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NOTES

MT-PWHD-009607

Bessmer, Daniel 6/10-11/82

MT-PWHD-009608

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DEPOSITION SUMMARY OF
DANIEL BESSMER
Seattle, Washington
June 10, 1982


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Examination by Mr. Soltys
(Attorney for UNARCO)

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|---|---|
| Personal Background<br>p.6 | The deponent's name is Daniel James Bessmer. He resides at 6700 Stampede Blvd. N.W., Bremerton, Washington, 98310. He is 65 years old (Born in December 17, 1916). |
| Employment<br>p. 7 | From April 1942 to about June 1974, Mr. Bessmer was employed as an industrial hygienist. He was a naval officer from April 1942 to December 1946; and was employed by PSNS (Puget Sound Naval Shipyard) from 1949 to 1970 as an industrial hygienist. From about 1970 to 1972 he was a supervisory health physicist at Puget Sound Naval Shipyard. |
| Research<br>p. 8 | He was a research associate at the University of Washington from about December 1972 to June 1974. |
| What is an Industrial Hygienist?<br>p. 8 | Mr. Bessmer said: "is a specially trained person who is supposed to detect and evaluate occupational health hazards in the work environment and make recommendations for their control if necessary." |
| Professional Organizations<br>p. 8-9 | Mr. Bessmer belongs to the American Industrial Hygiene Association, and the American Association of Industrial Hygiene. He participated in meetings and also gave lectures. |
| Shipyards<br>p. 10 | As an industrial hygienist in the shipyards he operated under the medical officer which operated under the shipyard commander and the commander would work under the Naval Ship Systems Command - Commanding Officer. |
| p. 10-11 | As an industrial hygienist in the shipyards he would also report to the Bureau of Medicine and Surgery by writing either a monthly or quarterly report including a medical dept. report to go through this bureau. |
| Newsletter<br>p. 11 | Prior to 1950 excerpts of these reports were published quarterly in a newsletter and sent around to other shipyards. |

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| What is a Naval Shipyard?<br>p. 12 | is a shipyard manned by civil servants and is commanded by a naval officer |
| Naval Industrial Hygiene Assoc.<br>p. 13-15 | Mr. Bessmer started this organization in the 1960's. The purpose of this association was to speak as a group and exchange information. In their meetings they presented technical papers (He does not have any of these Papers; does not know if Puget Sound preserved them.) |
| Educational Background<br>p. 16 & 19 | In 1934, Mr. Bessmer received a high school diploma from Mountain View Union High School, California. In 1942 he received a B.A. in physical science from San Jose State College. In January 1947 he received a master's degree in Chemistry from Standford University. |
| Military Background<br>p. 16-17 | Mr. Bessmer joined the Navy on April 24, 1942 His rank was ensign; his job, Industrial Hygiene Officer.<br><br>At the end of June 1942 he was sent by the US Navy, to Colombia University for training in industrial Hygiene. |
| Air Samples<br>p. 18 | While he was at Columbia he learned to take air samples; they studied cotton dust, silica dust, asbestos etc. |
| Asbestos<br>p.19-20 | While at Columbia he was told that asbestos was a hazardous material, that innalation would cause a condition called asbestosis. He was also taught methods by which inhaling excessive amounts of asbestos dust could be avoided. These methods were primarily the use of respirators and ventilation. |
| Return to Mare Island - Survey<br>p. 20-22 | After completing the course at Columbia, Mr. Bessmer returned to Mare Island as an Industrial Hygiene Officer; in 1942, they were directed by the Bureau of Medicine and Surgery to complete an industrial hygiene survey of the shipyard. This survey started immediately on October/November of 1942. The potential hazards were Electro Plating Solutions, some are [illegible] contained chromic acid [illegible] |

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monary distress; also the inhalation of regular welding fumes; solvents like chlorinated hydrocarbons which can cause severe kidney and liver damage.

Results of the Survey
p. 25-26

The first draft was sent through channels to be forwarded to the Bureau of Medicine and Surgery but the captain in the Navy sent the report back and written on was "This would be a good thing on peacetime".

Bessmer and 3 or 4 other industrial hygienist rewrote the report and reduced it substantially in volume and forwarded to the bureau. This report only contained the essential information which was Emasculated.

New York Naval Shipyard
p. 27

After Mare Island, in early 1943, the New York Naval shipyard was Mr. Bessmer's next station; his job was also Industrial Hygiene Officerand stayed there for six months. His jobwas primary sanitation inspection of sewers, looking at food lockers etc.

Pearl Harbor Naval Shipyard
p. 27-29

Mr. Bessmer's rank was lieutenant junior grade and he reported to duty there on Sept. 1944; he stayed for two years and his job was industrial hygiene officer; primary assigned to no lead absorption test; check electricians and welders for color blindness.

He also made some special investigations: found formaldehyde in the insulation which can cause respiratory distress.

Naval Air Station in San Diego, CA
p. 29

In January 1946 he was released to inactive duty and went to the Naval Air Station in San Diego; he was an Industrial Hygiene Officer for two months. He looked in the shop and ran few lean samples and then he received his release to active duty.

Navy Precautions
p.30

They had respiratory protection; they also received semi-annual and annual chest x-rays but Mr. Bessmer does not know when this practice was initiated.

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| TLV<br>p. 30 | During the period of 1942 to 1946, the TLV was 5mmpcf; this figure was published by the American Conference of Governmental Industrial Hygienists and adopted by the Navy Industrial Hygienist. |
| Existence of Health Hazard at the Shipyard<br>p. 35-36 | If there is a health hazard at the shipyard; the industrial hygienist formulates recommendations for control. The function of the industrial hygienist stops here and the Production Officer or Public Works Officer take over. |
| Other Industrial Hygienist at Puget Sound<br>p. 38 | When Bessmer went to PSNS in 1949, there was only one other industrial hygienist (Robert L. Gade, Lieutenant Commander). |
| p. 40-42 | Mr. Bessmer believed that the asbestos dust in the air at Puget Sound was something which required monitoring. He took samples with a midget impinger. When Mr. Bessmer arrived at Puget Sound In 1949, the shipyards considered asbestos workers to be involved in a hazardous occupation. The workers received periodic chest x-rays; first every six months; later they were switched to annual. Also initially , Navy doctors were doing the examination but, eventually (late 50's or early 60's) they used civilian doctors. |
| Bureau of Ships (1949)<br>p. 42-43 | Mr. Bessmer believes that in the late 60's the Bureau of Ships promulgated guidelines by which asbestos products should be handled in Naval shipyards. |
| Ventilation at Puget Sound<br>p. 43 | In 1949, in ship 56, ventilation was being used to cut down the amount of asbestos particles in the air. |
| Shop 56<br>p. 43 | Was the pipe covers, insulators and pipefitters |
| Puget Sound Familiarzation Tour for Bessmer<br>p. 45-49 | Commander Gade conducted Mr. Bessmer for about 6 months on a tour of the ship and shops; after the tour, Mr. Bessmer completed on informal survey called Inspection Survey. |

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In 1950 the Production Officer, Captain Bell wrote in memorandum to the official officer requesting that Mr. Bessmer should not be allowed in the shops. He was barred from all the shops.

In the middle 50's he gain access again to go into any of these shops because Captain Bell retired.

Respirators
p. 49-51
(also see p. 56-58, p. 75-77, p. 134-140, and p. 211)

Mr. Bessmer does not remember when he first arrived at Puget Sound in 1949 observing any asbestos workers wearing respirators. He remembers that in 1950 some did.

Respirator were available from shop 06 (Tool Room) by just asking for one.

Recommendations to use respirators were advise by Commander Gade.

p. 51-53

While working in the other shipyards (Long Beach, Mare Island, Pearl Harbor) Mr. Bessmer personnally did not advise any asbestos workers to use a respirator; at Puget Sound probable in 1950 he personnally advised the use of respirators. He send this formal recommendation in letter form to the Production officer with copies to the shop head.

Shop Head for Shop 56
p. 52

In the 1950's - Mr. Chandler and later Mr. Colin Edwards

Discussion RE Asbestos Hazards
p. 54

Mr. Bessmer had a discussion with the Shop Head regarding the asbestos hazards and suggested that respirators be worn by his people; he told him that it was an inhalation hazard that could cause Asbestosis.

The Shop Head relaid this information on to the asbestos workers and he put out a memorandum in 1961.

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| Type of Respirators Used at Puget Sound<br>p. 56 (also see pp. 40-51, 75-77, 134-140 and p. 211 | They were a rather obsolete design, World War II vintage, manufactured by Mine Safety Appliance Corp. They were the double cannister style respirators. |
| p. 57-58 | If the conditions were dusty, Mr. Bessmer would suggest that they were respirators. But he had some difficulty in getting the workers to wear their respirators. |
| Union Representatives<br>p. 58 | The METDC Trades Council was a worker's representative at the time; Mr. Bessmer had conversations with Mr. Ramage regarding the use of respirators. |
| Magnesia<br>p. 59 | Mr. Ramage thought that the worker were dying from the inhalation of Magnesia and Mr. Bessmer told Mr. Ramage that the hazard was the Asbestos.<br><br>Mr. Ramage represented pipe covers and insulators at Puget Sound only. |
| Caution Labels<br>p. 62 (also see pp. 86-87, 88-90, 103, and 165-166) | In the late 50's while at PSNS the US Navy produced labels for hazardous materials; Mr. Rosati at Mare Ilsand was the person responsible for this program.<br><br>These labels were not produce specifically for products containing asbestos particles. The label placed on products containing asbestos said: "Toxic, inhalation hazard, wear respiratory protection". |
| Mr. Bessmer's Assistant<br>p. 65 | Mr. Bessmer had an assistant, Jack McElhiney and trained thru to be an Industrial Hygienist. |
| Industrial Hygiene Lab at Puget Sound<br>p. 65 | When Mr. Bessmer arrived in 1949 at PSNS, the lab was very limited, subsequently the lab expanded. |
| p. 66 | - Missing in Deposition - |
| Marr/Report on Asbestos Workers<br>p. 67-73 | In 1962 or 1964 (Mr. Bessmer is hazy on Dates) he received information from Mr. Marr of Long Beach, Mr. Marr had written a report covering the asbestos workers and his findings. |

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At that time when Mr. Bessmer receive the article (Report), he had commenced his own study/survey but was unable to get the Physicians reading X-rays to provide him with names and shops of people showing fibrotic changes in the lung about 1960.

Since 1948, he suspected a connection between the fibrotic changes in the lung and the inhalation of asbestos particles.

After the MARR Report, Mr. Bessmer talked to Mr. Edwards, the Shop Head of Shop 56 and encouraged more ventilation to reduce airborn asbestos particles at PSNS. Also the use of respirators increased.

Memorandum Re: Respirators
p. 75-77 (also see pp. 49-51, 56-58 and p. 211

In 1961 the Shop 56 Head distributed a memorandum which was revised in 1966; This memo required to wear respirators while working with asbestos products.

After the second memorandum (1966) Mr. Mangold observed workers working without respirators.

Wet Sweeping
p. 78-79

In the early 1950's Mr. Bessmer recommended wet sweeping at PSNS. This procedure was probably implemented by Commander Gade.

Mr. Bessmer's Assistants
p. 80

After Mr. McElhiney, Mr. Harry Rigner was his assistant; in 1962 Mr. Mangold was hired and in 1963 Mr. Beckett was hired.

Mr. Mangold and Mr. Beckett became Industrial Hygienist at PSNS. Mr. Mangold took Mr. Bessmer's position first and then when he went to OSHA Mr. Beckett took his position.

Mr. Manning
p. 84-85

Was a civilian industrial hygienist at Long Beach Naval Shipyard. In the early 60's he went to PSNS to see what kind of industrial hygiene program they had in general.

Labels
p. 86-87 (also see pp. 88-90, 103, 133 and p. 165-166

Labels were placed on items such as Chlorinated Hydrocarbon solvents, Benzine products like Substances, Asbestos, Silica dust (Asbestos cement, Magnesia Block).

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| Magnesia Block/Labels p. 88-90 (also see pp. 62, 86-87, 88-90, 103, 133 and 165-166 | This product came to Puget Sound in cardboard cartons and the supply department was responsible for labeling the materials received in the shipyard. In the case of the Magnesia Block the label was placed outside on the carton not on the individual Block. |
| Safety Programs at Puget Sound p. 90 | There were not formalized programs. Mr. Bessmer gave lectures to apprentices and to survivors on general industrial hygiene matters. |
| Stand Up Safety Meeting p. 92 | These meetings were held on Friday afternoon; conducted in shop by supervisory personnel. Occasionally agendas were prepared for these meetings. |
| Ventilation p. 96 | Mr. Bessmer recommended to increase the the ventilation at PSNS but it was not increased. |
| Duncan Holiday and Reitze p. 98 | They visited the shipyard in the late 60's. |
| Articles (Exhibit I and II p. 100-101 | The 1968 Report (Exhibit I) is entitled Asbestos Exposure and Pulmonary X-ray changes to pipe covers and insulation at PSNS; authored by C.A. Mangold, R.R. Beckett and D.J. Bessmer, Industrial Hygiene Division Puget Sound Naval Shipyard, Bremerton, Wa.<br><br>The 1970 Article (Exhibit II) is entitled Asbestos Exposure and Control; authors Mr. C.D. Mangold, R.R. Beckett and D.J. Bessmer. |
| Wetting Down Asbestos p. 101-102 (also see p. 78-79) | Mr. Bessmer stated that when he came to PSNS in 1949 he observed that men were wetting down asbestos before cutting to prevent the formation of dust in the breathing gear. He believes Mr. Gade told them to do that. |

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Examination by Mr. Hennessey
(Attorney for Pittsburg-Corning)

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| Labeling Program<br>p. 103 (also see pp. 62, 86, 87, 88-90, 103, 133 and 165-166 | Mr. Bessmer instituted the labeling program immediately after Mare Island instituted their program. (no exact date available; Its possible that Mare Island has records). |
| Command Structure<br>p. 104-105 | The Shipyard itself was under the control of the Naval Ship Systems Commander or Bureau of Ships. The Bureau of Medicine and Surgery was their techical Bureau in the Medical Dept. |
| Asbestos Exposure Issues<br>p. 105 | In the 1950's Commander Babione had this responsibility; he was in charge of occupational health at the Bureau of Medicine.<br><br>Commander George Lawton, M.D., Captain Hutchinson M.D., Captain Beck M.D., held that position at one time. |
| Johnson, Barboo, and Siegel<br>p. 106 | Industrial Hygienists<br>- Jac Siegel was a toxicologist and Barboo started out as a Sanitarian Industrial Hygienist. |
| Commander Babione<br>p. 107 | Had a medical degree. |
| Publication<br>p. 108-109 | There was a Quarterly publication compiled from excerpts from the quarterly health reports to Bu Med; consistent in three editions: 1.) Discussed any cases of interes in the occupational health field (written by a Doctor); 2.) Described work done by the Industrial Hygienist RE: Findings and controls recommended; 3.) Sanitation (food, water supply, Sewage Disposal). |
| Chest X-ray Abnormalties<br>p. 111-112 | Since the 50's Mr. Bessmer was trying to get information on X-ray abnormalities on workers, but he did not get them until the 60's, even though these were available. |
| Asbestos Control Attempts<br>p. 113 | Until the very end of 1975, Mr. Bessmer got a response from [illegible] with regard to Asbestos Control Attempts. |

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| Communication with BUMED<br>p. 114 | Mr. Bessmer communicated with BU Med through the quarterly report, occasionally by telephone and sometimes by personal letter to Captain Beck, Commander Balisene, San Barboo and Johnson.<br><br>He would also meet with these people on an annual basis at the American Industrial Hygiene Association Conference. |
| Exhibit I<br>p. 115 | The part of Mr. Bessmer played authorizing this document (1968 Report) was primarily review. Mr Bessmer compiled the X-ray abnormalities and turned them over to Mr. Mangold and Mr. Mangold did the necessary investigation. |
| Exhibit II<br>p. 116 | Again, the part Mr. Bessmer played authoring this document (1970 Report) was review; and again, Mr. Mangold did the majority of the compilation and investigation. |
| Table 5<br>p. 116 | According to Mr. Bessmer this is an accurate list of asbestos containing products compiled by Mr. Mangold. Mr. Mangold went into the the ship and on the ship looked at usage rates. This information was probably collected in 1966 or 1967. |

Examination by Mr. Slagle
(Attorney for Eale Pitcher)

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| Ship Trades<br>p. 120-121 | Various trades are involved to completed a vessel i.e., ship fitters, welders, electricians, machinists.<br><br>Welders and machinists would most commonly be working in the area of asbestos insulators; the estimated time they would be in this area would vary widely (5 minutes to all day). |
| Table 1<br>p. 122-123 | Table 1 is part of Exhibit I; this table shows a large disparity in the incidence of asbnormal chest xrays in the various trade: i.e., pipe coverers and insulators were exposed to asbestos and their high incidence was attributed by Mr. Bessmer to Asbestos. The Boilermakers are next since they work with asbestos and other materials which can produce lung conditions. |

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| | Mr. Bessmer stated that its possible to handle asbestos in a safe manner. |
| Asbestos Cement<br>p. 124-127 | Mr. Bessmer in his 1970 report had recommended mixing asbestos cement in plastic bags that were closed. He believed it would reduce the incidence of lung disease.<br><br>Respirators were also recommended to wear when mixing cement.<br><br>Sometimes the cement was mixed in the open air and sometimes in shacks. |
| Ovrille Dean, M.D.<br>p. 125 | Dr. Dean is one of the Medical officers in the PSNS Medical Dept. |
| Air Samples<br>p. 130 | In 1949 air samples had already been taken and Dr. Bessmer subsequently conducted additional air sampling. |

Examination by Mr. Mertel
(Attorney for Fiberboard)

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| Approved Materials Listt<br>p. 132 | When dealing with mixtures of materials, Mr. Bessmer would go to the supply dept. and look up Navy specifications. |
| Labels for Asbestos<br>p. 133 (also see pp. 62, 86-87, 88-90, 103 and 165-166 | There was no specific label for Asbestos; the Navy generated some labels that said, "Insulator, Hazardous, Respirator should be worn." |
| Respirators<br>p. 134-140 (also see pp. 49-51, 56-58, 75-77, 134-140 and p. 211 | Respirators became mandatory around 1966. The supervisory personnel of the shop was responsible to enforce the requirement to wear respirators.<br><br>Mr. Bessmer through informed conversations, encouraged the METAC Trades Council, (this was a pre-union) Mr. Ramage and other representatives in the pipe coverers and insulators dept. to involve themselves in this health matter.<br><br>Mr. Bessmer never enforced responsibilities, <u>only recommended</u> what should be done. |
| Rules and Regulations<br>p. 140-141 | Any Rules and Regulations developed by Mr. Bessmer as an industrial hygienist should have to go to the shop heads for review and approved. |

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Examination by Ms. Gail Lundgren
(Attorney for Owens-Corning)

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| Mr. Mangold<br>p. 142 | Was hired by Mr. Bessmer in 1962; he worked under Mr. Bessmer in the Industrial Hygiene Dept. from 1962 to 1970. |
| Medical Officers<br>p. 143-144 | Dr. McBratney - Civilian doctor at PSNS when Captain Hutchinson left in 1965 he assumed the head physician he retired until 1972. |
| | Captain Beck - Medical officer at PSNS in 1950. |
| | Captain Reid - (deceased) took over Captain Beck about 1953 or 1954. |
| | Captain Jeffers - Took over Captain Reid |
| | Other: Captain Ecklund and Dr. Carter. |

DEPOSITION CONTINUED JUNE 11, 1982

Examination by Mr. Ley
(Attorney for Combustion Engineering

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| Stand up Safety Meetings<br>p. 146<br>(also see p. 92) | The Safety Division of Industrial Relations Dept. in the shipyard was in care of these meetings (repeated: held weekly). |
| | Mr. Switzel was the Head of the Safety Division; Bob Britten was the Head of the Industrial Relations Department and before him there was Joe King was in charge (probable late '50's - early '60's) |
| Exhibit III<br>p. 149 | Is an excerpt from Safety Review Magazine (Oct. 1962) titled: Asbestosis |
| Exhibit IV<br>p. 150 | Is an article published in the American Industrial Hygiene Journal (May/June 1964) title: Asbestos Exposure during Naval Vessel Overhaul, Offered by William T. Marr. |

Examination by Mr. Hilfer
(Attorney for the Plaintiffs)

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| TLV<br>p. 151 (also see pp. 178-194, 213 and 227 | The Threshold Limit Value was defined by Mr. Bessmer: "Is the value of exposure measurement below which most people will not suffer harm." The TLV is associated with dust. |

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| Maximum Allowable Concentration (MAC) p. 152 | The TLV superceeded the maximum allowable concentration; The MAC was the old method of defining exposure limits and is roughly a ceiling concentration above which exposure should not be allowed (5 mpcf) |
| Hazards p. 154-155 | Is Mr. Bessmer's opinion that in the early '50's is that workers at PSNS knew there was a hazard associated with asbestos -- that asbestos dust should not be inhaled. |
| Dust Control Procedures p. 156 | The dust control procedures in 1949 were not limited only to asbestos dust. |
| Dust Counts p. 156 | Mr. Bessmer began to take dust count since 1950. |
| Annual Physical Examination p. 159 | In 1940 Source Trades got annual physical examinations: i.e.,<br>- Employees in dusty operation got annual x-rays (including asbestos workers)<br>- Electroplaters got a semi-annual physical<br>- Lead workers got Urinary Lead Tests<br>- Firemen got annual physicals |
| Barred from Shops p. 160 | Mr. Bessmer was barred from the shops for about five months until the production officer retired. |
| Labeling Program p. 165-166 (also see pp. 62, 86, 87, 88-90, 103 and 133 | Bascially in this program, the Navy had approximately six different kinds of labels: one was toxic, poison, oxidizer, corrosive and flammable. The color for these labels was different for each one i.e., toxic - red, corrosive - white.<br><br>The labels placed on asbestos products (toxic) did not include the word Asbestosis or Cancer. |
| Visitors Contact with J-M//Dr. Reitze p. 166-167 | Around 1969 or 1970 - Dr. Reitze visited PSNS. After his visit he wrote a letter to the Chief, BU Med and copy to the shipyard, generally it said that PSNS had a good program. |
| Risk of Cancer p. 168 | Sometime in the 1960's Mr. Bessmer first became aware that there was a risk of Cancer associated with exposure to Asbestos. |

PRIVILEGED



J-M 83

MT-PWHD-009624

| | |
|---|---|
| Lecture at Columbia University<br>p. 169<br>(also see p. 185) | Mr. Bessmer took a course in 1942 at Columbia and remembers Dr. Garner saying that Asbestosis was similar to Silicosis; that Asbestosis didn't produce death but might be disabling. |
| Health Hazard Evaluation<br>p. 174 | Normally an industrial hygienist would evaluate a potential health hazard by taking air samples in the breathing zones of people, refer to literature, textbooks, printed materials from the manufacturers of products, hiw own knowledge and experience, attend conferences, and another source is epidemiological studies. |
| PSNS Duties<br>p. 177 | In 1962 PSNS was chosen to be a nuclear shipyard; getting the nuclear program going, took most of the time. |
| TLV and J-M<br>p. 178-194 (also see pp. 213 and p. 227) | In 1959 J-M Corp. had two methods of counting dust: 1) 5 mppcf and 2) one million fiber per cubic foot for the fiber. (Mr. Bessmer was not aware of this). Mr. Bessmer believes that is probably true that the TLV was mainly intended to prevent the incidence of Asbestosis and not of Cancer. Asbestosis was the only hazard Mr. Bessmer knew of in those early days. |

Examination by Mr. Kirk Mortensen
(Attorney for the Plaintiffs)

| | |
|---|---|
| Lecture at Columbia University<br>p. 185 (also see p. 169) | The lecture given by Dr. Gardner lasted about half a day. |
| Mare Island Survey<br>p. 186 | Mr. Bessmer made a hazard survey at Mare Island in 1942; made a written report. |
| Work Force<br>p. 189 | The greatest number of people in the general force at PSNS was 15,000 at one time. |
| Respirators and Goggles<br>p. 190-192 (also see pp. 49-51, 56-58, 75-77, 134-140 and p. 211) | No Respirators or masks were provided to pipe coverers and insulators upon their beginning of employment as PSNS. Mr. Bessmer heard reports/complaints about the difficulties the workers had when they had to wear goggles for eye protection and a respirator at the same time; the mask would push the goggles up and then they couldn't see what they were doing. |



PRIVILEGED
J-M 83

MT-PWHD-009625

| | |
|---|---|
| Exhibit B, C & D<br>p. 195-205 | Manufacturer's literature on Kaylo Heat Insulation -- the third page of this Exhibit states that "Block or Pipe Insulation can be sowed, cut or scored with ordinary tools; the material is non-irritating to the skin and non-toxic."<br><br>J-M Data Sheet on Thermal Insulation products -- states "Easy to apply and safe to handle." It is a non-burn asbestos paper product with 95% fiber content.<br><br>The above contradicts the message Mr. Bessmer got from Dr. Gardner in 1942. That statement would be a clear message that there was no risk in working with that product that contained 88% Asbestos Fiber. |
| Exhibit D<br>p. 205-206 | Is a letter written to Mr. Albert Edwards, Industrial Hygiene Engineer, Indiana State Board of Health. This letter lists ingredients of materials called Careytemp Insulation. (Mr. Bessmer never heard before about Careytemp insulation) |
| Respirators<br>p. 211 (also see pp. 49-51, 56-58, 75-77, and 134-140) | Respirators were required earlier than 1968 but they became mandatory in 1968. |
| TLV<br>p. 213 (also see pp. 151, 178-194 and p. 227) | Mr. Bessmer's initial impression years ago was that the TLV was a safe exposure level and his present state of knowledge is that almost any amount of asbestos could be harmful. |

Examination by Mr. Willhite
(Attorney for the Plaintiffs)

| | |
|---|---|
| Employment/Other Shipyards<br>p. 215-217 | Mr. Bessmer serve at Pearl Harbor Shipyard from September 1943 - 1945; during this time he conducted air sample surveys -- took samples for formaldehyde with a midgest impinger. Did not conduct studies for AIRBORNE Asbestos. |
| Safety Manuals<br>p. 218 | The Asbestos exposure and control manuals were put out by the shipyard. |

PRIVILEGED

J-M 83



MT-PWHD-009626

| | |
|---|---|
| Exhibit B, C & D<br>p. 195-205 | Manufacturer's literature on Kaylo Heat Insulation -- the third page of this Exhibit states that "Block or Pipe Insulation can be sowed, cut or scored with ordinary tools; the material is non-irritating to the skin and non-toxic."<br><br>J-M Data Sheet on Thermal Insulation products -- states "Easy to apply and safe to handle." It is a non-burn asbestos paper product with 95% fiber content.<br><br>The above contradicts the message Mr. Bessmer got from Dr. Gardner in 1942. That statement would be a clear message that there was no risk in working with that product that contained 88% Asbestos Fiber. |
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| Safety Manuals<br>p. 218 | The Asbestos exposure and control manuals were put out by the shipyard. |

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J-M 83



MT-PWHD-009627

DJB8202

(1)

(35 pages total)

DEPOSITION SUMMARY OF
DANIEL BESSNER
SEATTLE, WASHINGTON
JUNE 10, 1982

KING COUNTY ASBESTOS CASES OF SCHROETER, GOLDMARK & BENDER: LEVINSON, FRIEDMAN, et al; BANGS, CASTLE, et al; DODD, CONEY AND BISHOP, McCUTCHEON & GROSHONG: WALTHEW, WARNER, et al; ROY E. JACKSON,

VS.

JOHNS-MANVILLE CORP; UNARCO INDUSTRIES, INC., et al,

NO. 81-2-18584-3

EXAMINATION BY MR. SOLTYS
(ATTORNEY FOR UNARCO)

PERSONAL BACKGROUND

PRIVILEGED
J-M 83

THE DEPONENT'S NAME IS DANIEL JAMES BESSNER, ~~HE~~ HE RESIDES AT 6700 STAMPEDE BLVD. N.W., BREMERTON, WASHINGTON, 98310. HE IS 65 YEARS OLD (BORN IN DECEMBER 17, 1916).

MT-PWHD-009628

EMPLOYMENT

p. 7

FROM APRIL 1942 TO ABOUT JUNE, 1974, MR. BESSNER WAS EMPLOYED AS AN INDUSTRIAL HYGIENIST. HE WAS A NAVAL OFFICER FROM APRIL 1942 TO DECEMBER 1946; AND WAS EMPLOYED BY ~~PUGET SOUND NAVAL SHIPYARD~~ *PSNS FROM 1949 TO 1970 AS AN INDUSTRIAL HYGIENIST. FROM ABOUT 1970 TO 1972 HE WAS A SUPERVISORY HEALTH PHYSICIST AT PUGET SOUND NAVAL SHIPYARD.

RESEARCH

p. 8

HE WAS A RESEARCH ASSOCIATE AT THE UNIVERSITY OF WASHINGTON FROM ABOUT DECEMBER 1972 TO JUNE 1974.

WHAT IS AN INDUSTRIAL HYGIENIST?

p. 8

MR. BESSNER SAID: "IS A SPECIALLY TRAINED PERSON WHO IS SUPPOSED TO DETECT AND EVALUATE OCCUPATIONAL HEALTH HAZARDS IN THE WORK ENVIRONMENT AND MAKE RECOMMENDATIONS FOR THEIR CONTROL IF NECESSARY".

PRIVILEGED
J-M 83

PROFESSIONAL ORGANIZATION

p. 8-9

MR. BESSNER BELONGS TO THE AMERICAN INDUSTRIAL HYGIENE ASSOCIATION, AND THE AMERICAN BOARD OF INDUSTRIAL HYGIENE.

* PSNS = PUGET SOUND NAVAL SHIPYARD

HE PARTICIPATED IN MEETINGS AND ALSO GAVE LECTURES.

SHIPYARDS

p. 10

AS AN INDUSTRIAL HYGIENIST IN THE SHIPYARDS HE OPERATED UNDER THE MEDICAL OFFICER WHICH OPERATED UNDER THE SHIPYARD COMMANDER AND THE COMMANDER WOULD WORK UNDER THE NAVAL SHIP SYSTEMS COMMAND - COMMANDING OFFICER

p. 10-11

AS AN INDUSTRIAL HYGIENIST IN A SHIPYARD HE WOULD ALSO REPORT TO THE BUREAU OF MEDICINE AND SURGERY BY WRITING EITHER A MONTHLY OR QUARTERLY REPORT INCLUDING A MEDICAL DEPT. REPORT TO GO THROUGH THIS BUREAU.

NEWSLETTER

p. 11

PRIOR TO 1950 EXCERPTS OF THESE REPORTS WERE PUBLISHED QUARTERLY IN A NEWSLETTER AND SENT AROUND TO OTHER SHIPYARDS

WHAT IS A NAVAL SHIPYARD?

p. 12

IS A SHIPYARD MANNED BY CIVIL SERVANTS AND IS COMMANDED BY A NAVAL OFFICER

PRIVILEGED
J-M 83

(4)

NAVAL INDUSTRIAL HYGIENE ASSOCIATION

p. 13 - ~~14~~ 15

MR. BESSMER STARTED THIS ORGANIZATION IN THE 1960'S. ~~AT~~ ~~IN THEIR MEETINGS,~~ ~~THEY PRESENTED TECHNICAL PAPERS; WHICH~~ ~~HE GOT~~ ~~HE ASSUMES THAT WHEN HE~~ THE PURPOSE OF THIS ASSOCIATION WAS TO SPEAK AS A GROUP AND EXCHANGE INFORMATION. - IN THEIR MEETINGS THEY PRESENTED TECHNICAL PAPERS (HE DOES NOT HAVE ANY OF THESE PAPERS; ~~NEITHER~~ PUGET SOUND DOES KNOW IF ~~THEY~~ ~~WERE~~ PRESERVED THEM)

EDUCATIONAL BACKGROUND

p. 16

MR. BESSMER ~~HAS~~ RECEIVED IN 1934 A HIGH SCHOOL DIPLOMA FROM MOUNTAIN VIEW UNION HIGH SCHOOL, CALIFORNIA. IN 1942 HE RECEIVED A B.S. IN PHYSICAL SCIENCE FROM SAN JOSE STATE COLLEGE.

PRIVILEGED J-M 83

JOINED THE NAVY

p. 16-17

MR. BESSMER JOINED THE NAVY ON APRIL 24, 1942. HIS RANK WAS ENSIGN; HIS JOB, INDUSTRIAL HYGIENE OFFICER.

AT THE END OF JUNE 1942 HE WAS SENT BY THE USNDY TO COLUMBIA UNIVERSITY FOR TRAINING IN INDUSTRIAL HYGIENE.

(5)

AIR SAMPLES
p. 18

WHILE HE WAS AT COLUMBIA HE LEARNED TO TAKE AIR SAMPLES; THEY STUDIED COTTON DUST, SILICA DUST, ASBESTOS ETC..

EDUCATION BACKGROUND CONTINUED
p. 19

IN JANUARY 1947 HE RECEIVED A MASTER'S DEGREE IN CHEMISTRY FROM STANFORD UNIVERSITY.

ASBESTOS
p. 19-20

WHILE AT COLUMBIA HE WAS TOLD THAT ASBESTOS WAS A HAZARDOUS MATERIAL, THAT INHALATION WOULD CAUSE A CONDITION CALLED ASBESTOSIS. HE WAS ALSO TAUGHT METHODS BY WHICH ~~HE~~ INHALING EXCESSIVE AMOUNTS OF ASBESTOS DUST COULD BE AVOID

THESE METHODS WERE PRIMARILY ~~TO~~ THE USE OF RESPIRATORS AND VENTILATION.

RETURN TO MARE ISLAND
p. 20-~~21~~ 22

AFTER COMPLETING THE COURSE AT COLUMBIA, MR. BESSMER RETURN TO MARE ISLAND AS AN INDUSTRIAL HYGIENE OFFICER; IN 1942 ~~HE WAS~~ THEY ~~THEY WERE~~ DIRECTED BY THE BUREAU OF MEDICINE AND SURGERY TO COMPLETE AN INDUSTRIAL

PRIVILEGED
J-M 83

HYGIENE SURVEY OF THE SHIPYARD. THIS SURVEY STARTED IMMEDIATELY ON OCTOBER/NOVEMBER OF 1942 & THE POTENTIAL HAZARDS WERE ELECTRO PLATING SOLUTIONS) SOME ARE CYANIDE BASE AND SOME CONTAINED CHROMIC ACID WHICH CAUSE PULMONARY DISTRESS; ALSO THE INHALATION OF REGULAR WELDING FUMES; SOLVENTS LIKE CHLORINATED HYDROCARBONS WHICH CAN CAUSE SEVERE KIDNEY AND LIVER DAMAGE.

POTENTIAL HAZARDS AT MARE ISLAND p. 22-24

RESULTS OF THE SURVEY p. 25-26

THE FIRST DRAFT WAS SENT THROUGH CHANNELS TO BE FORWARDED TO THE BUREAU OF MEDICINE & SURGERY BUT THE CAPTAIN IN THE NAVY SENT THE REPORT BACK AND WRITTEN ON WAS "THIS WOULD BE A GOOD THING ON PEACETIME".

(BESSMER AND 3/4 OTHER INDUSTRIAL HYGIENISTS)

THEY RE WROTE THE REPORT AND REDUCED IT SUBSTANTIALLY IN VOLUME AND WAS FORWARDED TO THE BUREAU. THIS REPORT ONLY CONTAINED THE ESSENTIAL INFORMATION WHICH WAS EMASCULATED

PRIVILEGED

J-M 83

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IN EARLY 1943,

NEW YORK NAVAL SHIPYARD
p. 27

THIS SHIPYARD WAS MR. BESSMER'S NEXT STATION AFTER MARE ISLAND; HIS JOB WAS AS INDUSTRIAL HYGIENE OFFICER AND STAYED THERE FOR SIX MONTH. HIS JOB WAS PRIMARY SANITATION, INSPECTION OF SEWERS, LOOKING AT FOOD LOCKERS ETC..

PEARL HARBOR NAVAL SHIPYARD
p. 27-29

MR. BESSMER'S RANK WAS LIEUTENANT JUNIOR GRADE AND HE REPORTED TO DUTY THERE ON SEPT. 1944; HE STAYED FOR TWO YEARS AND HIS JOB WAS INDUSTRIAL HYGIENE OFFICER; PRIMARY ASSIGNED TO DO LEAD ABSORPTION TESTS; CHECK ELECTRICIANS AND WELDERS FOR COLOR BLINDNESS.

PRIVILEGED
J-M 83

HE ALSO MADE SOME SPECIAL INVESTIGATIONS; FOUND FORMALDEHYDE IN THE INSULATION WHICH CAN CAUSE RESPIRATORY DISTRESS.

NAVAL AIR STATION IN SAN DIEGO, CALIF
p. 29

IN JANUARY 1946 HE WAS RELEASED TO INACTIVE DUTY AND WENT TO THE NAVAL AIR STATION IN SAN DIEGO; THIS TASK WAS INDUSTRIAL

HYGIENE OFFICER FOR TWO MONTHS HE LOOKED IN THE SHOP AND RAN FEW LEAD SAMPLES AND THEN HE RECEIVED HIS RELEASE TO ACTIVE DUTY.

NAVY PRECAUTIONS
p. 30

THEY HAD RESPIRATORY PROTECTION; ~~THEY~~ THEY ALSO RECEIVED SEMI-ANNUAL AND ANNUAL CHEST RAYS BUT MR. BESSMAR DOES NOT KNOW WHEN THIS PRACTICE WAS INITIATED.

TLV
p. 30

DURING THE PERIOD OF 1942 TO 1946 THE TLV WAS 5 mppcf; THIS FIGURE WAS PUBLISHED BY THE AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS AND ADOPTED BY THE NAVY INDUSTRIAL HYGIENIST.

EXISTENCE OF HEALTH HAZARDS AT THE SHIPYARD
p. 35-36

IF THERE IS A HEALTH HAZARD AT THE SHIPYARD; THE INDUSTRIAL HYGIENIST FORMULATES RECOMMENDATIONS FOR CONTROL. THE FUNCTION OF THE INDUSTRIAL HYGIENIST STOPS HERE AND THE PRODUCTION OFFICER OR PUBLIC WORK OFFICER TAKE OVER.

