

The Federal Industrial Hygiene Agency

A HISTORY OF THE DIVISION OF OCCUPATIONAL HEALTH

UNITED STATES PUBLIC HEALTH SERVICE

PREPARED BY

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Prepared for the History of Industrial Hygiene Committee,
American Conference of Governmental Industrial Hygienists

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TABLE OF CONTENTS

	<u>Page</u>
<u>Part 1 - 1910-1940</u>	1
Introduction	1
World War I	3
Early Environmental Investigations	3
Vermont Granite Study	4
The Anthracite Coal Study	6
Studies of Radiation and Physical Hazards	6
Air Pollution Investigations	7
Studies of Industrial Dermatoses	7
Tetraethyl Lead Studies	7
The Depression Years	9
Early State Activities and Academic Training	9
The United States Department of Labor	10
The Gauley Bridge Incident	11
States Relation Activities	12
End of an Era	13
<u>Part 2 - 1940-1970</u>	15
World War II	16
Postwar Adjustments	17
Air Pollution	18
Salt Lake City Field Station	18
Field Headquarters	19
Field Studies	19
A Change of Command	20
The Occupational Health Program	21
Reestablishment of the Division of Occupational Health	23
The Uranium Study	25
The Bituminous Coal Study and the Federal Coal Mine Health and Safety Act	26
New Challenges	27
Conclusion	27
<u>Supplements</u>	
Omissions	29
References	30
Directors of the Federal Industrial Hygiene Agency	32
Appendix 1. Exchange of Correspondence between the U.S. Bureau of Mines and the Public Health Service	

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PART 1
1910-1940

Introduction^{1, 2}

Government programs often have strange beginnings; some are created in response to compelling demands, some result from public or political pressures, and others are inspired by dreams or foresight of an individual. The inception of industrial hygiene as a governmental concern must be placed in the latter category for the official creation of the United States Public Health Service Office of Industrial Hygiene and Sanitation in 1914 placed it in the era of the sanitary specialist and the microbiologist. With high mortality rates of that day measuring the massive toll of communicable diseases and diseases transmitted by insects and animals, and with public health authorities fearful that the next day might bring an epidemic of yellow fever, plague, smallpox or cholera, who would have foretold that some day man's major health problems would be attributed to environmental rather than biological agents? Joseph W. Schereschewsky, M.D., the first Chief, Office of Industrial Hygiene and Sanitation, was an individual with this kind of foresight. The development of industrial hygiene as a federal program, on the other hand, may have been an outgrowth of Congressional interest in health problems of miners. Public Health Service records show that in 1910 there were conferences between Surgeon General Walter W. Wyman and Joseph E. Holmes, the first Director of the United States Bureau of Mines. Shortly thereafter, the Public Health Service assigned Dr. Samuel C. Hotchkiss to the Bureau of Mines for studies of silicosis among miners of the Joplin, Missouri area. The studies were later continued in Pueblo, Colorado. One can only presume that interest in tuberculosis motivated involvement of the Public Health Service since it was known that a high mortality rate from this disease was associated with many occupations.

In 1913, while on assignment from the Public Health Service to the Bureau of Mines, Dr. James A. Watkins began a series of studies in the Homestead and Duquesne, Pennsylvania, plants of the United States Steel Corporation. Although reports of his investigations are not available, it is known that they related to plant sanitation, working conditions, and health of employees. As an outgrowth of these studies, the United States Steel Corporation appointed Dr. Thomas Darlington, Commissioner of Health for New York City, as head of its newly created Medical and Sanitary Department. This corporation, thus, established one of the earliest medical services in industry and founded what probably was the first of these programs based on the concept of preventive medicine.

By 1914 there must have been pressures for studies in industries other than mining and steel, for in that year the Public Health Service formally established, in the Hygienic Laboratory, the Office of Industrial Hygiene

and Sanitation. Dr. Schereschewsky, the Chief, was headquartered in Pittsburgh, probably because of the close relationship with the Bureau of Mines and the absence of laboratory facilities in Washington. The Hygienic Laboratory was concerned entirely with biological investigations and had no laboratory facilities for environmental testing. Studies were begun immediately in the New York garment industry, in the Youngstown, Ohio, steel industry, and in certain industries of Cincinnati, Ohio. Studies in the Joplin area, started by Dr. Hotchkiss, were resumed.

The New York garment study, certainly a classic investigation for its era, identified an excessively high rate of tuberculosis among the industry's workers and paved the way for elimination of "sweat shops." As a result, the well-known International Ladies Garment Workers Union Health Center was established under the direction of Dr. Leo Price and later continued by his son, Dr. Leo Price, Jr. This event marked the first entrance of a labor union into the health field.

Silicosis studies in the United States had their origins in the studies started by Dr. Hotchkiss in the Tri-State Mining District of Missouri, Kansas, and Oklahoma. This classical investigation was later continued by Dr. Anthony Lanza, Dr. Royd R. Sayers, and Dr. Frank Merriwether. It is of historical interest that, of the 720 miners examined, 433 (or 60%) were diagnosed as having "miners' consumption." Because instruments for measuring dust concentrations had not been perfected, environmental information on mining conditions was not included in the investigation. An outgrowth of this investigation was a silicosis clinic in Joplin jointly financed by the Public Health Service, the Bureau of Mines, and the Metropolitan Life Insurance Company. Later, Dr. Lanza and Dr. Sayers each served as Chief, Office of Industrial Hygiene and Sanitation, and devoted their entire careers to occupational medicine. In 1921 Dr. Lanza became affiliated with the Metropolitan Life Insurance Company, and during World War II served as an adviser to the United States Army on occupational medicine. Following the war, he assisted in establishing the Institute of Environmental Health of New York University. Dr. Sayers remained in the Office of Industrial Hygiene and Sanitation until 1940, when he became Director, United States Bureau of Mines. He later served as Chief Medical Officer, United Mine Workers Welfare and Retirement Fund.

Dr. Schereschewsky served as Chief of the Office of Industrial Hygiene and Sanitation until 1918, when he was moved to Washington to become Director of the newly created Division of Scientific Research. Another step forward was taken by Schereschewsky when in 1922 he implemented the cancer research program at the Public Health Service Boston Marine Hospital. This research activity was later to be expanded into the National Cancer Institute. It is improbable, however, that this talented physician could foresee the day when occupational cancer would be a significant cause of mortality among industrial workers.

By knowing the many problems faced by the official industrial hygiene agency in later periods, one wonders how such dramatic accomplishments could have been made in the period of 1910 to 1918. The progress is more impressive in view of the fact that there were no federal laws or regulations providing the agency with any right to investigate working conditions in industry and that this was a period of conflict between management and labor

when it was unusual to find employers with concern for environmental conditions of work. In addition to being dedicated scientists, these early investigators must have been skilled salesmen, since these studies could only be carried out with the permission and cooperation of management. Although the Bureau of Mines had been created in 1910 for the purpose of improving safety and health conditions in the mining and mineral industries, the agency was totally devoid of authority to conduct investigations or enforce standards. Whether these early studies resulted in any significant reduction in mortality is a debatable question. They did, however, set a pattern for scientific studies and develop a philosophy that prevailed until the passage of the Occupational Safety and Health Act of 1970. In these early days the desire to correct adverse environmental conditions certainly was present, but two essential factors, technology and legal mechanisms, were absent. Until the outbreak of World War I, the entire staff of the Office of Industrial Hygiene and Sanitation consisted of about 12 commissioned medical officers and some clerical assistants.

World War I^{1, 2}

During World War I, industrial hygiene activities in the Public Health Service received a temporary impetus and financial support, as it did again 25 years later when the United States entered World War II. The Secretary of War assigned responsibility for sanitation and surgical services in the United States Explosive Plant C at Nitro, West Virginia, to the Office of Industrial Hygiene and Sanitation. Although reports from this service are not available, it is apparent from other references that the primary mission was to provide an emergency medical service. The only preventive effort appeared to be sanitation and inoculations for smallpox and typhoid fever. In addition to Plant C, studies were made of medical and surgical facilities and care of workers in 170 war material manufacturing establishments. Hygienic conditions in 30 plants manufacturing TNT, tetryl, picric acid, war gases and other chemicals, and in shell loading plants were investigated at the request of the Ordnance Department, U.S. Army. These studies had very little impact in controlling occupational diseases. Although the number of deaths from TNT poisoning is not known, it is believed that the mortality rate from TNT poisoning was greater than the battle mortality rate among American troops. This fact must have made a strong impression on Dr. Lanza for in World War II, when he was an advisor to the Army Ordnance Department, preventive medical and industrial hygiene programs were essential elements of all government-owned, contractor-operated munition plants. Other studies carried out during the war years related to lead poisoning in the pottery industry and health hazards in the glass and chemical industries, in addition to industrial fatigue, illumination, and physiological effects of high temperature and humidity.

Early Environmental Investigations^{1, 2}

When Dr. Lanza resigned from the Public Health Service in 1921, he was replaced by Dr. Lewis R. Thompson, a highly competent medical scientist and administrator. By this time the program had lost most of the impetus received during World War I. To remedy some of the administrative problems, Dr. Thompson moved the Office of the Chief to Washington and began to recruit

engineers for the program. Dr. Thompson first gained his reputation through a 1916 epidemiological study of poliomyelitis in New York City and its environs. In this investigation he was associated with Dr. James P. Leake, who in 1930 was to succeed Dr. Thompson as Chief of the Office of Industrial Hygiene and Sanitation. The reputation both men had earned as field investigators may have in part accounted for their industrial hygiene appointments.

Beginning about 1920, the Bureau of Mines and the Office of Industrial Hygiene and Sanitation began a joint program to evaluate potential hazards and to develop ventilation design specifications for the Holland Tunnel under the Hudson River. The design criteria became a model for subsequent vehicular tunnels. Other health problems encountered in building the tunnel were carbon monoxide, gases from explosives, silicosis, and elevated atmospheric pressure. About 57% of the exposed workers developed silicosis. Among those assigned to the project by the Public Health Service were Dr. Royd R. Sayers, Dr. Frank V. Merriwether, and a Dr. O'Brien. This project was the beginning of brilliant careers for three additional men, employed by the Bureau of Mines, who ultimately became well known for their work in industrial hygiene. They were John J. Bloomfield, later to be closely associated with industrial hygiene in the Public Health Service; William P. Yant, later Director of Research, Mine Safety Appliance Company; and Lawrence B. Berger, later Director of Health and Safety, U.S. Bureau of Mines.

In 1922 Dr. Thompson recruited Mr. Bloomfield, from the Bureau of Mines, and Leonard M. Greenburg. Greenburg, a Ph.D. in engineering, was later to study medicine, and for many years served as director of the Division of Industrial Hygiene, New York State Department of Labor.

Since there were no laboratory facilities for industrial hygiene in Washington, Dr. Thompson assigned technical staff to various academic institutions, such as Yale and Johns Hopkins University, and to the Bureau of Mines to carry out technical activities of the Office. While assigned to Yale, Mr. Bloomfield and Dr. Greenburg worked with Dr. C. E. A. Winslow, a pioneer in the field of public health training and administration. Dr. Greenburg's primary responsibility was research, while Mr. Bloomfield devoted most of his time to field investigations. Greenburg's major contribution while at Yale was the development, in association with George W. Smith, U.S. Bureau of Mines, of the Greenburg-Smith Impinger.^{3, 4} For many years the Impinger was the workhorse instrument of the industrial hygiene profession and opened a new era for environmental investigations. With new tools and with staff engineers available for investigative work, Dr. Thompson, assisted by Dr. Edgar Sydenstricker, a biostatistician, designed a series of dust studies to determine pathological effects of silica, marble, asbestos, and coal dusts and to develop engineering controls. John Bloomfield was placed in charge of environmental investigations. Two of these studies--the Vermont granite and anthracite coal mine studies--are noteworthy.

Vermont Granite Study^{5, 2}

The Vermont study investigated the granite industry, which began to develop in and around Barre about 1830. Because of the absence of American

workers skilled in granite cutting and polishing, workers with these skills were imported from Italy, and by 1920 almost all granite workers were of Italian origin or descent. Physicians in the Barre area had long been familiar with a lung condition that was assumed to be a necessary risk of the occupation and was diagnosed either as tuberculosis or stone cutter's phthisis. In 1917 the death rate from tuberculosis among these workers was 114 times greater than that for the adult population of the state. In 1920 Dr. D. C. Jarvis, a Barre physician, interested the Trudeau Sanatorium of Saranac Lake, New York, in the problems of silico-tuberculosis among granite workers. A study carried out by Dr. F. L. Hoffman of Saranac Lake showed that 399 workers, or 94% of those examined, either had definite or probable silicosis and tuberculosis or uncomplicated silicosis. Of those with silicosis, the average length of exposure was 21 years.

Beginning in 1923, discussions were initiated between Dr. Thompson and the Vermont State Health Officer for a more detailed study of the problem. Such an investigation fulfilled Dr. Thompson's plan to study pathologic effects of silica dust and contributed to the solution of a severe health problem in the state. This study, which was the first known cooperative study between the federal industrial hygiene agency and a state health department, set a pattern of joint federal and state effort that was to be followed for many years.

In the early phase of the study, the sugar tube method was used for dust evaluation but was soon replaced by the Greenburg-Smith Impinger. This was the first field investigation in which the instrument was used, and it would be almost 50 years before the Impinger was to be replaced by other dust-sampling instruments.

In the 1924-1926 investigation it was found that, among pneumatic tool operators, machine operators, carvers, letterers, and tool grinders, there was a 100% incidence of silicosis among workers with 15 or more years of exposure. Early silicosis appeared in some workers after about 2 years of service. Tuberculosis was usually evident after 20 years of service, and life expectancy was approximately 6 months after development of tuberculosis. The importance of autopsies was recognized by investigators, but for religious reasons they were difficult to obtain. Success was possible only after investigators convinced local priests of their scientific importance.

Environmental studies indicated that the presumed safe limit for granite dust containing 35% free silica was between 9 and 20 MPPCF (million particles per cubic foot of air) in the size range of less than 10 microns. Translating this finding to silica dust, the TLV (threshold limit value) would be between 3.15 and 7.0 MPPCF. The standard for silica dust, 5 MPPCF, was the midpoint of this range.

It was almost 10 years before the recommendations of this study were implemented. In 1936 there was an agreement between the labor union and management, with the federal industrial hygiene agency acting as the technical advisor, by which working conditions in the industry would be evaluated in accordance with standards promulgated by the Vermont Department of Public Health. A follow-up study conducted by the federal agency in 1936-1937 indicated that 45.3% of the 805 granite shed workers examined had X-ray evidence of silicosis. By 1956, in another follow-up study that

used records of the Vermont industrial hygiene agency, 15% of 1,390 granite shed workers had evidence of silicosis. Of 1,133 workers employed since 1937, the year in which engineering controls began, only one worker had evidence of suspected silicosis.

The Anthracite Coal Study⁶

By 1925 it was evident that there was a serious chest disease among the anthracite miners of Pennsylvania. In 1926 the Governor of Pennsylvania and the labor union requested the Surgeon General of the Public Health Service to undertake a study of the nature and prevalence of chronic incapacitating coal miner's asthma. Even though the effects of coal mine dust had been described in Lancet as early as 1834, this investigation was the first epidemiological study of the pulmonary effects of coal mine dust. Before the American study was completed, two British investigators published their findings which included a pathologic description of anthracosilicosis. The Public Health Service investigation determined that 23% of 2,711 miners examined had evidence of anthracosilicosis and suggested 25 MPPCF of coal mine dust as the safe exposure. Studies by the Bureau of Mines in 1969 determined that 25 MPPCF of coal mine dust was about the equivalent of 2 mg/m³, a value that was to become the legal standard in the Federal Coal Mine Health and Safety Act of 1969. Although some efforts were made by the coal mine operators to comply with recommendations of the report, few, if any, complied with the recommended standard of 25 MPPCF. The investigators at that time, however, could hardly have been aware that the problem being investigated was to explode into a major political and scientific issue in 1968.

Studies of Radiation and Physical Hazards¹

By 1920 the United States Bureau of Standards was using radium. Its use, however, was apparently without strict control. Records show that in 1923 the Office of Industrial Hygiene and Sanitation conducted medical examinations of employees of the Bureau of Standards having an exposure to radium. A cooperative program between the two agencies continued for several years, but the details of the activity are unknown.

The insidious nature of radium exposure became apparent in 1928 when workers engaged in painting instrument dials with radium paint began to die of radium poisoning. Press reports and other documents identified personnel of the Office of Industrial Hygiene and Sanitation as involved in a national conference relating to the problem. Bloomfield and others conducted environmental studies of workplaces where radium paint was being used.

One of the earliest documented reports on heat stress was a 1928 study conducted by the Office of Industrial Hygiene and Sanitation in a Johnstown, Pennsylvania, steel plant which identified an excessive incidence of pneumonia among open hearth workers because of chilling following exposure to high temperatures. This investigation put to rest a prevailing theory that pneumonia among these workers was due to air pollution.²

Air Pollution Investigations

The Office of Industrial Hygiene and Sanitation probably was the first government agency to recognize the significance of community air pollution as a health problem. John Bloomfield's personal file contains many press clippings of his experiences. He tells of the curiosity of bystanders while he was sampling air in dense traffic areas of Baltimore, Boston, St. Louis, New York, Washington, and other cities. The St. Louis Post Dispatch of March 31, 1927, described Bloomfield's "queer intricate machine which automatically inhaled air and strange 10 inch bulbs which when opened, drew in the amount of air taken in an average breath." Dr. C. Hampton Jones, the Baltimore Health Commissioner, felt that the study might explain the reason for a greater incidence of seasonal illness between November 1 and May 1. In some cities a large percentage of the samples showed carbon monoxide concentrations in excess of 0.8 parts per 10,000 parts of air. These studies predated public concern about community air pollution by at least 30 years.

