ABSTRACT

RICHARD JAMES BROSTROM, JR. The Impact of Public Comment on Regulatory Decision-Making: The Arsenic Standards. (Under the direction of Dr. Michael A. Berry)

A method for the characterization and analysis of public comment on an EPA standard was proposed. The arsenic emissions standard was chosen since it was the most commented upon standard ever promulgated by the Agency. The proposed method worked well, as participating groups were clearly defined and the intent of each of the groups was reasonable in relation to their inferred environmental ideology. The effectiveness of each of the major groups of commenters was measured by relating the number of comments submitted versus the number of changes made.

Comments received on the risk assessment constituted 89 percent of all comments submitted, over half were submitted by citizens not belonging to any particular special interest group. Few changes were made to the risk assessment as a result of the comments and the effectiveness of the comments for all groups was less than two percent.

Comments submitted on the technical issues of the standard were more successful in causing change to the proposed standard. The effectiveness of each group varied widely, but the average effectiveness was 20 times greater than for comments submitted on risk issues. Many changes dealt with the submittal of new cost and emissions data by the affected industries.

To allow for a discussion of the comment process, Godschalk's Exchange Model was altered and applied to the standard. The Exchange Model indicated that the comment process was successful except in the Agency's response to the public comment. A group theory model was used to analyze the the Agency's response to the comment. This model indicated that the changes made to the proposed standards by the EPA could not be explained rationally on the basis of public comment. Other factors which influence EPA must be considered when explaining the Agency's decisions in light of the public intent.

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## SECTION I - INTRODUCTION/STUDY PURPOSE

### Introduction

The chain of events which leads from public input to governmental agency action is difficult to describe. The dynamics of an agency's decision-making process is normally beyond casual observation (Berry, 1984). Yet, this link is the keystone which insures democracy and commands accountability in bureaucratic decision-making. It is a bureaucracy's responsibility to consult with the general public and the various interest groups. In environmental rule-making, citizen involvement forces equity, efficiency and effectiveness, as both corporate and environmental critics seek to curb administrative discretion in two ways - through public participation and through litigation.

Public comment on proposed rules is one of the few nonadjudicatory means for the expression of public opinion of a proposed agency action. Congress has taken steps to insure adequate public involvement in agency actions by demanding that certain measures be taken to involve the public before a rule can be finalized. In its rule-making procedures, EPA is required to actively solicit comment from affected publics, which includes citizens, environmentalists, and the potentially regulated industry.

Although the Agency is not compelled to make any decisions in light of comments received, it is compelled, many times, to make very difficult decisions on issues without legislative direction, well

defined policy, or regulatory precedent. It is in these controversial issues, for example, the determination of acceptable risk, where public comment becomes an important factor in the Agency decision-making process. Since public input includes comments from concerned citizens, environmental groups and industrial supporters, the Agency is often forced to view many sides of the impacts which stem from a regulation. Each rule promulgated has a varying degree of public involvement. As each environmental rule is promulgated, EPA builds its own precedents on these controversial issues with input from the public.

Precedents are also created by the courts, as many of these rules are adjudicated (more than 80 percent of all environmental standards (Pederson,1975)). The courts establish precedents for the Agency to follow based upon its decisions in light of the public will and the technical data. The public will is determined on the basis of comment received during the public comment period which accompanies proposed standards. However, citizen group suits have declined since 1975 due to the willingness of officials to consult and accomidate citizen demands rather than precipitate a lawsuit (Lake, 1982).

Public input, then, affects Agency action on current environmental standards, but is also contributing to the policy-creating and precedent-setting actions of EPA which will affect environmental legislation for years to come.

A good example of environmental rule-making which incorporates a large amount of public involvement in critical issues can be found in section 112 of the Clean Air Act. A section 112 regulation is commonly called a "NESHAP", for national emission standards for hazardous air pollutants. The congressional intent was to use section 112 NESHAP's

to deal effectively with air toxic "hot spots", and provide a catch-all for non-criteria pollutants which may pose a threat to the public health. With concern for toxic air pollutants growing, more and more environmental rules will be promulgated under section 112 legislation. Figure 1.1 illustrates section 112 and other commonly used statutory mechanisms for regulation under the Clean Air Act.

As can be seen from Figure 1.1, section 112 is quite different from other sections of the Act in two major areas:

1. NESHAPS are standards which are to be developed without the consideration of costs.

2. NESHAPS are standards which are to be developed with great consideration to evidence of demonstrated health effects.

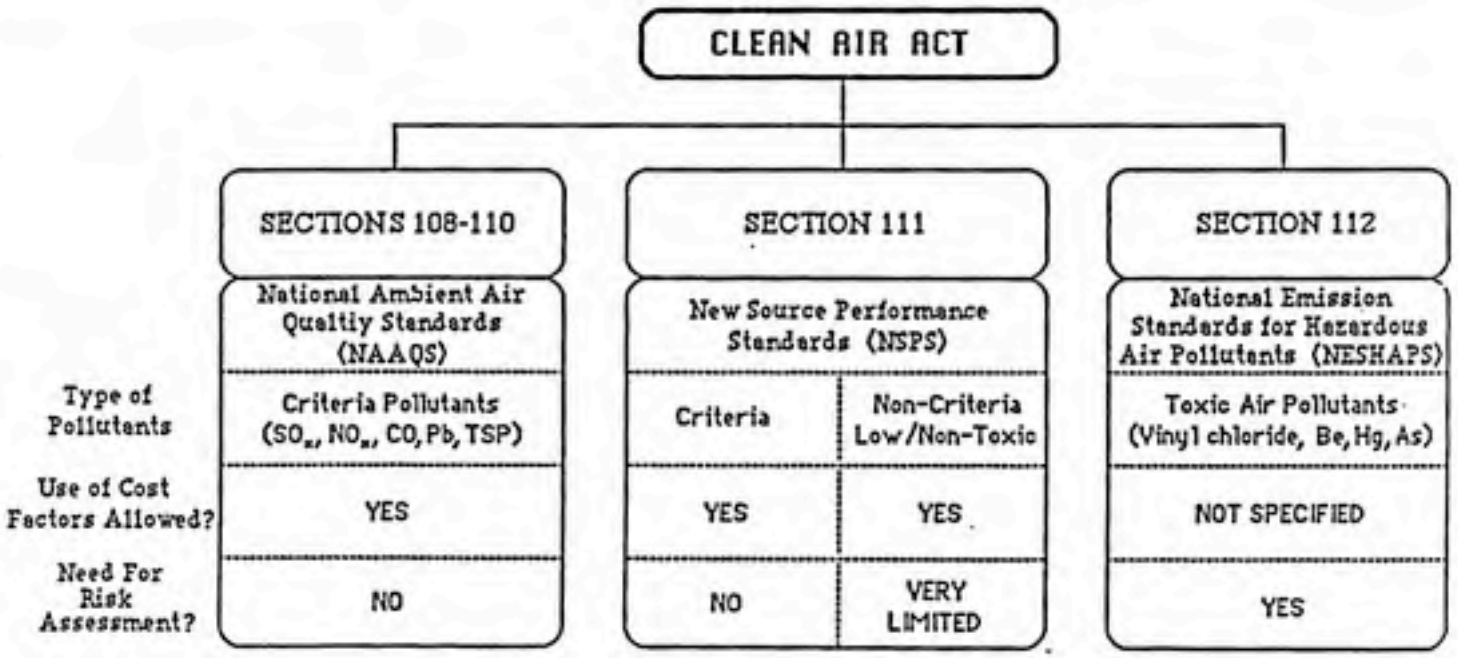


FIGURE 1.1 SECTION 112 AND THE CLEAN AIR ACT

The current body of scientific knowledge is incapable of demonstrating health effects from many air carcinogens with any degree of certainty. It is this distinction which make section 112 so important for the preservation of the public health, while at the same time makes the standard-setting process so unwieldy.

Like the criteria pollutant regulations, section 112 has technical issues which must be resolved by EPA in areas such as the selection of prominent emissions source categories. In addition, the best available emissions control technologies must be determined by an analysis of existing or tested pollution control devices. The major difference between NESHAP's (section 112) regulation and NSPS's (section 111) regulation is the basis for regulation. While cost/benefit analyses were spelled out by Congress for use in section 111, the basis for regulation in section 112 is risk assessment.

Unlike criteria pollutants, which have a definite measurable health effect, health affects from toxic air pollutants are considered permanent. The most common endpoint used for study is cancer. With air carcinogens it is much more difficult to identify the exact cause/effect relationship of pollutant source and health impact. Given the Agency's current approach to air carcinogens, the public is at some risk if exposed to any ambient concentration of carcinogen, however small. The explanation for the acceptance of a non-threshold theory for regulating air carcinogens can be found in the Agency's Air Carcinogen Policy. Here, the Agency embraces an opinion put forward by the National Academy of Sciences that:

> "...when there is exposure to a material, we are not starting at an origin of zero cancers. Nor are we starting at an origin of zero carcinogenic agents in our environment. Thus, it is likely that any carcinogenic agent added to the environment will act by a particular mechanism on a particular cell population that is already being acted on by the same mechanism to induce cancer." (EPA,1983)

The use of risk assessment as a basis for regulation incorporates, to a great extent, the issues in which the Agency must seek public involvement to aid in its decision-making. The very issues discussed earlier to which the Agency does not have a set policy are issues which are incorporated into section 112 regulation. These issues include acceptable/non-acceptable risks, regulation in the absence of a clearly established health endpoint, and the use of economics as a factor in a health-based regulation. Without a clearly defined, politically acceptable policy in these issues, EPA must satisfy the public will, or face the consequences in court.

If a single section 112 regulation incorporates Agency use of public involvement as an input into the regulation process, it would be the national emissions standards for inorganic arsenic promulgated in August, 1986. The purpose of the rule was to limit the amount of inorganic arsenic emitted into the air from various industrial sources. Many of the sources which emitted the volatile metal were located in urban areas of the country. While the Agency had some evidence which indicated that people living near the sources would probably receive some health benefits from the regulation, there could be no doubt that the economic impacts resulting from the standard would be significant to employees and local economies.

The focal point of the standard centered primarily on one arsenic emission source, the ASARCO-Tacoma copper smelter in Tacoma, Washington. Almost one fourth of all arsenic emitted to the atmosphere nationwide was dumped from this smelter with nearly two million residents within 50 km (EPA,1983). The smelter, which employed 600 people and provided over $20 million in local revenues, was already on the brink of closure as inexpensive copper from South America began to make its way into the U.S. market (U.S. Bureau of Mines, 1984). EPA studies indicated that a strict arsenic emission regulation would most certainly close the plant (EPA,1983).

On the other hand, several well documented epidemiological studies had been published which showed that arsenic caused lung cancer in exposed smelter workers, so EPA had a well documented health risk. This risk was stated publicly by the Agency in the proposed regulation and caused an immediate reaction by the public and the affected industry. Because of the urban location of the smelter, an enormous amount of publicity occurred when the Agency announced its plans to regulate arsenic emissions from copper smelters. This publicity was soon turned by the Agency into public comment as EPA sought public input from the community to aid in its decision-making.

## Study Purpose

Although it is clear that the Agency went to great lengths in the solicitation of public comment on the arsenic standards, it is not clear as to whether the comments received actually served their intended purpose. Currently, no adequate method of quantitatively

analyzing the public comment process exists. The purpose of this paper is to suggest a method for analysis of the public comment process currently used in environmental rule-making. The standard chosen for study is the inorganic arsenic standard promulgated under section 112 of the Clean Air Act in August, 1986.

Since more than 2500 comments were received by the Agency, this rule-making also provided a unique opportunity to measure a cross-section of public comment on an environmental standard with some measure of statistical validity. In characterizing the comment, the following questions were be addressed:

- Who participated in establishing the standard?
- How intensively did the major groups (environmental, business, industrial, university, local government, etc...) participate?
- What was the collective "intent" of each of the groups who participated in the process?
- How effective were each of the groups in convincing EPA to rethink its position and change the proposed arsenic standard?
- Did EPA respond deferentially to comments submitted by any particular group?

The different modes of solicitating public opinion, hearings or letters, are compared and contrasted as to their effectiveness in prompting Agency changes to the standard. Since the study will indicate issues in which the Agency is more apt to respond, groups

petitioning the Agency can focus their limited resources into areas in which the Agency is most likely to change its proposed position. By analyzing the effectiveness of comments submitted by citizens as compared to comments submitted by groups which shared the same opinion on an issue, the relative value of different groups which claim to represent affected publics can be assessed.

Without a clear identification of the public intent as indicated by the comments submitted, there is little chance for a meaningful determination of the effectiveness of the public comment process. This study develops a method for determining the intent of each of the groups who participated in the process. By applying the intent of each of the groups with their relative success in prompting EPA to change the proposed standard, a measurement of the effectiveness of each group is possible.

Finally, this study employs two models for analzing the results of the quantitative analysis. Godshaulk's Exchange Model is used to analyze the effectiveness of the comment period framework used by EPA. In order to explain EPA response to the public comment, a group theory model is used. By incorporating these methods for analysis and the public participation models, the utility of the public comment period for environmental regulation can be assessed.

## SECTION II - LITERATURE REVIEW

### Goals of Public Participation

The use of public input as a guide to government agency decision-making has developed a body of theoretical approaches which can be used to understand the complex process. There has probably been more ink spilled by policy analysts discussing the merits of the public involvement process than by concerned citizens using it. No analysis of the effectiveness of the public involvement process is meaningful without a presentation of the intended goals of public participation in agency actions. James Creighton, author of the U.S. Department of the Interior's Public Involvement Manual, lists three goals for useful public participation.

- CREDIBILITY - Public comment is incorporated into the decision-making process to add to agency credibility with groups having highly divergent viewpoints.

- IDENTIFICATION OF PUBLIC CONCERNS - Public comment allows a government agency to receive input from many different perspectives.

- DEVELOPING CONSENSUS - Comment serves to aid an agency in developing a policy which satisfies the most people. (Creighton,1980)

It is this last point which is particularly important in environmental rule-making, as the Environmental Protection Agency seeks the "path of least resistance" in its final regulations. However, the

development of consensus is rarely achieved by Agency alignment with one view or another. Rather, the results of public comment most often represent a compromise of competing interests. Agency compromise was recognized nearly half a century ago in an article which appeared in the Journal of Public Policy. Here, the Agency's use of public opinion was described as a "fiction used to describe an amalgam of competing interests which is shaped and reshaped in the furnace of their conflicts." (Fainsod, 1940). This opinion points out the fact that the public comment process can be described as a fierce battleground for competing interests, rather than simply a means for the agency to collect the opinion concerned citizens.

## Realities of Public Involvement

Public input into agency action has been intensely criticized by policy analysts and various citizen groups which seek a participatory role in the development of governmental regulation. Some of this criticism is based upon common misunderstandings of the realities of the public involvement process. Creighton (1980) listed some common objections to the currently used public involvement process and the realities of the process which serve to dispel common myths. Three of the most frequent objections to public involvement are listed in Table 2.1

The last objection listed in Table 2.1 identifies the increase in time and cost to an agency as a result of the public participation process and is represented in Figure 2.1. This figure shows that the costs of a standard can actually be reduced when time and money are

TABLE 2.1 COMMON OBJECTIONS TO THE PUBLIC INVOLVEMENT PROCESS

| Objection | RESPONSE |
|---|---|
| An Agency is obliged to act in the best interest of the public, so the public need not be involved. | An Agency does not always know the public good, especially in local situations. |
| Only a small percentage of affected persons can actually be involved. | The organized public can be well represented by groups. |
| Public input brings politics into a professional decision process. | Many agency decisions are influenced by politics. |
| Public input is very expensive and time consuming for the agency. | Public input reduces cost and time for implementation. |

Source: Creighton, Public Involvement Manual, 1980

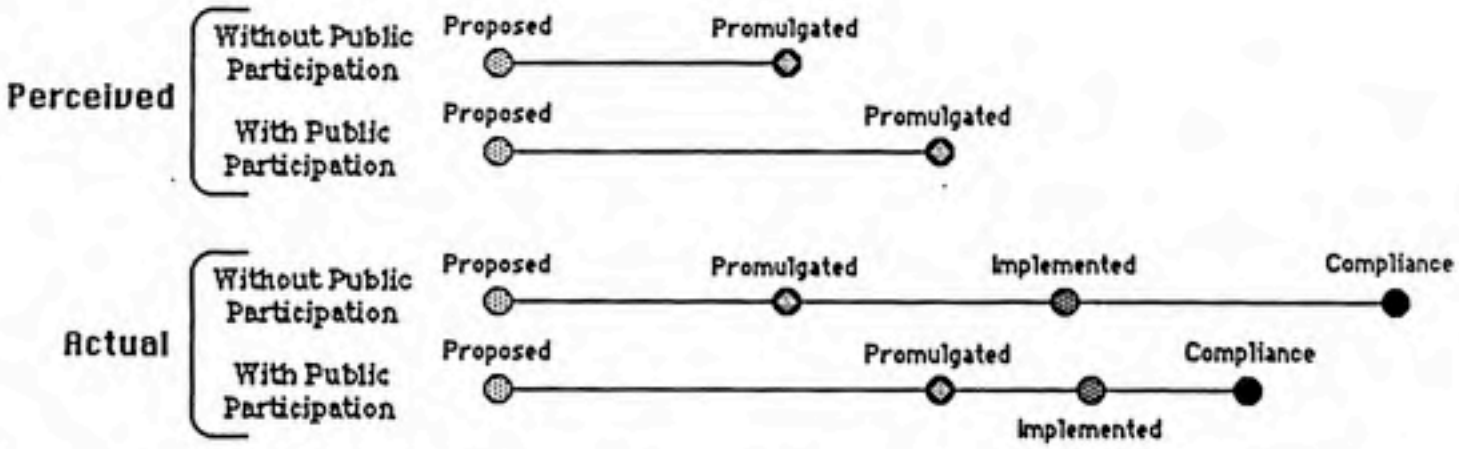


FIGURE 2.1 ACTUAL VS PERCEIVED COSTS/TIME OF A REGULATION

Source: Creighton, Public Involvement Manual, 1980

spent previous to the promulgation of a rule, since the true costs of a standard must include the implementation phase. By satisfying the public demands before promulgation, much of the implementation cost is reduced due to the fact that costly citizen suits can be avoided and industry compiance is more quickly realized.

Other misunderstandings have been explored by policy analysts who present them in hopes of preventing unnecessary frustration on the part of participating groups (Buck, 1981; Godschalk, 1981; Creighton, 1980). Three of the major fallacies of public involvement in government decision-making are presented below.

- FALLACY 1: All persons affected by a regulation should be involved. The belief that all affected persons should participate in the public participation process is rooted in a "town-meeting" approach to public decision-making. Although ideal, this situation would most certainly cause increased chaos in an already chaotic process. Administrative realities and the wide scope of much of the environmental legislation make representative participation essential. Fortunately, the public can be well represented by various groups on both ends of the spectrum of environmental philosophy. One study has shown that the views of 63 percent of the public were adequately represented by a single environmental group (Buck, 1981).

- FALLACY 2: Public participation outcomes are binding to the Agency. As mentioned in Section I, even though the public must be heard from, the Agency is not compelled to make decisions based upon the outcome of the public involvement procedures. However, the public can file suit against EPA based upon Agency decisions made in light of the public comments presented, and the technical evidence which exists.

- FALLACY 3: Public Participation is an integral part of Agency decisions. In many cases, the public input has little bearing on the outcome of a regulation. This is especially true in issues in which EPA has a well established regulatory precedent. Where this is the case, the Agency may be merely "going through the motions" in the public involvement process. However, for regulatory issues in which there is no foundation for a decision, the Agency may have to incorporate public comment as an integral part of its decision-making process.

Model of Public Participation

Different models have been proposed to depict the process of public involvement in agency decisions. Godschalk and Stiftel (1981) proposed a model which defines the process in terms of "exchange phases" between an agency and the public. Although the model was proposed for an agency's planning activities, the phases can be easily adapted to regulatory analysis. Figure 2.2 depicts the model as applied to the regulatory decision-making process used by EPA.

This process, as described by the model, involves exchanges between EPA and the public on three levels, or "phases". The first of these is an exchange of opportunity. Here, the government agency must make itself accessible to the public. In the case of environmental rule-making, this availability is displayed mainly in two modes, the public hearing and the acceptance of comment letters. In turn, the public is responsible for its own involvement and participation in the opportunities provided by the Agency. As with all three phases, the success of public participation depends upon activity on the part of the Agency and the affected public.

Phase 2 is the Information phase. Here, background information and points of view from both sides of the issues surrounding a regulation are presented in the hope of developing some kind of consensus which EPA can incorporate into a standard. In this phase the Agency is made aware of the public will, which most often lacks consensus.

