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Foster Wheeler

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UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

WILLIE SCOTT and PATRICIA SCOTT,

Plaintiffs,

vs.

A.W. CHESTERTON COMPANY; 3M COMPANY; ADAMS ELEVATOR EQUIPMENT COMPANY; AIV, L.P. HOUSTON individually and as parent, alter ego and successor-in-interest to THE WALWORTH COMPANY; ALLIED PACKING & SUPPLY, INC.; AMERICAN COOLAIR CORPORATION individually and as parent, alter ego and successor-in-interest to ILG INDUSTRIES; AMERICAN STANDARD, INC. as parent, alter ego and successor-in-interest to AMERICAN RADIATOR and AMERICAN BLOWER COMPANY; ARMSTRONG INTERNATIONAL, INC.; ASBESTOS CORPORATION LIMITED; ATLAS FOUNDRY COMPANY, INC.; ATWOOD & MORRILL CO., INC.; AURORA PUMP COMPANY; BAILEY VALVE, INC.; BALTIMORE AIR COIL COMPANY, INC.; BEAIRD COMPANY LTD, individually and as parent, alter ego and successor-in-interest to MAXIM EVAPORATORS PRODUCTS; BELDEN WIRE & CABLE COMPANY; BELL & GOSSETT COMPANY; BORGWARNER MORSE TEC INC. as successor-in-interest to BORG-WARNER CORPORATION; BRANDON DRYING FABRICS, INC.;

(ASBESTOS)

U.S.D.C. Case No. _____

Alameda County Superior Court Case No. RG08379519

DECLARATION OF LAWRENCE STILWELL BETTS IN SUPPORT OF FOSTER WHEELER ENERGY CORPORATION'S NOTICE OF REMOVAL

BUFFALO PUMPS, INC.; BW/IP INTERNATIONAL INC. formerly known as BORG-WARNER INDUSTRIAL PRODUCTS, successor to BYRON JACKSON PUMPS; CARRIER CORPORATION; CARVER PUMP COMPANY; CERTAINTEED CORPORATION; CLEAVER-BROOKS, INC.; COFFIN TURBO PUMP, INC.; COLLINS ELECTRIC CO. OF SAN FRANCISCO; CRANE CO.; CROSBY VALVE, INC.; CROWN, CORK & SEAL COMPANY, INC.; CSR, LTD also known as COLONIAL SUGAR REFINING CO.; D.W. NICHOLSON CORPORATION; THE DARCOID COMPANY OF CALIFORNIA; DURABLA MANUFACTURING COMPANY; DURAMETALLIC CORPORATION; E.D. BULLARD COMPANY; EATON CORPORATION, individually and as successor-in-interest to CUTLER-HAMMER; ELLIOTT COMPANY; EMERSON PROCESS MANAGEMENT POWER & WATER SOLUTIONS, INC., individually and as successor-in-interest to FISHER CONTROLS and AUTOMATIC SWITCH COMPANY; FLUOR CORPORATION; FOSTER WHEELER LLC; GARLOCK SEALING TECHNOLOGIES LLC; GENERAL MOTORS CORPORATION; GENERAL CABLE TECHNOLOGIES CORPORATION; GENERAL DYNAMICS CORPORATION; GENERAL ELECTRIC COMPANY; THE GOODYEAR TIRE & RUBBER COMPANY; GOULDS PUMPS, INCORPORATED; FRAY MARINE, INC.; HAMILTON MATERIALS, INC.; HANSON PERMANENTE CEMENT, INC. formerly known as KAISER CEMENT CORPORATION; HONEYWELL INTERNATIONAL INC., individually and as successor-in-interest to ALLIEDSIGNAL and BENDIX; IMO INDUSTRIES INC. individually and as parent, alter ego, formerly known as, doing business as, and successor-in-interest to IMO DELAVAL INC.; INGERSOLL-RAND COMPANY; ITT CORPORATION, individually and as parent, alter ego and successor-in-interest to MCDONNELL & MILLER; J.T. THORPE & SON, INC.; JERGUSON

GAGE & VALVE COMPANY; JOHNSON CONTROLS, INC.; KAISER GYPSUM COMPANY, INC.; KELLY-MOORE PAINT COMPANY, INC.; KENTILE FLOORS, INC.; LAMONS GASKET COMPANY formerly known as POWER ENGINEERING & EQUIPMENT CO.; MANNINGTON MILLS, INC.; MARTINEZ SHEET METAL, INC.; NATKIN & COMPANY; NORTHERN PUMP, a division of MCNALLY INDUSTRIES LLC; NIBCO INC. WHICH WILL DO BUSINESS IN CALIFORNIA AS CAL NIBCO; NOMELLINI CONSTRUCTION CO.; ORCHARD SUPPLY HARDWARE STORES CORPORATION; OTIS ELEVATOR COMPANY; OWENS-ILLINOIS, INC.; PACIFIC MECHANICAL CORPORATION; PARKER-HANNIFIN CORPORATION; PATTERSON PUMP COMPANY, A SUBSIDIARY OF GORMAN-RUPP COMPANY, individually and as successor-in-interest to GRISCOM-RUSSELL; PLANT INSULATION COMPANY; QUINTEC INDUSTRIES INC.; RAYTHEON COMPANY; ROCKWELL AUTOMATION, INC. as parent, alter ego and successor-in-interest to ALLEN-BRADLEY; S.B. DECKING, INC., individually, formerly known as and successor-in-interest to SELBY, BATTERSBY & COMPANY; SCOTT MECHANICAL COMPANY; SOCO WEST, INC.; SPIRAX SARCO, INC.; SPX PROCESS EQUIPMENT, individually and as successor-in-interest to, parent and alter ego to MARLEY COOLING TECHNOLOGIES, INC.; STERLING FLUID SYSTEMS (USA) INC. formerly known as PEERLESS PUMPS; TARKETT FLOOR PRODUCTS TEXAS INC. individually and parent, alter ego and successor-in-interest to DOMCO INC. FLOOR PRODUCTS (TEXAS) and as parent, alter ego and successor-in-interest to AZROCK INDUSTRIES, INC.; THE BF GOODRICH COMPANY; THE GOODYEAR TIRE & RUBBER COMPANY; THE LUNKENHEIMER COMPANY; THE NASH ENGINEERING COMPANY; THE OKONITE COMPANY, INC.; THE TRANE COMPANY; THE WILLIAM POWELL COMPANY;