Studies of Industrial Dermatoses¹

Dr. Louis Schwartz became interested, during the late 1920s, in skin diseases as a public health problem, and it was this interest that led him to the field of industrial dermatoses. In 1931 the Public Health Service established the Office of Dermatoses Investigations under the direction of Dr. Schwartz, and the Office began a series of dermatoses studies in such industrial facilities as candy factories, silk dyeing plants, woolen mills, and petroleum refineries. Later, the Office of Industrial Hygiene and Sanitation and the Office of Dermatoses Investigations were combined as the Division of Industrial Hygiene.

Tetraethyl Lead Studies⁷

Early in 1923 tetraethyl lead began to be used commercially as a gasoline additive to increase the efficiency of internal combustion engines and as an antiknock compound. The apprehension of public health officials about such wide distribution of a toxic compound was aroused when fatal poisonings occurred in the manufacture and mixing of this substance. At the suggestion of the Surgeon General of the Public Health Service, the manufacture, sale, and distribution of tetraethyl lead and leaded gasolines were temporarily discontinued on May 5, 1925.

On May 20, 1925, the Office of Industrial Hygiene and Sanitation, acting through the Surgeon General, called a conference of public health and other interested authorities for "the determination of such facts and the reporting of such investigations and experiences as may lead to definite determinations of the hazards, if any, which follow the manufacture, distribution, and use of tetraethyl lead and similar substances, not only to those engaged in the manufacture and distribution of the compound, but more particularly to the public at large." On the basis of clinical observations and research conducted by the Bureau of Mines, the Department of Industrial Medicine at Columbia University, and the Medical College at the University of Cincinnati, it was concluded that tetraethyl lead was a highly toxic

compound but that little or nothing was known about the public health effects of its use as a gasoline additive. The conference thereupon adopted the following resolution: "It is the sense of this Conference that the Surgeon General of the United States Public Health Service appoint a committee of seven recognized authorities in clinical medicine, physiology, and industrial hygiene, to present to him, if possible, by January next, a statement as to the health hazards involved in the retail distribution and general use of tetraethyl lead gasoline motor fuel; and that this Conference endorse as wise the decision of the Ethyl Corporation to discontinue temporarily the sale of ethyl gas; that this investigation shall be paid for exclusively out of public funds; and the results of this investigation shall be reported back to a public conference called for the purpose by the United States Public Health Service, at which labor shall be represented."

To carry out this mandate the Surgeon General appointed a Working Committee consisting of Dr. A. J. Chesley, State Health Officer, Minnesota Board of Health; Dr. William H. Howell, Professor of Physiology, The Johns Hopkins University; Dr. Reid Hunt, Professor of Pharmacology, Harvard University; Dr. Walter S. Leathers, Professor of Preventive Medicine, Vanderbilt University; Dr. Julius Stieglitz, Professor of Chemistry, University of Chicago; and Dr. C. E. A. Winslow, Professor of Public Health, Yale University. This Committee first met on June 15, 1925, with Dr. Howell serving as Chairman. The Office of Industrial Hygiene and Sanitation was given responsibility for the investigation, with Dr. James P. Leake as the officer in charge. In his History of the Public Health Service, Dr. R. C. Williams made the following statement regarding the investigation:

"Dr. James P. Leake of the Service was placed in direct charge of the field investigations that were necessary in making the study. A great deal of careful planning, as well as exact field and laboratory work, was necessary. The results of these studies that were carried out under the personal direction of Dr. Leake stand as a model for precise, accurate, expeditiously conducted, and conclusive scientific investigation."

The Committee completed its mission on January 17, 1926, when it met to draft and sign the final report on the investigation, subsequently issued as Public Health Bulletin No. 163, The Use of Tetraethyl Lead and Its Relation to Public Health. The proposed regulations covered: (1) the manufacture of tetraethyl lead and the blending of the latter to make ethyl fluid, (2) mixing, (3) distribution of ethyl gasoline, and (4) precautions for automobile garages, repair shops, service stations, and filling stations.

Following the 1926 Conference of State and Territorial Health Officers, the president of the Ethyl Corporation and, later, other manufacturers of tetraethyl lead voluntarily agreed to manufacture, blend, and market tetraethyl lead and leaded gasolines in accordance with the intent of the regulations. This agreement was administered by the Division of Industrial Hygiene for many years. During this period several changes were made, including one in 1958 permitting an increase in the permissible amount of tetraethyl from 3 cc to 4 cc per gallon of gasoline providing certain conditions were met. Although the federal government no longer administers

the agreement, tetraethyl lead is still manufactured and distributed according to the intent of the original agreement.

Shortly after the problem was delineated, the Ethyl Corporation employed Dr. Robert A. Kehoe as its medical consultant and later established the Kettering Laboratory at the University of Cincinnati with Dr. Kehoe as its director. Both the Institute and Dr. Kehoe became famous for studies on lead intoxication.

The Depression Years

The depression years, or at least the period from 1930 to 1937, brought almost a complete cessation of field investigations. However, the lull provided the staff with an opportunity to finish a number of publications relating to their field investigations and to rework data for additional and supplementary publications. One of the historical publications of this period was Public Health Bulletin No. 217, The Determination and Control of Industrial Dust, by Sanitary Engineer John J. Bloomfield and Assistant Sanitary Engineer J. M. Dallavalle. It has been reported that the total budget for industrial hygiene in 1935 was \$30,000 per year.

The annual compensation rates for commissioned officers of the Public Health Service in 1931 provides an interesting sidelight.⁸ At that time, engineers and scientific personnel could not be commissioned, so the following rates apply only to medical officers. Civilian personnel were usually paid at a lower rate.

Surgeon General (Two-Star General)	\$8000	
Medical Director (Colonel)	3500-4000	
Senior Surgeon (Lt. Colonel)	3000-3500	less than 23 years of service
Surgeon (Major)	3000	less than 23 years of service
Passed Assistant Surgeon (Captain)	2400	less than 17 years of service
Assistant Surgeon (1st Lieutenant)	2000	less than 10 years of service

All officers, except the Surgeon General, received a 5% increase in base pay for each 3 years of service up to 30 years. Although there were quarters and subsistence allowances to supplement base pay, no officer, other than the Surgeon General, could earn more than \$7200 per year, and the Surgeon General was limited to \$9700. Travel reimbursement was based on 8 cents per mile between the officer's official station and the temporary duty station and return. Mileage was to include transportation costs and per diem at the temporary duty station regardless of duration. There was no retirement system for Public Health Service Officers; when an officer had completed 30 years of service, the Surgeon General could place him in a status designated as "Awaiting Orders." While on this status he received 50% of base pay.

Early State Activities and Academic Training

During the period 1913-1940 many events occurred which were to have an influence on the development of the Office of Industrial Hygiene and Sanitation as well as the professions of industrial hygiene and occupational health.

Noteworthy among these were the start of state industrial hygiene programs. In 1913 both New York and Ohio established industrial hygiene agencies staffed with physicians and engineers. The first statewide survey of industrial hygiene problems was begun in Ohio by Dr. Emery Hayhurst for the Ohio State Board of Health. His report, Industrial Health Hazards and Occupational Diseases in Ohio, was published in 1915.⁹

In 1918 Harvard University was the first institution to establish a course of instruction and research leading to a degree in industrial hygiene.⁹ This included work in the occupational disease clinic at the Massachusetts General Hospital for students with a medical degree. In 1919 the Medical School of the University of Cincinnati established a 1-year course leading to a certificate of public health in industrial medicine; Yale and Johns Hopkins also provided courses in industrial hygiene to graduate public health students.⁹

The United States Department of Labor⁹

The U.S. Department of Labor also played an important role in the development of industrial hygiene and occupational health. In 1884 the Bureau of Labor was created in the Department of the Interior, where it remained until 1903 when Congress established the Department of Commerce and Labor. In 1913 the U.S. Department of Labor was created as an independent department with cabinet rank. From its inception in 1884, the labor agency was active in working with the states to promote health and safety legislation and compensation laws for occupational injuries and diseases. In 1902 Maryland passed the first state legislation providing for stated benefits to workmen injured in the course of employment without suit or proof of negligence. The law, however, was declared unconstitutional in 1904. In 1917 Hawaii was the first jurisdiction of the United States to enact occupational disease compensation legislation, followed by California in 1918, and Connecticut and Wisconsin in 1919.

In 1910 the Department of Labor issued a report on Phosphorus Poisoning in the Match Industry in the United States, by John B. Andrews. This led to the first major public act to control occupational diseases in the United States--the imposition of a prohibitive tax on yellow matches. In the same year, Dr. Alice Hamilton was employed by the Department to investigate the lead industry throughout the country, the results of which were published as Bureau of Labor Bulletin No. 95 in 1911. Dr. Hamilton continued as a consultant to the Department of Labor until 1921, during which time she made a number of studies relating to industrial poisons. Much of the material for her book, Exploring the Dangerous Trades, came from her work as a consultant for the Department. The Division of Labor Standards was established in 1934 and was reorganized in 1948 as the Bureau of Labor Standards. In 1936 Congress passed the Public Contracts Act (Walsh-Healy) which established labor standards for government contracts in excess of \$10,000. It was through the influence of the Division of Labor Standards that requirements for safety and health were included as a part of the standards. As far as can be determined, these were the first mandatory standards for safety and health to be adopted by the Federal Government.

At least by 1948 there was a considerable degree of rivalry between the Public Health Service and the Department of Labor regarding responsibility for federal activities in industrial hygiene. Although some resolution of the problem was reached in 1953, the problem was not completely solved until the passage of the Occupational Safety and Health Act of 1970.

The Gauley Bridge Incident

During the depression, the need for legislation to compensate workers with silicosis and to apply preventive measures was brought forcefully to the attention of the American public and legislators by the Hawk's Nest Tunnel tragedy in 1934. In the early 1930s a water diversion tunnel was being constructed near Gauley Bridge, West Virginia, under Hawk's Nest Mountain, through a high silica formation. In its construction, dust suppression methods were not used. It was reported that airborne dust concentrations in the tunnel limited visibility to about 10 feet, even when a powerful flashlight was used. The number of workers who died of diseases related to dust inhalation was never determined since it was known that many workers were buried in unmarked graves without death records. Although a rapidly developing silicosis was presumed to be the cause of death, some investigators were of the opinion that death was due to an overloading of the lungs with dust.

Tragedy often sets the stage for social legislation, and national publicity about the Gauley Bridge tragedy caused the Secretary of Labor to convene the First National Silicosis Conference in April 1936.¹⁰ Many reports by the Office of Industrial Hygiene and Sanitation were used by various conference committees in formulating recommendations. National legislation did not result from the meeting, in part because of the prevailing philosophy of the era that health and safety was a state responsibility and that the federal government should not intervene. The resulting reports and findings did, however, cause many of the states, especially those with sizable mining industries, to add silicosis to the list of compensable diseases and to establish hygienic standards for silica dust.

The Division of Industrial Hygiene

While Dr. Royd R. Sayers was Chief, the Office of Industrial Hygiene and Sanitation was combined in 1937 with the Office of Dermatoses Investigations as the Division of Industrial Hygiene in the newly created National Institute of Health. The first Director of the Institute was Dr. L. R. Thompson, a former Chief of the Office of Industrial Hygiene and Sanitation. When the National Institute of Health was created, Building 3 was designated as the "permanent home" of the Division of Industrial Hygiene.

Since the primary function of the Institute was research, funds were made available to the Division of Industrial Hygiene for that purpose. Dr. Paul Neal, a career Public Health Service officer, was assigned to the Division to implement a research activity which was to supplement the field investigations activities. To assist Dr. Neal, other prominent individuals were added to the staff, including Dr. Lawrence Fairhall, toxicologist;

Dr. Fredrick Goldman, chemist; Dr. J. W. Miller, pathologist; Dr. Heinz Specht, biologist; and Mr. Robert Keenan, chemist. Research studies were begun in toxicology, lung pathology due to the action of dusts, and chemical methods for the determination of atmospheric contaminants. Later, Dr. Neal and Dr. Specht, in cooperation with the Navy, were to initiate research on the effects of high altitude on flight personnel.

In 1940 Dr. Sayers became the Director of the United States Bureau of Mines, Department of the Interior. He was succeeded by Dr. Neal, who accepted the position only as a temporary appointment since his interest was research rather than administration.

States Relations Activities

Following passage of the Social Security Act in 1935, federal funds were made available to the Public Health Service for extending research investigations and for making grants-in-aid to the states for public health activities including industrial hygiene. Dr. Sayers vested responsibility for the states relations activities in Mr. John J. Bloomfield by appointing him as Chief, States Relations Branch. When this work was begun, only about four states had industrial hygiene programs; but by 1955, 42 of the 48 states had an industrial hygiene activity, although some were marginal programs. To assist in developing the program, Mr. Bloomfield added a number of individuals to the staff, including Dr. William Gafafer, Victoria Trasko, Mary Peyton, and Richard Page. Later, Olive Whitlock was to be added to the staff as the first of the Division's Occupational Nurse Consultants; she was to be succeeded by Ruth Kahl. Dr. Gafafer, Miss Trasko, and Miss Kahl served with the Division for many years. One of the early programs of the States Relations Branch was an industrial hygiene survey of 15 states conducted through and with the cooperation of state and local health departments during the period from 1936 to 1939. The participating states were Maine, New Hampshire, Maryland, Virginia, South Carolina, Tennessee, Indiana, Ohio, Illinois, Iowa, Arkansas, Texas, Colorado, Utah, and Idaho. A number of persons who were later to direct or participate in industrial hygiene programs were originally brought into the profession through grants to state and local health agencies to participate in the survey. The results of these surveys were published in 1940 as Public Health Service Bulletin No. 259, The Industrial Hygiene Problem in the United States. This publication was used for many years as a guide for estimating the magnitude of industrial hygiene problems and as a pattern for more detailed statewide surveys made during the post-World War II period.

In 1937 a meeting was called in Washington of all state directors of industrial hygiene. The second meeting of this group in Washington in 1938 resulted in the formation of the National Conference of Industrial Hygienists, which was later to become the American Conference of Governmental Industrial Hygienists.

In addition to promoting programs in states, this period marked the beginning of informal industrial hygiene training. The first training seminar was held in Washington in 1937 and was attended by 63 persons, including the staff of the Division of Industrial Hygiene. Later, Bloomfield offered courses in the states and cooperated with the University of California at Berkeley in presenting courses through the School of Public Health.

This was a difficult period in which to promote industrial hygiene as an official agency program since health agencies were concerned with basic public health programs such as sanitation and communicable disease control. It was difficult to correlate significant morbidity and mortality with specific industrial activities because of the absence of occupational morbidity and mortality data. In the concept of most public health administrators, industrial diseases were limited primarily to silicosis and lead or mercury poisoning. Although other diseases were known to have an occupational etiology, many state health officers believed that the incidence of these diseases was so low that they had little significance when compared to mortality from other causes. Although Dr. Louis Schwartz demonstrated a high prevalence of industrial skin diseases, little significance was attached to their occurrence since these conditions usually were not disabling. Few individuals were concerned about occupational cancer since it was thought that only coal tar derivatives had a carcinogenic potential and, in fact, the chemical industry, especially petrochemical manufacturing, was in its infancy. Many state health officers expressing an interest in industrial hygiene were disillusioned when they failed to obtain support from either management or labor. Moreover, these were the depression years and workers were more concerned about obtaining and holding jobs than they were about safety and health conditions.

End of an Era

The year 1940 marked the end of an era in the development of industrial hygiene and occupational medicine. The nation was beginning to face World War II and the problems, both social and technical, which would develop in a period of preparing for a major world conflict.

Before moving to a review of the subsequent era, it might be well to identify accomplishments in industrial hygiene and occupational health which can be related to the federal agency's effort prior to 1940. Among these accomplishments were:

1. Recognition of the fact that the working environment could have a serious effect on the health of workers.
2. Development of investigational techniques, especially the application of epidemiological techniques to occupational diseases.
3. Development of early hygienic standards, especially for silica, lead, mercury, and carbon monoxide, which would establish the base for future standards.
4. Identification of the pneumoconiosis problem and development of preventive methods.
5. Development of the concept of training programs in industrial hygiene and occupational health.
6. Recognition of the need to involve states and other official agencies in industrial hygiene.

7. Development of cooperative efforts between government agencies, federal and state, to solve worker health problems.
8. Early recognition of factors which were later to be significant worker and community health problems, such as air pollution, radiation, and noise.
9. Training of individuals who would become outstanding in the public health movement and the promotion of industrial hygiene and occupational health as a national program.

Individuals concerned with the industrial hygiene effort of this era have been criticized for failure to involve organized labor in the health movement. Although efforts were made to involve labor, organized labor was struggling for national recognition and worker health was not a goal with a high priority. Organized labor was often suspicious of government's objectives and fearful that the results of medical examinations would be made available to employers.

PART 2
1940-1970

World War II again focused attention on the need for industrial health services and the growth of occupational medicine and industrial hygiene can be attributed largely to emergency requirements of the era. Although many industries had medical departments before the war, the primary objective of most industrial medical services was medical care and emergency treatment of occupational accidents. Before World War II, it was almost unknown for an industrial company to have an industrial hygienist on its staff.