The Agency also provides information to the public. Currently, this is done in environmental regulation by the required publication of

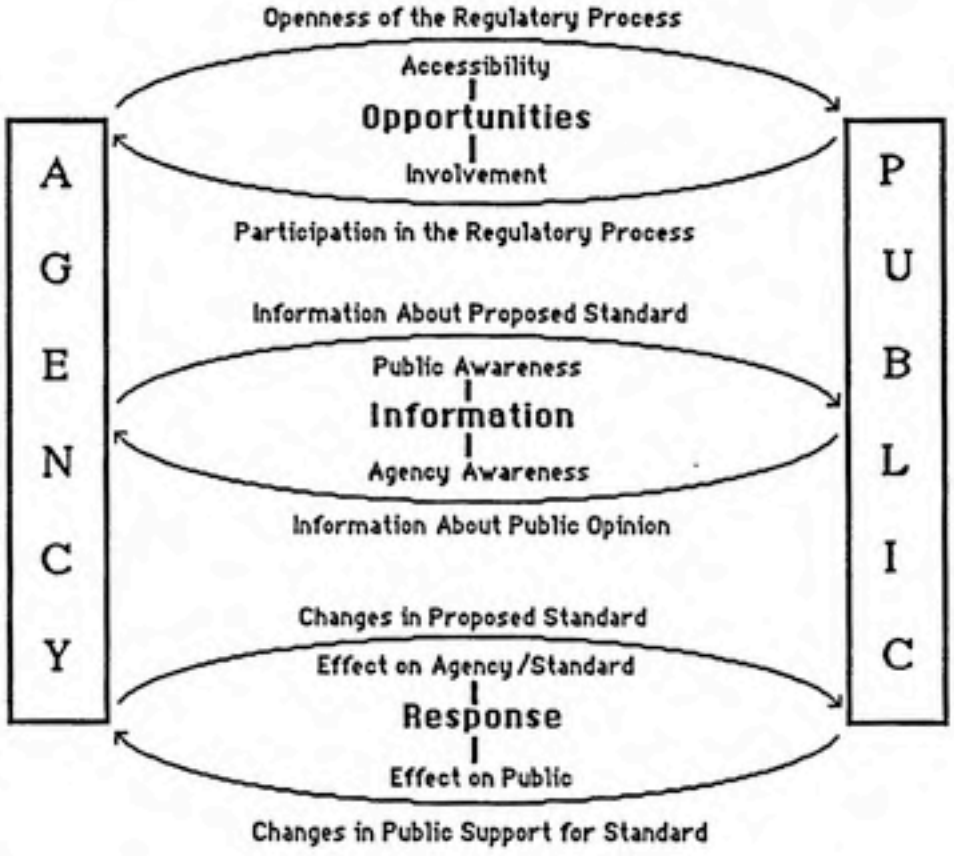


FIGURE 2.2 EXCHANGE MODEL OF PUBLIC PARTICIPATION

background information documents (BID's) which are available for public critique. In these background documents, EPA presents all the data and calculations used to support a proposed or promulgated standard. Because Phase 2 requires a means for the successful transfer of information and opinion, its effectiveness depends, to a great extent, upon the adequacy of the Opportunity phase.

The final phase of the Exchange Model is the Response phase. Here, changes in the proposed standard and changes in public support are manifested. Agency response to the public comment process is relatively straight-forward to assess, since any changes in the proposed standard are outlined in published documents. The Agency may change a proposed standard on the basis of its own decisions. Unless the change is a result of an exchange of information in the public comment forum, the effectiveness of the citizen participation process cannot be assessed. Likewise, the Agency may respond to perceived public discontent and change the standard, but unless public dissatisfaction is brought forward by official public comment opportunities, the success of citizen participation cannot be measured.

Unlike EPA's response to public input, public response to the Agency is more difficult to assess and is measured by changes in public support for the standard. Often, Agency compromise on an issue can leave competing groups unsatisfied since none of the involved groups acheives its stated goal. Yet, regardless of how public opinion on the regulation changes, there is no doubt that changes in public support occur as a response to the final rule, and these changes can be used to measure the success of public participation.

In reality, the three phases presented in the Exchange Model are used repeatedly. The announcement of projected changes sparks the need for additional comment from the public, and new hearings are scheduled and the public comment period is extended or reopened. Still, the Exchange Model presented by Godschalk and Stiftel can be used to analyze the effectiveness of the public comment process. By providing

a breakdown of the different steps in which the process is carried out, the success of each of the three phases in the model can be assessed and then combined to provide an indication of the success of the entire process.

## Literature and Models

The body of literature that exists for the analysis of public comment indicates a major problem with the process. A great deal of misunderstanding surrounds the public involvement process, and misperceptions of the process have raised objections to citizen involvement. Agency decisions are not always based extensively on the results of citizen involvement, nor is the agency obliged to act in accordance to the public will.

In addition to describing the utility of citizen comment, models have been proposed to aid in the analysis of the public involvement process as a whole. Godschalk's Exchange Model can be adapted for use in environmental rule-making as well. The Exchange model provides a method for analysis based upon the exchange of opportunity, information, and response which occurs during the public involvement process.

## SECTION III - REGULATORY HISTORY OF ARSENIC

The history of the regulation of arsenic as an air pollutant is an interesting one, and provides a good example of the process required to promulgate a standard under the Clean Air Act. More importantly for this study, the standard highlights the public involvement processes used by EPA and prescribed by the Administrative Procedures Act of 1947. Public involvement methods described by the Administrative Procedures Act include both the formal rule-making procedures, for example, citizen suits, and informal notice-and-comment period rule-making procedures. EPA also involved the affected public in workshops and public hearings which are not required by the Clean Air Act. The following section briefly outlines the history of the regulation of arsenic as an air pollutant, including both the standard-setting approach used and the role which public participation played in the development of the final standard.

An analysis of the adequacy of the actual standards, in terms of public health benefits, is not essential to the issue of public participation in the standard-setting process. Indeed, it is well beyond the scope of this work. Therefore, an analysis of the actual value of the regulation is not addressed.

### Need For a Regulation

Section 112 was added to the Clean Air Act in 1970 to cover all air pollutants not already considered by the national ambient air quality standards which were developed under sections 108-110. Since

sections 108-110 cover only criteria pollutants used by the agency to monitor air quality trends, section 112 is the primary mechanism for the regulation of toxic air pollutants. As an air pollutant which posed a significant risk of adverse health effects, inorganic arsenic was considered a candidate pollutant for a national emission standard regulation under section 112.

The Clean Air Act, as amended in 1977, directed the Agency to promulgate a rule to limit arsenic emissions under section 112. Although EPA had dealt with the country's main inorganic arsenic emission sources (non-ferrous smelters) in 1976 with a new source performance standard, the Agency failed to specifically consider arsenic emissions in the regulation (Ajax, 1985). Environmental groups petitioned the Agency in the matter, and in response to this pressure EPA made a commitment to begin the data collection process essential to the proposal of a regulation.

In addition, Congress also pressured the Agency to act on the arsenic issue. Since only two hazardous air pollutants had been regulated by the Agency under section 112 during 1970 to 1977, Congress intentionally listed seven hazardous air pollutants for the agency to study and regulate. According to the Act, a national emissions standard for any hazardous air pollutant must be proposed one-half year following the official listing of a hazardous air pollutant (HAP) in the Federal Register, and promulgated just one-half year after the proposal.

In June, 1980 EPA listed arsenic as a hazardous air pollutant. This listing procedure is important as it begins the section 112 rule-making process. As the seventh hazardous air pollutant listed

following radionuclides, benzene, vinyl chloride, asbestos, mercury, and beryllium, it was the last of the seven chemicals that the Clean Air Act specifically directed EPA to act upon in section 122.

The basis for this listing, beyond the congressional mandate, was a number of Agency studies which showed arsenic to be a probable human carcinogen. Evidence for this classification was the consistent increased risk found in different arsenic exposure studies, as well as the observed specificity of tumor sites (skin and lungs) and the high relative risks which resulted when compared to other studied carcinogens. In a major study from the Agency's Carcinogen Assessment Group, arsenic's carcinogenic potency was ranked in the first quartile of 52 suspect carcinogens analyzed (EPA, 1984).

In addition, airborne emissions of arsenic were well documented and significant. Emission sources had been characterized, and emissions quantified. In some instances, high arsenic emission sources were found in areas with large populations. Since EPA's definition of "hazardous" requires both significant exposures as well as an established toxicity, the listing of arsenic as a hazardous air pollutant was well justified.

However, it was not until June 20, 1983, two years after the deadline specified by the Clean Air Act, that an arsenic rule was proposed. Even then, the Agency was forced into issuing the proposed regulation by a U.S. District Court after suit by the State of New York. Stating that the administrator had "violated her duties to promulgate regulations for the listed airborne arsenic", EPA's claim of "administrative impossibility" was not accepted as an excuse for its

lack of timeliness in the regulation process (New York vs Gorsuch, No. 81 CIV 6678 (WCC)). EPA was given the statutory deadline of six months to propose a regulation for arsenic.

In the proposed rule, source categories of arsenic emissions were selected as targets for regulation. The most important of these were the primary copper smelters which emitted more than one fourth of all airborne arsenic nationwide (EPA, 1983). Since this relatively volatile metal is present as an impurity in nearly all copper deposits, smelters emit arsenic when roasting, smelting and converting the copper ore at high temperatures. The inorganic arsenic is emitted from tall stacks which vent the furnaces and converters and also escapes existing control equipment and is emitted as a low-level fugitive.

Because there were two very distinct classes of arsenic-laden ores used by the copper smelters, a proposed standard for smelters was published for each of the groups according to the arsenic content of the copper ores used to produce the blister copper product. Figure 3.1 displays the range of arsenic containing ores used by the smelters. Only one smelter, the ASARCO-Tacoma smelter, fell into the high-arsenic ore category, while the nation's other fourteen primary smelters refine copper from low-arsenic content ores.

The next most important emission source was the glass manufacturers. Glass manufacturing plants were included as a source category since some manufacturers add arsenic to the raw materials used in the production of glass. Arsenic, when added to the glass mixture, provides increased clarity and sparkle, as well as helps to catalyze the transformation of the silica mixture into glass (Troy, 1986). As with the copper smelters, the inorganic arsenic is volatilized and

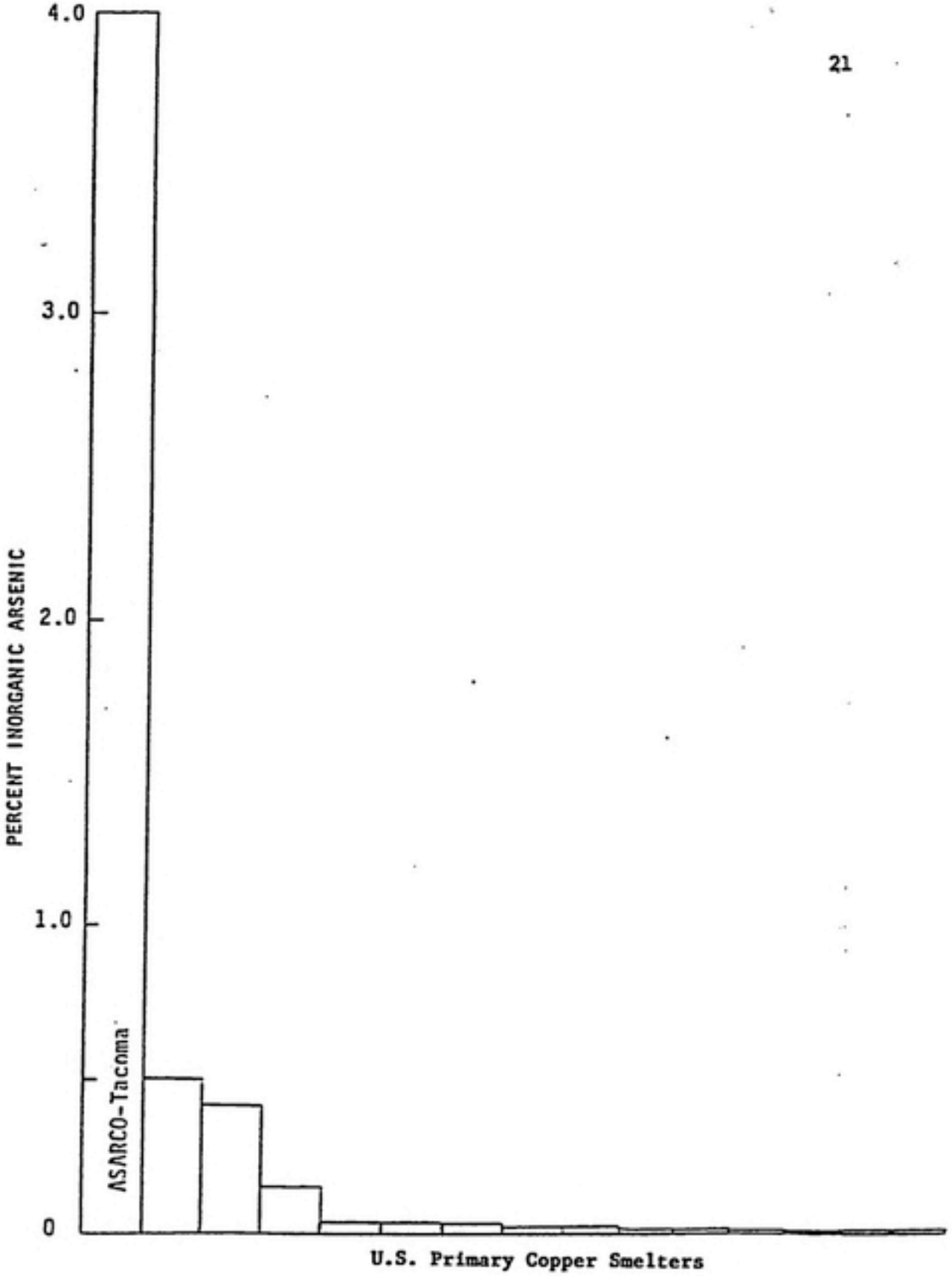


Figure 3.1 Percent Inorganic Arsenic In Feed Materials At Primary Copper Smelters
From: (Ajax, 1985)

emitted from the glass mixture during the heating process, and emitted as both stack and fugitive emissions. As a group, glass manufacturers were a relatively minor source of arsenic emissions, accounting for 7 percent, or 37 tons/year of airborne arsenic nationwide (EPA, 1983).

After these two categories, there were many smaller sources of arsenic emissions in the country, only one of which was considered major enough to constitute a public health hazard. Those industries not considered were zinc and lead smelters (both primary and secondary), zinc oxide production plants, cotton gins, and arsenic trioxide/metallic arsenic chemical plants. The arsenic chemical plant category was not considered for regulation in the initial proposal but was later proposed and promulgated in a rule which affected only the arsenic production plant used in conjunction with the nation's lone high-arsenic primary copper smelter.

## The Proposed Standards

All the comments analyzed in this study pertain to the proposed standards for high- and low-arsenic smelters and the glass manufacturing plants. Because of their importance to understanding the issues raised by commenters, the proposed standards are outlined below. Included in the outline is the risk data used by the EPA for all the proposed standards. The risk assessment/risk management process is outlined as well.

- RISK ASSESSMENT: In order to propose a national emissions standard for a hazardous air pollutant, an air pollutant must "contribute to...an increase in mortality or an increase in serious

reversible, or incapacitating irreversible, illness" (CAA Section 112(A)(1)). In the case of inorganic arsenic, three epidemiological studies were found which indicated an increased incidence of lung cancer in smelter workers. No epidemiological studies existed which analyzed arsenic exposure and the incidence of other suspected adverse health effects, such as peripheral neuropathy, growth retardation and brain dysfunction among children, hyperkeratosis, and an increase in adverse birth outcomes. Risk estimates used in the standard were based entirely upon the incidence of lung cancer.

Using data from the three studies, the risk per unit of arsenic exposure was calculated to be $2.95 \times 10^{-3}$ per $ug/m^3$, the geometric mean of the three values available (EPA, 1983). Using the Agency's computerized Human Exposure Model, this risk value was then applied to populations inhabiting regions within a 20 km radius around the emsiions source. Because the computerized model incorporates meteorological data to model the dispersal of the arsenic to areas around the source, the resultant risks were a combination of population density and estimated ambient air concentration of arsenic.

Table 3.2 displays the lung cancer risk estimates used in proposing the standards. Smoking and benzene exposure risks are listed along with the other sources to provide a relative reference as to the severity of arsenic risks. The attributable risk percent column shows the percent of all lung cancers expected in the affected population which could be theoretically attributed to arsenic exposure from each source category.

- HIGH-ARSENIC COPPER SMELTERS: National emissions standards for the control of arsenic emissions from primary copper smelters were proposed under section 112 of the Clean Air Act July 20, 1983 (48 FR 33112). Included in the high-arsenic category were smelters processing feed material with an annual average arsenic content of 0.7% or greater. The only existing smelter in this category was located in Tacoma, WA and owned by ASARCO, Incorporated. Three regulatory alternatives were proposed by EPA in April of 1983 for application to arsenic emissions from Tacoma smelter.

  Regulatory alternative 1 represented the "no-action" alternative which reflected the current level of control. Alternative 2 corresponded to the control of fugitive arsenic emissions by the application of an emission control technology already in place in some smelters in the country. The technologiy required was a secondary hood/horizontal air curtain for converter fugitive emissions. The final alternative was to require the smelter to process ores which were virtually free of arsenic. The Agency "felt very strongly that this alternative would close down the smelter" (Ruckelshaus, 1984).

  Alternative 2 would have provided only a limited reduction in emissions, estimated to be 39 percent or 110 tons per year (EPA, 1983). No other emissions reduction alternative was proposed, except for alternative 3 which would have closed the plant. EPA felt that the best available control technology was

TABLE 3.1 RISK VALUES USED IN THE PROPOSED ARSENIC STANDARDS
(Listed by Source Category)

| SOURCE CATEGORY | NUMBER OF PLANTS | TOTAL ARSENIC EMISSIONS (tons/yr) | TOTAL EXPOSED POPULATION ( < 20km ) | NUMBER OF LUNG CANCERS PREDICTED (annually) | [a] ATTRIB. RISK (percent) |
|---|---|---|---|---|---|
| Not Included:[b] | | | | | |
| Primary Pb Smelters | 5 | 38 | 2,200,000 | 0.1 | 0.01% |
| Secondary Pb Smelters | 35 | 3 | 70,000,000 | 0.4 | < 0.01% |
| Primary Zinc Smelters | 5 | < 1 | 5,000,000 | < 0.1 | < 0.01% |
| Zinc Oxide Plants | 2 | 9 | 2,000,000 | 0.1 | 0.01% |
| Cotton Gins | > 300 | 5 | not determined | — | — |
| Arsenic Plants | 8 | < 1 | 12,600,000 | < 0.1 | < 0.01% |
| Included: | | | | | |
| High-Arsenic Smelters[c] | 1 | 310 | 368,000 | 17.4 | 11.55% |
| Low-Arsenic Smelters[d] | 14 | 812 | 650,200 | 1.6 | 0.62% |
| Glass Manufacturers[e] | 15 | 37 | 4,166,000 | 1.2 | 0.07% |
| TOTALS FOR PROPOSED: | 30 | 1159 | 5,184,200 | 20.2 | 0.97% |
| Comparison: (using the above population) | | | | | |
| Benzene Emissions[f] | — | — | 5,184,000 | 5.2 | 0.25% |
| Cigarette Smoking[f] | — | — | 5,184,000 | 622.0 | 30.00% |

[a] Percentage of lung cancers in affected population which are caused by source emissions. Based on a lung cancer rate of 40/100,00 ("U.S. Cancer Mortality Rates and Trends, 1950-1979", EPA 600/1-83-015a, September 1983)

[b] Source: "Inorganic Arsenic Risk Assessment of Primary and Secondary Lead Smelters, Primary Zinc Smelters, Zinc Oxide Plants, Cotton Gins, and Arsenic Chemical Plants",EPA-450/5-82-002, April, 1985. NOTE: Affected population estimated for these classes are for a 50 km radius.

[c] Source: "Inorganic Arsenic Emissions from High-Arsenic Primary Copper Smelters - Background Information for Proposed Standards", EPA-450/3-83-009a, April, 1983.

[d] Source: "Inorganic Arsenic Emissions from Low-Arsenic Primary Copper Smelters - Background Information for Proposed Standards", EPA-450/3-83/010a, April, 1983.

[e] Source: "Inorganic Arsenic Emissions from Glass Manufacturing Plants - Background Information for Proposed Standards",EPA-450/3-83-011a, April, 1983.

[f] Source: "Air Toxics Problem in the United States: An Analysis of Cancer Risks for Selected Pollutants", EPA,450/1-85-001, May, 1985.

already in place at arsenic emission points in the plant. Under these alternatives, the Agency proposed to regulate the high-arsenic primary copper smelters category under alternative 2.

- LOW-ARSENIC COPPER SMELTERS: National emissions standards for the control of arsenic emissions from primary copper smelters processing feed material with an annual average arsenic content of 0.7% or less were also proposed on July 20, 1983 (48 FR 33112). The 14 smelters which process low-arsenic ores were evaluated for both process and fugitive emissions to determine areas where a reduction in arsenic emissions was possible. The Agency's April, 1983 review led to the development of five regulatory alternatives.