THOMSAS DEE ENGINEERING CO., INC.; THORPE INSULATION COMPANY; THYSSENKRUPP ELEVATOR CORPORATION; TUTTLE & BAILEY; TYCO INTERNATIONAL (US) INC. individually and as parent, alter ego and successor-in-interest to ANDERSON GREENWOOD AND KUNKLE VALVE; UNIROYAL, INC.; VALLEY SHEET METAL CO.; VIACOM INC., successor by merger to CBS CORPORATION and formerly known as WESTINGHOUSE ELECTRIC CORPORATION; VIKING PUMP INC., A UNIT OF IDEX CORP.; WARREN PUMPS, LLC; WATTS WATER TECHNOLOGIES, INC. individually and as parent, alter ego and successor-in-interest to WATTS INDUSTRIES, INC. as successor-in-interest to LESLIE CONTROLS, INC. and MUELLER STEAM SPECIALTY; WEIR VALVE & CONTROLS USA INC. individually and as parent, alter ego and successor-in-interest to ATWOOD & MORRILL CO., INC.; WESTBURNE SUPPLY INC. individually and as parent, alter ego and successor-in-interest to P.E. O'HAIR & CO.; YARWAY CORPORATION; YORK INTERNATIONAL CORPORATION WHICH WILL DO BUSINESS IN CALIFORNIA AS: YORK HEATING AND AIR CONDITIONING; ZURN INDUSTRIES, INC.; and FIRST DOE through TWO HUNDREDTH DOE, inclusive,

Defendants.

I, Lawrence Stilwell Betts, MD, PhD, CIH, FACOEM, declare that:

1. My name is Lawrence Stilwell Betts. I am a "retired" United States Navy Captain with an active professional practice based in Poquoson, Virginia. As reflected in my Curriculum Vitae (Exhibit 1), I am the President of a medical corporation that is based upon applying the principles and methods of preventive medicine. I routinely integrate and apply occupational and environmental medicine, toxicology, and industrial hygiene to consult or work with difficult or complex medical cases where treatment, or exposure, or possible consequences of exposure, is in question. However, the emphasis of my

entire career has been prevention of illness and the promotion of health through the integration of my scientific and medical knowledge and experience. After my retirement from the Navy in 2001, I was presented the VADM Richard A. Nelson Award for my career contributions to Navy and Marine Corps readiness through leadership in prevention of disease and promotion of health. My professional practice still includes work with the Navy and other military services, as well as non-military federal agencies, industry, professional organizations, and academically- and privately-practicing professionals. In addition to recurrent consultations, I teach, mentor, perform research, develop prevention and treatment protocols, and write medical articles and text chapters. I am a Professor at the Eastern Virginia Medical School in the Department of Family and Community Medicine and a Clinical Professor of Physiological Sciences. With approval from my superiors in the Navy, I have been academically affiliated with Eastern Virginia Medical School for the past twenty-seven years. I serve on several national committees addressing broad, as well as specific, issues in occupational and environmental health. I am board certified in both Occupational Medicine by the American Board of Preventive Medicine, and in the comprehensive practice of Industrial Hygiene by the American Board of Industrial Hygiene. In the practice and application of toxicology, it is well known that ALL chemicals are toxic as a consequence of dose (Paraselsus [1493-1541]: *"Sola dosis facit venenum"* – "Dose alone makes the poison") and that "hazard" is a consequence of how a chemical is used. The anticipation, recognition, evaluation, and control of hazardous conditions are the fundamentals of industrial hygiene, as well as my practice of preventive medicine and public health.

2. During my Navy career spanning three decades, I had experiences ranging from the provision of "field" services underway and on shore as a junior industrial hygiene officer, to the oversight of the medical and scientific aspects of a robust occupational health program as a senior Navy officer. I have spent time at sea on a number of United States Navy and United States Naval ships. I served as a physician on the USS KITTY HAWK (CV-63) during its Service Life Extension Program (SLEP) in the

Philadelphia Naval Shipyard from 1987 to 1989. My experiences and training enabled me to become qualified as a Surface Warfare Medical Department Officer. Based upon my scientific and medical training, and experience as a Navy officer for three decades, I am generally familiar with the industrial products that were used by the Navy and the Navy work environments, both ashore and afloat. I am also familiar with the history and practice of the Navy occupational health program from its early days before World War II until the present time.

3. I understand Mr. Willie Scott apparently served on active duty as an electrician's mate and electrician in the United States Navy from 1944 to 1946, and again from 1947-1963. I also understand that Plaintiffs are claiming that Mr. Scott served or worked aboard the USS BERSTAGI, the USS REPOSE, the USS BENEVOLENCE, the USS SPERRY, the USS REDFISH, the USS MT. BAKER, the USS RASHER (or USS RUSHER), the USS SEA FOX, and the USS CHARR (or USS CHAR), and that he also worked on projects at various shore activities. As a result of his active duty tasks and associated asbestos exposures, the plaintiffs claim that he developed an asbestos-related condition. I further understand that Plaintiffs allege that Foster Wheeler is one of a number of companies responsible for asbestos-containing products to which plaintiffs allege that Mr. Scott was exposed.

4. During the time periods that these ships were built, it is my understanding that Foster Wheeler manufactured and delivered boiler and auxiliary equipment to the Navy pursuant to Navy contracts, some of which may or may not have ended up on ships that Mr. Scott worked aboard. In any event, however, any such boiler and auxiliary equipment manufactured and supplied by Foster Wheeler in fulfillment of government contracts followed the specifications set forth by the United States Government detailing required components, materials, and performance characteristics. The U.S. Navy would have accepted delivery of such boiler, auxiliary equipment, and related manuals only if they met these specifications. The Navy would not have accepted, commissioned, or permitted a Navy vessel to steam with boiler and auxiliary equipment that did not

comply with precise specifications set forth by the Navy, which includes providing any labeling of the equipment.

5. To the extent that Foster Wheeler ever delivered boiler and auxiliary equipment to the government for use on Navy vessels in the 1940s – 1950s and thereafter, the U.S. Government already recognized that the prolonged inhalation of sufficient concentration of asbestos fibers could result in pulmonary disease. Indeed, this knowledge was held by the U.S. Government prior to the period of construction, and Mr. Scott's work, on any such ships. Based upon that scientific and medical knowledge, the U.S. Government generally, and the Navy specifically, by the early to mid 1940s had already developed an active and robust program to control exposure to asbestos concentrations recognized to be harmful, and medically monitored personnel exposed to those levels. Additionally, the Navy established engineering control procedures (including isolation, exhaust ventilation, wet methods, and process changes to minimize dust release) and training, and required the use of respiratory protection for personnel considered to be at risk of excessive exposure during dusty operations.