PRIVILEGED
J-M 83

OTHER INDUSTRIAL HYGIENIST AT PUGET SOUND
p. 38

WHEN BESSMER WENT TO PSNS ~~WAS TRANSFERRED TO PUGET SOUND NAVAL SHIPYARD~~ IN 1949; THERE WAS ONLY ONE MORE INDUSTRIAL HYGIENIST (ROBERT L. CADE, LIEUTENANT COMMANDER).

(9)

p. 40 - 42

MR. BESSNER BELIEVED THAT THE ASBESTOS DUST IN THE AIR AT PUGET SOUND WAS SOMETHING WHICH REQUIRED MONITORING. HE TOOK SAMPLES WITH A MIDGET IMPINGER. WHEN MR. BESSNER ARRIVED AT PUGET SOUND IN 1949 THE SHIPYARDS CONSIDERED ASBESTOS WORKERS TO BE INVOLVED IN A HAZARDOUS OCCUPATION. THE WORKERS RECEIVED PERIODIC CHEST X-RAYS; FIRST EVERY SIX MONTHS; LATER THEY WERE SWITCHED TO ANNUAL. ALSO INITIALLY NAVY DOCTORS WERE DOING THE EXAMINATION (late 50's or early 60's) BUT EVENTUALLY THEY USED CIVILIAN DOCTORS.

BUREAU OF SHIPS (1949)

p. 42-43

MR. BESSNER BELIEVES THAT IN THE LATE 60'S THE BUREAU OF SHIP PROMULGATED GUIDELINES BY WHICH ASBESTOS PRODUCTS SHOULD BE HANDLED IN NAVAL SHIPYARDS

VENTILATION AT PUGET SOUND

p. 43

IN 1949 IN SHOP 56 VENTILATION WAS BEING USED TO CUT DOWN THE AMOUNT OF ASBESTOS PARTICLES IN THE AIR.

SHOP 56

p. 43

WAS THE PIPE COVERS, INSULATORS AND PIPE-FITTERS

PRIVILEGED

J-M 83

(10)

PUGET SOUND

FAMILIARIZATION

TOUR FOR BESSMER

p. 45-~~48~~ 49

COMMANDER GADE CONDUCTED MR. BESSMER ~~[illegible]~~ FOR ABOUT A MONTH ON A TOUR OF THE SHIP AND SHOPS; AFTER THE TOUR MR. BESSMER COMPLETED AN INFORMAL SURVEY CALLED INSPECTION SURVEY.

IN 1950 THE PRODUCTION OFFICER, CAPTAIN BELL, WROTE A MEMORANDUM TO THE MEDICAL OFFICER REQUESTING THAT MR. BESSMER SHOULD NOT BE ALLOWED IN THE SHOPS, HE WAS BARRED FROM ALL THE SHOPS

IN THE MIDDLE 50'S HE GAIN ACCESS AGAIN AS TO GO INTO ANY OF THESE SHOPS BECAUSE CAPTAIN BELL RETIRED.

RESPIRATORS

p. 49-51

MR BESSMER DOES NOT REMEMBER WHEN HE FIRST ARRIVED AT PUGET SOUND IN 1949 OBSERVING ANY ASBESTOS WORKERS WEARING RESPIRATORS. HE REMEMBERS THAT IN 1950 SOME DID.

RESPIRATOR WERE AVAILABLE FROM SHOP 06 (TOOL ROOM) BY JUST ASKING FOR ONE.

RECOMMENDATIONS TO USE RESPIRATORS WERE MADE BY COMMANDER GADE.

PRIVILEGED
J-M 83

p. 51-~~52~~ 53

WHILE WORKING IN THE OTHER SHIPYARDS (LONG BEACH, MARE ISLAND, PEARL HARBOR) PERSONNALLY MR. BESSMER DID NOT ADVISE ANY ASBESTOS WORKER TO USE A RESPIRATOR; AT PUGET SOUND PROBABLE IN 1550 HE PERSONNALLY ADVISED THE USE OF RESPIRATORS. HE SEND THIS FORMAL RECOMMENDATION IN LETTER FORM TO THE PRODUCTION OFFICER WITH COPIES TO THE SHOP HEAD.

SHOP HEAD FOR SHOP 56

p. 52

IN THE 1550's - MR. CHANDLER AND LATER MR. COLIN EDWARDS

DISCUSSION RE ASBESTOS HAZARDS

p. 54

W/ THE SHOP HEAD

MR. BESSMER HAD A DISCUSSION/RECORDING THE ASBESTOS HAZARDS AND SUGGESTED THAT RESPIRATORS BE WORN BY HIS PEOPLE; HE TOLD HIM THAT ~~IT COULD CAUSE~~ IT WAS AN INHALATION HAZARD THAT COULD CAUSE ASBESTOSIS.

PRIVILEGED
J-M 83

THE SHOP HEAD RELAID THIS INFORMATION ON TO THE ASBESTOS WORKERS; HE PUT OUT A MEMORANDUM IN 1561.

TYPE OF RESPIRATORS USED AT PUGET SOUND

p. 54

THEY WERE A RATHER OBSOLETE DESIGN, WORLD WAR II VINTAGE, MANUFACTURED BY MINE SAFETY APPLIANCE CORP. THEY WERE THE DOUBLE CANNISTER STYLE RESPIRATORS.

p. 57-58 IF THE CONDITIONS WERE DUSTY, MR. BESSNER WOULD SUGGEST THAT THEY WERE RESPIRATORS. BUT HE HAD SOME DIFFICULTY IN GETTING THE WORKERS TO WEAR THEIR RESPIRATORS

UNION REPRESENTATIVES

p. 58 THE METAL TRADES COUNCIL WAS A WORKER'S REPRESENTATIVE AT THE TIME; MR. BESSNER HAD CONVERSATIONS WITH MR. RAMAGE REGARDING THE USE OF RESPIRATORS.

MAGNESIA

p. 59 MR. RAMAGE THOUGHT THAT THE WORKER WERE DYING FROM THE INHALATION OF MAGNESIA AND MR. BESSNER TOLD MR. RAMAGE THAT THE HAZARD WAS THE ASBESTOS.

MR. RAMAGE REPRESENTED PIPE COVERS AND INSULATORS AT PUGET SOUND ONLY.

CAUTION LABELS

p. 62 IN THE LATE 50'S WHILE AT ~~PUGET SOUND~~ PSNS BE THE US NAVY PRODUCED LABELS FOR HAZARDOUS MATERIALS; MR. ROSATI AT MARE ISLAND WAS THE PERSON RESPONSIBLE FOR THIS PROGRAM

THESE LABELS WERE NOT PRODUCE ~~FOR~~ SPECIFICALLY FOR ~~ASBESTOS~~ PRODUCTS CONTAINING ASBESTOS PARTICLES. THE

PRIVILEGED
J-M 83

(13)

LABEL PLACED ON PRODUCTS CONTAINING ASBESTOS SAID: "TOXIC, INHALATION HAZARD, WEAR RESPIRATORY PROTECTION".

MR. BESSNER'S ASSISTANT
P. 65

MR. BESSNER HAD AN ASSISTANT, JACK McELHINEY AND TRAINED HIM TO BE AN INDUSTRIAL HYGIENIST.

INDUSTRIAL HYGIENE LAB AT PUGET SOUND
P. 65

WHEN MR. BESSNER ARRIVED IN 1949 AT ~~PUGET SOUND~~ PSNS, THE LAB WAS VERY LIMITED, SUBSEQUENTLY THE LAB EXPANDED

PAGE 66 — MISSING IN DEPOSITION —

REPORT ON ASBESTOS WORKERS
P. 67-71

IN 1962 OR 1964 (MR. BESSNER IS HAZY ON DATES) HE RECEIVED INFORMATION FROM MR. MARR OF LONG BEACH, MR MARR HAD WRITTEN A REPORT COVERING THE ASBESTOS WORKERS AND HIS FINDINGS.

PRIVILEGED
J-M 83

(14)

AT THAT TIME WHEN MR. BESSNER RECEIVE THE ARTICLE (REPORT), HE HAD COMMENCED HIS OWN STUDY/SURVEY ~~TO DETERMINE~~ BUT WAS UNABLE TO GET THE PYSICIANS READING X RAYS TO PROVIDE HIM W/ NAMES AND SHAPS OF PEOPLE SHOWING FIBROTIC CHANGES IN THE LUNG ABOUT 1960.

SINCE 1948, HE SUSPECTED A CONNECTION BETWEEN THE FIBROTIC CHANGES IN THE LUNG AND THE INHALATION OF ASBESTOS PARTICLES.

THE MEDICAL OFFICERS WERE CAPTAIN BACK, CAPTAIN JEFFERS, CAPTAIN ECKLUND, CAPTAIN REID AND CAPTAIN HUTCHINSON.

HARE REPORT

p. 73

AFTER THE HARE REPORT, MR. BESSNER TALKED TO MR. EDWARDS, THE SHOP HEAD OF SHOP 56 AND ENCOURAGED MORE VENTILATION TO REDUCE AIRBORNE ASBESTOS PARTICLES AT ~~PUGET SOUND~~ PSNS. ALSO THE USE OF RESPIRATORS ~~INCREASED~~ INCREASED.

PRIVILEGED
J-M 83

(15)

MEMORANDUM

p. 75-77

IN 1961 THE SHOP 56 HEAD DISTRIBUTED A MEMORANDUM WHICH WAS REVISED IN 1966; ~~THIS~~ THIS MEMO REQUIRED TO WEAR RESPIRATORS WHILE WORKING WITH ASBESTOS PRODUCTS

AFTER THE SECOND MEMORANDUM (1966) MR. MANGOLD OBSERVED WORKERS WORKING WITHOUT RESPIRATORS

WET SWEEPING

p. 78-79

IN THE EARLY 1950's MR. BESSMER RECOMMENDED WET SWEEPING AT ~~PUGET SOUND~~ PSNS. ~~IT~~ THIS PROCEDURE WAS PRIMARILY IMPLEMENTED BY COMMANDER CODE

MR. BESSMER'S ASSISTANTS

p. 80

AFTER MR. MCELHINEY, MR. HARRY RIGNER WAS HIS ASSISTANT; IN 1962 MR. MANGOLD WAS HIRED AND IN 1963 MR. BECKETT WAS HIRED.

PRIVILEGED

J-M 83

MR. MANGOLD AND MR. BECKETT BECAME INDUSTRIAL HYGIENIST AT ~~PUGET SOUND~~ PSNS. MR. MANGOLD TOOK MR. BESSMERS position FIRST AND THEN WHEN HE WENT LEFT ~~JEFFREY~~ TO OSHA ~~BECAME CHIEF INDUSTRIAL HYGIENIST~~ MR. BECKETT TOOK HIS POSITION

MT-PWHD-009642

MR. MANNING
p. 84-85

WAS A CIVILIAN INDUSTRIAL HYGIENIST AT LONG BEACH NAVAL SHIPYARD. IN THE EARLY 60'S HE WENT TO PSNS ~~PUGET SOUND~~ TO SEE WHAT KIND OF INDUSTRIAL HYGIENE PROGRAM THEY HAD IN GENERAL.

LABELS
p. 86-87

LABELS WERE PLACED ON ITEMS SUCH AS CHLORINATED HYDROCARBON SOLVENTS, BENZINE PRODUCT LIKE SUBSTANCES, ASBESTOS, SILICA DUST (ASBESTOS CEMENT, MAGNESIA BLOCK)

MAGNESIA BLOCK
p. 88-89

THIS PRODUCT CAME TO PUGET SOUND IN CARDBOARD CARTONS AND THE SUPPLY DEPT. WAS RESPONSIBLE FOR LABELING THE MATERIALS RECEIVED IN THE SHIPYARD. IN THE CASE OF THE MAGNESIA BLOCK THE LABEL WAS PLACED <u>OUTSIDE</u> ON THE CARTON <u>NOT</u> ON THE INDIVIDUAL BLOCK.

PRIVILEGED
J-M 83

SAFETY PROGRAMS AT PUGET SOUND
p. 90

THERE WERE NOT FORMALIZED PROGRAMS. MR. BESNER GAVE LECTURES TO APPRENTICES AND TO SURVIVORS ON GENERAL INDUSTRIAL HYGIENE MATTERS.

(17)

STAND UP SAFETY MEETING

p. 92

(Also see p. 148)

THESE MEETINGS WERE HELD ON FRIDAY AFTERNOON CONDUCTED IN SHOP BY SUPERVISORY PERSONNEL. OCCASIONALLY AGENDAS WERE PREPARED FOR THESE MEETINGS.

VENTILATION

p. 96

~~VENTILATION WAS RECOMMENDED BY~~ MR. BESSNER RECOMMENDED TO INCREASE THE VENTICATION AT ~~PUGET SOUND NAVAL SHIPYARD~~ PSNS BUT IT WAS NOT INCREASED.

DUNCAN HOLIDAY AND REITZE

p. 98

THEY VISITED THE SHIPYARD IN THE LATE 60's.

ARTICLES (EXHIBIT 1 AND 2)

p 100 - 101

(SEE PICS ALSO)

THE 1968 REPORT (EXHIBIT 1) IS ENTITLED ASBESTOS EXPOSURE AND PULMONARY X-RAY CHANGES TO PIPE COVERS AND INSULATORS AT ~~PUGET SOUND NAVAL SHIPYARD~~ PSNS; authored by C.A Mangold, R.R. BECKETT AND D. J. BESSNER, Industrial Hygiene Division Puget Sound Naval Shipyard, Bremerton, Wa.

THE 1970 ARTICLE (EXHIBIT 2) IS ENTITLED ASBESTOS EXPOSURE AND CONTROL; AUTHORS MR. C.D. MANGOLD, R.R. Beckett and D.J. BESSNER

PRIVILEGED
J-M 83

Wetting down Asbestos
p. 101-102

Mr. Bessner stated that when he came to PSNS ~~Puget Sound~~ in 1949 he observed that men were wetting down asbestos before cutting to prevent the formation of dust in the breathing zone. He believes Mr. Cade told them to do that.

EXAMINATION BY MR. HENNESSEY
(ATTORNEY FOR PITTSBURG CORNING)

LABELING PROGRAM
p. 103

MR. BESSNER INSTITUTED THE LABELING PROGRAM IMMEDIATELY AFTER MARE ISLAND INSTITUTED THEIR PROGRAM. (NO EXACT DATE AVAILABLE) IT IS POSSIBLE THAT MARE ISLAND HAS RECORDS)

PRIVILEGED
J-M 83

COMMAND STRUCTURE
p. 104-105

THE SHIPYARD ITSELF WAS UNDER THE CONTROL OF THE NAVAL SHIP SYSTEMS COMMANDER OR ~~BUREAU~~ OF SHIPS. THE BUREAU OF MEDICINE AND SURGERY WAS THEIR TECHNICAL BUREAU IN THE MEDICAL DEPT.

ASBESTOS EXPOSURE ISSUES
p. 105

IN THE 1950'S ~~HAD THIS RE~~ COMMANDER BABIONE HAD THIS RESPONSIBILITY; HE WAS IN CHARGE OF OCCUPATIONAL HEALTH AT THE BUREAU OF MEDICINE.

(19)

- Commander George Lewton (M.D), Captain Hutchinson (M.D) & Captain Beck (M.D) held that position at one time.

Johnson, Barboo, and Siegel
p. 106

Industrial Hygienists.
- Jac Siegel was a toxicologist and Barboo started out as a Sanitarian (Industrial Hygienist.

Commander Babione
p. 107
(Also see p. 105)

~~He~~ had a medical degree

Publication
~~Quarterly Health Reports to Bu Med~~
p. 108 - 109

There was a quarterly publication compiled from excerpts from the Quarterly Health Reports to Bu Med; consisten in 3 sections:
1) Discussed any cases of interest in the occupational health field (written by a doctor)
2) Described work done by the industrial hygienist re: findings and controls recommended
3) Sanitation (food, water supply, sewage disposal)

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20

CHEST XRAY ABNORMALITIES

p. 111-112

SINCE THE 50's MR. BESSMER WAS TRYING TO GET INFORMATION ON XRAY ABNORMALITIES ON WORKER; BUT HE DID NOT ACTUALLY GET THEM UNTIL THE 60's. EVEN THOUGH THESE WERE AVAILABLE.

Asbestos Control Attempts

p. 113

UNTIL THE VERY END OF 1969, MR. BESSMER GOT A RESPONSE FROM BUMED WITH REGARDS TO ~~[illegible]~~ ASBESTOS CONTROL ATTEMPTS.

Communications with Bu Med

p. 114

MR. BESSMER COMMUNICATED WITH BU MED through the quarterly report and occasionally by telephone and sometimes by personal letter to Captain Berk, Commander Balione, Sam Barboo and Johnson.

HE WOULD ALSO MEET WITH THESE PEOPLE ON AN ANNUAL BASIS AT THE AMERICAN INDUSTRIAL HYGIENE ASSOCIATION CONFERENCE

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(21)

EXHIBIT 1

p. 115

THE PORT MR. BESSNER PLAYED AUTHORING THIS DOCUMENT (1968 REPORT) WAS PRIMARILY REVIEW. MR. BESSNER COMPILED THE X-RAY ABNORMALITIES AND TURNED THEM OVER TO MR. MANGOLD AND MR. MANGOLD DID THE NECESSARY INVESTIGATION.

TABLE 5

p. 116

According to Mr. Bessner this is an accurate list of asbestos containing products compiled by Mr. Mangold. Mr. Mangold ~~when~~ went into the the ship and on the ship and looked at usage rates. This info was probably collected in 1966 or 1967

EXHIBIT 2

AGAIN, THE PORT MR. Bessner played AUTHORING THIS DOCUMENT (1970 REPORT) WAS REVIEW; AND AGAIN, MR. Mangold DID THE MAJORITY OF THE COMPILATION AND INVESTIGATION

EXAMINATION BY MR. SLAGLE

(Attorney for Eagle Picher)

~~TEXAS INVOLVED IN THE VARIOUS~~
~~STAGES & USES OF ENRON64~~

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SHIP TRADES
p. 120-121

VARIOUS TRADES ARE INVOLVED TO COMPLETE A VESSEL - I.E.) SHIP FITTERS, WELDERS, ELECTRICIANS, ~~ETC~~ MACHINISTS.

Welders and machinists would most commonly be working in the area of asbestos insulation; THE ESTIMATED TIME THEY WOULD BE IN THIS AREA WOULD VARY WIDELY (5 minutes to all day)

TABLE 1
p. 122-123

TABLE 1 is part of EXHIBIT 1; THIS TABLE SHOWS A LARGE DISPARITY IN THE INCIDENCE OF ABNORMAL CHEST XRAYS IN THE VARIOUS TRADES: I.E., pipe COVERERS AND INSULATORS WERE EXPOSED TO ASBESTOS AND THEIR HIGH INCIDENCE ~~TO~~ WAS ATTRIBUTED BY MR. BESSNER TO ASBESTOS. THE BOILERMAKERS ARE NEXT SINCE ~~THEY~~ WORK W/ ASBESTOS AND OTHER HAZARDS WHICH CAN PRODUCE LUNG CONDITIONS.

~~Besides~~ Mr. Bessner stated that it's possible to handle asbestos in a safe manner

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Asbestos Cement
p. 124 - 127

- Mr. Bessmer in his 1970 report had recommended mixing asbestos cement in plastic bags that were closed. He believed it would reduce the incidence of lung disease.

- Respirators were also recommended to wear when mixing cement

- sometimes fine cement was mixed in the open air and sometimes in shacks

Orville Dean, M.D
p. 125

Dr. Dean is one of the medical officers in the PSNS Medical Dept.

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Air Samples
p. 130

In 1949 air samples had already been taken and Mr. Bessmer subsequently conducted additional air sampling.

EXAMINATION BY MR. MERIEL
(ATTORNEY FOR ~~CHUCK~~ FIBERBOARD)

Approved Materials List
p. 132

When dealing with mixtures of materials, Mr. Bessmer would go to the supply dept and look up Navy specifications.

LABELS FOR ASBESTOS
p. 133

THERE WAS NO SPECIFIC LABEL FOR ASBESTOS; THE NAVY GENERATED SOME LABELS THAT SAID, "INSULATION, HAZARDOUS, RESPIRATOR SHOULD BE WORN"...

RESPIRATORY
p. 134 - 140

RESPIRATORS BECAME MANDATORY AROUND 1966.

THE SUPERVISORY PERSONNEL OF THE SHOP WAS RESPONSIBLE TO ENFORCE THE REQUIREMENT TO WEAR RESPIRATORS

MR. BESSNER ENCOURAGE THE METAL TRADES COUNCIL, (THIS WAS A PRE-UNION) MR. RANAGE AND OTHER REPRESENTATIVE IN THE PIPE COVERERS AND INSULATORS DEPT. TO INVOLVED THEMSELVES IN THIS HEALTH MATTER. HE DID THIS THROUGH INFORMAL CONVERSATIONS.

MR. BESSNER NEVER ENFORCED RESPONSIBILITIES, ONLY RECOMMENDED WHAT SHOULD BE DONE.

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RULES AND REGULATIONS

p. 140-141

ANY RULES AND REGS DEVELOPED BY Mr. Bessner or an industrial hygienist would have to go to the ~~board~~ ship heads for review and approval.

EXAMINATION BY Ms Gail VLUNDGREN

(ATTORNEY FOR OWENS CORNING)

MR. MANGOLD

p. 142

~~Mr. Bessner hired Mr. Mangold.~~

WAS HIRED BY MR. BESSNER IN 1962; HE WORKED UNDER MR. BESSNER IN THE INDUSTRIAL HYGIENE DEPT. FROM 1962 TO 1970

MEDICAL OFFICERS

p. 143-144

DR. McBRATNEY - DIVISION DOCTOR AT PSNS ~~WHEN CAPTAIN HUTCHINSON LEFT~~ IN 1965 HE ASSUMED THE HEAD PHYSICIAN ~~CAPTAIN HUTCHINSON~~ RETIRED UNTIL 1972

CAPTAIN BECK - MEDICAL OFFICER AT PSNS IN 1950

CAPTAIN REID (deceased) TOOK OVER CAPTAIN BECK ABOUT '53 OR '54

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CAPTAIN JEFFERS - TOOK OVER Captain Reid

Other: CAPTAIN ECKLUND & Dr. CARTER.

DEPOSITION CONTINUED JUNE 11, 1982

EXAMINATION BY MR. LEY
(ATTORNEY FOR COMBUSTION ENGINEERING)

STAND UP SAFETY MEETINGS
p. 146
(Also p. 92)

THE SAFETY DIVISION OF INDUSTRIAL RELATIONS DEPT. IN THE SHIPYARD WAS IN CHARGE OF THESE MEETINGS (repeated: HELD WEEKLY)

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MR. SWITZEL WAS THE HEAD OF THE SAFETY DIVISION; Bob BRITTEN WAS THE HEAD OF THE INDUSTRIAL RELATIONS DEPARTMENT AND BEFORE HIM THERE ~~WAS~~ JOE King WAS IN CHARGE (PROBABLE LATE '50's - EARLY '60's)

EXHIBIT 3
p. 149

IS AN EXCERPT FROM SAFETY REVIEW MAGAZINE (OCT. 1962) TITLED: ASBESTOS

EXHIBIT 4
p. 150

IS AN ARTICLE PUBLISHED IN THE AMERICAN INDUSTRIAL HYGIENE JOURNAL (MAY/JUNE 1964) TITLE: ASBESTOS EXPOSURE DURING NAVAL VESSEL OVERHAUL, OFFERED BY WILLIAM T. MARR

EXAMINATION BY MR. HILTER
(ATTORNEY FOR THE PLAINTIFFS)

TLV
p. 151

THE TRESHOLD LIMIT VALUE WAS DEFINED BY MR. BESSMER: "~~THE~~ IS THE VALUE OF EXPOSURE MEASUREMENT BELOW WHICH MOST PEOPLE WILL NOT SUFFER HARM".

THE TLV IS ASSOCIATED WITH DUST

MAXIMUM ALLOWABLE CONCENTRATION (MAC)
p. 152

THE TLV SUPERCEEDED THE MAXIMUM ALLOWABLE CONCENTRATION; THE MAC WAS THE OLD METHOD OF DEFINING EXPOSURE LIMITS AND IS ROUGHLY A CEILING CONCENTRATION ABOVE WHICH EXPOSURE SHOULD NOT BE ALLOWED (5 mpcf)

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J-M 83

HAZARDS
~~PRIOR KNOWLEDGE~~
p. 154-157

IS MR. BESSMER'S OPINION THAT IN THE EARLY '50's WORKERS AT PSNS KNEW THERE WAS A HAZARD ASSOCIATED W/ ASBESTOS -- THAT ASBESTOS DUST SHOULD NOT BE INHALED.

DUST CONTROL PROCEDURES
p. 156

THE DUST CONTROL PROCEDURES IN 1949 WERE NOT LIMITED ONLY TO ASBESTOS DUST.

DUST COUNTS

p. 156

MR. BESSMER BEGAN TO TAKE DUST COUNTS SINCE 1950.

ANNUAL PHYSICAL EXAMINATIONS

p. 159

IN 1940 SOME TRADES GOT ANNUAL PHYSICAL EXAMINATIONS: i.e.,

- EMPLOYEES IN DUSTY OPERATION GOT ANNUAL XRAYS (incl. asbestos workers)
- ELECTROPLATERS GOT A SEMI-ANNUAL PHYSICAL
- LEAD WORKERS GOT URINARY LEAD TESTS
- FIREMAN GOT ANNUAL PHYSICALS

BARRED FROM SHOPS

p. 160

MR. BESSMER WAS BARRED FROM THE SHOPS FOR ABOUT 5 MONTHS UNTIL THE PRODUCTION OFFICER RETIRED.

LABELING PROGRAM

p. 165-166

BASICALLY IN THIS PROGRAM, THE NAVY HAD APPROXIMATELY SIX DIFFERENT KINDS OF LABELS: ONE WAS TOXIC, POISON, OXIDIZER, CORROSIVE & FLAMMABLE. THE COLOR FOR THESE LABELS WAS DIFFERENT FOR EACH ONE i.e., TOXIC - RED, CORROSIVE - WHITE.

THE LABELS PLACED ON ASBESTOS PRODUCTS (TOXIC) DID NOT INCLUDE THE WORD ASBESTOSIS OR CANCER.

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J-M 83

VISITORS/DR. Reitze
p. 166-167

AROUND 1969 or 1970 ~~[illegible]~~ PSNS Dr. Reitze visited PSNS. AFTER HIS VISIT HE WROTE A LETTER TO THE CHIEF, BU Med AND COPY TO THE SHIPYARD. GENERALLY IT SAID THAT PSNS HAD A GOOD PROGRAM.

RISK OF CANCER
p. 168

SOMETIME IN THE 1960's Mr. BESSMER FIRST BECAME AWARE THAT THERE WAS A RISK OF CANCER ASSOCIATED W/ EXPOSURE TO ASBESTOS

LECTURE COURSE AT COLUMBIA UNIVERSITY p. 169
(See p. 185)

Mr. BESSMER TOOK A COURSE IN 1942 AT COLUMBIA AND REMEMBERS Dr. GARNER SAYING THAT ASBESTOSIS WAS SIMILAR TO SILICOSIS; THAT ASBESTOSIS DIDN'T PRODUCE DEATH BUT MIGHT BE DISABLING.

HEALTH HAZARD EVALUATION
p. 174

NORMALLY, AN INDUSTRIAL HYGIENIST WOULD EVALUATE A POTENTIAL HEALTH HAZARD BY TAKING AIR SAMPLES IN THE BREATHING ZONES OF PEOPLE, ~~WOULD HAVE TO~~ REFER TO LITERATURE, TEXTBOOKS, PRINTED MATERIALS FROM THE MANUFACTURERS OF PRODUCTS, HIS OWN KNOWLEDGE AND EXPERIENCE, ATTEND CONFERENCES AND ANOTHER SOURCE IS EPIDEMIOLOGICAL STUDIES.

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J-M 83

PSNS DUTIES
p. 177

IN 1962 PSNS WAS CHOSEN TO BE A NUCLEAR SHIPYARD; GETTING THE NUCLEAR PROGRAM GOING, TOOK MOST OF THE TIME.

TLV AND J-M
p. 178-184

IN 1959 J-M Corp. had two methods of counting dust: 1) Impinger and 2) one million fiber per cubic foot for the fiber. (Mr. BESSNER was not aware of this)

Mr. Bessner believes that is probably true that the TLV was mainly intended to prevent the incidence of asbestosis and not of cancer

Asbestosis was the only hazard Mr. Bessner knew of in those early days.

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EXAMINATION BY MR. KIRK MORTENSEN
(ATTORNEY FOR THE PLAINTIFFS)

LECTURE AT COLUMBIA UNIV.
p. 185

THE LECTURE GIVEN BY DR. GARDNER LASTED ABOUT HALF A DAY.

MARE ISLAND SURVEY
p. 186

MR. BESSNER MADE A HAZARD SURVEY AT MARE ISLAND IN 1942; MADE A WRITTEN REPORT

WORK FORCE
P. 189

THE GREATEST NUMBER OF PEOPLE IN THE GENERAL FORCE AT PSNS WAS 15,000 AT ONE TIME.

RESPIRATORS & GOGGLES
P. 190 - 192

NO RESPIRATORS OR MASKS WERE PROVIDED TO PIPE COVERERS AND INSULATORS UPON THEIR BEGINNING OF EMPLOYMENT AT PSNS

Mr. Bessmer heard reports/complaints about the difficulties ~~and~~ the workers had when they had to wear goggles for eye protection and using a respirator at the same time; the mask would push the goggles up and then ~~the~~ they couldn't see what they were doing.

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EXHIBIT B, C, D
P. 195 - ~~204~~ 205

MANUFACTURER'S LITERATURE ON KAYLO HEAT INSULATION -- THE THIRD PAGE OF THIS EXHIBIT STATES THAT "BLOCK OR PIPE INSULATION CAN BE SAWED, CUT OR SCORED WITH ORDINARY TOOLS; THE MATERIAL IS NON-IRRITATING TO THE SKIN AND NON-TOXIC.

EXHIBIT E
P. 199-200

J-M DATA SHEET ON THERMAL INSULATION PRODUCTS -- STATES "EASY TO APPLY AND SAFE TO HANDLE". IT IS A NON-BURN ASBESTOS PAPER PRODUCT WITH 95% FIBER CONTENT.

THE ABOVE CONTRADICTS THE MESSAGE MR. BESSMER GOT FROM DR. GARDNER IN 1942. THAT STATEMENT WOULD BE A CLEAR MESSAGE THAT THERE WAS NO RISK IN WORKING WITH THAT PRODUCT WHAT CONTAINED 88% ASBESTOS FIBER.

EXHIBIT D
p. 205-206

IS A LETTER WRITTEN TO Mr. ALBERT EDWARDS, IND. HYGIENE ENGINEER, INDIANA STATE BOARD OF HEALTH. THIS LETTER LISTS INGREDIENTS OF MATERIAL CALLED CAREYTEMP INSULATION. (Mr. Bessmer never heard before about Careytemp insulation)

Respirators
p. 211

Respirators were required earlier than 1968 but they became mandatory in 1968

TLV
p. 213

Mr. Bessmer's ~~first~~ INITIAL IMPRESSION YEARS AGO WAS THAT THE TLV WAS A SAFE EXPOSURE LEVEL ~~DATE~~ AND HIS PRESENT STATE OF KNOWLEDGE IS THAT ALMOST ANY AMOUNT OF ASBESTOS COULD BE HARMFUL

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J-M 83

EXAMINATION BY MR. WILLHITE
(ATTORNEY FOR THE PLAINTIFFS)

OTHER SHIPYARDS
P. 215 - 217

Mr. Bessmer came at Pearl Harbor Shipyard from Sept. 1943 - 1945; during this time he conducted air sample surveys -- took samples for formaldehyde with a midget impinger. Did not conduct studies for ~~asbestos~~ AIRBORNE asbestos.

SAFETY MANUALS
218

THE ASBESTOS EXPOSURE ~~CONTROL~~ AND CONTROL MANUALS WAS PUT OUT BY THE shipyard.

INDUSTRIAL HYGIENIST RESPONSIBILITIES
P. 219

ONE OF Mr. Bessmer's responsibilities as an industrial hygienist is to educate workers concerning the hazards of various products.

PSNS
P. 219

While at PSNS apprentice insulators (up through the mid-50's) were (at least) taught by by older insulators

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ELECTROSTATIC PRECIPITATOR
P. 220

Mr. Bessmer WAS NOT AWARE THAT ~~THE~~ DR. GARDNER HAD INSTRUCTED THE ASBESTOS MANUFACTURERS THAT THE ELECTROSTATIC PRECIPITATOR WAS A MORE EFFECTIVE METHOD OF SAMPLING AIRBORNE ASBESTOS PARTICLES

EXAMINATION BY MR. SLAGLE
(ATTORNEY FOR ENGLE PICHER)

MAGNESIA DUST
P. 225

Mr. Bessmer was informed by Mr. Ramage that workers (PIPE COVERS and insulators) were dying as a result of inhalation of magnesia dust; the disease was not specified. according to Mr. Bessmer, Mr. Ramage was concerned with safety but he was mis-directing his concern by attributing those cases to magnesia dust and ~~not to asbestos~~ dust. later when asbestos WAS A CAUSE ~~OF~~ Mr. Ramage demanded blood counts which have very little bearing on asbestosis

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J-M 83

ILL.
p. 227

The TLV are published by the American Conference of Governmental Industrial Hygienists.

Exhibit 5
p. 230

Is a publication put out by Shop 56; contained safety recommendations

Asbestos Containing Insulation Materials

These materials were banned or drastically reduced after approx 1972 based on a Bureau of Ships directive

Examination by Mr. French
(Attorney for Celotex)

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Workers knew Mr. Bessner
p. 234

The workers knew Mr. Bessner and probably associated him with safety rules and regs. in the shipyard.

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DEPOSITION SUMMARY OF
DANIEL BESSMER
Seattle, Washington
June 10, 1982

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Examination by Mr. Soltys
(Attorney for UNARCO)

| | |
|---|---|
| Personal Background<br>p.6 | The deponent's name is Daniel James Bessmer. He resides at 6700 Stampede Blvd. N.W., Bremerton, Washington, 98310. He is 65 years old (Born in December 17, 1916). |
| Employment<br>p. 7 | From April 1942 to about June 1974, Mr. Bessmer was employed as an industrial hygienist. He was a naval officer from April 1942 to December 1946; and was employed by PSNS (Puget Sound Naval Shipyard) from 1949 to 1970 as an industrial hygienist. From about 1970 to 1972 he was a supervisory health physicist at Puget Sound Naval Shipyard. |
| Research<br>p. 8 | He was a research associate at the University of Washington from about December 1972 to June 1974. |
| What is an Industrial Hygienist?<br>p. 8 | Mr. Bessmer said: "is a specially trained person who is supposed to detect and evaluate occupational health hazards in the work environment and make recommendations for their control if necessary." |
| Professional Organizations<br>p. 8-9 | Mr. Bessmer belongs to the American Industrial Hygiene Association, and the American Association of Industrial Hygiene. He participated in meetings and also gave lectures. |
| Shipyards<br>p. 10 | As an industrial hygienist in the shipyards he operated under the medical officer which operated under the shipyard commander and the commander would work under the Naval Ship Systems Command - Commanding Officer. |
| p. 10-11 | As an industrial hygienist in the shipyards he would also report to the Bureau of Medicine and Surgery by writing either a monthly or quarterly report including a medical dept. report to go through this bureau. |
| Newsletter<br>p. 11 | Prior to 1950 excerpts of these reports were published quarterly in a newsletter and sent around to other shipyards. |



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| | |
|---|---|
| What is a Naval Shipyard? p. 12 | is a shipyard manned by civil servants and is commanded by a naval officer |
| Naval Industrial Hygiene Assoc. p. 13-15 | Mr. Bessmer started this organization in the 1960's. The purpose of this association was to speak as a group and exchange information. In their meetings they presented technical papers (He does not have any of these Papers; does not know if Puget Sound preserved them.) |
| Educational Background p. 16 & 19 | In 1934, Mr. Bessmer received a high school diploma from Mountain View Union High School, California. In 1942 he received a B.A. in physical science from San Jose State College. In January 1947 he received a master's degree in Chemistry from Standford University. |
| Military Background p. 16-17 | Mr. Bessmer joined the Navy on April 24, 1942 His rank was ensign; his job, Industrial Hygiene Officer.<br><br>At the end of June 1942 he was sent by the US Navy, to Colombia University for training in industrial Hygiene. |
| Air Samples p. 18 | While he was at Columbia he learned to take air samples; they studied cotton dust, silica dust, asbestos etc. |
| Asbestos p.19-20 | While at Columbia he was told that asbestos was a hazardous material, that inhalation would cause a condition called asbestosis. He was also taught methods by which inhaling excessive amounts of asbestos dust could be avoided. These methods were primarily the use of respirators and ventilation. |
| Return to Mare Island - Survey p. 20-22 | After completing the course at Columbia, Mr. Bessmer returned to Mare Island as an Industrial Hygiene Officer; in 1942, they were directed by the Bureau of Medicine and Surgery to complete an industrial hygiene survey of the shipyard. This survey started immediately on October/November of 1942. The potential hazards were Electro Plating Solutions, some are cyanide, and some contained chromic acid which cause pul- |



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monary distress; also the inhalation of regular welding fumes; solvents like chlorinated hydrocarbons which can cause severe kidney and liver damage.

Results of the Survey
p. 25-26

The first draft was sent through channels to be forwarded to the Bureau of Medicine and Surgery but the captain in the Navy sent the report back and written on was "This would be a good thing on peacetime".

Bessmer and 3 or 4 other industrial hygienist rewrote the report and reduced it substantially in volume and forwarded to the bureau. This report only contained the essential information which was Emasculated.

New York Naval Shipyard
p. 27

After Mare Island, in early 1943, the New York Naval shipyard was Mr. Bessmer's next station; his job was also Industrial Hygiene Officerand stayed there for six months. His jobwas primary sanitation inspection of sewers, looking at food lockers etc.