  Alternative 1, the "no-action" alternative, would not affect the facilities. Alternatives 2, 3, and 4 provided for different levels of emission control by the application of various control technologies and process techniques. Alternative 5, like the final alternative proposed for the high-arsenic category, would have required the smelters to process ores which were virtually free of arsenic content.

  The Agency selected two alternatives for the proposed standard. The two alternatives chosen affected six smelters nationwide. These six plants would have been required to install secondary hoods/air curtains on their converter operations to control fugitive arsenic emissions. In addition, four of the six would have had to install control devices for fugitive emissions from matte and slag tapping operations. The selection of the two alternatives in the proposed regulation would have resulted in a 17 percent, or 137 tons/year, decrease in arsenic emissions from this source category (EPA, 1983).

- GLASS MANUFACTURING PLANTS: National emissions standards for the control of arsenic emissions from glass manufacturing plants were also proposed July 20, 1983 (48 FR 33112). Over 400 companies are involved in the production of the various types of glass, but only fifteen furnaces in the glass industry manufacture glass which contains arsenic (EPA, 1983). The Agency proposed three alternatives for regulation in April, 1983.

  Alternative 1, similar to the smelter category, was the no-action alternative which represented current levels of emission control which existed at the time. Alternative 2 represented the control achievable with a fabric filter or electrostatic precipitator installed on the furnaces in plants which add arsenic to the glass batch. The last alternative was the most restrictive and would have required the complete elimination of arsenic in the manufacture of glass. Of these three possibilities, alternative 2 was chosen as the proposed national emissions standard. The reduction of arsenic emissions in the eight affected plants was predicted to be 36 tons, or 88 percent (EPA, 1983).

Public Comment Period

The proposed standards prompted an unprecedented number of comments from outside the Agency. The EPA had never received such a large number of comments relating to a single group of proposed standards. A large number of comments were related to the ASARCO-Tacoma primary copper smelter. The high cancer risks projected by EPA models and the fragile economic situation of the copper smelter were translated into an important community issue.

The Agency felt that the intense local awareness in the Tacoma area was an opportunity to involve public in the standard-setting process to a degree which had never before been considered in environmental rule-making. In order to effectively involve the public, EPA sent out a team of officials to hold three workshops preceding the public hearings. These workshops, all held in the Tacoma area, were well attended by concerned citizens, smelter employees, and industry and environmental leaders alike. The workshops helped to explain information in the proposed standard and the risk assessment process upon which it was based. In addition, the Agency also provided public education on issues such as risk management and emission control techniques through local television and newspaper advertisements.

The public education campaign ended with three days of public hearings held November 2-4, 1983 in Tacoma. At these meetings, Agency officials responded to the concerns of groups and citizens in the area about the proposed inorganic arsenic standard and the risk assessment used. Over 100 individuals were heard from during these hearings,

the majority of which supported the proposed standard as a reasonable compromise between jobs and health (EPA, 1984).

An additional public hearing session was held just four days later in Washington, D.C. Lasting just one day, November 8, 1983, 13 speakers were heard, mostly from the affected glass and copper industries. Uncertainties in the modeling studies were brought up at both hearings and EPA, along with environmental groups and the affected industries, met on December 20, 1983 to discuss the data used for the Tacoma smelter (Ajax, 1986).

Because of requests by commenters for additional time to prepare oral testimony and to review the revised modeling results for the ASARCO Tacoma copper smelter, the Agency postponed closure and reopened the public comment period three times (48 FR 38009, 48 FR 55880, 49 FR 36877). The comment period on the proposed standards officially closed on November 5, 1984.

The Agency went to great lengths to solicit public comment during the preparation of the arsenic standard. Because the Agency was so active in Tacoma, some commenters felt that EPA was actually asking the public to vote on the proposed standard. Administrator Ruckelshaus, in an effort to assure these commenters that he was not abdicating his responsibility in the matter, made the Agency's position clear in a speech given at Princeton in February of 1984:

> "We organized an extraordinary campaign of public education in Tacoma. So unusual was this kind of event that some inferred that I was abdicating my responsibility for this decision. After some initial

> confusion on this score, we made it clear that it was entirely my decision, and that although I wanted to hear, I was not committed to heed ... I suppose some would have been happier continuing in their fond belief that we could provide absolute safety with absolute certainty, and were disturbed by these proceedings." (Ruckelshaus 1984)

In addition to the information gathered in the public hearings and the workshops, EPA also received public comment on the standards by letter. Many groups sent comments or printed copies of their testimony presented at the public hearings, since written letters are considered to be the only admissible evidence of a complaint in future litigation (Stewart, 1977). More than 650 letters were received by the Agency on the ASARCO-Tacoma standard alone. When all source categories are considered, more than 800 commenters submitted questions and comments pertaining to the proposed standards. Most of the comments received by the Agency raised several issues, and, of course, many of the comments were repeated by other commenters.

As required, EPA considered all comments and responded to those questions which raised significant issues. The Agency was then required to publish all comments which were deemed "significant", and thus required a formal response. In issues relating to the risk assessment procedures used in the proposed inorganic arsenic standards, the Agency published over 2300 comments alone.

Comments were grouped by issue and then all comments relating to each issue were listed by EPA. The official EPA response followed the listing of all comments received which pertained to that particular issue. The document containing official Agency response to the risk

assessment issues was published in April, 1985. For comments relating to more technical issues, such as the selection of best available control technology or the use of different cost models, the Agency published separate documents for each of the proposed standards in May, 1986.

Promulgated Standards

Promulgated national emission standards for hazardous air pollutants for inorganic arsenic were published in the Federal Register August 4, 1986 (51 FR 27956). The effect of public comment can only be assessed by examining the final standards, since any changes made to the standard can be identified by comparing the proposed and the final standards. Therefore, a brief discussion of the changes which occurred follows.

- RISK ASSESSMENT: Two additional studies were added to the epidemiological data base. This additional information increased the unit risk estimate to $4.39 \times 10^{-3}$ per $ug/m^3$, a 48 percent increase over the proposed unit risk value (EPA, 1985). However, emission estimates were revised downward as comment on the proposed estimates was received by the Agency. The combination of these two factors greatly decreased the estimated risks from the arsenic emission sources nationwide. Table 3.2 presents the updated lung cancer risk estimates used in promulgating the arsenic standards. Again, smoking and benzene exposure risks are given to provide a relative reference as to the severity of arsenic risks. The attributable risk percent column shows the percent of all lung cancers expected in the affected population which could be theoretically attributed to arsenic exposure from each source category.

  In addition to the changes in the emissions and unit risk data, the Agency expanded its computerized model to include all persons living within 50 km of each emissions source. This change was due to commenters who felt that significanly exposed populations existed beyond the 20 km limit used in the proposed standards. Public comment also caused the Agency to use measured

TABLE 3.2 RISK VALUES USED IN THE PROMULGATED ARSENIC STANDARDS
(Listed by Source Category)

| SOURCE CATEGORY | NUMBER OF PLANTS | TOTAL ARSENIC EMISSIONS (tons/yr) | TOTAL EXPOSED POPULATION ( < 50km ) | NUMBER OF LUNG CANCERS PREDICTED (annually) | [a] ATTRIB. RISK (percent) |
|---|---|---|---|---|---|
| Proposed: | | | | | |
| Arsenic Plants[b] | 8 | < 1 | 12,600,000 | < 0.1 | < 0.01% |
| High-Arsenic Smelters[c] | 1 | 129 | 1,800,000 | 2.9 | 0.40% |
| Low-Arsenic Smelters[d] | 14 | 306 | 1,900,000 | 1.0 | 0.13% |
| Glass Manufacturers[e] | 15 | 37 | 11,600,000 | 0.4 | 0.01% |
| TOTALS: | 30 | 472 | 27,900,000 | 4.3 | 0.04% |
| Comparison: (using the above population) | | | | | |
| Benzene Emissions[f] | — | — | 27,900,000 | 27.9 | 0.25% |
| Cigarette Smoking[f] | — | — | 27,900,000 | 3348.0 | 30.00% |

[a] Percentage of lung cancers in affected population which are caused by source emissions. Based on a lung cancer rate of 40/100,00 ("U.S. Cancer Mortality Rates and Trends, 1950-1979", EPA 600/1-83-015a, September 1983)

[b] Source: "Inorganic Arsenic Risk Assessment of Primary and Secondary Lead Smelters, Primary Zinc Smelters, Zinc Oxide Plants, Cotton Gins, and Arsenic Chemical Plants",EPA-450/5-82-002, April, 1985.

[c] Source: "Inorganic Arsenic Emissions from High-Arsenic Primary Copper Smelters - Background Information for Promulgated Standards", EPA-450/3-83-009b, Not published.

[d] Source: "Inorganic Arsenic Emissions from Primary Copper Smelters and Arsenic Chemical Plants - Background Information for Promulgated Standards", EPA-450/3-83/010b, May, 1986.

[e] Source: "Inorganic Arsenic Emissions from Glass Manufacturing Plants - Background Information for Promulgated Standards", EPA-450/3-83-011b, May, 1986.

[f] Source: "Air Toxics Problem in the United States: An Analysis of Cancer Risks for Selected Pollutants", EPA,450/1-85-001, May, 1985.

ambient arsenic emissions data in areas around the Tacoma smelter, instead of relying on the modeled emissions levels. The change in the risk assessment as a result of using ambient data was not great, since the measured data did not differ significantly from the modeled data, particularly when compared to the relative uncertainties in the risk assessment process (Fitzsimmons, 1986).

- HIGH-ARSENIC COPPER SMELTERS: Although EPA prepared a final standard for the high-arsenic category of primary copper smelters, a standard was never promulgated. There was no need for the standard since the ASARCO-Tacoma smelter closed in March, 1985 before a rule could be finalized.

- LOW-ARSENIC COPPER SMELTERS: The final rule promulgated for low-arsenic smelters, re-named to include all primary copper smelters, incorporated several significant changes which were prompted by comments received by the Agency. The two most notable changes occurred from data submitted by the copper smelting industry during the notice-and-comment period of the standard setting process. These changes included a 62 percent decrease in the overall emissions from this source category and a 16 percent increase in the capital costs projected for the installation of required control equipment (EPA, 1986). Table 3.3 shows some of the changes made in the emissions and cost data.

  Probably the most significant change in the proposed standard was the converter feed cut-off level for those smelters which would be affected by the standards. The proposed cut-off, affecting 6 out of the 14 smelters, was increased by an order of magnitude to include only one smelter. In addition, the provisions for emission reductions for slag and matte tapping operations were dropped since the revised arsenic emission rates indicated that "the small reduction in public health risk resulting from matte and slag tapping controls did not warrant the imposition of these controls at any of the existing smelters" (EPA,1986) The final standard resulted in a maximum emission reduction of 4.4 tons of airborne arsenic per year or 1.4 percent. To put this environmental impact into perspective, the maximum reduction in expected cancers from the standard was estimated to be 0.4 cases per year.

  Public comment also prompted EPA to add additional provisions. These included an increase in opacity monitoring and several steps which were required to minimize emissions due to malfunctions and upsets. Upsets and malfunctions refer mostly to control equipment start-ups and control equipment repair or maintenance shut-downs. These sources of emissions had been left out of the proposal but were added after state regulators and environmental groups brought them to the Agency's attention.

  As an attachment to the standard on copper smelters, EPA promulgated standards on the arsenic chemical plant operated by ASARCO in Tacoma. The Tacoma copper smelter was closed down but ASARCO had not indicated any plans to discontinue operation of

TABLE 3.3 CHANGES IN SMELTER EMISSIONS/COST DATA

| EMISSIONS DATA[1] Smelter | Proposal Estimate -1983- (Mg/Y) | Revised Estimate -1986- (Mg/Y) | Percent Reduction |
|---|---|---|---|
| ASARCO-Hayden | 30.1 | 5.4 | 82% |
| ASARCO-El Paso | 27.5 | 16.7 | 39% |
| Kennecott-Utah | 8 | 1.5 | 81% |
| Kennecott-McGill | 45.9 | 10.1 | 78% |
| Phelps Dodge-Morenci | 6.9 | 1.9 | 72% |
| Phelps Dodge-Ajo | 2.6 | 0.5 | 81% |
| Phelps Dodge-Hidalgo | 1.2 | 0.2 | 83% |
| | 122.2 | 36.3 | 70% |

| COST DATA[2] Smelter | Proposal Estimate -1983- ($1000) | Revised Estimate -1986- ($1000) | Percent Increase |
|---|---|---|---|
| ASARCO-Hayden | 1,700 | 3,660 | 115% |
| ASARCO-El Paso | 1,375 | 1,850 | 35% |
| Kennecott-Utah | 5,200 | 8,800 | 69% |
| Kennecott-Hayden | 6,730 | 8,000 | 19% |
| Kennecott-McGill | 8,760 | 7,150 | -18% |
| Phelps Dodge-Morenci | 8,530 | 12,970 | 52% |
| | 32,295 | 42,430 | 31% |

[1]Converter fugitive emissions (EPA-4503/-83-010b pg I-4-17)

[2]Capital cost estimates (EPA-450/3-83-010b pg I-8-17)

the arsenic chemical production plant which had been processing stockpiled smelter waste. Consequently, EPA felt that the proposed fugitive control measures for the arsenic plant should be finalized. The rule promulgated for this arsenic plant required no specific control technologies. Rather, the standard demanded a modification of work practices at the facility, including the preparation of a regular inspection, maintenance, and housekeeping plan. The reduction of arsenic emissions and the resulting

improvement in public health was not estimated by the Agency since the plant was not required to install any particular control device.

- GLASS MANUFACTURING PLANTS: Changes were also made to the standard proposed for the glass manufacturing category. Unlike the smelters category, the cost and emissions estimates were not significantly changed. However, the cut-off limit for uncontrolled arsenic emissions was raised 625 percent and the Agency also allowed any furnace which added more than 2.8 tons per year of arsenic to the batch to chose any conceivable control option as long as an emission reduction of arsenic was at least 85 percent over the uncontrolled level. An emission testing exemption was given to any furnace which added less than 8 tons of arsenic per year to the batch.

  The increase in the cut-off and specific exemptions combined to reduce the number of affected facilities from 8 to 2. One of the plants affected was scheduled to change production to a nonarsenic glass type, while the other was expected install an electrostatic precipitator. Expected arsenic emission reduction was 16.1 tons per year or 43 percent nationwide (EPA, 1986).

Final Outcome

Emission standards for arsenic were finally promulgated more than five years after the statutory deadline given in section 112 of the Clean Air Act. Public comment resulted in a large number of significant changes to the proposed standards, particulary in the data used by EPA to estimate emissions and compliance costs. These changes reflected a reduction in the expected health impacts, as arsenic emission estimates were revised downward. Consequently, the promulgated standards were much less restrictive upon the arsenic-emitting industries. Figure 3.2 is a timeline which graphically depicts the series of events that occurred during the promulgation of the section 112 regulation for arsenic.

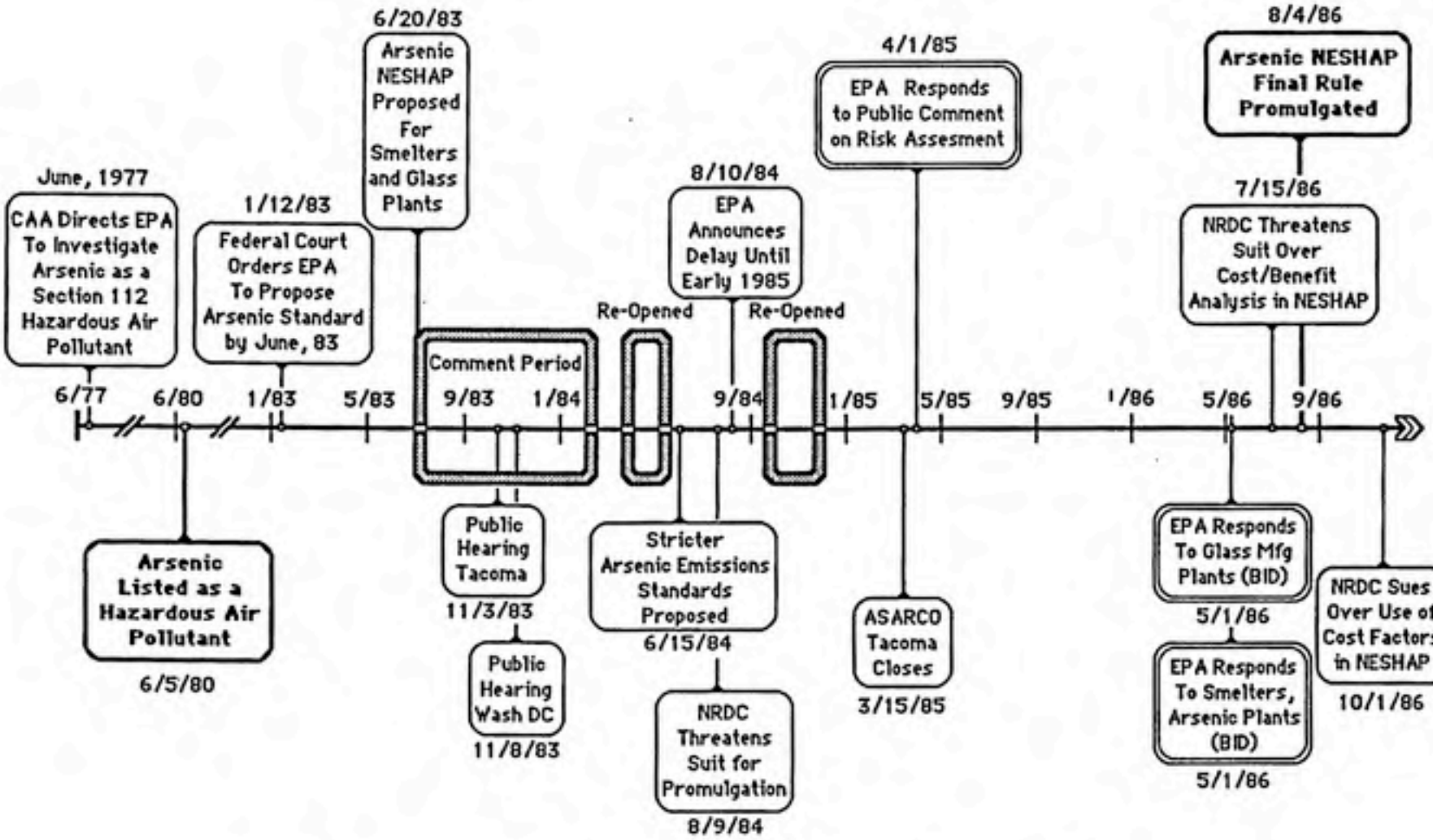


FIGURE 3.2 ARSENIC STANDARD PROMULGATION TIMELINE

## SECTION IV - METHODS

### Data Collection

Comments made on the standard were published in three documents: Inorganic Arsenic NESHAPS: Response to Public Comments on Health, Risk Assessment, and Risk Management (EPA-450/5-85-001), Inorganic Arsenic Emissions from Primary Copper Smelters and Arsenic Plants - Background Information for Promulgated Standards (EPA-450/3-83-010b), and Inorganic Arsenic Emissions from Glass Manufacturing Plants - Background Information for Promulgated Standards (EPA-450-3/83-011b). These documents contain all of the public comments considered significant by the Agency during the development of the standard. Only these comments are publicly available. The documents also contain the official Agency responses to the questions raised by the commenters.

The first document, subsequently referred to as the "Risk Assessment" document, contains those comments that raised questions regarding the risk assessment used to select arsenic as a hazardous air pollutant, to select the various source categories of arsenic emissions, and to estimate health risks based on these emissions. The risk document includes comments on the risk assessment process used for glass manufacturers, arsenic chemical plants, and high- and low-arsenic primary copper smelters.

As was mentioned in Section 3 of this study, the single facility in the high-arsenic category closed down before a final rule was promulgated. However, since comments on the risk assessment process had already been published, many of the submitted comments had

already evoked an official response from the Agency and are included in the analysis presented in the next section. Comments made on the technical issues surrounding the high-arsenic smelter were not published and the Agency made no official response. Consequently, these comments are not included in this analysis.

The risk assessment document, released more than 16 months before the final standard was promulgated, contains more than 2350 individual comments. To put this in perspective, the risk assessment document contains more than 10 times the number of comments appearing in the other two documents which related to more technical issues. Table 4.1 presents a summary of the types of issues raised by commenters in the risk assessment document.

