LEAD INDUSTRIES ASSOCIATION

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LEAD HYGIENE AND SAFETY
BULLETIN NO. 99

SUBJECT: AIR AND WATER
POLLUTION

To Members of the Lead Industries Association:

Those of our members who have read the Legislative Reports issued by this office during the current year will have noted the many bills dealing with subjects of air and water pollution.

The greatly increased attention given to these problems by both state and federal lawmakers and their consequently enhanced importance to our industries makes it seem worth while to distribute to our members the two enclosed recent and authoritative papers, one on Air Pollution by Dr. H. H. Schrenk of the Industrial Hygiene Foundation, and the other on Water Pollution by Mr. Robert H. Harris of the United States Public Health Service.

Manfred Bowditch

Manfred Bowditch
Director of Health and Safety

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SYMPOSIUM ON INDUSTRIAL HEALTH AND SAFETY

Air Pollution

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Being a good employer sums up the in-plant pollution situation . . . Being a good neighbor encompasses the solution to problems of air contamination outside the work area

THE control of atmospheric contaminants in the working environment has been the subject of concentrated action for many years. The primary objective of this work is to prevent harmful or objectionable concentrations of contaminants from reaching the breathing zone of workers.

This objective is accomplished to a large extent by local or general ventilation, and the contaminants are discharged outside the plant. The fact that these effluents might cause damage or create a nuisance outside the plant was recognized, and control measures were instituted in many instances. However, the marked increase in interest in air pollution recently has focused attention on disposal of industrial wastes and the need for reexamination of this problem.

It is immediately evident that the experience gained in in-plant studies serves as a valuable background, but problems can differ widely. Within the plant individual substances are usually encountered, an adult population in relatively good health is involved, and operational procedures, personnel, and control measures can be kept under close supervision. Outside the plant weather conditions influence the dilution and distribution of contaminants, effects are influenced by contaminants from other sources, proximity of domestic dwellings, and the health status of the general public. Conditions inside the plant can be evaluated with reasonable accuracy, whereas conditions outside the plant are much more vague and difficult to appraise, particularly with regard to nuisance complaints and effects on health. The problem in its broad scope becomes one of community or public relations and resolves itself into being a good neighbor.

Pure air is hypothetical, as all air is polluted to some extent either by natural or man-made contaminants. An air pollution problem exists when the concentration of a contaminant or contaminants reaches a level which constitutes a nuisance, adversely affects the health of the individual, or causes damage to property.

What Makes a Nuisance?

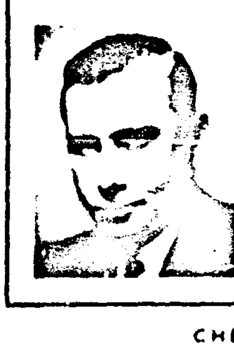
A nuisance may be produced by excessive settled particulate matter on porches, window sills, tables, and other horizontal surfaces, soiling and discoloring of walls, draperies, linens, and clothes, irritation of eyes and nasal passages, obnoxious odors, and loss of visibility.

A nuisance cannot be measured in absolute units. In some instances the intensity may be such that it cannot be denied, in others, the existence of a nuisance may be questioned. Whether fancied or real, complaints of nuisance cannot be dismissed lightly. To do so may lead to misunderstanding, controversy, and magnification of the problem. A willingness to listen, a spirit of cooperation, and a candid presentation of facts may bring the problem into proper focus.

That air pollution can adversely affect health is generally accepted, but a true evaluation in a quantitative sense is not available. The dramatic episodes of the Meuse Valley in Belgium in 1930, and of Donora, Pa., in 1948 are evidence of acute effects. The evaluation of chronic effects due to long-term exposure is difficult because of the many variables which are encountered. Chronic effects may be of two basic types, one due to a direct toxic action by the contaminants and the other an indirect action or influence on other diseases.

