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STATE ENVIRONMENTAL MANAGEMENT IN WEST GERMANY: AIR POLLUTION CONTROL IN NORTH RHINE-WESTPHALIA

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ABSTRACT

North Rhine Westphalia was one of the first states of West Germany to adopt vigorous air pollution control legislation and implementation strategies. Its air pollution control research laboratories have long been among the best in the world. The strategies for air quality maintenance are a combination of state and local planning, building inspection regulations, and technical measures for emission reduction. Through such strategies North Rhine-Westphalia has achieved a significant reduction in sulfur dioxide, particulate matter and nitrogen oxide pollutants. This article reviews the organizational structure for environmental management in the state of North Rhine-Westphalia and some of the strategies which it has adopted to control air pollution.

The State of North Rhine-Westphalia is the most heavily industrialized state of West Germany. By the early nineteen-fifties, the consequences of this heavy industrialization were beginning to be felt in North Rhine-Westphalia and environmental pollution became the subject of considerable inquiry. The state authorities worked closely with the federal authorities in organizing research efforts and in the establishment of the foundations for the preservation of the quality of the environment. By the end of the nineteen-fifties, the federal and state governments of West Germany began to revise the legal basis for environmental pollution control and developed new standards for such control. North Rhine-Westphalia has been one of the leading German states in the initiation of environmental pollution control measures.

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One might say that "necessity has been the mother of invention" in North Rhine-Westphalia due to the extent of industrialization in this region of the country. The industry which is located here is of the "heavy" variety, such as, chemical, iron, steel, cement, and coal production, which is the backbone of an industrial economy and is the source of a substantial amount of air and water pollution.[1] Industrial operations, furthermore require a great many people to keep them running and they want to be relatively close to their jobs so in ever increasing numbers they congest the areas near their work. This has a compounding effect on the quality of the environment. For with the people come automobiles—the most pernicious source of air pollution known—and a greater demand for water which heightens the need for bigger and better water clarification and supply plants.

The environment has been both good and cruel to the citizens of North Rhine-Westphalia. The area had the fortune of being blessed with an ample supply of coal (the Ruhr is the largest coal-mining district of West Germany) and an extensive network of rivers which facilitated the shipment of products and stimulated the growth of the region, but along with this growth came the deleterious side-effects of environmental pollution which, untended, could reduce this proud location to a wasteland.

As the years passed the policy makers became more and more aware of the costs of industrial growth. Smog conditions became more serious, people began to get sick more often and weaker ones were dying, lakes and streams became undesirable for recreational use, and famous cathedrals began to suffer damage to their stone and glass. As a result, the legislators of North Rhine-Westphalia responded early, relative to the other states of Germany, and enacted a number of environmental programs. They also created new research institutions to examine the causes and search for possible solutions to environmental problems stemming from the intensive industrial development of the region. The purpose of this paper is to present a cursory description and analysis of those air pollution control policies and the institutional system which was established for their implementation in North Rhine-Westphalia.

ADMINISTRATION FOR ENVIRONMENTAL PROTECTION IN WEST GERMAN STATES

In the vertical distribution of power and authority in West Germany there are three basic groupings below the federal level. There is an upper institutional level in the form of the *Länder* (federal state) Ministries. There is a middle

[1] North Rhine-Westphalia has the following percentages of West German industrial capacity within its boundaries: Iron and steel industry—(70%), Stoneware—(60%), Steam power plants—(50%), Basic chemical products industry—(50%), Iron foundries, steel casting, and malleable cast iron foundaries—(50%), Non-ferrous metal foundaries—(35%), Mineral refineries—(40%) [1].

institutional level in the form of the *Regierungspräsidien* (provincial governor's offices) which are agencies for parts, or regions, of the federal states. There is a lower institutional level in the form of the *Landkreise* (counties) and/or *Gemeinden* (communities or cities and villages). In addition to these groupings there are some special agencies like the *Gewerbeaufsichtämter* (special trade supervisory agencies) which are responsible for regulating specific industrial production activities. All of these levels of government participate in the implementation of environmental pollution control laws generated at the federal and state levels of government.