Pearl Harbor Naval Shipyard
p. 27-29

Mr. Bessmer's rank was lieutenant junior grade and he reported to duty there on Sept. 1944; he stayed for two years and his job was industrial hygiene officer; primary assigned to no lead absorption test; check electricians and welders for color blindness.

He also made some special investigations: found formaldehyde in the insulation which can cause respiratory distress.

Naval Air Station in San Diego, CA
p. 29

In January 1946 he was released to inactive duty and went to the Naval Air Station in San Diego; he was an Industrial Hygiene Officer for two months. He looked in the shop and ran few lean samples and then he received his release to active duty.

Navy Precautions
p.30

They had respiratory protection; they also received semi-annual and annual chest x-rays but Mr. Bessmer does not know when this practice was initiated.

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| | |
|---|---|
| TLV<br>p. 30 | During the period of 1942 to 1946, the TLV was 5mmpcf; this figure was published by the American Conference of Governmental Industrial Hygienists and adopted by the Navy Industrial Hygienist. |
| Existence of Health Hazard at the Shipyard<br>p. 35-36 | If there is a health hazard at the shipyard; the industrial hygienist formulates recommendations for control. The function of the industrial hygienist stops here and the Production Officer or Public Works Officer take over. |
| Other Industrial Hygienist at Puget Sound<br>p. 38 | When Bessmer went to PSNS in 1949, there was only one other industrial hygienist (Robert L. Gade, Lieutenant Commander). |
| p. 40-42 | Mr. Bessmer believed that the asbestos dust in the air at Puget Sound was something which required monitoring. He took samples with a midget impinger. When Mr. Bessmer arrived at Puget Sound In 1949, the shipyards considered asbestos workers to be involved in a hazardous occupation. The workers received periodic chest x-rays; first every six months; later they were switched to annual. Also initially , Navy doctors were doing the examination but, eventually (late 50's or early 60's) they used civilian doctors. |
| Bureau of Ships (1949)<br>p. 42-43 | Mr. Bessmer believes that in the late 60's the Bureau of Ships promulgated guidelines by which asbestos products should be handled in Naval shipyards. |
| Ventilation at Puget Sound<br>p. 43 | In 1949, in ship 56, ventilation was being used to cut down the amount of asbestos particles in the air. |
| Shop 56<br>p. 43 | Was the pipe covers, insulators and pipefitters |
| Puget Sound Familiarzation Tour for Bessmer<br>p. 45-49 | Commander Gade conducted Mr. Bessmer for about 6 months on a tour of the ship and shops; after the tour, Mr. Bessmer completed on informal survey called Inspection Survey. |

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In 1950 the Production Officer, Captain Bell wrote in memorandum to the official officer requesting that Mr. Bessmer should not be allowed in the shops. He was barred from all the shops.

In the middle 50's he gain access again to go into any of these shops because Captain Bell retired.

Respirators
p. 49-51
(also see p. 56-58, p. 75-77, p. 134-140, and p. 211)

Mr. Bessmer does not remember when he first arrived at Puget Sound in 1949 observing any asbestos workers wearing respirators. He remembers that in 1950 some did.

Respirator were available from shop 06 (Tool Room) by just asking for one.

Recommendations to use respirators were advise by Commander Gade.

p. 51-53

While working in the other shipyards (Long Beach, Mare Island, Pearl Harbor) Mr. Bessmer personnally did not advise any asbestos workers to use a respirator; at Puget Sound probable in 1950 he personnally advised the use of respirators. He send this formal recommendation in letter form to the Production officer with copies to the shop head.

Shop Head for Shop 56
p. 52

In the 1950's - Mr. Chandler and later Mr. Colin Edwards

Discussion RE Asbestos Hazards
p. 54

Mr. Bessmer had a discussion with the Shop Head regarding the asbestos hazards and suggested that respirators be worn by his people; he told him that it was an inhalation hazard that could cause Asbestosis.

The Shop Head relaid this information on to the asbestos workers and he put out a memorandum in 1961.



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|---|---|
| Type of Respirators Used at Puget Sound p. 56 (also see pp. 40-51, 75-77, 134-140 and p. 211 | They were a rather obsolete design, World War II vintage, manufactured by Mine Safety Appliance Corp. They were the double cannister style respirators. |
| p. 57-58 | If the conditions were dusty, Mr. Bessmer would suggest that they were respirators. But he had some difficulty in getting the workers to wear their respirators. |
| Union Representatives p. 58 | The METDC Trades Council was a worker's representative at the time; Mr. Bessmer had conversations with Mr. Ramage regarding the use of respirators. |
| Magnesia p. 59 | Mr. Ramage thought that the worker were dying from the inhalation of Magnesia and Mr. Bessmer told Mr. Ramage that the hazard was the Asbestos.<br><br>Mr. Ramage represented pipe covers and insulators at Puget Sound only. |
| Caution Labels p. 62 (also see pp. 86-87, 88-90, 103, and 165-166) | In the late 50's while at PSNS the US Navy produced labels for hazardous materials; Mr. Rosati at Mare Ilsand was the person responsible for this program.<br><br>These labels were not produce specifically for products containing asbestos particles. The label placed on products containing asbestos said: "Toxic, inhalation hazard, wear respiratory protection". |
| Mr. Bessmer's Assistant p. 65 | Mr. Bessmer had an assistant, Jack McElhiney and trained thru to be an Industrial Hygienist. |
| Industrial Hygiene Lab at Puget Sound p. 65 | When Mr. Bessmer arrived in 1949 at PSNS, the lab was very limited, subsequently the lab expanded. |
| p. 66 | - Missing in Deposition - |
| Marr/Report on Asbestos Workers p. 67-73 | In 1962 or 1964 (Mr. Bessmer is hazy on Dates) he received information from Mr. Marr of Long Beach, Mr. Marr had written a report covering the asbestos workers and his findings. |



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At that time when Mr. Bessmer receive the article (Report), he had commenced his own study/survey but was unable to get the Physicians reading X-rays to provide him with names and shops of people showing fibrotic changes in the lung about 1960.

Since 1948, he suspected a connection between the fibrotic changes in the lung and the inhalation of asbestos particles.

After the MARR Report, Mr. Bessmer talked to Mr. Edwards, the Shop Head of Shop 56 and encouraged more ventilation to reduce airborn asbestos particles at PSNS. Also the use of respirators increased.

Memorandum Re: Respirators
p. 75-77 (also see pp. 49-51, 56-58 and p. 211

In 1961 the Shop 56 Head distributed a memorandum which was revised in 1966; This memo required to wear respirators while working with asbestos products.

After the second memorandum (1966) Mr. Mangold observed workers working without respirators.

Wet Sweeping
p. 78-79

In the early 1950's Mr. Bessmer recommended wet sweeping at PSNS. This procedure was probably implemented by Commander Gade.

Mr. Bessmer's Assistants
p. 80

After Mr. McElhiney, Mr. Harry Rigner was his assistant; in 1962 Mr. Mangold was hired and in 1963 Mr. Beckett was hired.

Mr. Mangold and Mr. Beckett became Industrial Hygienist at PSNS. Mr. Mangold took Mr. Bessmer's position first and then when he went to OSHA Mr. Beckett took his position.

Mr. Manning
p. 84-85

Was a civilian industrial hygienist at Long Beach Naval Shipyard. In the early 60's he went to PSNS to see what kind of industrial hygiene program they had in general.

Labels
p. 86-87 (also see pp. 88-90, 103, 133 and p. 165-166

Labels were placed on items such as Chlorinated Hydrocarbon solvents, Benzine, products like Substances, Asbestos, Silica dust (Asbestos cement, Magnesia Block).



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| Magnesia Block/Labels p. 88-90 (also see pp. 62, 86-87, 88-90, 103, 133 and 165-166 | This product came to Puget Sound in cardboard cartons and the supply department was responsible for labeling the materials received in the shipyard. In the case of the Magnesia Block the label was placed outside on the carton not on the individual Block. |
| Safety Programs at Puget Sound p. 90 | There were not formalized programs. Mr. Bessmer gave lectures to apprentices and to survivors on general industrial hygiene matters. |
| Stand Up Safety Meeting p. 92 | These meetings were held on Friday afternoon; conducted in shop by supervisory personnel. Occasionally agendas were prepared for these meetings. |
| Ventilation p. 96 | Mr. Bessmer recommended to increase the the ventilation at PSNS but it was not increased. |
| Duncan Holiday and Reitze p. 98 | They visited the shipyard in the late 60's. |
| Articles (Exhibit I and II p. 100-101 | The 1968 Report (Exhibit I) is entitled Asbestos Exposure and Pulmonary X-ray changes to pipe covers and insulation at PSNS; authored by C.A. Mangold, R.R. Beckett and D.J. Bessmer, Industrial Hygiene Division Puget Sound Naval Shipyard, Bremerton, Wa.<br><br>The 1970 Article (Exhibit II) is entitled Asbestos Exposure and Control; authors Mr. C.D. Mangold, R.R. Beckett and D.J. Bessmer. |
| Wetting Down Asbestos p. 101-102 (also see p. 78-79) | Mr. Bessmer stated that when he came to PSNS in 1949 he observed that men were wetting down asbestos before cutting to prevent the formation of dust in the breathing gear. He believes Mr. Gade told them to do that. |



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Examination by Mr. Hennessey
(Attorney for Pittsburg-Corning)

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| Labeling Program p. 103 (also see pp. 62, 86, 87, 88-90, 103, 133 and 165-166 | Mr. Bessmer instituted the labeling program immediately after Mare Island instituted their program. (no exact date available; Its possible that Mare Island has records). |
| Command Structure p. 104-105 | The Shipyard itself was under the control of the Naval Ship Systems Commander or Bureau of Ships. The Bureau of Medicine and Surgery was their techical Bureau in the Medical Dept. |
| Asbestos Exposure Issues p. 105 | In the 1950's Commander Babione had this responsibility; he was in charge of occupational health at the Bureau of Medicine.<br><br>Commander George Lawton, M.D., Captain Hutchinson M.D., Captain Beck M.D., held that position at one time. |
| Johnson, Barboo, and Siegel p. 106 | Industrial Hygienists<br>- Jac Siegel was a toxicologist and Barboo started out as a Sanitarian Industrial Hygienist. |
| Commander Babione p. 107 | Had a medical degree. |
| Publication p. 108-109 | There was a Quarterly publication compiled from excerpts from the quarterly health reports to Bu Med; consistent in three editions: 1.) Discussed any cases of interes in the occupational health field (written by a Doctor); 2.) Described work done by the Industrial Hygienist RE: Findings and controls recommended; 3.) Sanitation (food, water supply, Sewage Disposal). |
| Chest X-ray Abnormalties p. 111-112 | Since the 50's Mr. Bessmer was trying to get information on X-ray abnormalities on workers, but he did not get them until the 60's, even though these were available. |
| Asbestos Control Attempts p. 113 | Until the very end of 1975, Mr. Bessmer got a response from BU Med with regard to Asbestos Control Attempts. |

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| Communication with BUMED<br>p. 114 | Mr. Bessmer communicated with BU Med through the quarterly report, occasionally by telephone and sometimes by personal letter to Captain Beck, Commander Balisene, San Barboo and Johnson.<br><br>He would also meet with these people on an annual basis at the American Industrial Hygiene Association Conference. |
| Exhibit I<br>p. 115 | The part of Mr. Bessmer played authorizing this document (1968 Report) was primarily review. Mr Bessmer compiled the X-ray abnormalities and turned them over to Mr. Mangold and Mr. Mangold did the necessary investigation. |
| Exhibit II<br>p. 116 | Again, the part Mr. Bessmer played authoring this document (1970 Report) was review; and again, Mr. Mangold did the majority of the compilation and investigation. |
| Table 5<br>p. 116 | According to Mr. Bessmer this is an accurate list of asbestos containing products compiled by Mr. Mangold. Mr. Mangold went into the the ship and on the ship looked at usage rates. This information was probably collected in 1966 or 1967. |

Examination by Mr. Slagle
(Attorney for Eale Pitcher)

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| Ship Trades<br>p. 120-121 | Various trades are involved to completed a vessel i.e., ship fitters, welders, electricians, machinists.<br><br>Welders and machinists would most commonly be working in the area of asbestos insulators; the estimated time they would be in this area would vary widely (5 minutes to all day). |
| Table 1<br>p. 122-123 | Table 1 is part of Exhibit I; this table shows a large disparity in the incidence of asbnormal chest xrays in the various trade: i.e., pipe coverers and insulators were exposed to asbestos and their high incidence was attributed by Mr. Bessmer to Asbestos. The Boilermakers are next since they work with asbestos and other materials which can produce lung conditions. |

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Mr. Bessmer stated that its possible to handle asbestos in a safe manner.

Asbestos Cement
p. 124-127

Mr. Bessmer in his 1970 report had recommended mixing asbestos cement in plastic bags that were closed. He believed it would reduce the incidence of lung disease.

Respirators were also recommended to wear when mixing cement.

Sometimes the cement was mixed in the open air and sometimes in shacks.

Ovrille Dean, M.D.
p. 125

Dr. Dean is one of the Medical officers in the PSNS Medical Dept.

Air Samples
p. 130

In 1949 air samples had already been taken and Dr. Bessmer subsequently conducted additional air sampling.

Examination by Mr. Mertel
(Attorney for Fiberboard)

Approved Materials Listt
p. 132

When dealing with mixtures of materials, Mr. Bessmer would go to the supply dept. and look up Navy specifications.

Labels for Asbestos
p. 133 (also see pp. 62, 86-87, 88-90, 103 and 165-166

There was no specific label for Asbestos; the Navy generated some labels that said, "Insulator, Hazardous, Respirator should be worn."

Respirators
p. 134-140 (also see pp. 49-51, 56-58, 75-77, 134-140 and p. 211

Respirators became mandatory around 1966. The supervisory personnel of the shop was responsible to enforce the requirement to wear respirators.

Mr. Bessmer through informed conversations, encouraged the METAC Trades Council, (this was a pre-union) Mr. Ramage and other representatives in the pipe coverers and insulators dept. to involve themselves in this health matter.

Mr. Bessmer never enforced responsibilities, only recommended what should be done.

Rules and Regulations
p. 140-141

Any Rules and Regulations developed by Mr. Bessmer as an industrial hygienist should have to go to the shop heads for review and approved.



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Examination by Ms. Gail Lundgren
(Attorney for Owens-Corning)

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| Mr. Mangold<br>p. 142 | Was hired by Mr. Bessmer in 1962; he worked under Mr. Bessmer in the Industrial Hygiene Dept. from 1962 to 1970. |
| Medical Officers<br>p. 143-144 | Dr. McBratney - Civilian doctor at PSNS when Captain Hutchinson left in 1965 he assumed the head physician he retired until 1972.<br><br>Captain Beck - Medical officer at PSNS in 1950.<br><br>Captain Reid - (deceased) took over Captain Beck about 1953 or 1954.<br><br>Captain Jeffers - Took over Captain Reid<br><br>Other: Captain Ecklund and Dr. Carter. |

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Examination by Mr. Ley
(Attorney for Combustion Engineering

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| Stand up Safety Meetings<br>p. 146<br>(also see p. 92) | The Safety Division of Industrial Relations Dept. in the shipyard was in care of these meetings (repeated: held weekly).<br><br>Mr. Switzel was the Head of the Safety Division; Bob Britten was the Head of the Industrial Relations Department and before him there was Joe King was in charge (probable late '50's - early '60's) |
| Exhibit III<br>p. 149 | Is an excerpt from Safety Review Magazine (Oct. 1962) titled: Asbestosis |
| Exhibit IV<br>p. 150 | Is an article published in the American Industrial Hygiene Journal (May/June 1964) title: Asbestos Exposure during Naval Vessel Overhaul, Offered by William T. Marr. |

Examination by Mr. Hilfer
(Attorney for the Plaintiffs)

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| TLV<br>p. 151 (also see pp. 178-194, 213 and 227 | The Threshold Limit Value was defined by Mr. Bessmer: "Is the value of exposure measurement below which most people will not suffer harm." The TLV is associated with dust. |



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| Maximum Allowable Concentration (MAC)<br>p. 152 | The TLV superceeded the maximum allowable concentration; The MAC was the old method of defining exposure limits and is roughly a ceiling concentration above which exposure should not be allowed (5 mpcf) |
| Hazards<br>p. 154-155 | Is Mr. Bessmer's opinion that in the early '50's is that workers at PSNS knew there was a hazard associated with asbestos -- that asbestos dust should not be inhaled. |
| Dust Control Procedures<br>p. 156 | The dust control procedures in 1949 were not limited only to asbestos dust. |
| Dust Counts<br>p. 156 | Mr. Bessmer began to take dust count since 1950. |
| Annual Physical Examination<br>p. 159 | In 1940 Source Trades got annual physical examinations: i.e.,<br>- Employees in dusty operation got annual x-rays (including asbestos workers)<br>- Electroplaters got a semi-annual physical<br>- Lead workers got Urinary Lead Tests<br>- Firemen got annual physicals |
| Barred from Shops<br>p. 160 | Mr. Bessmer was barred from the shops for about five months until the production officer retired. |
| Labeling Program<br>p. 165-166 (also see pp. 62, 86, 87, 88-90, 103 and 133 | Bascially in this program, the Navy had approximately six different kinds of labels: one was toxic, poison, oxidizer, corrosive and flammable. The color for these labels was different for each one i.e., toxic - red, corrosive - white.<br><br>The labels placed on asbestos products (toxic) did not include the word Asbestosis or Cancer. |
| Visitors Contact with J-M//Dr. Reitze<br>p. 166-167 | Around 1969 or 1970 - Dr. Reitze visited PSNS. After his visit he wrote a letter to the Chief, BU Med and copy to the shipyard, generally it said that PSNS had a good program. |
| Risk of Cancer<br>p. 168 | Sometime in the 1960's Mr. Bessmer first became aware that there was a risk of Cancer associated with exposure to Asbestos. |

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| Lecture at Columbia University<br>p. 169<br>(also see p. 185) | Mr. Bessmer took a course in 1942 at Columbia and remembers Dr. Garner saying that Asbestosis was similar to Silicosis; that Asbestosis didn't produce death but might be disabling. |
| Health Hazard Evaluation<br>p. 174 | Normally an industrial hygienist would evaluate a potential health hazard by taking air samples in the breathing zones of people, refer to literature, textbooks, printed materials from the manufacturers of products, hiw own knowledge and experience, attend conferences, and another source is epidemiological studies. |
| PSNS Duties<br>p. 177 | In 1962 PSNS was chosen to be a nuclear shipyard; getting the nuclear program going, took most of the time. |
| TLV and J-M<br>p. 178-194 (also see pp. 213 and p. 227) | In 1959 J-M Corp. had two methods of counting dust: 1) 5 mppcf and 2) one million fiber per cubic foot for the fiber. (Mr. Bessmer was not aware of this). Mr. Bessmer believes that is probably true that the TLV was mainly intended to prevent the incidence of Asbestosis and not of Cancer. Asbestosis was the only hazard Mr. Bessmer knew of in those early days. |

Examination by Mr. Kirk Mortensen
(Attorney for the Plaintiffs)

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|---|---|
| Lecture at Columbia University<br>p. 185 (also see p. 169) | The lecture given by Dr. Gardner lasted about half a day. |
| Mare Island Survey<br>p. 186 | Mr. Bessmer made a hazard survey at Mare Island in 1942; made a written report. |
| Work Force<br>p. 189 | The greatest number of people in the general force at PSNS was 15,000 at one time. |
| Respirators and Goggles<br>p. 190-192 (also see pp. 49-51, 56-58, 75-77, 134-140 and p. 211) | No Respirators or masks were provided to pipe coverers and insulators upon their beginning of employment as PSNS. Mr. Bessmer heard reports/complaints about the difficulties the workers had when they had to wear goggles for eye protection and a respirator at the same time; the mask would push the goggles up and then they couldn't see what they were doing. |

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| Exhibit B, C & D<br>p. 195-205 | Manufacturer's literature on Kaylo Heat Insulation -- the third page of this Exhibit states that "Block or Pipe Insulation can be sowed, cut or scored with ordinary tools; the material is non-irritating to the skin and non-toxic."<br><br>J-M Data Sheet on Thermal Insulation products -- states "Easy to apply and safe to handle." It is a non-burn asbestos paper product with 95% fiber content.<br><br>The above contradicts the message Mr. Bessmer got from Dr. Gardner in 1942. That statement would be a clear message that there was no risk in working with that product that contained 88% Asbestos Fiber. |
| Exhibit D<br>p. 205-206 | Is a letter written to Mr. Albert Edwards, Industrial Hygiene Engineer, Indiana State Board of Health. This letter lists ingredients of materials called Careytemp Insulation. (Mr. Bessmer never heard before about Careytemp insulation) |
| Respirators<br>p. 211 (also see pp. 49-51, 56-58, 75-77, and 134-140) | Respirators were required earlier than 1968 but they became mandatory in 1968. |
| TLV<br>p. 213 (also see pp. 151, 178-194 and p. 227) | Mr. Bessmer's initial impression years ago was that the TLV was a safe exposure level and his present state of knowledge is that almost any amount of asbestos could be harmful. |

Examination by Mr. Willhite
(Attorney for the Plaintiffs)

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|---|---|
| Employment/Other Shipyards<br>p. 215-217 | Mr. Bessmer serve at Pearl Harbor Shipyard from September 1943 - 1945; during this time he conducted air sample surveys -- took samples for formaldehyde with a midgest impinger. Did not conduct studies for AIRBORNE Asbestos. |
| Safety Manuals<br>p. 218 | The Asbestos exposure and control manuals were put out by the shipyard. |

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| Industrial Hygienist Responsibilities<br>p. 219 | One of Mr. Bessmer's responsibilities as an industrial hygienist is to educate workers concerning the hazards of various products. |
| Training at PSNS<br>p. 219 | While at PSNS apprentice insulators at least (up through the mid - 50's) were taught by older insulators. |
| Electrostatic Precipitator<br>p. 220 | Mr. Bessmer was not aware that Dr. Gardner had instructed the asbestos manufacturers that the electrostatic precipitator was a more effective method of sampling airborn asbestos particles. |

Examination by Mr. Slagle
(Attorney for Eagle Pitcher)

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|---|---|
| Magnesia Dust<br>p. 225 | Mr. Bessmer was informed by Mr. Ramage that workers (pipe coverers and insulators) were dying as a result of inhalation of magnesia dust; the disease was not specified. According to Mr. Bessmer, Mr. Ramage was concerned with safety but he was misdirecting his concern by attributing those cases to magnesia dust and later when asbestos was a cause Dr. Ramage demanded blood counts which have very little bearing on asbestosis. |
| TLV<br>p. 227 (see also pp. 178-194 and p. 213) | The TLV are published by the American Conference of Governmental Industrial Hygienists. |
| Exhibit V<br>p. 230 | Is a publication put out by Shop 56; contained safety recommendations. |
| Asbestos Containing Insulation Materials | These materials were banned or drastically reduced after approximately 1972 based on a Bureau of Ships directive. |

Examinations by Mr. French
(Attorney for Celotex)

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| Workers knew Mr. Bessmer<br>p. 236 | The workers knew Mr. Bessmer and probably associated him with safety rules and regulations in the shipyard. |

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IN THE SUPERIOR COURT OF THE STATE OF WASHINGTON

IN AND FOR THE COUNTY OF KING

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| KING COUNTY ASBESTOS CASES OF SCHROETER, GOLDMARK & BENDER: LEVINSON, FRIEDMAN, et al; BANGS, CASTLE, et al; DODD, CONEY & BISHOP. McCUTCHEON & GROSHONG: WALTHEW, WARNER, et al; ROY E. JACKSON,<br><br>Plaintiffs,<br><br>vs.<br><br>JOHNS MANVILLE CORP.; UNARCO INDUSTRIES, INC., et al,<br><br>Defendants. | NO. 81-2-18584-3 |

RECEIVED
JUN 16 1982
W.A.D.A.

DEPOSITION UPON ORAL EXAMINATION

OF

DANIEL BESSMER

10:00 a.m.
June 10, 1982
1111 Third Avenue Building
Seattle, Washington

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Eileen L. Berg
Court Reporter

dean moburg
& associates
inc.
court reporters
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seattle, washington 98104 206-622-3110

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| Number | Description | Page |
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| 1 | 16-page report entitled, "Asbestos Exposre and Pulmonary X-ray Changes to Pipe Coverers and Insulators at Puget Sound Naval Shipyard" | 101 |
| 2 | Multi-page document entitled, "Asbestos Exposure and Control | 101 |
| 3 | 3-page document entitled, "Safety Review" | 148 |
| 4 | 7-page document entitled, "Industrial Hygiene Journal" | 150 |
| 5 | 7-page document entitled, "Marine Pipe Covering and Insulating, Shop 56, May 1961" | 230 |




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| Number | Description | Page |
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| A | Multi-page document, first page of which is letter to W.W.F. Shipherd from Keasbey & Mattison. | 180 |
| B | 3-page document, entitled, "Navshipyd Puget" | 195 |
| C | 1-page document entitled, "Thermal Insulation Products" | 199 |
| D | 1-page document entitled, "Kaylo Pipe Insulation" | 201 |
| E | 2-page document, letter addressed to Mr. Albert Edwards, Industrial Hygine Eng. from L. A. Pechstein | 205 |




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A P P E A R A N C E S cont'd.

| | |
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A P P E A R A N C E S cont'd.

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DANIEL JAMES BESSMER Being first duly sworn on oath, testified as follows:

MR. SOLTYS: Let the record reflect this deposition is being taken pursuant to the Washington rules of discovery, notice to all parties, subpoena to the witness, and in pursuance with the file order previously entered in the asbestos cases. If anyone else would like to add an additional statement on the record before we get going, please feel free to do that.

AUDIENCE: I assume an objection by one plaintiff is an objection by all plaintiffs?

MR. SOLTYS: I think we can agree an objection made by one plaintiff is an objection by all plaintiffs and an objection by one defendant will likewise be an objection by all defendants. And in conformance with our prior agreement I think an objection to the form, foundation or responsiveness of answer can be made simply by saying, objection, form; objection, foundation, or objection, responsiveness.

AUDIENCE: And all other objections are reserved until the time of trial?

MR. SOLTYS: I understand all other objections are reserved until time of trial.



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AUDIENCE: Does that include objections as to lack of foundation, assumes facts, something like that?

MR. SOLTYS: A foundation objection will have to be made I understand.

AUDIENCE: Mr. Soltys, you said the Washington rules. The deposition was being taken pursuant to the Washington rules. I assume you also mean the federal rules?

MR. SOLTYS: The Washington rules and the federal rules of discovery will apply.

EXAMINATION

BY MR. SOLTYS:

Q Would you state your full name and present home address, please?

A Daniel James Bessmer, 6700 Stampede Boulevard N.W., Bremerton, Washington, 98310.

Q Mr. Bessmer, could you tell me your age and your date of birth, please?

A Born December 17, 1916. I am 65.

Q Are you presently employed?

A No.

Q When was your last employment?

A I taught fencing at Olympic College for a while after



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I was retired, but I assume you mean industrial hygiene.

Q Let's do that. Have you ever been employed as an industrial hygienist?

A Yes.

Q During what period of time were you employed as an industrial hygienist?

A From April 1942 to about June, 1974.

Q Were you always employed by one employer while you were working as an industrial hygienist?

A No.

Q Can you tell me for whom you were employed during that period of time?

A I was employed as a naval officer from April 1942 to December 1946. I was employed as a teacher, part-time teacher of chemistry from '46 to '47, and I was employed as a civilian at Long Beach Naval Shipyard from 1947 to 1949. I was employed by Puget Sound Naval Shipyard from November, 1949 until 1970 as an industrial hygienist. From about 1970 to 1972 I was a supervisory health physicist at Puget Sound Naval Shipyard.

Q And then you retired in 1972 from Puget Sound Naval Shipyard and that would be the last employment you had as an industrial hygienist?



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A Not really, I was a research associate at the University of Washington from about December 1972 to June '74.

Q Could you tell me what an industrial hygienist is?

A He is a specially trained person who is supposed to detect and evaluate occupational health hazards in the work environment and make recommendations for their control if necessary.

Q I take it that the profession of industrial hygiene is in fact a profession?

A I count it as such, yes.

Q During your lifetime in that profession, did you belong to any professional organizations?

A Yes, I did.

Q Can you tell me which ones they were?

A I belong to the American Conference of Governmental Industrial Hygienists, the American Industrial Hygiene Association, and the American Board of Industrial Hygiene.

Q As a member in those organizations would you be the recipient of various newspapers, magazines or newsletters which any of those organizations might have put out?

A Yes.

Q Did you participate in any of the meetings conducted by any of those organizations?

A Yes.



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Q Did you ever deliver a speech or give a lecture in conjunction with your participation in any of those organizations?

A Yes.

Q When I think of an industrial setting on the one hand I think of safety, wearing hardhats, wearing goggles, things like that, and health on the other hand. Is there a difference between what an industrial hygienist does and what a safety officer might do?

MR. WILLHITE: Object to form.

MR. SOLTYS: Strike the question.

Q (By Mr. Soltys) Does the industrial hygienist also look after the physical safety of workers in industry?

MR. WILLHITE: Same objection. Leading.

A In some respects, yes.

Q (By Mr. Soltys) Is there also another division in industry which would care for the safety features on a job site as opposed to the health features?

A Could you repeat that?

Q Is there another position besides the industrial hygienist division which concerns itself only with the safety aspects of a job site?

A I can only speak for my own experience in the shipyards that I worked in. There is a separate organization.

Q What is that organization called?



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A That is the safety division of the industrial relations department.

Q Under whom does that division operate?

A The industrial relations officer.

Q Who does the industrial hygienist operate under in shipyards?

A At the time I worked it was under the medical officer.

Q Would this medical officer be assigned to the individual shipyard?

A Yes.

Q Who would that medical officer work under?

A He would work under the shipyard commander.

Q Would the shipyard commander in turn work under someone else?

A He would work under the Naval Ship Systems Command, commanding officer.

Q Is there a Bureau of Medicine and Surgery?

A Yes.

Q Has it always been called the Bureau of Medicine and Surgery?

A To the best of my recollection, yes.

Q Does an industrial hygienist in a shipyard report to the Bureau of Medicine and Surgery?

A Yes.

Q Can you explain to me the manner in which that reporting



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is done?

A We would write at different times either a monthly or quarterly report of our activities which would be included in a medical department report. This medical department report would then go through the shipyard commander to the Bureau of Medicine and Surgery.

Q Would the Bureau of Medicine and Surgery then communicate what it learned from one shipyard to another shipyard?

MR. WILLHITE: Objection. Calls for speculation.

A In part they published excerpts from these reports which they felt would be of universal interest in a newsletter and sent this around to other shipyards.

Q (By Mr. Soltys) How often would this newsletter come out?

A Quarterly.

Q Was this always so from 1942 until 1970?

A No.

Q When did this start, to the best of your knowledge?

A In the 1950's. I don't recall an exact date.

Q Prior to 1950, the 1950's, when this procedure was adopted, was there some method by which the Bureau of Medicine would get information to its various industrial hygienists?

A They were free to write letters to the shipyard commander



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or through the channels or there were some informal communications, phone calls, this type of thing.

Q Did the Bureau of Medicine and Surgery ever give directives to shipyards or industrial hygienists working in shipyards?

A Yes.

Q Was there any specific way in which this had to be done?

A That was a formally written order sent via the shipyard commander.

Q You indicated a little bit earlier you worked in various shipyards. Were all of the shipyards you worked in United States Navy shipyards?

A Yes.

Q This would be as opposed to a civilian shipyard, would it not?

A That is correct.

Q Could you explain the difference between a civilian shipyard and a U. S. Navy shipyard?

MR. MORTENSEN: Objection, lack of foundation.

MR. SOLTYS: Strike the question.

Q (By Mr. Soltys) Could you explain to me what a naval shipyard is?

A It is a shipyard which is manned by civil servants and is commanded by a naval officer.



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Q I am sorry. Was that the end of the answer?
A Yes.
Q Does a naval shipyard ever do civilian work? In other words, work on a civilian vessel?
A Yes.
Q Would a naval shipyard ever work on a civilian vessel which was only to be used for civilian purposes?
A Yes.
Q Do civilian shipyards, to the best of your knowledge, work on naval vessels?
A Yes.
Q Is there an industrial hygienist usually at the civilian shipyard also?

MR. WILLHITE: Objection, no foundation.

A I do not know.
Q (By Mr. Soltys) Have you ever had contact with an industrial hygienist who was working at a civilian shipyard?
A No.
Q Is there an organization in which all of the industrial hygienists working for naval shipyards would belong or get together?
A Yes, there is a Naval Industrial Hygiene Association.
Q Did you belong to that organization?
A Yes, I started it, actually.



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Q When did you start that organization?
A I believe it was in the 1960's. Again, I don't recall the exact year.
Q Prior to the 1960's when that organization was started, was there some means by which all of the industrial hygienists working at the various naval shipyards could get together?
A Some of us would attend the conferences sponsored by the American Conference of Governmental Industrial Hygienists and the American Industrial Hygiene Association and we would usually sit down and talk together.
Q Would there be a distinct division in those two organizations for the industrial hygienists who work in naval shipyards?
A I am not sure I understand your question.
Q Did those two organizations have a separate division for the industrial hygienists who were employed in naval shipyards?
A No.
Q What was the purpose of forming the organization you formed in the 60's for the industrial hygienists who were working in naval shipyards?
A Primarily we would speak as a group.
Q Was one of the purposes to allow you an apparatus by which you could exchange information as to what was going



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on from naval shipyard to naval shipyard?

MR. WILLHITE: Object to form, leading the witness, counsel.

A No, not primarily.

Q (By Mr. Soltys) In your meetings in this organization did you exchange information about what was going on in the various naval shipyards?

A We presented technical papers, yes.

Q Is there a library at the Puget Sound Naval Shipyard?

A Yes.

Q Are any of the papers from this organization preserved in that library, to your knowledge?

A Not to my knowledge.

Q At the time when you left the naval shipyard at Puget Sound, were the papers of this organization preserved in that library?

A No.

Q Do you yourself possess any of these papers?

A No.

Q Do you know where we would be able to find these papers?

A If they still exist they would be in the files in the industrial hygiene division.

Q At the Puget Sound Naval Shipyard?

A Yes.

Q I want to go back in time a little bit and ask if you



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hold a high school diploma?

A Yes.

Q Where is that diploma from?

A Mountain View Union High School, Mountain View, California.

Q When did you receive that diploma?

A 1934.

Q Did you then attend college to obtain a bachelor's degree?

A Yes.

Q Which school did you attend for that purpose?

A San Jose State College.

Q Did you ever receive a bachelor's degree from that college?

A Yes.

Q When did that occur and what was the degree in?

A It was a B.A. in Physical Science and it was obtained in 1942.

Q You indicated earlier that you were an officer in the United States Navy?

A Yes.

Q When did you join the navy?

A On active duty, April 24, 1942.

Q So essentially you received your degree from San Jose State College after you joined the navy?



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A That is correct.
Q When you joined the navy what was your job?
A In the navy?
Q Yes.
A Industrial hygiene officer.
Q What was your rank?
A Ensign.
Q Where were you stationed?
A Mare Island Naval Shipyard.
Q From what period of time were you stationed at Mare Island Naval Shipyard?
A Initially about three months.
Q Then do you have the months from what month of 1942 to what month in 1942?
A April 24, 1942 to the end of June, 1942.
Q What happened in June, 1942?
A I was sent to Columbia University for training in industrial hygiene.
Q Who sent you to Columbia for training in industrial hygiene?
A The U. S. Navy.
Q To your knowledge had the U. S. Navy sent any other of the industrial hygienists to Columbia University?
A Yes.
Q Do you know the approximate numbers of hygienists sent



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by the Navy to Columbia University.

MR. WILLHITE: Object. No foundation.

A I don't know how many they sent to Columbia, but Harvard and Columbia combined I believe there were 42 of us in the entire navy.

Q As of 1942 who had gone to those schools?

A Yes.

Q Did each of those schools have an industrial hygiene program?

A Yes.

Q When you were at Columbia can you tell me what courses you studied?

A Bio-statistics, ventilation principals, chemical analysis of hazardous materials, sanitation, industrial psychology, and then the toxicology of various hazardous materials, such as dust, fumes, gases, mists.

Q While you were at Columbia did you learn how to take air samples?

A Yes.

Q Were air samples being taken in 1942 in any of the U. S. Navy shipyards?

A I can't speak for all of the U. S. Navy shipyards, they were not being taken in Mare Island.

Q When you say you studied dust, can you tell me more specifically what types of dust you studied at Columbia?



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A We studied cotton dust, silica dust, asbestos. I don't remember any of the others off-hand.

Q Can you tell me what industrial psychology is?

A Not really, I never used that part of my training.

Q Let's finish up with your education. Have you received any formal education other than what you received at San Jose State College and at Columbia University?

A Yes, I went to Stanford, where I received a master's degree in chemistry.

Q When did you receive that degree?

A January, 1947.

Q Subsequently did you ever receive any other training from any other university?

A I had a course in noise control from M.I.T. and very short refresher courses at these conferences.

Q I want you to go back to your time at Columbia University, and you indicated that you studied dusts, including asbestos. Can you tell me what you were told about asbestos at Columbia University?

A Essentially that it was a hazardous material, that inhalation would cause a condition called asbestosis if inhaled in excess of the maximum allowable concentration over a long period of time and that this condition might eventually lead to disability.

Q Were you ever told that the asbestos dust if inhaled could



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cause fibrosis in the lungs?

A Yes.

Q Were you ever shown any xrays in conjunction with that course at Columbia which displayed the condition of asbestosis?

A Yes.

Q With regard to the inhalation of asbestos dust and while you were at Columbia, were you taught methods by which you could avoid inhaling excessive amounts of asbestos dust?

A Yes.

Q Can you tell me what some of those methods were that were taught to you in 1942 at Columbia University?

A Use of respiratory protection and ventilation, primarily.

Q Do you remember who taught you the course on asbestos?

A I believe it was Dr. Leroy Gardner.

Q After completing the course at Columbia University, what was your next duty assignment?

A I went back to Mare Island.