Maximum allowable concentrations of many toxic substances have been established for protecting the health of workers in industry. However, these concentrations have been established for single substances and pertain to adults in relatively good health for exposures of eight hours daily. They are of little use in attempting to establish amounts that may be breathed safely 24 hours a day by the general population. Furthermore, there may be a simultaneous action of a number of substances, both gaseous and particulate, and the resultant effect may be greater than the summation of action of the individual constituents. Basic information on this phase of the problem can be obtained by carefully planned laboratory studies.

With regard to the indirect effects of air pollution, there are a number of significant questions which cannot be an-



H. H. SCHRENK, who has published about 190 articles before this one, is currently "at home" in the research laboratories of Mellon Institute's Industrial Hygiene Foundation. A three-degree graduate of the University of Wisconsin (he received his Ph.D. in 1928), Dr. Schrenk finds industrial hygiene and sports the most interesting subjects in the realms of chemistry and hobbies, respectively. He was formerly chief of the health branch of the U. S. Bureau of Mines, and chief of the environmental investigations branch, Division of Industrial Hygiene, with the U. S. Public Health Service. He devotes spare time to several technical and professional organizations and has been both chairman and councilor of the ACS Pittsburgh Section.

swered at this time. What is the effect on preexisting diseases, particularly of the respiratory system? What effect does air pollution have on resistance to common diseases? What is the effect of the loss of ultraviolet rays? The answers to these questions are needed not only to evaluate the effects of air pollution on health, but to prevent unsound assumptions and conclusions which are always prevalent where there is a lack of data.

Careful studies of vital statistics to evaluate possible association of atmospheric pollution with various common diseases may shed some light on this subject. Extreme care must be exercised to consider all factors; otherwise erroneous interpretations may hinder rather than help.

There are a number of ways in which air pollution can cause economic loss—discoloring of buildings due to dirt, blackening of painted surfaces, corrosion of stone and metal surfaces, damage to merchandise in stores, injury to vegetation and livestock.

The effects on vegetation and livestock, particularly, have been the subject of extensive study and controversy. Swain (1) has recently reviewed the experiences at Ducktown, Tenn., Anaconda, Mont., Salt Lake City, Utah, and Trail, British Columbia. The report of the Selby Smelter Commission (2) is also of historical interest. The effects of fluorine in soils and crops has been recently reported by MacIntire (3).

Steps in Evaluation of The Air Pollution Problem

Much of the work in the field of atmospheric pollution has dealt with smoke abatement or specific problems which have presented themselves because of complaints of nuisance or damage. In other words, the problem has been one of correcting existing conditions. The problem of the future will be one of anticipating and preventing adverse conditions. The basic requirement will be to know your contribution to the over-all atmospheric pollution load.

Virtually every process or operation which produces gases or fine particles is a potential source of atmospheric contaminants. Combustion of fuel, incinerators, industrial operations, traffic, building and highway construction, and windstorms are typical examples. Since the raw materials being handled are the primary sources of atmospheric contaminants, an inventory of such materials is an essential first step in the evaluation of an air pollution problem.

The next step is a study of plant layout with regard to location and heights of stacks, flow diagrams, chemical and physical reactions which the materials undergo, and production figures. This information serves as a basis in selecting sampling locations to determine significant points of discharge of contaminants. The results of the analysis of the effluents provides data on the chemical and physical state and amounts discharged, these indicate the scope and magnitude of the problem.

It should be borne in mind that the reaction of contaminants does not cease with their discharge into the air. The possibilities of oxidation of the constituents and the interreaction of the numerous constituents which are usually present are almost unlimited. The resultant substances may be more irritating than the original materials. Furthermore, the problem of identifying the offending substance becomes much more difficult. This has been demonstrated in the Los Angeles air pollution problem where extensive studies are still under way to reveal the causative agent that produces severe eye irritation.

