Chapter 2

Introduction

Although engineering in the Public Health Service (PHS) dates from 1913, the Service itself goes back much further. The fifth Congress passed "an act for the relief of sick and disabled seamen", which President John Adams signed into law on July 16, 1798. This law, which became the Public Health Service Act (the Act), was passed because merchant ships arriving in port would unload their sick and injured sailors along with their cargo. When the sailors were not working, and therefore not getting paid, they could not pay for medical care or living quarters, and became a burden on the port cities in which their ships had abandoned them.

The Marine Era

To provide for these ill and injured seamen, the Act was passed and marine hospitals were established for their care. The first was Chelsea Hospital in Charlestown, Massachusetts. As a financing scheme, each merchant seaman paid twenty cents per year to the Treasury Department to pay for this care. This makes the Public Health Service one of the first prepaid medical plans. Because the money was collected by the Treasury Department, PHS was part of that department and remained there for many years. Incidentally, seamen from the USS Constitution were treated at Chelsea Hospital during the War of 1812.

The familiar PHS emblem of a crossed caduceus and anchor, which dates at least from 1871, reflects this history. The winged caduceus with two entwined serpents is commonly recognized as a symbol of medicine; however, in Greek mythology the medical symbol is the caduceus of Aesculapius, consisting of a non-winged staff and a single serpent. The winged staff with two serpents is the caduceus of Mercury, and is a symbol of commerce. Its use in the PHS emblem reflects this original connection to the commerce in which the seamen were engaged and which was supported by the PHS hospitals.

In the other part of the emblem, note that the anchor chain wraps around the shank and one arm of the anchor. This "fouled" anchor is a nautical symbol of distress, signifying the sick and disabled seamen that PHS was created to serve.

The Epidemic Era

For the nation and the Service, the time between the creation of the Marine Hospital Service and the Civil War exemplified the pioneering spirit. People moved from the cities on the eastern seaboard into the center of the continent, and new cities grew along the Mississippi River, its tributaries, and through the Great Lakes Region. Because waterborne commerce was a focus of these cities, diseases could follow the movement of populations. The western migration carried epidemics of cholera, small pox, yellow fever, plague, typhus, and other diseases along with it.

The Marine Hospital Service established facilities along the rivers to combat such diseases. For the construction of the marine hospitals, architect Robert Mills was commissioned in the early 1830s to design a standard hospital, of which multiple copies were constructed for the Marine Hospital Service by the Corps of Topographical Engineers of the Army. This use of PHS architects in designing health facilities continues today.

The cause of these epidemics was not known, but fear of them was so great that some towns and cities established quarantines against the passage of vessels that carried ill crew or passengers. A classic example is the case of the steamboat or tugboat tender John Porter, which left New Orleans bound for Ohio in the middle of the 19th century with a crew that was sick with typhoid fever. Public Health Service physicians from some of the hospitals along the route were asked to come aboard to assess what caused the disease, and to minister to the sick crewmen. When the vessel finally reached Cincinnati, the communities along the Ohio River were so panicked by the illness that they blocked the boat from docking because it carried "the plague." The incident generated a good bit of notoriety, and about twenty crew members died before the typhoid fever subsided. Still, this is a good example of how the Marine Hospital Service/Public Health Service was a resource to the public for assessing and treating diseases. The PHS hospitals in Cincinnati and other river cities were focal points for public health for some time to come.

The Sanitation Era

The epidemic era, with concerns such as those directed at the John Porter, lasted into the late 1800s, when the germ theory gained scientific recognition. With the realization that the causes of many dreaded diseases were related to sanitation, attention was focused on the need for improvements in that area. The great influx of immigrants from Europe into the eastern port cities magnified existing problems of waterborne and rodent-borne diseases in those cities, and identified them as a public health problem.

As the Nation awakened to the need to deal with these problems, the Public Health Service was called in to focus on them. Members of the Service had to go where the problems were, and the kind of mobility necessary was well suited to a military model. So the Marine Hospital Service, which was created primarily to directly care for merchant seamen, moved into a responsibility for dealing with the epidemics occurring throughout the country.