The other two comment documents contain 224 total comments relating to the technical issues of the Arsenic NESHAP and are subsequently referred to as the "Technical Issues" documents. Any questions or comments raised regarding EPA's cost estimates, choice of source categories and selection of control equipment were published in

Table 4.1 CATEGORIZATION OF COMMENTS IN RISK ASSESSMENT DOCUMENT

| Category | Category (cont.) |
|---|---|
| 1. Listing of Arsenic as a HAP | 5. Ample Margin of Safety |
| 2. Exposure and Risk Determination | 6. Economics as a Factor |
| 3. Acceptable Risk Determination | 7. Jobs versus Health |
| 4. Quality of Life | 8. Victim Compensation |

Table 4.2 CATEGORIZATION OF COMMENTS IN TECHNICAL ISSUES DOCUMENTS

| Category | Category (cont.) |
|---|---|
| 1. Arsenic Emission Estimates | 4. Start-Ups and Shutdowns |
| 2. Emission Control Technologies | 5. Cost Estimates and Impacts |
| 3. Compliance Provisions | 6. Test Methods and Monitoring |

these two documents. Issues raised in these documents are provided in Table 4.2.

Comments are listed without the identification of the author and each comment is identified in the text only by a unique number. All authors are listed by number in a separate section of the publication. These identifiers were added later after all other information was recorded. This published comment/response format provided a good opportunity to compile all the information needed to analyze EPA's response to comments without firsthand knowledge of the identity of the person or group raising the question.

While examining the questions raised, it was possible to determine the "intent" (type of change demanded) from the comment. The determination of intent is essential to analyzing the impact of a comment since only those comments which requested changes were considered by EPA. Because of the inherently subjective nature of determining the "intent" of each particular question, a categorization scheme was used to to organize the "intents" of all the questions and

comments into four mutually exclusive groups. The categorization scheme used is shown in Table 4.3.

After categorizing the implied intent of each of the 2601 comments, the official EPA response to each comment was characterized. EPA responded in many different ways to the comments, with responses ranging from "EPA disagrees with the comment" to a 12 page

Table 4.3 CATEGORIZATION OF INTENT OF COMMENTS

| Intent | Examples of Authors' Comments |
|---|---|
| Proposed Standard is To Strict | Exposure threshold exists<br>Standard is too costly in its present form<br>Standard will cost too many jobs<br>Arsenic is not a proven carcinogen<br>Other epidemiological studies are negative |
| Proposed Standard is Good | No exposure threshold exists<br>Standard uses the correct ratio of costs/benefits<br>Standard will adequately protect the public health<br>Standard ignores insignificant sources of emissions<br>Action is needed to control emissions |
| Proposed Standard is Not Enough | Risk estimate used is too low<br>Standard is overly concerned with cost<br>Standard will not protect the public health<br>Standard does not consider other pollutants<br>Other risk factors (i.e. skin cancers) not considered |
| Not Applicable or Classifiable | Standard should require cleanup of area soils<br>Standard should be set for ambient air concentrations<br>Standard should require costs of travel to hearings<br>Standard is based upon bad data |

justification of the selection of best available control technology (EPA, 1985). Examples of Agency responses and the assigned categories are listed in Table 4.4.

The final step in the data analysis task was to aggregate commenters into groups. Each commenter was assigned to a particular group category. Table 4.5 lists the 25 different groups used to categorize the authors. The assignment of each of the comments to one of the groups listed in Table 4.5 was accomplished by using the index given in published background information documents.

Table 4.4 CATEGORIZATION OF EPA RESPONSE TO SELECTED COMMENTS

| Response | Examples of EPA Response |
|---|---|
| Not Considered | EPA disagreed with the comments made. |
| | Question/Comment did not apply to Section 112. |
| Considered; Not Changed | EPA re-analyzed with ambient rather than modeled exposure data. |
| | EPA considered impact of other health affects, for example, skin cancer. |
| Considered; Changed To Make Stricter | EPA revised the standard to include regulation of proper work practices. |
| | EPA revised the standard to include regulation of emissions from start-ups/shutdowns. |
| Considered; Changed To Make Weaker | EPA increased estimated costs for control equipment. |
| | EPA raised the throughput cutoffs to reduce the number of affected smelters and glass plants. |

Table 4.5 GROUPS PARTICIPATING IN THE ARSENIC STANDARD

| Group Name | Subgroup Name | Actual Participants |
|---|---|---|
| Citizens (C) | Individuals (I) | 561 Citizens |
| | Groups (G) | Smelter Crisis Education Project |
| | Union (U) | Pierce Co Central Labor Council<br>United Steelworkers of America<br>WA State Labor Council AFL-CIO |
| Environmental Groups (E) | NRDC (N) | Natural Resources Defense Council |
| | Sierra Club (S) | Grand Canyon, Cascade Chapters |
| | Greenpeace (G) | Greenpeace USA, Greenpeace NW |
| | Other (O) | Friends of the Earth - NW Office<br>Mount Rainier Council<br>Ohio State Clearinghouse |
| Smelters (S) | ASARCO (A) | ASARCO, Incorporated<br>Shea & Gardner |
| | Kennecott (K) | Kennecott, Incorporated<br>Prather,Seeger,Doolitle,Farmer |
| | Phelps-Dodge (P) | Phelps-Dodge Corporation<br>Consultants in Epid & Occup Health<br>Evans, Kitchel & Jenckes |
| | Newmont Mining (N) | Newmont Mining Corporation |
| | TN Chemical (T) | Tennessee Chemical Company |
| Glass Mfg (L) | Corning (C) | Corning Glass Works |
| | Owens-Illinois (O) | Owens-Illinois, Inc |
| | Miscellaneous (M) | Ford Motor Company<br>Glass Packaging Institute<br>Libby-Owens-Ford Company |
| Other Industry (O) | Groups (G) | Chemical Manufacturer's Association |
| | Cotton (C) | National Cotton Council of America<br>Plains Cotton Growers, Inc |

Table 4.5 (cont) GROUPS PARTICIPATING IN THE ARSENIC STANDARD

| Group Name | Subgroup Name | Actual Participants |
|---|---|---|
| Government (G) | Local (L) | Chelan Co Public Utility District 1<br>Puget Sound APCA<br>Seattle-King Co Dept of Pub Health<br>Tacoma-Pierce Co Board of Health<br>Tacoma-Pierce Co Econ Devlptmnt Bd<br>Toledo Dept of Public Utilities<br>Vashon-Maury Island Comm Council |
| | State (S) | NJ Dept of Envr Protection<br>NM Envr Improvement Division<br>NY Dept of Law<br>PA Dept of Envr Resources<br>TX Air Control Board<br>WA Dept of Ecology<br>WA Dept of Labor and Industries<br>WA Dept of Social & Hlth Services |
| | National (N) | Centers for Disease Control<br>Natl Inst of Envr Health Sciences<br>Office of Management and Budget |
| | Representatives (R) | 1 Senator, 3 Congressmen |
| University (U) Academicians | - none - | Brown U - Dept of Geol Science<br>Princeton U - Dept of Religion<br>U of Michigan - Sch of Pub Health<br>U of Pennsylvania - Sch of Finance<br>U of Puget Sound - Dept of Econ<br>U of Washington - Dept of Civl Engn<br>U of Washington - Sch of Pub Health<br>U of Wisconsin - Dept of Psychology |
| Medical (M) Professionals | - none - | American Lung Association<br>Neurology & Neurosurgury Assoc, Inc<br>Pierce County Medical Bureau<br>St Luke's Med Bldg, St Joseph Hosp |
| Businesses (B) | - none - | 56 Different Businesses |
| Hearings (H) | Tacoma, WA (T) | Bicentennial Pavilian, Tacoma WA |
| | Washington, DC (W) | Jefferson Auditorium, Washington DC |

A total of 2601 comments and questions were categorized by using the following variables:

1. Chapter/Publication .... Document & major category of question
2. Section ..... Subcategory of each question type
3. Question ..... Particular issue brought up by question
4. Source ..... Comment format, letter or public hearing
5. Author's Number ..... EPA assigned number - 2 numbers recorded
6. Author's Intent ..... Intent of the question, Table 4.3
7. EPA Response ..... EPA action on the question
8. Result ..... Result of EPA action, Table 4.4
9. Author's Major Group ... Major category of the author, Table 4.5
10. Author's Subgroup ..... Minor category of the author, Table 4.5

Data Analysis

With nearly 30,000 variables to consider, the comments from each of the published documents were loaded onto an IBM-PC XT using Lotus 1-2-3 software. Data were entered without assigning the author's identity. Only the author's number was assigned. These data were then transferred to a dBASE III Plus data base file.

After entering these data, a second data base was created which included commenters' numbers and the assigned groups and subgroups. The commenter's identity was then added tothe first data file using a dBASE III Plus program to match each comment to the author's identity. The intent of the author's question was recorded without observer bias which would result from firsthand knowledge of the identification of the author.

Following the compilation of each of the variables found in the 2601 comments, the data were read into a large file for computerized statistical manipulation and analysis. Before the data were analyzed, selected representative questions from the original documents were examined and reviewed in order to provide quality assurance/control checks on the variables recorded. In addition, data were continuously verified throughout the statistical analysis period whenever unexpected results occurred. These checks insured accuracy in the raw data used for the analysis.

The data were analyzed with a PC-based statistical package, SYSTAT. The SYSTAT program allowed for analysis with grouping by types of questions, by the group categories, or by the source of the comment. With this approach, each group could be analyzed independently and then compared to other groups who participated in the standard-setting process.

The general "intent" from each group participating in the process was obtained by averaging an assigned numerical measure of the intent of each of the comments submitted to the Agency. This average intent was then compared to other groups. The average intent indicated the environmental ideology of each group category.

The effectiveness of each of the various groups was evaluated by preparing tables of comments versus EPA response. Using this analysis, the relative effectiveness of each group's comments was measured and compared. Over 300 pages of statistical output were generated. The results of the above analysis are discussed in Section 5.

Representative Group Response

Once the 2601 comments had been analyzed, selected commenters representing the groups participating in the NESHAP were telephoned and given the opportunity to comment on the preliminary results. These groups represented both sides of each issue, including viewpoints from EPA, industry, environmental groups and local government officials involved in the comment process. The telephone survey was performed for two reasons; it checked the validity of the findings determined in the statistical analysis, and it helped to provide some of the explanations for the results obtained.

Representatives from many of the groups submitting comments were also asked for their opinion on the methods used and the applicability of the statistical analysis procedures. All representatives were contacted via telephone for discussion of the draft results, and some filled out questionnaires or agreed to personal meetings to review the draft results in detail.

Individuals contacted are listed in Table 4.6. The results of their informal comments are presented in Section 5.

Table 4.6 PEER REVIEW OF DRAFT RESULTS FROM THIS STUDY

| NAME | POSITION | GROUP | PHONED | QUESTNR | MEETING |
|---|---|---|---|---|---|
| R. Ajax | Standards Development Branch, USEPA | EPA | X | | X |
| R. Drake | President, Glass Packaging Institute | Glass Mfg | X | X | |
| D. Doniger | Senior Staff Atty NRDC | Envr Grps | X | X | |
| B. Early | Legislative Rep. Sierra Club | Envr Grps | X | X | |
| G. Fitzsimmons | Standards Development Branch, USEPA | EPA | | | X |
| C. Frantz | Envir Control Owens-Illinois | Glass Mfg | | | X |
| M. Gregory | Arizona Chapter Sierra Club | Envr Grps | X | X | |
| L. Lindquist | Plant Manager ASARCO, Inc. | Smelters | X | X | |
| J. Nolan | Envr Engineer Puget-Sound APCA | Governmt | X | X | |
| P. Scanlon | Plant Manager Phelps-Dodge Corp. | Smelters | X | X | |
| N. Troy | Envir Control Owens-Illinois | Glass Mfg | X | X | |

## SECTION V - RESULTS

The results of the statistical analysis of the comments submitted were not surprising to many of the participants who reviewed the preliminary data. They do, however, provide many clues which can be used to characterize and explain the effects that public comment can have in the environmental regulation process. These effects are evaluated by characterizing the comments presented to EPA and analyzing the Agency's response.

### Number of Comments

The number of comments submitted by each special interest group provides a simple, yet interesting insight into the nature of the public response received by the Agency during the promulgation of the arsenic standard. Figure 5.1 depicts the proportion of comments submitted by outside groups, displayed for all comments together and broken apart by risk assessment and technical issues. These charts show the relative percentages of comments submitted by each group involved in the public comment process.

Figure 5.1 indicates that the largest number of comments submitted to EPA were by private citizens. The arsenic standard would affect a large population of workers and citizens living in or around major arsenic emissions sources, most notably the Tacoma, WA ASARCO copper smelter and the Toledo, OH Owens-Illinois glass manufacturing plant.

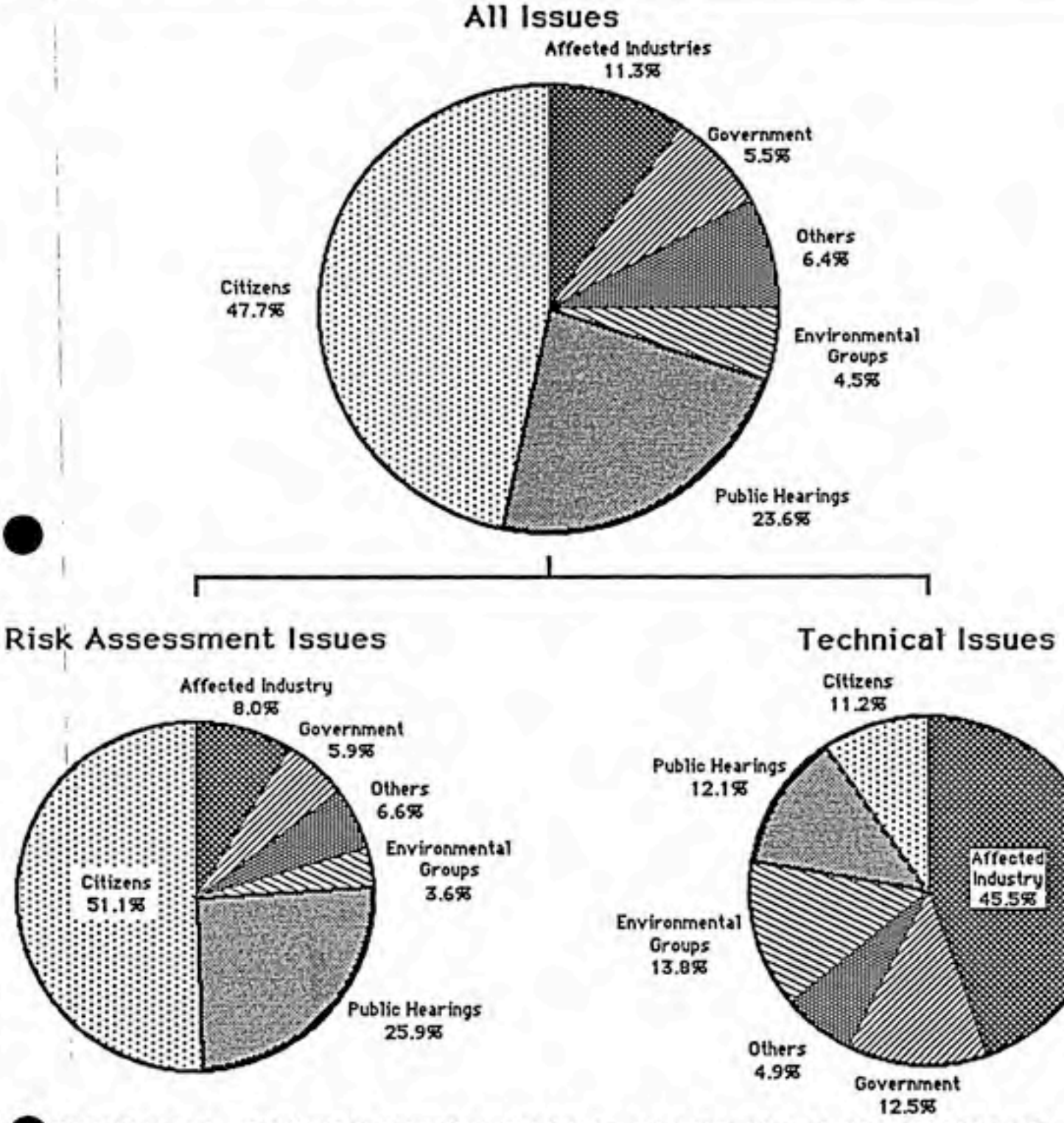


FIGURE 5.1 GROUPS PARTICIPATING IN THE ARSENIC STANDARD

Because of the urban location of these plants, the copper smelter in particular, a large number of comments from affected citizens were expected. However, the number of citizen comments may be disproportionately large due to the inclusion of various people who are actually members of an organized group in another category. This type of misclassification error is possible because the determination of each commenter's identity was based solely on the amount of information given in a letter submitted to the Agency.

The small proportion of citizen comments on technical issues when compared to the proportion submitted for risk issues should be noted (11 percent to 51 percent). This is not surprising in light of the issues dealt with in the technical documents which included data and engineering problems. The average citizen, though affected by these issues, is usually not capable of presenting a serious argument in this realm. Consequently, the impact of citizens in the public involvement process is most effective in issues which are more understandable. Citizens are most comfortable with the risk issues which include the determination of acceptable risk, decisions concerning jobs versus health, and the calculation of ample margins of safety. Table 4.1 lists these issues.

Although it is not discernible from the charts, nearly 90 percent of the comments submitted concerned risk assessment issues. This is a direct result of the Agency's efforts to solicit information from private citizens on risk assessment issues.

Unlike private citizens, industry appeared to have concentrated its resources and comments on the technical issues rather than the risk

issues. Patrick Scanlon of Phelps-Dodge Corporation, a major copper smelting company, submitted a number of comments to EPA which related to the standard. He verified that industry aimed its resources at the technical issues. He explained industry's philosophy for submitting comments to the Agency under the section 112 standard:

> "Industry realized that EPA would find it difficult to ignore valid changes based on fact. Risk assessment involves greater subjectivity than technical issues and meaningful changes by EPA are unlikely unless the technical data base indicates it." (Scanlon, 1986)

It was not possible to identify the source of any of the comments raised at the public hearings. Public hearing comments were submitted to EPA orally and recorded by the Agency without identification of the comment's author. Therefore, the comments submitted during these hearings were analyzed as a single group. This provides an indication of the relationship of the public hearing comments to all the other comments submitted by letter.

Measuring Group Support for the Standard

Comments were separated by: 1) those which indicated support for the proposed standard, and 2) those which opposed the standard because it was either too restrictive or not strict enough. By comparing the totals of these two comment types within each group, the relative

support for the proposed standard can be measured. Table 5.1 shows the relative support for the standard as indicated by the comments submitted from the various groups. In Table 5.1, any comments which requested a change are compared to comments which supported the regulation.

The most significant feature of this table is that only one group, the Medical community, supported the proposed standard with a majority of their comments. Nearly all groups participating in the public comment process seemed displeased with the proposed rule, especially the Environmental groups, the Copper Smelters, and the Glass Manufacturers. Two factors are responsible for this observation: group motivation, and political "posturing".

TABLE 5.1 COMMENTER'S SUPPORT FOR THE ARSENIC NESHAP

| Group | # Comments in Support of the Proposed Standard | # Comments Submitted to EPA | % Comments in Support of the Proposed Standard |
|---|---|---|---|
| Medical | 17 | 30 | 57% |
| University | 16 | 41 | 39% |
| Unaffected Industry | 7 | 21 | 33% |
| Hearings | 209 | 641 | 33% |
| Citizens | 373 | 1240 | 30% |
| Businesses | 22 | 85 | 26% |
| Government | 27 | 144 | 19% |
| Smelters | 37 | 245 | 15% |
| Environmental | 12 | 117 | 10% |
| Glass Plants | 3 | 37 | 8% |
| Unknown | 0 | 6 | 0% |
| TOTALS: | 723 | 2601 | 28% |

The seventy two percent (72%) rate of critical comments revealed posturing by polarized groups. "Posturing" describes a technique used by groups to achieve ideological goals more effectively. By exaggerating their discontent with the proposed standard, groups not completely satisfied with the rule can establish a clear record for future litigation. The groups which use this method most often are the same groups which attempt to shape environmental regulation most frequently. In the arsenic standard controversy, these groups were the affected industries and the environmental organizations (Fitzsimmons, 1986).

The second explanation for dissatisfaction with the proposed rule related to motivation for the public participation process. As with all issues affecting the public, a number of citizen activists get involved, while a large number of complacent individuals do not get involved. The complacent "silent majority" is less motivated to voice their opinion. Their opinion is presumed to be more supportive of EPA's actions, or at least less opposed to it. Unlike the posturing factor which is used more often by ideologically polarized groups, the silent majority factor affects groups with a wider range of opinion, like citizens.

When these factors are considered together, the level of satisfaction shown in Table 5.1 most likely underestimates actual public support for the proposed standard. However, the relative order of the level of satisfaction for each of the groups is believed to be accurate.