6. The information possessed by the U.S. Government during this period (and the comprehensive occupational health program based upon this information), and thereafter and until such time as Mr. Scott's work on Navy vessels ended, with respect to the specification and use of asbestos, and the health hazards associated with its use aboard Navy vessels, far exceeded the information that possibly could have been provided by a boiler manufacturer such as Foster Wheeler. Based upon the state-of-the-art knowledge at that period, the U.S. Government was fully aware of the health hazards of asbestos and had a program to control exposure of personnel and monitor their health. This existed before World War II and through the period that Mr. Scott was working on any Navy vessels – and it continues until this day.

7. In preparing this declaration, I have relied upon my personal and professional knowledge and experience as an industrial hygienist and an occupational medicine physician, my operational and industrial experiences from my total Navy

career, my review of historical documents regarding the Navy's knowledge and the scientific and medical communities' knowledge of the hazards of asbestos, and my numerous communications with industrial hygienists and physicians who worked for the Navy and the United States Public Health Service dating back to the 1940s.

8. The Navy's specification and use of asbestos aboard ships, including in or on boilers and other high temperature equipment, was not by chance or based on any requirements of Foster Wheeler. The extensive use of asbestos was predicated upon military necessity. As discussed in their landmark paper addressing the use of asbestos in the Navy, Fleischer and coworkers (1946) (Exhibit 5) state:

> *"An important ingredient of pipe covering material used on U.S. Navy vessels is amosite...The chief reasons for the wide use of amosite felt and pipe covering in naval work are its low thermal conductivity, light weight, strength and refractoriness. When the felt and pipe covering were first developed, we were still building vessels under the Washington Treaty of Limitations in Tonnage, and every pound saved meant that much more armor, guns or ammunition for a given displacement, to say nothing of more economic operation for the weight involved in insulation.*
>
> *Amosite pipe covering weighs about 14 pounds per cubic foot, with a temperature limit of 750°F, as compared to magnesia with a weight of 16 pounds per cubic foot, and a temperature limit of 500°F. High temperature amosite pipe covering weighs about 18 pounds per cubic foot as compared to 26 pounds per cubic foot for other high temperature insulations. Because of the lower conductivity and the higher temperature limit of the amosite type, less of it need be used in a combination covering than other types of insulations.*
>
> *The development of amosite felt started in 1934 when a need existed to secure a thermal insulation lighter in weight and thermally more efficient than the materials (blocks and cement or asbestos blankets) which were then being used on destroyer turbines. The Navy approved the type developed by a manufacturer in September, 1934. Originally amosite was used only for turbine insulation, but it proved so satisfactory that its field of application enlarged to include insulation of valves, fittings, flanges, etc. From the initial destroyer, it has been used on almost all the destroyers built since that time and on all other combat vessels built since before the War.*
>
> *Pipe covering was a later development in late 1935 and early 1936. Due to the manufacturing problems involved, it took a longer time to evolve into a satisfactory shape, and its first use on naval vessels was in 1937. Since that time its use has spread markedly and it was used on the great majority of naval combat vessels built during World War II.*
>
> *Water-repellent amosite felt was developed during the early part of 1942, as a*

replacement for hair felt in the insulation of cold water lines to prevent sweating. Hair felt had the disadvantage of being combustible and as it was organic, when it became wet it molded or rotted and could harbor vermin. At this time fires on board certain naval vessels convinced the Navy of the desirability of eliminating any combustible material from on board ship. Eventually water-repellent amosite was made in strips of 50 foot lengths and of suitable width to enclose the circumference of the pipe and enclosed in an extremely light-weight muslin to facilitate the handling and reduce the dust, which the water-repellent agent accentuated."

9. The United States Navy recognized that the inhalation of asbestos fibers in sufficient amounts (dose = concentration × time) could result in pulmonary disease since at least the early 1920s and had an active program to identify hazardous exposures and control recognized health effects. In the *"Instructions to Medical Officers"* (*Notes on Preventive Medicine for Medical Officers, United States Navy* (Dublin, 1922) (Exhibit 9)), asbestos was listed as one of the many inorganic and organic dusts that could cause pulmonary disease when inhaled in a sufficient quantity for a significant period of time. Dublin recognized several methods to prevent the inhalation of these dusts including: the use of water to control the release of dust; the use of local exhaust systems to remove the dust at the point of origin; the use of inclosing (sic) chambers; and the use of respirators and helmets. He stated: "No one of these can apply to all conditions, but the particular method to be used must be adapted to the peculiarities of the process." From the extensive list of inorganic, as well as organic, dusts and "occupations which offer such exposure," it is obvious that his perception of dust control was based upon the avoidance of recognizable disease, and not the mere presence of a given, or visible, amount of dust being generated.

10. The United States Navy expanded the scope of its asbestos hazard control program by including the enlisted corpsmen of the medical department in the hazard control process. In the Handbook of the Hospital Corps, (Bureau of Medicine and Surgery, 1939) (Exhibit 12), the Bureau of Medicine and Surgery discussed the organization used for disease and injury prevention in the United States Navy, and took a lead position in the prevention of industrial disease:

"The Government having passed such laws must therefore lead the way in protecting its own employees ....An organization has been set up in the Navy to protect its personnel, both civilian and naval. A safety engineer is provided, who acts directly under the Assistant Secretary of the Navy. He has supervision of the safety precautions taken to protect the civilian employees in the navy yards, ammunition depots, torpedo stations and the like. He is also a consultant in all matter pertaining to safety aboard ships, at training stations and other Navy Department activities. A naval medical officer is assigned to his office for the purpose of consultation in all matters pertaining to health and safety and to cooperate in devising means by which health may be protected and accidents prevented. Aside from this particular medical officer, all medical officers, dental officers, members of the Hospital Corps and nurses form the balance of the medical staff of this organization. It is essential that each one of these members know and understand the hazards to be encountered in the Navy, the steps to be taken to protect against injury and disease, the treatment of diseases and injuries arising therefrom and the organization of medical personnel for such purposes. Naval medical personnel are required to perform duties ashore, at sea, in foreign countries, in the air and under the sea. In each of these places a variety of health hazards exist. It is therefore necessary that this personnel have a thorough knowledge of the industry to which they are attached, the hazards presented, the methods of prevention and the treatment of all injuries occurring.