In a Report on the Human Environment in West Germany, the tasks of the Länder (and their constituent governments) are outlined in a brief, but careful manner [2]. Among the tasks assigned to these middle and lower levels of government is the task of law enforcement. This means that the states, especially, are responsible for the recruitment, training, and assignment of expert personnel for the organization of sufficient administrative structures for environmental protection, including the establishment and outfitting of the respective offices. In order to have an adequate basis for control, the states have the authority and responsibility to establish monitoring and measuring institutes as well.

Another task assigned to the states is the provision of research facilities, however, the federal government also operates its own research facilities. These facilities are to serve as advisory bodies to the executive bodies of government to whom policy guidance and implementation responsibilities are designated. Such technical guidance is necessary since pollution control is largely a matter of technical feasibility.

There is also a strong link between state planning programs and environmental planning. For example, there must be an "inclusion of environmental protection in the political plans and decisions on the federal, state, regional and local level (including structural and economic planning.)" [2, pp. 66-67]

Furthermore, the Länder are responsible for the issuance of environmental protection standards for special problems within their respective areas of jurisdiction. This responsibility is derived from a constitutional grant of authority which stipulates that the states are to apply federal law within their own jurisdictions. This permits the states to adopt standards more applicable to their particular regions such as smog alarm plans or protection measures for regions requiring special protection for purposes of health, to protect cultural treasures, to protect health resort areas, or to protect other environmentally sensitive areas.

None of the state governments in West Germany have assigned all tasks of environmental policy to one governmental department. Though some state governments have included the term "environmental affairs" (*Umweltschutz*) in a departmental designation (such as Bavaria, West Berlin, Hesse, and the Palatinate). The various ministries simply carry out environmental tasks in conjunction with their everyday operating functions. Coordination and

supervisory functions pertaining to environmental affairs, however, are generally, in most states, assigned to one particular state department which performs a similar function for the rest of the state administration [2].

Within North Rhine-Westphalia primary responsibility for environmental pollution control, at the state level, is divided between two state ministries. The principal agency responsible for monitoring the implementation of Federal and State Air Pollution Control regulations is the State Ministry for Labor, Health and Social Affairs. A lesser responsibility, limited to the degree to which air pollution control regulations deal with the area of transportation, is assigned to the State Ministry for the Economy, Middle Classes, and Transport. Water pollution control regulation, alternatively, is the responsibility of the State Ministry of Food, Agriculture and Forestry. As the Ministry of Labor, Health and Social Affairs is for air pollution, the latter ministry is responsible for the implementation of *both* federal and state water pollution control laws.

FEDERALISM AND POLLUTION CONTROL

The invaluable feature of federalism whereby states can act as proving grounds for policy formulation and implementation is most evident in the area of environmental protection. In West Germany, for example, the existing environmental laws of federal states have been regarded as "temporary solutions as to their contents, until a uniform legislation has been produced in the federation." [2] The Immissions Protection Law of North Rhine-Westphalia provides a good example. It was adopted before, and had considerable bearing on, the adoption of the Federal Immissions Protection Law of 1974. To a lesser extent, but somewhat similar in nature, the current debates in the U.S. Congress over a "National Bottle Bill" have their origin in the apparent success of the "Oregon Bottle Bill." [3]

Though there may be uniform federal legislation for a particular area of environmental pollution control, e.g., air pollution, state and local governments have to provide the organizational structures necessary for the implementation of the law. This is the situation in both the United State and West Germany. A prime example of this can be seen in the requirements of the Clean Air Act in the United States. The legislative mandate stipulates that each state must construct and implement an implementation plan on how it will proceed to meet the National Ambient Air Quality Standards (NAAQS) promulgated by the United States Environmental Protection Agency [4]. And once a plan for a particular state has been approved by the USEPA, the state has an obligation to implement the strategies outlined in the plan toward the accomplishment of the national standards. A state could adopt a combination of strategies toward this goal. Such strategies include – Transportation Control Plans (TCP), Indirect Source Review (ISR), Air Quality Management Plans (AQMP), New Source Review (NSR), and the Prevention of Significant Deterioration classifications (PSD), for example.