The first Surgeon General, Dr. John Woodworth, was appointed in 1871. He is known for overhauling the Marine Hospital System, which was losing money at the time he took office. For his report covers, he chose the PHS seal previously described. Dr. Woodworth was responsible for establishing a warning system through which outbreaks of disease could be reported, thus encouraging nationwide health communications. He also put through a national quarantine act allowing the detention of vessels known to carry disease. The impact of Dr. Woodworth on the PHS was dramatic.

Staff doctors from Marine Hospitals were assigned, when requested by local authorities, to handle outbreaks of small pox, yellow fever, and other epidemic diseases. The successful handling of these emergencies by the service showed the value of a flexible corps able to meet emergency situations efficiently. This laid the foundation for the Act of January, 1889, establishing by law the Public Health Service Commissioned Corps,

long pursued by Dr. Woodworth. The original Corps Officers wore uniforms similar to those of the Union Officers of the Civil War. In the same year, Columbia University graduated the nation's first Sanitary Engineers. Their activities were confined to the local level for many years.

In 1901 Congress authorized construction of the PHS Hygienic Laboratory "for the investigation of infectious and contagious diseases." A PHS division of scientific research was established to study stream pollution in relation to the then widespread disease of typhoid. Amendments to the Interstate Quarantine Act assigned the PHS responsibility to control interstate transfer of communicable diseases. This act laid the basis for subsequent control over water as a disease carrier.

The Pure Food and Drug Act was passed in 1906 in response to growing public concern relating disease to food and drug policy. The need for engineers in the PHS became visible when efforts to study waterborne diseases began. Slow sand filtration of water in places such as Hamburg, Germany, dramatically reduced the incidence of cholera. In his 1907 report, Surgeon General Wyman stated: "There should be attached to the Bureau a sanitary engineer of high professional standing, competent to solve technical problems connected with the purification of water and sewage, the prevention of pollution of interstate streams, and other matters involving knowledge of Sanitary Engineering." It was several years before this idea was adopted.

A 1912 Act gave PHS authorization for the "investigation of diseases of man and of the pollution of navigable streams," thus expanding the service's mandate. The same Act increased funding of The Hygienic Laboratory (the precursor to NIH) to $20,000 per year. The first engineer entered the PHS in 1913 at the Chicago Marine Hospital. Although there were at that time over 340 graduate Sanitary Engineers from programs at ten schools across the country, most were working for state health departments.

Using some of the first PHS engineers, Surgeon General Blue, renowned for the elimination of bubonic plague in San Francisco, set up the Ohio River investigation in Cincinnati. They wanted to examine the characteristics of drinking water and all of the possible contaminants from the incoming streams.

By 1914, the first PHS drinking water standards were developed. They were revised in 1925, 1941, 1946, and 1962. These standards are highly respected and have been used and recognized through the years by PHS and state agencies as an important contribution toward ensuring high quality drinking water.

Given the state of public health today, it is difficult to imagine the diseases of concern from the turn of the 20th century until the First World War. Overall infant mortality was about one in ten before epidemiologists noted that breast fed infants had a mortality rate of 20 per thousand, while infants fed with the new bottled milk had rates of 100 to 300 per thousand. Lack of pasteurization was the problem; however what was in the milk and how it was passed to the infant was not recognized. PHS became involved in pasteurization and the first PHS plant became operational just prior to World War I.

The War Era

The U.S. officially entered World War I in 1917. President Wilson, by executive order, made PHS a part of the U.S. military force. The July (1917) issue of National Geographic described the PHS and the Commissioned Corps and its role in helping the military provide support for the rapidly constructed and quickly crowded military bases around the country, as troops from the newly established draft poured into the bases for basic training. This effort was funded by the Red Cross.

The same issue included an article describing military uniforms and insignias, including those of the PHS. It is interesting to note that the Surgeon General at that time had one star.

The article detailed the insignia for the Professor of the Hygienic Laboratory, the Quarantine Inspector, PHS Chaplain, Intern, and First through Third Class Pharmacists. The station and marine engineers, who took pilot boats to meet quarantined ships, were also included, but no engineers were commissioned.

Surgeon General Blue arranged with the military to provide sanitation around the containment areas for these facilities. The mission was to protect against typhoid, tuberculosis, and other contagions by ensuring that the quality of water, food, and waste disposal was adequate around the bases. Communities were also examined so that military people leaving the bases and going into the communities would not bring back diseases.

