	Superior Graphite Comapny	268	148
11.	Borg Warner	161	19
12.	Signode Corp.	192	29
13.	Ashland Chemical Company	30	10
14.	Wilson & Co. Gelatin Division	15	4
15.	Benj Harris & Co.	69	13
16.	Chicago Heights Grayiron Foundry, Inc.	22	1
17.	Borg-Warner Calumet Steel Division	360	16
18.	Columbia Tool Steel Company	55	4
19.	Stauffer Chemical Coindustrial Chem Div	1,310	381
20.	Com Ed - Bloom Peaking Units	138	50
21.	Keystone Steel & Wire	60	31
22.	General Electric Co.	17	5
23.	Amsco Division-Abex Corporation	911	84
24.	Dawes Products Co.	153	12
25.	Standard T Chemical Co Inc.	65	2
26.	North American Car Corporation	2	1
27.	Western Electric Co. Hawrhorne Works	544	162
28.	General Elec/Hot Point-Range Division	84	3
29.	St. Regis Paper Co.	38	1
30.	Meyer Material Co Plant 1	270	102
31.	Metro Containers	236	106
32.	Planters/Curtiss Confectionery	182	84
33.	Revere Aluminum Building Products, Inc.	9	1
34.	Harvey Technical Center	9	6
35.	Allied Asphalt Paving Co.	33	20
36.	Vulcan Containers Inc.	5	1
37.	Vulcan Mold and Iron Company	212	73

Table A1. (Cont'd)

Sequence No.	Plant Name	TSP in Ton/Yr Allowable	Actual
38.	Bell & Howell Co. Lincolnwood MFG	14	9
39.	General Motors Corp - Electric-Motive Div	69	43
40.	Material Service Corporation	140	114
41.	Reynolds Metals Co.	1,470	469
42.	Vulcan Matls - Lime Plant #540	342	19
43.	Vulcan Mail Co: McCook Quarry #378	615	440
44.	Armak Company Chemical Division	54	15
45.	Universal Oil Products Co - Process Div.	105	17
46.	N L Ind Metal Dev	73	4
47.	Benjamin Moore & Co.	17	7
48.	Sloan Valye Company Foundry Division	125	6
49.	International Harvester Co.	98	28
50.	Bell & Gossett Fluid Hndlg Div of IT&T	4	1
51.	Addressograf-Multigf	16	4
52.	A.B. Dick Company	80	30
53.	Borden Chemical -Mystik Tape Div.	42	3
54.	Interlake, Inc. Riverdale Plant	534	427
55.	Wells Manufacturing Company	841	41
56.	Com Ed - Ridgeland Station	325	17
57.	Com Ed - Ridgeland Station	933	28
58.	Koppers Company Inc. Org. Matls. Div.	164	28
59.	Metropolitan Sanitary District	97	10
60.	Marblehead Lime Co.	952	141
61.	Material Service Corp.	652	446
62.	Material Service Corp. Yard 59	632	10
63.	Skil Corp.	17	2
64.	Winnetka Electric Plant	16	7
65.	Meyer Material-Hanover Park Plant No 3	284	37
66.	GTE Automatic Electric Inc.	8	6
67.	Edward Hines Lumber Company	30	29
68.	Ford Motor Company	225	41
69.	Central Can Company - 19th St Plant	4	1
70.	Continental Can Company, Inc.	20	9
71.	Ekco Products, Inc.	19	14
72.	W.F. Hall Printing Company	34	31
73.	Harco Aluminum Co.	36	35
74.	Lawkin Leather & Rubber Company	15	6
75.	Marblehead Lime Co.	1,502	106
76.	Great Lakes Carbon Corp.	175	47

Table A1. (Cont'd)