When the national defense effort gained momentum in late 1939 and 1940, the professional staff of the Division of Industrial Hygiene consisted of less than 30 individuals. Dr. Sayers, in 1940, was assigned by the Public Health Service to the Department of Interior as Director, United States Bureau of Mines, and Dr. Paul Neal was appointed Chief, Division of Industrial Hygiene. Dr. Neal accepted the appointment as an interim one because his interest was in research. For this reason, Dr. James G. Townsend was appointed Chief in 1941.¹¹ Dr. Townsend was the first Division Chief whose interest was primarily public health administration rather than research and investigation. Shortly after his appointment, John J. Bloomfield was appointed Assistant Division Chief, an action which reflected increasing concern for industrial hygiene and its need for professional recognition.

Unfortunately, many events occurred during the period between 1939 and the entrance of the United States into World War II which are not documented. Among the stories the writer has heard, one relates to the establishment of industrial hygiene services in the U.S. Navy and Army. It was reported that both the Navy and Army requested the Public Health Service to provide industrial hygiene services. Both requests were refused on the basis that the Service had neither the funds nor staff to undertake the task and that, for other reasons, the armed services should assume direct responsibility for industrial hygiene activities. The Navy called upon Dr. Philip Drinker of Harvard University for assistance in establishing its program. Dr. Drinker served for the duration of the war in this capacity, and his Navy trainees served as the core for a postgraduate training program in industrial hygiene at the Harvard School of Public Health. This was the first degree curriculum to be offered in industrial hygiene and it was followed, during the postwar period, by training programs in other universities such as the Universities of Pittsburgh, Michigan, North Carolina, Wayne State, California (at Berkeley and Los Angeles), Cincinnati, Iowa, and New York University.

At this point it is appropriate to emphasize the role of John Jacob (Jack) Bloomfield in program development. Bloomfield served in the Division of Industrial Hygiene from 1922 until 1949, when he was assigned to the Institute of Inter-American Affairs of the State Department to develop industrial hygiene programs in South and Central America. After his retirement from the Public Health Service in 1961, he continued this role as a consultant to the Pan American Health Organization and the World Health Organization. He did not retire from active participation until 1976 when he was 79 years old. With all due respect to Dr. Townsend for his administrative talents, it was Bloomfield who was the technical expert and who served as the program implementer and administrator. He will probably be

best remembered for his role as the "industrial hygiene salesman" and in developing state programs, but in his career he was always involved in the decision-making process and was always assigned the difficult tasks. Mr. Bloomfield died in May 1977.

World War II

The outbreak of World War II brought about a need for significant changes in program direction for the Division of Industrial Hygiene. Emphasis had to be shifted from field investigations to direct services through a cooperative program with the Ordnance Department of the Army and assistance to state programs and research. Between 1939 and 1943 the Division grew from a small cadre of professionals to a staff of about 125, of which 68 were commissioned officers.

To prevent a repetition of high mortality from diseases such as TNT poisoning, which occurred in World War I, the Ordnance Department and the Public Health Service entered into an agreement whereby the Division of Industrial Hygiene would provide occupational medical and industrial hygiene services to government-owned, contractor-operated arsenals. Dr. Robert H. Flinn and Dr. Allen J. Brandt were given the responsibility of organizing and directing medical and environmental studies in the arsenals. Dr. Anthony Lanza, who had been Chief of the Office of Industrial Hygiene and Sanitation during World War I, was the Chief Medical Officer of the Ordnance Department and was assisted by Dr. W. J. McConnell. In 1943 Dr. Flinn and Dr. Brandt were assigned by the Division as members of Dr. Lanza's staff.

Within the Division, arsenal survey teams were organized to provide industrial hygiene and medical services to arsenals which included plants manufacturing TNT, RDX, tetryl, smokeless powder, and shell loading plants. Dr. R. F. Sievers was the senior medical officer and Harry E. Seifert was the senior industrial hygienist. A tribute to the work of these teams is that there were only 22 reported deaths from TNT poisoning during World War II even though the United States supplied TNT for most of its allies.¹¹ While on an arsenal survey at a shell loading plant in La Porte, Indiana, Mr. William Paine was killed in an explosion. This is the only known occupational casualty of the Division in its long history. Lewis J. Cralley, who was with Bill Paine, was not injured in the explosion as he was in an adjacent room. Among the individuals who served on the arsenal survey team were:

Clyde M. Berry
Donald Birmingham, M.D.
I. Botvnick, M.D.
Paul C. Campbell, M.D.
George D. Clayton
Lester V. Cralley
Lewis J. Cralley

Henry N. Doyle
Joseph E. Flanagan
J. Q. Cant, M.D.
O. F. Hedley, M.D.
Duncan A. Holaday
William E. McCormick
Lucien E. Renes

Laboratory support for the program was provided by Fredrick Goldman, Robert Keenan, and Edward Rushing.

During the war period, a special grant program was available to the states for industrial hygiene purposes. This program was directed by John Bloomfield, assisted by Richard T. Page, Victoria Trasko, and Ruth Kahl. Through the grant program the states could purchase industrial hygiene equipment and employ personnel. In addition, the Division of Industrial Hygiene could assign personnel to the states for industrial hygiene purposes. Because of this program and the availability of funds and personnel, many state programs were initiated or reactivated. Most of the programs were continued into the postwar period. Among the personnel assigned to the states who continued a career in industrial hygiene or occupational medicine included:

Clyde Berry
Forest H. Bumford
Dohrman H. Byers
Emil T. Chanlett
L. V. Cralley
W. E. Doyle, M.D.
L. M. Farner, M.D.
J. E. Flanagan
K. N. Fluckey
J. W. Hammond

W. G. Hazard
Harry Heimann, M.D.
Andrew D. Hosey
Francis P. Jung
Pope A. Lawrence
Thomas F. Mancuso, M.D.
W. A. McQuary
Otto Paganini
W. M. Pierce
Edwin H. Place, M.D.

Jack C. Radcliffe
Warren G. Reinhart
Paul F. Rezin
August T. Rossano
O. J. Sobol
Irving R. Tabershaw, M.D.
B. D. Tebbens
George E. Tubich
C. D. Yaffe

Postwar Adjustments

The conclusion of World War II necessitated a readjustment of goals, organization, and budget. War assistance funds which supported much of the Division's activities were discontinued and personnel employed under these funds returned to their prewar careers, continuing their careers in occupational health with the states, private industry, or universities. However, many were retained by the Division.

In 1946, on the recommendation of Dr. Townsend and Mr. Bloomfield, the Division was reorganized and transferred from the National Institute of Health to the Bureau of State Services. The primary reason for this change in administrative structure was a readjustment of goals. To remain in the National Institute of Health, the primary mission of the Division would have been research. But Townsend and Bloomfield felt that the primary mission of the Division was promotion of state programs supported by field investigations. By transferring to the Bureau of State Services, Building 3 at NIH was lost to the Division, which resulted in the loss of the research program. Most of the Division's research staff, including Dr. Neal and Dr. Specht, transferred to other NIH programs. Even though the research program was lost, laboratory support facilities were retained in Building T-8 on the NIH reservation, and the administrative offices were moved to the Public Health Service Building at 4th and D Streets, S.W.

To support the states relations program, the Division placed industrial hygiene consultants in selected Public Health Service regional offices. The functions of these consultants were to promote and provide technical support for state programs and to handle the affairs of the Division within the region. These assignments were short-lived because in 1948 the policy of

the Public Health Service was altered to base generalized consultants rather than program specialists in regional offices.

Included in the reorganization of the Division were two new positions. James Justice was the Division's first administrative officer and Frank Costello became the first information officer. Mrs. Tula Brocard was employed to assist Costello and succeeded him when he transferred to the Bureau of State Services. Mrs. Brocard remained in the position until 1966. Another innovation was publication of the Industrial Hygiene Newsletter, first as a quarterly and later a monthly publication, edited by Mrs. Catherine Beauchamp. (See note page 29.)

Air Pollution

By tradition, the Division of Industrial Hygiene had technical responsibility for community air pollution investigations. Bloomfield had conducted a series of studies in major cities during the 1930s but, for the most part, these were limited to carbon monoxide determinations, although some fallout measurements had been made. However, there was little Congressional or public interest in air pollution, and the limited investigational work done by the Division was accomplished within the industrial hygiene budget on the concept that community air pollution was an extension of the industrial hygiene problem. During the war, when the smog problem in Los Angeles became acute, the Division was called upon to provide consultation to the city. Most of this consultation was provided by T. R. Thomas, and it was believed that the primary contributor to the smog problem was industrial pollution.

In 1948, however, following the Donora, Pennsylvania, air pollution incident in which a large number of premature deaths occurred from industrial pollution during an extended atmospheric inversion period, the Division of Industrial Hygiene was requested to conduct a detailed study of the tragedy.¹² This study provided the Division with some expertise in air pollution and attempts were made to obtain funds for air pollution investigations. However, Congress was not receptive to appropriating funds for this purpose and the problem was not given a high priority by the Public Health Service. Despite lack of funds for this purpose, the Division was called upon to provide consultative services and technical support. Later, the Division provided assistance to Mexico for an air pollution study at Tampico and provided technical assistance to the Department of State in a joint U.S.-Canadian study of air pollution in the Detroit-Windsor area. Principal investigators for the Donora investigation were H. H. Schrenk, Harry Heimann, and George D. Clayton; George Clayton was also the principal investigator for the Tampico and U.S.-Canadian studies.

Salt Lake City Field Station

In 1948, when it became apparent that regional office consultants would be discontinued, the Division moved to establish a field station in the western states. Sites considered were Denver, Salt Lake City, and Berkeley. Since limited funds were available, Salt Lake City was selected since the

University of Utah offered a medical detachment barracks on the site of old Fort Douglas, which had been given to the University for expansion purposes. The space was made available to the Division without cost. The station became operational in October 1948 with a staff of four: Henry N. Doyle, Chief; Edward Rushing, senior chemist; Emily Friend, secretary and administrative assistant; and a junior chemist. Funds for the conversion of the building to an acceptable facility were provided by the Utah Department of Public Health in return for the assignment of Pope A. Lawrence as Director, Division of Industrial Hygiene.

Although the primary mission of the field station was to provide technical assistance to the western states, its major function soon became the uranium mining study. In 1950 Duncan A. Holaday was assigned to the station to be technically responsible for the uranium investigation, and shortly thereafter Paul Woolrich was assigned to the station as an industrial hygiene engineer. The station continued to function with a considerably enlarged staff until 1976, when it was closed by the National Institute for Occupational Safety and Health.

Field Headquarters

When the Division was transferred to the Bureau of State Services, a search immediately began for a field location for its laboratories. Cincinnati was selected due to its proximity to a large industrial area and because the city had for many years been the location of the PHS Water Pollution Laboratories. By 1949 construction of the Robert A. Taft Sanitary Engineering Center had begun; and the Center, under the direction of Vernon G. McKinzie, was located temporarily on the second floor of a converted warehouse at 1014 Broadway. The first floor was altered to accommodate laboratories and offices, and the field headquarters became operational in 1950 with Lewis J. Cralley as Chief. Other staff members included C. D. Yaffe, Chief, Engineering Branch; Dohrman H. Byers, Chief, Laboratory Branch; Herbert E. Stokinger, Chief, Toxicology Branch; Donald J. Birmingham, Chief, Medical Branch; and Arthur Doyle, Administrative Officer. By 1960 the field headquarters occupied all three floors of the building. With the restoration of laboratory facilities, the Division was able to resume its research activities. This fact caused some of the senior staff to reassess goals of the Division, with some supporting the concept of research as a major mission. However, the pressure for field investigations caused the Division to continue its traditional role of field studies, but greater emphasis was placed on engineering and toxicology research.

Field Studies (1946-1952)

World War II resulted in a significant growth of the industrial hygiene and occupational medical professions which was carried over into the postwar period. Many industries, because of issues raised by the medical and industrial hygiene staff, were more receptive to the identification of industrial disease problems and labor unions were beginning to place greater emphasis on health conditions. As a result, the Division began to receive requests from both management and labor for investigations of health problems. In 1947 representatives of the chromate-producing industry initiated conferences with

the Division regarding the incidence of bronchogenic carcinoma in the industry. These conferences led to a request by the industry for the Division to determine the relationship of exposure of employees to the incidence of bronchogenic carcinoma and to recommend medical and engineering control programs. The study identified a cancer rate of 1,115 per 100,000 workers as compared to a rate of 20.8 for a comparison group.¹³

During the same period, a labor union requested the Division to investigate the health effects of tungsten carbide, but the study was never completed because of failure to obtain the full cooperation of management.

The study of uranium miners was initiated by the Division because it was expected that long exposure to radon would cause an elevated rate of lung cancer among these miners. The study which began in 1950 is continuing even though an increased rate of lung cancer was apparent by 1963.¹⁴

In 1952 the chemical workers union (United Gas, Coke and Chemical Workers of America), the diatomite mining and processing industry, and the California Department of Public Health requested the Division to determine the health hazards associated with the mining and processing of diatomite and the health status of workers, with reference particularly to the prevalence of pneumoconiosis.¹⁵ In 1946 the steelworkers union (United Steelworkers of America) requested the Division to evaluate the health hazard resulting from the use of fluorides in the steel industry.¹⁶

A Change of Command

Bloomfield continued in his position as Assistant Chief until 1949, when he was assigned to the Institute of Inter-American Affairs as regional consultant for South and Central America. At this time, Joseph E. Flanagan was appointed to succeed Bloomfield as Assistant Chief. In 1951, when Dr. Townsend was approaching retirement age, he was assigned to Panama, and Dr. Seward E. Miller, Director of the Chicago Regional Federal Security Agency, was appointed to succeed Dr. Townsend as Chief, Division of Industrial Hygiene.

Dr. Miller brought a fresh viewpoint to the Division and envisioned a broader role for the Division, especially in the area of occupational medicine and psychiatry. Steps were immediately taken to strengthen the administration of the Division, and shortly after his appointment the name of the Division was changed to the Division of Occupational Health to reflect a broader span of interest. Dr. Dale Cameron, a Public Health Service psychiatrist, was brought into the Division as Chief, Occupational Medical Branch, and to develop a program to better define the psychiatric components of worker illness. Other administrative changes were made in 1952 when Henry Doyle was transferred from the Salt Lake City Field Station to Headquarters as Chief, State Aid Branch; Lewis J. Cralley was assigned as Chief, Salt Lake City Field Station; and Dr. W. Clark Cooper was appointed as Chief, Field Headquarters.

Dr. Miller examined in depth every activity of the Division and required the development of long-range plans for each specific activity. Since the Division had been unable to obtain funds for air pollution, Dr. Miller

relinquished responsibility for the program. This proved to be an unpopular decision as some of the Division staff had hoped to incorporate air pollution as a program activity with the hope of increasing appropriations for industrial hygiene. Soon after this decision was made, however, a Congressional interest in air pollution developed and it became a major Public Health Service program. Most likely, however, it was a wise decision, as the incorporation of air pollution as a Division function could have resulted in a dilution of occupational health because of political interest in air pollution and the lack of Congressional support for occupational health.

Another highlight of Dr. Miller's administration was a decision in 1953 to support legislation sponsored by the Department of Labor to strengthen safety and health programs in state labor agencies and to provide state grant-in-aid funds for this purpose. This decision was contrary to past Public Health Service policy and, although the legislation was never introduced, it served to establish rapport between the Bureau of Labor Standards and the Division of Occupational Health. This action was the beginning of a number of cooperative projects between the two agencies.

An attempt was made during Dr. Miller's administration to establish a National Institute of Occupational Health. Although some support was evident from segments of the occupational medical profession and organized labor, the proposal was never submitted to Congress. However, in 1970, when Congress was considering the Occupational Safety and Health Act, a copy of the document was made available to a Congressional committee.

Despite efforts to strengthen its budget base, the Division suffered a substantial budget cut in 1953 which necessitated a loss of certain activities, including Dr. Gafafer's long-term studies of absenteeism among industrial workers, the work of Margaret Klem and Margaret McKiever on industrial health and medical programs, and Dr. Cameron's program on occupational psychiatry. Funds for the technical program were not substantially reduced, but the Division did request and receive financial and personnel assistance from the National Cancer Institute for continuation of the uranium mine study.

The Occupational Health Program

A major reorganization of the Bureau of State Services occurred in 1954 by combining all of the Divisions of the Bureau into two major Divisions. The Division of Special Health Services, with Dr. Miller as its Chief, contained all of the medical activities of the Bureau, such as occupational health, heart disease, cancer, and TB control; each activity was designated as a Program. In the reorganization, Henry N. Doyle was appointed Chief, Occupational Health Program, and Joseph E. Flanagan became Assistant Director of the Robert A. Taft Sanitary Engineering Center.

In this fiscal year the budget for occupational health was again reduced, to a sum of \$350,000. This required a further reduction in personnel and prevented any new field investigations. The states relations program was virtually discontinued and publication of the "Industrial Hygiene Newsletter" ceased.

By this time it was apparent that there was a major problem of pneumoconiosis among bituminous coal miners, but several requests to investigate this problem had been denied. However, it became evident that any budget restoration would probably be based on ability to identify a significant industrial disease associated with a high social cost. This coincided with a renewed interest in silicosis and an invitation to present a paper on accomplishments in the epidemiologic study of silicosis at the McIntyre-Saranac Conference on Occupational Chest Diseases (1955). For the paper, Victoria Trasko collected data from compensation agencies to estimate the number of silicosis cases occurring by industry. From the available information, it was possible to identify about 3,200 compensable cases in a 2-year period, with the mining industry being the major contributor.¹⁷ This information proved to be valuable because later in the year hearings were held by the House of Representatives on safety in the metal mining industry. The witness of the Division was able to convince the Committee that silicosis in the metal mines was a hazard of equal importance with safety.¹⁸ As a result, the House Committee recommended and obtained an additional \$150,000 for the Division to conduct a special study of silicosis in the metal mining industry in cooperation with the Bureau of Mines. This was the first step in the turn-around, for after that the budget continued to increase, albeit very slowly.