* * *

At all navy yards, the Commandant is the head of the organization. He is responsible to the Navy Department for the protection of the employees, as well as the naval personnel, under his command. He is familiar with the nature of the work being performed by the employees at his station and the health and accident hazards presented. Accordingly, he appoints, as the working head of the organization, a safety officer or a safety engineer, as he is better known. The safety engineer must be of sufficient rank to have become familiar with the various trades in a navy yard, a knowledge of machinery, a man of cooperative ability and well liked, and having sufficient knowledge of safety devices and appliances to intelligently make inspections and recommend proper protective measures. His duties are primarily, to prevent accidents and promote healthy working conditions. It is his duty to inspect all working places, make a general survey of all mechanical conditions and to recommend the addition of all necessary safety appliances for the protection of the workers...

The Commandant further assigns a medical officer to act as advisor to the safety engineer. The medical officer must be of the same qualifications as the safety engineer, with the addition that he must be thoroughly versed in the diseases connected with Industry....[I]t is well for members of the Hospital Corps to understand the nature of these duties in order that they may be of assistance to him in the performance of these duties:: [ ]...He acts as consultant to the safety engineer in all matters pertaining to the general welfare and health of employees. Hygiene and sanitation are his important duties. He must interest himself in the employees and instruct them in the every day principles of personal hygiene and self preservation. He must instruct the employees in safety measures and encourage them to cooperate in protective measures. They must be made 'safety conscious' or 'safety minded.' The morale must be kept up....

The medical officer must inspect all working places in order to have a better understanding as to the actual conditions under which the men work. He must make appropriate recommendations to improve deficiencies noted and must then see that these recommendations are carried out."

The text further notes that the safety engineer is assisted by other personnel:

> *"The safety engineer is assisted in his work by the foremen of the shops and in some instances by safety committees in each shop elected by the employees. These men or committees are generally chosen from among the older employees and from men who have considerable experience in their trade....[ ] The organization of the medical advisor is composed of junior medical officers, dental officers, to some extent, members of the Hospital Corps, and of nurses. The duties of the hospital corpsmen are to assist the medical officer in his inspections, assist in the treatment of the injured and to prepare the necessary reports and returns in cases of accident, occupational disease, and the physical examination of employees."*

A similar organization is described for *"... a battleship or in other places."*

To this end, the enlisted Hospital Corpsmen were informed of the hazards presented by asbestos and instructed to "locate these hazards and afford protection accordingly." Two of the hazards that the hospital corpsmen were specifically instructed to evaluate in a questionnaire (inspection or survey form) are:

> *"What precautions are exercised to prevent damage from pipe covering compounds?"*
>
> *"What asbestos hazards exist?"*

Also, the hospital corpsman was instructed to help keep the workforce healthy:

> *"Proper working places must be provided and maintained. Hygienic and sanitary conditions must be kept on a high plane. All moving parts of machinery must be guarded, goggles provided for workers required to use them; helmets and masks for sand blasters; proper ventilation for the chrome workers; masks for asbestos workers; protection for workers in X-ray and radium; protective gloves, shoes, and other garments for foundry workers, and other means of protection too numerous to mention here must be available and used. [ ] Special physical examinations must be made of all sand blasters, asbestos handlers, those exposed to radium and its compounds, lead workers, those engaged in dusty or smoky trades, handlers of T.N.T. and other explosives, etc., to prevent the occurrence of the diseases associated with those trades from injuring the men."*

11. This type of active assessment, evaluation, and recommendation for control was embraced by senior United States Navy officers. In his memorandum to the Manager of the Navy Yard, Boston, Captain H.E. Jenkins, MC, USN (Jenkins, 1939) (Exhibit 13) discussed his findings and recommendations from his survey of the pipe covering shop and work shack at that yard. Although he stated that the health hazards to personnel were very remote, based upon his evaluation of the amount of dust released, Captain Jenkins recommended that a dust respirator and gloves be worn to

supplement the "conscientiously and intelligently enforced" practice of wetting down insulating material. Captain Jenkins also addressed the impractical use of respirators during shipboard lagging operations and recommended sufficient wetting to prevent dust generation as far as practicable. Less than one week later, C.D. Headlee (1939) (Exhibit 14), issued a Production Division Notice (Number 996) implementing these recommendations.

12. Captain E.W. Brown, in the *Annual Report of the Surgeon General, U.S. Navy to the Secretary of the Navy* (Surgeon General, U.S. Navy, 1941) (Exhibit 15) and in the scientific publication of his presentation made to the Fifth Annual Meeting of the Air Hygiene Foundation of America (Brown, 1940, printed 1941) (Exhibit 16), discussed the findings of his medical survey at the New York Navy Yard. Captain Brown, recognized as the founder of the Navy's formal occupational health program, assessed asbestos exposure and medical findings of eleven workers at the New York Navy Yard. With knowledge of occupational exposure to silica and its delayed medical findings, and under the conditions that he observed, Captain Brown found no indication of pulmonary disease in these workers at that time. He noted that wet methods and local exhaust ventilation were implemented, and that the workers wore a respirator "during the dustiest aspect of the process." He stated that similar findings were reported in two other yards and recommended that the study be extended to all men in this trade. These references further demonstrate that senior Navy personnel actively monitored and controlled the Navy policy regarding disease and injury prevention, and were indeed the leaders in field assessment and control of occupational health hazards, including asbestos.

13. When quantitative assessment (counting) of asbestos particles in air was available, the Navy followed the recommendations of the United States Public Health Service. Based upon the findings of Dreessen and coworkers' 1938 study (Exhibit 17) of asbestosis in the textile industry prepared by direction of the United States Surgeon General, the United States Navy accepted an exposure level of 5 million particles per

cubic foot (5 MPPCF) as the time-weighted average (TWA) for occupational exposure. Dreessen et al. concluded: "It would seem that if the dust concentration in asbestos factories was kept below 5 million particles (the engineering section of this report has shown how this may be accomplished), new cases of asbestosis would probably not appear." This TWA is the average airborne concentration of asbestos particles to which an individual could be exposed in an eight hour period. Shorter periods of higher concentrations were acceptable as long as the average exposure calculated over eight hours did not exceed the TWA.