Measuring Group Intent

Comments were separated by those supportive of the proposed standard, those requesting that the standard be relaxed, and those suggesting that the standard was not strict enough. A point system was used to evaluate each comment in order to determine the average "intent" of each group. The point system used was as follows:

+ 10 Points ..... Proposed Standard is not strict enough
0 Points ..... Proposed Standard is acceptable
- 10 Points ..... Proposed Standard is too strict

Although this system seems trivial, the comments were easily scored. No individual group obtained a perfect score. For example, the affected industries disagreed with EPA on nearly all issues, but sided with the agency on a few—usually those issues in which the environmentalists strongly differed with the Agency.

Tables 5.2 and 5.3, and Figure 5.2 measure the intent obtained by averaging all comments submitted by each group and subgroup. Figure 5.2 illustrates the averaged intent of the major groups used to categorize comments submitted for the arsenic standard. As expected, the Affected Industry group fell towards the bottom of the scale (-10). This indicated that industry felt the standard was too strict. On the other side of the spectrum, the Environmental Groups category, with an average intent score of 7.3, indicated that the proposed standard was ineffective in the protection of public health.

The average comment from other groups such as College/Universities and Medical Professionals indicated a general support for the proposed

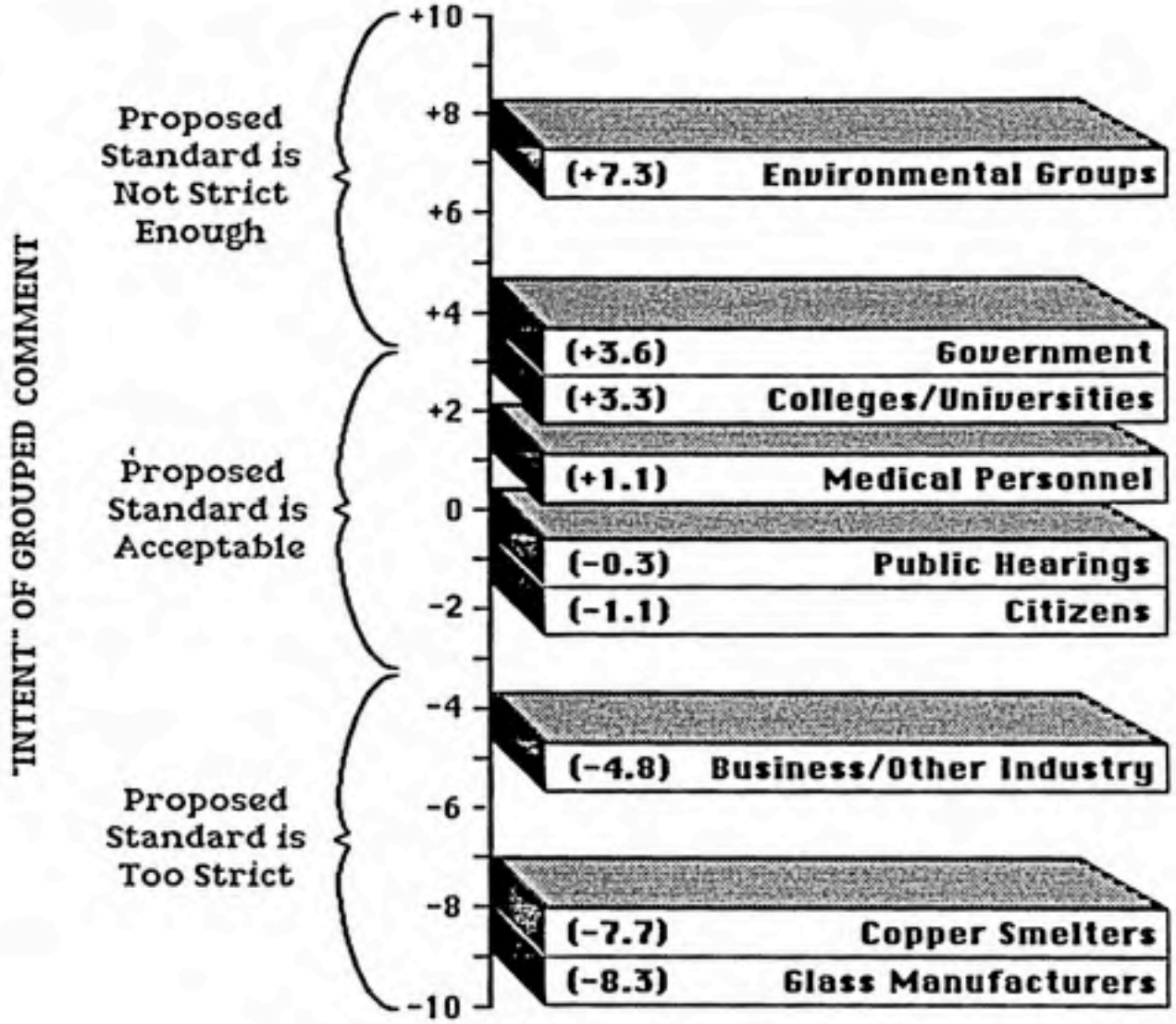


FIGURE 5.2 "INTENT" OF GROUPS INVOLVED IN THE ARSENIC STANDARD

standard although they leaned towards the opinion that the standard was not strict enough. The Other Industry category (industry which was not directly affected by the standard—local businesses, cotton industry, and the Chemical Manufacturer's Association) sided with the affected industry's viewpoint, although to a lesser degree. The same was true for Government, which sided with the environmentalists, but to a lesser degree.

Analysis of the Public Hearing category indicates support for the proposed regulation. This is a result of the averaging of conflicting views presented at the hearings, rather than an indication of specific support for the standard. It should be noted that the positions of each of the groups on the scale of environmental ideologies were similar to what would be expected, a fact which supports the analytic methods used in this study (Ajax, 1986).

Table 5.2 presents the average group and subgroup intent, as well as the number of comments submitted by each. Of particular interest in this table is the variation in the average intent between subgroups within the same group. All of the environmental subgroup scores indicated that the proposed standard was not strict enough but the degree of discontent varied widely between individual groups. The environmental group intent ranged from 2.1 for the Other Groups category, to a score of 9.1 for the Sierra Club's two participating chapters. The same is true for the glass manufacturers and the copper smelters, except that the average intent for all groups in these categories indicates that the standard was too strict.

Table 5.2 AVERAGE OF THE INTENT OF COMMENTS BY GROUPS AND SUBGROUPS

| Group Name | Number of Comments | Group Intent | Subgroup Name | Number of Comments | SubGroup Intent |
|---|---|---|---|---|---|
| Citizens (C) | 1240 | -1.1 | Groups (G) | 1 | 10.0 |
| | | | Individuals (I) | 1204 | -1.1 |
| | | | Union (U) | 35 | -1.1 |
| Environmental | 117 | 7.3 | Sierra Club (S) | 29 | 9.1 |
| Groups (E) | | | NRDC (N) | 59 | 8.4 |
| | | | Greenpeace (G) | 8 | 7.5 |
| | | | Other (O) | 21 | 2.1 |
| Smelters (S) | 245 | -7.7 | Kennecott (K) | 22 | -10.0 |
| | | | Phelps-Dodge (P) | 42 | -10.0 |
| | | | ASARCO (A) | 177 | -6.9 |
| | | | Newmont Mining (N) | 2 | -5.0 |
| | | | TN Chemical (T) | 2 | 0.0 |
| Glass Mfg (L) | 31 | -8.7 | Corning (C) | 18 | -8.9 |
| | | | Owens-Illinois (O) | 7 | -8.6 |
| | | | Miscellaneous (M) | 6 | -6.7 |
| Other Industry (I) | 21 | -4.7 | Groups (G) | 21 | -4.7 |
| | | | Cotton (C) | 0 | --- |
| Government (G) | 144 | 3.6 | Local (L) | 51 | 3.1 |
| | | | State (S) | 29 | 3.6 |
| | | | National (N) | 38 | 3.9 |
| | | | Representatives (R) | 26 | 4.4 |
| Businesses (B) | 85 | 4.9 | - none - | 85 | -4.9 |
| Medical (M) | 30 | 1.1 | - none - | 30 | 1.1 |
| University (U) | 41 | 3.3 | - none - | 41 | 3.3 |
| Hearings (H) | 641 | -0.3 | Tacoma, WA (T) | 566 | 0.2 |
| | | | Washington, DC (W) | 75 | -4.9 |
| Unidentified | 6 | -5.0 | - none - | 6 | -5.0 |
| TOTALS: | 2601 | -1.0 | | 2601 | 1.0 |

An interesting feature of the public comment comes to light from an analysis of the trends indicated by these groups. It appears that as the ideologically extreme groups were less directly affected by the arsenic standard, the average intent of the comments submitted became generally more supportive of the Agency's proposed standard. This is not surprising, given the fact that the more affected groups have more at stake in the standard, both economically (in the case of industry), and politically (in the case of environmental groups).

However, this feature could also be tied to less scrupulous economic factors as well. In the proposed standard, none of the glass plants represented by the Miscellaneous category were considered for regulation. These smaller plants would actually benefit economically by the imposition of a costly regulation on their large competitors. Consequently, the smaller plants not affected by the proposed standard argued less vehemently against it.

The same trend is observed with the smelters, as one unaffected smelter actually indicated support for the proposed standard (Tennessee Chemical Corporation - only 2 comments submitted). However, one must also realize that the smaller facilities also lack the large amounts of resources necessary to collect their own data and argue against a proposed standard. This factor would also contribute to the observed trend.

The subgroups in the government category show an interesting trend. From Table 5.2, it appears that as government subgroups became further removed from the source of arsenic emissions, they became less supportive of the proposed standard (National Government = 3.9, State Government = 3.6, Local Government = 3.1).

The reason for this may have been the urgency of the arsenic emissions situation. Local governments were eager to have something done about the emissions problem even if the proposed regulation was thought to be ineffective. The Local government subcategory showed more support for the standard than any other government subgroup.

State governments, who had recognized the emissions problem and had tried in vain to solve them, realized that EPA's efforts were "nothing new" and commented accordingly (Nolan,1986). Agencies at the national level felt even more strongly that the proposed standard would not be effective in reducing emissions, especially when compared to other emissions standards promulgated by EPA. These agencies were most opposed to the standard on the grounds that it was not strict enough. However, localized support of the proposed standard was slight and any inferences stated are highly subjective since the range of different intents in the Government category is less than 4 percent of the entire scale.

Table 5.3 lists, in numeric order, the average intent for each subgroup. This table highlights a sharp difference in subgroups of the public hearings. From Table 5.3, it appears as if the participants in the Tacoma public hearing were significantly more supportive of the proposed standard than were the participants in the Washington D.C. hearing.

Discussions with NRDC Senior Staff Attorney David Doniger verified this outcome (Doniger, 1986). Two factors can account for the difference in support for the proposed standard at the hearings. In Tacoma, the Agency went to great lengths to involve different affected groups, especially citizens who worked at the smelter and other Tacoma

Table 5.3 RANKING OF SUBGROUPS BY AVERAGE INTENT OF COMMENTS
(Groups Submitting more than 5 Comments)

| Group Name | Subgroup Name | Number of Comments | SubGroup Intent |
|---|---|---|---|
| Envr Groups (E) | Sierra Club (S) | 29 | 9.1 |
| Envr Groups (E) | NRDC (N) | 59 | 8.4 |
| Envr Groups (E) | Greenpeace (G) | 8 | 7.5 |
| Government (G) | Representatives (R) | 26 | 4.4 |
| Government (G) | National (N) | 38 | 3.9 |
| Government (G) | State (S) | 29 | 3.6 |
| University (U) | - none - | 41 | 3.3 |
| Government (G) | Local (L) | 51 | 3.1 |
| Envr Groups (E) | Other (O) | 21 | 2.1 |
| Medical (M) | - none - | 30 | 1.1 |
| Hearings (H) | Tacoma, WA (T) | 566 | 0.2 |
| Citizens (C) | Union (U) | 35 | -1.1 |
| Citizens (C) | Individuals (I) | 1204 | -1.1 |
| Other Industry (I) | Groups (G) | 21 | -4.7 |
| Hearings (H) | Washington, DC (W) | 75 | -4.9 |
| Businesses (B) | - none - | 85 | -4.9 |
| Glass Mfg (L) | Miscellaneous (M) | 6 | -6.7 |
| Smelters (S) | ASARCO (A) | 177 | -6.9 |
| Glass Mfg (L) | Owens-Illinois (O) | 7 | -8.6 |
| Glass Mfg (L) | Corning (C) | 18 | -8.9 |
| Smelters (S) | Kennecott (K) | 22 | -10.0 |
| Smelters (S) | Phelps-Dodge (P) | 42 | -10.0 |
| TOTALS: | | 2590 | -1.0 |

(Unidentified or Groups with 5 or less Comments)

| Group Name | Subgroup Name | Number of Comments | SubGroup Intent |
|---|---|---|---|
| Citizens (C) | Groups (G) | 1 | 10.0 |
| Smelters (S) | TN Chemical (T) | 2 | 0.0 |
| Smelters (S) | Newmont Mining (N) | 2 | -5.0 |
| Unidentified | - none - | 6 | -5.0 |
| TOTALS: | | 11 | -2.7 |

area citizens most affected by the emissions. This resulted in the expression of many different opinions at the hearings. Both sides of the regulatory issues were well represented. Because of the diversity of viewpoints, the average intent at the Tacoma hearings indicated a strong support for the proposed standard, even though nearly 70 percent of the comments submitted at the hearing were not supportive of the rule.

This was not the case at the Washington D.C. hearing which was much less publicized and generally dominated by the industry's viewpoint. In many ways, the Washington D.C. hearing was a typical public hearing. Regulated industries commonly constitute 90 percent of the presentations in federal agency hearings and commit as much as 100 times the budget resources of citizen organizations (Checkoway, 1981).

## Measuring Group Effectiveness

The comments were analyzed for their effectiveness in prompting EPA to change its initial position. "Effectiveness" was measured by the ratio of the number of comments submitted versus the number of changes which occurred as a result of the comments. Although over 2600 comments were submitted on the standards, a lesser number of comments (1642, or 64 percent) requested a change in the proposed regulation. Only those comments which requested a change were considered in the analysis of effectiveness. Comments were also broken down into risk issues and the technical issues to examine whether the Agency responded deferentially to questions submitted on separate issues of the regulation.

Table 5.4 presents the effectiveness of various comments on the risk assessment/risk management process used in promulgating the standard. For a list of the specific issues covered, see Table 4.1. The most significant feature of Table 5.4 is that no single group was more than 5 percent successful in convincing EPA to change the proposed standard. The low effectiveness measured is especially important when considering that comments on the risk assessment constituted nearly 90 percent of all comments submitted to the Agency on the arsenic standard. When all groups are considered together, only 1 out of every 57 comments sent to the Agency concerning the risk assessment process convinced EPA to change its position.

One explanation for the poor success rate of commenters lies in the nature of the risk assessment process. The methods used in risk assessment involve extensive use of mathematical models based upon

Table 5.4 RANKING OF EFFECTIVENESS OF COMMENTERS ON RISK ISSUES

| Group Name | # Comments Submitted Requesting Changes | # Changes | Percent Effective |
|---|---|---|---|
| Smelters | 109 | 5 | 5% |
| Envr Groups | 66 | 3 | 5% |
| University | 22 | 1 | 5% |
| Government | 81 | 2 | 2% |
| Business | 49 | 1 | 2% |
| Hearings | 357 | 7 | 2% |
| Citizens | 773 | 7 | 1% |
| Other Industry | 7 | 0 | 0% |
| Medical | 11 | 0 | 0% |
| Glass Plants | 0 | 0 | — |
| TOTALS: | 1475 | 26 | 2% |

upon simplifying assumptions. This produces a situation "ripe for conflict" (Bacow, 1985). A large number of citizens attended EPA workshops and were exposed to the often-disturbing degree of uncertainty inherent in the risk assessment process. The number of comments submitted to the Agency from citizens, 51 percent of all risk comments, could be attributed to these risk assessment education efforts. Citizens found it easy to criticize the Agency's risk assessment because of their knowledge and interest. (Fitzsimmons, 1986; Nolan, 1986).

EPA found its risk assessment as easy to defend as it was for citizens to criticize. Then-administrator Ruckelshaus, commenting on this issue, quipped, "with all its uncertainties, risk assessment data is like the captured spy...if you torture it long enough, it will tell you anything you want to know." (Ruckelshaus, 1984). Because of the many uncertainties, EPA could easily justify its estimation of risk to the public, since any other approach would include the same magnitude of uncertainty.

Comments which addressed technical issues raised during the public comment process are listed by group in Table 5.5. For a list of the specific issues covered, see Table 4.2. As can be seen in Table 5.5, the percent of comments which resulted in a change in technical issues is much larger than those which addressed the risk-related issues. Comments submitted on the selection of best available control technology, arsenic emissions data, or cost estimates had a 20 times better chance of prompting EPA to change their position than comments on risk assessment issues.

Table 5.5 RANKING OF EFFECTIVENESS OF COMMENTERS ON TECHNICAL ISSUES

| Group Name | # Comments Submitted Requesting Changes | # Changes | Percent Effective |
|---|---|---|---|
| University | 1 | 1 | 100% |
| Citizens | 15 | 12 | 80% |
| Hearings | 21 | 14 | 67% |
| Government | 23 | 9 | 39% |
| Smelters | 56 | 21 | 38% |
| Glass Plants | 28 | 10 | 36% |
| Envr Groups | 26 | 3 | 12% |
| Other Industry | 3 | 0 | 0% |
| Unknown | 4 | 0 | 0% |
| Medical | 0 | 0 | — |
| Business | 0 | 0 | — |
| TOTALS: | 177 | 70 | 40% |

The most effective of all groups were the University Academicians. This group was 100 percent effective in convincing the Agency to change their proposed standard. However, this is a trivial observation since the University Academicians submitted only one comment relating to the regulation's technical issues. Therefore, this percentage is not considered significant and is most assuredly an overestimation of the group's effectiveness.

It is not easy to explain the extreme effectiveness of citizens submitting comments on technical issues (80% as indicated by Table 5.5). The most reasonable explanation for this anomaly is that some individuals identified themselves by name only when submitting comments. These "citizens" may have actually been members of groups

with significantly more experience and expertise on these issues (Ajax, 1986).

Another possibility is that some citizens may have been credited with causing a change when the actual comment made was generated by someone else with a good knowledge of engineering. This scenario is plausible since certain comments were submitted "en masse", with a large number of commenters signing the same request for a change in the proposed standard.

Public hearings proved to be effective forums for introducing changes of a technical nature. The 67 percent effectiveness of commenters at public hearings is twice as large as that for comments submitted by letter. Most of the changes that came about as a result of the hearings were changes which weakened the standard, and were submitted during the industry-dominated Washington D.C. hearing. Of the 14 comments from public hearings which resulted in changes in the proposed standard, 9 were submitted at the Washington hearings.

The next most effective groups were the affected industries and government officials. This is due to their direct experience and expertise with the technical issues surrounding the proposed regulation. Government groups had tried unsuccessfully to reduce arsenic emissions by local or state regulation. In attempting to solve the problem, state and local officials became well versed on the technical issues which the proposed standard addressed.

The state and local agencies, like the Puget-Sound Air Pollution Control Agency, had up-to-date industry emissions data. Some local government officials were better educated in these issues than was the EPA staff (Nolan, 1986). This increased the effectiveness of their comments on technical issues. The affected industries were most

familiar with emissions data and thus controlled the emissions estimates used by the Agency (Gregory, 1986; Nolan, 1986; Doniger, 1986). The knowledge and contol of data were the most significant cause of change to the proposed standard.

Environmental groups were less effective in convincing EPA to change its position on technical issues. This is probably due to the lack of technical expertise by these groups which are staffed mostly by lawyers. Environmental groups, although well aware of the technical issues, had little control over emissions data and cost estimates used by the Agency. The lack of control over the data reduced the ability environmental groups to convince EPA to change technical issues in the standard.

Other groups, further removed from the data and technical experience, were not effective in swaying the Agency on technical issues. These groups included business groups, unaffected industries, and the medical community.

Table 5.6 presents a ranking of the effectiveness of various groups on both technical and risk issues. The most successful of these groups was the glass manufacturing industry, which caused a change with 1 out of 3 comments submitted. The high effectiveness of glass manufacturers can be attributed to their high rate of success on technical issues combined with the fact that they did not comment on risk assessment issues.

The primary copper smelting industry was also relatively successful in promoting changes on both risk and technical issues. Environmental groups, government officials and university academicians were more effective than average, while medical professionals and citizens were ineffective in swaying EPA.

TABLE 5.6 GROUP RANKING OF EFFECTIVENESS FOR ALL ISSUES

| Group Name | # Comments Submitted Requesting Changes | # Changes | Percent Effective |
|---|---|---|---|
| Glass Plants | 28 | 10 | 36% |
| Smelters | 165 | 26 | 16% |
| Government | 104 | 11 | 11% |
| University | 23 | 2 | 9% |
| Envr Groups | 92 | 6 | 7% |
| Hearings | 378 | 21 | 6% |
| Citizens | 788 | 19 | 2% |
| Business | 49 | 1 | 2% |
| Other Industry | 10 | 0 | 0% |
| Medical | 11 | 0 | 0% |
| Unknown | 4 | 0 | 0% |
| TOTALS: | 1652 | 96 | 6% |

From Table 5.6, it is clear that the affected industries, as a group, were significantly more effective in prompting Agency change than was any other group. Again, the reason for much of this disparity was the fact that EPA was largely reliant upon industry for the data used as a basis for the regulation of arsenic as a hazardous air pollutant.