Q What was your job at Mare Island?

A Industrial hygiene officer.

Q When you returned to Mare Island, was there any kind of a survey in process of being conducted at Mare Island Naval Shipyard?

A No.



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Q At any time while you were at Mare Island was there any kind of a survey conducted of the conditions at Mare Island?

A Yes.

Q Do you recall how it was that that survey came to be conducted?

A We were directed to make a survey by the Bureau of Medicine and Surgery.

Q What was that survey to entail?

A It was a complete industrial hygiene survey of the shipyard, which would indicate potential health hazards, numbers of people exposed and protective equipment and use.

Q At Mare Island Naval Shipyard?

A Yes.

Q Do you remember when that directive came down from the Bureau of Medicine?

A I believe it was 1942.

Q Do you recall when this survey was begun?

A It was started immediately.

Q Do you remember approximately what month it was that it was begun, the spring, summer?

A It was probably October or November of 1942.

Q Do you recall approximately how long it took to conduct the survey?

A A month or two.



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Q Was the survey conducted by the industrial hygienist assigned to that shipyard?
A Yes.
Q How many industrial hygienists were assigned to that shipyard at that time, 1942?
A I believe there were three or four.
Q You did participate in the survey yourself?
A Yes.
Q Prior to starting the survey, could you tell me what hazards you believe that the workers in the shipyard were being exposed to?
A Not really, because our work prior to the survey was establishing a laboratory so that we could do dust counts and this type of thing.
Q As an industrial hygienist were you aware of what the potential hazards were that a worker in 1942 would be exposed to in a shipyard?
A Yes.
Q Can you tell me what those potential hazards were?
A Electroplating solutions.
Q What is the hazard associated with those?
A That would depend on the solution, some are cyanide, some contained chromic acid.
Q Would those cause pulmonary distress?
A Yes.



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Q Go ahead, what else?
A Sandblasting dust.
Q Would that cause pulmonary distress?
A Yes. Grinding propellors, the dust produced from brass.
Q Would that cause pulmonary distress?
A Yes.
Q Anything else?
A Yes, we were also concerned with illumination and ventilation for comfort, heat, stress, noise, welding fumes.
Q What was the hazard associated with welding fumes?
A If they were welding on a lead painted surface there would be a lead hazard. If they were welding on galvanized material there would be a hazard of metal fume fever.
Q Would those cause pulmonary distress?
A Yes.
Q Would the inhalation of just regular welding fumes cause pulmonary distress?
A At that time my information was that it would not.
Q Subsequently did you come to learn that the inhalation of regular welding fumes would cause pulmonary distress?
A No.
Q What other potential hazards were you aware of?
A Chlorinated hydrocarbons.
Q Are those solvents?



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A Those are solvents.
Q What is the hazard associated with those things?
A It would depend on the solvent. Carbon tetrachloride was a severe kidney and liver damage, would cause severe liver and kidney damage.
Q Would the inhalation of any solvent cause pulmonary distress?
A Some were anesthetics and would put you to sleep. I don't know about pulmonary distress or not.
Q Were lead based paints being used in shipyards in 1942?
A I believe they started shortly thereafter.
Q Would inhalation of fumes from lead based paints cause pulmonary distress?
A That was not the primary hazard that might cause a transient pulmonary distress.
Q Have you identified all of the potential health hazards to the pulmonary system that you believe existed in shipyards in 1942?
A No, there were parting compounds containing free silica used in foundary, some of the foundary furnaces exhausted their product of combustion into the shop atmosphere. The forge shop would also do this. There were metal fumes in the foundary.
Q Is that the entire list?
A That I can recall at the moment, yes.



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Q Let's go back to that survey which was conducted at Mare Island Shipyards sometime in the autumn of 1942. Was the result of the survey ever reduced to writing?

A Yes.

Q What happened to that survey, the written survey?

A The first draft was sent through channels to be forwarded to the Bureau of Medicine and Surgery but it did not get off the shipyard.

Q Why is that?

A The captain of the yard, as he was called then, decided that this was not an appropriate occurrence in wartime.

Q Did he ever make a comment about the report?

A Yes, he sent the report back to us and written on it was this would be a good thing in peacetime.

Q Do you remember the name of that person?

A No.

Q Do you remember what his rank was?

A I believe it was captain in the navy.

Q Captain in the United States Navy?

A Yes.

Q I take it that that report then as it was prepared and drafted was never forwarded to the Bureau of Medicine?

A That is correct.

Q What happened to that report?

A We rewrote it and reduced it substantially in volume



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and information and that was forwarded to the Bureau of Medicine and Surgery.

Q When that revised report was forwarded on to the Bureau of Medicine was it comparable to the first report which was returned to you?

A I believe it contained the essential information.

Q Was the information in any way toned down or emasculated?

A Probably.

Q In fact in prior depositions you have indicated it was emasculated?

A Yes.

Q How long did you stay at the Mare Island Naval Shipyard?

A Until early 1943.

Q During the period of time from when the report was prepared until you left the shipyard, did you agree with the captain when he said that that report was not appropriate in wartime?

A Well, initially I didn't. I came out of Columbia all fired up and it took the wind out of my sails, but it was indicative of the type of reception our work got from then on and I finally came to conclude that maybe it wasn't so important for the war effort.

Q When you mention the war effort, could you tell the court reporter what we generally speak of as the war years?



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A 1942 through 1946.
Q What was your next station after Mare Island Naval Shipyard?
A New York Naval Shipyard.
Q And that is what we also refer to as the Brooklyn Shipyard?
A Yes.
Q What was your job at the New York Naval Shipyard?
A Industrial hygiene officer.
Q How long did you stay there?
A About six months.
Q What was your job while you were there?
A Primarily sanitation, inspecting sewers for cross connections, looking at food lockers, checking temperature on dishwashers.
Q And I presume you didn't have much to do with dust control in the New York Naval Shipyard?
A No.
Q What was your next job after the New York Naval Shipyard?
A Pearl Harbor Naval Shipyard.
Q Were you still an officer in the United States Navy?
A Yes.
Q What was your rank when you went to Pearl Harbor Naval Shipyard?
A Lieutenant Junior Grade.



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Q When did you report to duty there?

A September, 1944, I believe.

Q Would it have been '43?

A '43.

Q What was your job at the Pearl Harbor Naval Shipyard?

A Industrial hygiene officer.

Q How long did you stay there?

A Two years.

Q During that two year period of time what was your specific task at that yard?

A General industrial hygiene. However, I was assigned primarily to do lead absorption tests on persons who were exposed to lead, check electricians and welders for color blindness. We had a clothing impregnation unit which supposedly was secret to impregnate clothing for gas defense and we ran periodic checks on them. I made some special investigations.

One I remember, a ship came in and people in the ammunition lockers were unable to pass ammunition during the battle because their eyes would water and I found formaldehyde in the insulation, this type of thing.

Q Did the inhalation of that product, by the way, cause respiratory distress?

A Yes.



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Q When were you discharged from the United States Navy?
A January, 1946. I was released to inactive duty, not discharged.
Q Where did you go after Pearl Harbor Naval Shipyard?
A Went to the Naval Air Station in San Diego.
Q What was your task there?
A Industrial hygiene officer.
Q What were you doing specifically at San Diego Naval Air Station?
A The laboratory had been disestablished so I primarily went around and looked in the shops and ran a few lead samples and after about two months I received my release to active duty.
Q While you were at Mare Island, the Long Beach Shipyard and Pearl Habor Naval Shipyard, did you understand that the inhalation of asbestos dusts constituted a health hazard?
A Yes.
Q Did the United States Navy understand that?
MR. WILLHITE: Object to form, speculation.
Q (By Mr. Soltys) Let me ask you a question in that case. While you were still an officer in the United States Navy, and I mean a line officer, were the people who worked with asbestos considered by the navy to be working in a hazardous occupation?



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MR. WILLHITE: Same objection.

A I was not a line officer, I was a staff officer. The second part of your question, yes.

Q (By Mr. Soltys) Did the persons working with asbestos products while you were staff officer in the United States Navy receive special hazardous duty pay?

A Not to my knowledge.

Q Were there any special precautions that the navy had developed for those persons working with asbestos products?

A Other than furnishing respiratory protection, not to my knowledge.

Q Were there any kinds of physical examinations, chest xrays, things like that which were done for the persons working with asbestos products?

A I do not know where the practice was initiated, but asbestos workers received semi-annual and later annual chest xrays.

Q You don't know whether that was being done during the period from 1942 to 1946 while you were a staff officer with the United States Navy?

A No.

Q During that period of time was there some maximum allowable concentration of asbestos dust or was there some threshhold limit value of asbestos dust which was



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known to you?

A Yes, five million particles per cubic foot of air.

Q Was that during the entire time period from 1942 to 1946?

A Yes.

Q Who was it that first promulgated that particular figure?

A They were published by the American Conference of Governmental Industrial Hygienists and were adopted by the navy industrial hygienists.

Q Do you know when the industrial hygienists adopted that figure?

A Well, it was the only guideline we had at that time so it was immediately.

Q Who was responsible to determine how much airborne dust particles each worker was being exposed to?

MR. WILLHITE: Objection, foundation.

A The industrial hygiene officer.

Q (By Mr. Soltys) Did you ever try to determine the amount of asbestos particles in the air each of the workers was being exposed to?

MR. MORTENSEN: Objection, unless time is specified.

Q (By Mr. Soltys) Let's start while you were at Mare Island, at any time while you were at Mare Island?

A No.



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Q At any time while you were at Long Beach Naval Shipyard?
A No.
Q At any time while you were at the Pearl Harbor Naval Shipyard?
A No.
Q At any time while you were at the San Diego Air Station?
A No.
Q Was there any asbestos, by the way, being used at the San Diego Naval Air Station?
A Not that I know of.
Q Did you ever have the facilities to conduct those types of tests?
A Yes.
Q What would you need so that you could determine how many air particles, how many asbestos particles a worker was being exposed to?
A You would need a sampling device which would pull a known amount of air over a period of time through a collecting device and some method of counting the particles in the collecting liquid.
Q Did you have such a device when you were at the Mare Island Naval Shipyard?
A I believe yes, we did.
Q Did you ever take asbestos samples, air samples, while you were at Mare Island?



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A No.
Q Would it have been the job of the industrial hygienist to do that?
A Yes.
Q If the industrial hygienist did not do that would there be someone else responsible to do that?
A No.
Q When you were at the Long Beach Naval Shipyard did you have a device or the equipment to take air samples?
A No.
Q When you were at the Puget Sound Naval Shipyard did you have such a device or equipment?
A Yes.
Q Did you ever take those samples there?
A Yes.
Q When you were at Pearl Harbor Naval Shipyard were the results of those tests ever reduced to writing?

MR. MORTENSEN: Objection, you have confused --

MR. WILLHITE: You asked about Puget Sound instead of Pearl Harbor.

Q (By Mr. Soltys) I meant to ask you whether or not a device was available at the Pearl Harbor Naval Shipyard.
A Yes.
Q Did you take air samples at Pearl Harbor?



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A No.

Q Why didn't you take samples at Pearl Harbor?

A I was not assigned that, the other industrial hygienists that were there did, if any were taken.

MR. WILLHITE: Move to strike the last part of the answer as non-responsive.

Q (By Mr. Soltys) I think what you said, you didn't take them personally while you were at Pearl Harbor because you weren't assigned to that?

A Yes.

Q Do you know if any of the other industrial hygienists who might have been assigned to Pearl Harbor actually took air samples?

A No, I don't.

Q It was the job of the industrial hygienist to take those air samples?

A Yes.

Q Am I correct in my understanding if there is a hazard associated, for instance with the inhalation of asbestos at a shipyard, it is the job of the industrial hygienist first to discover the existence of the hazard and second to protect the workers from the hazard.

MR. WILLHITE: Object to the form of the question.

MR. SOLTYS: Strike the question.



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Q (By Mr. Soltys) Am I correct in my understanding if there is a hazard at a shipyard, a health hazard at a shipyard, it is for the industrial hygienist to discover that hazard?

A Yes.

Q If a hazard is discovered is it also the job of the industrial hygienist to protect the worker from that hazard?

MR. WILLHITE: Object to the form.

MR. PICKRELL: I object to the question as vague in the use of the word protect.

MR. SOLTYS: Let me strike the question.

Q (By Mr. Soltys) You indicated to me, Mr. Bessmer, that if there is a hazard that exists in a shipyard, it is up to the industrial hygienist to discover the existence of the health hazard?

A Yes.

Q What does he do once he discovers the existence of a health hazard?

A I probably should qualify that and say he discovers the potential of a health hazard and it is up to him to evaluate to determine whether or not it actually is a hazard.

Then, if it comes out that it is indeed a health hazard, then he should formulate recommendations



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for control.

Q Is that where the industrial hygienist's function stops?

A Yes.

Q Who takes over after the industrial hygienist has formulated a procedure by which a potential or an existing health hazard could be eliminated?

A Generally recommendations were forwarded over the medical officer's signature to the department head concerned. If it was a production department shop it would be the production officer. If it was a public work shop, it would be the public works officer.

Q For whatever reason the production officer or any of the other officers don't want to implement a proposed protection for workers, does the industrial hygienist have any further obligation, in your experience, to proceed further?

MR. WILLHITE: Object to the form, argumentati
no foundation, not limited as to time and place.

Q (By Mr. Soltys) At any time did the industrial hygienist have an obligation to proceed further if the production officer did not implement a proposed safety device?

MR. PICKRELL: Would you define what you mean by obligation?

Q (By Mr. soltys) In your understanding as an industrial hygienist, if you were to make a proposal, and the



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production officer refused to go along with your proposal to eliminate a health hazard, what would you feel as an industrial hygienist your duty would be after that?

MR. WILLHITE: Object to form on the grounds of foundation, on the grounds of no definition of duty.

A There was little that the industrial hygienist could do after that except perhaps on an informal basis go around to people he knew and try to sell them on the idea.

Q You left the United States Navy as a staff officer in 1946. Can you tell me what you did upon leaving the United States Navy as a staff officer?

A I went to Stanford and obtained a master's degree in chemistry.

Q When did you receive that degree?

A January, 1947.

Q What did you do upon receipt of that degree?

A I was hired as an assistant chief chemist for International Minerals and Chemicals Corporation.

Q How long did you work for that organization?

A Until July of 1947.

Q What did you do in July of 1947?

A I took a position as industrial hygienist at Long Beach Naval Shipyard.

Q How long did you stay at Long Beach Naval Shipyard?



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A Until November of 1949.
Q Where did you go then?
A To Puget Sound Naval Shipyard.
Q When you took over the Long Beach Naval Shipyard was there any industrial hygienist working there?
A No.
Q You were employed as a civilian to be an industrial hygienist at the Long Beach Naval Shipyard?
A Yes.
Q At any time while you were at the Long Beach Naval Shipyard were other industrial hygienists hired?
A No.
Q You came to Puget Sound Naval Shipyard in November, 1949?
A Yes.
Q When you came to the Puget Sound Naval Shipyard were there any other industrial hygienists present at the time?
A Yes.
Q Do you remember how many?
A One.
Q Do you remember what his name was?
A Robert L. Gade, G-a-d-e, Lieutenant Commander.
Q Was he an industrial hygienist also?
A Yes.
Q Are there ever medical doctors who are also industrial hygienists?



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MR. WILLHITE: Did you say are there ever?

Q (By Mr. Soltys) To your knowledge have you ever met a medical doctor who was also an industrial hygienist?

A I think I have heard of them.

Q When you arrived at Puget Sound Naval Shipyard, what was your assignment?

A To work as an industrial hygienist.

Q You weren't given any particular task, for instance to conduct a survey or to try to work in a certain building or anything like that?

A No.

Q You did whatever an industrial hygienist had to do when you saw a hazard?

A Yes.

Q When you arrived in 1947 I presume you still had the knowledge you had obtained in 1942 from Columbia University, and that was asbestos dust particles inhaled in sufficient quantities would constitute a hazard?

MR. WILLHITE: Object to form.

MR. SOLTYS: Strike that question.

Q (By Mr. Soltys) When you arrived at the Puget Sound Naval Shipyard in 1947 --

A '49.

Q '49, thank you. Am I correct in my understanding you still had all the same knowledge that you had received at



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Columbia University regarding the inhalation of asbestos particles?

A Yes.

Q Did you believe when you got to Puget Sound Naval Shipyard that the amount of asbestos dust in the air was something which required monitoring?

A Yes.

Q Was there a monitoring program under way when you arrived in 1949?

A Not a regular monitoring program, no samples had been taken in the past.

Q Were those reduced to writing?

A Yes.

Q Did you have an opportunity to look at those?

A Yes.

Q Do you know what kind of equipment was being used to take those samples?

A I believe a midget impinger.

Q Do you remember the manufacturer of that impinger?

A The air sampling device was Mine Safety Appliance. The little glass impinger, I don't know, Pyrex.

Q Was it one of those Greenberg Smith type?

A No, the midget impinger is small, the Greenberg Smith is large.

Q Can you tell me how you would take a sample, an air sample,



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with that type of device?

A You place the sampling fluid in the impinger and place the impinger in the breathing zone of a worker, if it was his exposure that we wanted, or if it was a general exposure we placed it in the shop atmosphere, draw a known amount of air through the impinger and take it back and count it under the microscope.

Q When you arrived at Puget Sound Naval Shipyard in 1949, was there a file entitled asbestos anywhere in the industrial hygiene department, to your knowledge?

A I don't know that there is a specific file designated as such, but there were sampling results as part of an overall survey.

Q When you arrived at the Puget Sound Naval Shipyard in 1949, did that shipyard consider asbestos workers to be involved in a hazardous occupation?

A Yes.

Q Were those workers receiving additional pay for their work in that department?

A I don't know.

Q Were there any special medical precautions being taken with regard to those persons working in the asbestos area at Puget Sound Naval Shipyard when you got there in 1949?

A They were receiving periodic chest xrays.



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Q Were they doing anything else? Were they getting, for instance, periodic medical examinations?
A Not to my knowledge.
Q How often were these periodic xrays being conducted?
A I believe initially they were done every six months. Later they were switched to annual.
Q Do you know who it was that actually conducted these xrays?
A It was the physician in the medical department.
Q That would be the medical department at the Puget Sound Naval Shipyard?
A Yes.
Q Were these U. S. Naval doctors doing the examinations?
A Initially they were navy doctors. We eventually went civilian.
Q When did you go to the civilian doctor, by the way?
A I believe in the late 50's or early 60's, I am pretty hazy on that.
Q When you arrived at the Puget Sound Naval Shipyard had anyone promulgated, to your knowledge, rules and regulations or methods by which asbestos products were to be handled in that shipyard?
A I don't recall any.
Q Was there such a thing as a Bureau of Ships in 1949?
A Yes.



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Q To your knowledge in 1949 had the Bureau of Ships promulgated any guidelines by which asbestos products should be handled in a naval shipyard?

MR. MORTENSEN: Object to the form and foundation unless it is established that was the duty of that Bureau of Ships.

A Not to my knowledge.

Q (By Mr. Soltys) At any time did the Bureau of Ships ever promulgate guidelines by which asbestos products should be handled in naval shipyards.

MR. MORTENSEN: Same objection.

A I believe they did in the late 60's.

Q To your knowledge was the promulgation you have described in the late 60's the first promulgation from any U. S. governmental source regarding how asbestos products should be handled?

MR. PICKRELL: If you know.

A That is the only one I recall.

Q (By Mr. Soltys) When you arrived at the Puget Sound Naval Shipyard in 1949, did you know that ventilation was a proper method in cutting down the amount of airborne dust particles?

A Yes.

Q Was ventilation being used at the Puget Sound Naval Shipyard in 1949 to cut down the amount of asbestos



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particles anywhere in the air in the shipyard?
A Yes.
Q Can you tell me where ventilation was being used?
A In Shop 56.
Q Is Shop 56 a special designation given by the navy to a particular type of functioning shop?
A Yes.
Q What is the purpose of Shop 56?
A It was the pipe coverers and insulators and the pipe-fitters.
Q If I went to any naval shipyard and walked into any Shop 56 would I also go into a shop doing that kind of work?
A Yes.
Q Was that ventilation being used anywhere else at Puget Sound Naval Shipyard in 1949 when you first got there?
A For control of asbestos?
Q Yes.
MR. MORTENSEN: Lack of foundation.
Q (By Mr. Soltys) To your knowledge?
A Not to my knowledge.
Q In 1949 when you got to the Puget Sound Naval Shipyard, did you know the use of respirators was another way of controlling the amount of asbestos particles inhaled by a worker?
A Yes.



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Q In 1949 when you arrived at the Puget Sound Naval Shipyard were asbestos workers using respirators?

MR. MORTENSEN: Object, unless you establish this witness went aboard all the ships where these people were working and had full opportunity to observe every area where asbestos was in the air. It sounds to me like the day he got there you had him searching the whole place, which had 33,000 men on it.

MR. SOLTYS: I appreciate your objection. I know how you really don't want to prolong our deposition and I know how you would be perfectly satisfied by making an objection, for instance, response or foundation or form and in the future you can feel free to do that and I will understand it means all that.

Let me go back so Mr. Mortensen will be happy.

Q (By Mr. Soltys) Mr. Bessmer, when you first got to the Puget Sound Naval Shipyard did you take it upon yourself to go around to see what was actually going on at the Puget Sound Naval Shipyard?

A Yes.

Q Can you tell me what it was that you did so that you could familiarize yourself with what was going on at the Puget Sound Naval Shipyard?

A Commander Gade conducted me on a tour of the shops and the



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ships.

Q How long did that tour last?

A Perhaps a month.

Q After you had completed that tour did you continue to move around the Puget Sound Naval Shipyard to further acquaint yourself with what was going on there?

A Yes.

Q Did you attempt to take any kind of a survey in the early months when you first arrived at the Puget Sound Naval Shipyard so you would understand what was going on there?

A Not a formal industrial hygiene survey, no.

Q But an informal survey which would acquaint you with what was going on.

A An inspection survey, we called it.

Q Did you ever at any time in 1949 have any difficulty getting into any of the work areas at Puget Sound Naval Shipyard?

A Early in 1950 I did. I was barred from the shops.

MR. MORTENSEN: Move to strike, responsiveness.

Q (By Mr. Soltys) My question was in 1949 did you have any difficulty, and I presume the answer is no?

A No.

Q In 1950 did you have any difficulty in getting access to all the facilities at Puget Sound Naval Shipyard?

A Yes.
Q Tell me what happened in 1950.
A The production officer wrote a memorandum to the medical officer requesting that I not be allowed in the shops.
Q Essentially you were barred from going into some of the shops?

MR. MORTENSEN: Object to form.

Q (By Mr. Soltys) Were you barred from entering any of the shops at Puget Sound Naval Shipyard by that memorandum?
A Yes.

MR. WILLHITE: Same objection.

Q (By Mr. Soltys) Which shops were you barred from?
A All of them
Q Who actually barred you?
A The production officer.
Q Do you recall his name?
A Captain Bell.
Q B-e-l-l?
A Yes.
Q To your knowledge is Captain Bell still alive today?
A He is not.
Q At any time while Captain Bell was still at the Puget Sound Naval Shipyard, did you again gain access to any of those shops?



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A No.

Q Captain Bell was a United States Naval Officer?

A Yes.

Q What was his rank?

A Captain.

Q Mr. Bessmer, is it true that from time to time persons have been in charge of, for instance, a ship or facility and would be called captain and yet not hold the rank of naval captain?

A Yes.

Q At any time did you again gain access to the shops at Puget Sound Naval Shipyard?

A Yes.

Q Tell me how it is that you came to again be allowed into these shops.

MR. MORTENSEN: Object, I want a time.

MR. SOLTYS: Is that a foundation objection.

Q (By Mr. Soltys) At what time were you again allowed access to any of these shops?

A Approximately the middle of 1950.

Q Why was it that you were again allowed access to these shops.

A Captain Bell retired.

Q Who took over then in his position?

A I don't remember.



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Q Was he the production officer at the Puget Sound Naval Shipyard until the time of his retirement.

A Yes.

Q During that period of time when you were barred from the shops by Captain Bell what did you do?

A I wandered around the waterfront and on the ships, observed what was going on there.

Q During this period of time when Captain Bell was the production officer was this also wartime?

A No.

Q The war had --

A Correction, Korea came along about then.

Q Going back to the line of questions which I was asking before we got into this, I had asked you whether or not you had observed any asbestos workers wearing respirators at Puget Sound Naval Shipyard in 1949 when you first arrived. Do you remember whether or not you observed any asbestos workers wear respirators at Puget Sound Naval Shipyard in 1949?

A I don't remember.

Q In 1950 do you recall having observed any asbestos workers at Puget Sound Naval Shipyard wearing respirators?

A To the best of my recollection some did.

Q Do you remember in what shops those workers were wearing respirators?



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A They wore them primarily on the ship.

Q Did you ever see anyone in Shop 56 wearing a respirator?

A No.

Q Can you tell me what other shops existed at the Puget Sound Naval Shipyard in 1949 besides Shop 56?

A Shop 11, Shipfitter shop; Shop 26, welding shop; Shop 17, sheet metal shop; Shop 31, inside machine shop; Shop 38, outside machine shop; Shop 07, public works; Shop 72, riggers; Shop 71, paint shop. There was an electronic shop and I can't remember the number of it.

Q You have indicated a series of numbers. Would those numbers be uniform in any naval shipyard you went to?

A Yes.

Q You said that you did observe in 1950 some asbestos workers wearing respirators aboard ship. Do you know where those respirators were obtained from?

A From the shop 06, tool room.

Q Do you know how workers would obtain a respirator?

A He would go to the tool room and ask for one.

Q To your knowledge was any worker ever denied a respirator when he asked for one?

A No.

Q Was there a program under way when you arrived at Puget Sound Naval Shipyard in 1949 to encourage the asbestos



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workers to use respirators?

A I believe recommendations had been made.

Q By whom were the recommendations made, to your knowledge?

A By my predecessor, Commander Gade.

Q Did you ever overhear him making such a recommendation?

A No.

Q Did you ever see anything in writing by Mr. Gade encouraging people to wear respirators?

A I believe I saw his recommendations, yes.

Q While you were at the Long Beach Naval Shipyard did you yourself advise any asbestos worker that you should be wearing a respirator?

A No.

Q At Mare Island did you ever personally advise any asbestos worker he should be wearing a respirator?

A No.

Q At the Pearl Harbor Naval Shipyard did you ever advise any asbestos worker he should be wearing a respirator?

A No.

Q While you were at Puget Sound Naval Shipyard, at any time in your career did you ever advise persons who were working with products containing asbestos to wear respirators?

A Yes.

Q When was the first time you personally recommended that



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respirators be worn by persons working with products containing asbestos?

A Probably 1950. I don't remember.

Q Did you ever reduce your recommendation that respirators should be worn to writing?

A Yes.

Q Do you recall to whom that recommendation was sent?

A It was sent to the production officer with copies to the shop head.

Q When you say the shop head, which shop are you talking about?

A Shop 56.

Q Do you remember the name of the shop head for 56?

A The person I remember is Mr. Chandler.

Q He was a civilian?

A Yes.

Q When was he there, to your knowledge?

A I imagine the 1950's.

Q Who else was a shop head at Shop 56?

A Mr. Colin Edwards was shop head later.

Q Do you remember when he started, approximately?

A I don't have a good feeling for the date.

Q Did you reduce your recommendation that asbestos workers should wear respirators to writing on more than one occasion?



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A Yes.
Q Could you tell me what kind of writing it was that you had promulgated?
A It was a formal recommendation through channels.
Q Is there a special form on which these formal recommendations are written?
A No, letter form.
Q On approximately how many occasions did you reduce this recommendation to writing?
A At least twice.
Q Do you remember the years in which you did that?
A No.
Q You indicated that the first one was probably in 1950?
A Yes.
Q Do you believe that the second one was likewise in 1950?
A Not the same year, no, it would be later.
Q Was there discussion between yourself and the production captain regarding that recommendation?
A No.
Q Was there discussion between yourself and the shop head regarding that recommendation?
A Yes.
Q Can you tell me when that discussion occurred? Was that in 1950?



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A I really don't remember.
Q Can you tell me the essence of that discussion?
A Just that I discussed the hazards of asbestos with him and suggested that respirators be worn by his people.
Q Can you tell me what you told that shop head regarding those hazards?
A Just that it was an inhalation hazard that would produce asbestosis.
Q Did you ask that shop head to relay this information on to the asbestos workers?
A I don't believe so.
Q To your knowledge did the production officer ever forward this information on to the asbestos workers?

MR. WILLHITE: Object to form, foundation.

A No.
Q (By Mr. Soltys) To your knowledge did the shop head ever relay this information on to the asbestos workers?

MR. WILLHITE: Same objection, no foundation.

A Yes.
Q (By Mr. Soltys) How do you know that he did that?
A He put out a written memorandum initially in 1961.
Q Pursuant to your written recommendation of 1950, to your knowledge did the shop head ever relay the information on to the people who were working with



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products containing asbestos particles?

MR. WILLHITE: Same objection, no foundation.

A Not to my knowledge.

Q (By Mr. Soltys) Do you know where I could ever find a copy of either of those written recommendations that you made?

A They were in my files when I left. Whether they are still there or not, I don't know.

Q How would your files be identified at the Puget Sound Naval Shipyard? If I wanted to go to the shipyard and find the file, where those recommendations are, how would I go about doing that?

A Go to the industrial hygiene office and see if they were there.

Q To your knowledge was either of your written recommendations ever posted on a board or anyplace where an asbestos worker could see them?

A Not to my knowledge.

MR. SOLTYS: Off the record.

(Brief recess taken.)

MR. SOLTYS: Back on the record.

Q (By Mr. Soltys) Mr. Bessmer, when you reported into the Puget Sound Naval Shipyard in 1949, were you issued any kind of a safety booklet?



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A I don't recall.
Q When you reported in 1949, were you issued any kind of a respirator?
A No.
Q Do you know if the persons who were working with products containing asbestos product particles in 1949 were issued respirators when they reported in?
A No.
Q No, you don't know, or no, they were not?
A No, they were not issued.
Q Would this be something they would have to get themselves by going to the shop to obtain them?
A Yes.
Q What kind of respirators were being issued in 1949 at the Puget Sound Naval Shipyard?
A I believe they were manufactured by Mine Safety Appliance Corporation. They were a rather obsolete design, World War II vintage.
Q Were these the double cannister style respirators?
A Yes.
Q If these respirators were properly maintained would they be an effective device to reduce the amount of asbestos inhaled by the worker?
MR. WILLHITE: Objection, foundation.
A Yes.



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Q I think when we broke I was asking you questions about the documents that you had produced in which you recommended the use of respirators for people working with asbestos products. Did you yourself personally have any discussion with any people working around asbestos products whereby you explained to those people they should be wearing respirators?

A Yes.

Q Can you tell me how it would be that you would come to have that discussion with these people?

A I would run into them on the ship, possibly during ripout or insulation or mixing asbestos cement. If I thought the conditions were dusty, I would suggest that they wear respirators.

Q Did you have any difficulty in getting these people to wear their respirators?

MR. WILLHITE: Object to form, time, place.

Q (By Mr. Soltys) When was it that you started doing this?

A Immediately, 1950.

Q Can you tell me how often you did that from 1950 on?

A It was not a regular thing. It was just if I happened to run across the situation. I have no idea how often.

Q Did the workers then wear their respirators?

A Not necessarily.

Q Did you have any difficulty in getting the workers to



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wear their respirators?

MR. WILLHITE: Same objection previously noted.

A Yes.

Q (By Mr. Soltys) In the shipyard were there any trade unions represented?

A The Metal Trades Council was a worker's respresentative at that time.

Q When you say the worker's respresentative, what workers are you talking about?

A The entire shipyard.

Q Did you ever have any conversation with any representative of the Metal Trades Council regarding the use of respirators?

A Yes.

Q With whom did you have those conversations?

A A Mr. Ramage.

Q When did you have conversations with Mr. Ramage?

A It was in the 1950's, I don't recall the exact date.

Q Can you tell me the essence of the conversation you had with Mr. Ramage?

A Mr. Ramage was concerned that the magnesia dust was hazardous and that people were being harmed by this material and I tried to allay his fears as far as magnesia went and tell him it was asbestos that was



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the problem.

Q What kind of problems did Mr. Ramage say that his workers were having?

A He thought they were dying.

MR. WILLHITE: Move to strike, non-responsive, speculation.

MR. SOLTYS: Could you read back my last question and the answer?

(Reporter reads back last question and answer.)

Q (By Mr. Soltys) Mr. Ramage thought his workers were dying from the inhalation of magnesia?

A Yes.

Q And you told Mr. Ramage it wasn't the magnesia, it was the asbestos?

A It was a hazard, yes.

Q Did you ever use the word asbestosis when talking to Mr. Ramage?

A I don't recall.

Q Did you explain to Mr. Ramage his workers should use respirators?

A Yes.

Q Did Mr. Ramage respond to that caution?

A I don't recall his response.

Q Tell me the types of workers who Mr. Ramage represented.



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A Pipe coverers and insulators.
Q Would he only cover the pipe coverers and insulator workers at the Puget Sound Naval Shipyard or all over the State of Washington or a region?
A Puget Sound Naval Shipyard only.
Q Did you ever ask Mr. Ramage to take the information that you had just given him about the asbestos back to the other pipe fitters or insulators across the state or in other shipyards?
A I don't recall whether I asked that specifically or not.
Q This information that you passed on to Mr. Ramage, you said was in 1950?
A It was in the 50's, I don't know exactly what year.
Q Is Mr. Ramage still alive by the way?
A I do not know. He was the last time I saw him, which was several years ago.
Q Do you remember where he lived at that time?
A He was operating a pickup, canopy and trailer sales company.
Q In what town?
A It was between Port Orchard and Bremerton.
Q You don't remember the name.
A No.
Q This information you passed on to Mr. Ramage, was this same information held to your knowledge by any other



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industrial hygienist working for the United States Government in 1950?

MR. WILLHITE: Objection, speculation.

Q (By Mr. Soltys) To the best of your knowledge did any other governmental industrial hygienist possess the same knowledge you had in 1950?

MR. WILLHITE: Same objection.

A Yes.

Q (By Mr. Soltys) Can you tell me the names of any other governmentally employed industrial hygienist who had that same knowledge in 1950?

A I would have to limit it to the ones who went to Columbia with me. There would be Mr. Munton.

Q After each name I am going to ask you where that person was employed in his career to the best of your knowledge and the approximate years when he was employed there. Just give me whatever you know.

A Mr. Munton was employed at the Portsmouth Naval Shipyard, the years I don't know.

Q How do you spell that name, please?

A M-u-n-t-o-n.

Mr. Rosati, who was employed as a civilian by Mare Island Naval Shipyard. Mr. Roland Byrd, B-y-r-d, who was at Pearl Harbor with me during the war and later went to Jacksonville Naval Air Station. I can't



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think of any more at the moment.

Q At any time while you were at Puget Sound Naval Shipyard, did the United States Navy ever produce any kinds of labels or tags to be placed on any products containing asbestos?

A They produced labels for hazardous materials, yes.

Q When did that occur?

A I think in the late 50's.

Q Do you know who was responsible for developing that program?

A I believe Mr. Rosati at Mare Island initiated it.

Q Did you have any discussions with Mr. Rosati prior to that program being initiated?

A Not on that subject, no.

Q Were you aware that program was going to be initiated before it was actually initiated?

A No.

Q Did you ever have any discussion with anyone that that kind of program ought to be initiated?

A No.

Q Was there any label which was prepared by the United States Navy which was to be placed on products containing asbestos particles?

A It was not produced for that specific purpose, no.

Q Was there a label though that was placed on products



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containing asbestos?

A Yes.

Q Do you remember what that label said?

A I believe it said toxic, inhalation hazard, wear respiratory protection.

Q Do you feel as an industrial hygienist that that label would adequately warn people of the hazards involved with the inhalation of asbestos particles?

MR. WILLHITE: Object to form, time, place, foundation.

Q (By Mr. Soltys) Can you respond to that question?

A It should have.

Q If that label had been on products containing asbestos particles and you had seen it in 1942 after you completed your course at Columbia University, would seeing that label have told you anything that you didn't already know?

MR. WILLHITE: Object to form.

A No.

Q (By Mr. Soltys) When was that program actually started?

A I believe in the 1950's, I am not certain of the exact timeframe.

Q That label that we are talking about, toxic, inhalation hazardous, respiratory protection should be worn, that information is the same information you were giving to



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production officers and the shop head or Shop 56 way back in 1950, wasn't it?

MR. WILLHITE: Object to form, leading.

MR. SOLTYS: Strike the question.

Q (By Mr. Soltys) Was the information which was on that label we have been talking about the same information that you were giving to the production officer in the shop, head of Shop 56 back in 1950?

MR. WILLHITE: Same objection.

A Yes.

Q (By Mr. Soltys) Would you tell me, going back again to 1950, the names of the other industrial hygienists working at the Puget Sound Naval Shipyard?

A After Commander Gade left I was the only one.

Q When did Commander Gade leave?

A Shortly after I got there.

Q In 1949?

A 1950.

Q When Commander Gade left did you then inherit all of his files?

A Yes.

Q I asked you a question before about whether or not you ever found a file of Commander Gade's which was dedicated to asbestos?

A I don't recall such a file.



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Q Were any other industrial hygienists ever hired to work out of Puget Sound Naval Shipyard?
A I was authorized to obtain an assistant after a year or two.
Q That would be 1951 and '52?
A Yes.
Q What was that assistant's name?
A Jack McElhiney.
Q Was he an industrial hygienist?
A No.
Q What kind of work did he do?
A I trained him to be an industrial hygienist and he subsequently did field sampling and analytical work.
Q Did you ever obtain an industrial hygiene lab at Puget Sound Naval Shipyard?
A Yes.
Q When did this happen?
A There was one, a very limited one available when I arrived there in 1949.
Q What was it when you arrived in 1949?
A A fume hood and small amount of bench space, usual chemicals and sampling apparatus that was in vogue at that time.
Q Subsequently was the lab expanded?
A Yes.



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States Government regarding any hazard associated with the inhalation of asbestos particles?

A Yes.

Q When did you first receive such other information?

A Approximately 1964 or '65.