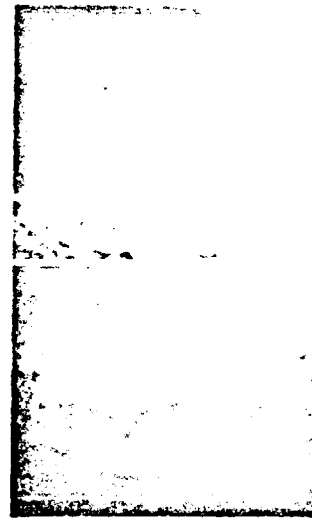
Air pollutants are of two types: those that exist in the gaseous state and those that are present as particulate matter. While this is an elementary classification, it is useful in the development of analytical procedures and control measures.

Most of the gases encountered in air pollution studies, as sulfur dioxide, hydrogen sulfide, carbon monoxide, aldehydes, nitrogen oxides, and hydrogen fluoride, are well known to the chemist. Analytical procedures are available or can be readily developed by modification of existing methods for special applications. The mixing, dilution, and distribution of gases by air currents are also well understood. Basic chemical engineering principles for collection of gases are available.

Particulate matter—consisting of dusts, fumes, mists, fogs, and smoke of a wide range of particle size—constitutes in many respects a much more complex problem than do the gaseous constituents. Dust particles formed by mechanical disintegration vary greatly in size and composition. Fumes formed by volatilization and condensation usually consist of small particles, although agglomeration may take place readily. Mist particles are also formed by mechanical disintegration as by atomizing and are in general larger than fog particles formed by condensation. Smoke results from combustion or destructive distillation and usually particle size is small. There is, however, no classification of the types of particulate matter mentioned on the basis of particle sizes, each type covers a wide range with overlapping.

In the realm of gases, chemical composition is a most important factor. In the realm of particulate matter, physical properties are of equal or greater importance than is composition. Large particles tend to settle rapidly, usually near the source of discharge, and are a nuisance mainly because of their contribution to dust or dirt on porches, window sills, and other horizontal surfaces. In general, they are of much less significance and more easily controlled than the smaller particles which may stay suspended in the air for long periods of time.

One of the outstanding characteristics of aerosols of small particles is their obscuring power. The facts that aerosols can be seen and that relatively small concentrations can markedly decrease visibility are important because they are properties that are readily noticed by the layman and hence are likely to be the cause of complaints. The loss of visibility is due primarily to the scattering of light, which depends not only on concentration but also on particle size and refractive index of the material. Another important property of fine particle aerosols is that the particles tend to follow the streamlines of the air flow because of their small mass and momentum. These properties make it difficult to collect such particles for determination or control. Two other properties of aerosols that are important, particularly from the standpoint of control, are their ability to coalesce to form larger aggregates and take on an electric charge which facilitates collection.



Donora Report photos of same point at same time of day showing atmospheric pollution on different days

Determination of Air Contaminants

It is well understood by the analytical chemist that an analysis is no better than the sample. Frequently, samples are collected and analyzed by some routine procedure without a clear understanding of the purpose of sampling or the limitations of the sampling and analytical methods. Interpretation of such results also leaves much to be desired. The resurgence of interest in analytical chemistry and the outstanding progress that has been made in recent years, particularly in physical methods, should be helpful in air pollution studies.

Although methods have been developed specifically for the determination of air contaminants there is a need for a careful review of this entire subject. Better methods are needed for research studies and simpler methods are needed for routine investigations. Apparatus for continuous recording of the concentration of contaminants is desirable. The analytical chemist has an opportunity in this field to make outstanding contributions to industry and the community. Much of the progress in air pollution is dependent on good analytical tools.

To be meaningful, the results of the determination of contaminants in the general atmosphere must be correlated with various meteorological elements, such as wind direction and speed, temperature gradient, relative humidity, and rainfall. For example, a typical curve of air pollution during the day usually shows a peak during the early morning hours when there is marked stability of the atmosphere. A minimum occurs in the middle of the day because of heating of the ground and resultant convection currents which carry the contaminants to higher levels where they are more readily dissipated by the winds.