Another war effort was treatment of venereal disease. Thirty-four states called in PHS to help set up the Red Cross sponsored clinics, although the names of the diseases were unmentionable in the press.

There were a number of sanitation projects. For example, PHS was responsible for maintenance at the Little Rock, Arkansas base. There were over 3,000 wells in the area. Springs had to be trenched to prevent contamination runoff. PHS was also responsible for removing mud from the bottom of the Leavenworth, Kansas, filtration plant. Milk and ice cream processing and food supplies in areas adjacent to bases were also under PHS control.

In the southern states, mosquito-transmitted disease was a major concern. Based on experience in the Panama Canal Zone, this lead to the first large-scale engineering operation for malaria control in the U.S. PHS engineers were brought in to direct trenching and drainage in an effort to remove standing water. Where it could not be removed, they sprayed with a mixture of kerosene and crude oil using sprayers that covered twenty to thirty feet (very advanced for the time). Debris was removed from the area, and a new device that trickled a mixture of oil and kerosene at a rate of twenty to thirty drops per minute was used to prevent the mosquito population from returning. The work was done around the country either from PHS automobiles or from a PHS railroad car equipped with a complete laboratory.

PHS was also asked to examine some of the problems associated with ammunition production, including silicates used in heavy metal work and the effects of acid fumes. This marked the introduction of PHS into the field of industrial hygiene and occupational health.

After the war, PHS was charged with setting up hospitals to care for disabled veterans. This responsibility was later transferred to the newly formed Veterans Administration. The PHS sanitation experience was also applied to working with local communities, especially in rural areas. A major program was instituted to redirect public thinking toward cleaning up outhouses. Advertisements stated that sanitary privies were cheaper than coffins. PHS was involved in designing those sanitary facilities.

Other concerns included the safety of food (especially milk and shellfish) and water supplies. Outbreaks of cholera from shellfish were not uncommon. The death rate from typhoid and paratyphoid dropped dramatically as a result of the increase in waterworks.

Recognition of industrial problems was concurrent with work in public health. The Surgeon General's annual report described activities such as examining the posture of workers in the post office and a study using high concentrations of phosphates in water to increase the muscle tone of the postal workers and reduce leg fatigue. Productivity did increase, but whether the effect could be attributed to increased muscle tone or the laxative effect of the phosphate was not clear. Not all industrial hygiene efforts were exactly on target in those early days.

During the late 1930s and early 1940s the need for railroad sanitation received a great deal of attention; however, as air travel became more common, efforts addressing the need for quality food, water, and sanitation were extended. Today these issues are tackled through programs of Shipboard Sanitation and Shipboard Public Health administered by the Centers for Disease Control and Prevention.

In 1943 RADM John K. Hoskins, P.E. was appointed as the first Chief Engineer of the Public Health Service.

World War II brought PHS back into the mission of mosquito control. Assistant Surgeon General Mark Hollis, later to become the second Chief Engineer of the PHS, was assigned as executive officer and later Officer-in-Charge of the Malaria Control in War Areas Programs (MCWA). The mission of the MCWA program was to establish mosquito-free zones around each military and industrial location serving the war effort in 15 southeastern states, California, Hawaii, Puerto Rico, and the U. S. Controlled Caribbean areas. At the time, this program constituted the largest application of mosquito control measures ever attempted in the U. S. Following the completion of its initial mission, the successful protection of millions of people from malaria, the MCWA mission was expanded to include responsibility for dengue, typhus, and other communicable diseases. At the end of the war, MCWA operations were redirected to communicable disease problems affecting the nation. In 1946, the MCWA became the Communicable Disease Center (later renamed the Centers for Disease Control the agency now known as the Centers for Disease Control and Prevention. Assistant Surgeon General Hollis, an engineer, served as its first director.

The Post-War Sanitation Era

For some time, PHS engineers had worked with the Bureau of Indian Affairs (BIA) however, direct and significant association with the Federal Indian health program did not occur until 1912. Pursuant to an act of Congress approved on August 24 of that

year, PHS medical officers began a study of the prevalence of certain diseases among the Indian people. Sanitation conditions on the reservations were for the most part unsatisfactory, which contributed to the spread of disease. The need for a specific program dedicated to addressing this problem was cited in the PHS report to Congress; however, nothing was done beyond occasional "clean up" campaigns and physician's inspections of homes, schools, and Indian agencies. In 1927 PHS sanitary engineers assisted the BIA staff in surveying water and sewer systems and investigating other basic sanitation problems. PHS officers concentrated on BIA compounds, e.g., schools, hospitals, and agency headquarters. Little attention was devoted to Indian housing and community conditions.