Measuring Intent Versus Effectiveness

The final analysis of the comment data involved the separation of the grouped comments into to categories, those requesting a weaker standard and those wanting a stronger standard. The effectiveness measure employed in the previous section was then applied to each type

of comment in order to determine whether EPA was more likely to respond to comments of one type or another. This produced a measure of effectiveness which is dependent upon the intent of the comment submitted and independent of the source of the comment. The tendency of the Agency to respond to one type of comment was then measured as the ratio of the effectiveness of comments requesting a weaker standard versus the effectiveness of comments requesting a stronger standard. Table 5.7 displays the results of this analysis.

The first two categories, Environmental Groups and the Affected Industry are not well suited for this analysis since they were effective in promoting change in only one direction. That is, the affected industry did not submit any comments which resulted in a stronger standard, nor did environmental groups prompt the Agency to relax the standard.

Environmental groups and affected industries were included in Table 5.7 to indicate a rather surprising result. Both of these groups actually did submit comments which, if considered seriously by EPA, would have resulted in ideologically opposite changes in the proposed standard. These comments are the 8 "weaker" comments submitted by the environmental groups and the 7 "stronger" comments submitted by the affected industries. The category for each of these comments was the risk assessment. One industry representative admitted that the industry did comment in the same direction as environmentalists, but only to "set the record straight" (Scanlon, 1986). One environmental official, on the other hand, denied making comments which would have made the standard weaker (Doniger, 1986).

TABLE 5.7 EPA RESPONSE TO INTENT OF COMMENTS

ENVR GROUPS

| Comment Intent | Changed Weaker | Not Changed | Changed Stronger | Percent Changed | Ratio W:S | Overall % Changed |
|---|---|---|---|---|---|---|
| Weaker | | 8 | | 0% | -XXX- | 7% |
| Stronger | | 78 | 6 | 7% | | |

AFFECTED INDUSTRY

| Comment Intent | Changed Weaker | Not Changed | Changed Stronger | Percent Changed | Ratio W:S | Overall % Changed |
|---|---|---|---|---|---|---|
| Weaker | 36 | 150 | | 19% | -XXX- | 19% |
| Stronger | | 7 | | 0% | | |

CITIZENS

| Comment Intent | Changed Weaker | Not Changed | Changed Stronger | Percent Changed | Ratio W:S | Overall % Changed |
|---|---|---|---|---|---|---|
| Weaker | 15 | 443 | | 3% | 2.7 | 2% |
| Stronger | | 326 | 4 | 1% | | |

GOVERNMENT

| Comment Intent | Changed Weaker | Not Changed | Changed Stronger | Percent Changed | Ratio W:S | Overall % Changed |
|---|---|---|---|---|---|---|
| Weaker | 4 | 24 | | 14% | 1.8 | 11% |
| Stronger | 1 | 69 | 6 | 8% | | |

HEARINGS

| Comment Intent | Changed Weaker | Not Changed | Changed Stronger | Percent Changed | Ratio W:S | Overall % Changed |
|---|---|---|---|---|---|---|
| Weaker | 16 | 183 | | 8% | 2.9 | 6% |
| Stronger | | 174 | 5 | 3% | | |

OTHERS

| Comment Intent | Changed Weaker | Not Changed | Changed Stronger | Percent Changed | Ratio W:S | Overall % Changed |
|---|---|---|---|---|---|---|
| Weaker | 2 | 61 | | 3% | 1.1 | 3% |
| Stronger | | 33 | 1 | 3% | | |

Table 5.7 is most useful for assessing group comments which caused changes on both sides of the issues. These groups include Citizens, Government, Hearings, Medical, University, Other Industry, and Business. The latter four were combined into a miscellaneous category due since they were rather ineffective in causing any changes in the standard. The citizens category lists a "W:S" ratio of 2.7 to 1. This means that a citizen stood a three times better chance of promoting changes in the proposed standard if the intent of the comment was to weaken the standard. This statistic is affected significantly by the "so-called citizens" who prompted the Agency to make changes in the standard on the basis of technical data.

The government category shows a nearly two-fold increase in the response rate for comments demanding a less strict standard. The data in the government category indicate the lone "backfiring" comment. According to the public comment record, a government official requested a re-analysis of the emissions data from a specific source. In the government official's opinion, the Agency's estimate was too low. EPA responded to the request and found that the emission level projected in the proposed standard was actually too high. The lower emissions estimate was included in the final standard. This change weakened the standard even though the intent of the comment was to make the standard more strict.

The hearings group indicates a three-fold increase in the response rate for questions which requested that the standard be made weaker. This fact comes through in spite of the nearly equal numbers of comments submitted by both sides of the issues. The Others category

shows a slight tendency by the Agency to respond to comments requesting a weaker standard. The ratios generated in the Hearings and the Other categories are, however, not independent of the group submitting the comment since various groups are included in each category.

All the ratios listed in Table 5.7 which resulted in changes in either direction indicated that commenters who requested a weaker standard were more effective, regardless of the group to which they belong. This observation leads to the conclusion that even without considering the influence of different groups on EPA, the Agency responded disproportionally to comments requesting a weaker standard.

Table 5.8 shows the relationship between intent and effectiveness for all comments. Not surprisingly, the W:S ratio is 2.5. Although combining all groups results in a ratio which is somewhat dependent upon the success of each of the groups, this table, along with Table 5.7, shows that EPA was more inclined to weaken the standard than to strengthen it.

TABLE 5.8 EPA RESPONSE TO COMMENT INTENT
(All Comments Combined)

| Comment Intent | Changed Weaker | Not Changed | Changed Stronger | Percent Changed | Ratio W:S | Overall % Changed |
|---|---|---|---|---|---|---|
| Weaker | 73 | 869 | | 8% | | |
| | | | | | 2.5 | 6% |
| Stronger | 1 | 687 | 22 | 3% | | |
| TOTALS: | 74 | 1556 | 22 | | | |

Table 5.9 indicates an even greater inclination of the Agency to respond to industry's viewpoint. Table 5.9 documents the comments which were "considered" by the Agency. In this methodology, EPA "considered" a comment when the Agency acted upon a comment with more than a written response which appeared in the comment publications. This included comments that the Agency acted upon, but did not incorporate into the final standard.

For example, the Agency addressed comments concerning the risks of skin cancer from arsenic exposure. EPA examined published risk factors and mortality rates for skin cancer. The Agency determined that these values were not significant when compared to the risks of lung cancer, and as a consequence, no changes were made (EPA,1985). The Agency was, however, prompted to react to the issues raised by these comments which indicated that the comments were somewhat effective in promoting EPA action on an issue.

The results in Table 5.9 show that EPA was much more inclined to consider a comment if it appeared to make the standard more strict. EPA considered almost three times as many comments when the commenter attempted to strengthen the standard. In all fairness to the Agency,

TABLE 5.9 INTENT OF CONSIDERED COMMENT VERSUS EPA CHANGE
(All Comments Combined)

| Comment Intent | Changed Weaker | Considered, But Not Changed | Changed Stronger | Percent Changed | Ratio W:S | Overall % Changed |
|---|---|---|---|---|---|---|
| Weaker | 73 | 5 | | 94% | | |
| | | | | | 9.0 | 33% |
| Stronger | 1 | 189 | 22 | 3% | | |
| TOTALS: | 74 | 1556 | 22 | | | |

this indicates EPA's caution in promulgating a standard which neglects a possible public health risk factor. However, once a comment was considered, it was 9 times more likely to be incorporated into the final standard if it attempted to weaken the standard.

Research Methodology

The previous analysis demonstrates that this method can be used to assess the input of public comment on regulatory decision-making. The submitted comments were broken down into groups, each group's intent was determined by averaging the intent of all comments submitted by members of the group and their effectiveness in convincing EPA to change the proposed standard was measured. The results of this statistical analysis of comments received on the arsenic standard, when considered together, indicate that the standard was weakened to a degree not merited by the public comment.

First of all, industry concentrated its efforts and resources in controlling the emissions and cost data and was significantly more successful than other groups in convincing the Agency to change its proposed position. Secondly, the Agency appeared to have been more apt to change the proposed regulation when the comment submitted requested a weaker standard, regardless of the group which submitted it. The latter point assumes that all submitted comments had an equal validity which, of course, is false. The trend in Agency's response to the comments is nonetheless thought to be disproportional to the public comments submitted. These factors, along with other results discussed in this section, will be discussed in the context of a public participation model in the following section.

## SECTION VI - DISCUSSION

A method was devised to characterize the groups participating in the promulgation of the arsenic standard; the intent of these groups; and the relative effectiveness of each group as measured by the success of their comments. The arsenic standard was chosen for analysis because EPA went to great lengths to solicit and use public opinion. In the analysis of this standard, participating groups were clearly defined and the intent of each group was considered reasonable in relation to their inferred environmental ideology.

The measures of effectiveness employed in the proposed method indicated that industry-minded groups were more successful than others in propmting EPA to change the proposed standard. Upon further analysis of the results, it appeared that EPA responded inordinately to the industrial viewpoint that the proposed standard was too strict. The Godschalk Exchange Model, adapted for use in examining the regulatory public participation process, was applied in order to assess the success of the entire public participation process as a whole. This model also pinpoints the areas in which public involvement failed to serve its intended purpose.

The Godschalk Exchange Model is well suited for use in this type of study since it is designed to analyze the impacts of participation in the regulatory process rather than to assess the success of the regulation in accomplishing agency goals. This model provides for an analysis of the success of public comment on agency regulation by breaking the participation process into separate but interrelated phases of exchange between the government agency and the public.

The model purports to analyze public participation in three phases; the Opportunity Phase, the Information Phase, and the Response Phase. See Figure 2.2 for a graphic representation of the model. In order to measure the effectiveness of citizen involvement as a whole, each phase must be analyzed independently. This framework was then used to assess the utility of public involvement in the arsenic standard process based upon the efforts of both EPA and the participating citizens.

Phase 1 - Opportunity

The arsenic standard provided the public with outstanding opportunities to exchange views on the inherent issues. Three EPA sponsored workshops, four days of public hearings, and more than 12 months of public comment period provided the public with plenty of opportunity to get involved in the standard-setting process. The Agency also held meetings with industry representatives, state and local government officials and environmental groups to discuss the technical data used in the proposed arsenic standard.

Just as important to the success of the opportunity phase is the degree to which the public took advantage of the involvement opportunities. In the promulgation of the arsenic standard, the public was involved in an unprecedented fashion. An indicator of the success of this phase was the amount of information exchanged. Over 800 persons submitted 2601 comments in more than 650 letters sent to EPA. In contrast, another section 112 regulation, benzene, was briefly

reviewed which contained, all together, 85 comments submitted from the public sector (Brostrom, 1986).

In addition to the large number of comments from citizens, the affected industries were also heavily involved. Most environmental regulatory decision-making involves only selected representatives of the entire industry, usually large companies with a significant economic stake. In the arsenic standard-setting process, all of the potentially regulated plants worked with EPA to come to an acceptable regulation (Fitzsimmons, 1986).

To summarize the public participation process in terms of the opportunities presented for the exchange of information, the process was an unqualified success. EPA made itself accessible to citizens and groups on both sides of the issues, and the public took advantage of opportunities to become involved in the comment process. This two-directional flow of participation insured adequate opportunity for public involvement in the process.

Phase 2 - Information

The opportunities presented during the standard-setting process are useful only if accompanied by a meaningful exchange of information. The success of the exchange of information can often be measured in terms of the quantity of information presented by the public to the Agency, and from the Agency to the public. Like the opportunity phase, the information phase requires a significant effort from both the Agency and the affected public in order to be successful.

The quantity of information exchanged was used as an indicator of the opportunities for public involvement, and it also provides a direct

indication of the adequacy of the information phase. The quantity of information submitted to the Agency from the public was exceptionally large, especially when compared to the information gathered from the public in other EPA standards (Fitzsimmons, 1986).

Information must also flow from EPA to the public if this phase is to be considered a success. This flow of information also includes the proceedings of the public workshops and hearings. Agency public hearings have been described by others as less-than-perfect forms of participatory democracy. Past uses of Agency-sponsored public hearings have ranged from the satisfying only the legal requirements, to simple one-way Agency public relations efforts, to methods for diffusing antagonism from the affected public (Checkoway, 1981). The number of comments submitted at the arsenic hearings indicates that a two-way flow of information and opinion existed, especially in Tacoma, where over 600 comments were made on the standard by attendees. This seems to indicate that the public hearing forum for the information phase was well designed and well used by both the Agency and the affected public.

Other forms of information, most of which were required by law, flowed from EPA to the public. These included the publication of information documents which outlined the background of the environmental problem, the technical body of data needed for the determination of a solution to the problem, and the determination of alternatives considered by EPA. Other published documents included the arsenic standard risk assessment information document with analyses of applicable epidemiological and toxicological studies used in the formulation of the risk value used in the standard.

The last set of documents published before the regulation was promulgated were the documents which included the Agency's official response to the comments submitted during the public comment period of the standard, this included comments on both risk assessment and technical data. All of these documents were available for public inspection and critique.

The quantity of information provided by the Agency for the public indicated a successful information phase. Still, the quality of this information must also be assessed to determine the actual success of public involvement. The quality of information exchanged is a more elusive measure and requires the data generated by this study.

Phase 3 - Response

The final phase used to analyze the success of the public comment process is the response phase. In this phase, opportunity and information exchanges should result in changes in the proposed standard. These changes include alterations in the Agency's proposed regulation due to public participation and changes in public support for the final regulation as a result of the incorporation of public concerns by EPA.

The changes made to the proposed arsenic rule were significant. Most of these changes occurred as a result of information exchanged through Agency-sponsored public participation opportunities. These changes, considered alone, indicate that the response phase was a

success for the Agency and the involved public. However, the fact that many changes were made as a result of the submitted comments does not guarantee a successful process. The exchange model also requires an analysis of changes in public opinion as well.

The final standard had a significant impact on the opinion of the public. While the final standard was undeniably weaker than the proposed standard, industry's opinion of the final standard improved (Lindquist, 1986; Scanlon, 1986). For the same reasons, the level of satisfaction of other groups, including local government agencies and environmental groups, was decreased markedly (Doniger, 1986; Early, 1986; Nolan, 1986; Gregory, 1986). The Natural Resources Defense Council has, in fact, sued the Agency over the outcome of the arsenic standard (Doniger, 1986).

One reason for the changes which affected the perception of the standard by the groups involved was EPA's dependence on the industries it regulates for the data used in the regulation process. Other researchers have also realized this dependence. As the economic stakes increase, so does the willingness of the industries involved to intervene in the regulatory process with data and other technical support (Checkoway, 1981). In the arsenic standard-setting process, the economic stakes of compliance with the proposed standard were considerable to an already failing copper industry. Industry's efforts to change the proposed standard succeeded and their level of satisfaction with the final standard improved.

The diminished levels of support by other various groups affect the success of the response phase. Some groups will always be

adversely affected by changes in a proposed standard. A large number of participants were not satisfied with the final standard, as indicated by the representative opinions and the suit pending against the Agency (Doniger,1986). The most disappointed groups were the ideological supporters of EPA--the environmental groups—who are usually most critical of Agency decisions (Buck, 1981).

Still, at least one representative of these groups, local government, felt that they had adequate opportunity to make a change in the standard (Nolan, 1986). The problem, according to many of the groups involved, was not the public involvement process. The problem with the final standard was the disproportional Agency response to concerns voiced by industry (Doniger, 1986; Nolan, 1986; Gregory, 1986).

According to the Godschalk Exchange model, the breakdown of the public participation process occurred not as a result of poor information or opportunities to exchange opinion, but in EPA's use of public comment. An explanation for the causes of this problem extend beyond the confines of the exchange model.

## Summary of the Model Phases

The adjusted Godschalk Exchange Model provided an excellent method for the analysis of the public participation process for environmental regulation. Using the model and its three phases, the promulgation of the arsenic standard was a qualified success in terms of the use of public involvement. Opportunities for involvement were provided by

EPA. The opportunities provided by the Agency were well used by concerned citizens and various special interest groups. A significant amount of information was exchanged between the Agency and the public. These factors contributed to many important changes in the standard.

However, many of the participants felt that EPA was overly sympathetic to industry's concerns and the final standard was considerably less acceptable than the proposed standard. Consequently, the public response to the Agency indicates that the Agency failed to act in accordance to the public comments submitted during the information and opportunity phases.

The response phase is, without a doubt, the most crucial element of the exchange model. This phase is the "bottom line" where changes are made to the proposed standard and in public opinion. Many of the groups involved felt that the proposed arsenic regulation would have been more effective in protecting the public health than the promulgated standard. Two explanations are provided to analyze their dissatisfaction. These explanations include public consensus in environmental rule-making, and a model which explains the Agency's actions on the basis of group theory.

## Consensus Explanation for Agency Response

The first explanation for dissatisfaction with the final standard is based upon the fact that <u>any</u> regulation, regardless of its content will disappoint a number of involved participants. Groups who involve themselves in the public participation process are highly divergent in

ideological goals. Industry and environmental groups disagree on most environmental issues. The adversarial nature of the environmental rule-making process nearly guarantees the disappointment of some of the participants.

Additional factors contribute to a reduced satisfaction with an environmental standard. The degree of satisfaction with a regulation changes considerably as citizens become enlightened on the issues. This satisfaction level usually drops as the Agency and involved groups publicly uncover assumptions and shortcomings of the regulation. This is especially true for regulations based upon public risk estimates which contain a significant amount of uncertainty. As the public becomes more aware of the issues and the uncertainty in many decisions, the consensus which may have existed at the time of the proposed rule breaks down. The EPA's chances for pleasing a majority of the citizen participants are reduced.

Figure 6.1 shows that the reduction of public support is inevitable, even without any changes to the proposed standard. The figure is based upon a model of public consensus proposed by Creighton (1980). The figure also indicates that public support for a standard will decrease even if the Agency's final regulation still satisfies the largest possible number of participating groups. The application of the consensus model is valid for the arsenic standard, however the reduced level of satisfaction occurred mostly to groups on one side of the issues. A one-sided reduction in satisfaction indicates that the cause of the overall drop in satisfaction was not so much a shift in public opinion as it was a shift in Agency's interpretation of public opinion.

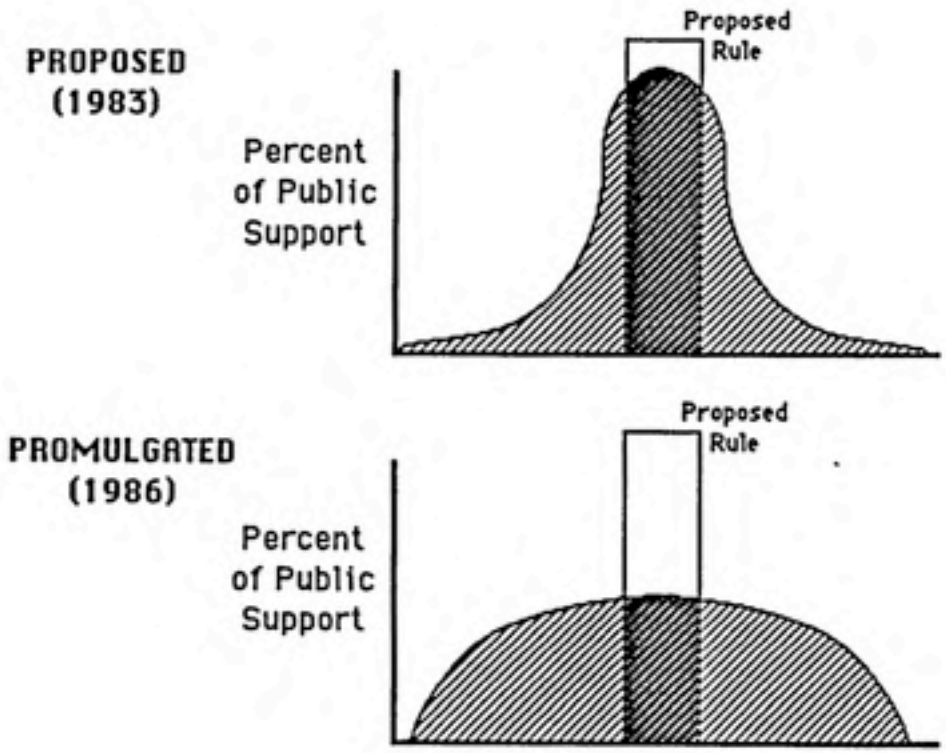


FIGURE 6.1 THE BREAKDOWN OF PUBLIC CONSENSUS

The shift in the Agency's perception of public opinion can be explained. The consensus model provides a possible explanation for the dissatisfaction of many groups involved in the standard-setting process, but cannot explain why the drop in satisfaction level was so disproportional.