Vertical air movement is an important factor in the dilution and removal of contaminants. Air turbulence and winds may be considered a giant ventilation system analogous to the ventilation of a plant or vehicular tunnel. As long as the system is working efficiently the contaminants are adequately diluted and removed, but difficulties immediately arise if the ventilation is stopped.

The wide range of concentrations of contaminants which can occur, even though the amounts of contaminants discharged remain constant, raises the question as to whether standards for the concentration of contaminants in the general atmosphere are practical. Are such standards to be based on average or stable atmospheric conditions? If based on stable conditions, what length of time is to be taken?

Obviously excessive concentrations will accumulate during a prolonged stable period. Curtailing or modifying certain operations when a prolonged stable period is forecast has been suggested. We cannot control the weather, but with a knowledge of its effects on the dilution and distribution of contaminants in local areas we can work with it rather than against it.

Control of Air Contaminants

Studies on properties, determination, effects—in fact, all other phases of the air pollution problem—are secondary to control. The results of these other studies, however, are necessary to define the problem and indicate its character and extent so that the engineer has a clear picture of objectives to be attained.

Control procedures for atmospheric contaminants are of two general types: those that do not require the collection of the contaminant from the effluent, and those that do require collection. There are three basic procedures which do not require collection. They are (a) dilution, usually obtained by high stacks, (b) change in process to eliminate formation or discharge of contaminants, and (c) transformation of a harmful or objectionable substance into one that is not harmful or objectionable.

There are a number of principles on which collection procedures are based, such as gravitational and centrifugal separation, filtration, electrostatic precipitation, ultrasonic flocculation, Venturi scrubbing, absorption (in water, aqueous solutions, or other solvents), and adsorption. An advantage of the noncollecting procedure is that there is no disposal problem of collected material. Collection procedures, however, have a greater variety of applications and will undoubtedly receive major attention.

Dilution. Disposal of atmospheric contaminants by discharging through high stacks is one of the oldest and commonest methods of air pollution control. This method has been used particularly by the metallurgical industry to dilute sulfur dioxide produced during roasting of sulfide ores.

A number of stacks approximately 600 feet in height have been built and the dilution and distribution of gases have been studied by air analysis. The theory of the dilution and spreading of smoke and gases from stacks has been discussed in a number of papers (4) and mathematical equations have been suggested for calculating ground level concentrations downwind. Work in this field is relatively recent and the results of more comprehensive studies may be expected.

Change in Process. Since, in general, air pollution represents waste, changes made in processes to eliminate waste have at the same time decreased air pollution. An excellent example is the beehive coke oven compared to the modern by-product coke ovens. While such changes have resulted in economic gain in many instances, it must be anticipated that this will not be true in the majority of cases, and the primary objective will be the prevention of air pollution.

Transformation. The transformation of objectionable substances to nonobjectionable substances has been successfully applied to the control of atmospheric contaminants. The method is limited, in general, to substances which are readily oxidized, the most commonly used procedure is combustion of malodorous substances. The main disadvantage is cost of fuel. It is not anticipated that transformation will have wide application, but for certain problems it may be the simplest solution.

Collection of Air Contaminants. The collection of air contaminants at the source is a field which has unlimited possibilities for the chemical engineer. The principles of absorption of gaseous substances are basic unit operations of chemical engineering; absorption methods, therefore, are well understood. However, the difficulties of removing relatively small concentrations of contaminants from large quantities of air by reasonably economic processes are great. The removal of particulate matter from gases is much more complex than is removal of gases. The problem of fine particles is particularly difficult. Various principles are available on which to base collection methods but there is need for extensive research and development in this field.