14. A 1941 memorandum from the Officer-in-Charge of the Navy's Division of Preventive Medicine to the Surgeon General (Stephenson, 1941; Exhibit 18) addressed the policy of inviting the Bureau of Labor Standards or the United States Public Health Service into the Navy yards for the purpose of surveying welding and other hazards. Commander Stephenson writes:

> *"I told Mr. Bard [Assistant Secretary of the Navy] that this was not considered the best policy, due to the fact that we had medical officers in the Yards and that in practically all instances recommendations of sound character had been made by medical officers. We saw no need of inviting the United States Public Health Service on its own invitation to do this job. Likewise, I told him that I had spoken to you and that you had indicated that President Roosevelt thought that this might not be the best policy, due to the fact that they might sense disturbance in the labor element."*

Under *"Points of great interest,"* Commander Stephenson expressed concern about silicosis, sand blasting, welding, solvents, hydrogenated (sic) hydrocarbons, eye flashes, cadmium dust, smokes and fumes, chromium trioxide, and asbestosis. With respect to asbestos, he stated:

> *"We are having a considerable amount of work done in asbestos and from my observations I am certain that we are not protecting the men as we should. This is a matter of official report from several of our Navy Yards."*

15. As mentioned by Captains Jenkins and Brown, they found asbestos exposure conditions that were not fully satisfactory and required changes. Recommendations for correction of the exposure conditions were made. In both of these instances, only a qualitative assessment was made and actual exposure levels were not

determined. Brown (1941; Exhibit 16) found no significant clinical findings in the limited number of workers observed during the relatively short, post-exposure period. The Navy's occupational health program was based upon internal support for the identification and control of occupational health hazards. In order to develop a sufficient cadre of physicians and scientists, the Navy developed training programs with Columbia University's DeLamar Institute of Public Health and the Harvard School of Public Health. By the end of World War II, over one hundred physicians, scientists, and engineers had been trained in occupational health at these two leading institutions of US public health.

16. The *Minimum Requirements for Safety and Health in Contract Shipyards* (United States Navy Department and United States Maritime Commission, 1943; Exhibit 19) were drafted in 1942 by representatives from labor management committees, labor unions, management of private shipyards, insurance companies, the United States Maritime Commission, and the United States Navy. When approved by the US Maritime Commission and the U.S. Navy in early 1943, compliance with these standards was expected:

> *"Each contractor is hereby given notice that the Navy Department and the Maritime Commission will expect full and complete compliance with the minimum standards which bear the approval of the Navy Department and Maritime Commission, and each is requested to give full cooperation to the consultants on health and safety who will be charged with the coordination and supervision of the safety and health program of the two agencies.*
>
> H-13. *A Guide for Prevention of Industrial Disease in Shipyards*
>
> *13.1 Eight common types of disease and methods for their prevention are given in the following sections. Help in applying these methods will be given by the local Safety Department and by safety and medical consultants of the Navy Department and the Maritime Commission.*
>
> ....
>
> *13.7 Asbestosis*
>
> *a. Sources: In general, any job in which asbestos dust is breathed. For example:*
>
> | *Job:* | *When Material Is:* |
> |---|---|
> | *Handling* | *Asbestos* |

Sawing *Asbestos mixtures*
Cutting
Molding
Welding rod salvage

b. Job can be done safely with:

1. Segregation of dusty work and,

2. (a) Special ventilation: hood enclosing the working process and having linear air velocities at all openings of 100 feet per minute, or

(b) Wearing of special respirators.

3. Periodic medical examination"

Less than six months after the Minimum Requirements were issued, the Secretary of the Navy (Forrestal, 1943 (Exhibit 20)) reaffirmed these requirements for all private shipyards having Navy contracts. The minimum requirements did not provide a specific occupational exposure value for asbestos. They gave general requirements for safe (healthful) operations. The Navy's occupational health team was responsible for assisting in interpreting the standards for implementation at Navy and contract yards throughout the country. Any significant inspection findings, whether favorable or adverse, were to be discussed first with the shipyard management, thus allowing management the opportunity to take corrective action for imminent dangers. The actual written report was to be submitted in draft form to the regional director of the Maritime Commission for final typing.

17. In addressing exposure to asbestos, Philip Drinker, then Chief Health Consultant for the United States Maritime Commission, and Professor in the Harvard

School of Public Health program that was training the Navy physicians, scientists, and engineers, recommended an occupational exposure level of 5 MPPCF. (Drinker, 1944 (Exhibit 21)). This is the same value as recommended by Dreessen and coworkers (1938) (Exhibit 17) to prevent the development of asbestosis.

18. In January, 1945, Philip Drinker (1945) (Exhibit 22) informed Captain T. J. Carter, Bureau of Medicine and Surgery, of a serious health risk from asbestos dust exposure at Bath Iron Works. He was concerned that similar risks might be found in other yards where the same type of pipe covering was used. In this letter, Professor Drinker stated that the manufacturers of the asbestos materials used at Bath would:

> *"...be glad to get out a brief statement of precautions which should be taken in light of their own experience and that they would inform their competitors that I had asked them to do so. I understand that neither the Navy nor Maritime wants any change in the specifications as the performance with the present materials is entirely satisfactory. From a health standpoint we do not believe any specification changes are needed."*

Drinker recommended that a study be performed to evaluate asbestos exposure and disease among workers. "Admiral Mills agreed that such studies would be wise before Navy or Maritime accepted this asbestosis risk as being significant in our general ships construction program." Four shipyards in the New York area, two contract and two U.S. Navy yards, were selected for this study of exposure levels and health status. The study, conducted by Fleischer, Viles, Gade, and Drinker-also called the "Fleischer-Drinker study"-was promptly undertaken and reported in September, 1945 by Drinker to Admiral Mills (Chief, BuSHIPS) (Drinker, 1945b: Exhibit 23); (Fleischer et al., 1946; Exhibit 5). The results of this study reaffirmed the Navy's position on adherence to an occupational exposure level of 5 MPPCF. The conclusions were:

> *"1. The character of asbestos pipe covering on board naval vessels is such that conclusions drawn from other asbestos industries such as textiles, cannot be applied.*
>
> *2. The operations of band saw cutting, grinding, cement mixing, and installation aboard ship should be equipped with exhaust ventilation to keep the total dust concentration low.*

3. The incidence of asbestosis among pipe coverers in the shipyards studied was low, 0.29 per cent or 3 cases out of 1074.

4. Since each of the 3 cases of asbestosis had worked at asbestos pipe covering in shipyards for more than 20 years, it may be concluded that such pipe covering is not a dangerous trade.