Group Theory Explanation for Agency Response

Group theory defines a "group" as the essential bridge between the government and the individual (Dye, 1972). Politics, according to group theory, is the struggle among many groups to change and influence public policy. In the arsenic standard, the goal of the special interest groups was to change the proposed regulation. The task of EPA was to manage group conflict by 1) providing a forum for the conflict to take place and 2) balancing the interests of competing groups.

In this study, the arsenic standard is analyzed in relation to the groups involved. The Godschalk Exchange Model is loosely based upon group theory, since the public is perceived as a single group which affects the Agency. The use of group theory to explain Agency response in light of the public involvement is a logical choice.

In applying group theory to the arsenic regulation, the final standard is defined by the result of the Agency's search for an equilibrium of competing interests. This equilibrium is established by the influence exerted by various groups involved in the conflict. If group influence is measured only by the number and intent of submitted comments on the proposed standard, the equilibrium determined as a result of the participating groups would be similar to that shown in Figure 6.2.

Figure 6.2 indicates that the equilibrium determined by the Agency's final rule does not correlate well with the comments submitted. If EPA changed its rule in response to the comments submitted, the final standard would reflect only slight alterations

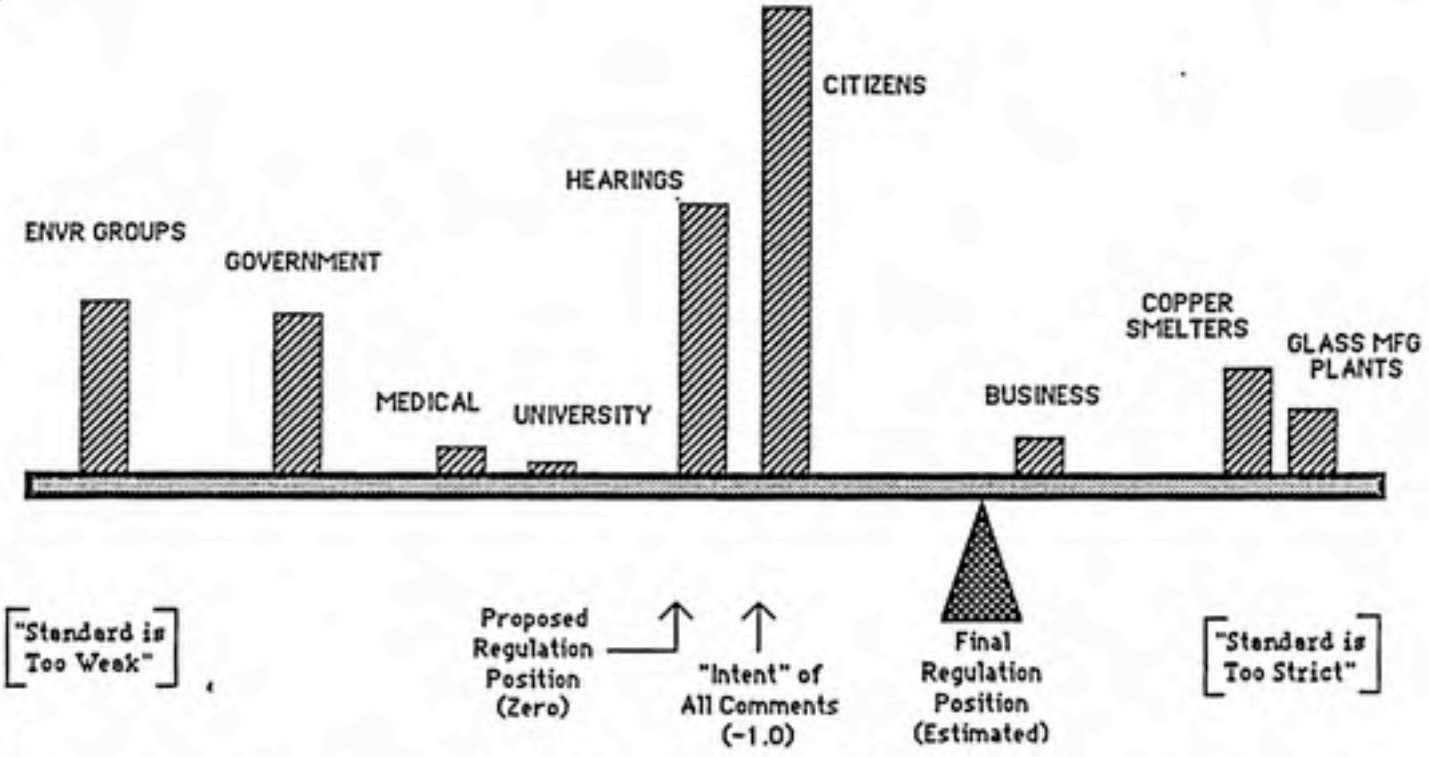


FIGURE 6.2 EQUILIBRIUM BASED ON NUMBER/INTENT OF COMMENTS

to the proposed regulation. Either the Agency did not make a rational decision based on the public's comment, or the group theory model has left out certain factors.

External factors commonly affect Agency decisions. The results discussed earlier indicated that factors other than the number and the intent of public comment existed and influenced the Agency's decisions. Those discussed earlier included the technical expertise of various group and a working knowledge of the data required for analysis.

The most important consideration in the analysis of influence is the ability and willingness of various groups to affect final decisions

by EPA after a rule is promulgated by filing a suit. The Agency openly admits that is is seriously affected by the threat of suit from outside groups (Ruckelshaus, 1984). Other factors affecting the sphere of influence include the relationship of the group to the Agency and the current regulatory climate.

The effect of outside factors on the sphere of influence depicted in Figure 6.2 is significant. Environmental groups and industry, with a willingness and financial backing to sue EPA, increase their influence on the Agency. Industry and government groups increase their influence as a result of their technical expertise and the data which they possess. The influence of industry and business groups increased due to the current conservative political climate which exists in the United States, a fact which frustrates environmental leaders (Gregory, 1986).

Other groups such as citizens and medical and university personnel are usually not benefited by the more subtle factors which shape environmental regulation. Their influence is measured only by the number and the intent of comments they submit during the public participation period. These groups can increase their influence only by supporting groups with the ability to manipulate technical data or sue the Agency.

Other factors which have not been mentioned most certainly influenced Agency decisions. However, additional factors are not required for this analysis. The factors discussed are considered indicative, rather than comprehensive.

Figure 6.3 is an update of Figure 6.2 which uses influences estimated using factors other than those discussed in conjunction with

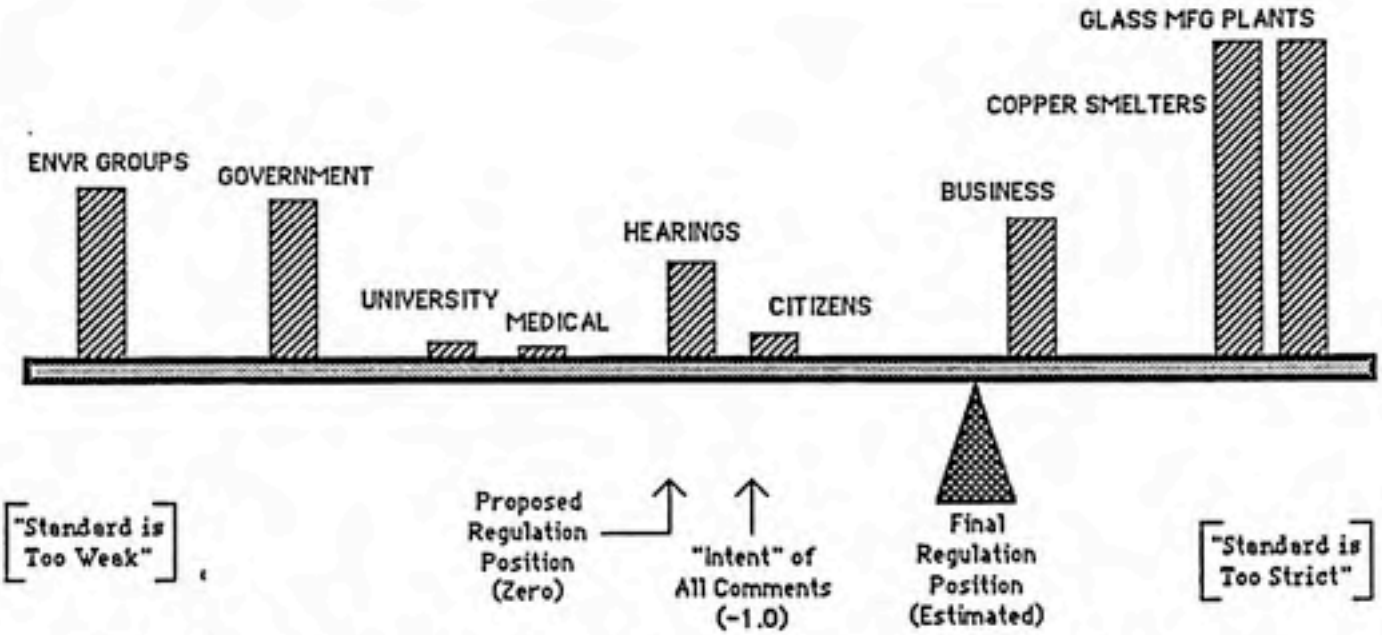


FIGURE 6.3 EQUILIBRIUM BASED ON UPDATED FACTORS

the intent of the commenters. This figure may provide insight into the correct reasoning behind the Agency's response to the public comment process. The equilibrium chosen by EPA in the final standard correlates with the updated group influence. Figure 6.3 shows that the decision made by the Agency can be explained rationally, but only for reasons other than the public will as indicated by the comments received.

This scenario is likely a more accurate and realistic depiction of the Agency's response to public comment. The main purpose of the comment period was to provide the Agency with knowledge of the general intent of each of the groups. After the intent for each group was well established, the Agency acted in accordance to the degree of influence

mustered by the participating groups, rather than by the substance of the comments submitted. EPA decision to make alterations in the proposed standard was based more upon these competing forces than the intent of public comment.

## SECTION VII - RECOMMENDATIONS

The EPA does not analyze the effectiveness or the utility of the public involvement process. The Agency's use of public comment has been criticized by many outside groups. The lack of review in its standard-setting process is damaging to the credibility of the Agency.

This study presents a method which can be used to analyze public comment submitted to the EPA for an environmental standard. The study serves to clearly define groups which participate in the environmental standard process and the collective intent of these groups. The results of this study also characterize EPA's response to public comment.

It is recommended that the Agency use this method to analyze the public comment process. The utility of the analytical methods presented here is subject to the type of standard proposed. Standards which involve a large number of comments and deal with a high degree of uncertainty in the data are most applicable to the proposed methods for analysis.

The results of this study also uncovered other issues. From the results of the study, is it recommended that the Agency continue to actively solicit the views of the affected public, especially in areas where there is no current consensus of scientific knowledge. In the case of section 112 regulation, this includes issues such as the determination of acceptable risk, jobs versus health, and regulation in

the face of uncertainty in health effects. In the promulgation of the arsenic standard, the Agency did an excellent job in preparing opportunities for the public will to be heard.

It is also recommended that the Agency give great deference to public hearings when the affected public can be present. The results of this study indicate that public hearings were a model for the entire public comment process, since most of the outcomes from these hearings were statistically equivalent to the average outcome of the entire public comment process. However, the results also indicated a significant difference between the public hearing held in Tacoma and the industry-dominated hearing held in Washington, D.C. The major cause of the different "intent" of the hearing was the fact that the general public—those most affected by the outcome—could not be present due to the economic hardships incurred. It is recommended that the Agency either hold all public hearings in areas where affected citizens reside, or refer to them by another name, since the affected public cannot realistically be expected to be present.

When public comment is submitted to EPA, the Agency should consider the actual content of the comment, rather than allowing externalities to affect the decision-making process. In the case of the arsenic standards, this would have meant a very slight adjustment in the final regulation. Instead, the proposed standard was significantly weakened.

Beyond the incorporation of industry's "better" data, the EPA increased proposed cut-off limits and added exemptions which will affect only 3 arsenic emitting facilities in the country. The lone

affected copper smelter was already installing the required control technology and one of the affected glass manufacturing plants switched over to a nonarsenic batch. The new standards, a 6-year nationwide effort, actually resulted in the installation of a single control device at one facility. This study shows that based on the comments submitted on the standard, the Agency's actions were not justified.

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APPENDIX A - Forms Used to Solicit Opinion of Draft Results

## Response to Public Comment in the Arsenic NESHAP

Over 2600 comments submitted during the notice-and-comment period of the Arsenic NESHAP were separated into two distinct areas; Risk Assessment/Risk Management and Technical Issues. This separation was performed by EPA contractors in the preparation of the documents presenting the comments on the standard and the official Agency response to them. The attached pie-chart shows the relative percentages of different groups involved in the comment process. Over 90% of all the comments submitted were in the Risk-Assessment, while all (100%) changes made to the standard were in the Technical Issues. Please comment on the following ideas:

1. Risk Assessment Issues, with all their assumptions, were attacked mostly due to their inherent vulnerability.

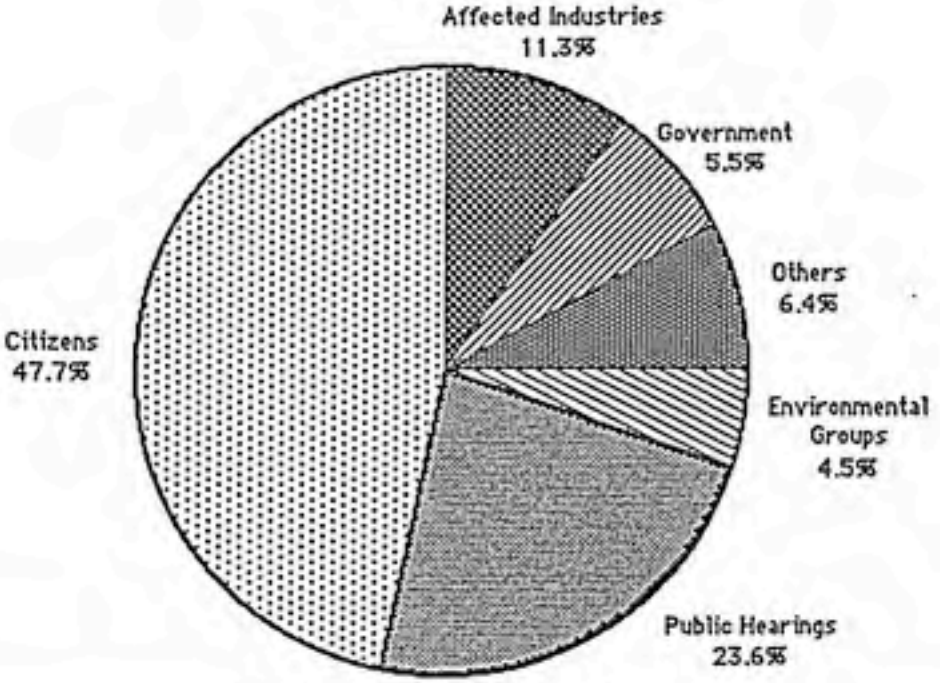
2. Citizens are more apt to comment on risk assessment issues since the technical issues are too difficult and involved for most citizens.

3. No changes were made to the risk assessment since it is as easy for the Agency to defend it as it is easy for outside groups to criticize it.

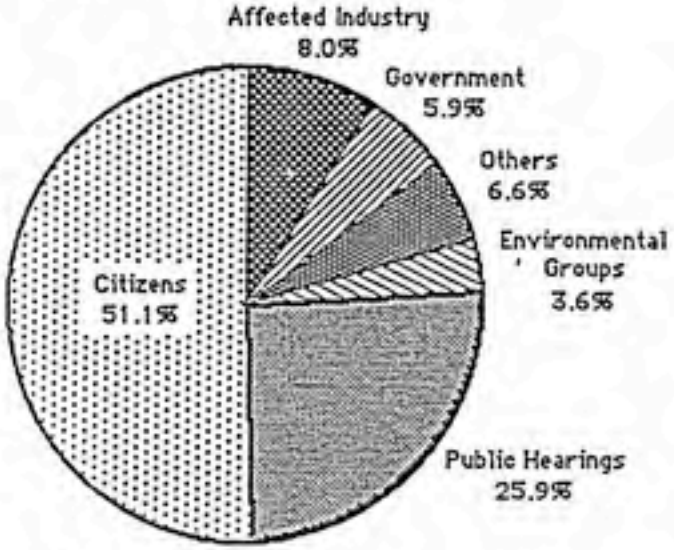
4. Any other ideas from this figure?

# Groups Participating in the Arsenic NESHAP

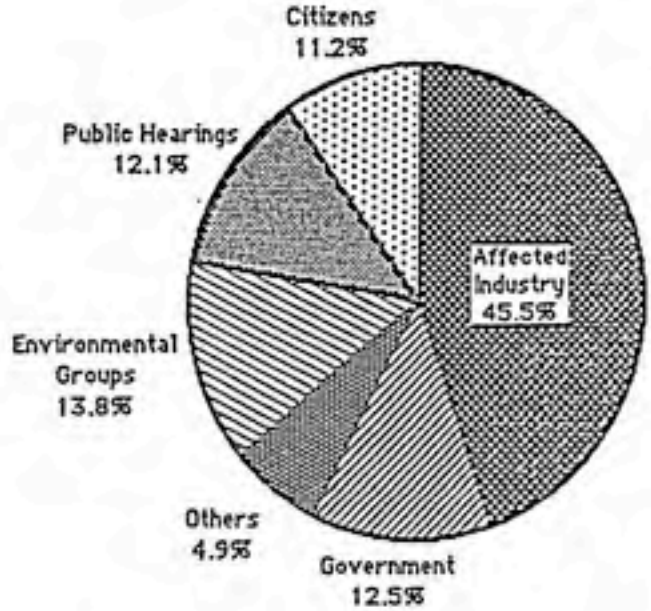
## All Issues




## Risk Assessment Issues




## Technical Issues



## Response to Public Comment in the Arsenic NESHAP

Comments were also separated by those indicating support for the proposed standard, and those opposed to the standard because it was either too strict or not strict enough. The attached table shows the relative support for the standard as indicated by the various groups which submitted comments to the Agency. Please comment on the following ideas:

1. No group, with the exception of the medical community, was satisfied with the proposed standard.

2. Groups not satisfied with the standard were "posturing" (exaggerating their discontent) for the record in order to establish their positions for potential litigation.

3. Why do you think the "Government" group was nearly as opposed to the proposed standard as the environmental groups and the affected industries? (Puget-Sound APCA was considered in the Local Government category.)

4. Any other ideas from this figure?

COMMENTOR'S SUPPORT FOR THE ARSENIC NESHAP

| Group | # Comments in Support of the Proposed Standard | # Comments Submitted to EPA | % Comments in Support of the Proposed Standard |
|---|---|---|---|
| Medical Personnel | 17 | 30 | 57% |
| Univ Personnel | 16 | 41 | 39% |
| Unaffected Industry | 7 | 21 | 33% |
| Hearings | 209 | 641 | 33% |
| Citizens | 373 | 1240 | 30% |
| Businesses | 22 | 85 | 26% |
| Government | 27 | 144 | 19% |
| Smelters | 37 | 245 | 15% |
| Envr Groups | 12 | 117 | 10% |
| Glass Plants | 3 | 37 | 8% |
| TOTALS: | 723 | 2601 | 28% |

## Response to Public Comment in the Arsenic NESHAP

Comments were then separated by those opposed to the proposed standard by those groups who wanted a stricter standard and those groups who felt the standard was to strict. The point system used to evaluate each comment in order to average the intent of each group of commentors was as follows:

| | |
|---|---|
| +10 Points | Standard is not strict enough |
| 0 Points | Proposed Standard is acceptable |
| -10 Points | Standard is too strict |

Although this system may be a bit contrived, the comments were quite easily scored. No group maintained a perfect score since, for example, the affected industries disagreed with EPA on nearly all issues, but did agree on a few (usually those issues where the environmentalists strongly differed with EPA). The attached tables and figure show the "intent" obtained when averaging all comments submitted by each group and subgroup. Please comment on the following ideas.

1. Were the Tacoma hearings more supportive of the standard than the Washington DC hearings (see table) or is this simply a result of averaging?

2. As the form of government became more localized, comment (on the average) became more supportive of the proposed standard.
   (National Govt = 3.9, State Govt = 3.6, Local Govt = 3.1)

3. Are the results of this figure something expected? What does this say about the methods used to average the "intent" of a group?