During the same period, the Bureau of State Services decided that there should be a visible radiological health program in the Bureau. Both the Occupational Health Program and the Division of Sanitary Engineering had some expertise in radiological health, but neither had medical expertise. The decision was made to place the program in the Occupational Health Program, and the Program was directed to recruit and train two medical officers at its expense. However, before the training was completed, the decision was made to create a Radiological Health Program in the Division of Special Health Services.

Between 1954 and 1956 the only new program launched by the Program was a formalization of its training activities, under the guidance of C. D. Yaffe. Short courses on industrial hygiene were scheduled beginning in 1955 at the Field Headquarters. These courses proved to be very popular, and later were expanded to include specific technical subjects. In 1958 the first edition of The Industrial Environment--Its Evaluation and Control was published. In 1973 it was rewritten and enlarged considerably by NIOSH.

On January 24, 1955, the American Medical Association presented the "Distinguished Service Citation to the Occupational Health Program-Public Health Service and The Directors Thereof" for outstanding contributions to the advancement of industrial health.

Dr. Miller retired from the Public Health Service in 1957 to become Director, Institute of Industrial Health, University of Michigan; and Dr. Harold J. Magnuson was appointed as Chief, Occupational Health Program. Dr. Magnuson, a career medical officer of the Public Health Service, had a background in clinical medicine, science, and administration. He set a goal of rebuilding the Program, especially its budget base and its scientific and

medical competency. Dr. Cooper was transferred from Field Headquarters to become Dr. Magnuson's assistant, and Henry Doyle became Chief, State Aid Branch. Lewis Cralley was moved from Salt Lake City to become Chief, Field Headquarters; and Duncan A. Holaday became Chief, Salt Lake City Field Station. During this period, three major field investigations were under way: (1) a reevaluation of the silicosis problem in metal mines, (2) lung cancer in uranium miners, and (3) hearing loss among workers in U.S. Prison Industries.

During post-World War II years and Dr. Miller's tenure as Division Chief, occupational health services in major industries became increasingly involved in the provision of personal health services to employees. While this represented an important contribution to preventive medicine in the broader sense, there was a real question, in the opinion of Dr. Magnuson, whether the limited resources of the Division of Occupational Health should follow this thrust or whether they could be better employed in emphasizing the environmental aspects of preventive services through basic research on occupational environmental factors and epidemiological support. In 1957 this was the subject of a memorandum from Dr. Magnuson to the Chief, Bureau of State Services, in which he stated that there was a need for public health agencies to shift from an emphasis on microbiology to a detailed consideration of microchemical factors. It was suggested that any future realignment of occupational health activities at the federal level should foster the concept of environmental emphasis and lesser emphasis on promotion of personal health services for workers. In 1958 the Surgeon General's Task Force on the reorganization of the Public Health Service called for the establishment of a Bureau of Environmental Health, with occupational health as one of its components. This Bureau was activated in principle, although the full reorganization plan failed to obtain the necessary Congressional approval at that time.

Reestablishment of the Division of Occupational Health

By 1959 it was evident that the "Super Division" concept was not a satisfactory administrative function, so the Division of Special Health Services was abolished and the Occupational Health Program became the Division of Occupational Health, with Dr. Magnuson and Dr. Cooper as Chief and Assistant Chief, respectively. By then the climate for occupational health was beginning to improve, as were all environmental health programs, because of the influence of Representative John Fogarty, Chairman of the House Appropriations Committee. Mr. Fogarty had been a bricklayer and an officer of the Union and was interested in industrial safety and health. However, the spectacular increases were for research and training grants. Dr. Douglas H. K. Lee was employed to direct an expanded research program in Cincinnati. Dr. Otto Bessey was added to the staff to administer the grants program and Dr. Philip Enterline for epidemiologic studies.

After 10 years of effort, the Division finally obtained \$100,000 for a study of coal pneumoconiosis in 1962. The appropriation of \$150,000 received 5 years previously was added to the \$100,000 for the coal mine study.²⁰ Because of inadequate funds, the early stage of the investigation was limited to a determination of the prevalence of pneumoconiosis among bituminous

miners. Once it was possible to demonstrate lung pathology in bituminous miners, the budget for the coal study increased each year so that by 1966 the line item budget for this investigation was \$750,000. With additional funds, clinical investigations were financed at the UMWA Hospital in Beckley, West Virginia, and in 1967 the Appalachian Laboratory for Occupational Respiratory Diseases (ALFORD) was established at the West Virginia Medical School, Morgantown.

In 1963 Dr. Magnuson accepted the position as Director, Institute of Industrial Medicine, to succeed Dr. Miller. Dr. Cooper was appointed Chief of the Division, even though it was known that he had requested retirement to accept an appointment as Professor of Occupational Medicine, University of California at Berkeley. In July of that year, Henry Doyle was assigned to Geneva, Switzerland, for a study program with emphasis on European research on coal pneumoconiosis. Dr. Cooper only served as Division Chief until his retirement was approved, and in the fall of 1963 he assumed his position in California. Dr. Gordon A. Seigel served as Acting Chief until Dr. Harry Heimann was appointed to succeed Dr. Cooper.

Dr. Heimann had been a Division staff physician between 1943 and 1951; immediately before his assignment as Chief, he had been on the staff of the Division of Air Pollution Control. Dr. Heimann had also declared his intention to retire before being appointed Division Chief. Dr. Murray C. Brown became Assistant Chief and, upon his return from Europe, Henry Doyle was also appointed Assistant Chief. When Dr. Heimann retired, Dr. Brown was made Chief, with Dr. Warfield Garson and Henry Doyle as Assistant Chiefs.

Dr. Brown concentrated his efforts on establishing the Appalachian Laboratories for Occupational Respiratory Diseases in conjunction with the medical school at West Virginia University in Morgantown and also attempting to build support for occupational health.

Dr. Brown visualized that in order to engender such support, there had to be enunciated a clear national program in occupational health as well as the development of a charter for the Division of Occupational Health within the Public Health Service. The Division had existed without any legislative authority for over 50 years. To attain this objective, Dr. Brown called upon Dr. William W. Frye, Chancellor of the Medical Center, Louisiana State University, as a consultant to help develop a special report concerning the occupational health needs of the nation. Dr. Frye, working with Dr. Warfield Garson, Mr. John F. Hardesty, and other staff members, developed a statement of national goals and a proposed program which included 17 specific recommendations to mount a national effort to attain the objectives as stated in the report. To support the report and its recommendations, 29 separate position papers were prepared by Division staff members and consultants.

The first task of the group which prepared the report was to set national goals for a truly national program of occupational health in which each of these diverse elements could play its proper part and in which a true partnership of all of the forces in the nation could be formed, under the leadership of the Division of Occupational Health, for a forceful assault on the occupational health problems of American workers. While the two goals selected were stated in idealistic terms, they nonetheless set the tone of

challenge which rings true even to this day. One goal was the elimination of any factor which makes the worker pay with his health or his life for the privilege of having a job. The second was the active promotion of the nation's economy through the reduction of sick absence and lowered production because of correctable health factors associated with the workplace. On the basis of knowledge and experience, it was estimated that a potentially attainable 5-year goal in occupational health would be the reduction of one day in yearly average of sick absence and a comparable reduction of related losses, such as those from temporarily restricted activity while the worker is on the job but below his usual level of health. Utilizing economic factors present in 1965, such improvements would have resulted in a 10 billion dollar annual gain in the gross national product.

With the further help of the staff of the Division of Occupational Health, the National Advisory Environmental Health Committee, chaired by Dr. Norton Nelson, Director, Institute of Environmental Medicine, New York University Medical Center, Mr. George Taylor of the AFL-CIO, and additional consultation with Dr. William F. Asche, Professor of Occupational Health at Ohio State University, the report entitled "Protecting the Health of Eighty Million Americans-A National Goal for Occupational Health" was submitted as a special report to the Surgeon General of the U.S. Public Health Service on November 19, 1965. (See note page 19.)

It is interesting to note that, once introduced, the so-called "Frye Report" underwent very close scrutiny and attack in all its program recommendations, both from within the federal agency as well as in the community generally; however, each and every one of the program recommendations sustained themselves and, with only minor modifications, became the blueprint for action in the future for this agency. It is even of greater interest to note that, subsequently, each and every one of the 17 program recommendations were implemented -- a feat which few federal agencies, if any, have ever accomplished.

Along with the Frye Report, other factors were beginning to influence the development of occupational health and industrial hygiene. By early 1967 it was evident that the Department of Labor, with the support of the labor unions, would soon sponsor federal legislation for protection of workers from safety and health hazards.

The Uranium Study

When this study was started in 1950, uranium mining was a small and new segment of the mining industry. It was expected that it would be the mid-1960's before a significant number of occupational lung cancers would be evident since it was known, from European experience, that the induction period was about 15 years. By 1963, an increased lung cancer incidence was evident among these miners. Earlier in the investigation, a tentative standard of 1 Working Level had been recommended. A Working Level (WL) was a combination of alpha-emitting products equivalent to 100 pica curies (pc) per liter of air. Although the potential problem had been presented to the

Atomic Energy Commission and various Congressional committees, the problem was not considered to be serious by organizations other than the Public Health Service. In 1967, however, several lung cancer victims received wide publicity, which motivated the Joint Committee to schedule hearings on the nature and extent of lung cancer among uranium miners.¹⁹

Prior to the hearings, each interested agency--which included the Departments of Health, Education and Welfare; Labor; Interior; Commerce; the Atomic Energy Commission; and the Federal Radiation Council--was instructed to develop and exchange position papers. In its paper, the Department of Health, Education and Welfare, on the recommendation of the Division of Occupational Health, supported a standard of 0.3 WL, which was contrary to the recommendation of 1.0 WL by the Federal Radiation Council. Several days before the hearings of the Joint Committee were scheduled to begin, the Secretary of Labor promulgated a standard of 0.3 WL for mines having Walsh-Healy contracts. This action surprised the Joint Committee because members felt that a recommendation for a standard should be dependent on the hearings, and the Committee tended to support the recommendation of the Federal Radiation Council. As a result, the testimony of Deputy Surgeon General Leo Gehrig was attacked vehemently by the members and staff of the Committee and professional witnesses. Although flaws were found in the technical supporting data, the recommendation of 0.3 WL survived the hearings and was later promulgated as a standard by the Bureau of Mines and the Department of Labor.

The Committee hearings brought about a cooperative effort between agencies in the solution of the problem; but even more importantly, they demonstrated the need for Congressional involvement in the matter of worker health and safety, and the hearings provided a stepping-stone in the evolution of the Occupational Safety and Health Act.

The Bituminous Coal Study and the Federal Coal Mine Health and Safety Act

By 1967 it was evident from the Division's study and other evidence that pneumoconiosis in coal miners was indeed a serious problem.²⁰ Special legislation had been adopted in Pennsylvania to compensate coal miners with evidence of pneumoconiosis, but in some states coal pneumoconiosis was not recognized as a compensable disease. Despite publicity about the problem, there appeared to be very little Congressional interest in coal mine safety and health. However, a coal mine explosion in November 1968 in Farmington, West Virginia, in which 78 miners were killed, stimulated a public demand for safety legislation. In December 1968, President Johnson requested the Bureau of Mines to develop and submit to him, as soon as possible, a draft coal mine safety and health Act. A draft Act was submitted to the White House in late December, but since there would be a change in administration within 3 weeks, it was known that there would be no action by the Congress. However, shortly after taking office, President Nixon called for a draft Act and the Congress immediately scheduled hearings. The Act, which was significantly modified and strengthened by the Committee and Congress, was passed in December 1969, with the Bureau of Mines as the enforcing agency and with responsibility for medical research and examinations delegated to the Public Health Service.^{21, 22}

The Act represented a major change in legislative philosophy on health protection and disability compensation. It also set the stage for passage of the Occupational Safety and Health Act in that the Federal Coal Mine Health and Safety Act established federal, rather than state, supremacy in matters of industrial safety and health. Hearings had been held by Congress in 1968 on an Occupational Safety and Health Act, but legislative action was not taken partially because the proposed Act violated the principle of states' rights in the matter of health and safety.²³

New Challenges

Because the Public Health Service was losing many of its environmental health activities to the newly created Environmental Health Agency, a reorganization occurred in early 1967 to provide greater visibility to the environmental programs of the Service. The Center for Urban and Industrial Health was created to house the environmental programs, including the Occupational Health Program. Headquarters for the Program were moved to Cincinnati, but due to increasing involvement of the executive staff in legislative affairs, it was moved back to Washington in 1968; shortly thereafter, the Program became the Bureau of Occupational Safety and Health in the Consumer Protection and Environmental Health Service, Environmental Control Administration. Dr. Brown retired in 1969 to become Director, Chicago Department of Public Health and Hospitals. Mr. Duncan A. Holaday served as Acting Chief for a temporary period until Dr. Marcus M. Key was appointed Chief, Bureau of Occupational Safety and Health. Between 1968 and 1971, the executive staff of the Division and Bureau was involved in working with Congressional committees in developing the Coal Mine Health and Safety Act and the Occupational Safety and Health Act. The latter Act, passed on December 29, 1970, created the National Institute for Occupational Safety and Health, with Dr. Marcus M. Key as the first Director.

Conclusion

The Division of Occupational Health and its predecessor organizations survived for 57 years (1914-1971) as an organizational entity in the United States Public Health Service--an unusual longevity record for any governmental program. Along with water pollution, it represented the federal government's first interest in environmental health. During its history it spawned other public health programs, including tuberculosis control, air pollution, and radiological health. The Division served as a training ground for many individuals who would become outstanding in the fields of industrial hygiene and occupational medicine in government, academic institutions, and business.

In its first 40 years, the total appropriations for the Division was less than one-fifth of the 1976 appropriation for the National Institute for Safety and Health; and in the last 17 years, the summation of its budgets was less than the 1976 NIOSH budget.

Until 1970 the Division, of necessity, worked within the framework of federal policy that industrial safety and health was a responsibility of

the various states and private industry. How the Division could, in its history, carry out over 40 major field investigations remains a mystery to many present-day investigators. It was accomplished, however, by the respect that the organization had attained as an unbiased fact-finding agency, and by the perseverance of individuals in the organization and their ability to sell a concept to the management of industries with health problems.

In 1964, at a luncheon commemorating the 50th anniversary of the Division of Occupational Health, Theodore Hatch spoke on the major accomplishments in occupational health in the past 50 years.²⁵ Although his listed accomplishments were not limited to the Division of Occupational Health, they certainly reflect the major efforts of the Division during its history. The accomplishments listed by Hatch were:

1. Epidemiological assessment of occupational health hazards.
2. Quantitative techniques of evaluation.
3. Interdisciplinary teamwork.
4. Concept of tolerance limits.
5. Principles of control.

To these might be added:

6. Development of state programs.
7. Support of academic institutions and the development of short-term training courses.
8. A contribution to extending the life expectancy of the industrial worker from 55 years in 1914 to 69 years in 1970.

When looking into the future, Hatch raised the question, "Can we, by optimal design of jobs, create beneficial work situations which will raise the level of health over that of the nonworking population and thereby reduce the likelihood of occurrence or, at least, postpone the onset of degenerative diseases and extend the productive years of our people?" This, together with the legislative mandate in the Occupational Safety and Health Act of 1970 "to provide medical criteria which will assure, insofar as practicable, that no employee will suffer diminished health, functional capacity, or life expectancy as a result of his work experience,"²⁶ is the goal of the future. In the past, the profession could and did accept the concept of minimum risk; that goal has now changed to the elimination of all risks in the work environment. An even more significant challenge, however, is the elimination of risks without adversely affecting the productivity of American industry.

Omissions

In the history of any organization, it becomes impossible to mention all of the individuals who made a significant contribution to the mission of the organization. Among those who should be recognized for their contributions to the Division of Occupational Health are:

Howard E. Ayre	Andrew D. Hosey
Donald J. Birmingham, M.D.	Howard L. Kusnetz
Mary L. Brown	Marshall E. LeNier
Dohrman H. Byers	Maybelle Markee
W. D. David, M.D.	Albert E. Russell, M.D.
Waldemar C. Dreessen, M.D.	Lester D. Scheel, Ph.D.
Francis Dukes-Dubos, M.D.	Harry E. Seifert
Edward J. Fairchild, Ph.D.	Herbert T. Stokinger, Ph.D.
Robert H. Flinn, M.D.	Charles D. Yaffe
Robert L. Harris	

Notes

(1) Industrial Hygiene was begun, in mimeographed form, in 1941. With Volume 4 in 1944, the name was changed to Industrial Hygiene Newsletter. It was first published in a printed format in 1947.

(2) The National Advisory Environmental Health Committee consisted of:

Dr. Norton Nelson, Chairman

Mr. George Flaccus, Jr.
Vice-President of Industrial Relations
Jones and Laughlin Steel Corporation

Mr. George R. Taylor
American Federation of Labor and
Congress of Industrial Organizations

Dr. James Sterner
Medical Director
Eastman Kodak Company

REFERENCES

Much of the information in this history is based on information available to the writer through his long association with the Division of Occupational Health and his extended friendship with John J. Bloomfield. The writer was employed by the Division from 1943 to 1968, and served as Assistant Director for Mineral Health, United States Bureau of Mines, from 1968 to 1970. In July 1975, a recorded interview was held with Jack Bloomfield in which much of the history of the Division, especially the period from 1922 to 1948, was reviewed. This tape is in the custody of the Chairman, ACGIH Committee on the History of Industrial Hygiene.