Q From whom did you receive that information?

A Mr. William Marr of Long Beach.

Q Can you tell me the essence of the information you received from Mr. Marr?

A He had written a report covering the asbestos workers and his findings and investigation of asbestos in Long Beach.

Q Could that date have been 1962 instead of 1964?

A It could have been. I am hazy on dates.

Q At the time you received that article, had you commenced any independent study or survey to determine the extent of the hazards associated with the inhalation of asbestos particles at Puget Sound Naval Shipyard?

A Yes.

Q When did you first start your study?

A I had taken air samples over the years from time to time, but I was able to get the physician reading xrays to provide us with the names and shops of people showing fibrotic changes in the lungs about 1960.

Q When was the first time you ever asked such a medical



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officer to give you that information.

A I did that all the time, from the time I got there.

Q From 1949 on you were asking the medical officer to advise you whenever he observed fibrotic changes in the lungs of the workers who were involved with asbestos?

A Yes, I was trying for the epidemiological approach.

Q At that time, 1949, you suspected a connection between the fibrotic changes in the lungs and the inhalation of asbestos particles?

A Yes.

Q Did you tell anyone else at the Puget Sound Naval Shipyard that you suspected a connection between those two things?

A Yes.

Q Tell me who else you told that information to.

A Well, I told Mr. Ramage, for example, that lung damage would occur. I don't know if I used the term fibrosis.

Q Or asbestosis, for that matter?

A Yes.

Q Is there anyone else that you told?

A Medical officers, of course, were aware of it already.

Q What was the rank of the medical officer, by the way?

MR. WILLHITE: Move to strike, calls for speculation. Also, non-responsive portion to the question.



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Q (By Mr. Soltys) Did you ever tell the medical officer the same thing?
A No.
Q Did you ever discuss with the medical officer that you suspected a connection between the inhalation of asbestos particules and fibrosis in the lung?
A I assumed the medical officer knew this.
MR. WILLHITE: Move to strike, speculation, not responsive.
Q (By Mr. Soltys) Did the medical officer ever tell you he suspected a connection between the inhalation of asbestos particles and fibrosis in the lungs?
A No.
Q Did he ever ask you why you wanted the information regarding fibrosis in the lung in the workers there?
A No.
Q Can you tell me what the rank was of the medical officer?
A Captain.
Q Do you remember what his name was?
A Well, there were a number of them, Captain Back, Captain Jeffers, Captain Ecklund, Captain Reid, Captain Hutchinson, and I believe after that we went to civilians.
Q When was the last naval medical officer employed at the Puget Sound Naval Shipyard, to your recollection?



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than other trades.

Q When did you first notice the pipefitters and insulators showed a higher incidence in lung changes than the other workers?

A When we tabulated the results from this study.

Q When was that tabulation made?

A About 1965, I believe.

Q Were there any preliminary tabulations made along the way, prior to the final tabulation in 1965?

A No, we didn't really have a sufficient sample to do that.

Q How large a sample did you actually use?

A I believe it was several hundred of the pipefitters and insulators, the other trades I don't remember.

Q You indicated that Mr. Marr -- what was his rank?

A He was a civilian.

Q Mr. Marr had submitted some kind of a report, either in 1964 or possibly 1962, is that true?

A Yes.

Q Was this report ever forwarded on to the Bureau of Medicine and Surgery?

A I believe it was, but I do not know of my own knowledge.

Q Was that report prepared by Mr. Marr while he was employed as a civilian at a naval shipyard?

A Yes.

Q Was that report prepared in conjunction with his job as



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an industrial hygienist at the naval shipyard?

A Yes.

Q Did you ever see that report published by the Bureau of Medicine and Surgery?

A No.

Q Was that report sent to the Bureau of Ships?

A I don't know.

Q Did you ever see the report published by the Bureau of Ships?

A No.

Q Can you tell me essentially what existed in the Marr Report which would indicate that there is any relationship between health hazards and the inhalation of asbestos particles?

A I believe that they had had some compensation claims and several deaths, I don't remember how many, which were attributed to inhalation of asbestos and xray changes in the lungs.

Q Did you discuss the Marr Report with Mr. Marr himself?

A I did not, no.

Q Did you discuss the Marr report with any of the other personnel at the Puget Sound Naval Shipyard?

A I believe Mr. Mangold and I had talked about it.

Q Did you ever discuss the Marr Report with the production officer at any time at the Puget Sound Naval Shipyard?



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A I don't recall doing it, but I believe it was discussed.
Q Did you discuss the Marr report with any of the medical officers at the Puget Sound Naval Shipyard?
A Yes.
Q Which medical officers?
A Dr. McBratney.
Q Did you discuss the Marr Report with any of the shop heads, including the shop head of Shop 56?
A I don't recall.
Q After the Marr Report did you yourself encourage any kind of additional protection for the people who were working with asbestos containing products at the Puget Sound Naval Shipyard?
A Yes.
Q Tell me what you did.
A I talked to Mr. Edwards, the shop head.
Q Of Shop 56?
A Shop 56, and I believe Mr. Mangold increased his emphasis on this factor also.
Q Did you at that time encourage more ventilation in order to reduce the number of airborne asbestos particles at Puget Sound Naval Shipyard?
A Yes.
Q Was this done by reducing that recommendation to writing?
A I don't recall.



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Q Did you obtain better ventilation at the Puget Sound Naval Shipyard after the Marr Report?

A I believe that we did.

Q Did you also try to encourage more use of respirators after the Marr Report?

A Yes.

Q Did you reduce that recommendation to writing?

A I don't recall.

Q Do you recall whether or not there was better or more use of respirators at Puget Sound Naval Shipyard after the Marr Report?

A I believe use of respirators increased.

Q Can you describe for me in any increments you think would be applicable the manner in which respirators were being used at Puget Sound Naval Shipyard between 1949 and the time of the Marr Report?

In other words, if there was a period of time when there was a great deal of use of the respirators and you can break out periods of time, go ahead and do that.

A I don't believe there was any such period of time. I believe that people would wear respirators when they felt like it.

Q And not when they didn't feel like it?

A There was very little enforcement.



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Q Do you believe as the industrial hygienist at Puget Sound Naval Shipyard during this period of time that you had adequately advised the people who were being exposed to asbestos particles that they should be wearing respirators?

A I believe that I adequately advised the shop head.

Q That is again Shop 56?

A Shop 56.

Q After the Marr Report and until you left your position as industrial hygienist at Puget Sound Naval Shipyard, can you characterize in whatever time increments you feel would be accurate the use of respirators at the Puget Sound Naval Shipyard?

A I believe after we had tabulated the results in 1965.

Q You are talking about your own report, aren't you?

A Yes, that this information was used to back our recommendations for increased use of protective equipment and I believe that the shop head conferred in this, Shop 56 head, and distributed a memorandum to his people requiring the use of respirators.

Q When do you believe that occurred?

A I believe he had a memorandum initially in 1961, which was revised and updated in 1966.

Q Let's go back to the 1961 memorandum. Did that memorandum require that the people who were working with



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asbestos products wear respirators?

A I believe it did.

Q Did the people who were working with asbestos products wear respirators after that memorandum was put out?

MR. WILLHITE: Object to form.

MR. MORTENSEN: Foundation.

MR. SOLTYS: Strike the question.

Q (By Mr. Soltys) After that 1961 memorandum was put out, to your knowledge, in the year following that, were respirators always used by the asbestos workers at Puget Sound Naval Shipyard who were involved in working with asbestos products?

MR. WILLHITE: Same objection, form, foundation.

A No.

Q (By Mr. Soltys) Did anyone try to enforce that regulation?

A Not to my knowledge.

Q Are you aware of whether or not every worker even saw that regulation?

A Not of my own knowledge.

MR. MORTENSEN: Object to form.

Q (By Mr. Soltys) Subsequent to the updating of that memorandum, was the use of respirators mandated at Puget Sound Naval Shipyard?



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A Yes.
Q When did that second memorandum come out?
A 1966.
Q After 1966 did asbestos workers always use respirators when working around asbestos products?
MR. WILLHITE: Object to form, foundation.
Q (By Mr. Soltys) To your knowledge?
A No.
Q How do you know they didn't?
A They were observed working without respirators.
Q Did you personally observe them working without their respirators?
A No.
Q Who did?
A Mr. Mangold.
Q Did he ever reduce his observations to writing?
A I believe in our 1968 report this was mentioned.
Q Would this report by Mr. Mangold have been in the ordinary course of his job as an industrial hygienist at Puget Sound Naval Shipyard?
A Yes.
Q Likewise, did Mr. Mangold from time to time after the promulgation of the second memorandum advise you orally that he observed workers not wearing their respirators?



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A I don't recall.

Q If he did, would this be the kind of a communication which would be expected of him in the ordinary course of his business as an industrial hygienist at Puget Sound Naval Shipyard?

A Yes.

Q And you would be the person to whom he would give such a report?

A Yes.

Q Going back to the Marr Report, after the Marr Report came out, you advised us you tried to use more ventilation and you encouraged again the use of the respirators.

Were there any other things which were promulgated for the asbestos workers at Puget Sound Naval Shipyard because of the Marr Report?

A No.

Q Was there any wetting down of the asbestos before it was cut right after the Marr Report was promulgated?

A Yes.

Q Did you go to wet sweeping of asbestos on the decks after the Marr Report was prepared?

A I could qualify, both of those, that we did it before the Marr Report.

Q When did you start wet sweeping at Puget Sound Naval



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Shipyard?

A I believe I recommended that about the first time I went into the shop.

Q Back in 1949?

A Early 1950's.

Q What about wetting down the asbestos when it was being cut?

A That was in progress when I got there in 1949.

Q Do you know who it was who implemented that procedure, by the way?

A I imagine Commander Gade recommended it.

Q Did you ever talk to Commander Gade about the problem associated with inhaling asbestos products?

A I don't recall specifically.

MR. SOLTYS: I think this would be an appropriate place to break for lunch.

(Recess taken.)

MR. SOLTYS: Back on the record.

Q (By Mr. Soltys) Mr. Bessmer, we are ready to start the afternoon session of your deposition. I think earlier on you indicated that at some point you did receive additional assistance in the Puget Sound Naval Shipyard in the industrial hygiene department and you identified one person who was working for you.

A Yes.



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Q Subsequently did you ever receive additional assistance in that department?

A Mr. McElhiney left and I had another assistant, Mr. Harry Rigner. He didn't last very long, and in 1962 I hired Mr. Mangold and I believe it was the next year, 1963, when I got Mr. Beckett.

Q Was Mr. Mangold an industrial hygienist?

A His resume indicated he had some experience.

Q What about Mr. Beckett?

A No, he was fresh out of school.

Q Did both of those gentlemen eventually become industrial hygienists?

A Yes.

Q Can you explain to me the manner in which you progressed from the time you hired Mr. Mangold and Mr. Beckett up until the time you phased out of the industrial hygiene department at Puget Sound Naval Shipyard insofar as the hierarchy goes between yourself, Mr. Mangold, Mr. Beckett, and any other industrial hygienists who might have worked there?

MR. WILLHITE: What was that question again?

MR. SOLTYS: Strike that question.

Q (By Mr. Soltys) Did you ever hire anyone after Mr. Mangold and Mr. Beckett?



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A Not for industrial hygiene.

Q That is right up until the time you got out of the industrial hygiene department at Puget Sound Naval Shipyard?

A Yes.

Q Did Mr. Mangold or Mr. Beckett ever follow you to become the industrial hygienist at Puget Sound Naval Shipyard?

A Yes.

Q Which one or which ones?

A Mr. Mangold took my position first and then Mr. Mangold left and Mr. Beckett took it.

Q When did Mr. Mangold take that position?

A Approximately 1970.

Q When did he leave?

A I think he left about the same time I did, in the middle of 1972.

Q Do you know where he went?

A I believe he went with OSHA.

Q When did Mr. Beckett take over?

A When Mr. Mangold left.

Q Is Mr. Beckett still the industrial hygienist at Puget Sound Naval Shipyard?

A No.

Q When did he leave?



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A He didn't leave, he is the industrial hygienist for the naval regional medical center.

Q Where is that located?

A It is located on Puget Sound Naval Shipyard grounds in the old hospital.

Q Is there a new industrial hygienist at Puget Sound Naval Shipyard now?

A I believe so.

Q You don't know his name?

A I am not familiar with the organization setup as it is now.

Q Was there in your opinion any difference in the way Puget Sound Naval Shipyard was run in the war years versus the post war years?

A I have no knowledge of how it was run during the war years.

Q You were there during the Korean War years, I take it?

A Yes.

Q Was there a difference between the way it was run before the Korean War years and the Korean War years?

A Not to my knowledge.

Q Was there a difference in the manner in which the yard was run during the Korean War years and the post Korean War years?

A Not to my knowledge.



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Q Again, were you there during the Viet Nam War years?
A Yes.
Q Was there a difference in the way it was run in the pre-Viet Nam versus the Viet Nam War years?
A No.
Q How about the Viet Nam versus post Viet Nam War years?
A No.
Q Have I covered all of our wars?
A I believe so.
Q With regard to the study you did, did you notice that there were physical changes in the lungs of one type of worker at Puget Sound Naval Shipyard which were different from the physical changes of other workers?
A I am not qualified to read xrays so I don't have an answer. I don't know.
Q With regard to percentages then, do you notice differences from trade to trade at Puget Sound Naval Shipyard?
A Yes.
Q Can you tell me which trades seem to have the most changes in the lung changes among their workers?
MR. MORTENSEN: Object, foundation.
A Pipe coverers and insulators.
Q (By Mr. Soltys) Can you tell me which trade came next in line and then go ahead and progress down as best you can recall.



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MR. PICKRELL: Counsel, isn't all this in the 1968 and 1970 reports that were published?

MR. SOLTYS: I am sure it was.

Q (By Mr. Soltys) Is that true, Mr. Bessmer?

A I believe so, I couldn't answer your question anyway, I don't remember.

Q But this was published in a report which you co-authored and which came under the date of August 1968?

A Yes.

Q Who did you co-author that work with?

A Mr. Mangold and Mr. Beckett.

Q Did you work in conjunction with industrial hygienists or medical doctors from any other part of the state or country?

A No.

Q Do you know who a Mr. Manning is?

A Yes.

Q Who is Mr. Manning?

A He was a civilian industrial hygienist at Long Beach Naval Shipyard.

Q Did he ever come up to Puget Sound Naval Shipyard on any kind of inspection tour?

A Yes.

Q Do you remember when that happened?

A I don't remember the exact year, early 1960's.



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Q That was before you actually published your report, the 1968 report?

A I believe so.

Q Do you remember why he came up?

A I think he came up to just see what kind of industrial hygiene program we had in general.

Q Did you two discuss the exposure to asbestos products in the Puget Sound Naval Shipyard?

A No.

Q Did you discuss in any way the use of asbestos in either shipyard?

MR. PICKRELL: Counsel, is this relevant to the Washington cases or is it calculated to lead to discoverable material for Washington purposes?

MR. SOLTYS: Yes.

MR. PICKRELL: Could you tell me why? I don't understand how it is and this gentleman has already been deposed twice.

MR. SOLTYS: Relevancy never had anything to do with discovery depositions, but I think it is relevant because it confirms the general knowledge of what the product, what asbestos does to humans and the fact that one industrial hygienist, one professional will talk to another professional about the problems and it helps us to see or discover where other sources of



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information might be.

MR. PICKRELL: Thank you.

MR. SOLTYS: Was there a question pending?

THE WITNESS: Can I have it read back?

(Reporter reads back last question.)

A No.

Q (By Mr. Soltys) Do you remember what you did talk about during that visit?

A I didn't talk to Mr. Manning very much.

Q Who did Mr. Manning meet with?

A Probably Mr. Mangold.

Q Earlier we had discussed the labels the United States Navy had established to be placed on products which constituted dust hazards. When was that program begun at Puget Sound Naval Shipyard?

A I don't remember the date.

Q Who actually printed the labels?

A I don't know.

Q Did you receive the labels there as opposed to having to make them up at the shipyard?

A You stirred a memory. I think initially we printed them ourselves, eventually I think the navy printed and distributed them.

Q Do you remember when you printed them yourself?



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A No.
Q Would this have been done pursuant to a directive from someone else?
A It could have been, I don't recall.
Q Do you remember when the navy supplied you with these labels?
A I don't remember the date.
Q Can you tell me on which products, if any, these labels were placed?
A There were thousands.
Q Thousands of labels or thousands of products?
A Thousands of products.
Q Can you give me an example of some of the products?
A Chromic acid was labeled oxidizer.
Q Let me limit you to the ones which said toxic substance, inhalation hazard, respiratory protection should be worn. With regard to those labels, on what products were they placed?
A They were placed on such items as chlorinated hydrocarbon solvents, some benzine like substances, those that produced silica dust, asbestos.
Q I know you haven't completed your answer, but let me limit you to the products which contained asbestos on which these labels were placed. Can you give me some examples of products by description, for instance, pipe



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covering, pads, anything you want to choose.

A Just any type of material that contained asbestos, asbestos cement, or magnesia block?

Q Let's stay with magnesia block. Can you tell me how magnesia block came to Puget Sound Naval Shipyard at any time after the labels were being used?

A I believe it came in cardboard cartons.

Q Where would you actually place the label when the product entered the shipyard?

A The supply department was responsible for applying labels to materials received in the shipyard.

Q So as soon as they came into the supply department the supply department was obligated to put a label on the product?

A Yes.

Q Assuming that magnesia block came with several blocks in a cardboard carton, where physically would the label or labels be placed on that product?

A Anywhere on the outside of the carton.

Q Would you place the label on the carton and not on the individual blocks?

A That is correct.

Q What would happen then to the magnesia block in the carton?

A It would be removed for use by the shop.



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Q Who actually removed it?
A I don't know.
Q Do you know where the block was actually removed?
A I imagine either in the shop or on the ship.
Q What would happen to the carton?
A I don't know.
Q Was a label ever placed on the actual product itself, the magnesia block as opposed to on the carton it came in?
A I don't believe it was.
Q Do you know whether or not the workers who are actually installing asbestos containing products ever saw those labels?

ATTORNEY: Calls for speculation, no foundation.

MR. SOLTYS: I am asking for a yes or no answer.

ATTORNEY: Same objection.

A I don't know.
Q (By Mr. Soltys) Did you have safety programs at Puget Sound Naval Shipyard?
A Did I have safety programs?
Q Did the Puget Sound Naval Shipyard have safety programs?
A Yes.
Q Did they have any safety programs which in any way



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dealt with the inhalation hazard associated with asbestos?

A Could you define program?

Q Tell me what kind of safety programs you had at the Puget Sound Naval Shipyard at any time and if the type of program changed from time to time, start from the earlier time and work your way through the type of safety programs you had there.

A I had nothing to do with safety programs, that was from the industrial relations department.

Q Did that department ever deal with the inhalation hazards caused by dusts?

A No.

Q Did anyone at Puget Sound Naval Shipyard ever develop a program whereby the hazard associated with inhaling dusts would be discussed?

A I don't believe there was a formalized program. I would give lectures to apprentices and to supervisors on general industrial hygiene matters and it may have been mentioned there.

Q When you say it, are you talking about the inhalation of asbestos?

A Yes.

Q When did you start that kind of program?

A That was ongoing from the time I got there.



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Q Approximately how many people did you have an opportunity to talk to regarding the problems associated with inhaling asbestos particles?
A I would say one or two hundred.
Q Were the persons with whom you had these discussions be the persons who would be foremen or leadman capacities?
A Some of them.
Q What would the others be?
A Some would be 4-B supervisors. Some were apprentices.
Q What is a 4-B supervisor?
A That is a white collar supervisor.
Q And by apprentice you mean a trade apprentice?
A Yes.
Q How would people determine whether or not they would take your course or participate in your discussions?
A It was part of a curriculum of either the industrial relations department or apprentice school.
Q Did everyone have to go through that program if they were going to work at Puget Sound Naval Shipyard?
A No.
Q How is it that some would go through your program and some would not?
A I would participate as long as they had room for me and I had time to do it and if we ran out of time and they did too, we would knock it off for a while.



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Q When you would give your talks regarding the inhalation hazard associated with asbestos, would you instruct your people to pass the word on to other workers?
A I don't believe so.
Q To your knowledge was the subject of asbestos inhalation a topic of conversation among the workers?
MR. WILLHITE: Object to form.
A Not to my knowledge.
Q Was there such a thing at the Puget Sound Naval Shipyard at any time as a standup safety meeting on a Friday afternoon?
A Yes.
Q Was there a formal name given to that program?
A No, just standup safety meetings.
Q What exactly is a standup safety meeting?
A They would be conducted in shops by supervisory personnel. They would gather the people under their jurisdiction together and discuss some safety topics.
Q How often were they held?
A I believe every week.
Q Every Friday?
A Yes.
Q For how long did they last?
A Half an hour perhaps.
Q Was there a specific time set aside for those meetings?



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A Yes.
Q When was that?
A I believe it was following the noon hour.
Q Was it during a lunch hour for instance? Do you know if the men got paid while they attended these meetings?
A I don't remember.
Q Who was allowed to attend these meetings?
A Anyone.
Q Were those meetings compulsory?
A I don't know.
Q Did everyone working in a given shop attend the standup safety meeting that that shop was conducting on a given Friday?

MR. MORTENSEN: Object, foundation.

A I don't know.
Q (By Mr. Soltys) Did you ever attend any of those standup safety meetings?
A No.
Q Were there agendas prepared for those standup safety meetings?
A Occasionally.
Q Do you know who prepared the agendas?
A I believe the safety officer.
Q Did you ever have any input as to what ought to be in the safety meetings?



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A I believe I did. I can't recall specifically.
Q Are you aware that the topic of asbestos inhalation was ever the subject of any of those standup safety meetings?
A No, I am not aware.
Q Did you ever suggest that should be the topic of any of the standup safety meetings?
A I don't recall.
Q How about the use of respirators at the standup safety meetings, was that ever a topic?
A I don't know.
Q I want to go back to the labels once again. After you started using the labels did you notice that the asbestos workers were beginning to wear their respirators more often than they had prior to that time?
MR. WILLHITE: Objection, foundation.
A No, I did not.
Q Did you have discussions with anyone about the fact that the asbestos workers were not wearing their respirators more after you used those labels than before.
Q At Puget Sound Naval Shipyard were there ever separate changing stations or changing areas wherein the people who had been working around asbestos could change their clothes?
A In the timeframe of my work there, no.



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Q At any time did you recommend that there should be separate changing areas?

A I believe these recommendations were made about the time I went.

Q Prior to that time do you believe that there should have been separate changing areas?

A From hindsight, yes.

Q At the time though that wasn't something that was significant to you while you were still there?

A No.

Q What about separate shower areas?

A No, they had shower areas with other employees.

Q Did you ever recommend that there should be separate shower areas for the men working around asbestos products?

A No.

Q Am I correct in my understanding that the naval shipyard would bid against one another across the nation to get a certain job on a ship?

A That is a little out of my territory. I am not sure if they bid on it or if it was awarded on the basis of past performance.

Q To your knowledge did the naval shipyard have to show a profit in the work they did?

A No.

Q Would the naval shipyard have to bid against civilian



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shipyards for work on ships?

A I don't know.

Q Did you ever recommend that ventilation should be increased at any time at Puget Sound Naval Shipyard only to be told it would be too costly to do that.

MR. MORTENSEN: Object to form.

A I don't recall.

Q (By Mr. Soltys) Did you ever make recommendations that ventilation should be increased at Puget Sound Naval Shipyard?

A Yes.

Q Was the ventilation increased every time you suggested that it ought to be increased?

A No.

Q Can you tell me the reason given to you why it was not increased?

MR. MORTENSEN: Object to form as to place and time.

Q (By Mr. Soltys) Before you respond to my question, let me ask you to try to identify by time as best you can recall each time you actually asked or recommended that the ventilation be increased and then respond, if you can, as to what you were told if the ventilation wasn't increased at that time.

MR. MORTENSEN: Object to form, ship versus



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shop.

Q (By Mr. Soltys) And if you are able to identify the area where you suggested additional ventilation should be installed.

A There were so many and spread over such a period of time that I don't think I could be specific.

Q Would you be able to be specific if you limited yourself to those instances which involved asbestos?

A Yes.

Q Can you then respond to that question for me?

A We recommended that the ventilation system in the shop be cleaned up, some of the air flows had deteriorated, and it was in fact cleaned. Ventilation aboard ship was considered to be impractical at that time and we only had small three inch suckers as they were called, which were used for welding, and they wouldn't have been practical at all for asbestos in the ship.

Q Was there ever a suggestion on your part that ventilation should be added, additional ventilation should be added to Shop 56?

A To the shop, no.

Q When was it that you actually left the industrial hygiene department at the Puget Sound Naval Shipyard?

A I believe it was late in 1970 or early '71.

Q Where did you go once you left that department?



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A Physically I stayed in the same place but my responsibilities changed.

Q Tell us what your responsibilities were at that time.

A My position description read, supervisory health physicist, my job title was director of radiation health.

Q Were you still consulted by Mr. Mangold and/or Mr. Beckett regarding industrial hygiene in the shipyard itself after you had actually left the industrial hygiene section?

A On occasion.

Q Do you know who Dr. Selikoff is?

A Yes.

Q And have you ever met Dr. Selikoff?

A No.

Q Have you ever read anything which Dr. Selikoff might have published?

A Yes.

Q Tell me what you read by Dr. Selikoff.

A I don't recall the titles but I remember reading some of his first articles on asbestosis.

Q Did you ever meet any of the other persons who might have come from Mt. Sinai Hospital in New York City?

A I am not sure they came from Mt. Sinai. I met Duncan Holiday and a fellow named Reitze and someone else whose name I can't recall. They visited the shipyard.



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Q Do you remember when that visit occurred?
A Late 60's, say '69, '70, somewhere in there.
Q When that visit occurred had you already read some of Dr. Selikoff's articles?
A I believe so.
Q Did you ever take those articles to the medical director at Puget Sound Naval Shipyard or any of the production officers at the naval shipyard?
A I didn't take them to the production people and the medical officers got the same publications I did.
Q Did you ever discuss the articles with the medical officer?
A I don't recall specifically.
Q Can you tell me why you didn't take the articles to the production officer?
A Probably because they were in technical journals and it was not my place really to take them to the production officer, it would be my superior's.
Q When you say your superior's, you mean the medical director's?
A Yes.
Q To your knowledge did the medical directors ever take any of those articles to the production officers?
A I don't know.
Q In any event, you never had a discussion with any of the



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production officers regarding Dr. Selikoff's articles?

A No.

Q Mr. Bessmer, I understand that in 1970 there was an article which you also co-authored?

A Yes.

MR. SOLTYS: Through the courtesy of Mr. Pickrell we would like to identify the 1968 and the 1970 articles as Exhibit Numbers 1 and 2 to your deposition, and I understand that we have a stipulation among all parties here that those are the authentic articles which you co-authored in 1968 and 1970.

Is there any objection?

MR. MORTENSEN: No objection.

MR. WILLHITE: No objection.

MR. PICKRELL: No objection. Do we have them here physically?

MR. SOLTYS: Yes, they are here someplace. Off the record.

(Off record discussion.)

MR. SOLTYS: Back on the record. The 1968 report is entitled Asbestos Exposure and Pulmonary X-ray changes to pipe coverers and insulators at Puget Sound Naval Shipyard, and it identifies the name C. A. Mangold, R. R. Beckett and D. J. Bessmer, Industrial



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Hygiene Division, Puget Sound Naval Shipyard, Bremerton, Washington. And it further identifies it as Exhibit E to Mr. Bessmer's deposition as taken on January 7, 1980. I guess that is the one that I suggested that we mark as Exhibit No. 1 to this deposition.

The second article is entitled Asbestos Exposure and Control, Puget Sound Naval Shipyard, Bremerton, Washington. It is dated March 1970. It shows a reviewed and approved signature by W. F. Petrovic, P-e-t-r-o-v-i-c, Rear Admiral, United States Navy, Commander, and that is the one which I had identified as Exhibit No. 2.

The second cover page on that article identifies the authors as Mr. C. A. Mangold, R. R. Beckett, and Mr. D. J. Bessmer.

(Exhibits No. 1 and 2 marked for identification.)

Q (By Mr. Soltys) When you came to the Puget Sound Naval Shipyard in 1949, Mr. Bessmer, I believe you stated that you observed that the men were wetting down asbestos before they started cutting it in some instances. Is that true?

A Yes, in the shop.

Q Shop 56?



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A Yes.
Q Do you know why those people were doing that?
A To prevent the formation of dust in the breathing zones.
Q Do you know who it was who told them to do that?
A I did not know, I assume it was Mr. Gade.
Q Do you know whether or not the men knew why they were wetting down the asbestos?

MR. WILLHITE: Objection, speculation.

A I believe they knew why, yes.
Q Did you have a discussion with the men as to why they were wetting down asbestos?
A I don't recall.
Q Can you tell me why you think the men were doing that?
A To reduce dust. I might amend that. I think it was easier to handle too in prefabricating insulating pads in the shop.
Q When cleanup was being done in 1949 was there wetting down occurring at that time too?

MR. MORTENSEN: Where? Object to form.

Q (By Mr. Soltys) Anyplace at Puget Sound Naval Shipyard?
A No.

MR. SOLTYS: That is all I have.

EXAMINATION

BY MR. HENNESSEY:

Q Mr. Bessmer, my name is Stuart Hennessey. I represent



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Pittsburgh Corning Corporation. Earlier Mr. Soltys asked you about labeling and specifically asked you what date you had started labeling asbestos products. As I recall you were unable to remember that date, is that correct?

A That is correct.

Q Do you know of any way we could determine the date on which labeling started?

A When the labeling program was first instituted by Mare Island and the information sent to other shipyards, I instituted it immediately.

Q So are you indicating that Mare Island might have records as to when it started?

A Yes, I believe so.

Q Do you believe any correspondence from Mare Island to PSNS would exist?

A I don't know.

Q If it did exist, where should we look for it?

A In the industrial hygiene division, Puget Sound Naval Shipyard.

Q Again, with respect to labeling, I believe you indicated that once you had instituted the program it was the responsibility of the supply department to put the labels on, is that correct?

A That is correct.



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Q Do you know what person in the supply department was tasked with that responsibility?

A No, I do not.

Q Do you know who the commanding officer of the supply department was at the time the labeling started?

A No, I don't.

Q I believe earlier today you indicated that in terms of chain of command you fell under the control of the medical officer at PSNS; is that correct?

A That is correct.

Q Do you know who the medical officer was under?

A He was under the shipyard commander.

Q At PSNS are there various commands located in one area?

A I believe there is one other command.

Q What would that be?

A That would be inactive ship maintenanceman, mothball fleet.

Q They have a separate command structure, do they?

A Yes.

Q Did you ever had occasion to report on to Washington, D.C. or to the Department of the Navy?

A I am not sure I understand your question.

Q As I understand it, you got your authority from the medical officer, is that correct?

A Yes.



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Q Do you know whether he had a superior in Washington, D. C., or the Pentagon?

A The shipyard itself was under the control of the Naval Ship Systems Commander or Bureau of Ships as it was initially. The Bureau of Medicine and Surgery was our technical bureau in the medical department. They had no command functions as such, but they were responsible for some technical direction.

Q Would their technical direction oversee asbestos exposure issues?

A It could.

Q At the time you started at PSNS who in Bu Med would have had responsibility for that, if you know?

MR. WILLHITE: Object to foundation, it assumes there was a responsibility.

Q (By Mr. Hennessey) Go ahead.

A I don't recall the names of the people. I remember some of them, but the timeframe is nebulous.

Q Let's go ahead with any names of people any time you were at PSNS who you believe had responsibility for asbestos exposure issues.

A Well, there was a Commander Babione, B-a-b-i-o-n-e, who was in charge of occupational health at Bu Med. It was way back in the 50's.

I remember a Commander George Lawton held the same position. I believe Captain Hutchinson was in



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that position at one time. I believe Captain Beck was there too. I am not certain.

ATTORNEY: Move to strike as non-responsive.

A And there was another one, I can't remember his name at the moment.

Q (By Mr. Hennessey) What was the position that you said Commander Babione held?

A I think he was in charge of occupational health, section, division, whatever it was in Bu Med.

Q This was in the 50's?

A Yes.

Q So to your understanding then in the 50's Bu Med had an actual division that was tasked with responsibility for occupational health, is that correct?

A Yes.

Q Do you know if there was anybody besides Captain Babione in that position?

A Yes, I believe they had an industrial hygienist. One name I remember was Johnson. Another name was Barboo. Another name is Jac Siegel, J-a-c, S-i-e-g-e-l.

Q Would Mr. Johnson have been a naval officer or civilian personnel?

A Naval officer.

Q How about Barboo and Siegel?

A Naval officers.



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Q Do you know if Johnson, Barboo, or Siegel had any medical degrees?
A No, they did not.
Q Do you know what their educational background was?
A Jac Siegel was, I believe he was toxicologist. I believe primarily I think Barboo had started out as a sanitarian industrial hygienist. Johnson I don't remember.
Q With regard to Commander Babione, do you know if he had a medical degree?
A Yes.
Q Was he a medical doctor then?
A Yes.
Q How about George Lawton?
A He is an M.D., also a medical doctor.
Q Captain Hutchinson?
A Medical doctor.
Q Captain Beck?
A Medical doctor.
Q Did you ever have occasion to communicate with anyone at the occupational health section with regard to potential asbestos hazards?
A Not until the late 60's.
Q What communication did you have at that time?
A I don't recall. I believe Barboo wanted some photographs



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of some of the controls we had.

Q Would you communicate with the occupational health section on a regular basis on any topic?

A No.

Q I understand from this morning that there was a quarterly publication that came out from Bu Med that you received, is that correct?

A Yes.

Q Did that have any special column or section relating to occupational health issues?

A It was all relating to occupational health issues.

Q Was it generated then by the occupational health section?

A Yes, it was compiled from excerpts from our quarterly health reports to Bu Med.

Q What did these quarterly health reports from Bu Med consist of?

A There was a statistical portion and a narrative portion. The statistical portion in my opinion was to reflect medical department workload. They would have numbers of xrays done, numbers of abnormal findings, not broken down in any manner.

The narrative portion was in two sections. One was -- I beg your pardon, three sections. One was written by a medical doctor who discussed any cases of interest in the occupational health field.



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The second section was written by the industrial hygienist and would describe work done by the industrial hygiene division and the findings and controls recommended, et cetera.

The third section was on sanitation.

Q Mr. Bessmer, I am not well-schooled in industrial hygiene. When you use the term sanitation, what are you referring to?

A Food, water supply, sewage disposal.

Q It would not refer to health conditions at the work site, would it?

A Not generated by an occupational process.

Q Were these quarterly health reports required during the entire time you were at PSNS?

A Initially they were monthly and then they were dropped to quarterly, but they continued all during the time I was there.

Q Do you remember when a change was made from monthly to quarterly?

A No.

Q Can you give me an approximation?

A Probably in the late 50's.

Q Do you know who at Bu Med the reports were addressed to?

A They were addressed to the chief, Bureau of Medicine, Surgery.



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Q Do you know who actually reviewed the reports?
A The occupational health section.
Q How did you come to know that?
A By talking to the people.
Q At the occupational health division?
A Yes.
Q Was it apparent they were reading your reports?
A Yes.
Q This morning and in prior depositions we discussed an occupational health study that you had done during the war which was held back by commanding officers, I believe, and watered down and then sent on. Do you recall that testimony?
A Yes.

MR. WILLHITE: Object to the form of the question.

Q (By Mr. Hennessey) I would like to ask you the same question with regard to these quarterly health reports you sent in and as I understand it they became the basis for this quarterly newsletter; is that correct?
A Yes.
Q Do you have any opinion as to whether or not the reports that were sent in were watered down before they were disseminated through the newsletters?

MR. WILLHITE: Object to form.



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A They were not.

Q (By Mr. Hennessey) As I understand it your health reports to Bu Med had a statistical portion dealing with xray abnormalities, is that correct?

A Yes.

Q Do you know who at PSNS filled out that information?

A I believe it was the clerk in the front office.

Q The front office of what department?

A Of the medical department.

Q Was this information as to xray abnormalities part of the report throughout your career at PSNS?

A Yes.

Q I believe this morning you indicated that you had been trying to get information as to xray abnormalities on workers since the 50's, is that correct?

A That is correct.

Q And you didn't actually get them until the 60's, is that correct?

A That is correct.

Q Based upon the quarterly reports reflecting xray abnormalities, do you have any opinion as to whether or not that information was available prior to the time it was given to you?

ATTORNEY: Object to form, time, place.

A It was available.



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Q (By Mr. Hennessey) Would it be fair to say it was available from the time you first came to PSNS?

A Yes.

Q We have talked in general terms about abnormalities on the xrays. Can you describe to me what sorts of abnormalities were dealt with?

ATTORNEY: Object. Foundation.

A I don't know. They were all inclusive, whatever the physician found, it was not broken down as to type of abnormality.

Q When we speak of xrays though, are you referring to chest xrays?

A Yes.

Q Were there any other sort of xrays that were included in this statistical portion of the quarterly health report?

A Not to my knowledge.

Q Was there any breakdown as to type of workers with regard to xray abnormalities in the quarterly health report?

A No.

Q As I understand it the portion of the quarterly health report that you had personal input to would be the narrative portion where you describe work being carried out and controls?



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A Yes.

Q Do you recall your testimony this morning in which you described at least two memoranda attempting to prescribe control methods for asbestos dust?

A Yes.

Q Do you know if you ever made references to those memoranda in the quarterly health report?

A I don't recall them, but I pretty well included everything I did in the narrative portion so I would assume I did.

Q Based upon your general procedure you would have, is that correct?

A Yes.

Q Did you ever get any response from Bu Med with regard to your asbestos control attempts?

A Not until the very end, 1965, something like that.

Q Do you know if any of your efforts at asbestos exposure control were included in the quarterly newsletter that came out from Bu Med?

A I don't recall any.

Q Besides this occupational health section at Bu Med, was there any other department or division or person within the navy with whom you commonly communicated on industrial hygiene issues?

A No.

Q As a general rule did you ever communicate with Bu Med



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on industrial hygiene issues other than through the quarterly report?

A Yes.