In 1950 the need to improve basic sanitation on Indian reservations began to receive more attention. The BIA obtained the services of a full-time PHS sanitary engineer who was asked to develop a sanitation program for reservation Indians. This officer is given credit for training local Indian people to work as sanitarian aides. The first twelve aides were employed in 1952 and, together with others who were hired later, conducted reservation-wide surveys to define and catalog environmental conditions in Indian homes. While conducting the survey visits, and at other times whenever possible, the aides attempted to explain how better sanitation practices could improve health on the reservation.

Survey results showed that more than 80 percent of all Indian and Alaskan Native families were hauling and carrying water for household use, and that 70 percent of that water came from contaminated or potentially contaminated sources. More than 80 percent of the surveyed homes had inadequate waste disposal facilities. Twelve percent had no such facilities at all. Clearly, these gross environmental deficiencies were primarily responsible for the high incidence of certain preventable diseases among the Indian population, particularly among children.

In 1955 the health care responsibilities of the BIA were transferred to PHS. At that time only thirteen sanitary engineers and environmental health officers (most of whom were PHS Commissioned Officers) were working in the program. They were assisted by 31 Indian and Alaskan Native sanitarian aides who had received basic training in water supply protection, sewage disposal, vector control, food sanitation, and other essential sanitation principles. Because no Federal resources were available to mitigate the glaring environmental deficiencies that existed, the aides worked on and near their communities trying to convince their people to use personal funds to protect water sources, build or relocate privies, screen windows and doors, and generally improve conditions. The efforts of the aides, while successful in creating a better understanding, seldom resulted in actual improvements because the people were too poor to put their suggestions into practice.

On April 24, 1959, Health, Education and Welfare (HEW) Secretary Arthur S. Fleming asked leaders of the 86th Congress to consider a bill authorizing the Surgeon General to construct sanitation facilities for Indian homes and communities. Eight similar bills were introduced. Following hearings, reports to the House and Senate recommended enactment of the legislation proposed by Secretary Fleming. The Indian Sanitation Facilities Act (P.L. 86-121; 42 USC 2004a) was passed and signed by the President on July 31, 1959. This Act was the basic enabling legislation for the Indian Sanitation Facilities Construction Program.

From 1960 through 1991, approximately $950 million was appropriated to provide sanitation facilities for American Indians and Alaskan Natives. Under the direction of the Sanitation Facilities Construction Branch, more than 166,000 homes received water and sewer service for the first time. Systems serving more than 55,000 homes were upgraded. The health of American Indians and Alaskan Natives was markedly improved as a direct result of the construction of local sanitation facilities.

As of May 2001 the Indian Health Service had 245 engineers, most of whom are Commissioned Officers, serving at 75 duty stations on or near Indian reservations throughout the Continental U.S. and Alaska.

The Environmental Pollution Era

The PHS organized the Division of Industrial Hygiene in 1912. Early atmospheric pollution studies were an extension of the science of industrial hygiene. By 1931 PHS industrial hygiene activities included studies of municipal dust, radium dial painting industry, and a comparison of air pollution in 14 major cities.

The year 1948 was a turning point for the PHS and the nation as a whole.

Donora, Pennsylvania was a steel mill town south of Pittsburgh. A peculiar weather inversion lasting approximately twenty days allowed heavily polluted air to collect over the small town. That air contributed to a large number of deaths and illness. Around the world, two similar outbreaks of significant industrial pollution caused more havoc. Suddenly the world became aware that effluent stacks were more than just aesthetically displeasing. There could be subtle and dangerous long-term consequences. Knowledge of carcinogens and chemical effects was just beginning. PHS engineers were brought in to collect samples and analyze the Donora community. This marked the entry of PHS into the field of air pollution control.