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19. Radiation Exposure of Uranium Miners. Hearings before the Subcommittee on Research, Development, and Radiation of the Joint Committee on Atomic Energy, Congress of the United States. 90th Congress, Parts 1 and 2, 1967.
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Directors of the Federal Industrial Hygiene Agency

1914-1977

Office of Industrial Hygiene and Sanitation

Joseph W. Schereschewsky	1914-1918
Anthony J. Lanza	1918-1921
Lewis R. Thompson	1921-1930
James P. Leake	1930-1932
Royd R. Sayers	1932-1937

Division of Industrial Hygiene

Royd R. Sayers	1937-1940
Paul A. Neal	1940-1941
James G. Townsend	1941-1951
Seward E. Miller	1952-1954

Division of Occupational Health

Seward E. Miller	1952-1954
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Occupational Health Program

Henry N. Doyle	1954-1956
Harold J. Magnuson	1956-1959

Division of Occupational Health

Harold J. Magnuson	1959-1963
W. Clark Cooper	1963
Harry Heimann	1963-1964
Murray C. Brown	1964-1969

Bureau of Occupational Safety and Health

Marcus M. Key	1969-1970
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National Institute for Occupational Safety and Health

Marcus M. Key	1970-1974
John F. Finklea	1975

Assistant and Deputy Directors

Division of Industrial Hygiene

John J. Bloomfield	1941-1949
Joseph E. Flanagan	1949-1952

Division of Occupational Health

Joseph E. Flanagan	1952-1954
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Occupational Health Program

Henry N. Doyle	1957-1959
W. Clark Cooper	1959

Division of Occupational Health

W. Clark Cooper	1959-1963
Murray C. Brown	1964-1965
Henry N. Doyle	1965-1967
Warfield Garson	1965-1967

Bureau of Occupational Health and Safety

Stanley Reno	1969-1971
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National Institute for Occupational Safety and Health

Edward J. Baier (Deputy)	1972
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H.N. Doyle, R.R. Sayers, W.D. Dressen, Louis Schwartz, James P. Leake, Seward Miller



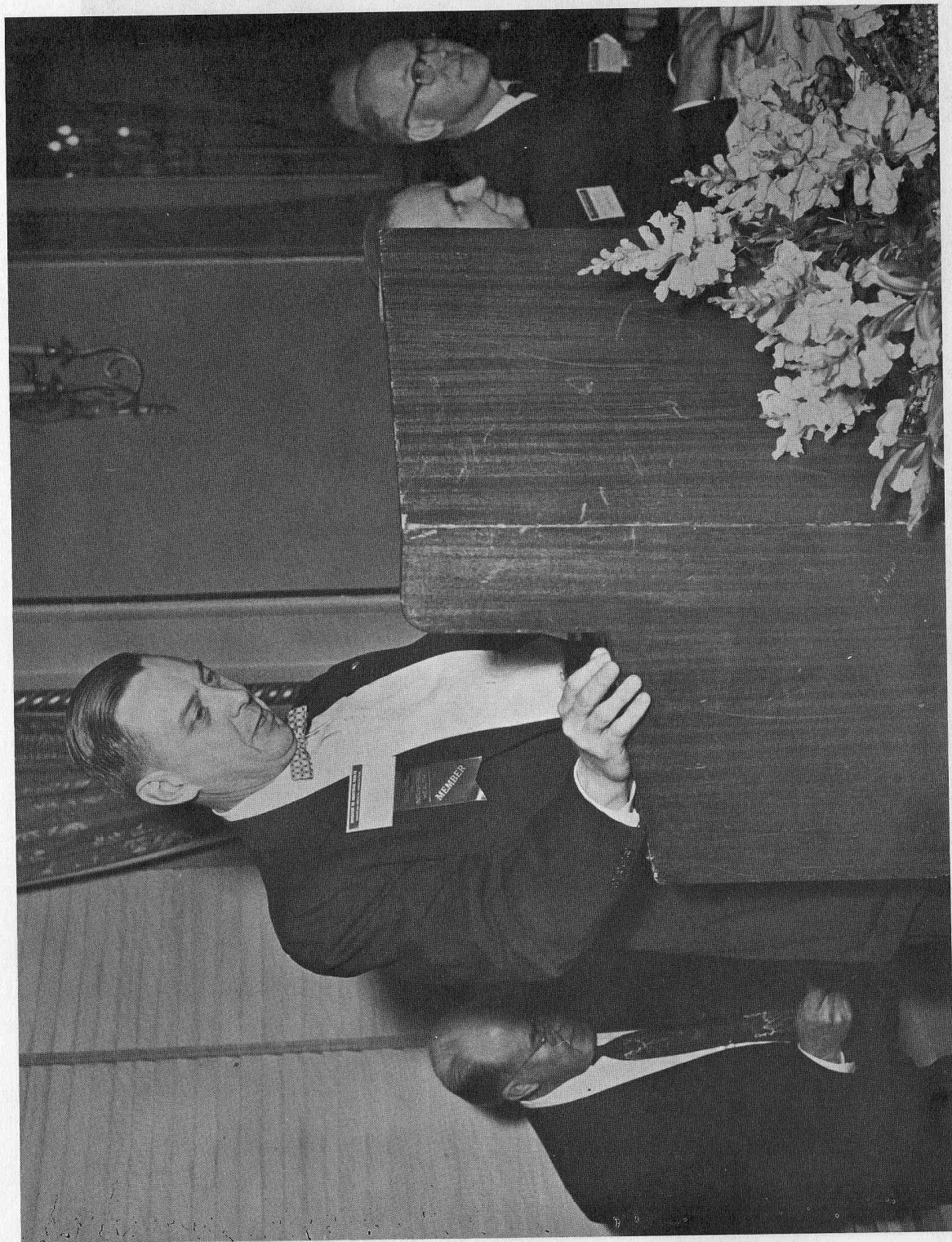
James G. Townsend, Seward E. Miller, W. Clark Cooper, Harold J. Magnuson

H.W. Doyle, R.G. Seiler, A.D. Dickson, James E. DeLoach, Robert G. Brown, William J. Ruckelshaus

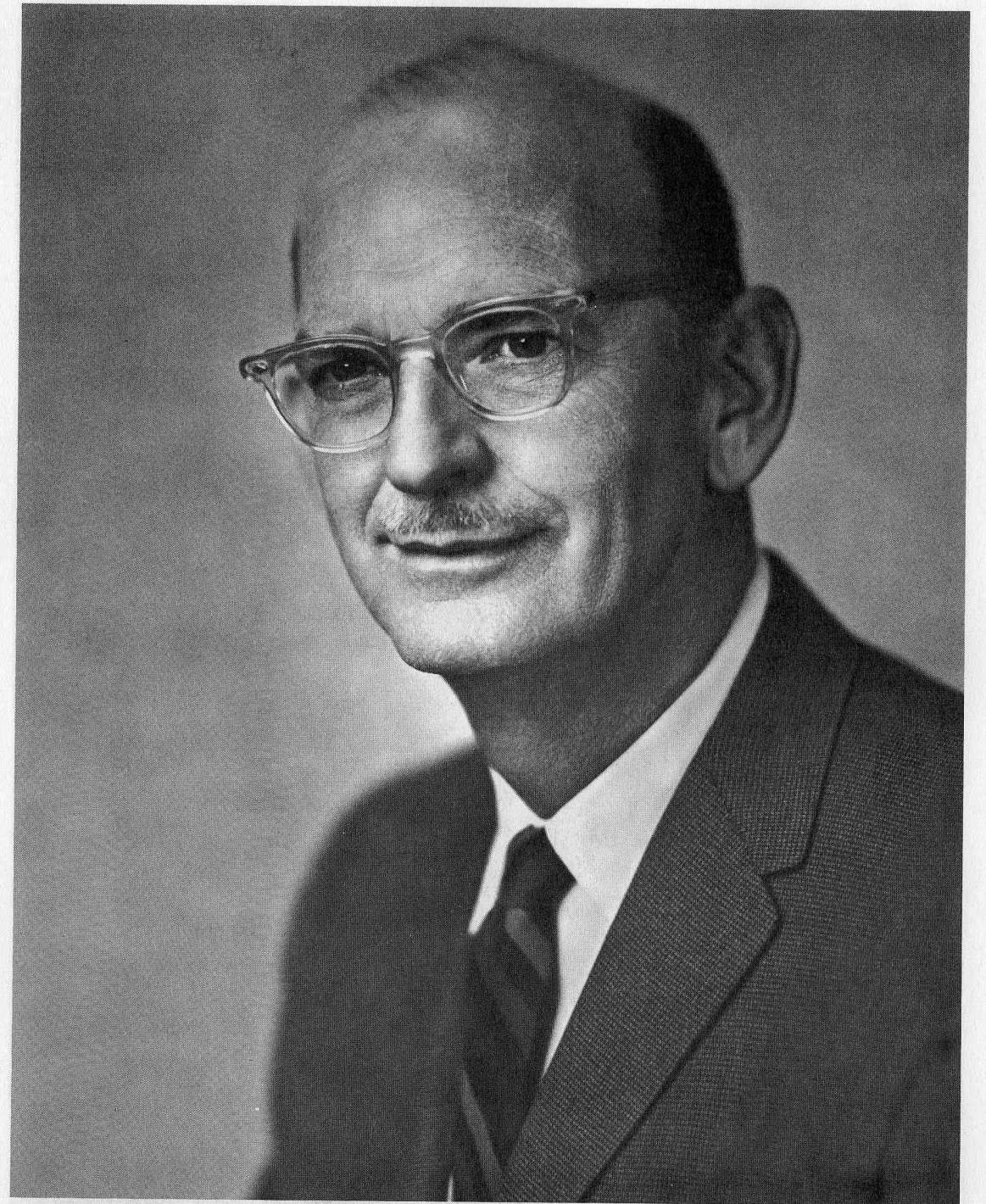


James G. Townsend
Chief, Division of Industrial Hygiene
1941-1951

Chief, Division of Occupational Health



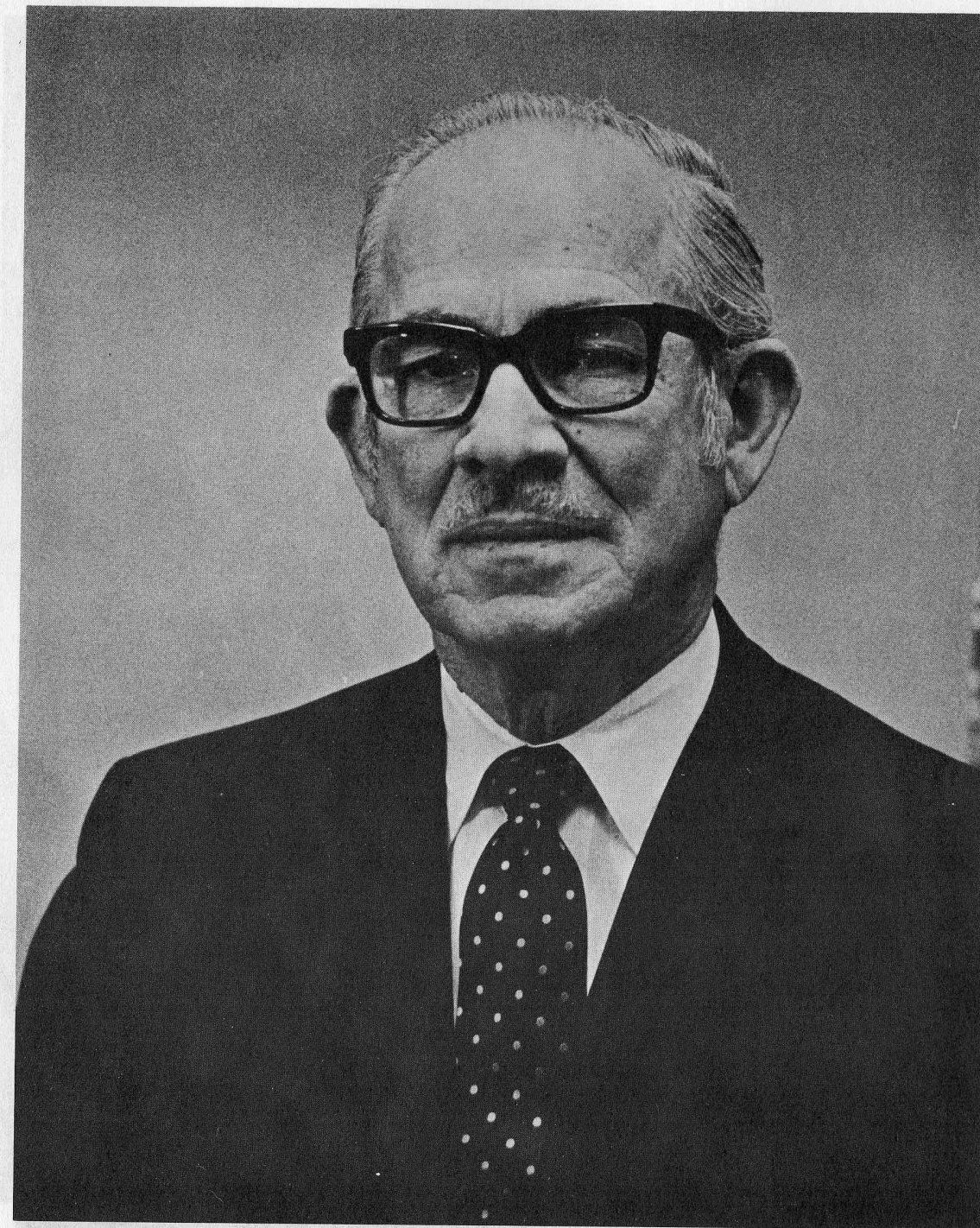
Seward E. Miller
Chief, Division of Occupational Health
1951-1954



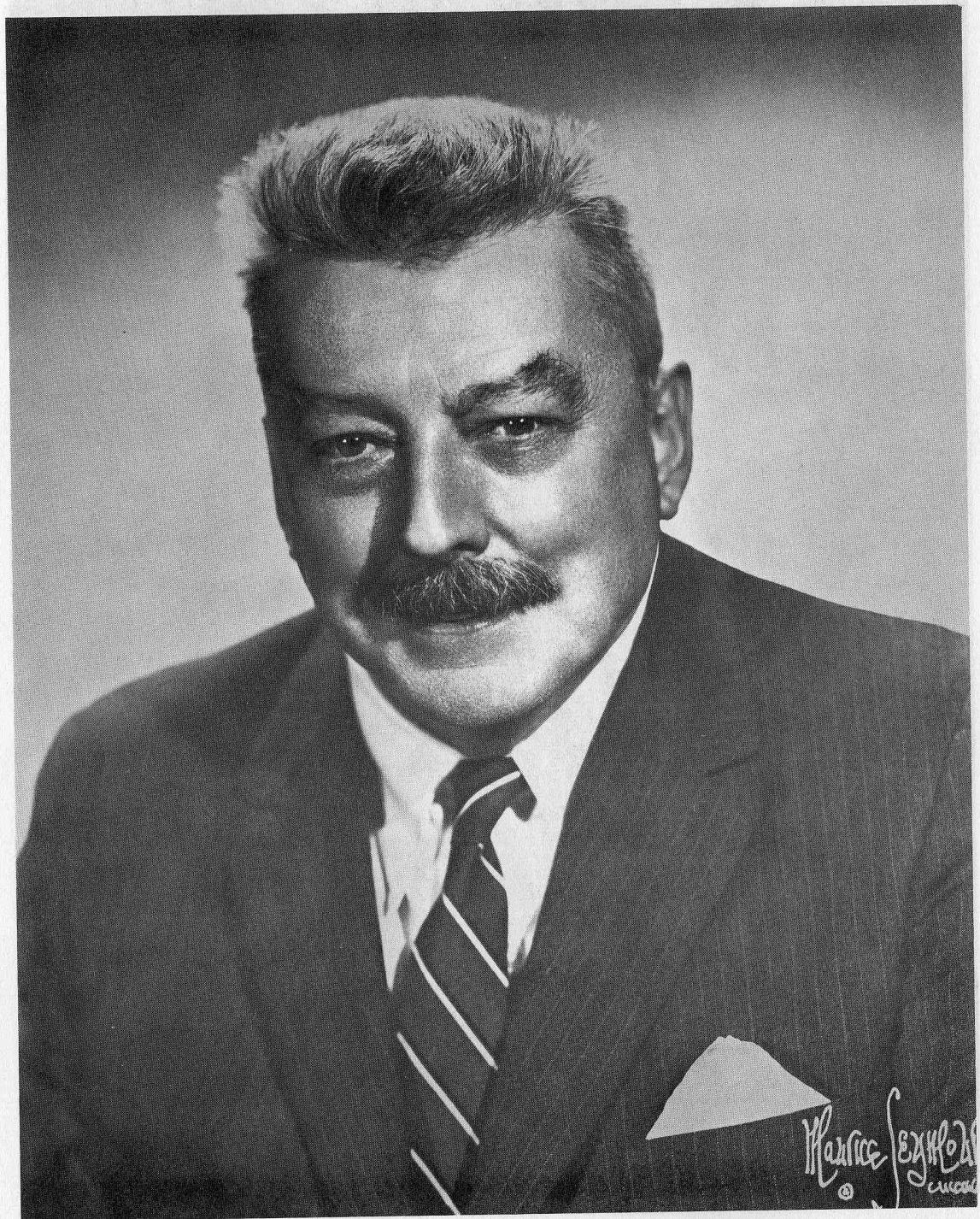
Henry N. Doyle
Chief, Occupational Health Program
1954-1956



W. Clark Cooper
Chief, Division of Occupational Health
1963



Harry Heimann, M.D.
Chief, Bureau of Occupational Safety & Health
1963-1970
Harry Heimann, M.D.
Chief, Division of Occupational Health
1963-1965



Murray Cox Brown
Chief, Division of Occupational Health
1965-1969



Marcus M. Key, M.D.
Chief, Bureau of Occupational Safety & Health
1969-1970

Director, NIOSH
1970-1974

APPENDIX 1

Copies between the Public Health Service and the Bureau of Mines relative to cooperative activities and the assignment of surgeons to Mine Rescue Cars.