Q How was that?

A Occasionally by telephone, sometimes by personal letter, if I knew the person real well.

Q Can you give me the names of people at Bu Med or at the occupational health division that you knew well?

A Well, I knew Captain Beck quite well, Commander Babione I knew, Sam Barboo, I knew all of them, Johnson.

Q How did you come to know those individuals?

A Through contact at the American Industrial Hygiene Association conferences. Some I had known when I was in the Navy.

Q Was there any convention or conference at which you met with these people on an annual basis?

A Yes.

Q What would that have been?

A That would be the American Industrial Hygiene Association Conference.

Q Am I correct that met annually?

A Yes.

Q Do you ever recall the dangers of exposure to asbestos dust being mentioned at those conferences?

A No, I don't.



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Q Do you ever recall mentioning that topic in your conversations or letters to these individuals?
A No.
Q Earlier, Mr. Bessmer, mention was made to Exhibit No. 1 to this deposition. Do you have that document in front of you?
A Yes.
Q You are shown as one of the authors on that document, is that correct?
A Yes.
Q Can you tell us what part you played in authoring that document?
A Primarily review.
Q I take it there was a fair amount of investigation necessary to generate the document, is that correct?
A Yes.
Q Who did that work?
A I initiated the compiling of the xray abnormalities and turned it over to Mr. Mangold when other duties became such that I didn't have time.
Q Was the work for this report done during normal working business hours?
A Yes.
Q Was it done in the ordinary course of business?
A Yes.



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Q There are some tables attached to the report, Mr. Bessmer. I would like you to turn your attention to Table 5, if you will.

Have you found that?

A Yes.

Q That appears to be a list of asbestos containing products, is that correct?

A Yes.

Q Do you know how that list was compiled?

A I believe Mr. Mangold did that investigation.

Q Do you know what he did?

A Went into the shop and on the ship and looked at usage rates and what products were being used.

Q To your knowledge then would this list be based both upon an inspection of products and upon personal observation?

A Yes.

Q Do you know the list to be accurate?

A Yes.

Q I note that this report bears the date August of '68. Do you know when it was that the information reflected in Table 5 was accumulated?

A After we had acquired the data on the number of lung abnormalities in the shop then the rest of the investigation took place. I imagine it was about two



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or three years, the rest of it, that the rest of it was done.

Q Do I understand you correctly then that the information in Table 5 would have been collected in 1966 and 1967?

A Probably.

Q Would you turn to the second page of Table 5, please. At the top of that page you notice the product Unibestos is mentioned?

A Yes.

Q You notice it says piping up to 30 inches in diameter, very little is used at this time.

A Yes.

Q Do you know if the statement as to the amount used was accurate as to the entire shipyard?

MR. MORTENSEN: Object, lack of foundation.

A Yes, to my knowledge it is.

Q (By Mr. Hennessey) Were you still supervising Mr. Mangold in 1968?

A Yes.

Q Had you directed him to investigate the entire shipyard?

A Yes.

Q Do you believe that statement as to the amount used to be accurate as of 1968?

ATTORNEY: Same objection, no foundation.

A I have to assume it is accurate.



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Q (By Mr. Hennessey) Let me direct your attention, Mr. Bessmer, to what has been marked as Exhibit No. 2 to your deposition. Are you familiar with that document?
A Yes.
Q Can you tell me what it is?
A It is an additional report made after our August report. It includes the August report, August 1968 report, as a part, and then what we had been doing since on control of asbestos exposures.
Q The fourth page of that document bears the date March, 1970. Do you know if that is the date that the study was published?
A I believe so.
Q You are shown as an author on this. Can you tell us what part you played in authoring this document?
A Again, review.
Q Would this be an instance again where Mr. Mangold did a majority of the compilation and investigation?
A Yes.
Q Was that done under your supervision?
A Yes.
Q Was it done in the ordinary course of business?
A Yes.
Q Again, there are tables attached to Exhibit 2, Mr. Bessmer. I would like to direct your attention to



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Table 4. On the first page of Table 4, you will notice the fourth item mentioned again is Unibestos, is that correct?

A Yes.

Q Again, the comment is made that very little is installed at present. Do you see that?

A Yes.

Q Do you know whether any check was made to reaffirm the data collected in 1966 and '67 before the 1970 study was published?

A No, I don't know that.

Q To your knowledge would it be fair to say this reference as to the amount of Unibestos used was accurate at the time the study was published in March of '70?

ATTORNEY: Objection, foundation.

A I believe so.

MR. HENNESSEY: No further questions.

EXAMINATION

BY MR. SLAGLE:

Q My name is Rick Slagle, and I represent Eagle Picher Industries. My understanding is that there is a large number of different trades involved in the construction of ships, is that correct?

A Yes.



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Q Is it the occasion that all these various trades would be working in the same area at the same time?
A Probably not all of them, but a number of different trades would be working in the same area.
Q Is a vessel completed in stages at all?
A Yes.
Q Can you tell me what stages a vessel goes through on its way to completion?
A Initially the keel would be laid and then the frames would be installed and the skin of the ship would go on next.
Q Which trades would be involved in these various stages?
A Ship fitters would be involved in all of this, and then the compartments would be closed off. Again, ship fitters and welders.
Q During these first two stages, would asbestos insulation workers be in the area?
A No.
Q Then what happens after the compartments are closed off?
A I imagine the wiring and the machinery would be installed, electronics.
Q What trades would be involved in that process?
A Electricians and machinists and then after machinery was installed then the asbestos workers would come aboard.



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Q By this time would the ship fitters and the welders and the electricians and so on have completed most of their work in the area?

A Some would still be going on.

Q Which trades, if any, would most commonly be working in the area of asbestos insulators?

A I believe welders and machinists.

Q Can you estimate what portion of the time that they would be in the area of the asbestos insulator?

A I believe it would vary widely. They might be in there all day or they might be in there for five or ten minutes. It depends on the welders. Sometimes they just weld on the bulkhead and then walk off, so there is no set time I could give you.

Q Would you say the majority of a welder's time he is in the vicinity of the insulation workers?

A No.

Q The majority of the time he would not be in the vicinity?

MR. MORTENSEN: I object to the form unless it is shown you are talking about new or used work.

Q (By Mr. Slagle) Is this true with respect to both new and used work?

A No, I have been talking about new construction so far. In ship overhaul there is a great deal of, I will use the term confusion, everybody is working in everybody else's



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way, so in overhaul there would be more trades possibly working in asbestos areas.

Q Referring you to Table 1, of what has been marked as Exhibit No. 1, you notice, do you not, that there is a large disparity in the incidence of abnormal chest xrays in various trades?

A Yes.

Q How do you account for that fact?

A Pipe coverers and insulators were exposed to asbestos and I attribute their high incidence to asbestos. Boilermakers were next, and they do work around the boilers which are lagged with asbestos and they also use other materials which can produce lung conditions.

Q I notice that there is a difference in the incidence there of approximately seven-fold between pipe coverers and boilermakers, is that correct?

A Yes.

Q Is that because the boilermakers are not exposed to asbestos nearly as often as pipe coverers?

A That is a possibility.

Q Are there any other possibilities?

A The materials they use might be less damaging to the lungs.

Q So their overall exposure to hazardous types of materials is less, is that correct?



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A Yes.
Q And that would be true with the rest of the trades as the incidence of lung abnormalities goes down, is that correct?
A Yes.
Q In your opinion, is it possible to handle asbestos containing insulation products in a safe manner?
A Yes.
Q If the recommendation set forth in the 1970 report were followed, in your opinion would it be possible to handle those products safely?
A I believe so.
Q Would you look at Pages 7 and 8 of the second sections of the 1970 report?
A I don't seem to have page numbers here.
Q There is a section there that refers to application of cements, is that correct?
A Yes.
Q In your opinion if the safety procedure set forth under that section were followed, is it possible to apply cement in a safe manner?
MR. MORTENSEN: I object to the vagueness of the question, safe -- form.
A It might not be 100 percent effective, no.
Q (By Mr. Slagle) Can you explain your answer a little



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bit further?

A Well, I was under the impression we had recommended mixing asbestos cement in plastic bags that were closed.

Q Was that practice ever used at the shipyard to your knowledge?

A I believe it was starting to be used.

Q At what time did they start doing that?

A About the time I left, 1969, '70. This would certainly help.

Q Did you think that recommendation was in the 1970 report?

A Yes. Well, it is at the top here, for small applications, that may be what I am getting confused, for small rather than large amounts.

Q Assuming these recommendations were followed for both small and large amounts, did you feel you could safely handle asbestos containing insulation cement?

MR. MORTENSEN: Object to the form of the question, the word safely.

A I believe it would help in reducing the incidence of lung disease.

Q (By Mr. Slagle) Which of these practices were actually followed in 1949 when you came to PSNS?

A Under this particular section, application of cement?



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Q Yes.
A A was followed.
Q Were cements mixed at dockside rather than on board ship for safety reasons at that time?
A I don't recall. I don't think it was primarily for safety. I think it was more for convenience.
Q Did you have an opportunity to actually observe mixing of cement?
A Yes.
Q Did you ever have occasion to see it mixed on board ship?
A I don't recall seeing it on board ship.
Q Do you recall seeing it on the dock?
A Yes.
Q Do you have an opinion whether or not the majority of the cement was mixed on the dock?
A I believe it was.
Q Can you give me any kind of an estimate as to what percentage of the cement would be mixed on the dock?
A Really, I thought all of it was.
Q What other safety precautions were followed in 1949?
A That is the only one, that section that I recall, respirators were available.

MR. SLAGLE: Off the record.

(Off record discussion.)



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MR. SLAGLE: Back on the record.

Q (By Mr. Slagle) I believe we were talking about application of asbestos when we took our break. During one of your prior depositions, Mr. Bessmer, you indicated that the work practices outlined in Section 3 of this 1970 report were followed in 1949 except for sub-section D. Do you recall that testimony at all?

A No. You showed it to me and I must have said it, I don't know why.

Q Would it be possible that whether or not these work practices were followed would vary from worker to worker?

A It is possible.

Q At this time were the workers aware of the risks associated with this type of dust?

ATTORNEY: Object to the form of the question.

Q (By Mr. Slagle) In 1949?

A I believe so.

Q Was it recommended that they wear respirators when they mixed this cement?

A Yes.

Q Was any other type of education program in effect at this time?

A No.



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Q Would other trades be in the area when these workers were mixing asbestos cement?
A I don't believe so. There might be somebody transiting the area, but he would not be working there.
Q Who would actually do the mixing, which trade?
A Shop 56, pipe coverers and insulators.
Q Would he be an apprentice or journeyman?
A I don't know.
Q How large were these shacks that they mixed the cement in?
A Some of it was done in the open air, shacks, I don't recall the size, they were maybe 10 by 12. I don't recall really.
Q Did you or anyone on your staff have occasion to take dust samples during this mixing process?
A I believe Mr. Mangold took some.
Q Do you recall what the results of those samples were?
A No.
Q Do you know a man named Frank Mox?
A No.
Q How about a man named Harold R. Duryea, D-u-r-y-e-a?
A No.
Q How about Orville Dean?
A Orville?
Q Dean, D-e-a-n, I believe he was a physician.



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A Yes.

Q Who is Dr. Dean?

A He is one of the medical officers in the Puget Sound Naval Shipyard medical department.

Q Do you recall during what time period he was in the medical department?

A I think he is still there. I don't recall when he was hired.

Q Did you ever have an occasion to prepare what I will refer to as a hazardous material evaluation?

A I am not sure I know what you are referring to.

Q At any time while you were at Puget Sound Naval Shipyard did people from production or purchasing ask you to evaluate the hazards of any materials they were considering purchasing?

A I don't recall any.

Q I want you to assume that a manufacturer gave you a warning in 1949 to the effect that hazardous material was harmful to your health or could be harmful to your health that respirators or proper ventilation should be used when using the material --

ATTORNEY: Object to the form of the question, hypothetical, and it is incomplete.

Q (By Mr. Slagle) If a manufacturer would have given you that warning, would it have conveyed any information to



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you that you did not already know?

A It would depend on which material he was talking about.

Q Can you explain your answer?

A Yes, if it was a material I was familiar with it would not give me anything I didn't know. If it was a material that I did not know about, then yes, it would be of interest.

Q Suppose the manufacturer indicated that this product contains asbestos and that asbestos can be a health hazard if inhaled in large quantities over a long period of time and that respiratory protection should be worn when handling it. Would that information convey anything to you that you didn't know?

MR. MORTENSEN: Object to the form, improper hypothetical.

A The answer is no.

Q Would that information have conveyed anything to the shipyard that the shop heads did not already know?

MR. MORTENSEN: Object, speculative, form, no foundation.

A In my opinion, no.

Q (By Mr. Slagle) Would that convey any additional information to the workers that they did not already know?

MR. MORTENSEN: Same objection.



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A I did not believe it would.

Q (By Mr. Slagle) If such a warning had come to the shipyard, would it have in the ordinary course of business come to your attention?

MR. MORTENSEN: Object to foundation, how would it come; form.

A I believe I might have heard of it.

Q (By Mr. Slagle) What would your response as an industrial hygienist have been to that?

MR. MORTENSEN: Same objection.

A I would attempt to implement it.

Q (By Mr. Slagle) Other than by implementing it, would you have gone out and conducted studies and so on?

A Yes.

Q In 1949, air samples had already been taken, had they not?

A Yes.

Q And you subsequently conducted additional air sampling, is that correct?

A Yes.

Q Is there any type of response that you would have been inclined to give that kind of a warning other than conduct the studies and evaluate the results of those studies.

MR. MORTENSEN: Same as previous objection.



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A No, it would be included in the recommendations to the production department.

Q But at any rate, you had already conducted the studies and evaluated the results of the studies in the 1950's, is that correct?

A Yes.

MR. SLAGLE: No further questions.

EXAMINATION

BY MR. MERTEL:

Q My name is Chuck Mertel and I represent Fibreboard Corporation. I will try and be very brief.

With regard to the ships worked on at Puget Sound Naval Shipyard, are you aware, sir, whether or not there was a requirement for the navy to approve materials that were put on those vessels? I am specifically directing myself and my question to insulation materials as contrasted to artillery and things like that. Are you aware of any sort of approved materials list or that type of documentation?

A Yes.

ATTORNEY: Object to form and foundation.

Q (By Mr. Mertel) Would you tell me how you are familiar with that then?

A Well, in the course of evaluating materials --



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MR. MORTENSEN: This is beyond the pre-deposition notice, Mr. Mertel, I am afraid.

MR. MERTEL: Don't be afraid, state your objection, Mr. Mortensen.

MR. MORTENSEN: It is outside the scope of the pre-deposition notice and oral examination presented by Karr, Tuttle.

ATTORNEY: I might add we join in that objection. There were five subjects listed in that notice signed by Mr. Soltys, and none relate to that subject.

MR. MERTEL: We will take it up with the Court.

ATTORNEY: All plaintiffs will join in that objection.

Q (By Mr. Mertel) You can go ahead and answer the question.

A What was the question.

Q I asked you how you were aware of the materials going into the insulation materials, going into these vessels, being on some sort of an approved materials list?

A When I dealt with mixtures of materials I would often go to the supply department and look up navy specifications for this particular material and in some cases it would give me the composition.

Q Were all insulation materials that went on the navy vessels



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required to meet the navy specifications before they would go on those vessels?

ATTORNEY: Same objection. Could we have a continuing objection to this line?

MR. MERTEL: Yes, you can.

MR. MORTENSEN: Plus form, foundation and responsiveness.

ATTORNEY: And the subject and the scope.

Q (By Mr. Mertel) And your answer?

A I don't know.

Q At any time in your work experience, sir, did the U. S. Navy prepare specific warning labels for asbestos as contrasted to the labels I think you earlier described which were for toxic materials, or did I misunderstand your prior testimony?

A You understood correctly. There was no specific label for asbestos.

Q Those labels you described earlier, the ones that said insulation, hazardous, respirator should be worn, that type of label, that was for all toxic, what you folks consider to be toxic substances?

A Correct.

Q I may have missed this point. When approximately were those labels generated by the navy?

A I don't recall the date.



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Q And I think that is right, you said those were first started at Mare Island, and perhaps we should check the records there.

A That is right.

Q The Marr Report, did this report, as you recollect it, add any new information to the information that you already had in your possession?

A I believe it confirmed what we had already concluded.

Q Am I correct that respirators became mandatory around 1966?

A Yes.

Q Am I also correct that your prior testimony confirmed that even at that point in time they were not in fact uniformly worn in the jobs they were mandatory for?

A That is correct.

Q Whose obligation was it, if anyone's, to enforce the requirement to wear the respirators when working around toxic substances?

A The supervisory personnel of the shop.

Q Let's go back to that one shop, that would be Shop No. 56, would that have been then the job of that man who I think you said at one point was Chandler and then it changed to Mr. Edwards?

A Yes.

Q That is the supervisor we are talking about for that



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particular shop?

A Yes.

Q Would it be a correct statement to say that the supervisors were not relieved of the responsibility for merely instructing their men to use this equipment, they were obligated to follow up and insure they in fact did it? Would you say that is a fair statement of the supervisor's obligations or duties, if you want to put it that way?

ATTORNEY: Object to the form. It is compound. Also argumentative.

MR. MORTENSEN: Leading, argumentative.

MR. PICKRELL: Calls for speculation.

MR. MERTEL: I am encouraged by all these objections. Let's see if we can press forward. Can you answer the question or are you confused by it in any way?

THE WITNESS: I am not confused by the question. I have forgotten what it was.

MR. MERTEL: We will have the court reporter read it back.

(Reporter reads back last question.)

MR. BERGMANN: I join in the objection.

A Yes.



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Q (By Mr. Mertel) Was there, in your work experience, sir, as the industrial hygienist there at the navy shipyard and at several shipyards, a problem with workers refusing to wear respirators because that -- well, was there a problem with them refusing to wear respirators?

MR. MORTENSEN: Object as to form, vague, time, place.

A Yes.

Q (By Mr. Mertel) At the navy shipyard was there known to you an attitude such as maybe in shorthand referred to an old timer attitude about not wearing respirators or does that ring any bells with you?

MR. MORTENSEN: Object to the form.

MR. PICKRELL: I object. I think the question is too vague.

MR. MERTEL: Maybe it is. I agree.

Q (By Mr. Mertel) Was there a problem with older workers in wearing the respirators?

A I don't believe age was a factor.

Q With regard to Captain Bell, you were denied access that you testified earlier to, your shops there at Puget Sound Naval Shipyard, as I reconstructed your testimony, for a period of about five years. Is that about right?

A No, sir, about five months.



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Q Five months, and that was corrected when he retired?
A Yes.
Q The chain of command at the navy shipyard, I am not just 100 percent clear on. In your capacity, am I correct that you reported to the medical officer?
A That is correct.
Q Then the medical officer, is it correct, in turn reported to the production department head?
A No, he reported to the shipyard commander.
Q And also reporting to the shipyard commander would be the head of the production department?
A Production department.
Q And it was in that production department that Captain Bell was housed for a period of time?
A Yes.
Q Were the unions representing the various trades at the yard active in any way, and by the yard I am referring to Puget Sound Naval Shipyard, active in any way in attempting to control, to improve the work environment at the yard that is, in direct contact with you that you know of?

MR. MORTENSEN: I object, lack of foundation.

A No.
Q (By Mr. Mertel) Did you have contact in your capacity as



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industrial hygienist with the unions in any capacity?

MR. MORTENSEN: Object, no foundation.

A I talked to Paul Warner and Mr. Ramage and some of the other shop representatives of the metal trades council.

Q You mentioned Mr. Ramage. I want to come back to that. Did you understand he had a title within the union?

MR. MORTENSEN: What union are we speaking of?

A This was pre-union. This was the Metal Trades Council.

Q (By Mr. Mertel) Did he have a title within the Metal Trades Council?

A I believe he was the Metal Trades Council representative in the pipe coverers and insulators department, shop steward, something on that order.

Q Did Mr. Ramage or the Metal Trades Council or other representatives ever involve themselves in, let's say, enforcing the requirements to wear respirators?

A No.

Q Did you, sir, encourage them to involve themselves in this health matter?

A Yes.

Q Did you do that? How did you do that?

A Informal conversations.

Q When did the turnover occur from the Trades Council to the unions?

A I don't recall the date.

Q Can you fix it in the 60's?

A I believe it was in the 60's.

Q The same line of questions, when the unions came in, did they involve themselves in these health matters?

MR. MORTENSEN: Object, form, vague.

A Not with me.

Q Did you meet with the unions, any of them, and discuss with them, for example, the need to wear respirators? Were there conversations like that that you may have had with the representatives of the union?

MR. MORTENSEN: Same objection.

A No.

Q (By Mr. Mertel) Would that have been something you considered part of your job in the 60's after this changeover to meet with the unions as you previously did with the Trades Council people to talk safety with them? I am talking about health and safety.

A No.

Q Who would have done that on behalf of the navy in dealing with the union folks, if anyone?

A The unions had a contract with a shipyard and the contract negotiators would discuss this. There was a section on health and safety in the contract, as I recall.



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Q Whose responsibility was it, if you know, under the contract, to deal with health and safety matters such as wearing respirators when working in dusty conditions?
A I don't recall.
Q In any event, it was your understanding it wasn't your responsibility, is that correct?
A I never had enforcement responsibilities. I could recommend only what should be done.
Q Did you attend any union meetings and give them pep talks about wearing those things or do anything of that nature?
A No.
Q The enforcement responsibility you have described, who had those responsibilities?
A Shop supervision.
Q So that would again fall back on an individual such as we referred to earlier, Shop 56 and someone like Edwards?
A Yes.
Q The shop supervisors I notice in some of these reports they signed these safety regulations and guidelines, didn't they?

Let me put it to you another way. When you would develop as an industrial hygienist the safety rules and guidelines, would they among other things go



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to the shop heads for review and approval?

A Yes.

Q The man you worked with in Mare Island, and you gave us his name, I think it is Barsoti (phonetic). Is that what it is?

A Rosati.

Q Is he still living in the Oakland Bay area, to your knowledge?

A Yes.

Q Walnut Creek, to be exact?

A Yes.

Q Do you still have contact with him?

A We exchange Christmas cards.

Q Have you discussed these litigations with him? I know you had your deposition taken a couple times. Has that been discussed with him?

A No.

Q Aside from the exchange of Christmas cards, you have no contact with him?

A No.

MR. MERTEL: That is all I have.

EXAMINATION

BY MS. LUNDGREN:

Q My name is Gail Lundgren and I just have a few questions



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I need to clarify.

Isn't it true that at one point in time that Puget Sound Naval Shipyard during your tenure there, there were several divisions of responsibility that you oversaw?

A Yes.

Q What period of time would that be?

A Are you referring to the sanitation and health physics industrial hygiene?

Q That is correct.

A I believe I took on sanitation in 1962, quite close to that, and I had also had health physics and industrial hygiene.

Q Isn't it correct that Mr. Mangold at one point took over the branch known as the industrial hygiene branch?

A Yes.

Q When did that occur?

A The latter part of 1970 or early '71.

Q Was he involved in the industrial hygiene division below you before that time?

A Yes.

Q When did that occur?

A I hired Mr. Mangold in 1962.

Q So basically your testimony is he was working under you in the industrial hygiene department from 1962 to 1970?



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A Yes.

Q You earlier mentioned some of the medical officers that worked at Puget Sound Naval Shipyard during your tenure and you mentioned a Captain Beck, a Jeffers, Ecklund, Reid and Hutchinson, and I was wondering if you could recall any other medical officers during your tenure at Puget Sound Naval Shipyard?

A The civilian medical officer, Dr. McBratney and the present one, Dr. Carter, very briefly.

Q Were those two medical officers employed by the shipyard?

A Yes.

Q So they would report to the commander of the shipyard?

A Initially, yes.

Q They would also have some connection with the Bureau of Medicine?

A The medical department remained under the technical direction.

Q Do you recall when Dr. McBratney was a medical officer of Puget Sound Naval Shipyard during your tenure there?

A He was a civilian doctor for some time while Captain Hutchinson was there and then Captain Hutchinson left in approximately 1965 and Dr. McBratney assumed the head physician.

Q How long did he remain, I suppose you would call it chief medical officer?



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A I think he retired about the same time I did, 1972.
Q There was a short time when Dr. Carter was there?
A Yes.
Q Do you recall when Captain Beck was medical officer at Puget Sound Naval Shipyard?
A 1950.
Q Just the one year?
A No, he was there for three or four years.
Q Did Jeffers then take over after Captain Beck?
A I think Captain Reid came after Captain Beck.
Q So that would be about 1953 or '54?
A Yes.
Q Then when did Captain Reid leave?
A They were all there about three or four years.
Q So that would put Captain Reid leaving at approximately '57 to '58, is that correct?
A Yes.
Q And then who took over after Captain Reid?
A Captain Jeffers.
Q When did he leave, approximately, '62 or '63?
A I think it was probably before that. I am awfully hazy on dates. There was a Captain Watkins in there too that I think I left out.
Q When do you recall Captain Watkins being a medical officer?



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A He was there before Captain Hutchinson. He was there, I know he was there in 1962. Ecklund came before Beck, he was there just a short time after I reported for duty.

Q Do you know where any of these gentlemen reside presently?

A Dr. McBratney and Watkin live in a trailer court near Kitsap Airport.

Q Any others?

A Captain Hutchinson is in Sun City, Arizona.

Q Any others?

A Captain Reid is dead. Captain Jeffers is dead.

Q How about Captain Beck or Captain Ecklund?

A Captain Beck is dead. Captain Ecklund, I don't know where he is.

Q How about Dr. Carter?

A He is still in the medical department in the shipyard.

Q Are there any other medical officers that you can recall at this time?

A No.

MS. LUNDGREN: That is all I have.

(Deposition adjourned at 4:00 p.m., to be continued June 11, 1982, at 9:30 a.m.)



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EXAMINATION

BY MR. LEY:

Q I am Roger Ley, Mr. Bessmer. I represent Combustion Engineering, one of the defendants in this lawsuit. I have just a few questions to ask you.

With regard to the safety meetings, do you know what department within the navy was in charge of those meetings?

A It was the safety division of industrial relations department in the shipyard.

Q Do you recall when the safety meetings were first held?

A No, I believe they were in progress when I got there.

Q Were they in progress when you left?

A Yes.

Q So were they conducted throughout the time you were at PSNS?

A To the best of my knowledge.

Q How often were they held? Was that weekly?

A I believe so.

Q Do you recall who was the head of the safety division when you first came to the shipyard?

A The name was Switzel. I don't recall his first name.

Q Do you recall who is successors were up until the time you left the shipyard?

A I don't remember very many of them. I can't even remember



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the last one.

Q Do you have any recollection as to how long Mr. Switzel was head of the safety division?

A He was there for two or three years after I arrived. I don't know when he came aboard.

Q The same question for the industrial relations department, do you recall who was the head of it when you got there and any of its successors?

A I only remember the last one was Bob Britten, B-r-i-t-t-e-n. He is now retired.

Q And how long had he been --

A There is another one I remember, before him was Joe King.

Q Do you recall when Joe King's tenure was?

A No, I don't remember the dates.

Q The 60's, 70's?

A He was there probably, Joe King, probably late 50's to early 60's, and Bob Britten after that.

Q So Bob Britten would have been in charge of industrial relations for maybe ten years or so?

A Yes.

Q You don't recall now any other people in industrial relations or any of the heads of either industrial relations or the safety division?

A It may come to me in the course of the day, but right at the moment it is a blank.



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Q Would you mention it to us if they come to you?

A Yes.

Q Do you recall the title of the person who was in charge of the safety meetings?

A Well, each foreman or leading man, I believe it was in the shop, held his own little safety meeting with his group. That was called the standup safety meeting.

Q Were there weekly safety meetings for the production division of the shipyard?

A Other than these, no.

Q Was there anybody in charge of organizing the safety meetings in the industrial relations department?

A I believe the safety division would put out a little sheet to each leading man which he would use as a lead-in for his talk.

Q Would it have been the head of the safety division who was responsible for generating these sheets?

A Yes.

MR. LEY: I ask this be marked as Exhibit No. 3.

(Exhibit No. 3 marked for identification.)

Q (By Mr. Ley) I was going to show you and ask if you can identify what has been marked as Defendant's Exhibit No. 3?



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A Yes.
Q What is it?
A This is an excerpt from Safety Review Magazine, dated October 1962. The excerpt was titled, Asbestosis, and authored by Captain H. M. Robbins, M.C., USN, and W. T. Marr, industrial hygienist, Long Beach Naval Shipyard.
Q Do you want to take a second and look through that. Is that article familiar to you?
A I believe I have seen it.
Q Is that article anything that you have referred to earlier in the deposition?
A No.
Q Is there any relationship between this article and the Marr Report you discussed yesterday?
A I would assume there was, but of my own knowledge I don't know.
Q I am not sure whether you told me, do you have any recollection of having seen this article before?
A Yes, I think I saw it because I regularly got safety reviews.
Q Did you read the safety review articles when they came out?
A Yes.
Q Was that your usual and customary practice?
A Yes.



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Q Was that your usual and customary practice in 1962?
A Yes.
Q So would it be fair to say you read this article in 1962?
A Yes.

MR. LEY: I will offer that article and ask that this be marked as Defendant's Exhibit No. 4.

(Exhibit No. 4 marked for identification.)

Q (By Mr. Ley) Handing you what the court reporter has marked as Defendant's Exhibit No. 4, can you identify that?
A This is an article published in the American Industrial Hygiene Journal of May/June, 1964, titled Asbestos Exposure During Naval Vessel Overhaul, offered by William T. Marr.
Q Is this article familiar to you?
A Yes.
Q And is this article something you discussed previously in the deposition?
A I don't believe so, no.
Q Have you had an opportunity to take a quick look at the subject of the text of the article?
A Yes.
Q Having looked at it briefly, is it familiar to you?



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A Yes.
Q Do you recall when you first saw that article?
A It would be in 1964 that I subscribed to the Industrial Hygiene Journal.
Q You read these as your usual and customary practice in 1964?
A Yes.

MR. LEY: I will offer Defendant's Exhibit No. 4. I have nothing further.

EXAMINATION

BY MR. HILFER:

Q Mr. Bessmer, my name is Richard Hilfer, and I represent some plaintiffs that are present or former Puget Sound Naval Shipyard employees.

Sir, in the course of your career as an industrial hygienist, have you ever heard the term threshhold limit value?
A Yes.
Q Would you define that for us?
A It is a value above which, below which, correction, most people will not suffer harm. I am putting it very badly. The threshhold limit value is the value of exposure measurement below which most people will not suffer harm.



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Q Does the threshhold limit value have some association with dust?
A Yes.
Q Have you ever heard the term maximum allowable concentration?
A Yes.
Q Would you define that term?
A That is a concentration, roughly a ceiling concentration above which exposure should not be allowed.
Q Are the terms maximum allowable concentration and threshhold limit value virtually synonymous?
A No.
Q Can you contrast them for us?
A Maximum allowable concentration was the old method of defining exposure limits and as I say, it referred primarily to a ceiling value, again, below which most people would not suffer harm, but the threshhold limit value superceded that at some later date. It was felt it was more indicative of what an occupational exposure should be.
Q Can you give us the approximate day that the threshhold limit value superceded the maximum allowable concentration?
A I really don't remember.
Q Referring you again to 1942, to the course you took in industrial hygiene at Columbia University, was the



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subject of threshhold limit value discussed in that course?

A No, they were using maximum allowable concentrations at that time.

Q In the course of that course, did the maximum allowable concentrations of asbestos, was that discussed?

A Briefly, yes.

Q Can you recall what it was?

A Five million particles per cubic foot of air.

Q Do you recall who would have taught that portion of the course?

A I believe it was Dr. Leroy Gardner.

Q During the term of this course by Dr. Gardner, with specific reference to asbestos, what specific hazards were discussed?

A The hazards of asbestosis from inhalation of asbestos above the maximum allowable concentration over a long period of time.

Q Was that the only hazard that was discussed?

A Yes.

Q There was not then any mention of a possible risk of cancer associated with exposure to asbestos?

A I don't recall any.

Q What were you told about asbestosis at that course?

A That is was similar to silicosis and that it was



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relatively benign, but would cause shortness of breath and disability and possibly ease of contracting tuberculosis.

Q Were you also told asbestosis would only result from exposure over the maximum allowable concentration over a long period of time?

A Yes.

ATTORNEY: Object to form.

Q (By Mr. Hilfer) Do you recall where Dr. Gardner was employed at the time he taught the course to you at Columbia University in 1942?

A At a place called Lake Saranac Institute.

Q When Dr. Gardner taught this course in 1942 at Columbia, did he advise the students that he was doing research for any asbestos companies or manufacturers of asbestos products?

MR. SOLTYS: Object to form.

Q (By Mr. Hilfer) When you arrived at the Puget Sound Naval Shipyard in 1949, and began to do your look around the yard, you stated that you became aware of the working conditions. Is that correct?

A Yes.

Q In response to general questions yesterday by the defense counsel, you indicated that sometime in the early 50's it was your opinion that the workers at the Puget Sound



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Naval Shipyard knew there was a hazard associated with asbestos, is that correct?

A That is correct.

Q What was the hazard? What were the hazards those workers knew about in the early 1950's?

A That asbestos dust should not be inhaled.

Q Have you finished your answer?

A I was going to add because of the danger of asbestosis.

Q I understand we are speaking in generalities because some workers knew more than others, is that correct?

MR. SOLTYS: Object to form.

A Correct.

Q (By Mr. Hilfer) In general terms would the knowledge that these workers had about the hazards of asbestosis, hazards of exposure to asbestos, been similar to your own at that time?

A Would you repeat that?

Q Let me rephrase it.

In the early 1950's, in your opinion, do you believe that the workers knew there was a risk of cancer associated with exposure to asbestos?

A No.

Q And in the early 1950's, did you believe the workers knew there was a risk of an irreversible progressive fibrosis of the lungs associated with asbestos?



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MS. LUNDGREN: Object to the form, foundation.

A I don't know.

Q (By Mr. Hilfer) You indicated when you arrived at Puget Sound Naval Shipyard in 1949, that there were some dust control progress going on, is that correct?

A That is correct.

Q And this specifically with respect to Shop 56 included ventilation machines?

A Yes.

Q And some wetdown procedures as well, is that correct?

A Yes.

Q Were the dust control procedures at Puget Sound Naval Shipyard in 1949 limited only to asbestos dust?

A No.

Q What other dusts were involved?

A We had silica dust in the foundry. We had dust from sandblasting operations. We had dust from reclamation of sand used in sandblasting operations. I can't think of anymore offhand.

Q Some portions of these dust control programs was aimed at those factors as well as asbestos dust?

A Yes.

Q When did you begin to take dust counts at the Puget Sound Naval Shipyard?



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A I took them on and off ever since I was able to, 1950 on.

Q In 1950 were you referring to the maximum allowable concentration or the threshhold limit value?

A I believe it was the maximum allowable concentration.

Q Was that maximum allowable concentration still five million particles per cubic foot of air?

A Yes, for asbestos.

Q In the course of your taking these air samples, how often did you find a sample that had more than five million particles per cubic foot of air?

A Very rarely, for asbestos again.

Q I am limiting this to asbestos. What percentage of the time did you find it with respect asbestos?

A Below the MAC?

Q Above the MAC.

A Above the MAC --

MS. LUNDGREN: Object to form, not limited in time and place.

A I would estimate less than five percent.

Q (By Mr. Hilfer) In the early 1950's, with respect to asbestos dust, did you believe it was necessary for a worker to wear a respirator if the dust count was below the MAC?

A In some cases where the dust counts vary widely over a



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short period of time I did, yes.

Q That would be called a peak exposure or something like that?

A Yes.

Q Excluding a peak exposure, did you believe it was necessary in the early 1950's for a worker to wear a respirator when the asbestos dust count was below the MAC?

A No.

Q Did you tell the workers that?

A I don't recall.

Q So if in the early 1950's you were out doing dust counts and the dust counts were below the MAC, you would not advise the workers in the area to wear a respirator, is that correct?

A That is correct.

Q We have been talking a lot about asbestos in the early 1950's. What other types of industrial hazards were you confronted with?

A There were many types of hazards in the shipyards. Do you want a listing?

Q Yes.

A I can at least give you a partial one, metal fumes from welding operations and foundry operations, use of chlorinated solvents, the use of benzine, carbon



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tetrachloride, which is a chlorinated solvent, illumination, noise, ionizing radiation, non-ionizing radiation, arsenic, lead, the vapors from painting operations, ultra-violet, I could go on for a couple of days.

Q As part of your job as an industrial hygienist, you were concerned with all those hazards, were you not?

A That is correct.

Q Did those other hazards, excluding asbestos, take a lot of your time?

A Yes.

Q Did they take up a majority of your time?

A Yes.

Q You indicated that when you arrived in 1949 at Puget Sound Naval Shipyard some trades got annual physical examinations, is that correct?

A Yes.

Q What trades were those?

A Employees in dusty operations got annual chest xrays, including asbestos workers. Electroplaters, I believe got a semi-annual physical. Lead workers received urinary lead tests, firemen received annual physicals, transportation workers received physicals. I don't know, that is not the whole list.

Q When you arrived at the shipyard and eventually got into



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Shop 56, I understand you recommended that they employ wet sweeping?

A Yes.

Q Did they in fact follow your recommendation?

A Yes.

Q You indicated in 1949 that you had been barred from the shops by the production officer for approximately five months, is that correct?

A I believe it was early 1950 when I was barred, after I had been there about two months.

Q When you were barred, for that five months you were barred from the shops, could you go anywhere else in the shipyard?

A Yes.

Q Could you go aboard the ships?

A Yes.

Q Did you go aboard the ships?

A Yes.

Q After the deck production officer retired and you were no longer barred from the shops, could you go anywhere in the yard in the performance of your duties?

A Yes, except the decoding room.

Q And that was because of security reasons, is that correct?

A Yes.



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Q You received the Marr Report in 1964 I believe it was, is that correct?

A I believe so.

Q When did you commence to do your own epidemiological study of asbestos?

A I believe that I got Dr. Frank to send us his xray findings starting about 1960.

Q Were you aware of any other studies that had been done with respect to asbestos before that time?