AIR POLLUTION CONTROL IN NORTH RHINE-WESTPHALIA (SEE TABLE 1)

North Rhine-Westphalia was one of the first states of Germany to adopt air pollution control legislation and strategies. The legislative authorities passed legislation concerning emissions of air pollutants in 1962. The law was non-technical in nature and covered both non-industrial and industrial establishments which caused air pollution, noise, or vibration. Air pollution was defined as any modification of the natural composition of the air by the introduction of smoke, soot, dust, gas, vapors or odors. Any person operating such establishments was required to install, operate and maintain the plant in such a fashion as to protect the neighborhood from sanitary nuisances [6].

Table 1. Organization for Air Pollution Control in North Rhine-Westphalia

Highest State Authority	A.	Minister for Labor, Health and Social Affairs (Industrial and Trade)	Minister for Economics, Commerce and Transportation (Traffic and Mining)
Higher State Authority	B.	High State Mining Authority for North Rhine-Westphalia	
(Middle) Intermediate State Authority	A.	Province Governors	
Lower State Authorities		State trade inspection authorities	Mining inspection authorities
Communal and Other Self-Administering Bodies		Communities	Counties
		Cities without Counties (building inspection authorities, street traffic authorities)	
State Institutes	A.	State Institute for Immissions and Soil Use Protection of North Rhine-Westphalia	State Product Testing Agency of North Rhine-Westphalia
Other Public Institutes and Institutes Which Are Entrusted With Public Problems	B.	Medical Institute for Air Hygiene and Silicosis Research	Technical Supervisory Assoc.
		District Master Chimney Sweep Authority	The Registered Association for the Investigation of the Effects on Public Health (E.V., engeträgenden Verein)

Source: *Umweltbericht – Nordrhein-Westfalen* (Düsseldorf: Ministerium für Arbeit, Gesundheit, und Soziales, 1974), [5, p. 67].

The state government of North Rhine-Westphalia (as well as Bavaria) also established a program of granting loans aimed at promoting air pollution control measures as early as 1962. By 1970, the loans and allowances granted, for this purpose, by the state of North Rhine-Westphalia amounted to 15 million DM per year [7].

The strategies of environmental air quality in North Rhine-Westphalia are a combination of state and local planning, building inspection regulations, and technical measures for emission reduction. The result is that the state largely controls the location of many land use activities. This is accomplished by requiring distances between business and industrial zones as well as between traffic networks and residential zones and recreation areas, and the planning arrangements which require that zones be set aside for development as well as protection of the regions [5, p. 11].

The state government regulates the permitting process as well as the planning process. For this purpose, the State Ministry for Labor, Health and Social Affairs issues detailed guidelines concerning immissions protection. The guidelines require that all construction plans must contain immissions reduction procedures, e.g., before a permit is issued.

The state government supervises the air pollution effects of industrial operations, checking on the observance of air pollution control regulations through the monitoring and regulatory activities of the State Trade Inspection Authorities (*Gewerbeaufsichtämter*) and the State Mining Inspection Authority (*Bergaufsicht*).

The institutional arrangement for air pollution control is totally separate from the institutional arrangement for water pollution control in North Rhine-Westphalia. As previously noted the agency with primary responsibility for the administration of Federal and State laws for air pollution control is the Ministry of Labor, Health and Social Affairs, which is situated in Düsseldorf. The Ministry formulates all directives that are necessary for the implementation of the Federal Immissions Control Law (to the extent that they are not formulated by the Federal Ministry of the Interior) and state air pollution control regulations. Much of the formal authority of the State to determine standards was reduced by the passage of the 1974 Federal Immissions Control Law, but the state does still have some capacity to determine stricter standards than the national standards. Such standards would be determined by the Ministry of Labor, Health and Social Affairs.