Copies of Memoranda of Understanding between the Public Health Service and the Bureau of Mines, 1937, 1951, 1956, 1961, and 1966.

This material was furnished the writer by Dr. Aurel Goodwin, Chief, Health Division, Mine Enforcement and Safety Administration, U.S. Department of the Interior.

May 10, 1910

Dr. Walter Wyman
Surgeon-General, Marine Hospital Service
Washington, D. C.

Sir:

Mr. J.A. Holmes, of the Technologic Branch of the Geological Survey, in charge of the investigations of mine explosions, has just returned from certain examinations at the Palos coal mine disaster in Alabama, and has brought with him a few samples of blood collected from the miners killed in that disaster.

The Geological Survey would appreciate your cooperation in examination of these samples of blood with a view to determining the nature of the death of these miners, whether from violence of the explosion, from suffocation in the ordinary "black-damp" (CO₂, etc.) subsequent to the explosion, or from the more poisonous effect of carbon monoxide (the "white-damp" of the miners).

I will appreciate anything you can have done toward the examination of these samples with a view to determining this question for the Geological Survey.

Each sample is numbered, and the report on each sample should refer to these numbers.

Very respectfully,

Dr. George Otis Smith
Director

May 14, 1910

Dr. George Otis Smith, Director
United States Geological Survey
Washington, D. C.

Sir:

In reference to your letter of May 10th addressed to Surgeon-General Walter Wyman, requesting the examination of certain samples of blood, I have the honor to make the following report:

The samples of blood were delivered to the Laboratory by Mr. J.A. Holmes, of the Geological Survey. The box contained seven bottles, Specimens Nos. 2 and 7 were almost entirely lost by leakage, the stoppers having become loosened in transit. The bottle containing specimen No. 7 was entirely empty, except for the thin film of dry blood; and only one or two drops of moist blood remained in the bottom of bottle No. 2. The amount of blood in bottle No. 7 was not sufficient for a satisfactory spectroscopic or chemical examination.

Examination of the small amount of blood in bottle No. 2 showed faint and rather uncertain indications of carbon monoxide; but there were not sufficient material for a satisfactory determination.

In specimens Nos. 1,3,4,5 and 6 carbon monoxide was determined by both chemical and spectroscopic examination. From this we are of the opinion

that the persons from whom specimens Nos. 1,3,4,5 and 6 were taken probably died from carbon monoxide poisoning, as the presence of this gas was definitely determined.

In the collection of future specimens of blood it is suggested that completeness of the examination would be furthered by the collection of larger amounts of blood than those recently submitted. All specimens had undergone more or less putrefaction, due to contamination; and it is also suggested that the bottles in which the blood is to be collected and the pipettes for collecting the same from the body, be sterilized before use, in order to prevent contamination as much as possible.

It would also be of advantage if the specimens, immediately after collection, were placed upon ice and forwarded on ice to the laboratory for examination.

We do not know of any procedure whereby the presence of carbon dioxide can be detected in the blood, or whether the violence of the explosion caused death except where there are visible signs of violence. However, the presence of carbon monoxide, when sufficient amounts of blood are available, can be definitely determined.

The laboratory will be pleased to make examination of any future specimens that you may desire to submit.

The examinations were made in the division of chemistry, in this laboratory.

Respectfully,

Dr. John F. Anderson
Director Hygienic Laboratory

May 18, 1910

Dr. John F. Anderson
Director Hygienic Laboratory
Public Health and Marine-Hospital Service
Washington, D.C.

Sir:

In reference to your letter of May 14, reporting the results of the examination of certain samples of blood sent to your laboratories from the Geological Survey through Surgeon-General Walter Wyman:

Please allow me to thank you for the courtesy and promptness with which you have examined these samples of blood. It is unfortunate that the samples had been lost from a few of the bottles, but only the thin glass vials were available for collection of the samples, and it was feared that if the stoppers were pushed in more tightly the vials themselves would break and thus lose the entire sample.

The results obtained from the samples examined, however, are of great interest, and seem to indicate that in all cases more or less of the carbon-monoxide was inhaled before the miner died, and that in this way the poisonous gas affected the blood. It was quite apparent from the conditions in the mine that the majority of the miners from whom these samples were collected died of suffocation or gas poisoning, rather than from the violence of the explosion. In fact, there was only one case in which the violence of the explosion was indicated by serious injuries to the body of the miner.

Please allow me to thank you also for the suggestions to be followed in the collection of future samples of blood. These will be transmitted to the mining engineers in the field, and doubtless will be followed by them in connection with these future unfortunate occasions.

If other disasters occur during the continuance of this work under the Geological Survey, the samples of blood that may be collected will be forwarded to you for examination.

Very respectfully,
George Otis Smith
Director

November 4, 1910

To the Honorable
The Secretary of the Interior

Sir:

Concerning suggested cooperation between the Bureau of Mines, the American National Red Cross and the Bureau of Public Health and Marine Hospital Service in investigations relative to the health conditions in mines and mining camps:

In endeavoring to carry out that part of the Act creating the Bureau of Mines which provides that it shall "make diligent investigation of the methods of mining, especially in relation to the safety of miners,"....and "the possible improvement of conditions under which mining operation are carried on, " with your approval six mine rescue cars have been procured, outfitted with the equipment relating to the methods of preventing mine disasters, the method of mine rescue work, methods of fighting mine fires and first aid to the injured work. The railway companies are to transport these cars free of charge, together with their four attendants; and the cars will be distributed one to each of the several important coal fields of the country, each car stopping a week at each successive mining camp visited in its territory.

The personnel accompanying each of these cars includes a mining engineer who will investigate mining conditions and give illustrated evening talks to the miners on the methods of preventing mine accidents; and experts who will train a squad of miners in the methods of mine rescue work, and another experts who will train other miners in the first-aid to-the-injured work.

It would be well if there could accompany each of these cars also a medical expert who would investigate the sanitary conditions of the mines and mining camps and in special cases make examinations with regard to the occurrences of hook worm or other special diseases that might readily be transmitted from the mines of other countries to the United States or from one mining region to another within the United States.

In considering how this latter work might be undertaken most economically in such manner as to avoid duplication and reduce to the minimum the cost of the same to the Federal Government, two plans are proposed:

- (1) That the Bureau of Public Health and Marine Hospital Service be requested to send with each of these cars traveling through regions in which it is suspected that serious miner's diseases may be found an assistant surgeon, especially trained in the examination of such diseases;

- (2) That in other regions where it is not expected that such serious miner's diseases occur either the Bureau of Public Health or the Red Cross be invited to send with each such car an assistant surgeon who is familiar with modern sanitation practice, with mining conditions, and with the nature of injuries resulting from mine accidents; who will supervise the investigations and training work carried on by the employees of the Bureau of Mines in relation to these phases of the mining conditions.

In each of the above cases it is proposed that the salary and traveling expenses (including subsistence) of the assistant surgeon accompanying each of these cars be furnished by the Bureau of Public Health or the Red Cross as the case may be; and that the Bureau of Mines supply on each car only sleeping accommodations for such surgeons accompanying, which it can do without cost to the Department.

I therefore have the honor to request your authority to furnish quarters to officials of the Government who may be detailed from the Bureau of Public Health and Marine Hospital Service and also to the assistant surgeons of the American National Red Cross; if it meets with your approval that such arrangement as is suggested above be proper under the circumstances.

Respectfully yours,

George Otis Smith
Director

November 22, 1910

Dr. Walter Wyman, Surgeon General
Public Health and Marine Hospital Service
Washington, D.C.

My dear Dr. Wyman:

The Bureau of Mines will have one of its mine rescue cars leave Washington about December 10 for a trip through the West Virginia coal mining camps. With the approval of the Secretary of the Interior, I am authorized to invite you to send from the Bureau of Public Health and Marine Hospital Service a surgeon who would be interested in making examinations concerning the presence or absence of hookworm or other diseases among the men working in any of these mines.

This car will be in charge of a mining engineer, Dr. John J. Rutledge, and he will have with him a practical miner trained in first aid to the injured methods and a cook who also will serve as porter. The car is equipped with living conveniences and for meals. It also is fitted with three lower and a number of upper berths for sleeping purposes each supplied with mattresses, blankets, and necessary linen.

While the Bureau of Mines has not arranged for paying either the railway transportation or the cost of the meals of the representative who may be sent from the Bureau of Public Health but there will, of course, be no charge for quarters. The cost of meals on the cars is not expected to exceed one dollar per day. I trust that this arrangement will meet with your approval, and that you may be able to send a representative from your Bureau with this car.

I may add that the Bureau of Mines will have during this winter five or six additional cars in the following fields:

The anthracite fields of Pennsylvania; the Western Pennsylvania and Maryland

coal fields; the Indiana and West Kentucky coal fields; the Colorado and New Mexico coal fields; the Southern Wyoming coal fields, and the Montana and Washington coal fields.

If the Bureau of Public Health would like to make a similar arrangement in regard to any of these other coal fields mentioned such an arrangement will be entirely agreeable to the Bureau of Mines.

Yours very truly,

J. A. Holmes, Director

December 6, 1910

Engineer in Charge
Bureau of Mines
Pittsburgh, Pennsylvania

Dear Sir:

I inclose herewith copy of letter from Surgeon General Wyman, in regard to Dr. Rucker accompanying the rescue car through West Virginia mining camps. Dr. Rucker called yesterday to see the Director and went over the matter with him. In addition to Dr. Rucker, Surgeon General Wyman requests that Dr. Stiles also accompany the car.

The Director wishes me to inform you that the two lower berths of the state room should be reserved for Doctors Rucker and Stiles, giving them the entire use of the room. In some cases where visitors go with the car, this room should be reserved for them - the coal miner and first aid man using the upper berths when are on the car. The single state room is, of course, always reserved for the mining engineer.

You are referred to the Secretary's letter, November 4, copy herewith, authorizing the Bureau of Mines to furnish sleeping quarters for the Public Health & Marine Hospital Service and Red Cross physicians. There is no authority to subsidize these physicians but they will be expected to contribute a proportionate amount for subsistence. No charge is to be made for sleeping quarters.

Yours very truly,

Van H. Manning, Chief Clerk

December 2, 1910

Dr. J. A. Holmes
Director, Bureau of Mines
Department of the Interior
Washington, D. C.

My Dear Dr. Holmes:

This will introduce to you Passed Assistant Surgeon W.C. Rucker of this Service, who wishes to make some inquiries for me regarding the proposed trip of your mine rescue car through the West Virginia coal mining camps. It is contemplated having Dr. Rucker accompany your party, and he desires to secure some information as to the routes to be taken and the opportunities that will be afforded for investigations of sanitary conditions among the miners.

Respectfully,

W. Wyman, Surgeon-General

December 17, 1910

The Honorable,
The Secretary of the Interior

Sir:

Referring to my letter to you of November 4, approved by you on the same date, authorizing an official of the Public Health and Marine Hospital Service to be furnished with sleeping quarters on the on the mine rescue cars, these officials to investigate the sanitary condition of the mines and mining camps and in special cases make examinations with regard to the occurrence of hook worm or other special diseases that might readily be transmitted from the mines of other countries to the United States or from one mining region to another within the United States.

In accordance with your authority I have invited Surgeon-General Wyman to detail an officer to accompany mine rescue car No. 6 to the West Virginia coal fields. I am informed by Surgeon-General Wyman that after investigating the matter he finds that, while he is anxious to cooperate with the Bureau of Mines in this work, he fears that the present wording of the appropriation for the Bureau of Public Health will not permit him to pay the traveling expenses and subsistence for the medical expert accompanying the mine rescue car. He hopes, however, that the wording of the appropriation for the work of the Bureau of Public Health for the next fiscal year may be so changed as to grant the necessary authority.

Meanwhile mine rescue car No. 6 will be making its itinerary through the region in the Virginias where a preliminary investigation is most needed, with regard to future plans.

In view of the above situation, I respectfully request that you grant the necessary authority, so that in case of the Bureau of Public Health can not pay these expenses the Bureau of Mines, in addition to providing sleeping quarters on these rescue care --- already authorized by you --- can also pay the travel expenses of one or two experts from the Bureau of Public Health during the next six months, to the amount not exceeding three hundred dollars (\$300).

Very respctfully,

I.A. Holmes, Director

December 23, 1910

Dr. Walter Wyman, Surgeon General
Public Health and Marine Hospital Service
Washington, D.C.

Dear Sir:

Before he left the city yesterday, the Director of the Bureau of Mines authorized me to inform you that he would be pleased to have Dr. Rucker join mine rescue car No. 6 at such time after January 1 as will suit your convenience and that of Dr. Rucker.

There appears to be some question on your part as to your ability to pay the travel and subsistence expenses of Dr. Rucker while he is attached to this car and the Director authorizes me to say to you that, pending final action on your part, the Secretary of the Interior will allow a sum, not to exceed three hundred

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dollars, to cover the travel and subsistence expenses of Dr. Rucker.

Very truly yours,

Van H. Manning, Acting Director

December 23, 1910

Dr. Charles W. Stiles,
The Ontario
Washington, D.C.

Dear Sir:

I understand from the Director that he has had some correspondence with you in regard to your joining one of the mine rescue cars for the purpose of making certain investigations in the mining regions. Dr. Holmes tried to get you yesterday over the phone before he left the city, as he was anxious to see you before he left. He is now in North Carolina, but he will return to Washington about the middle of next week. I will be glad if you will call upon him then and discuss the matter in more detail. You will be advised as to the exact location of the car at such time after January 1st as it may be convenient for you to join it.

Very truly yours,

Van H. Manning, Acting Director

December 30, 1910

Van H. Manning, Esquire
Acting Director, Bureau of Mines
Department of Interior,
Washington, D. C.

Sir:

Returning to Washington, I beg to acknowledge the receipt of your letter, Number 1266. I will try to see Doctor Holmes as soon as possible.

Respectfully,

Charles W. Stiles
Professor of Zoology

January 17, 1911

Dr. J.A. Holmes
Director, Bureau of Mines
Department of the Interior
Washington, D. C.

Dear Doctor:

I beg leave to acknowledge the receipt of your letter of the 23rd ultimo stating that the Secretary of the Interior has authorized a sum not to exceed \$300 to cover the necessary traveling expenses of Passed Assistant Surgeon W.C. Rucker who has now gone to join mine rescue car No. 6 in West Virginia. Your action in providing temporarily for the expenses of Dr. Rucker while engaged in this work is much appreciated.

Respectfully,

Walter Wyman, Surgeon-General

A1-7

May 12, 1911

The Honorable
The Secretary of the Treasury

My dear Sir:

In connection with the work of the Bureau of Mines looking to the prevention of mine accidents and the improvement of the conditions under which mining operations are carried on, this Department has constant need of the advice and assistance of one or more thoroughly trained surgeons who can aid in all matters pertaining to the improvement of the hygienic conditions at mines, in occasional investigations that will throw light on the effect upon the systems of different mine gases, and in other associated problems.

Instead of organizing this work within the Bureau of Mines, it would seem wiser that this Department ask of the Treasury Department the cooperation of the Public Health and Marine Hospital Service, and that the work outlined above be carried on by the surgeons connected with the Public Health and Marine Hospital Service through such a cooperative arrangement with and for the Bureau of Mines.

If such an arrangement meets with your approval, I would respectfully ask that two surgeons be assigned to this work on the part of the Public Health and Marine Hospital Service, with a view to their continuing with this cooperative arrangement for a number of years, and becoming the leading authorities in connection with all matters pertaining to the health condition in and about American mines.

As a basis of this cooperation, I would respectfully suggest that the salaries of these surgeons be paid out of the appropriations for the Public Health and Marine Hospital Service under the Treasury Department, while the expenses for travel, etc., during the time that these surgeons are engaged in this cooperative work, be paid out of the appropriations of the Bureau of Mines.

All matters of detail connected with this cooperation can be arranged between the Surgeon General of the Public Health and Marine Hospital Service and the Director of the Bureau of Mines.

As indicating the legal basis within the Bureau of Mines for the kind mentioned, I may quote the following from Public Act No. 179 (Sec. 2):

"What it shall be the province and duty of said bureau (of Mines) and its director, under the direction of the Secretary of the Interior, to make dilligent investigation of the methods of mining, especially in relation to the safety of miners, and the appliances best adapted to prevent accidents, the possible improvement of conditions under which mining operations are carried on,....."

I may add that of the 700,000 miners connected with the coal mining industry, probably at least fifty per cent are of foreign birth, and are unfamiliar with the English language or American customs. Furthermore, large additions to the force working in these coal mines are made each year direct from different European countries, by men entirely unfamiliar with the Government or the traditions of this country, or with mining operations; and while among the 800,000 men connected with the metal mining industries, the percentage of English-speaking men is much larger, nevertheless, in these branches of the industry also, there are a large portion of men new to the country and to the industry. The risk of importing into American mines new diseases from other countries, and of distributing these diseases about the country, owing to the migratory habit of many of these miners, is such as to add to the importance of the cooperative work now

proposed.