A I don't recall any specifically. I beg your pardon, there was an article published about 1946, written by -- I remember two of the authors, Fred Viles, V-i-l-e-s, and R. L. Gade, who was the person I replaced at Puget Sound.

Q Was that article one of the reasons you wanted to do your own study in 1960?

A Yes, I guess you could say that.

Q What were the other reasons you wanted to do your own study in 1960?

A Because I didn't believe my own samples and we had a few claims filed and I just felt that asbestos needed more evaluation.

Q So you determined you needed to conduct your own scientific investigation into the subject, is that correct?



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A Correct.

Q In 1964 were you still gathering the statistics with respect to this study?

A I believe so.

Q In your two reports that you authored that have been marked as exhibits to this deposition, the 1968 and the 1970 reports that you authored with Mr. Mangold and Mr. Beckett, did you recommend that one method of asbestos control would be to substitute non-asbestos products for asbestos products?

A I believe we did.

Q With respect to the two reports I previously referred to, was it the findings of yourself with Mr. Beckett and Mr. Mangold that the exposure of the workers at Puget Sound Naval Shipyard was intermittent and largely at low levels, below the threshhold limit value?

A Yes.

Q At that time in the 1950's, if the dust count were below the threshhold limit value, you would not have felt respirators were necessary for the workers, is that correct?

A Yes.

MS. LUNDGREN: Object to form.

Q (By Mr. Hilfer) When you indicated in the early 1950's it was your opinion that the workers knew about the



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hazards posed by asbestos, how did you come to that opinion?

A Because Commander Gade had done some rather extensive investigation of the situation and the shop had installed a rather elaborate and extensive ventilation system for the purpose of controlling asbestos dust.

Q So you assumed from those steps the workers would infer there were some hazards?

A Yes.

Q Do you know whether in the 1950's, early 1950's, the worker's knowledge of the hazards posed by asbestos were general or whether they were specific?

MR. SOLTYS: Object to form.

Q (By Mr. Hilfer) Do you understand the question?

A I believe I do. I would say it would be general.

Q Did it basically boil down to all dusts are hazardous for you, that type of understanding?

MR. SOLTYS: Object to form.

A Yes.

Q (By Mr. Hilfer) Do you believe the workers were able to make a distinction between dusts caused by asbestos or silica or any other type of dust?

MR. SOLTYS: Object, foundation.

A I am not sure I understand that. What kind of distinction?



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Q Do you recall in the early 1950's the workers were able to make a distinction between the hazards posed by asbestos dust, silica dust, or any other dusts?

ATTORNEY: Objection, foundation, form.

A No.

Q (By Mr. Hilfer) You indicated that in conjunction with others a labeling program was instituted in the late 1950's or early 1960's. Is that an approximate time?

A Yes.

Q Isn't it true in the course of that labeling program you labeled literally thousands of different kinds of substances?

A Yes.

Q Did any of these substances that you put labels on already have warning labels on them placed there by the manufacturer?

A Some did.

Q What were those substances that already had labels on them, placed there by the manufacturers?

MS. LUNDGREN: Objection, form, timeframe.

A Primarily solvent type materials.

Q (By Mr. Hilfer) What was the general nature of those labels?

A It would be flammable or non-flammable or use with adequate ventilation.



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Q Basically in the course of this labeling program you had approximately six different kinds of labels, is that correct?
A Yes.
Q What was the distinction between each of the six as best you can remember?
A One was toxic, one was poison, one was oxidizer, one was corrosive, one was flammable, one was -- I don't remember the sixth one.
Q What color were these labels?
A The color was different for each one, I believe. I don't remember. I think toxic was red and corrosive was white. The color was different for each one so a person not being able to read, let's put it that way, could still tell the difference.
Q So you were concerned with some people that might have had difficulties reading?
A Yes.
Q What color was the label placed on the products that you believed caused an inhalation hazard?
A It would depend on the severity of the hazard. If it was an extremely serious hazard, it would be poison. If it was a lesser danger, it would be toxic, and I don't remember the colors.
Q The label placed on asbestos was the toxic, as opposed to



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poison, is that correct?

A Yes.

Q So that indicated it was at least a lesser hazard than some other substances?

MS. LUNDGREN: Object to form, foundation.

A Yes.

Q (By Mr. Hilfer) The labels that were placed on asbestos bearing products, were those just the labels for any type of inhalation hazard?

A Well, comparable toxicity, yes.

Q They did not include on the label the specific hazards posed by asbestos, did they?

A No.

Q On that label that was placed on asbestos products, did that include the word asbestosis?

A No.

Q Did it include the word cancer?

A No.

Q You indicated approximately 1969 or 1970 a team from Mt. Sinai Hospital came to the Puget Sound Naval Shipyard, is that correct?

A Three persons came, I don't know whether they were from Mt. Sinai or not.

Q Was one of those gentlemen a man by the name of William Reitze?



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A Yes.
Q Did you subsequent to that visit receive a letter from Mr. Reitze?
A I don't recall.
Q Do you know if subsequent to that visit that Mr. Reitze wrote a letter to the commanding officer of Puget Sound Naval Shipyard?
A I don't recall.
Q Do you recall in your deposition that was taken in March 11, 1982, stating that after that visit Mr. Reitze wrote a letter to the commanding officer of Puget Sound Naval Shipyard commending the Puget Sound Naval Shipyard on its asbestos control methods?
A Was that not commander of the shipyard or the chief, Bureau of Medicine and Surgery?
Q You tell me your recollection.
A I believe he wrote one to the Chief, Bureau of Medicine and Surgery, and a copy went to the shipyard.
Q Did you see that letter?
A Yes.
Q What did it say, the substance of it?
A I don't recall specifically. I think generally it said we had a good program.
Q Did you make any other recommendations in that letter?
A I don't recall any.



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Q In the course of your duties at Puget Sound Naval Shipyard as an industrial hygienist did you ever have occasion to visit any civilian shipyards?

A No.

Q Any of the other shipyards you may have visited would have been military shipyards, is that correct?

A Yes.

Q During the time that you were at Puget Sound Naval Shipyard in taking dust counts did you ever find dust in excess of the threshhold limit value in the shops?

A In the shop, no.

Q In either informal or formal conversations with workers in shops, shop heads, those types of people within Puget Sound Naval Shipyard, did you ever advise anyone that there was a risk of cancer associated with exposure to asbestos?

A No.

Q When did you first become aware there was such a risk of cancer associated with exposure to asbestos?

A I believe it was sometime in the 1960's. I don't recall any specific occurrence that tipped me off.

Q Would you have been aware of that before Dr. Selikoff's report of 1964?

A I don't recall.

Q During the time you were in the industrial hygiene



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department at Puget Sound Naval Shipyard, did you ever receive any literature from manufacturers of asbestos or asbestos products relating to the health hazards posed by exposure to asbestos?

A No.

Q During the time you were the industrial hygienist at Puget Sound Naval Shipyard, did any representatives of manufacturers of asbestos or asbestos products ever advise you of the hazards associated with exposure to asbestos?

A No.

Q During the time you were the industrial hygienist at Puget Sound Naval Shipyard when you would attend seminars or meetings did any representative of a manufacturer of asbestos or asbestos products ever speak at one of those meetings or seminars about the hazards posed by exposure to asbestos?

A I don't recall.

Q Going back to your course in 1942 at Columbia, is it fair to say that Dr. Gardner told you that asbestosis was similar to silicosis?

MS. LUNDGREN: Object, form, foundation.

A Yes.

Q (By Mr. Hilfer) Did he further tell you that asbestosis was somewhat benign?



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A He may not have used those exact words, but that was my understanding.

Q How did you come to the understanding that it was somewhat benign from what you were taught in 1942?

A That it was similar to silicosis, which generally didn't produce death but might be disabling.

Q Based on the things that you knew in the 1940's, 1950's, and early 1960's, was it your belief that it was necessary for a worker to wear a respirator when the dust count was below the threshhold limit value?

A No.

Q Were the respirators that were available to the workers ever examined by the industrial hygiene department?

A Yes.

Q Were they ever tested by the industrial hygiene department?

A No.

Q Do you know of any studies or tests that were conducted on these respirators that found that the filters in the respirators were made of asbestos?

MS. LUNDGREN: Object to form.

A No.

Q (By Mr. Hilfer) In the late 1960's, were industrial hygienists at other shipyards calling Puget Sound Naval Shipyard for information on the program that was instituted at the Puget Sound Naval Shipyard with



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respect to asbestos dust?

MR. SOLTYS: Object, foundation.

A No.

Q (By Mr. Hilfer) Is that of your own personal knowledge?

A They didn't call me.

Q Do you know if they called Mr. Mangold?

A No.

Q When did you hire Mr. Mangold?

A 1962.

Q What duties were assigned to Mr. Mangold in 1962?

A Well, he was essentially in training for a period of time until I satisfied myself that he knew how to take samples, do general industrial hygiene work.

Q Did you gradually turn the problem of asbestos and its hazards over to Mr. Mangold?

A Yes.

Q When was that turning over taking place?

A I would say about 1963.

Q So after 1963 were you less and less involved with the program relating to asbestos?

A Yes.

Q Mr. Mangold has characterized the program relating to asbestos at Puget Sound Naval Shipyard in the late 1960's as unique, ahead of its time, and right on track, unquote. Would you agree with that?



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MR. SOLTYS: Object to form and foundation.

A I think in general I would agree with that.

Q (By Mr. Hilfer) I think I might have asked you this. Back in 1942 at Columbia, did Dr. Gardner advise the class he was doing any research for the manufacturers of asbestos or asbestos products?

A I don't recall that he did.

Q Do you recall the report that was done, the survey that was done at Mare Island in 1943 in which somebody wrote across it, this would be good in peacetime, or words to that effect?

A I recall such a survey, yes.

Q Was asbestos specifically mentioned in that survey?

A That I don't recall.

Q Yesterday in response to Mr. Soltys' questions, he asked you a question about whether you made a recommendation, that recommendation was presented to the other powers that be in the shipyard, but was not implemented, and you indicated all you could do was to kind of go around and lobby informally for your recommendation. Do you recall that line of questioning in your answers?

A Yes.

Q And doing that kind of lobbying with respect to asbestos, would it have been helpful for you in the 1950's to have information that indicated there was a cancer risk



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associated with asbestos?

MS. LUNDGREN: Object to form.

A Yes.

Q (By Mr. Hilfer) That would have been additional evidence that you could have presented before these other people, is it not?

A Yes.

ATTORNEY: Objection, form.

Q (By Mr. Hilfer) It would have been helpful anyway?

MS. LUNDGREN: Object to form.

A Yes.

Q Approximately, with respect to the labeling program that was instituted at the shipyard, how many products besides asbestos were labeled in terms of number?

A Hundreds, I don't recall any exact number.

Q Yesterday when one of the attorneys was asking you about the government specifications list for asbestos products, do you recall that line of questioning?

A Yes.

Q Do you have any knowledge as to whether the asbestos products sold to the Puget Sound Naval Shipyard were any different from those sold to private users?

ATTORNEY: Objection, foundation.

A I don't have that knowledge.

Q (By Mr. Hilfer) That was sort of out of your area of



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expertise, was it not?

A Yes.

ATTORNEY: Object to form, foundation.

Q (By Mr. Hilfer) In general how does an industrial hygienist go about evaluating a health hazard?

A First you would have to be alerted somehow, either by your own inspections or some other method, that a potential health hazard existed, and then normally you would take air samples in the breathing zones of people who were exposed and analyze them in the laboratory, assemble your data and evaluate these to see if corrective measures were required.

Q In evaluating those hazards in general terms would it be important also to refer to the literature on that hazard?

A Yes.

Q What other sources would an industrial hygienist have to refer to other than the literature?

A His own knowledge and experience and textbooks, literature, of course.

Q What about printed materials from the manufacturers of the products or substances that were involved?

A Yes, if such were available.

Q Would conferences such as some of the ones you attended with some of the other governmental hygienists also be



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a source of knowledge?

A Yes.

Q Would epidemiological studies also be a source of knowledge?

A Yes.

Q Were you aware that as early as 1930 Johns Manville had in its possession an epidemiological study indicating there was asbestos hazards identified with the inhalation of asbestos?

ATTORNEY: Objection, lack of foundation and form.

A No, I was not.

Q (By Mr. Hilfer) Were you aware of any studies from the 1930's indicating that there was a significant hazard posed by inhalation of asbestos?

MR. SOLTYS: Object to form.

A I don't recall any.

Q (By Mr. Hilfer) If there had been such studies, would it have been important for you to know about it?

MS. LUNDGREN: Object to form, calls for speculation.

A Yes.

Q (By Mr. Hilfer) Why?

A It would be additional information on which to base my evaluations that I had.



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MR. HILFER: Let's take a break.

(Brief recess taken.)

MR. HILFER: Back on the record.

Q (By Mr. Hilfer) Mr. Bessmer, in the course of your duties as an industrial hygienist at Puget Sound Naval Shipyard, did you ever have occasion to see containers or products containing asbestos?

A Yes.

Q During the time you saw those containers, did you ever see a warning label or caution label on those containers that had been placed there by the manufacturer?

A I don't recall any.

Q During the times that you saw those containers of products containing asbestos, did a respirator ever come with the product?

A Not to my knowledge.

Q After 1964, approximately, would you generally defer to Carl Mangold on the subject of asbestos and the control procedures instituted at the Puget Sound Naval Shipyard?

A Yes.

MR. SOLTYS: Object to form.

Q (By Mr. Hilfer) Why is that?

A My other duties had taken so much of my time that I turned it over to him.



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Q Can you briefly tell us what those other duties would have been?

A In 1962 the Puget Sound Naval Shipyard was chosen to be a nuclear shipyard and in getting the nuclear programs going, this took most of my time.

Q Were you aware that in 1947 Vandiver Brown, the secretary and general attorney for the Johns-Manville Corporation gave a speech that was critical of the threshhold limit value?

MR. SOLTYS: Object to form and foundation.

A I don't recall that.

Q (By Mr. Hilfer) Would it have been helpful to know that?

ATTORNEY: Same objection.

A Yes.

Q (By Mr. Hilfer) Why would it have been helpful?

ATTORNEY: May I have a running objection to that?

MR. HILFER: Yes.

A It would have been useful in evaluating the hazard.

Q (By Mr. Hilfer) Were you aware that in 1956 that people from the Raybestos Manhattan Company indicated that the threshhold limit value may not be reliable because it counted only particles and not fibers of asbestos?

ATTORNEY: Objection, form and foundation.



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A I don't recall seeing it.

Q (By Mr. Hilfer) Would it be helpful to you to know that?

ATTORNEY: Same objection.

A Yes.

Q (By Mr. Hilfer) Why would it be helpful?

ATTORNEY: Same objection.

A It would have been additional information in evaluation of the hazard.

Q Were you aware that in 1959, Hugh M. Jackson, manager of the industrial health program for the Johns-Manville Corporation indicated that Johns-Manville Corporation was actually using two methods of counting dust?

ATTORNEY: Object, form, foundation. May I have a running objection to the same line of inquiry for foundation?

MR. HILFER: Yes.

A I don't recall seeing that.

Q (By Mr. Hilfer) So you would not have been aware then in 1959 that the Johns-Manville Corporation had two methods of counting dust, namely, five million particles per cubic foot for the dust and one million fibers per cubic foot for the fiber?

A I don't recall that.

Q Would that have been helpful to you?

A Yes.



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Q Why?
A It would have been additional information in evaluation of the hazard.
Q Were you aware of an article written in 1957 for the Asbestos Textile Institute by Hugh M. Jackson of the Johns-Manville Corporation?
ATTORNEY: May I have a running objection for foundation?
MR. HILFER: Yes.
A May I ask what publication that was in?
Q (By Mr. Hilfer) It would have been for the Asbestos Textile Institute Air Hygiene and Manufacturing Committee.
MR. SOLTYS: Is that, counsel, a running form objection?
MR. HILFER: Yes.
A I don't recall seeing that.
Q (By Mr. Hilfer) So you would have been unaware that he stated that in the article, the use of a respirator as a means of protecting an operator against exposure to asbestos should be regarded as the last line of defense?
A No.
Q You would not have been so aware?
A I would like to qualify that by saying that I always



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considered a respirator to be the last line of defense when engineering controls were not possible.

Q So to summarize your answer, it would be that if other methods were useful, you should use them before resorting to respirators?

A Correct.

Q Would you recognize Dr. Leroy Gardner's signature if you saw it?

A No.

Q Did you ever read any other textbooks or articles by him after you left Columbia?

A I don't remember.

MR. HILFER: I would like this package of documents marked as the next exhibit in order.

(Exhibit A marked for identification.)

Q (By Mr. Hilfer) Mr. Bessmer, would you please look at the second and third page of this exhibit?

ATTORNEY: Would counsel advise what you are looking at before you go on? Would counsel briefly explain because we only have one or two around.

MR. HILFER: Shall we go off the record and I will explain.

(Off record discussion.)

MR. HILFER: Back on the record.



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Q (By Mr. Hilfer) Mr. Bessmer, have you had a chance to look at the second and third page of that exhibit, which purports to be a letter dated February 24, 1943?

A Yes.

Q Would you look at the signature at the end of that letter?

A Yes.

Q Do you recognize that at all?

A I have never seen Mr. Gardner's signature before.

Q With respect to the first page of that letter, dated February 24, 1943, I would like you to look at the last paragraph on the page, the third full sentence, which states, the question of cancer susceptibility now seems more significant than I previously imagined.

ATTORNEY: Object to foundation for this whole exhibit and any line of inquiry emanating from it. May I have a running objection to that based on foundation?

MR. HILFER: Yes.

MS. LUNDGREN: Form as well.

Q (By Mr. Hilfer) Have you had a chance to read --

MS. LUNDGREN: Are you granting a running objection to form as well on this line of questioning?

MR. HILFER: Not as to form.

Q (By Mr. Hilfer) Did Dr. Gardner tell you anything



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of that nature in 1942?

MR. SOLTYS: Object to form.

A I don't remember anything, hearing anything like that.

Q Was there any mention of cancer at all in Dr. Gardner's course at Columbia University in 1942?

MS. LUNDGREN: Object to form.

A I don't recall any.

Q (By Mr. Hilfer) Would it have been helpful to you in 1943 to know that Dr. Gardner thought the question of cancer susceptibility now seems more significant than he previously imagined?

MR. SOLTYS: Object to form.

A Yes.

Q (By Mr. Hilfer) I would now like you to turn to the outline attached there and it is numbered sequentially at the top of the page. Do you see those numbers?

A Yes.

Q There is an index and there is another set of numbers. Let's turn to Page 7 on the second sequence. Would you look down at what has been marked as Roman Numeral X, Subject 3, entitled Cancer of the Lung? Would you read that. Just with respect to what you read on that page, would it have been helpful to you to know in 1943 that asbestosis may actually favor development of tumors in susceptible species?



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MR. SOLTYS: I object to the form of the question.

Q I always find animal experiments difficult to extrapolate to humans, but it would have been additional information.

Q (By Mr. Hilfer) Would you next turn to Page 10 in that second sequence and read the entire grouping marked Roman Numeral XIII, entitled, Recommendation for a New Standard of Safe Atmospheric Concentration of Asbestos Dust. Have you read that?

A Yes.

Q And all the sub-sections, A through E?

A Yes.

Q Would it have been helpful to you in 1943 to know Dr. Gardner believed that the threshold limit value was probably unreliable?

MS. LUNDGREN: Object to form and foundation.

A Yes.

Q (By Mr. Hilfer) Why would that have been helpful to you?

MS. LUNDGREN: Object to form.

A It would have speeded up the conclusions to which I came to depend on.

Q (By Mr. Hilfer) Would it have given you more evidence to confront the people at Puget Sound Naval Shipyard about the nature and extent of the hazard posed by



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asbestos?

ATTORNEY: Object to form.

A Yes.

Q (By Mr. Hilfer) Did you ever receive any communications from anyone that indicated that the threshhold limit value was aimed at preventing asbestosis and not preventing cancer?

MS. LUNDGREN: Object to form, foundation.

Q (By Mr. Hilfer) Do you understand the question?

A I believe so. No, I did not receive correspondence.

Q Do you have any opinion as to whether that is true?

MR. SOLTYS: Object, foundation.

A I am going to have to back up. What was true?

Q (By Mr. Hilfer) That the threshold limit value was mainly intended to prevent the incidence of asbestosis and not the incidence of cancer.

MR. SOLTYS: Object to form.

A I believe that is probably true.

Q (By Mr. Hilfer) What do you base that belief on?

A Asbestosis was the only hazard that I knew of in those early days.

MR. HILFER: Thank you. No further questions.

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EXAMINATION

BY MR. MORTENSEN:

Q Mr. Bessmer, I am Kirk Mortensen. I represent some other plaintiffs, like Mr. Hilfer.

Mention has been made about your being at Columbia University in 1942 and hearing a lecture by Dr. Gardner.

About how long did that lecture last, do you remember?

A As I recall it was about half a day.

Q And that was the last you saw of Dr. Gardner at that time?

A Yes.

Q You didn't see him later?

A No.

Q Another subject here, Mr. Bessmer, generally was the work force at Puget Sound Naval Shipyard receptive to you and your colleagues' ideas that safety in general, once you got there in 1949 and through the years?

A They weren't antagonistic.

Q There were some habits you had to break?

A Yes.

Q And educational programs that you had to conduct primarily, I imagine, to break down some of those habits that you observed?



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A Yes.

Q And as your time there continued was more and more cooperation witnessed by you by the various people you were talking to?

ATTORNEY: Object to form and foundation.

A I believe so, yes.

Q (By Mr. Mortensen) And eventually is it fair to say that Puget Sound Naval Shipyard either in the late 60's or early 70's came to be known as a model program for asbestos dust control?

MS. LUNDGREN: Object to form.

A Yes.

Q (By Mr. Mortensen) And part of the reason it gained that reputation was the work force was obeying safety rules and following your recommendations, is that correct?

MR. SOLTYS: Object to form and foundation?

A Yes, I believe compliance had increased.

MR. SOLTYS: Object to responsiveness of answer.

Q (By Mr. Mortensen) Another subject, Mr. Bessmer, I apologize for the jumping around here. My next question, you mentioned yesterday during one of the defendant's questions of you about the hazard survey you made at Mare Island in 1942. Do you recall that testimony?



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A Yes.
Q You made a report in writing?
A Yes.
Q Do you have that in your possession at this time?
A No.
Q Do you have it at your home or anywhere else outside of this room?
A No.
Q Of all the naval shipyards you have worked at or been around, was Puget Sound Naval Shipyard's hygiene department, let's say in the 1960's, staffed by more people than any other you had been in?

MS. LUNDGREN: Object to foundation, also form, timeframe for when he was at the other institutions as opposed to the 1960 timeframe.

A No.
Q (By Mr. Mortensen) What other shipyards had larger industrial hygiene departments?
A During the war when industrial hygienists were naval officers, we had several at each shipyard.
Q What was the most during your tenure at Puget Sound Naval Shipyard? What was the most number of people assigned to the industrial hygiene department there at Bremerton?
A Not counting clerical help, three.



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Q Mr. Mangold, yourself, and Mr. Beckett?
A Yes.
Q In 1950 at Puget Sound Naval Shipyard, because of the Korean conflict, was there vigorous activity in terms of ships in and ships out and work force?
MS. LUNDGREN: Object to form, foundation.
A Yes.
Q (By Mr. Mortensen) Did you have a chance to observe this because of your presence there?
A Yes.
Q Were there a lot of conversions of ships going on to your knowledge, or what primarily was the task at hand for the yard at that time, 1950?
MS. LUNDGREN: Object, foundation.
A I think there was some new construction and some overhaul, some conversion, I don't recall the division of each.
Q Were some ships that hadn't been used being demothballed, as we understand that term today, getting ready to be put back into action?
A I don't remember.
Q In general terms at that time, there was, to your observation, a lot of pressure on production people to get the ships out on the water and out of the shops, out of drydock, is that correct?
MR. SOLTYS: Object to the form of the



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question and foundation.

A There was always pressure, yes, to get the work out.

Q (By Mr. Mortensen) And that would be more true during did you say wartime?

A No, I just said there was always pressure to get the ships out on time.

Q That would be more so during any conflict where a navy might be involved?

A Availability would be shortened.

Q What was the greatest number of people in the general work force at Puget Sound Naval Shipyard that you recall during the time you were there from 1949 to '72?

MS. LUNDGREN: Object, foundation.

A I believe there were 15,000 at one time.

Q (By Mr. Mortensen) You testified, I believe, yesterday, that Shop 56 personnel were not or did not wear respirators in the 50's when in the shop, is that correct?

A That is correct.

Q That was because adequate ventilation was occurring in the shop at that time, is that right?

MS. LUNDGREN: Object to form.

A Yes.

Q (By Mr. Mortensen) The shops, I think you have described in previous testimony, were clean air



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environments at that time, 1950?

MS. LUNDGREN: Object to form.

A Yes.

Q (By Mr. Mortensen) Mr. Bessmer, were you aware of any pipe coverers and insulators upon their beginning of employment at Puget Sound Naval Shipyard being provided a respirator or a mask, one or the other in their tool-box?

A No.

Q Did you ever during the course of your employment at Puget Sound Naval Shipyard have an opportunity to look in a pipe coverer's or insulator's tool box to see what he might have in it?

A I don't recall that I did.

Q I believe that it is fair to assume that since you yourself hold the philosophy that a respirator is the last line of defense in the control of dust, you didn't believe they were very effective. Is that a fair summary of your overview of the use of respirators?

MR. SOLTYS: Object to form.

MS. LUNDGREN: Foundation.

Q (By Mr. Mortensen) Do you believe respirators were effective for dust control at the shipyard?

MS. LUNDGREN: Same objection.

A If worn they would help.

Q (By Mr. Mortensen) They weren't totally preventive of



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all dust getting through them and into the body though, were they?

MS. LUNDGREN: Object to form, foundation.

A Again, it would depend on the filters used. I couldn't give a blanket statement, I don't believe.

Q Did the workers ever talk to you about their respirator use?

A Yes.

Q Did they ever report they were cumbersome to wear at times, akward?

A Yes.

Q You mentioned poor fitting. Beards would interfere with their effective use, I would imagine?

A Yes.

MS. LUNDGREN: Object to form.

Q (By Mr. Mortensen) Would the workers ever talk to you about the inability to wear one because of confining or tight spaces in which they would be working on ships?

A Yes.

MS. LUNDGREN: Object to form.

Q (By Mr. Mortensen) Did you ever hear any reports about the difficulties when they had to wear goggles for eye protection in using a respirator at that time?

A Yes.



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Q What were some of those complaints or statements that were brought to your attention?

A They complained that if they wore safety goggles and put a mask on, it would push the goggles up and then they couldn't see what they were doing.

Q Safety goggles were a frequent practice that was required by you and your staff through the years at Puget Sound, weren't they?

MS. LUNDGREN: Object to form.

A It was required, not by me.

Q (By Mr. Mortensen) Safety goggles were -- how would you characterize it in terms of the frequency of use of those aboard ship?

A They were almost universally used.

Q You testified yesterday that age was really not a factor in whether or not a person would wear a respirator or not. Do you recall that statement?

A Yes.

Q The factors that I have gone over now, just previous to this question, were those some relevant factors in whether or not people would resort to the use of a respirator?

A Yes.

Q You have mentioned Mr. Ramage's name several times. Is that John Ramage, or do you recall?



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A I don't recall his first name.
Q How well did you know the man?
A Just speaking acquaintance in the shop atmosphere.
Q What position did he hold, the maximum position that he held at Puget Sound when you were there, do you recall that?
A I believe he was a journeyman pipe coverer and insulator.
Q Did you ever have a chance to assess whether or not he was safety conscious at all?
MS. LUNDGREN: Object to form.
A Yes.
Q (By Mr. Mortensen) What did you conclude?
A He was much concerned with safety, although he was misdirecting it a little bit.
Q To your knowledge did Mr. Ramage have any understanding in the 50's that exposure to asbestos fibers or dust could lead to cancer?
MS. LUNDGREN: Object to form and foundation.
A I don't know.
Q (By Mr. Mortensen) Mr. Bessmer, if a manufacturer's representative of any company selling any kind of product from propellors to asbestos containing products or anything wished to, was there any regulations that you were aware of during your tenure at Puget Sound that



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would prevent them from going aboard the base with a pass?

ATTORNEY: Object, foundation.

A My understanding of the procedure was that all manufacturer's representatives checked in with the production department first before they went anywhere in the yard.

Q During your course of tenure at Puget Sound did you ever know yourself of manufacturer's reps being allowed admittance to the base?

A Yes.

ATTORNEY: Move to strike, no foundation.

Q (By Mr. Mortensen) What was the source of your knowledge on that?

ATTORNEY: Same objection.

A I had some call on me.

Q (By Mr. Mortensen) What type of company or product or manufacturer did you understand them to represent?

A Safety equipment, cleaning supplies, skin cleansers.

Q Did you ever recall visiting with or discussing at the base in the yard insulation products with any person who you believed was a manufacturer's rep of an asbestos containing insulation manufacturer?

A I don't recall any.

Q I believe Mr. Hilfer asked you some questions and you



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indicated to him in your capacity as an industrial hygienist and having some concern of course with dust control that you read from time to time manufacturer's literature on their products, insulation products, for example. Is that true or have I got it wrong?

A I don't recall reading any on insulation products.

Q Have you seen any flyers, leaflets, advertisements or anything like that on insulation products, technical or otherwise type of literature?

A I don't recall any.

Q Would you ever need to resort to any literature to find out the composition of an insulation product?

MS. LUNDGREN: Object to form.

A Yes.

Q Technical manuals would be something to look at?

A Governmental specifications.

MR. MORTENSEN: I would like to have the court reporter mark this as our next exhibit.

(Exhibit B marked for identification.)

Q (By Mr. Mortensen) Mr. Bessmer, I would like to have you examine what the court reporter has marked for us as Plaintiff's Exhibit B. Can you identify what has been placed before you, the three page document, Exhibit B, just for the record?



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A I don't know what the top form is, the title is cut off down here. The other appears to be some manufacturer's literature on Kaylo heat insulation.

Q At the very bottom of Exhibit B, left corner, at least my copy shows document search. Do you see those two words?

A Yes.

Q Just before the word document is an S. Have you ever heard of a phrase called asbestos document search in the course of your employment at Puget Sound Naval Shipyard?

A No.

Q In any event, Exhibit B purports to bear the name Navy Shipyard, Puget, 1951 at the very top left, does it not?

A Yes.

Q And you are otherwise not familiar with this type of form?

A No.

Q Mr. Bessmer, I would direct your attention to the third page, lower right, last paragraph of this exhibit. Do you see that it states, block or pipe insulation can be cut, scored or sawed with ordinary tools of the trade. The material is non-irritating to the skin and non-toxic. Do you see that?



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A Yes.
Q Do you also see a man pictured up there above that on Page 3 with his arms extended to a couple of objects?
A Yes.
Q The upper lefthand corner shows somebody, again, it is a poor Xerox, but appearing to saw by hand an object in front of him?
A Yes.
Q It says, Kaylo heat insulation is easily cut with ordinary tools. Isn't the language contained there that this material is non-irritating to the skin and non-toxic. Isn't that language a little bit contradictory from what you learned from Dr. Gardner in 1942?

ATTORNEY: Object to form and foundation.

Q (By Mr. Mortensen) Does that language contradict what you learned and took with you from Dr. Gardner in 1942?
A Can I speak with my attorney a moment?
Q Sure.

MS. EGAN: Object to form and foundation of that question.

A In answer to your question, I will qualify it by referring to the last sentence in the first paragraph, which says, a small amount of asbestos fiber is included at the time of manufacture. If that is the case, then



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the final sentence of that you referred to is in contradiction.

Q (By Mr. Mortensen) If the average supervisor, foreman, or insulator at Puget Sound Naval Shipyard had read that language by seeing that brochure of this manufacturer's flyer, would it be your experience as a hygienist that he would probably conclude that wearing a respirator when working with this material wasn't necessary?

ATTORNEY: Object to form and foundation.

A Yes.

Q (By Mr. Mortensen) If you had read that statement and had seen it when you were at Puget Sound Naval Shipyard from the Owens-Illinois Corporation in 1951, isn't it true as a hygienist you would have been left to believe, at least to the extent of this product, that asbestos was no longer considered to be as harmful as it was when it was told to you in 1942, some eight years earlier, that it could be harmful?

ATTORNEY: Object to form and foundation.

A I would tend not to believe it.

Q (By Mr. Mortensen) When the Owens-Illinois Corporation states in a document such as Exhibit B that this material which does contain some asbestos fiber is not irritating to the skin and not toxic, isn't that a clear



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message to that asbestos worker that they are assuming no risk in using that product?

ATTORNEY: Object, form and foundation.

A It could be construed as such, yes.

MR. MORTENSEN: I would like to have the court reporter mark this as the next exhibit.

(Exhibit No. C marked for identification.)

ATTORNEY: Could I have a running objection as to foundation?

MR. MORTENSEN: Yes.

Q (By Mr. Mortensen) Please review that exhibit C, Mr. Bessmer.

ATTORNEY: Also, I think this is new subject matter beyond direct examination and I am making an objection to these questions.

A I have read it.

Q (By Mr. Mortensen) What does it purport to be, Exhibit No. C, Mr. Bessmer?

A This is apparently a manufacturer's data sheet on thermal insulation products put out by J. M. I assume that is Johns-Manville.

Q Have you ever seen a similar type of thing before in your career at Puget Sound Naval Shipyard or any other shipyard?



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A No.

Q Having looked at Exhibit C, Mr. Bessmer, does that indicate for that product listed there the asbestos content? It is a paper product, right?

A Yes. It talks about fiber content. I don't know whether all the fibers are asbestos or not.

Q Something says about 95 percent.

A Fiber content.

Q Medium length fiber paper with high fiber content, minimum 95 percent.

ATTORNEY: Objection.

Q (By Mr. Mortensen) And it is non-burn asbestos paper. I believe down here it says long fiber asbestos paper made with high grade long asbestos fiber, minimum content 88 percent. Can you conclude from that whether or not that particular product that I just referred to in that paragraph was basically mostly asbestos fiber?

A Yes.

Q Do you also see in this exhibit C the statement under advantages, easy to apply and safe to handle? Do you notice that in that exhibit?

A Yes.

Q Does that contradict the message you got from Dr. Gardner in 1942?

A Yes.



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Q If the average insulator or shop foreman or superintendant or whoever would come in contact with the insulation process at Puget Sound Naval Shipyard had read this flyer, such as Exhibit C, would you believe him to be acting with due care to his health in not using a respirator?

ATTORNEY: Objection, leading.

Q (By Mr. Mortensen) Given that statement?

A Yes.

Q Wouldn't that statement be a clear message to such a worker that they were assuming no risk in working with that product that contained 88 percent asbestos fiber?

ATTORNEY: Object to form, leading.

A Yes.

MR. MORTENSEN: I would like this marked as Exhibit D.

(Exhibit D marked for identification.)

MS. LUNDGREN: Before questions are asked on this document, I want to comment that this line of questioning is clearly beyond the scope of direct examination, but with counsel's respect, I would like a running objection on foundation as well as form.

MR. MORTENSEN: Not on form, but foundation



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is fine.

MS. LUNDGREN: Also, a running agreement that all trial objections will be reserved, except for form and foundation and responsiveness of the answer, and I would also like to comment that it seems to me, given the middle upper portion of the page, which says Exhibit B, that this document was retained from a deposition in asbestos litigation early on, I believe sometime in 1980, possibly 1981, and therefore there can be no showing that this was indeed at Puget Sound Naval Shipyard. That is one basis for my foundation objection.

Q (By Mr. Mortensen) Just review Exhibit D in your own due time, Mr. Bessmer.

MR. MORTENSEN: I believe this is probably within the scope of the notice of deposition, as well as material Mr. Bessmer relied on as well as the fact that it shows this gentleman something that pertains to worker knowledge that would justify fully their not using respirators as the defense so desperately tried to show they were negligent in not using. If it is a safe product, you shouldn't wear anything.

MS. LUNDGREN: I would disagree with Mr. Mortensen's comment and state simply that all my trial objections, as per our earlier agreement, are reserved



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MS. LUNDGREN: The document speaks for itself. object to form.

A It states, "Easy fabrication, ordinary tools of the trade sufficient for all cutting, sawing or scoring, non-irritating to the skin and non-toxic. Offers pleasant handling characteristics."

Q (By Mr. Mortensen) Mr. Bessmer, isn't that language contradictory to the message you were given by Dr. Gardner in 1942?

MS. LUNDGREN: Object to form.

A Yes.

Q (By Mr. Mortensen) Wouldn't the average insulation worker in Puget Sound Naval Shipyard working with that product and reading that kind of a statement feel free in not using a respirator?

ATTORNEY: Object to form, foundation.

Q (By Mr. Mortensen) Wouldn't he at least feel safe in not using his respirator in working with that particular product, given that information?

MS. LUNDGREN: Same objection.

A Yes.

Q (By Mr. Mortensen) Does that information that you have just read to us from Exhibit D import in your ability and experience as an industrial hygienist a clear message to the worker he is not taking any undue risk to his



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health in not wearing a respirator in working with that product?

MS. LUNDGREN: Object to form.

A Yes.

MR. MORTENSEN: I would like this marked as Exhibit E.

(Exhibit E marked for identification.)

MS. LUNDGREN: May I request a question on voir dire to Exhibit D?

MR. MORTENSEN: Yes.

VOIR DIRE EXAMINATION

BY MS. LUNDGREN:

Q I want to ask one question, Mr. Bessmer. Did you ever see this during your tenure at Puget Sound Naval Shipyard, Plaintiff's Exhibit E to this deposition?

A No.

EXAMINATION (CONTINUED)

BY MR. MORTENSEN:

Q Having put before you, what I believe is a two-page document entitled Plaintiff's Exhibit E, can you identify that for us, please?

A It appears to be a letter from, I can't quite tell who it



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is from here, but it is written to Mr. Albert Edwards, Industrial Hygiene Engineer of the Indiana State Board of Health, and it lists ingredients of materials called Careytemp insulation.

Q Do you know the name Phillip Carey Company?

A I am not familiar with it, no.