19. The results of this well-designed study, measuring actual asbestos exposure values and performing health assessments on the exposed workers, became established as Navy policy. The Navy adopted a recommended "maximum allowable concentration (M.A.C.)" value for asbestos of 5 MPPCF. This was the same value discussed by Dreessen and coworkers (1938) (Exhibit 17) when assessing the asbestos textile industry with much longer daily exposure periods and primarily the chrysotile type of asbestos. It was also the value recommended by the National Conference of Governmental Industrial Hygienists in 1942, and later adopted by the American Conference of Governmental Industrial Hygienists (ACGIH) in 1946 (ACGIH, 1946 (Exhibit 24)). Among the members of the ACGIH in 1946, a private organization which did not offer membership to individuals affiliated with industry, were three representatives of the Navy Department and forty-two representatives from the United States Public Health Service. There were no federal, state, or local occupational exposure standards. The Navy used the occupational exposure level that the best scientific and medical evidence supported. In 1955, the Navy adopted the "Threshold limit values for toxic materials" promulgated by the American Conference of Governmental Industrial Hygienists as a basic reference and "to provide guidance toward the reduction of potential health hazards encountered in the industrial environment for both military and naval civilian personnel." (Chief, Bureau of Medicine and Surgery, 1955; Exhibit 25) The Navy recognized that the:

> *"threshold limit values should be used as a guide in the control of health hazards and should not be regarded as fine lines between safe and dangerous combinations. The most desirable levels in all cases are those approaching zero, but practical considerations frequently require the acceptance of higher levels which are safe, but not ideal."*

Moreover, the Navy recognized that the:

> *"threshold limit values... are based on the best available toxicological information,*

long-term industrial experience, and experimental studies. In as much as these values are constantly being reevaluated, revisions or additions will be made as further information becomes available."

(Chief, BUMED, 1955 (Exhibit 25).)

20. On January 7, 1958, the Department of the Navy issued its *Safety Handbook for Pipefitters* (Bureau of Ordnance, 1958) (Exhibit 26). This handbook was one of many safety handbooks issued by the Navy as an aid in safety indoctrination and accident prevention. This handbook provides, in part:

"Asbestos. Asbestos dust is injurious if inhaled. Wear an approved dust respirator for protection against this hazard."

21. In the 1960 publication of *Safety and Health Regulations for Ship Repairing*, the Department of Labor (Exhibit 27) recommended an occupational exposure level of 5 MPPCF for asbestos. For comparison to the degree of risk and hazard, the Department of Labor also used the occupational exposure level of 5 MPPCF as the same absolute value for high "free" crystalline silica dust (greater than 50% free silica). The silica value is also the same value established by the ACGIH in 1942 and promulgated in 1946.

22. The use of the 5 MPPCF level as the occupational exposure value continued to be generally accepted by professionals practicing occupational health in the United States. This value was based upon controlling the development of the fibrotic disease, asbestosis. This occupational exposure value, and the widespread use of asbestos, continued in the Navy until the late 1960s when the scientific and medical communities (Selikoff, 1965 (Exhibit 28) and Selikoff, 1967, (Exhibit 29)) and the United States Navy (Commander NAVSEC, 1969 (Exhibit 30) and Officer-in-Charge NAVSEC Philadelphia, 1969 (Exhibit 31)) had evidence that it was not sufficient to adequately control the health effects of exposure.

23. Selikoff, in a paper written with Lee in 1979 (Lee and Selikoff, 1979 (Exhibit 32)) wrote:

"'What's past is prologue!' The decade of the 1960s provides a convenient time at which to terminate a historical view of asbestos disease. With admirable hindsight

from the late 1970s we can see that the essential evidence had already been reported, but not yet assembled or vested with sufficient credibility to be entirely convincing. With few exceptions, the evidence at that time rested on scattered reports of small numbers of cases, and the cases themselves suffered from being either selected or simply those that happened to come to the attention of the reporter. The population base from which the cases came was seldom mentioned. The significance of pleural changes and the occurrence of mesothelioma in persons without a distinct history of exposure remained in considerable doubt. The idea that asbestos could be at least a cofactor in the production of bronchogenic carcinoma was far from fully accepted. That parenchymal asbestosis was very likely to occur in those who had been exposed to heavy dosage in the early years of the industry was clear enough, but what effect environmental controls that had been introduced in the late 1930s might have upon its future prevalence was unknown. The possibility that quite low dosages might have grave consequences 30 or more years after first exposure was still unproven.

Many things were needed to confirm the suggestions that were emerging from the studies up to that time. Most importantly, systematic epidemiologic investigation was needed of large cohorts drawn from various types of industry, with the inclusion of adequate control populations. Some of these were already organized, but it was too early for the results to be meaningful. We now know that much of the negative evidence stemmed from coming to conclusions prematurely, before the slow processes of carcinogenesis had had a chance to make themselves evident. We now know also that reduction of heavy exposures that lead to early death would reveal such slowly developing diseases as mesothelioma and bronchogenic carcinoma with increasing clarity. But foreknowledge was not available at the time, although some investigators suspected that the auguries were not good. More sophisticated and sensitive ways of recognizing the disease processes at an early stage, before the appearance of marked radiographic changes, were badly needed. A series of international conferences, some already in the planning stages, were to accelerate these developments greatly. Those who felt that it was an exciting time were not to be disappointed. The excitement has not even yet been entirely dissipated."

24. Captain N.E. Rosenwinkel, representing the Navy's Bureau of Medicine and Surgery, provided information regarding the Navy's knowledge of asbestos hazards to shipyard employees for inclusion in a statement issued by Rear Admiral J.J. Stilwell of the Shipyard Management Directorate, Naval Sea Systems Command in 1968 (Rosenwinkel, 1968 (Exhibit 33)):

"The United States Navy is well aware of the hazards of asbestos to its employees engaged in ship construction and ship repair at naval shipyards. Hazard control measures implemented by the shipyard medical departments and safety divisions are in accordance with accepted standards of industrial hygiene practices in the United States. Stringent efforts are directed at keeping the concentration of airborne asbestos dust below the level recommended by the American Conference of Governmental Industrial Hygienists. An energetic periodic physical examination program insures the health of personnel exposed to this hazard."

25. During the period of the late 1960s, asbestos exposure and control were being addressed at different levels of command throughout the Navy. The Naval Ship Engineering Center was searching for substitutes that could meet the rigorous engineering requirements for shipboard applications (NAVSEC, 1969 (Exhibit 30)). A meeting between senior engineering, safety, and medical personnel was held to evaluate possible methods for reducing exposure and to make recommendations to the Chief of Naval Operations (Turnbull, 1969 (Exhibit 34)). Major Navy shipyards were sharing their research on asbestos exposure and control measures (Mangold, 1970 (Exhibit 10)).