I trust, therefore, that the plan proposed may meet with your approval.

Very respectfully,

Secretary of the Interior

May 20, 1911

The Honorable
The Secretary of the Interior

Sir:

I have the honor to acknowledge the receipt of your letter of the 12th instant relative to the cooperation of the Public Health and Marine Hospital Service with the Bureau of Mines by the detail of two officers for an extended period, who would render advice and make investigations of matters pertaining to health conditions in and about American mines, their salaries to be paid by this Department, and the expenses for travel, etc., being paid out of the appropriation of the Bureau of Mines.

In reply, I would state that I am heartily in favor of such cooperation, as the duties outlines would have a direct bearing on the public health. On account of the large number of aliens engaged in the mining industry and because of the unsettled and migratory habits of miners, as well as the peculiar conditions under which they work, it is very desirable that sanitary investigations be made to determine the influence of this industry on the health of the country as a whole.

At a recent meeting of the Board of Directors of the National Association for the Study and Prevention of Tuberculosis, resolutions were adopted referring to the conditions under which metal miners work, the lack of information regarding the occurrence of lung diseases among them, and recommending to the President and Congress of the United States that a thorough investigation of the sanitary conditions surrounding metal mining under ground, with special reference to diseases of the lungs, be made by the Bureau of Mines and the Public Health and Marine Hospital Service. Through the plan of cooperation mentioned, this investigation could be begun at once, and one officer will be accordingly detailed for duty in connection with the Bureau of Mines. Another officer may subsequently be detailed, and in the meantime, investigations can be undertaken in the Hygienic Laboratory with the view to determining the effect of mine gases on the animal organism.

The Surgeon-General of the Public Health Service and Marine Hospital Service will be requested to confer with the Director of the Bureau of Mines regarding the details of investigations and plan of operation.

Respectfully,

Franklin MacVeagh, Secretary

June 1, 1911

SUBJECT: First aid instruction by Marine Hospital Service.

The Director:

In re agreement between the Secretaries of the Treasury and the Interior concerning cooperation between the Marine Hospital Service and the Bureau of Mines on

matters relating to sanitary and health conditions in mines and mining camps:

I suggest that you take up with the chief of the marine hospital service the question of cooperation or instruction in first aid to the injured at the Pittsburgh testing station by Dr. James B. Stoner, the surgeon in charge of the U.S. Marine Hospital, in the Arsenal Grounds at Pittsburgh. I make this recommendation for the reason:

1. That the instruction given in first aid by the first aid assistants of this bureau in Pittsburgh may be criticised because it is not given under the immediate direction of a surgeon.
2. It is my belief, from information gathered on the spot, that the duties of the surgeon at the marine hospital here are not so exacting but that he could devote an hour or two, two or three times a week to addressing first aid classes on the principals of surgery as applied to first aid.

Very truly yours,

Engineer in Charge

June 5, 1911

SUBJECT: Cooperative work with Public Marine & Health Department on min sanitation.

Engineer in Charge:

Regarding the work to be conducted by the Public Marine and Health Department in cooperation with the Bureau of Mines on the subject of sanitation around mines and conditions underground:

Work of this character has, in large measure, to do with the occurrence and effect of noxious gases underground, and extensive investigations cannot be undertaken, of course, without dealing with the subject of mine gases. The Secretary of the Treasury in his letter to Secretary Fisher makes mention of certain investigations regarding the effect of gases which should, in his opinion, be conducted.

My desires in this matter are that mine gas work shall be taken care of as much as possible at Pittsburgh, and the work of a chemical nature having to do with these investigations handled by my section.

If a conference is arranged at any time in order to get down to a working basis on the subject, I would like to be present in order to define what has been done, which is by no means little, and also get a somewhat clearer view of what is being contemplated.

Very truly yours,

Assistant Chemist

June 8, 1911

Dr. J.A. Holmes
Director, Bureau of Mines
Washington, D. C.

Sir:

In response to the request of the Secretary of the Interior contained in his letter of May 12, 1911, and in conformity with the understanding had with your

Bureau, Assistant Surgeon S.C. Hotchkiss has been directed to join the mine rescue car which has its headquarters at Pueblo, Colorado. Dr. Hotchkiss has been informed that his duties will be to study conditions of the mining industry affecting the public health, and particularly with reference to the prevalence and causes of diseases of the lungs among miners.

It is understood from the above mentioned correspondence that the salary of Dr. Hotchkiss will be paid by this Service, and that the actual traveling expenses, etc., will be borne by the Bureau of Mines. He will leave in a few days for Colorado, but before doing so, will call at the Bureau of Mines for conference and to pay his respects.

Respectfully,

Walter Wyman, Surgeon-General

June 9, 1911

SUBJECT: Cooperation with Marine Hospital Service.

Mr. J.C. Roberts
Government Mine Rescue Car
New Castle, Colorado

My Dear Mr. Roberts:

Inclosed herewith is a letter in regard to a cooperative agreement entered into between the Secretary of the Treasury and the Secretary of the Interior. This letter is in conformity with an understanding had between this Bureau and the Public Health and Marine Hospital Service.

Assistant Surgeon S.C. Hotchkiss has been instructed to study conditions of the mining industry affecting the public health, and particularly with reference to the prevalence and causes of diseases of the lungs among miners, and he has been directed to join your car for the purpose of carrying on these investigations. He will report directly to the Public Health and Marine Hospital Service, but he will furnish the Bureau of Mines informal copies of his monthly reports. His salary will be paid by the Public Health and Marine Hospital Service, and his actual traveling expenses will be borne by the Bureau of Mines. Accounts will be settled by the usual departmental transfer of funds; you will therefore have nothing to do with the rendition of Dr. Hotchkiss' accounts. He will be subsisted on the Bureau of Mines cars without charge in the same manner as the other employees.

Dr. Hotchkiss will be at the Brown's Palace Hotel, Denver, Colorado, June 22 and 23 and you are therefore requested to communicate with him prior to that date, advising him where he can join the car between the 23 and 25 of June.

Very truly yours,

Van H. Vanning, Acting Director

June 9, 1911

Dr. S.C. Hotchkiss
Public Health & Marine Hospital Service
Washington, D.C.

Dear Sir:

I have written to Mr. J.C. Roberts, Engineer in charge of Bureau of Mines rescue

cars 2 and 4, of the cooperative agreement between the two bureaus, and I have requested him to notify you at the Brown's Palace Hotel, Denver Colorado, before June 22, at what point you can join the car between the 23d and 25th of June.

Very truly yours,

Van H. Manning,
Acting Director

June 9, 1911

MEMORANDUM for Accounts Division:

There has been allotted from the Mine Accidents appropriation for 1911, contingent fund, \$200 to cover the cost of cooperative work between the Public Health and Marine Hospital Service and the Bureau of Mines, to enable assistant Surgeon S.C. Hotchkiss to join the mine rescue cars now operating in the West. The salary of Dr. Hotchkiss will be paid by the Public Health and Marine Hospital Service, while the actual traveling expenses will be borne by the Bureau of Mines. These accounts will be settled by the usual departmental transfer of funds.

Van H. Manning,
Acting Director

June 10, 1911

Dr. J.A. Holmes
Director, Bureau of Mines
Washington, D.C.

Sir:

At the meeting of the Board of Directors of the National Association for the Study and Prevention of Tuberculosis held in Washington, April 15, 1911, the following resolution was adopted:

WHEREAS, The Royal Commission appointed by the Governor-General of Australia, to inquire into the subject of Miners' Lung Diseases, has ascertained a truly alarming state of affairs resulting from the extensive use of rock drills under ground, not provided with spraying apparatus to diminish the production of health injurious dust, and

WHEREAS, a large proportion of our mining population are exposed to conditions quite similar to those reported upon adversely in the Australian Commonwealth, and

WHEREAS, the actual extent of the occurrence of lung diseases among metal miners in the United States is a present unknown,

RESOLVED, by the Board of Directors of the National Association for the Study and Prevention of Tuberculosis, that we recommend to the President and the Congress of the United States that a thorough investigation into the whole subject of the sanitary conditions surrounding metal mining under ground, with special reference to diseases of the lungs, be made by the United States Bureau of Mines, the Public Health and Marine Hospital Service, and the appropriate State authorities.

The general question of the incidence of diseases of the lungs among miners, and the causes that bring them about, is important from a public health standpoint, and I shall be pleased to cooperate with you in this matter. Assistant Surgeon S.C. Hotchkiss has been instructed to investigate particularly the prevalence and causes of diseases of the lungs among miners. In this work he will undoubtedly

desire to receive the assistance of the officers of your bureau with whom he is associated, and I hope that there may be hearty cooperation between them.

Respectfully,

W. Wyman, Surgeon-General

June 14, 1911

Dr. Walter Wyman, Surgeon General
Public Health & Marine Hospital Service
Washington, D.C.

My dear Doctor Wyman:

I beg to acknowledge receipt of your letter of June 10, incorporating resolutions passed by the Board of Directors of the National Association for the Study and Prevention of Tuberculosis, relative to a joint investigation into the sanitary conditions surrounding metal mining, with special reference to diseases of the lungs, to be made by the Bureau of Mines and the Public Health and Marine Hospital Service.

The Bureau of Mines is greatly interested in the subject and its officers will cooperate to the fullest possible extent with Assistant Surgeon Hotchkiss, who has been assigned to this work from the Public Health Service.

I am just leaving Washington again for several days but immediately on my return I will arrange a personal conference with Assistant Surgeon Hotchkiss on the subject.

Meantime I beg to remain,

Yours very truly,

J.A. Holmes, Director

June 16, 1911

SUBJECT: Cooperative work with P.H. & M.H.S. on mine sanitation and mine sampling.

Engineer in Charge: Attention of Mr. Burrell.

In reply to your letter of June 1 and Mr. Burrell's letter of June 5 on the above subject:

It is my understanding that the investigations to be undertaken by the P.H. & M.H.S. in cooperation with the Bureau of Mines on the subject of sanitation around mines and conditions underground as affected by the occurrence of noxious mine gases will relate particularly to the health and sanitary conditions. The samples of dust and gas collected by that Service should be analyzed in their laboratories, especially as they have the means for making these tests.

There can be no objection to Mr. Burrell's having a conference with the surgeons detailed to make these investigations for the Bureau of Mines, which will be of benefit to both parties and will give them a clear view of what has been done and what is contemplated. There will be no duplication of mine gas investigations as related to mine accidents, which will be continued under Mr. Burrell.

Very truly yours,

Van H. Manning, Chief Clerk

A1-13

A1-12

MEMORANDUM TO FORM BASIS OF JOINT ACTION IN THE FIELD OF INDUSTRIAL HYGIENE
BETWEEN
THE UNITED STATES PUBLIC HEALTH SERVICE AND THE UNITED STATES BUREAU OF MINES

The following statement of objectives and principles of an industrial hygiene program is believed to be essential to constructive activity of the two Federal agencies concerned with the improvement of the health of workers in the mineral industries.

Objectives:

Protection of the working population in the mineral industries from industrial health hazards; control and prevention of such hazards.

In order to achieve these objectives, it is essential that the two Federal agencies most concerned with this problem (United States Public Health Service and United States Bureau of Mines) cooperate in their activities in this field, and also in fostering industrial hygiene services in those State organizations responsible for the protection of the workers in the mineral industries.

Functional division of activities between the United States Public Health Service and the United States Bureau of Mines

The United States Public Health Service conducts investigations in industry for the purpose of measuring existing health hazards and determining methods of controlling and, where possible, eliminating these hazards. Information thus obtained is available to State agencies for their use in administering laws, and enforcing rules and regulations, designed to prevent and control industrial health hazards. The Public Health Service also assists the several States in formulating programs for health protection in industry and extends financial aid for the creation and maintenance of facilities for the service activities of such programs.

The United States Bureau of Mines, among other things, conducts investigations with a view to improving health and safety conditions in the mining, quarrying, metallurgical, and other mineral industries. The information thus obtained is published and widely disseminated among workers and operators.

Fifteen safety stations and a number of safety service cars and trucks are maintained in the various mineral regions of the United States for the purpose of giving aid in mine disasters. Engineering studies, research and tests pertaining to health and safety of workers in the mineral industries are conducted by the Bureau of Mines in the field, and at several of the twelve experiment stations of the Bureau located at appropriate centers in the mineral industries. These investigations relate to the determination and abatement of harmful gases and dusts, and the reduction of hazards from inadequate ventilatinn, the use of explosives, electricity, and mechanical appliances in mining and related industries.

It is agreed, therefore, that the following program shall be the basis for cooperative efforts in accordance with the organic acts creating the two bureaus, which have for their objective the protection of the health of the workers in the mineral industries:

A. Cooperative functions of the United States Public Health Service under this agreement:

1. To conduct in cooperation with the Bureau of Mines broad studies embracing the various epidemiological phases necessary for an evaluation of conditions suspected of causing occupational diseases in the mineral industries. Such studies will include medical examinations of workers, statistical surveys and studies of working environment.

2. To conduct laboratory studies for the purpose of supplementing field investigations on the health of workers in the mineral industries, and either (a) to furnish the Bureau of Mines information on the toxicity or physiological effects of minerals, mineral products, or substances encountered in the mineral industries, or (b) at the request of the Bureau of Mines, either to make studies of the physiological effects of specific substances submitted by the Bureau or assign qualified personnel to conduct such investigations in the Bureau laboratories.
- B. Cooperative functions of the United States Bureau of Mines under this agreement:
1. To conduct in cooperation with the Public Health Service broad studies of the health problems in the mineral industries; such studies embracing the chemical, physical, and engineering phases of the medical and physiological studies under function of the Public Health Service.
 2. To conduct laboratory studies in the chemical, engineering, and physical phases of field investigations pertaining to the health of workers in the mineral industries.
 3. To cooperate with the proper State agencies in promoting the application of the results of the studies of the health of workers in the mineral industries made by the Public Health Service and the Bureau for the purpose of controlling and preventing health hazards in these industries.
 4. To test and rate equipment and develop methods for control of health hazards in the mineral industries.

It is agreed, further, that the Bureau of Mines and the Public Health Service shall make a joint approach to this problem; and that the two agencies work in close cooperation according to the foregoing statement of existing and developing relationships in a united effort to stimulate interest and action on the part of State agencies and others concerned with the protection of the workers in the mineral industries.

Publications will be by consent of both parties, and either party may publish any article of cooperative authorship, or prepared in connection with cooperative work.

/s/ Thomas Parran
Surgeon General,
Bureau of the Public Health Service

/s/ John W. Finch
Director, Bureau of Mines

Approved:

/s/ Josephine Roch
Assistant Secretary of the Treasury

/s/ T. A. Walters
First Assistant Secretary of the Interior

1937

MEMORANDUM OF UNDERSTANDING
FOR COOPERATIVE ACTIVITY IN THE FIELD OF
INDUSTRIAL HYGIENE IN THE MINERAL INDUSTRIES
BETWEEN

THE FEDERAL SECURITY AGENCY
PUBLIC HEALTH SERVICE

AND
THE DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

The Public Health Service and the Bureau of Mines hereby agree to this Memorandum of Understanding as a basis for cooperative activity to achieve increased protection of health and safety through the investigation, control and prevention of industrial health hazards in the mineral industries and in connection with the mining, preparation, treatment and utilization of minerals and the products thereof, and through furnishing assistance in industrial hygiene, health and safety to those State and local organizations engaged in protecting workers against health and safety hazards in the mineral industries.

1. Outline of existing activities of the Public Health Service and the Bureau of Mines.

(a) The Public Health Service conducts investigations in industry for the purpose of measuring existing health hazards and determining methods of controlling and, where possible, eliminating these hazards. Information thus obtained is available to State agencies for their use in administering laws, and enforcing rules and regulations, designed to prevent and control industrial health hazards. The Public Health Service, through consultative services, also assists the several States in formulating programs for health protection in industry, and through grants-in-aid, extends financial assistance for the creation and maintenance of industrial hygiene programs.

(b) The Bureau of Mines, among other things, conducts investigations with a view to improving health and safety in the mineral industries. The information thus obtained is published and widely disseminated among workers and operators and is available to Federal, State, and local governments for use in administering and enforcing laws and regulations relating to health and safety in the industries thus investigated. The Bureau of Mines also maintains safety stations and equipment in the various mineral regions of the United States and Alaska for the purpose of giving instruction and training on safety and health and making inspections and investigations in mines, and for giving aid in disasters. Engineering studies, research, and tests pertaining to health and safety of workers in the mineral industries are conducted by the Bureau of Mines in the field, and at several of the many research installations of the Bureau located at appropriate centers in the mineral industries. These investigations relate to the determination and abatement of harmful gases and dust, and the reduction of hazards from inadequate ventilation, the use of explosives, electricity, and mechanical appliances in mining and related industries.

2. Outline of cooperative functions under this Memorandum of Understanding.

It is agreed, therefore, that subject to applicable statutes and available appropriations, the following shall be the basis for the cooperative efforts of the Public Health Service and the Bureau of Mine under this Memorandum of Understanding to achieve their objective of increasing the protection of the health of workers in the mineral industries:

(a) Cooperative functions of the Public Health Service under this agreement:

- (1) To conduct in cooperation with the Bureau of Mines broad field studies embracing the various epidemiological phases necessary for an evaluation of conditions suspected of causing occupational diseases in the mineral industries. Such studies will include medical examinations of workers, statistical surveys, and studies of working environment.
- (2) To conduct laboratory studies on the toxicity or physiological effects of minerals, mineral products, or substances encountered in the mineral industries, for the purpose of supplementing field investigations on the health of workers in the mineral industries. The Public Health Service will, on request of the Bureau of Mines, furnish to the Bureau information on the result of such studies. The Public Health Service, at the request of the Bureau of Mines, also will make studies of the physiological effects of specific substances submitted by the Bureau and/or assign qualified personnel to conduct such investigations in the Bureau of Mines Laboratories.