General Discussion

The air pollution problem is complex and relatively new in its present scope, which encompasses virtually all industrial activities and numerous substances under a wide variety of conditions. The effects may range from a mild nuisance to serious injury to health and may involve a small group near an industrial establishment or an entire city, county, or district. In general, it is a community problem and hence is similar to the problems of sanitation and stream pollution. As such, both technical and public relation aspects must be considered. Although there are definite areas of deficiency in our knowledge, we should proceed as rapidly as possible with existing information. To delay action will only enhance future difficulties. Research to provide fundamental data can proceed concurrently.

Industry can appraise its present situation by determining the kinds and amounts of contaminants discharged into the air. Frequently, a study of material balance provides helpful information, but this should not take the place of sampling and analysis. The correlation of such data with information on nuisance and physiological effects should provide an evaluation of potential air pollution and indicate whether control measures are advisable.

The prevention of air pollution for future plants should start with the selection of the plant site, with particular reference to micrometeorology and presence or likely presence of domestic dwellings and farms. This information, together with a knowledge of the raw materials to be handled and chemical and physical reactions involved in operational procedures, should indicate whether there is likely to be an air pollution problem and its extent. Consideration can then be given to possible changes in process, design of buildings, and control procedures. In this way an air pollution problem can be prevented and the need for major changes to correct undesirable conditions eliminated. Furthermore, a bad reputation will not have been established. Prevention is always more effective and cheaper than correction.

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This is the [illegible] in a series of articles presented at the Symposium on Industrial Health and Safety at the 115th National ACS Meeting [illegible], April [illegible], 1949. The final article will appear in the next issue of C&EN.

THE WATER POLLUTION CONTROL PROGRAM

An address by
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Before the Idaho Mining Association
Sun Valley, Idaho, July 9, 1951

Mr. Shoemaker, members of the Idaho Mining Association and guests. It gives me great pleasure to discuss the Water Pollution Control Program of the Public Health Service before this Association.

First, I should like, very briefly, to give you some historical background on National Water Pollution Control Legislation. Such legislation has been kicking around in our national congress for about 50 years. Industrial groups have advocated that water pollution should be controlled on the state and local basis. Sportsmen and conservation groups have advocated strong Federal controls. The present legislation, as is true of most controversial legislation, is a compromise containing the better thinking of both groups. Also Congress, recognizing the controversial issues, saw fit to limit the present law under which we are operating to five years.

It has been just three years since Public Law 845, known as the Federal Water Pollution Control Act, was passed by the 80th Congress. However, no appropriations were made for operations under this act until July 1st, 1949. Consequently, the present program has been in operation only two years. Unless new or continuing legislation is enacted, the present law will expire on June 30, 1953 after only four, instead of five years of operation.

The following discussion will describe briefly some of the water pollution control activities on a national level and the activities here in the Pacific Northwest during the past two years.

I - WATER POLLUTION CONTROL - NATIONAL LEVEL

Public Law 845 provided that there should be created a National Water Pollution Control Advisory Board, whose duties would be to review the policies and program of the Public Health Service, and make recommendations thereon to the Surgeon General. This board has met on eight separate occasions during the past two years. One of the meetings was held in the Pacific Northwest, from July 10th to July 15th of 1950. The members of the board, while in this area, obtained much valuable information from municipal and industrial officials, sportsmen, conservation and other groups, and from state and federal agencies. At least two members of the Idaho Mining Association met the members of this National Board and had the opportunity to discuss your problems with them. The Federal Water Pollution Control Advisory Board is composed of four government officials (originally five) and six other members appointed by the President. Of the six members appointed by the President, five must represent the following: 1. the field of sanitary engineering, 2. the Council of State Government, 3. the American Municipal Association, 4. Wildlife conservation groups, and 5. Industry. The four governmental employees represent the Department of the Army, the Department of the Interior, the Department of Agriculture, and the Federal Security Agency.

Reports submitted to the Surgeon General by this board have been very helpful in organizing the Public Health Service water pollution control work and developing an over-all program for pollution abatement.