26. It was not until 1970, that the Occupational Safety and Health Act (PL 91-596) (Exhibit 2) established national permissible exposure levels (PEL) for the first time using the federal standard established under the Walsh-Healey Public Contracts Act. These standards applied to shipyards, as well as other industries using asbestos. At the time of enactment in 1971, the PEL for asbestos was 12 fibers per cubic centimeter (f/cc). Based upon current scientific and medical recommendations by that time, the Occupational Safety and Health Administration (OSHA) emergently lowered the PEL to 5 f/cc (ceiling value of 10 f/cc) in 1971, with a permanent standard of 2 f/cc becoming effective in 1976. In 1975, OSHA recognized sufficient medical and scientific evidence of human carcinogenicity to reduce the permissible exposure level to 0.2 f/cc. After legal challenges, OSHA reduced the PEL to 0.2 f/cc in 1986, and further reduced it to its current value of 0.1 f/cc in 1994. Requirements from the highest levels of authority in the United States Navy established the permissible exposure levels as they changed during this post-OSHA era (Naval Ship Systems Command (NAVSHIPS), 1971 (Exhibit 35); Bureau of Medicine and Surgery (BUMED), 1973 (Exhibit 36); and Chief of Naval Operations (CNO), 1974 (Exhibit 37)).

27. The Navy has continued to follow the policy of using occupational exposure levels based upon the best available scientific and medical information (BUMED, 1955 (Exhibit 25)). The federal PELs, established by the Occupational Safety and Heath Act of 1970, are generally based upon the American Conference of

Governmental Industrial Hygienists' Threshold Limit Values (TLVs) published in 1968. Due to statutory requirements, changes to the limited number of chemical PELs have generally been slow. PELs have been changed for a relatively few chemicals since the enactment of OSHA in 1970. The TLVs are periodically reviewed and an updated list is published annually. The TLVs more closely reflect the current state of knowledge and professional practice in occupational health. The Navy continues to use the most appropriate occupational exposure levels in the assessment of exposures and follows the requirements stated in the Chief of Naval Operations Instruction OPNAVINST 5100.23 F (Chief of Naval Operations, 2002) (Exhibit 38) to provide workplaces that reflect the state-of-the-art knowledge and technology, consistent with its defined mission:

> *"The maintenance of a safe and healthful workplace is a responsibility of commands throughout the Navy. A successful Navy Occupational Safety and Health (NAVOSH) program, one that truly reduces work-related risks and mishaps, results only when support and commitment to the program permeate every level of an organization. Within the Navy, the Chief of Naval Operations (CNO) has overall responsibility for the NAVOSH program and implements the program through the chain of command. Line management is responsible for the maintenance of safe and healthful working conditions."*

28. The Navy's Safety Program was driven from the highest level of authority and operational command. The "United States Navy Safety Precautions," OPNAV 34P1, was signed out by the Acting Secretary of the Navy, C.S. Thomas, on 8 June 1953 (Exhibit 39). In his "charge" written in this instruction, Mr. Thomas states:

> *"The safety of its personnel and the preservation of its materials have always been a major concern of the Navy Department. Evidence of this is the provision in Article 0406 of U.S. Navy Regulations, that "Each Naval Technical Assistant shall prepare and issue to the Naval Establishment the safety precautions, and instructions pertaining thereto, which are necessary or appropriate in connection with matters under his technical direction."*
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> *"In recognition of the burden of responsibility which a commanding officer has for the personnel and material under his command, a governing article, 01104 Basic Rule of Responsibility, has been included to allow for adjustments to local conditions and unusual circumstances. The complete text of this article not only appears in Chapter 1, but is reprinted on the title page of each chapter of the book."*

The "Basic Rule of Responsibility" states:

> *"Safety is a command function. Responsibility for the safety of personnel is vested in the commanding officer. Because these safety precautions apply only to usual conditions, commanding officers or others in authority may find it necessary to issue special precautions to their commands to cover local conditions and unusual circumstances. In addition to the posting of appropriate precautions, careful instruction and indoctrination of all personnel are necessary to ensure effective compliance with these precautions."*

In order to coordinate sharing of occupational health information between organizationally distinct, and geographically distant, naval activities, the Bureau of Medicine and Surgery instituted the quarterly publishing of Occupational Health Reports: Occupational Health Hazards during World War II. These reports were initially received by the Bureau of Medicine and Surgery from all field commands staffed with occupational health professionals, condensed, and redistributed to all the submitting commands. (BUMED 1955 (Exhibit 40), 1959 (Exhibit 41), 1961a (Exhibit 42), and 1961b (Exhibit 43).) Later, the Navy Environmental Health Center continued this function until the late 1990s when electronic information sharing made the process obsolete. These reports demonstrate that the sharing of industrial hygiene and other occupational health information and services between commands was common early in World War II.

29. Based on my education, training, and experience, it is my professional opinion that the Navy was well aware of the health hazards associated with the use of asbestos from the early 1920s. The Navy's decision to use asbestos materials was based upon naval operating requirements and missions in light of the known health hazards at various periods in time. The Navy had a longstanding and notable occupational safety and health program that addressed asbestos and other health hazards, and that provided exposure control recommendations and methods that were consistent with the state-of-the-art knowledge in science and medicine. The Navy operated under the premise that control of asbestos exposure could essentially eliminate the hazard of a material considered essential for sustained Navy operations. Using established scientific and medical knowledge, the Navy developed an active program to control the release of asbestos fibers in dusty operations, as well as to monitor the health of workers at risk. The landmark study of Fleischer-Drinker, reported in 1946 (Exhibit 5), confirmed the

general thought that exposures in the Navy to asbestos containing materials could be controlled and health effects could be limited by medical surveillance. Navy industrial programs were directed at controlling what was considered significant releases of dust. During the period from about 1938 through the later 1960s, the widely accepted occupational exposure limit was 5 MPPCF. In the mid-to-late 1960s, the Navy led the way is assessing asbestos exposure of personnel and developing a program and process to eliminate the material based upon new scientific and medical information that was becoming available.

30. The information possessed by the Navy, with respect to the specification and use of asbestos, and the health hazards associated with its use aboard Navy vessels, far exceeded any information that possibly could have been provided by a boiler and auxiliary equipment manufacturer. The boiler and auxiliary equipment manufacturer has absolutely no responsibility or control over the workplace or personnel - both essential aspects of hazard communication. Based upon the knowledge at the time, the Navy was fully aware of the health hazards of asbestos and had a program to control exposure of personnel and monitor their health, since before World War II. The knowledge of the hazards created by the use of asbestos containing materials was weighed with respect to the benefits provided by its use.

31. The Navy controlled asbestos exposure consistent with the then current state of accepted scientific and medical knowledge balanced by needs for national defense. Sailors did not have the option to avoid all exposure to asbestos-containing products or environments in which asbestos was used while on active duty.