(b) Cooperative functions of the Bureau of Mines under this agreement:

- (1) To conduct in cooperation with the Public Health Service broad studies of the health problems in the mineral industries; such studies embracing the chemical, physical, and engineering phases of health problems which the Bureau of Mines and the the Public Health Service have agreed should be investigated.
- (2) To conduct laboratory studies in the chemical, engineering, and physical phases of field investigations pertaining to the health of workers in the mineral industries.
- (3) To cooperate with the proper State agencies in promoting the application of the results of the studies of the health of workers in the mineral industries made by the Public Health Service and the Bureau of Mines for the purpose of controlling and preventing health hazards in these industries.
- (4) To test equipment for permissibility and develop methods for control of Health hazards in the mineral industries.

(c) The Bureau of Mines and the Public Health Service shall work in close cooperation according to the foregoing statement of existing and developing relationships in a united effort to stimulate interest and action on the part of State agencies and others concerned with the protection of the workers in the mineral industries.

(d) Manuscripts reporting the results of cooperative activities under this Memorandum of Understanding will be published by consent of both parties.

3. As used in this Memorandum of Understanding, the term "Mineral industries" covers all operations relating to the mining, preparation, treatment and utilization of minerals and the products thereof.

4. This Memorandum of Understanding supersedes the "Memorandum to Form Basis of Joint Action in the Field of Industrial Hygiene Between the United States Public Service and the United States Bureau of Mines," approved in 1937. This Memorandum of Understanding shall terminate at the end of five years from the date of final approval hereof, but may be terminated by either party at any time prior thereto upon 30 days' written notice to the other party.

/s/ Leonard A. Scheele

Surgeon General
Public Health Service

/s/ Thos. H. Miller

Acting Director, Bureau of Mines

(Surnames by: Indritz
Welsh)

Approved:

/s/ Oscar R. Ewing
Federal Security Administrator

December 28, 1950
Date

/s/ Oscar L. Chapman
Secretary of the Interior

January 26, 1951
Date

MEMORANDUM OF UNDERSTANDING
FOR COOPERATIVE ACTIVITY IN THE FIELD OF
INDUSTRIAL HYGIENE IN THE MINERAL INDUSTRIES
BETWEEN
THE DEPARTMENT OF HEALTH, EDUCATION AND WELFARE
PUBLIC HEALTH SERVICE
AND
THE DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

The Public Health Service and the Bureau of Mines hereby to this Memorandum of Understanding as a basis for cooperative activity to achieve increased protection of health and safety through the investigation, control and prevention of industrial health hazards in the mineral industries and in connection with the mining, preparation, treatment and utilization of minerals and the products thereof, and through furnishing assistance in industrial hygiene, health and safety to those State and local organizations engaged in protecting workers against health and safety hazards in the mineral industries.

1. Outline of existing activities of the Public Health Service and the Bureau of Mines.

(a) The Public Health Service conducts investigations in industry for the purpose of measuring existing health hazards and determining methods of controlling and, where possible, eliminating these hazards. Information thus obtained is available to State agencies for their use in administering laws, and enforcing rules and regulations, designed to prevent and control industrial health hazards. The Public Health Service, through consultative services, also assists the several States in formulating programs for health protection in industry, and through grants-in-aid, extends financial assistance for the creation and maintenance of industrial hygiene programs.

(b) The Bureau of Mines, among other things, conducts investigations with a view to improving health and safety in the mineral industries. The information thus obtained is published and widely disseminated among workers and operators and is available to Federal, State, and local governments for use in administering and enforcing laws and regulations relating to health and safety in the industries thus investigated. The Bureau of Mines also maintains safety stations

and equipment in the various mineral regions of the United States and Alaska for the purpose of giving instruction and training on safety and health and making inspections and investigations in mines, and for giving aid in mine disasters. Engineering studies, research, and tests pertaining to health and safety of workers in the mineral industries are conducted by the Bureau of Mines in the field, and at several of the many research installations of the Bureau located at appropriate centers in the mineral industries. These investigations relate to the determination and abatement of harmful gases and dusts, and the reduction of hazards from inadequate ventilation, the use of explosives, electricity, and mechanical appliances in mining and related industries.

2. Outline of cooperative functions under this Memorandum of Understanding. It is agreed, therefore, that subject to applicable statutes and available appropriations, the following shall be the basis for the cooperative effort of the Public Health Service and the Bureau of Mines under this Memorandum of Understanding to achieve their objective of increasing the protection of the health of workers in the mineral industries:

(a) Cooperative functions of the Public Health Service under this agreement:

- (1) To conduct in cooperation with the Bureau of Mines broad field studies embracing the various epidemiological phases necessary for an evaluation of conditions suspected of causing occupational diseases in the mineral industries. Such studies will include medical examinations of workers, statistical surveys, and studies of working environment.
- (2) To conduct laboratory studies on the toxicity or physiological effects of minerals, mineral products, or substances encountered in the mineral industries, for the purpose of supplementing field investigations on the health of workers in the mineral industries. The Public Health Service will, on request of the Bureau of Mines, furnish to the Bureau information on the result of such studies. The Public Health Service, at the request of the Bureau of Mines, also will make studies of the physiological effects of specific substances submitted by the Bureau and/or assign qualified personnel to conduct such investigations in the Bureau of Mines Laboratories.

(b) Cooperative functions of the Bureau of Mines under this agreement:

- (1) To conduct in cooperation with the Public Health Service broad studies of the health problems in the mineral industries; such studies embracing the chemical, physical, and engineering phases of health problems which the Bureau of Mines and the Public Health Service have agreed should be investigated.
- (2) To conduct laboratory studies in the chemical, engineering, and physical phases of field investigations pertaining to the health of workers in the mineral industries.
- (3) To cooperate with the proper State agencies in promoting the application of the results of the studies of the health of workers in the mineral industries made by the Public Health Service and the Bureau for the purpose of controlling and preventing health hazards in these industries.
- (4) To test equipment for permissibility and develop methods for control

of health hazards in the mineral industries.

(c) The Bureau of Mines and the Public Health Service shall work in close cooperation according to the foregoing statement of existing and developing relationships in a united effort to stimulate interest and action on the part of State agencies and others concerned with the protection of the workers in the mineral industries.

(d) Manuscripts reporting the results of cooperative activities under this Memorandum of Understanding will be published by consent of both parties.

3. As used in this Memorandum of Understanding, the term "Mineral industries" covers all operations relating to the mining, preparation, treatment and utilization of minerals and the products thereof.

4. This Memorandum of Understanding supersedes the "Memorandum of Understanding for Cooperative Activity in the Field of Industrial Hygiene in the Mineral Industries between the Federal Security Agency, Public Health Service and the Department of the Interior, Bureau of Mines," approved in 1951. This Memorandum of Understanding shall terminate at the end of five years from the date of final approval hereof, but may be terminated by either party at any time prior thereto upon 30 days' written notice to the other party.

/s/ Leroy E. Burney
Surgeon General
Public Health Service

/s/ Marling J. Ankeny
Director, Bureau of Mines

Approved:

/s/ Harold C. Hunt
Secretary of Health, Education
and Welfare

October 3, 1956
Date

/s/ Fred E. Seaton
Secretary of the Interior

November 8, 1956
Date

MEMORANDUM OF UNDERSTANDING
FOR COOPERATIVE ACTIVITY IN THE FIELD OF
INDUSTRIAL HYGIENE IN THE MINERAL INDUSTRIES
BETWEEN
THE DEPARTMENT OF HEALTH, EDUCATION AND WELFARE
PUBLIC HEALTH SERVICE
AND
THE DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

The Public Health Service and the Bureau of Mines hereby agree to this Memorandum of Understanding as a basis for cooperative activity to achieve increased protection of health and safety through the investigation, control and prevention of industrial health hazards in the mineral industries and in connection with the mining, preparation, treatment and utilization of minerals and through furnishing

assistance in industrial hygiene, health and safety to those State and local organizations engaged in protecting workers against health and safety hazards in the mineral industries.

1. Outline of existing activities of the Public Health Service and the Bureau of Mines.

(a) The Public Health Service conducts investigations in industry for the purpose of measuring existing health hazards and determining methods of controlling and, where possible, eliminating these hazards. Information thus obtained is available to State agencies for their use in administering laws, and enforcing rules and regulations, designed to prevent and control industrial health hazards. The Public Health Service, through consultative services, also assists the several States in formulating programs for health protection in industry, and through grants-in-aid, extends financial assistance for the creation and maintenance of industrial hygiene programs.

(b) The Bureau of Mines, among other things, conducts investigations with a view of improving health and safety in the mineral industries. The information thus obtained is published and widely disseminated among workers and operators and is available to Federal, State, and local governments for use in administering and enforcing laws and regulations relating to health and safety in the industries thus investigated. The Bureau of Mines also maintains safety stations and equipment in the various mineral regions of the United States for the purpose of giving instruction and training on safety and health and making inspections and investigations in mines, and for giving aid in mine disasters. Engineering studies, research, and tests pertaining to health and safety of workers in the mineral industries are conducted by the Bureau of Mines in the field, and at several of the many research installations of the Bureau located at appropriate centers in the mineral industries. These investigations relate to the determination and abatement of harmful gases and dusts, and the reduction of hazards from inadequate ventilation, the use of explosives, electricity, and mechanical appliances in mining and related industries.

2. Outline of cooperative functions under this Memorandum of Understanding. It is agreed, therefore, that subject to applicable statutes and available appropriations, the following shall be the basis for the cooperative efforts of the Public Health Service and the Bureau of Mines under this Memorandum of Understanding to achieve their objectives of increasing the protection of the health of workers in the mineral industries:

(a) Cooperative functions of the Public Health Service under this agreement:

(1) To conduct in cooperation with the Bureau of Mines broad field studies embracing the various epidemiological phases necessary for an evaluation of conditions suspected of causing occupational diseases in the mineral industries. Such studies will include medical examination of workers, statistical surveys, and studies of working environment.

(2) To conduct laboratory studies on the toxicity or physiological effects of minerals, mineral products, or substances encountered in the mineral industries, for the purpose of supplementing field investigations on the health of workers in the mineral industries. The Public Health Service will, on the request of the Bureau of Mines, furnish to the Bureau information on the result of such studies. The Public Health Service, at the request of the Bureau

of Mines, also will make studies of physiological effects of specific substances submitted by the Bureau and/or assign qualified personnel for special studies in the Bureau of Mines facilities.

(b) Cooperative functions of the Bureau of Mines under this agreement:

- (1) To conduct in cooperation with the Public Health Service broad studies of the health problems in the mineral industries; such studies embracing the chemical, physical, and engineering phases of health problems which the Bureau of Mines and the Public Health Service have agreed should be investigated.
- (2) To conduct laboratory studies in the chemical, engineering, and physical phases of field investigations pertaining to the health of workers in the mineral industries.
- (3) To cooperate with the proper State agencies in promoting the applications of the results of the studies of the health of workers in the mineral industries made by the Public Health Service and the Bureau of Mines for the purpose of controlling and preventing health hazards in these industries.
- (4) To test equipment for permissibility and develop methods for control of health hazards in the mineral industries.

(c) The Bureau of Mines and the Public Health Service shall work in close cooperation according to the foregoing statement of existing and developing relationships in a united effort to stimulate interest and action on the part of State agencies and others concerned with the protection of the workers in the mineral industries.

(d) Manuscripts reporting the results of cooperative activities under this Memorandum of Understanding will be published by consent of both parties.

3. As used in this Memorandum of Understanding, the term "Mineral industries" covers all operations relating to the mining, preparation, treatment and utilization of minerals.

4. This Memorandum of Understanding supersedes the "Memorandum of Understanding for Cooperative Activity in the Field of Industrial Hygiene in the Mineral Industries between the Department of Health, Education, and Welfare (Public Health Service) and the Department of the Interior (Bureau of Mines)", approved in 1956. This Memorandum of Understanding shall terminate at the end of five years from the date of final approval thereof, but may be terminated by either party, at any time prior thereto upon 30 days' written notice to the other party.

Surgeon General
Public Health Service

Director, Bureau of Mines

Secretary of Health, Education
and Welfare

Secretary of the Interior

Approved: December 1961

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MEMORANDUM OF UNDERSTANDING
FOR COOPERATIVE ACTIVITY IN THE FIELD OF
INDUSTRIAL HYGIENE IN THE MINERAL INDUSTRIES
BETWEEN
THE DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
AND
THE DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

The Public Health Service and the Bureau of Mines hereby agree to this Memorandum of Understanding as the basis for cooperative activity to achieve increased protection of health and greater safety through the investigation, control and prevention of industrial health hazards in the mineral industries and in connection with the mining, preparation, treatment and utilization of minerals and through furnishing assistance in industrial hygiene, health and safety to those State and local organizations engaged in protecting workers against health and safety hazards in the mineral industries.

1. Outline of existing activities of the Public Health Service and the Bureau of Mines.

(a) The Public Health Service conducts investigations in industry for the purpose of measuring existing health hazards and determining methods of controlling and, where possible, eliminating these hazards. Information thus obtained is available to State agencies for their use in administering laws, and enforcing rules and regulations, designed to prevent and control industrial health hazards. The Public Health Service, through consultative services, also assists the several States in formulating programs for health protection in industry, and through grants-in-aid, extends financial assistance for the creation and maintenance of industrial hygiene programs.

(b) The Bureau of Mines, among other things, conducts investigations with a view of improving health and safety in the mineral industries. The information thus obtained is published and widely disseminated among workers and operators and is available to Federal, State, and local governments for use in developing, administering and enforcing laws and regulations relating to health and safety in the industries thus investigated. The Bureau of Mines consults with the several States and assists the States in establishing and enforcing standards for the advancement of health and safety, in training supervisors, workers and State personnel, and is involved in developing and promulgating recommendations and regulations for these purposes. The Bureau of Mines also maintains safety stations and equipment in the various mineral regions of the United States for the purpose of giving instruction and training on health and safety and making inspections and investigations in mines and other places, and for giving aid in mine disasters. Engineering studies, research, and tests pertaining to health and safety of workers in the mineral industries are conducted by the Bureau of Mines in the field, and at several of the many research installations of the Bureau located at appropriate centers in the mineral industries. These investigations relate to the determination and abatement of harmful gases and dusts, and the reduction of hazards from inadequate ventilation, the use of explosives, electricity, and mechanical appliances in mining and related industries.

2. Outline of cooperative functions under the Memorandum of Understanding. It is agreed, therefore, that subject to applicable statutes and available appropriations, the following shall be the basis for the cooperative efforts of the Public

A1-23

Health Service and the Bureau of Mines under this Memorandum of Understanding to achieve their objectives of increasing the protection of the health of workers in the mineral industries:

(a) Cooperative functions of the Public Health Service under this agreement:

- (1) To conduct in cooperation with the Bureau of Mines broad field studies embracing the various epidemiological phases necessary for an evaluation of conditions suspected of causing occupational diseases in the mineral industries. Such studies will include medical examination of workers, statistical surveys, and considerations of working environment which the Bureau of Mines and the Public Health Service have agreed should be investigated.
- (2) To conduct laboratory studies on the toxicity or physiological effects of minerals, mineral products, or substances encountered in the mineral industries, for the purpose of supplementing field investigations on the health of workers in the mineral industries. The Public Health Service will, on the request of the Bureau of Mines, furnish to the Bureau information on the result of such studies. The Public Health Service, at the request of the Bureau of Mines, also will make studies of the physiological effects of specific substances submitted by the Bureau and/or assign qualified personnel for special studies in the Bureau of Mines facilities.

(b) Cooperative functions of the Bureau of Mines under this agreement:

- (1) To conduct in cooperation with the Public Health Service broad studies of the health problems in the mineral industries; such studies embracing the chemical, physical, and engineering phases of health problems which the Bureau of Mines and the Public Health Service have agreed should be investigated.
- (2) To conduct laboratory studies in the chemical, engineering, and physical phases of investigations pertaining to the health of workers in the mineral industries.
- (3) To cooperate with the proper State agencies in promoting the applications of the results of the studies of the health of workers in the mineral industries made by the Public Health Service and the Bureau of Mines for the purpose of controlling and preventing health hazards in these industries.
- (4) To test equipment for permissibility or Bureau of Mines approval and develop methods for control of health hazards in the mineral industries.

(c) The Bureau of Mines and the Public Health Service shall work in close cooperation according to the foregoing statement of existing and developing relationships in a united effort to stimulate interest and action on the part of State agencies and others concerned with the protection of the workers in the mineral industries.

(d) Manuscripts reporting the results of cooperative activities under this Memorandum of Understanding will be published by consent of both parties.

3. As used in this Memorandum of Understanding, the term "mineral industries" covers all operations relating to the mining, preparation, treatment and utilization of minerals.

4. This Memorandum of Understanding supersedes the "Memorandum of Understanding for Cooperative Activity in the Field of Industrial Hygiene in the Mineral Industries between the Department of Health, Education, and Welfare (Public Health Service) and the Department of the Interior (Bureau of Mines)", approved in 1961. This Memorandum of Understanding shall terminate at the end of five years from the date of approval thereof, but may be terminated by either party, at any time prior thereto upon 30 days' written notice to the other party.

Surgeon General
Public Health Service

Director, Bureau of Mines

Date approved:

December 22, 1966