The Ministry of Labor, Health and Social Affairs is the keystone of the entire air pollution control program in North Rhine-Westphalia. Below and around it are the direct implementing agencies and research support organizations necessary for air pollution control policy implementation. Directly below the Ministry are the principal implementing agencies – the offices of the province governors (*Regierungspräsidien*) in which there are sections which deal with immissions control. The state is divided into five province areas with offices in

Düsseldorf, Cologne, Detmold, Arnberg, and Münster. These offices act primarily as coordinative mechanisms between the Ministry of Labor, Health and Social Affairs and the State Trade Inspection Authorities and the State Mining Inspection Authority.

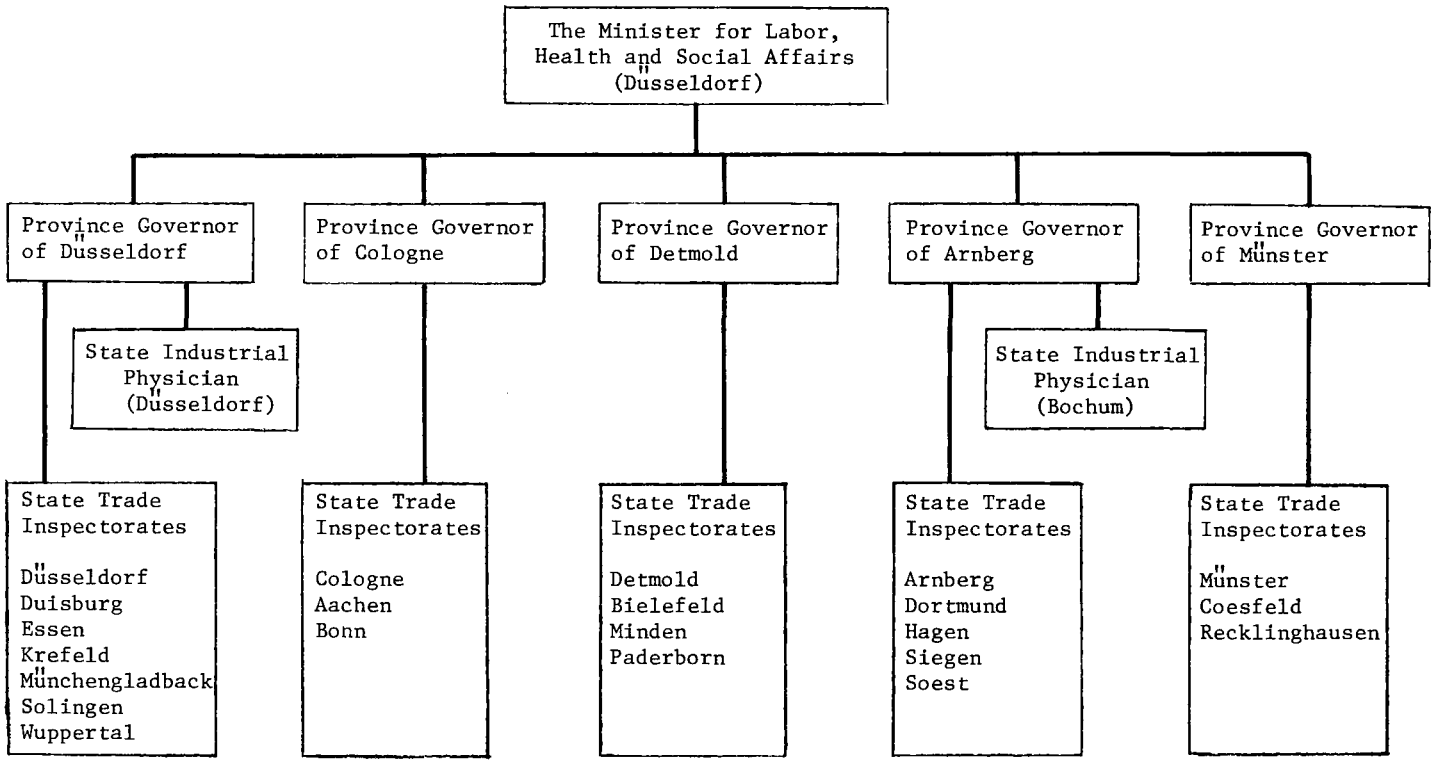
The State Trade Inspection Authorities have responsibility for accident, fire explosions, and radiation protection in the plants and worker health and safety, as well as air pollution control in plants. There are twenty-three trade inspection authorities in North Rhine-Westphalia which have air pollution control sections and which bear responsibility for these essential tasks:

1. Immissions protection (control)
2. matters of factory permit requirements
3. steam boiler plants – as far as they are not covered by the permit duty according to paragraph 16 of the Federal Trades Regulation
4. radiation protection and protection from the dangers of nuclear energy (radiation is considered to be an immission)
5. other environmental and nuisance immission protection measures [7, p. 69]. (See Figure 1.)

The inspection authorities are responsible for issuing permits to industrial installations which will require the establishments to install air pollution control equipment before they begin operation. The permits specify requirements for the construction and operation of establishments, including the maximum permissable levels of pollution. This permit granting process acts as a sort of pre-construction review. For, the industries must, in their applications for permits for new plants (or expansion), indicate expected air pollution loads by means of a standard formula and means by which it can be controlled. All applications are sent to a central location for the entire state (since 1974) and evaluated by means of computer. This process guarantees that the most progressive methods for air pollution control will be used for the most part, and promotes uniformity in the making of decisions by the permit granting administrative authorities. After the permits are issued and the installations begin operation, the inspection authorities perform in a monitoring capacity to insure adherence to permit specifications.

There are sections within the Trade Inspectorate specifically responsible for monitoring. Among these are motorized measuring (or survey) units which have been organized to more adequately handle this chore. They are equipped with the most recently developed measuring instruments which enable them to check for dust and gas emissions. These authorities are assisted in their task by a requirement under the Federal Immissions Control Law that large operations install air pollution measuring equipment and maintain a monitoring record.

The technology for such emission monitoring instruments already exists for dust and SO_2 for the larger steam power plants, cement works, and the iron and steel industry. There are current attempts to also furnish smaller and other



Source: Ministerium für Arbeit und Soziales, *Jahresbericht-1973 der Gewerbeaufsicht des Landes Nordrhein-Westfalen,* [8, p. 11].

Figure 1. Trade inspectorate organizational make-up

factory types with such instruments. Through these means of information gathering technology and through the strict organization of the Trade Inspection Authorities the effectiveness of air pollution control in North Rhine-Westphalia has been greatly enhanced.

A device which has been of tremendous importance in the control of air pollution in North Rhine-Westphalia has been the development of an emission register (*Emissionkataster*)[2] which operated through air pollution control regions (*Luftreinhaltegebieten*) similar to those designated in the United States. This system operates along the following lines. First, especially, heavily impacted regions of the state are declared air pollution control regions. Second, in each of these regions all air polluting sources are reviewed. Third, the results of these investigations are noted and an emission register is produced. Included in it are all sources of air pollution according to their geographical positions and their emissions conditions according to the output and character of substances released. Included are the emissions of industry, domestic heating, small businesses, and traffic projections. Finally, all of this information is placed into a computer which produces an emission register which serves as a kind of strategy map for an objective air pollution control policy [5, p. 66].

The emission register:

1. gives a summary of emissions (by specific polluting components) for a single emitter, or part of an emitter group;
2. is a basis for the enhancement and protection program for air pollution control;
3. permits a better forecast of projected emissions for industrial sources for which a permit must be issued;
4. assists in the determination of the necessary distances between residential and industrial zones (for the purposes of state and local planning);
5. guarantees the optimal regulation of emissions measurement operations;
6. makes it possible for the clarification of the inquiries of causality (that is, the determination of the originators of high air pollution concentrations) [5, p. 67].

In this fashion the emission register functions as a remarkable regulating device.