Franklin Roosevelt transferred the PHS from the Treasury Department into a new organization called the Federal Security Agency. PHS remained there until the Department of Health and Human Services was formed in 1953. The environmental activities of the Department were then reorganized into the Division of Sanitation, the Division of Water Supply and Pollution Control, the Division of Engineering Resources, the Division of Industrial Hygiene, and the Environmental Health Center. Thus, all of the areas of primary concern – milk and food, shellfish, interstate carriers, municipal and world sanitation, the field activities, radiological health, environmental programs, laboratories, hygiene, and housing – were covered.

The issue of pollution created the need for legislation and regulation. PHS provided early leadership in this field by directing environmental health research to define the dangers from physical agents, vectors, wastes, and radiation. Engineers were stationed at facilities across the country. Radiation research was conducted at laboratories at Los Alamos and Hanford. In addition, there were irrigation studies in Denver, Colorado; industrial hygiene studies in Salt Lake City, Utah; yellow fever studies at Davis, California; fly and conjunctivitis studies in Thomasville, Georgia; and infant diarrhea studies in New Orleans, Louisiana. The Taft Sanitary Engineering Center in Cincinnati also conducted research into these and many other areas.

Federal laws at that time were not as comprehensive as they are today. Under Public Law 845, for example, the PHS could intervene only if pollution from one state affected the health and welfare of another state. If pollution only affected the state producing it, then the problem was handled locally. The full strength of the present laws, now administered by the Environmental Protection Agency, was not available in the 1950s and early 1960s.

In 1953 interest in the effects of radiation activity was confined to research with isotopes in medicine, metallurgy, and fertilizers. There was little concern over nuclear power plants or fallout primarily because the full potential in those areas was not yet recognized. In the mid 1950s, under the auspices of the Atomic Energy Commission, PHS assumed the responsibility for assessing off-site activities from nuclear weapons testing in Nevada and, later, in the Pacific. Ultimately, the focus of that program was expanded to include research into medical radiation and x-ray activities.

In 1959 PHS was reorganized. Many environmental activities previously conducted by the Bureau of State Services were transferred to the PHS. A second reorganization was proposed in 1960 when another study of environmental issues and research suggested that those activities should be consolidated into a Bureau of Environmental Health, which would parallel the Bureau of State Services. The new environmental bureau never became a reality. Instead, the Consumer Protection and Environmental Health Service was formed in 1968. This was the first time that the food and drug organization and the environmental elements were brought together; however, in 1970 the Food and Drug Administration was formed as a separate organization, parallel to the Environmental Health Service.

PHS had been pursuing environmental projects; however, their approach may not have been sufficiently progressive. Congress recognized that to respond to growing public and governmental concerns about the impact of innumerable pollutants on public health and the environment, a dramatic change was needed. The Environmental Protection Agency was created in 1970, and under Reorganization Plan No. 3, fifteen components were transferred from five executive departments and independent agencies. Those components included:

- Air pollution control, solid waste management, radiation, and drinking water activities (from PHS),
- The Federal water pollution control program (a PHS program until 1966 when it was transferred to the Department of Interior),
- The responsibility to set tolerance levels for pesticides in food (from FDA),
- The authority to register pesticides and to regulate their use (from the Department of Agriculture),
- Part of a pesticide research program being conducted by the Interior Department,
- The responsibility for setting environmental radiation protection standards (from the former Atomic Energy Commission),

- The duties of the Federal Radiation Council to determine Federal Radiation Protection Guidance.

Thus, the EPA was given the lead Federal responsibility for mounting an integrated, coordinated attack on air, water, and noise pollution; solid waste management; pesticide use; and radioactivity in the environment. The parallel between the Public Health Service goals to protect and improve the health of the Nation and the EPA mandate to improve public health and the environment is inescapable. In many respects, EPA's public health mission is an outgrowth or extension of efforts begun by PHS.

To enable the EPA to quickly mobilize a staff, key personnel were transferred from other Federal organizations previously tasked to carry out environmental and public health activities. Five hundred sixty PHS officers, or about 10 percent of the original EPA work force, were also detailed to the new agency. Their skills and expertise in the areas of engineering, sanitation, veterinary medicine, toxicology, epidemiology, biostatistics, biology, and health sciences were and continue to be vital to the fulfillment of EPA's mission.