Administration of Public Law 845 is the responsibility of the Division of Water Pollution Control in the Public Health Service. Under the direction of Mr. Carl E. Schwab, the Division has accomplished a most difficult task in a short period of time. It has been able to staff not only the Washington headquarters office, but ten river basin offices as well. From data collected through the state water pollution control agencies and the ten river basin offices, it has prepared and published a national summary report on water pollution. The title of this report is "Water Pollution in the United States." Any of you who are interested in obtaining a copy of this report may do so by writing to the Idaho State Department of Public Health at Boise or to the River Basin Office in Portland. Following are some of the other activities of the Division of Water Pollution Control: investigated special industrial waste research projects, coordinated the research and field activities of the Environmental Health Center, Cincinnati, Ohio (Public Health Service stream sanitation and field survey center) with those of the Division of Water Pollution Control, performed many other administrative and technical functions relating to water pollution control and, last but not least, assisted in organizing a National Task Committee on Industrial Wastes.

The National Task Committee on Industrial Wastes is mentioned last because you should become familiar with some of the aims of this group. Also I should like to inform you that your secretary, Mr. Harry Marsh, is a member of this national committee representing the mining industry. I feel sure that in the near future he will be calling on many of you to assist him with his activities on this committee. The committee is composed of representatives from twenty-two of the nation's leading industries. Ultimately the committee hopes to have several hundred of its technicians serving on sub-committees devoted to specific industrial waste problems. The chief concern of the main committee is to solve the difficult industrial waste disposal problems now affecting the quality of this nation's water resources. The committee works through various industrial groups in promoting and disseminating information on research and development work on utilization, treatment and control of industrial wastes, in order that each individual plant may be informed and kept abreast of new developments. One of its important current activities is extending aid to the Public Health Service in the preparation of "industrial waste guides." The Committee feels that, by their activities, problems in waste disposal which now confront a given industrial group may be solved in the shortest period of time.

Now to get back to the National Report. For comparison purposes, the following statistics were taken from the report, "Water Pollution in the United States."

TOTALS FOR THE UNITED STATES

TABLE I

Sources of Pollution - Treatment Plants - Treatment Plant Needs

Description	Municipal	Industrial	Total
Separate sources of Pollution	11,800	10,400	22,200
With Waste Treatment Plants	* 6,628	2,595	9,223
Treatment Plant Capacity	—	—	—
Satisfactory	3,531	1,090	4,621
Unsatisfactory	2,541	657	3,198
Unknown	583	848	1,431
Treatment Plant Operations			
Satisfactory	4,318	1,360	5,678
Unsatisfactory	1,506	316	1,822
Unknown	831	919	1,750
Treatment Plants Needed			
New Plants	4,209	2,793	7,002
Replace Existing Plants	722	98	820
Additions or Enlargements	1,645	591	2,236
Needs not presently determined	1,627	5,532	7,159

* Some municipalities have more than one treatment plant.

This report also points out that during the postwar period municipal and industrial waste treatment plant construction accelerated at a rapid rate, as will be noted from Table II.

TABLE II

NUMBER OF WASTE TREATMENT PLANTS CONSTRUCTED IN THE UNITED STATES BY YEARS, 1946-1949 (incl)