Sequence No.	Plant Name	TSP in Ton/Yr Allowable	Actual
77.	Hyon Waste Management Services Inc.	18	15
78.	Rail-To-Water Corporation	46	2
79.	Proctor & Gamble Mfg. Co.	1,286	280
80.	Sherwin-Williams Co.	138	59
81.	Standard Brands Inc. Fleischmann Mfg	15	13
82.	Indiana Grain Co-Operative	65	6
83.	Com Ed - Crawford Station	3,602	860
84.	Chicago Castings Co.	289	92
85.	United States Steel Corp. South Works	1,101	444
86.	Interlake - Chicago Blast Furnace Plant	216	56
87.	Wisconsin Steel Works	1,452	211
88.	Republican Steel Corp.	2,773	2,123
89.	Com Ed - Fisk Station	1,008	853
90.	Com Ed - Calumet Peaking Units	387	67
91.	Central Soya Inc.	240	55
92.	Celotex Corp.	1,131	45
93.	Cargill, Inc Commodity Marketing Div.	1,741	617
94.	Amforge Incorporated	171	33
95.	Continental Grain Co-Elevator C	99	6
96.	American Can Co.	175	48
97.	Libby McNeill & Libby	58	51
98.	Stauffer Chem - Industrial Chemical Div	764	105
99.	Calumet Incinerator	150	58
100.	Garvey Grain Inc.	48	17
101.	Allied Metals	34	4
102.	Acme Barrel Co	93	17
103.	Ingersoll Products	102	34
104.	Garvey Grain Inc.	162	45
105.	Illinois Maintenance Co.	32	8
106.	Illinois Institute of Technology	21	18
107.	Sunbeam Appliance Co.	122	28
108.	Falstaff Brewing - Malting Division	314	73
109.	Dixie Portland Flour Mills Inc.	92	15
110.	Container Corporation of America	89	38
111.	United Wallcovering	13	1
112.	General Mills Inc.	1,446	124

Table A1. (Cont'd)

Sequence No.	Plant Name	TSP in Ton/Yr Allowable	Actual
113.	Best Foods Div CPC International Inc.	7	6
114.	Best Foods Div CPC International Inc.	12	10
115.	R.R.Donnelley & Sonsco	439	55
116.	E. J. Brach & Sons Div.	19	14
117.	Oscar Meyer & Co.	52	23
118.	Continental Can Co.	191	7
119.	Dutch Brand Division Nashua Corp.	124	62
120.	Ashland Petroleum Company	14	8
121.	Rheem Mfg. Co.	676	169
122.	Teledyne Industrial Diecast	310	151
123.	Stewart-Warner Corporation	16	14
124.	Continental Can Co.	16	8
125.	Northwest Incinerator	472	252
126.	John & Ollier Engraving Co.	11	10
127.	Regensteiner Publishing Enterprises, Inc.	24	6
128.	University of Ill. Circle Phys. Plant	81	58
129.	Palmer House Hotel	19	16
130.	Abitibi Corp.	491	8
131.	LaSalle Bank Bldg.	10	8
132.	Chicago Tribune Co.	214	10
133.	American Steel Container Co.	28	5
134.	University of Ill Medical Center	295	251
135.	W. H. Hutchinson & Son Div of Nat. Can	7	5
136.	Gutman and Company	8	1
137.	Cha-Stateway Gardens	25	17
138.	Marvel Metal Products Co.	3	1
139.	Uniroyal Inc.	59	15
140.	Pullman-Standard Division	4	1
141.	Cha-Gov Henry Horner Homes Extension	21	9
142.	Ford Motor Co. Chicago Stamping Plt.	22	3
143.	Amoco Chemicals Corp.	144	29
144.	Lake-River Terminals Inc.	12	3
145.	Witco Chemical Corp.	196	65
146.	Clark Oil & Refining Corp.	384	269

Source: Illinois Environmental Protection Agency Computer Printout (March 5, 1979)

Table A2. Sources Potentially Affected by Rule 105(a)(3) in Will County, Illinois, in 1975