In the years following EPA's formation, enactment of major new environmental laws and important amendments to older laws greatly expanded the agency's responsibilities. EPA now administers ten comprehensive environmental protection laws including the Clean Air Act; the Safe Drinking Water Act; portions of the Atomic Energy Act; the Comprehensive Environmental Response, Compensation, and Liability Act; and the Resource Conservation and Recovery Act. Other EPA offices with environmental and public health responsibilities include the Office of Air and Radiation; the Office of Water; the Office of Pesticides and Toxic Substances; the Office of Research and Development; and the Office of Solid Waste and Emergency Response.

In addition to their day-to-day responsibilities, PHS Commissioned Officers have played significant roles in meeting the challenges presented by the Three Mile Island nuclear emergency; the National Lake Survey; the accident at Chernobyl; and various response actions dictated by the Superfund legislation of 1980.

Although PHS engineers are detailed to the EPA, environmental issues are still addressed by PHS organizations including the Indian Health Service, the Agency for Toxic Substance and Disease Registry and the National Institute of Environmental Health Sciences in North Carolina. The Centers for Disease Control and Prevention (CDC) also studies a variety of issues surrounding the effects of toxic substances.

The beginning of biomedical engineering within the PHS is not clearly delineated. Engineering support for NIH research is described as far back as 1938 when PHS was working on neutrons from a cyclotron being used to treat cancer patients. Design of state-of-the-art equipment to support research continues today. The Medical Device Amendments Act of 1976 created a need for engineers to evaluate medical devices and thus spawned the formation of the Bureau of Medical Devices (BMD) within the FDA. In 1982, the BMD was merged with the Bureau of Radiological Health (BRH) to form the Center for Devices and Radiological Health (CDRH). Engineers in the Center are involved in many activities including, but not limited to, research, pre-market evaluation, and compliance enforcement.

The Environmental Health Era

During the first half of the 20th century [this century, PHS engineers were primarily involved in the reduction of preventable diseases through development of "barriers" between man and domestic waste. As waterborne diseases and diseases related to personal hygiene declined, the nation's health improved dramatically. In the late 1960's, attention turned to cleaning up the environment and, in the early 1970's, major water, air, and land pollution control programs were implemented. Establishing those programs proved to be exceedingly costly, however, and it soon became apparent that eliminating pollution from the environment entirely would be financially, if not technologically, impossible. The dramatic increase in the development of chemicals, for example, created air, water, and land pollutants that were more toxic, more easily and widely dispersed and, therefore, more difficult to control.

Health considerations as they relate to the environment were once again in the forefront and in the late 1980's a new, or perhaps renewed, emphasis on health precipitated an environmental health movement. Considerable attention is now being paid to the health risks from all potential pollutants. The PHS and EPA are working together to assess and manage health risks in the workplace and from pollutants in drinking water and the environment.

There are many examples of the PHS/EPA coalition in action. In 1988, through the CDC, EPA and PHS issued a national advisory urging radon testing for most of the nation's homes. Information was provided to help homeowners understand the increased risk of lung cancer from exposure to above average radon levels and to decide if they needed to take additional action to reduce the levels in their homes.

The PHS/EPA coalition was again evident in the relationships between the CDC and the Agency for Toxic Substances and Disease Registry (ATSDR). ATSDR was created by Congress to implement the health-related sections of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), and the Superfund Amendments Reauthorization Act of 1986 (SARA). Both Acts were implemented by EPA.

Looking to the Future

No part of America was untouched by the terrorist attacks on September 11, 2001. The Department of Health and Human Services (DHHS) like many other federal agencies found itself responding to manmade disaster on a scale not seen on American soil before. As a result of those terrible attacks; DHHS has realigned many resources and mission statements. The Commissioned Corps is undergoing close examination for what is being termed Transformation of the Corps. Many agencies now have dedicated emergency operations centers and personnel, and a whole new federal department, the Department of Homeland Security has been formed with DHHS personnel detailed to it.

Even with so many sweeping changes occurring, the Department of Health and Human Services continues to pursue its mission. Engineers and architects are a valuable team resource devoted to the problem-solving dimension of public health. This chapter has touched on only a few of the many contributions architects and engineers make to

improving public health. Because programs continue to evolve in step with the development of new policy and scientific knowledge, engineers will continue to be an integral part of the future of the Public Health Service, the Department of Health and Human Services, and our Nation's federal assets.