4. Any other ideas from these tables or the figure?

## INTENT OF COMMENT GROUPS AND SUBGROUPS

| Group Name | Number of Comments | Group Intent | Subgroup Name | Number of Comments | SubGroup Intent |
|---|---|---|---|---|---|
| Citizens (C) | 1240 | -1.1 | Individuals (I) | 1204 | -1.1 |
| | | | Groups (G) | 1 | 10.0 |
| | | | Union (U) | 35 | -1.1 |
| Envr Groups (E) | 117 | 7.3 | NRDC (N) | 59 | 8.4 |
| | | | Sierra Club (S) | 29 | 9.1 |
| | | | Greenpeace (G) | 8 | 7.5 |
| | | | Other (O) | 21 | 2.1 |
| Smelters (S) | 245 | -7.7 | ASARCO (A) | 177 | -6.9 |
| | | | Kennecott (K) | 22 | -10.0 |
| | | | Phelps-Dodge (P) | 42 | -10.0 |
| | | | Newmont Mining (N) | 2 | -5.0 |
| | | | TN Chemical (T) | 2 | 0.0 |
| Glass Mfg (L) | 31 | -8.7 | Corning (C) | 18 | -8.9 |
| | | | Owens-Illinois (O) | 7 | -8.6 |
| | | | Miscellaneous (M) | 6 | -6.7 |
| Othr Indstry (I) | 21 | -4.7 | Groups (G) | 21 | -4.7 |
| | | | Cotton (C) | 0 | --- |
| Government (G) | 144 | 3.6 | Local (L) | 51 | 3.1 |
| | | | State (S) | 29 | 3.6 |
| | | | National (N) | 38 | 3.9 |
| | | | Representatives (R) | 26 | 4.4 |
| Businesses (B) | 85 | 4.9 | 56 Businesses | 85 | -4.9 |
| Medical (M) | 30 | 1.1 | - none - | 30 | 1.1 |
| University (U) | 41 | 3.3 | - none - | 41 | 3.3 |
| Hearings (H) | 641 | -0.3 | Tacoma, WA (T) | 566 | 0.2 |
| | | | Washington, DC (W) | 75 | -4.9 |
| Unidentified | 6 | -5.0 | - none - | 6 | -5.0 |
| | 2601 | -1.0 | | 2601 | -1.0 |

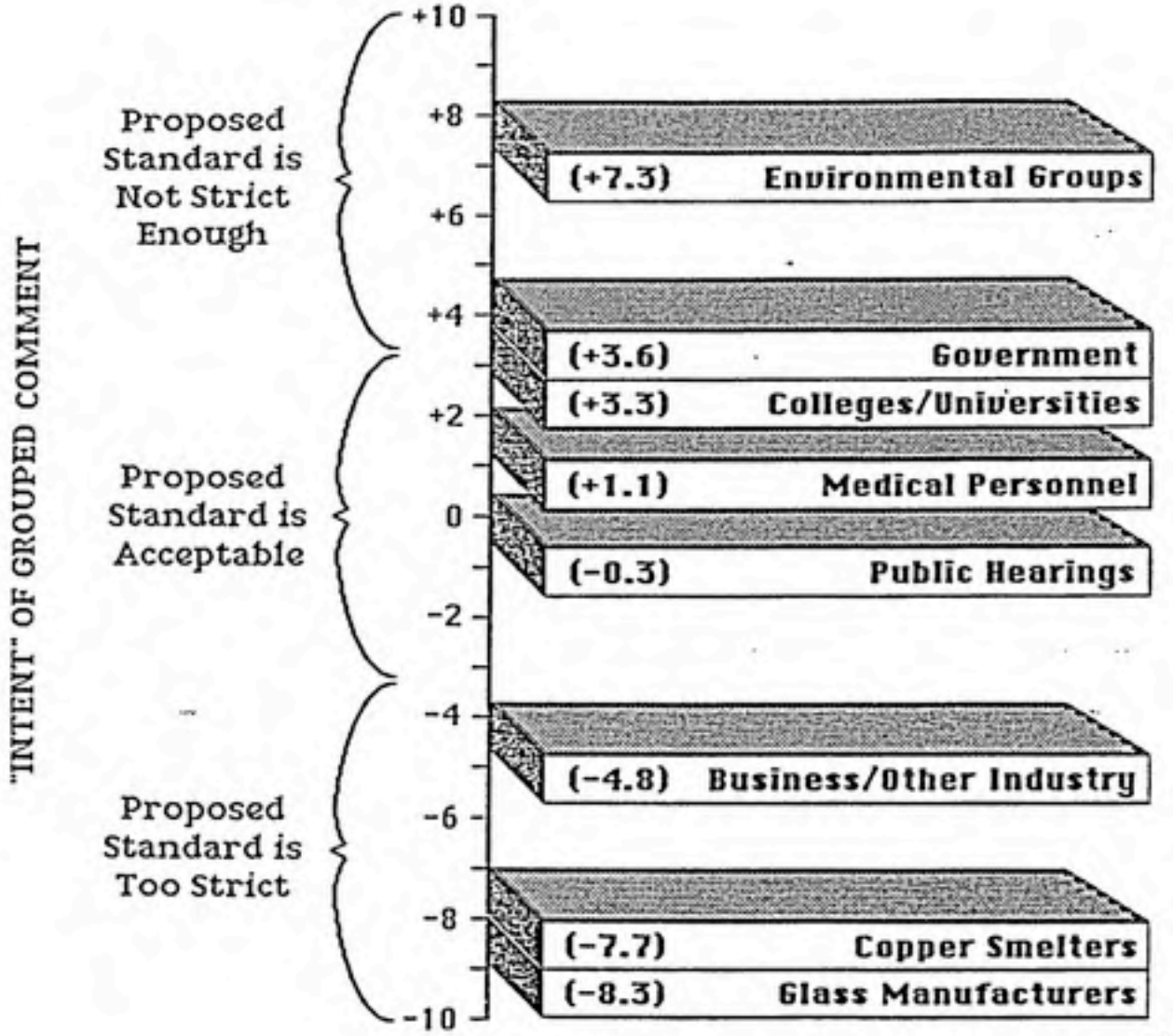
RANKING OF SUBGROUPS BY INTENT OF COMMENTS
(Groups Submitting 5 or more Comments)

| Group Name | Subgroup Name | Number of Comments | SubGroup Intent |
|---|---|---|---|
| Envr Groups (E) | Sierra Club (S) | 29 | 9.1 |
| Envr Groups (E) | NRDC (N) | 59 | 8.4 |
| Envr Groups (E) | Greenpeace (G) | 8 | 7.5 |
| Government (G) | Representatives (R) | 26 | 4.4 |
| Government (G) | National (N) | 38 | 3.9 |
| Government (G) | State (S) | 29 | 3.6 |
| University (U) | - none - | 41 | 3.3 |
| Government (G) | Local (L) | 51 | 3.1 |
| Envr Groups (E) | Other (O) | 21 | 2.1 |
| Medical (M) | - none - | 30 | 1.1 |
| Hearings (H) | Tacoma, WA (T) | 566 | 0.2 |
| Citizens (C) | Union (U) | 35 | -1.1 |
| Citizens (C) | Individuals (I) | 1204 | -1.1 |
| Othr Indstry (I) | Groups (G) | 21 | -4.7 |
| Hearings (H) | Washington, DC (W) | 75 | -4.9 |
| Businesses (B) | 56 Businesses | 85 | -4.9 |
| Glass Mfg (L) | Miscellaneous (M) | 6 | -6.7 |
| Smelters (S) | ASARCO (A) | 177 | -6.9 |
| Glass Mfg (L) | Owens-Illinois (O) | 7 | -8.6 |
| Glass Mfg (L) | Corning (C) | 18 | -8.9 |
| Smelters (S) | Kennecott (K) | 22 | -10.0 |
| Smelters (S) | Phelps-Dodge (P) | 42 | -10.0 |
| | | 2590 | -1.0 |

RANKING OF SUBGROUPS BY INTENT OF COMMENTS
(Groups Submitting 5 or less Comments)

| Group Name | Subgroup Name | Number of Comments | SubGroup Intent |
|---|---|---|---|
| Citizens (C) | Groups (G) | 1 | 10.0 |
| Smelters (S) | TN Chemical (T) | 2 | 0.0 |
| Smelters (S) | Newmont Mining (N) | 2 | -5.0 |
| Unidentified | - none - | 6 | -5.0 |
| | | 11 | -2.7 |

BREAKDOWN BY "INTENT" OF GROUPS INVOLVED IN THE ARSENIC NESHAP



Response to Public Comment in the Arsenic NESHAP

The comments were then analyzed for their effectiveness in prompting the EPA to change the proposed standard. This "effectiveness" was measured by the ratio of the number of comments submitted versus the number of changes occurring as a result of those comments. Comments were broken down into "All Comments Submitted" and "Technical Issues" categories, since comments in the category "Risk Assessment Issues" did not produce a change. (EPA did re-evaluate some aspects of the risk assessment, but no changes were made.) Please comment on the following ideas.

1. The groups with the enough financial backing to file suit against the agency were the most effective in prompting a change in the standard.

2. Most of industry's effectiveness resulted from the fact that EPA is completely reliant upon industry for the data it needs. (Most of the changes made were changes in data).

3. Environmental groups were not very effective in promoting changes in the regulation because EPA's proposed standard adequately incorporated their environmentally conservative views.

4. Any other ideas from this table?

## GROUP RANKING OF EFFECTIVENESS

ALL ISSUES

| Group Name | # Comments Submitted Requesting Changes | # Changes | Percent Effective |
|---|---|---|---|
| Glass Plants | 28 | 10 | 36% |
| Smelters | 165 | 21 | 13% |
| Government | 104 | 9 | 9% |
| University | 23 | 1 | 4% |
| Hearings | 378 | 14 | 4% |
| Envr Groups | 92 | 3 | 3% |
| Citizens | 788 | 12 | 2% |
| Unknown | 4 | 0 | 0% |
| Other Industry | 10 | 0 | 0% |
| Medical | 11 | 0 | 0% |
| Business | 49 | 0 | 0% |
| | 1652 | 70 | 4% |

TECHNICAL ISSUES

| Group Name | # Comments Submitted Requesting Changes | # Changes | Percent Effective |
|---|---|---|---|
| Citizens | 15 | 12 | 80% |
| Hearings | 21 | 14 | 67% |
| Government | 23 | 9 | 39% |
| Smelters | 56 | 21 | 38% |
| Glass Plants | 28 | 10 | 36% |
| Envr Groups | 26 | 3 | 12% |
| University | 23 | 1 | 4% |
| Other Industry | 3 | 0 | 0% |
| Unknown | 4 | 0 | 0% |
| Medical | 0 | 0 | --- |
| Business | 0 | 0 | --- |
| | 199 | 70 | 35% |

## Response to Public Comment in the Arsenic NESHAP

The last attached table splits up grouped comment into those wanting a weaker standard and those wanting a stronger standard. The "effectiveness" measure used before was then applied to each type of comment in order to determine if EPA was more likely to respond to one type or the other. This produced a measure of effectiveness independent of the source. Please comment on the following ideas.

1. The EPA responded three times more strongly to those commentors requesting a less strict standard than those wanting a stricter standard.

2. Government was more than twice as effective in promoting EPA to change the proposed standard than were environmental groups.

3. Any other ideas from this table?

# EPA REACTION TO COMMENT

Group: CITIZENS

| INTENT | Changed Weaker | Not Changed | Changed Stronger | Percent Changed | Ratio W:S | Overall % Changed |
|---|---|---|---|---|---|---|
| Weaker | 8 | 450 | | 2% | 1.4 | 2% |
| Stronger | | 326 | 4 | 1% | | |

Group: GOVERNMENT

| INTENT | Changed Weaker | Not Changed | Changed Stronger | Percent Changed | Ratio W:S | Overall % Changed |
|---|---|---|---|---|---|---|
| Weaker | 4 | 24 | | 14% | 2.7 | 8% |
| Stronger | 1 | 71 | 4 | 5% | | |

Group: ENVIRONMENTAL GROUPS

| INTENT | Changed Weaker | Not Changed | Changed Stronger | Percent Changed | Ratio W:S | Overall % Changed |
|---|---|---|---|---|---|---|
| Weaker | | 8 | | 0% | --- | 3% |
| Stronger | | 81 | 3 | 4% | | |

Group: AFFECTED INDUSTRY

| INTENT | Changed Weaker | Not Changed | Changed Stronger | Percent Changed | Ratio W:S | Overall % Changed |
|---|---|---|---|---|---|---|
| Weaker | 31 | 155 | | 17% | --- | 16 16% |
| Stronger | | 7 | | 0% | | |

Group: HEARINGS

| INTENT | Changed Weaker | Not Changed | Changed Stronger | Percent Changed | Ratio W:S | Overall % Changed |
|---|---|---|---|---|---|---|
| Weaker | 11 | 169 | | 6% | 3.3 | 4% |
| Stronger | | 176 | 3 | 2% | | |

Group: OTHERS (Medical, University, Other Industry, ect.)

| INTENT | Changed Weaker | Not Changed | Changed Stronger | Percent Changed | Ratio W:S | Overall % Changed |
|---|---|---|---|---|---|---|
| Weaker | 1 | 62 | | 2% | --- | 1% |
| Stronger | | 34 | | 0% | | |

Group: ALL GROUPS

| INTENT | Changed Weaker | Not Changed | Changed Stronger | Percent Changed | Ratio W:S | Overall % Changed |
|---|---|---|---|---|---|---|
| Weaker | 55 | 887 | | 6% | 3.0 | 4% |
| Stronger | 1 | 693 | 14 | 2% | | |

CHANGES IN SMELTER EMISSIONS/COST DATA

| * EMISSIONS DATA: Smelter | Proposal Estimate (Mg/Y) | Revised Estimate (Mg/Y) | Percent Reduction |
|---|---|---|---|
| ASARCO-Hayden | 30.1 | 5.4 | 82% |
| ASARCO-El Paso | 27.5 | 16.7 | 39% |
| Kennecott-Utah | 8 | 1.5 | 81% |
| Kennecott-Hayden | 6.5 | 6.5 | 0% |
| Kennecott-McGill | 45.9 | 10.1 | 78% |
| Phelps Dodge-Morenci | 6.9 | 1.9 | 72% |
| Phelps Dodge-Ajo | 2.6 | 0.5 | 81% |
| Phelps Dodge-Hidalgo | 1.2 | 0.2 | 83% |
| | 128.7 | 42.8 | 67% |

* Converter Fugitive Emissions (EPA-4503/-83-010b pg I-4-17)

| ** COST DATA: Smelter | Proposal Estimate ($1000) | Revised Estimate ($1000) | Percent Increase |
|---|---|---|---|
| ASARCO-Hayden | 1700 | 3660 | 115% |
| ASARCO-El Paso | 1375 | 1850 | 35% |
| Kennecott-Utah | 5200 | 8800 | 69% |
| Kennecott-Hayden | 6730 | 8000 | 19% |
| Kennecott-McGill | 8760 | 7150 | -18% |
| Phelps Dodge-Morenci | 8530 | 12970 | 52% |
| | 32295 | 42430 | 31% |

** Capital Cost Estimates (EPA-450/3-83-010b pg I-8-17)

Response to Public Comment in the Arsenic NESHAP

Final summary notes:

1. Do you feel as if you had a chance to make an impact on the final standard? If "yes", do you think you made an impact?

2. Are you more satisfied with the promulgated standard as compared to the proposed standard?

3. How applicable are these initial findings to other NESHAPS or even NSPS's that you have been involved with?

4. Would negotiated rulemaking have made for a more satisfactory standard? Does it have a place in a health-based standard?

5. Would you like a copy of the study?

APPENDIX B - Section 112 of the Clean Air Act

(i) seven years after the date on which any waiver is granted to such source or portion thereof, or

(ii) four years after the date on which such source or portion thereof commences operation,

whichever is earlier.

(F) No waiver under this subsection shall apply to any portion of a source other than the portion on which the innovative technological system or systems of continuous emission reduction is used.

(2) (A) If a waiver under paragraph (1) is terminated under clause (ii) of paragraph (1) (D), the Administrator shall grant an extension of the requirements of this section for such source for such minimum period as may be necessary to comply with the applicable standard of performance under subsection (b) of this section. Such period shall not extend beyond the date three years from the time such waiver is terminated.

(B) An extension granted under this paragraph shall set forth emission limits and a compliance schedule containing increments of progress which require compliance with the applicable standards of performance as expeditiously as practicable and include such measures as are necessary and practicable in the interim to minimize emissions. Such schedule shall be treated as a standard of performance for purposes of subsection (c) of this section and section 113.

NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS

SEC. 112. (a) For purposes of this section—

(1) The term "hazardous air pollutant" means an air pollutant to which no ambient air quality standard is applicable and which in the judgment of the Administrator causes, or contributes to, air pollution which may reasonably be anticipated to result in an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness.

(2) The term "new source" means a stationary source the construction or modification of which is commenced after the Administrator proposes regulations under this section establishing an emission standard which will be applicable to such source.

(3) The terms "stationary source," "modification," "owner or operator" and "existing source" shall have the same meaning as such terms have under section 111(a).

(b) (1) (A) The Administrator shall, within 90 days after the date of enactment of the Clean Air Amendments of 1970, publish (and shall from time to time thereafter revise) a list which includes each hazardous air pollutant for which he intends to establish an emission standard under this section.

Source: U.S. Government Printing Office (1977)
(Committee Print)

(B) Within 180 days after the inclusion of any air pollutant in such list, the Administrator shall publish proposed regulations establishing emission standards for such pollutant together with a notice of a public hearing within thirty days. Not later than 180 days after such publication, the Administrator shall prescribe an emission standard for such pollutant, unless he finds, on the basis of information presented at such hearings, that such pollutant clearly is not a hazardous air pollutant. The Administrator shall establish any such standard at the level which in his judgment provides an ample margin of safety to protect the public health from such hazardous air pollutant.

(C) Any emission standard established pursuant to this section shall become effective upon promulgation.

(2) The Administrator shall, from time to time, issue information on pollution control techniques for air pollutants subject to the provisions of this section.

(c) (1) After the effective date of any emission standard under this section—

(A) no person may construct any new source or modify any existing source which, in the Administrator's judgment, will emit an air pollutant to which such standard applies unless the Administrator finds that such source if properly operated will not cause emissions in violation of such standard, and

(B) no air pollutant to which such standard applies may be emitted from any stationary source in violation of such standard, except that in the case of an existing source—

(i) such standard shall not apply until 90 days after its effective date, and

(ii) the Administrator may grant a waiver permitting such source a period of up to two years after the effective date of a standard to comply with the standard, if he finds that such period is necessary for the installation of controls and that steps will be taken during the period of the waiver to assure that the health of persons will be protected from imminent endangerment.

(2) The President may exempt any stationary source from compliance with paragraph (1) for a period of not more than two years if he finds that the technology to implement such standards is not available and the operation of such source is required for reasons of national security. An exemption under this paragraph may be extended for one or more additional periods, each period not to exceed two years. The President shall make a report to Congress with respect to each exemption (or extension thereof) made under this paragraph.

Source: U.S. Government Printing Office (1977) (Committee Print)

(d)(1) Each State may develop and submit to the Administrator a procedure for implementing and enforcing emission standards for hazardous air pollutants for stationary sources located in such State. If the Administrator finds the State procedure is adequate, he shall delegate to such State any authority he has under this Act to implement and enforce such standards.

(2) Nothing in this subsection shall prohibit the Administrator from enforcing any applicable emission standard under this section.

(e)(1) For purposes of this section, if in the judgment of the Administrator, it is not feasible to prescribe or enforce an emission standard for control of a hazardous air pollutant or pollutants, he may instead promulgate a design, equipment, work practice, or operational standard, or combination thereof, which in his judgment is adequate to protect the public health from such pollutant or pollutants with an ample margin of safety. In the event the Administrator promulgates a design or equipment standard under this subsection, he shall include as part of such standard such requirements as will assure the proper operation and maintenance of any such element of design or equipment.

(2) For the purpose of this subsection, the phrase "not feasible to prescribe or enforce an emission standard" means any situation in which the Administrator determines that (A) a hazardous pollutant or pollutants cannot be emitted through a conveyance designed and constructed to emit or capture such pollutant, or that any requirement for, or use of, such a conveyance would be inconsistent with any Federal, State, or local law, or (B) the application of measurement methodology to a particular class of sources is not practicable due to technological or economic limitations.

(3) If after notice and opportunity for public hearing, any person establishes to the satisfaction of the Administrator that an alternative means of emission limitation will achieve a reduction in emissions of any air pollutant at least equivalent to the reduction in emissions of such air pollutant achieved under the requirements of paragraph (1), the Administrator shall permit the use of such alternative by the source for purposes of compliance with this section with respect to such pollutant.

(4) Any standard promulgated under paragraph (1) shall be promulgated in terms of an emission standard whenever it becomes feasible to promulgate and enforce such standard in such terms.

FEDERAL ENFORCEMENT

SEC. 113. (a)(1) Whenever, on the basis of any information available to him, the Administrator finds that any person is in violation of any requirement of an applicable

Source: U.S. Government Printing Office (1977) (Committee Print)