AIR POLLUTION RESEARCH CENTERS

The Ministry of Labor, Health and Social Affairs is supported in its determination of standards and guidelines through the research efforts of the State Center for Immissions and Soil Use Protection, in Essen; and the Medical

[2] The Germans differentiate between emissions and immissions. Emissions are those pollutants which are emitted in and around the immediate vicinity of a plant and immissions are those pollutants emitted into the ambient air.

Institute for Air Hygiene and Silicosis Research, in Düsseldorf. Both institutes have world-wide recognition for their research efforts in the area of air pollution control and health effect research. They have both been highly instrumental in the measurable success North Rhine-Westphalia has had in the field of air pollution control.

The State Center for Immissions and Soil Use Protection was specifically established on December 1, 1963, to provide the scientific consultation support means felt necessary for the state air pollution control effort. The basic task of the State Center "is to carry out research and development in the fields of air pollution control, protection against noise and vibration, and preservation of soil for agricultural and forest use." [9, p. 5] In conducting this research and development task the State Center employs approximately forty natural scientists and sixty engineers which form the vital core of the 350 member staff.

The State Center for Immissions and Soil Use Protection operates in a manner similar to the way in which the Federal Environmental Agency (FEA), in West Berlin, does in relation to the Federal Ministry of the Interior. The State Center is not directly a part of the Ministry of Labor, Health and Social Affairs, but is directly associated with it and provides much of the scientific knowledge necessary for the drafting of laws, ordinances and regulations to the state and local governments, like the FEA does for the Federal Ministry of the Interior. In addition to this responsibility, the State Center conducts technical investigations which often become the basis for the decisions which administrative, licensing and planning authorities must make in the implementation of Federal and state environmental pollution control laws. The State Center, as a technical institute, however, has no power to execute and implement policy decisions.

The Medical Institute for Air Hygiene and Silicosis Research is also a quasi-independent, research institute. It was established in 1962 at the University of Düsseldorf, but is state supported. It is a small, multi-disciplinary research center with twenty-five scientists and eighty-five helpers which conduct extensive research into the effects of air pollution on public health (primarily on humans, as opposed to the State Center which deals with plants and animals, as well) [5, p. 70]. Federal and state ministries, other scientific organizations in West Germany and around the world, and international authorities have frequently turned to this institute for information on the health effects of air pollution to be used in the determination of control standards.

SMOG WARNING SYSTEM

The State of North Rhine-Westphalia also has an extensive smog warning and regulation system which enables state and local authorities to undertake immediate steps to reduce emissions. This program was the first of its kind

initiated in West Germany. It began operating in 1965 with measuring stations in Dortmund, Essen, Bochum, Düsseldorf and Cologne. Today, it has twelve measuring stations that conduct continuous measurement and monitoring of sulfur oxides, nitrogen oxides, carbon monoxide, and hydrocarbon levels throughout the Rhine-Ruhr area. Measurements are taken every minute of the day and by means of telemetry communicated to the State Center which makes announcements of smog watches and various stages of smog alerts, as well as the actions to be taken when concentrations reach prescribed limits. This system has three stages of public alert based on specifications of toxic pollutant concentration limitations. As the pollution concentrations exceed the limitations, the different alerts are issued. In the first stage, e.g., when the SO_2 level exceeds a half hour average of 8 mg/m^3 at several measuring stations and a further increase is likely due to poor meteorological conditions, certain preparatory measures are taken. A pre-alarm is set off and the Minister of Labor, Health and Social Affairs is informed. In the second stage, e.g., when the SO_2 level exceeds 1.6 mg/m^3, some vehicular traffic patterns are restricted (i.e. 6-10 A.M. and 4-8 P.M. no cars in district under alert) and information is released to public media that a smog alarm is issued for twenty-four hours. In stage three, e.g., when the SO_2 level exceeds 2.4 mg/m^3, industrial installations must switch over to fuels low in sulphur and some are shut down until the air pollution epidemic passes. The 1975 standards include SO, CO, NO, and HC (1964 and 1970 basic standards for SO_2 smog alerts were 2.5 mg/m^3 and 2.0 mg/m^3. respectively).[3] Furthermore, an alarm may be issued on the basis of the likely combined effort of more than one pollutant and not solely on the basis of one pollutant.