Sequence No.	Plant Name	TSP in Ton/Yr Allowable	TSP in Ton/Yr Actual
1	Stauffer Chemical Co.	269	62
2	National Bottle Corp. (Universal Glass)	82	64
3	Union Oil Co. - Chicago Refinery	512	316
4	Mobil Joliet Refining Corp.	1,256	608
5	Amoco Joliet Plant	1,918	794
6	Glidden-Durkee Division of S.C.M.	383	37
7	Stepan-Industrial Chemicals Div.	316	106
8	Meyer Material Company	285	91
9	Rexene Styrenics Co.	1,017	95
10	Joliet Grain Company	22	18
11	Lemont Manufacturing Co. Div.	215	15
12	Elmhurst-Chicago Stone Co. Barb. Cr.	250	121
13	Collier Carbon & Chemical Corp.	328	229
14	Caterpillar Tractor Co.	82	24
15	Johns Manville Products Corp.	1,037	141
16	Com Ed Joliet Station	5,190	4,427
17	Olin Corp. Blockson Wks., Joliet Plant	9,605	1,326
18	Vulcan Materials Company	316	159
19	American Cyanamid Company	140	8
20	Texico Inc. 2nd & State St.	777	526
21	Material Service Corp. (YD #60-Pipe Plant)	60	9
22	GAF Corporation	1,182	61
23	Com Ed - Will County Generating Station	5,185	3,902
24	Andres & Wilton Farmers Grain & Supply	24	22
25	Kerr Glass Manufacturing Corporation	293	170

Source: Illinois Environmental Protection Agency Computer Printout (March 5, 1979)

Table A.3. Sources Potentially Affected by Rule 105(a)(3) in Macon County, Illinois, in 1975

Sequence No.	Plant Name	TSP in Ton/Yr Allowable	Actual
1.	A. E. Staley	14,007.8	3,173.4
2.	Firestone Tire	757.9	101.9
3.	Decatur Foundary	7.4	1.4
4.	F.S. Feed Div.	12.5	3.6
5.	Grigoleit Co.	29.1	16.8
6.	Collins Asphalt	20.3	17.0
7.	Mueller Foundry	185.3	104.7
8.	Traver Ready Mix	20.5	5.7
9.	Sangamon Constr.	29.3	7.7
10.	Perkinson Co.	36.3	21.8
11.	Dunn Company	14.8	6.2
12.	Grohne Concrete Products	23.1	3.8
13.	Wagner Casting	1,128.1	511.8
14.	Norfolk & Western	198.3	194.3
15.	Borg Warner	61.0	8.7
16.	Archer Daniel Midland-North	752.5	208.5
17.	Chambers, Bering Quinlin	362.5	181.7
18.	Laplace Coop. Grain	10.4	10.3

Source: Illinois State Implementation Plan for Air Pollution Control, Vol. 2: Total Suspended Particulates, p. 7-59.

Table A.4. Sources Potentially Affected by Rule 105(a)(3) in Madison County, Illinois, in 1975

Sequence No.	Plant Name	TSP in Ton/Yr Allowable*	Actual
1.	Duncan Foundry & Machine		8
2.	Laclede Steel Co.		365
3.	Owens, Illinois, Inc.		689
4.	Olin Corporation Brass Group		143
5.	A.D. Smith Corp.		7
6.	American Steel Foundries		94
7.	Reilly Tar & Chemical Corp. Plt #13		35
8.	Shell Oil Co.		3,660
9.	Amoco Oil Co.		680
10.	Richard Brick Co.		3
11.	C. M. Lohw, Inc.		15
12.	Illinois Power Co. Stallings Reg. St.		4
13.	St. Louis Slag Products Inc.		27
14.	Archer Daniels Midland Co.		376
15.	Granite City Steel Company		2,854
16.	Federal Metallurgical Division		96
17.	Mississippi Lime Co.		95

Source: Illinois State Implementation Plan for Air Pollution Control, Vol. 2: Total Suspended Particulates, p. 7-100

*Allowable emissions not available.