The Engineer Professional Advisory Committee

In October of 1962, the Surgeon General approved the establishment of the Engineer Career Development Program in PHS and authorized the formation of an Engineer Career Development Committee (ECDC). The principal objectives of the program were to build professional competence, assure effective use of PHS engineers, and improve the recruitment and retention of engineering personnel. Prior to the ECDC, engineer career development was handled by the Chief Engineer and a small number of individuals, the scope of PHS engineering activities being at that time relatively narrow. The ECDC was operated in a manner similar to programs for other PHS personnel, i.e., nurses, pharmacists, dentists, etc. The ECDC had three major purposes:

- To assist the PHS in determining engineering personnel requirements,
- To improve the recruitment and retention of PHS engineers,
- To maximize career development for the individual engineer through counseling, training, rotational assignments, etc.

In 1983, the Surgeon General revised the objectives of the PHS Career Development Committees, for all professional categories, and reestablished those objectives under the Engineer Professional Advisory Committee (EPAC). EPAC operating policies were revised again in 1988.

EPAC provides advice and consultation to the Chief Engineer, who in turn reports to the Surgeon General on matters relating to the professional activities and personnel issues affecting PHS engineers. EPAC acts in the interest of Civil Service and Commissioned Corps engineers and architects. As a communications link and information source for the distinct PHS engineer disciplines, EPAC also:

- Provides advice and assistance on engineer staffing issues, particularly recruitment and retention,
- Acts as a primary resource for engineer career development including mentoring,
- Communicates, develops and encourages the use of awards/recognition systems,
- Assists in the most effective utilization of engineers in disaster response.

Committee members represent each of the PHS engineer/user programs with ten or more engineers. In addition, a few at-large positions are filled irrespective of program affiliation. Members are knowledgeable professionals at all grade levels who represent a cross section of the interests, concerns, and responsibilities of engineers in organizations staffed by PHS personnel. About half of the EPAC members are from the

greater Washington, D.C. area and the rest from around the country. Eight to ten full committee meetings are held each year. Interested engineers may self-nominate. Membership approval is generally required from immediate and second level supervisors, the Chief Engineer, the Agency/OPDIV Representative to the Office of the Surgeon General, and the Surgeon General.

The Chief Engineer

The Chief Engineer of the Public Health Service is a flag rank (0-7) Commissioned Officer who works closely with the EPAC on issues of importance to Civil Service and Commissioned Corps engineers and architects. The first Chief Engineer was appointed by the Surgeon General in 1943. Over the next thirty years, the Chief Engineer's only duties were those of the chief professional officer. Since 1973, however, the Chief Engineer designation has been a part of agency program management. The Chief Engineer, who serves for up to four (4) years, is limited to staff activities and has no additional line authority. In addition to their normal agency billet responsibilities, the Chief Engineer:

- Represents the Surgeon General and the PHS in contacts with public and professional groups in the Engineer category, providing continuous liaison with such groups on matters of common interest as directed by the Surgeon General;

- Advises the Directors of PHS staff offices in areas of manpower development, recruitment, training, and career counseling for engineers, as these offices develop recommendations for consideration by the Surgeon General and the Assistant Secretary for Health;

- Advises the Directors of PHS staff offices in areas where his/her professional background and technical knowledge may contribute to the recommendations developed by the Surgeon General and the Assistant Secretary for Health;

- Represents the engineer category on the Chief Professional Officer's Committee; serves as an advisor (not a voting member) to the EPAC;

- Accepts invitations for speeches, attends meetings, and performs ceremonial duties directly related to his/her role as representative of the engineering category as duties and budgets allow.

Present and Past Chief Engineers

Approximate Dates	Chief Engineer
6/99 - present	RADM Robert C Williams
1/95-5/99	RADM Thomas G. Gallegos
11/89-4/94	RADM Bill F. Pearson
11/85-11/89	RADM John C. Villforth
1975-11/85	RADM Ian “Ike” Burgess
1970-1973	RADM Richard “Sted” Green
1966-1970	RADM Albert H. Stevenson
1962-1966	RADM Callis “Slim” Atkins
1948-1962	RADM Mark Hollis
1943-1948	RADM John K. Hoskins