32. The Navy's knowledge regarding the applications of asbestos and the health effects represented the state of the art. During the period from the early 1920s to the late 1960s, there was nothing about the hazards associated with the use of asbestos containing products used on or in boilers and auxiliary equipment on United States Navy ships known by a boiler manufacturer, like Foster Wheeler, that was not known by the United States government and the United States Navy.

33. A further question has been asked of me as to whether Navy specifications such as MIL-M-15071D (Department of the Navy, 1961) (Exhibit 3) or Navy instructions such as SECNAV Instruction 5100.8 ("Uniform Labeling Program – Navy," 24 September 1956) (Secretary of the Navy, 1956) (Exhibit 4) support the notion that manufacturers of equipment such as Navy boilers and auxiliary equipment were free to provide their own additional warning information about hazards associated with asbestos-containing products that they did not manufacture.

34. Based upon review of these documents, many other documents regarding the Navy's hazard communication program, my career experiences as an Industrial Hygiene Officer and physician in the Navy dating back to 1972, and personal knowledge of the Navy's hazard communication program and Naval practices generally, I can state as follows:

a. Uniformity and standardization of any communication, and in particular safety information, are crucial to the operation of the Navy. The Navy simply could not operate if various personnel were trained differently, and additionally received inconsistent information from different manufacturers. In fact, SECNAV Instruction 5100.8, Para.1 (Secretary of the Navy, 1956; Exhibit 4) states: *"the purpose of this Instruction is to standardize labeling requirements for hazardous chemical products during usage..."*

b. SECNAV Instruction 5100.8 does not apply to a Navy boiler as it is not a chemical. It is a piece of mechanical equipment.

c. SECNAV Instruction 5100.8 is not addressed to manufacturers (please see "SCOPE" on page one of this instruction), but rather it directs internal Navy "ACTION" as specifically written on page 2 of this instruction. SECNAV Instructions are commands from the Secretary of the Navy directing Navy personnel on the manner in which to carry out their obligations. Requirements for manufacturers seeking to be compensated for materials supplied to the Navy are covered in military specifications, not SECNAV instructions.

d. SECNAV 5100.8 did apply to hazardous materials as discussed under the "BACKGROUND" for promulgation of this instruction on page 2, and, in fact, did contemplate that labels affixed by the manufacturer of the material pursuant to state, federal, and other guidelines (such as MSDSs

published by the Manufacturing Chemists' Association) would be part of the Navy's hazard communication program (see, Para. 2(a)). In fact, asbestos insulation products began containing hazard warning labels from the insulation manufacturers in the mid-1960s. Prior to that time, beginning more than two decades earlier, the Navy's own occupational health program provided training, engineering and administrative controls, personal protective equipment, and medical surveillance to prevent the hazards of asbestos.

e. Any additional warning about the hazards of asbestos by an equipment manufacturer would be only partial in scope as well as inherently redundant, eventually obsolete, and possibly inconsistent with the Navy's own training. In the heat of battle, there is simply no time to be interpreting inconsistent hazard labels.

f. At best, an equipment manufacturer such as Foster Wheeler, which delivered equipment to Navy specifications could merely have told personnel to follow the Navy's own mandates for handling asbestos. This redundant information is not informative, diverts attention from hazards inherent in the equipment, and would certainly become obsolete. Boilers last many years and the Navy's asbestos hazard communication program has evolved over the years to keep pace with scientific developments and changes in materials.

g. If every equipment manufacturer (and conceivably even the pipe and structural steel manufacturers) provided its own warning about asbestos insulation that might be used on or around its product, inconsistent warnings would certainly have resulted. And, keep in mind, many other hazardous substances (e.g. boiler feed water chemicals, fuels, solvents, heavy metals) are used in conjunction with the multitudes of equipment on a ship. If each was to warn about all the possible substances that might be used on or around its equipment, sailors would quickly become inundated with inconsistent information on a myriad of substances.

h. Some types of insulation used by the Navy on equipment were non-asbestos (e.g., fiberglass blankets) and any warning about asbestos on such equipment would simply be wrong.

i. MILSPEC-M-15071D, Para. 3.3.1 (Department of the Navy, 1961; Exhibit 3) makes clear that equipment manufacturers' manuals must first be approved by the Bureau of Ships and the "manual shall not be modified without approval of the Bureau of Ships." Moreover, it cautions: *"Notes, cautions, and warnings should be used to emphasize important critical instructions. The use should be as sparing as is consistent with*

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> *real need."* This specification applied to risks inherent in the operation of the equipment (as distinguished from repair and/or overhaul). Gratuitous warnings about the possible use of materials made by others do not comport with this specification. Any suggestion that Foster Wheeler was free to depart from Navy-approved manuals is incorrect.

35. Lastly, but importantly, Foster Wheeler, as a manufacturer of boilers and auxiliary equipment, was not a subject matter expert regarding the health effects or industrial hygiene controls associated with the use of asbestos-containing materials in naval applications. It is unreasonable to assume that the Navy would have accepted "helpful comments" from a vendor or equipment manufacturer who was not a subject matter expert. The Navy had this specific knowledge and more. The Navy had a robust and encompassing occupational health program that far exceeded just the mere labeling of a material. This program included aspects appropriate for the degree of recognized hazard at various times, including training, engineering controls, medical examinations, provision of personal protective equipment, and use of alternative products when possible.

36. Therefore, I conclude:

a. The information possessed by the Navy with respect to the specification and use of asbestos, and the health hazards associated with its uses aboard Navy vessels, represented the state-of-the-art and far exceeded any information that possibly could have been provided by a boiler manufacturer, like Foster Wheeler. Based upon the state of knowledge at a given period in time, the Navy was fully aware of the recognized health hazards of asbestos and had a robust program to control exposure of personnel and monitor their health.

b. There was no information concerning any asbestos hazards, or dangers posed by any asbestos-containing materials used in boiler and auxiliary equipment supplied under Navy material specifications on a United States Navy ship that was known to a boiler and auxiliary equipment manufacturer, like Foster Wheeler, that was not known to the United States government and the United States Navy.

c. It would be unreasonable to assume that the Navy would have accepted gratuitous, "non-expert" comments from equipment manufacturers and vendors about hazards

associated with products they did not make – and especially for one about which the Navy was already fully aware and much more knowledgeable than the manufacturer or vendor.

I declare under penalty of perjury under the laws of the United States of America that the foregoing facts are true and correct. Executed this __th day of February, 2008.

Lawrence Stilwell Betts, MD, PhD