IMPLEMENTATION PROBLEMS IN NORTH RHINE-WESTPHALIA

The problems associated with the implementation of environmental law in West Germany are not significantly different from the situation in the United States. Headlining the problems is the difficulty of specifically identifying the culprits and ascribing the appropriate blame. This is caused by the difficulty of gathering evidence of a significant nature to accurately assess blame. Complications set in due to the problem of differentiation between negligence and felony along with the necessity of ascribing blame on the basis of the after-the-fact nature of prosecution. You have to wait until they have accomplished the foul deed before you can act. Finally, the prosecutors job is

[3] This information was obtained in an interview at the State Center for Immissions and Soil Use Protection, in Essen, December 2, 1974. It should be noted, however, that as immissions control technology is advanced, these standards are made more stringent.

complicated by the cross-jurisdictional nature of environmental pollution (which the polluter has a tendency to rely upon). In consideration of all of these difficulties it is amazing that there are any prosecutions at all.

In the first six months of 1974, however, out of 928 initiated cases awaiting processing, 602 cases were processed in the prosecutors' offices of North Rhine-Westphalia. Of those cases processed, the bulk were for violations of water protection, violations of air purity maintenance and noise pollution control regulations (which are considered jointly as immissions) rank a distant fourth behind water protection, nature and countryside, and waste removal and infectious disease regulation violations. The greatest number of prosecutions occurred in Hagen (139), Munster (107) and Cologne (104) [10, p. 23].

The source behind the apparent success of the prosecutors office lies in a decision of the Minister of Justice of North Rhine-Westphalia in 1971. With the number of environmental pollution regulation violations increasing and the court dockets becoming overloaded, the Minister decided that the prosecutors' offices needed special environmental prosecutors to handle the increasing load. Subsequently, a number of special prosecutors were appointed to handle the heavy workload.

The procedures utilized by the special prosecutors operate in this manner:

1. the polluter is notified of violation of permit application,
2. the polluter appears at the special prosecutors office,
3. the special prosecutor reviews case,
4. the special prosecutor suspends charges,

OR 5. the special prosecutor levies fine upon polluter,

6. the polluter pays the fine,

OR 7. the polluter files protest to administrative court against the fine,

OR 8. the special prosecutor orders firm to cease operations,

AND 9. the firm ceases operations,

OR 10. the firm files protest against order to close in administrative court.

In regard to the final element, however, protests are unsuccessful 60% of the time (e.g., of the 219 protests filed in the first six months of 1974, only 40 per cent were upheld) [10].

RESULTS OF AIR POLLUTION CONTROL EFFORTS

The extensive efforts of the North Rhine-Westphalia government in the area of air pollution control have proven to be worthwhile. The overall quality of the air in the highly industrialized Ruhr Valley has improved considerably. The State Institute for Immissions and Soil Use Protection, in Essen, has been monitoring several air pollutants at thirteen different monitoring sites throughout the state of North Rhine-Westphalia since 1963. For example, the amount of

particulate matter has been reduced 48 per cent from the first measurement in 1963 to 1975 [11, p. 7].

Although North Rhine-Westphalia has been somewhat successful in the reduction of sulfur dioxide and particulate matter concentrations, the struggle against air pollution is becoming more difficult. Scientists from that region note that:

> The sulfur dioxide will no longer be the main factor in air pollution, instead, there will be fluorine, hydrocarbons, chlorine and a number of odorous substances resulting from chemical processes. Besides that, the dust problem will have an entirely different aspect: the inconvenience will not be caused by coarse dust, but rather by very fine dust endangering the health. Therefore, the present dust precipitation checks must be supplanted by dust concentration checks [2, p. 82].

Their conclusions are supported by a report of the State Institute which appeared in the Frankfurter Allgemeine Zeitung (December 18, 1974) that the concentration of heavy metals in the air over the Ruhr are increasing.

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