YEAR	MUNICIPAL	INDUSTRIAL	TOTAL
1946	39	44	83
1947	93	97	190
1948	167	175	342
1949	208	251	459
			1,074
TOTAL	507	567	

Within the next two months, a report on water pollution entitled "Water Pollution in the Pacific Northwest" will be published. This report will contain details regarding sources of pollution and resulting damages, water uses, pollution prevention measures in effect and pollution prevention measures needed. The report is prepared in two parts. Part One considers the water pollution problems of the entire Northwest as a whole. Part Two briefly presents data for each of fourteen sub-basins. These sub-basins are divided as follows: 1. Kootenai, 2. Clark Fork - Pend Oreille, 3. Spokane, 4. Yakima, 5. Columbia River above mouth of Yakima, 6. Upper Snake, 7. Central Snake, 8. Middle and Lower Snake, 9. Willamette, 10. Columbia River below Yakima, 11. Puget Sound, 12. Washington Coast, 13. Oregon Coast, 14. Oregon Lakes. The report will also include a list of projects known to be needed in each of the sub-basins. As soon as this report is released, arrangements will be made with the Idaho State Department of Public Health and Mr. Harry Marsh, your secretary, for those of you who have an interest in this report to receive a copy of same.

In February, 1951, the River Basin Office was seated to membership in the Columbia Basin Inter-Agency Committee representing the Federal Security Agency. As most of you probably know, the CBIAC is responsible for coordinating the activities of all state and federal agencies in connection with the development of the water and land resources of the Columbia River Basin.

One activity of the River Basin Office in which we take great pride is our work with the Pollution Control Council of the Pacific Northwest. This council is an informal group made up of engineering representatives of the pollution control agencies and Health Departments of the states of Idaho, Montana, Oregon and Washington, Province of British Columbia, Territory of Alaska, Canadian Department of Health and Welfare and the Public Health Service. By sitting down around the table and discussing the problems of the various areas, we have been able to accomplish a great deal and will accomplish a great deal more in the future. Through the regular meetings of this council, there has developed a sincere feeling of understanding and cooperation. Following are a few of the council's accomplishments to date:

1. Prepared and adopted "Minimum Standards for the Prevention of Industrial Waste Pollution."

2. Prepared and adopted "Standard for Sewage Works Design."

3. Coordinated the industrial waste research activities being carried on by the various educational institutions in the Pacific Northwest.

4. Co-sponsored three industrial waste conferences (U. of Wash., 1949; Ore. State College, 1950; Wash. State College, 1950).

5. Has a committee actively engaged in developing "Water Quality Standards."

Since the fall of 1949 and at the request of the Atomic Energy Commission, the "officer in charge" of the Drainage Basin Office has served on the Columbia River Advisory Group to the Atomic Energy Commission.

In addition to the above, the Drainage Basin Office has performed many other routine functions on matters relating to water pollution. It has furnished a great deal of technical assistance to the state water pollution control agencies on matters relating to the effects of wastes on the physical, chemical and biological characteristics of both surface and underground waters. Time does not permit a detailed discussion of these activities here.

Before closing this discussion, I should like to say a few words about your Water Pollution Control Program here in Idaho. As you probably know, the Idaho Department of Public Health is your official pollution control agency. It has no statutory authority or funds as such. You have a very active "Water Resources Advisory Committee" in this state which has been of great value in advising your official state agency. Mr. Harry Marsh, your secretary, and Mr. Cushman, president of the Idaho Chamber of Commerce, are members of this Advisory Committee. I believe they and the other members of your state Water Resources Advisory Committee realize that this state needs to enact comprehensive water pollution control legislation. In fact, I understand that one of their current objectives is to study and prepare such a law for submission to your next legislature. When such legislation is drafted, it should include provisions for all water use interests to be represented in determining water pollution control program policies, it should contain sufficient powers to permit the enforcement of a state program, and it should provide for the adoption of stream standards. I believe we all realize that the best way to get strong federal control over our water pollution control programs is to fail to carry out adequate controls on the state and local levels. If we believe in state rights, and I feel most of us do, then the path should be clear. The Public Health Service does not advocate strong federal control over water pollution control programs. We are, after all, just what our name implies, a service agency. We would prefer to devote our efforts to service and research activities as such relate to public health. As we see this program, our main purpose is to coordinate the water pollution control programs of the various states into a national program, furnish technical advice and assistance to the states and, through them, to industry, and to promote and carry on research. With the type of cooperation which we are receiving from all interested groups here in the Pacific Northwest, this program must succeed.