Q Have you ever heard of Careytemp insulation before in your course of work at any shipyard?

A No.

Q Is there any mention made in that document as to the asbestos content, if any, of a Careytemp product?

A Yes.

Q What is your understanding as portrayed by that document of the content?

A That this material does contain asbestos fiber.

Q There is no mention of the amount, I believe, is there?

A No.

Q Mr. Bessmer, directing your attention to Page 2 of Exhibit E, it states none of the materials used in our formulation of Careytemp is toxic. Do you have that language before you?

A Yes.

Q Do you believe that if an insulation worker at Puget Sound Naval Shipyard were working with that Careytemp product and were informed of that message that he would



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be acting reasonably or responsibly in not using his respirator?

A Yes.

Q And that article makes it clear to anyone reading it that Careytemp with asbestos in it is non-toxic, isn't it?

A That is what it states.

Q And that is what you would conclude from reading it as an industrial hygienist?

A No, I do not agree with that.

Q That bears the date 1961, does it not?

A Correct.

Q It was pretty common knowledge by 1961 that asbestos wasn't the most healthy thing to be around, was it?

MS. LUNDGREN: Object to form.

A Yes.

Q (By Mr. Mortensen) And you had known about it for 15 years at that time?

ATTORNEY: Object to form.

MS. EGAN: I have a voir dire on Exhibit B.

VOIR DIRE EXAMINATION

BY MS. EGAN:

Q Mr. Bessmer, I have a question for you, if you would turn to Exhibit B, the first page, you indicated, I



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believe, you did not recall having seen the first page of that three page exhibit, is that correct?

A That is correct.

Q Have you ever seen Page 2 or Page 3?

A No.

EXAMINATION (CONTINUED)

BY MR. MORTENSEN:

Q One of the attorneys yesterday asked you about a hazardous material evaluation. Do you recall that question and phrase?

A Yes.

Q Have you had a chance to recall whether you were involved in forms that bore the name Material Hazard Evaluation, Mr. Bessmer? I know we are talking about the past, but does that ring any bells to you now?

A I had a system set up whereby I would try to determine the composition of various proprietary items and I had a sheet which I filled out. It may be called hazard evaluation sheet, I don't remember, which was sent to the shop involved.

MR. MORTENSEN: Off the record.

(Brief recess taken.)

MR. FRENCH: Back on the record. May I make a comment. I understand there have been some



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questions asked about Exhibit E and I just got here, but from my understanding, I would like to move to strike answers with respect to any questions you asked him about workers state of mind or their understanding, for lack of foundation. So if you will grant me a continuing objection as to foundation, as to any questions you may be asking with respect to the understanding of the workers.

MR. MORTENSEN: You would have that objection, as I understand our preamble, and of course Mr. Soltys was asking questions about that yesterday, so what is good for the goose is good for the gander, I agree.

Q (By Mr. Mortensen) Let's move into another subject real quickly. If someone were to use the phrase, Mr. Bessmer, let's say in the late 60's, in regard to Puget Sound Naval Shipyard asbestos control program, and describe it as unique, ahead of its time, and right on track, would you have any reason to disagree with that description of it?

MS. LUNDGREN: Objection, asked and answered.

A At the time I didn't realize that, in hindsight probably it was essentially correct.

Q (By Mr. Mortensen) Wetdown was mentioned in your testimony yesterday and you said that was a recommended



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technique for dust control in the shops. To your knowledge was wetdown resorted to in the ships where workers would be installing products?

A To the best of my recollection, no.

Q Would that be because of mildew and moisture problems that weren't satisfactory in the context of installing insulation aboard ships?

MS. LUNDGREN: Object to form.

A I don't know what those reasons were.

Q (By Mr. Mortensen) Were there some other practical reasons to your knowledge why wetdown continued to be employed during shipboard work?

MR. LEY: Object, foundation.

A I don't know the reason.

Q (By Mr. Mortensen) I believe yesterday some discussion was had about when respirators became mandatory at Puget Sound Naval Shipyard. Exhibit No. 2 indicates it was in 1968, and does that better recall to your memory when the mandatory use of respirators was laid down? You said '66 in answer to a question, but was it really '68 as Exhibit 2 indicates or not, which one is it?

A I don't recall what Exhibit 2 is.

MS. LUNDGREN: Object to form.

Q (By Mr. Mortensen) Showing you Defense Exhibit No. 2,



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on the second No. 2 page, it says in January, '68, dust respirators were made mandatory. Does that better refresh your recollection as to the exact year they became mandatory?

MS. LUNDGREN: Object to form.

A I believe they were required earlier, but it was not enforced.

Q (By Mr. Mortensen) So it became mandatory in '68, is my only point.

A Yes.

MS. LUNDGREN: Object to form and move to strike the response.

Q (By Mr. Mortensen) Mr. Slagle, representing Eagle Picher Company, asked you some questions about safe handling of asbestos. As a hygienist, Mr. Bessmer, were you aware that Dr. Selikoff and others have reported that people who never worked with asbestos insulation materials are still known to get asbestos related diseases?

MS. LUNDGREN: Object to form and foundation.

A Yes.

Q You have heard or read I am sure in the course of your career and the knowledge you have gained in your education of the disease mesothelioma?



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A Yes.

Q To your belief or knowledge is there any safe exposure to asbestos fibers that will guarantee that the exposed person will not get mesothelioma?

MS. LUNDGREN: Object to form and foundation.

A My present knowledge is I do not know.

Q (By Mr. Mortensen) In terms of asbestosis, I believe, would it be a fair summary of your testimony there may be a safe level of exposure to avoid the disease of asbestosis but you are not commenting on other diseases, such as mesothelioma? Is that a fair summary of your testimony?

MS. LUNDGREN: Object to form.

MR. LEY: Foundation also.

A That is a good question. I don't know that I testified to that specifically.

Q (By Mr. Mortensen) I believe you said yesterday to Mr. Slagle you felt there was some safe level of exposure.

MS. LUNDGREN: Object to form.

MR. LEY: Move to strike comment by counsel.

Q (By Mr. Mortensen) Which you maintained would not cause harm to people.

MS. LUNDGREN: Object to form.



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Q (By Mr. Mortensen) I would like to know what your opinion is, Mr. Bessmer, whatever it is.

A I don't recall that, so testifying that. My initial impression years ago was that the threshold limit value was the exposure limit below which people would not receive harm.

However, my present state of knowledge is almost any amount of asbestos could be harmful.

MS. LUNDGREN: Move to strike. Non-responsive.

Q (By Mr. Mortensen) Given your experience, training, education and overall knowledge in the field of industrial hygiene, particularly with regard to asbestos diseases, Mr. Bessmer, what is your present opinion as to the level, if any, a person can expose himself to asbestos fibers safely?

MR. LEY: Object to form, lack of foundation.

A I really don't know.

Q (By Mr. Mortensen) Did you feel there is a safe exposure level to asbestos that wouldn't incur harm on people?

MR. LEY: Object, foundation.

ATTORNEY: Object to form, repetitious.

MR. MORTENSEN: I am trying to clear your



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objections, counsel.

A I have not kept up with the field since I retired in 1972.

Q (By Mr. Mortensen) When you were retiring in 1972, isn't it a fact that asbestos insulation was being banned from further use in the shipyard for new work?

MS. LUNDGREN: Object to form.

MR. LEY: Lack of foundation.

A I believe there was a naval ship systems command directive that came out in that perspective.

Q (By Mr. Mortensen) Did you or your staff have anything to do with that diretive or the providing information that lead to that directive?

A I don't know of my own knowledge. I assume that the Bureau of Medicine and Surgery got in on it.

Q In any event, was it your understanding that the purchase of new asbestos containing insulation materials was either banned or radically reduced from 1972 on?

MS. LUNDGREN: Object to form and foundation.

A Yes.

Q From a hygienic standpoint, given your career training and experience, the reason for that was a recognition that asbestos containing products were a health hazard, isn't it?



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MS. LUNDGREN: Object to form and foundation.

A Yes.

Q (By Mr. Mortensen) And there was a need to find a substitute material to take their place that would not be a factor causing disease or a risk to workers?

MS. LUNDGREN: Object to form and foundation.

A Yes.

MR. MORTENSEN: I have no further questions. Thank you for your time and patience.

EXAMINATION

BY MR. WILLHITE:

Q Mr. Bessmer, my name is Ted Willhite, and I represent some of the plaintiffs in this litigation. I would like to begin by asking you some questions about your previous experience.

You testified that you had experience in shipyards other than Puget Sound Naval Shipyard, is that right?

A That is correct.

Q Sir, when did you serve at Pearl Harbor Shipyard?

A From September 1943 to September 1945.

Q Have you had occasion to visit Pearl Harbor Shipyard since you left there in 1945?



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A Yes.

Q When did you do that?

A About 1971.

Q Was that in an official capacity or unofficial capacity?

A Unofficial.

Q Was this a pleasure visit?

A Yes.

Q Did you speak with any of the industrial hygienists who were employed at Pearl Harbor Shipyard at that time?

A Yes.

Q Do you remember the name of the person you spoke with?

A Betty Steffy (phonetic) and Mike Horokowa (phonetic) and the entire staff of the health physics branch.

Q What was the purpose of your visit?

A In my capacity at Puget Sound as the director of radiation health, just an informal talk on my procedures in that area.

Q Was the subject of asbestos discussed at all?

A No.

Q Was the subject of dust levels at the Pearl Harbor Shipyard discussed at all, exclusive of radiation?

A No.

Q When you were at the Pearl Harbor Shipyard in 1943 to 1945, did you conduct any air surveys, air sample surveys?



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A Yes.

Q What measuring device did you use?

A I took samples for formaldehyde with a midget impinger. We used lead acetate paper for hydrogen sulfide in air as a qualitative measure only. That is about it.

Q I take it you did not conduct studies for airborne asbestos?

A No.

Q Concerning asbestos as a product, do you have any knowledge concerning the patents for insulation material?

A No.

Q In any of your courses or in the course of your experience at the Puget Sound Naval Shipyard, were you ever provided with any information concerning patents that may be held by any asbestos manufacturers concerning a substitute for asbestos?

A No.

Q You testified concerning certain warnings that had been placed on other products such as chlorinated hydrocarbons, benzine, and products of that sort. Do you recall that general testimony?

A Yes.

Q Do you recall when you first started seeing warnings that were placed on those products?

A By the manufacturer?



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Q Yes.
A I think there were some at the beginning of my career.
Q So at least from your standpoint as an industrial hygienist it was possible or practical to put labels on containers that contained hazardous materials?
MS. LUNDGREN: Object to form and foundation.
A Yes.
Q (By Mr. Willhite) You were asked some questions by the attorney for one of the asbestos companies concerning the safe handling of asbestos and the general question was whether or not asbestos could be handled safely if the instructions in the two safety manuals were followed. Do you recall that general line of testimony?
A My safety manuals you mean?
Q I mean the asbestos exposure and control manual and yes, the asbestos exposure and control manual that was put out by the shipyard?
A Yes, I recall the testimony.
Q Based upon what you know now, the methods of handling the asbestos that are referred to in these manuals were not adequate, is that a fair statement?
MS. LUNDGREN: Object to form.
A I would believe that additional measures should be taken.



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Q (By Mr. Willhite) Is it also fair to state your knowledge of asbestos, this is your own personal knowledge, grew and developed over the years?

A Yes.

Q You were originally taught that asbestos, you were taught by Dr. Gardner, that asbestos was benign?

MS. LUNDGREN: Object to form. Asked and answered as well.

A Yes.

Q (By Mr. Willhite) Would it be fair to state one of your responsibilities as an industrial hygienist is an educational responsibility in terms of educating workers concerning the hazards of various products?

A Yes.

Q When you were at the Puget Sound Naval Shipyard, is it correct that apprentice insulators, at least up through the mid-1950's, were taught their trade by older insulators?

A Yes.

Q Is it also correct to state that the decision on whether or not to wear a respirator, at least up through the mid-1960's, was largely a subjective standard?

A Yes.

Q In other words, if a worker thought that there was an excessive amount of dust, whether it was asbestos or



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any other type of dust, it was a personal decision whether or not to wear a respirator?

A Yes.

Q You testified that in 1962 that Puget Sound Naval Shipyard was chosen to be a nuclear shipyard, do you recall that testimony?

A Yes.

Q Can you tell us the names of the manufacturers of the reactors that were installed on the various nuclear vessels at Puget Sound?

A I believe Westinghouse.

Q Did you have occasion to work with any representatives of Westinghouse Corporation when you were assigned responsibilities for the nuclear program?

A No.

Q Did Dr. Gardner discuss with you the use of an electrostatic precipitator in the course you received from him in the 1940's?

A No.

Q Were you aware that he had instructed the asbestos manufacturers or at least one asbestos manufacturer that the electrostatic precipitator was a far more effective method of sampling airborne asbestos particles?

MS. LUNDGREN: Object to form and foundation.

A No.



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Q (By Mr. Willhite) Concerning the statements made in these product brochures which have been previously identified as exhibits on behalf of the plaintiffs, I am referring to for illustrative purposes the literature on Kaylo --

MS. LUNDGREN: I wish you would distinguish between Exhibit B and D.

Q (By Mr. Willhite) Let's refer to the Owens-Corning Fiberglass Exhibit D. Over the course of your employment at the Puget Sound Naval Shipyard, you had occasion to speak with various insulators and pipe coverers, and apprentice insulators, did you not?

A Yes.

Q And you also had occasion to speak perhaps to boilermakers and other trades people concerning various safety topics, is that fair?

A Yes.

Q If a warning label had been placed on a package of asbestos and that warning label said refer to manufacturer's specifications or refer to manufacturer's instructions, or whether a respirator should be worn, what would a reasonable and prudent employee at the Puget Sound Naval Shipyard conclude upon reading a statement that a product was non-toxic?

MS. LUNDGREN: Object, form, foundation, and



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also I hope I would have the same objections with Mr. Willhite that I previously stated with Mr. Mortensen.

MR. WILLHITE: Same general objections.

A Could I have the question read back?

Q (By Mr. Willhite) Let me simplify it. If a warning label had been placed upon a product such as asbestos and a person in the shipyard read that label and that label said refer to manufacturer's instructions concerning the installation of this product and that worker referred to the manufacturer's advertising materials and read the phrase, non-irritating to the skin and non-toxic, what would a reasonable and prudent insulator conclude as a result of reading this?

ATTORNEY: Object to form and foundation and clearly speculation.

A That there was no hazard involved in the use of the product.

MR. WILLHITE: That is all I have.

MR. MORTENSEN: I move for the admission of all plaintiff's exhibits at this time.

MS. LUNDGREN: I would on behalf of Owens-Corning at least, like to reserve all objections to the exhibits until the time of trial as previously was agreed between plaintiffs and defense counsel at the beginning.



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MR. FRENCH: I would join in that comment that Ms. Lundgren made. I would also make my objection to the admission at this time or any time of Exhibit E on the basis of foundation.

ATTORNEY: My understanding is an objection made by one counsel is an objection by all.

MR. MORTENSEN: Off the record.

(Brief recess taken.)

MR. SLAGLE: Back on the record.

EXAMINATION

BY MR. SLAGLE:

MR. SLAGLE: Mr. Bessmer, my name is Rick Slagle and I will try not to keep you too much longer and try not to cover territory that has already been covered.

Q (By Mr. Slagle) In 1942, at your class at Columbia, did they discuss particular trades or occupations that were at risk for obtaining asbestos related disease?

A Not that I recall.

Q Did you discuss at all textile or mining industries?

A No, not that I recall.

Q Do you recall testifying earlier today that the basis of your knowledge that the workers were aware of health hazards associated with inhalation and asbestos dust was



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the fact that there were modifications in Shop 56?

A Yes.

Q Were those modifications made strictly for asbestos purposes?

A Yes.

Q And they were made upon Commander Gade's study, is that correct?

A Yes.

Q Did he have a formal written study?

A I saw survey forms that he had filled out.

Q Had he summarized the results of those forms in any way?

A I can't recall.

Q Do you know whether he had any meetings with personnel at Shop 56 as a result of these hazards?

A No, I don't know that.

Q I believe that you have also testified earlier that after you arrived at the shipyard you had occasion to go around and observe the workers and on occasion talk, is that correct?

A Yes.

Q Is that also part of the basis for your knowledge that the workers were aware of the health hazards associated with inhalation of asbestos dust in 1949?

A Yes.



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Q You also testified that you had had a conversation with Mr. Ramage. Is that correct?

A Yes.

Q Mr. Ramage informed you that workers were dying as a result of inhalation of various dusts or magnesia dust, is that right?

A Magnesia dust, yes.

Q What diseases were they dying of, did he have any idea?

A He didn't say, he didn't specify.

Q Did he specify any workers in particular?

A Just pipe coverers and insulators.

Q So he felt it was particular to those two trades.

A Yes.

Q You indicated that Mr. Ramage was concerned with safety but he was somehow misdirecting his concern. Do you recall that testimony?

A Yes.

Q How was he misdirecting his concern?

A He was attributing those cases to magnesia dust and later, much later, when asbestos became a celebrated cause, he and some other people from the shop approached the medical officers and demanded blood counts, which has little bearing on asbestosis.

Q What time was that?

A I think that was in the middle 60's sometime.



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Q Do you recall what type of respirators were available at the shipyard in 1949?
A They were the mine safety appliance, twin cartridge type respirators.
Q Mine Safety Appliance. Does that refer to the U. S. Bureau of Mines?
A No, that refers to a private corporation.
Q Were those respirators approved by the U. S. Bureau of Mines?
A I believe so.
Q Do you recall being asked some questions about the effectiveness of respirators a little earlier today?
A Yes.
Q How is the effectiveness of respirators measured?
A I believe there are tests which the Bureau of Mines conducts using a material of a known particle size and they determine the penetration of the filter by these particles.
Q Do they rate respirators according to their effectiveness?
A I don't believe so. I think they were either approved or not approved.
Q Have you ever heard of the term protection factor?
A No.
Q Do you have any opinion at all what the effective rate of these respirators would be if they were properly



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worn and maintained?

A I believe it would be fairly high.

Q In the 90 and above range, is that 90 percent and above removal?

A Yes.

Q Did pipe fitters, coverers and insulators wear safety glasses as a general rule?

A Yes.

Q That would be every day, eight hours a day?

A Yes.

Q Is the threshhold limit value a generally accepted measure of risk of any potential contaminants to human health?

A Yes.

Q Who establishes the threshhold limit value?

A They are published by the American Conference of Governmental Industrial Hygienists.

Q Are manufacturers members of the American Conference of Governmental Industrial Hygienists?

A I don't know.

Q Are the threshhold limit values relied upon by the profession in general to establish safe exposure levels?

A Yes.

Q Do they in fact still have threshhold limit values today?

A Yes.



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Q Except they call them permissible exposure levels, don't they?
A I don't know, I am still in the TLV area.
Q You testified that respirators were not necessary for exposures under the TLV, do you recall that testimony?
A Yes.
Q Were they recommended even though they weren't necessary?
A No.
Q I think you have testified that there was a period of time when respirators were recommended and then there was a period of time when respirators were mandatory and then there was a period of time when respirators were mandatory and strictly enforced, is that correct?
A Yes.
Q When respirators were mandatory but not strictly enforced, did workers routinely use respirators?
A Some did.
Q Would the majority of them wear respirators?
A I don't know.
Q Was the fact that workers were not wearing respirators even though they were mandatory a basis for subsequently taking enforcement procedures to make sure they were worn?
A I don't know that either.



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Q Do you know what kind of enforcement was required or instituted at the yard?
A No.
Q In addition to information on potential health hazards from your department, workers had access to information on this topic from other sources, is that correct?
A I don't know.
Q Would you know whether they had ever received information on safety practices from their union?
A No, I would not know.
Q Have you ever heard of the green sheet?
A I believe I have.
Q Was that a union publication?
A I don't know.
Q Is it true that in addition to information that you provided them they also had safety meetings, that is correct, is it not?
A Yes.
Q They also had communications with one another?
A Yes.
Q In addition I believe you testified in 1961, Shop 56 put out a manual or a publication of some kind, is that correct?
A Yes.
Q I am going to hand you a document which is a portion of



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a much more lengthy document and ask if you have ever seen this before?

A Yes.

Q Is this the publication put out by Shop 56 that you were referring to earlier?

A Yes.

MR. SLAGLE: Could I have this marked as an exhibit, please?

(Exhibit No. 5 marked for identification.)

Q (By Mr. Slagle) Did you participate in any way in preparing these safety recommendations?

A Yes, I believe I had some input.

Q Were these recommendations general knowledge or recommended prior to the time they were actually put down in written form? Does this represent the general work practice requirements at PSNS prior to 1961?

A Yes, I believe so.

Q In addition to the union safety meetings and conversations with other workers and materials they received from Shop 56, they also had an opportunity to gain knowledge about the hazards of asbestos or the risk associated with inhaling asbestos from warning labels you put on the product, is that correct?

A Yes.



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Q During your tenure at PSNS did you ever change the color or category of warning associated with asbestos products?

A No.

Q And even though you subsequently became aware of the risk of cancer and other possible ramifications from asbestos dust the warning label itself was not changed?

A No.

Q Do you know why that was?

A The only other label I could have put on was poison and it didn't really fit that category.

Q What was the difference between the two categories?

A Poison was generally something that would be taken internally which would cause death.

Q I think you discussed something about hazardous material evaluation, but you didn't call it that, you said it was a system set up where you would try to determine the composition of various items and send out recommendations to the shop, is that right?

A Correct.

Q When did this system begin?

A Sometime in the 1950's, I don't recall exactly.

Q Would it have been in the early 50's or the late 50's?

A Probably early 50's.

Q Did this system include asbestos products?



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A I don't know now.
Q What was the basis for your statement that asbestos containing insulation materials were banned or drastically reduced after approximately 1972?
A I recall a Bureau of Ships directive which essentially had that effect.
Q How did you have occasion to see this Bureau of Ships?
A It was routed to me by yard mail.
Q So this would have been while you were still at the yard?
A Yes.
Q Do you recall approximately what time? Can you give me a year you may have received this Bureau of Ships directive?
A I would say about 1969, '70, somewhere in there.
Q Did you begin to observe or become aware of a change in the types of products used at the yard following receipt of this directive?
A I did not personally observe that, no.
Q I believe you testified that you would make additional recommendations above those contained in the 1970 report. Do you recall saying that?
A Yes.
Q What additional recommendations would you make?
A I don't know, I haven't studied it that much.



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Q Do you know in fact that you would make additional recommendations if you hadn't studied the report?

A I believe I could come up with some additional recommendations.

Q Do you recall at this time the names of any other shop head or persons associated with the industrial relations department at PSNS?

A Yes, I remember the name of the last safety superintendant when I retired, it was Lou Belden, L-o-u, B-e-l-d-e-n.

MR. SLAGLE: Thank you. I have no further questions.

EXAMINATION

BY MR. FRENCH:

Q My name is Phillip French. I represent the Celotex Corporation. Handing you Exhibit E to this deposition, do you recall being asked some questions about that?

A Yes.

Q When was the first time you saw that letter, by the way?

A Today.

Q Did you bring that with you or was that provided by Mr. Mortensen?

A I did not bring it with me.

Q You have never seen that before today?



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A No.

Q Do you know who this L. A. Pechstein is whose name appears on the second page?

A No.

Q Do you know who Mr. Albert Edwards is whose name appears on the first page?

A No.

Q You have no knowledge of any other correspondence between these individuals?

A No.

Q As a matter of fact, this letter is unsigned, is it not?

A Pardon?

Q This letter has no signature that appears anywhere on this letter, is there?

A No.

Q To the best of your knowledge none of the workers at PSNS ever saw this letter either?

A I don't know.

Q Is it a fair statement from your testimony of today and yesterday that a number of workers, based upon your observation and your experience at PSNS, a number of workers had knowledge of the dangers of asbestos and yet did not wear respirators when they were required?

A Yes.

Q By the way, you had occasion yourself to walk through



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different work areas I take it in the course of your employment?

A Yes.

Q Did you ever observe or ever hear anybody say anything to the effect that here comes Bessmer, put your hardhats on or anything to that effect?

A No.

Q Do you have any knowledge as to whether or not the workers would have known who you were when you were approaching?

A Yes, they would know who I was.

Q Would they associate you with being associated with safety rules and regulations in the shipyard?

A Yes.

Q Would you have any opinions as to whether or not some workers who perhaps did not comply ordinarily with safety regulations might take precautions to comply if they saw you coming?

MR. MORTENSEN: Object, foundation.

A I don't think I frightened anybody.

MR. FRENCH: Thank you, Mr. Bessmer, that is all I have.

MR. SLAGLE: I would like to comment on the record, we haven't finished our document production at PSNS and we are now at about approximately 3700 documents and about a third of the way through. During



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the course of this document production, I would expect we would receive documents that we don't have available to us today that Mr. Bessmer may have knowledge relating to and therefore we may ask for a deposition upon completion of that document production.

MR. MORTENSEN: What document production are we talking about, a clandestine one? Do you know anything about this?

MR. PICKRELL: No.

MR. MORTENSEN: Is it the one that Deborah Moran opens up two or three file drawers?

MR. SLAGLE: My understanding is Puget Sound Naval Shipyard has prepared a list of documents or made some effort to compile documents relating to asbestos and we haven't received those documents yet, but they are in the process of putting them together, and based upon documents that we expect to receive but have not yet received, we may have additional questions for this witness.

MR. MORTENSEN: If somebody is producing documents for one party, it better be made available for both.

MR. PICKRELL: Have you spoken to Deborah Moran recently about that?

MR. SLAGLE: No, I have not.



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MR. PICKRELL: It may be the documents we are going to attach as part of our answers to interrogatories, it is part of the request for production accompanying the interrogatories which may be mailed out to all of you today, I am not sure.

MR. SLAGLE: That is the essence of my comment. We don't have those documents yet and they may include things like Commander Gade's notes on inspections, dust samples, prior to 1949 and similar information that Mr. Bessmer may have substantial information on.

MR. PICKRELL: Signature not waived.

(Exhibits 1 through 5 and A through E attached.)

(Witness excused at 1:30 p.m.)

_____

DANIEL JAMES BESSMER

STATE OF WASHINGTON )
) ss.
COUNTY OF KING )

SUBSCRIBED AND SWORN TO BEFORE ME this _____ day of _____, 1982.

_____

NOTARY PUBLIC in and for the State of Washington, residing at _____.



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C E R T I F I C A T E

STATE OF WASHINGTON )
) ss.
COUNTY OF KING )

I, the undersigned Notary Public in and for the State of Washington, do hereby certify:

That the annexed and foregoing deposition of each witness named herein was taken stenographically before me and reduced to typewriting under my direction;

I further certify that the deposition was submitted to each said witness for examination, reading and signature after the same was transcribed, unless indicated in the record that the parties and each witness waive the signing;

I further certify that all objections made at the time of said examination to my qualifications or the manner of taking the deposition, or to the conduct of any party, have been noted by me upon said deposition;

I further certify that I am not a relative or employee or attorney or counsel of any of the parties to said action, or a relative or employee of any such attorney or counsel, and that I am not financially interested in the said action or the outcome thereof;

I further certify that each witness before examination was by me duly sworn to testify the truth, the whole truth and nothing but the truth;

I further certify that the deposition, as transcribed,



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is a full, true and correct transcript of the testimony, including questions and answers, and all objections, motions, and exceptions of counsel made and taken at the time of the foregoing examination;

I further certify that I am sealing the deposition in an envelope with the title of the above cause thereon, and marked "Deposition" with the name of each witness, and promptly delivering the same to the Clerk of the above entitled Court.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal this 13th day of June, 19 82.

Notary Public in and for the State of Washington, residing at Seattle



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DJB 8202 v+

Daniel J. Bessmer
Asbestos Cases
STCT/WA 6/10/82

EXHIBIT # E
WITNESS # D. J. Bessmer
Pete S. Hunt, Reporter
DATE: 1-7-80

FILE COPY

# ASBESTOS EXPOSURE AND PULMONARY X-RAY CHANGES TO PIPE COVERERS AND INSULATORS AT PUGET SOUND NAVAL SHIPYARD *

C. A. MANGOLD, R. R. BECKETT, D. J. BESSMER

Industrial Hygiene Division
Puget Sound Naval Shipyard
Bremerton, Washington

August 1968

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EXHIBIT NO. 1
Date 6-10-82 Case No. Bessmer
Id ____ Adm ____ Rej ____
Eileen L. Berg, N.P.
(206) 282-8545

* The opinions expressed in this paper are those of the authors and do not necessarily reflect those of the Department of the Navy, the Department of Defense, or any other official agency. Reference to a company or a product name does not imply approval or recommendation of the product to the exclusion of others that may be suitable.

This paper for presentation at the annual meeting of the Pacific Northwest Section of the American Industrial Hygiene Association at Richland, Washington on October 3 - 4, 1968.

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3. COMPARATIVE REVIEW OF CHEST X-RAYS. Most X-ray evaluations were based on several reviews over the 2-1/2 year study period. Those workers who were exposed to lung hazardous conditions received semi-annual 14 x 17 inch chest X-rays, all others received annual 70 mm chest X-rays. Physicians listed the X-ray findings as "fibrotic changes," or "pulmonary abnormalities."

Table I shows the distribution of diagnosed pulmonary fibrosis, or other abnormality for each trade category. Because the insulators had the highest incidence (21.2%) compared to all other trades, the work history was investigated. Table II compares the age, employment, and first pulmonary abnormalities for 22 insulation workers.

Table III summarizes the only case diagnosed as asbestosis reported during the study.

Table IV shows the distribution of pulmonary findings compared to the years exposed.

No cases of lung cancer were reported in the study group.

4. ENVIRONMENTAL REVIEW. Airborne samples were collected and counted according to the method adopted by the National Conference of Governmental Industrial Hygienists in 1942 (10,11). Particle size distributions were calculated for 20% of the samples. The geometric mean diameter did not exceed 2.3 microns by the light field method for any sample. Many asbestos fibers were probably below the limit of resolution of the microscope (1 micron) (9). The number of fibers observed were related to the type of material.

The materials described in Table V are used by nearly all insulators at Puget Sound Naval Shipyard. The asbestos products are similar to those used by union employees in the San Francisco Bay area (7,8) and Long Beach Naval Shipyard (4).

Thoroughly wetting amosite or other asbestos materials was found to reduce airborne particulate levels by one-half to two-thirds compared to dry handling techniques. Wetting amosite or magnesia block before ripout of old insulation aboard ship is not practical because the adhesive and paint coating is water resistant. Installation or ripout of asbestos insulation aboard ship produces high concentrations of airborne asbestos dust. Adequate ventilation and wet handling techniques in the fabrication shop keep the dust levels well below the TLV.

Table VI shows the estimated time weighted exposure to asbestos determined from work schedules and field sampling. The exposure patterns for each insulation job on new ship construction, overhaul, and prefabrication are estimated in Tables VII, VIII, and IX.

Graph A shows a typical sawing operation where excessive exposures occur for brief periods.



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Although dust respirators have been required for installation or ripout of asbestos aboard ship since 1956, this survey found that 76% of the insulation workers did not use dust respirators. Over 50% did not possess respirators which are readily available at tool rooms.

5. DISCUSSION. The exposure patterns of insulators at Puget Sound Naval Shipyard are intermittent, largely chronic low level, but include brief acute high level episodes during sawing or overhaul of ships when old insulation is ripped out without pre-wetting the material. Individual exposure patterns vary widely within work groups because of high mobility, individual work patterns, variety of job assignments, and the use of many different materials.

The insulators have a comparatively light exposure when compared to asbestos miners or fabric manufacturers, yet after about 10 years of exposure chest X-rays begin to reveal increased diffuse markings. Change of job status, termination, or removal from the hazardous duty list may obscure the past occupational history of insulation workers. There is a need to develop a uniform classification for reading and identifying such X-rays taken of insulation workers (14) and to maintain their occupational history. The individual habits of workmen appear to play a large part in their exposure patterns. Some workmen wear their respirators, while others will not. Most insulation workers were aware that exposure to asbestos, even at low concentrations, is hazardous. The attitude prevails that the hazards are unavoidable and must be accepted as part of the trade.

Total dust counts are believed to be important because some of the grains are actually particles from the asbestos fibers or the parent rock in the asbestos vein. They are in fact crystallographically indistinguishable from fibrous asbestos (9). Binders, metals from processing (14) and surface absorption may play yet another role. Until these uncertainities are resolved, the fines associated with asbestos products should not be treated as inert material.

The 21.2% diagnosed lung abnormalities found in insulation workers compared with 25% (7,8) found in union insulation workers in the San Francisco Bay area. The 3.5% occurrence of pulmonary abnormalities among boilermakers with marginal exposures to asbestos and silica may be partially due to asbestos.

6. CONCLUSIONS. A 2-1/2 year comparison of chest X-rays of 6571 production workers and 420 clerical workers at Puget Sound Naval Shipyard showed that 104 insulators handling asbestos have 21.2% diagnosed pulmonary abnormalities compared to the next highest incidence of 3.5% for boilermakers with some asbestos and silica exposure, and less than 1% for clerical workers with no known asbestos exposure.



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Only one case of asbestosis was diagnosed since July 1965 when the study was begun.

Exposure patterns and the high incidence of lung abnormalities suggest that the current threshold limit value of 5 mg/M$^3$ for asbestos may be too high.

Lung abnormalities of insulators are first evident after about 10 years exposure and progress until retirement or termination.

Insulation workers handle asbestos materials between 70 - 90% of the work shift. The exposure to asbestos dust is intermittent, although brief episodes at concentrations considerably above the TLV do occur during sawing or ripout. The total airborne particle count ranges about 5 mppcf for about 50% of the work day. The asbestos content of the materials ranges from 15 to 95%. The work day has periods of inactivity, time between job changes, and time for material acquisitions, which reduce the actual exposure to about 6 hours.

A high incidence of lung abnormalities would not be expected according to time weighted exposures compared to the present TLV. This is contrary to the 21.2% pulmonary abnormalities among insulators shown in Table I.

Possible explanations are:

a. The pulmonary abnormalities are the result of intermittent peak exposures throughout each work day for more than 10 years. The time weighted exposure estimates are low and do not reflect the true exposure.

b. The threshold limit value has been set too high.

c. Methods of evaluation do not properly access the exposure pattern.

The 21.2% pulmonary abnormalities found among insulation workers at Puget Sound Naval Shipyard compare to 25% found in union insulation workers in the San Francisco Bay area (8).

If working conditions remain the same, about 20% of the insulation workers at Puget Sound Naval Shipyard can be expected to have some pulmonary abnormalities distinguishable by chest X-rays after 15 years in the trade (Table IV).



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## INCIDENCE OF DIAGNOSED PULMONARY FIBROSIS

| TRADE | TOTAL WORKING FORCE | WORKERS WITH PULMONARY FIBROSIS OR OTHER ABNORMAL X-RAY FINDINGS | |
|---|---|---|---|
| | | NUMBER | PERCENT |
| Shipfitters | 890 | 6 | .7% |
| Sheetmetal Workers | 489 | 6 | 1.2% |
| Forge Workers | 32 | - | - |
| Welders | 998 | 11 | 1.1% |
| Inside Machinists | 536 | 1 | .2% |
| Outside Machinists | 490 | - | - |
| Boilermakers | 115 | 4 | 3.5% |
| Electricians | 574 | - | - |
| Pipe Coverers & Insulators | 104 | 22 | 21.2% |
| Pipefitters | 765 | 6 | .8% |
| Shipwrights & Joiners | 228 | - | - |
| Electronics Workers | 280 | - | - |
| Painters | 263 | 4 | 1.5% |
| Riggers | 664 | 1 | .1% |
| Temporary Services | 143 | 1 | .7% |
| Control Group (clerical workers) | 420 | 1 | .2% |

TABLE I

August 1968

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INTERVAL BETWEEN EMPLOYMENT AND
FIRST X-RAY INDICATIONS OF LUNG ABNORMALITY

| EMPLOYEE | AGE WHEN HIRED | YEAR HIRED | CHEST CONDITION 1st NOTED | INTERVAL BETWEEN EMPLOYMENT AND 1st X-RAY ABNORMALITIES | YEARS IN PC&I TRADE AT PSNS (WHERE KNOWN) |
|---|---|---|---|---|---|
| 1 | 22 | 1933 | 1959 | 26 years | 33 |
| 2 | 22 | 1933 | 1954 | 21 | 33 |
| 3 | 18 | 1936 | 1958 | 22 | 30 |
| 4 | 27 | 1939 | 1963 | 24 | 27 |
| 5 | 26 | 1941 | 1947 | 6 | 25 |
| 6 | 39 | 1941 | 1953 | 12 | 25 |
| 7 | 31 | 1942 | 1961 | 19 | 17 |
| 8 | 30 | 1944 | 1951 | 7 | 22 |
| 9 | 25 | 1945 | 1963 | 18 | 21 |
| 10 | 28 | 1947 | 1965 | 18 | 20 |
| 11 | 41 | 1947 | 1964 | 17 | 20 |
| 12 | 36 | 1951 | 1963 | 12 | 15 |
| 13 | - | 1952 | 1962 | 10 | - |
| 14 | 45 | 1952 | 1958 | 6 | - |
| 15 | 35 | 1953 | 1962 | 9 | 13 |
| 16 | 49 | 1960 | 1960 | - | 6 |
| 17 | 38 | 1958 | 1960 | 2 | 8 |
| 18 | 54 | 1961 | 1966 | 5 | 5 |
| 19 | 31 | 1961 | 1961 | - | 5 |
| 20 | 57 | 1961 | 1962 | 1 | 5 |
| 21 | 47 | 1963 | 1965 | 2 | 3 |
| 22 | 22 | 1965 | 1966 | 1 | 1 |

TABLE II

August 1968

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EMPLOYEE NUMBER 7: CASE HISTORY

| DATE | OCCUPATIONAL HISTORY | PROBABLE ASBESTOS EXPOSURE | CLINICAL HISTORY |
|---|---|---|---|
| 1942-52 | PC&I at PSNS | unknown | X-ray: negative |
| 1952-60 | PC&I maintenance work, apartment houses | intermittent, less than 5 mppcf * | |
| 1960 | PC&I at PSNS | less than 5 mppcf | X-ray: negative |
| 1961 | PC&I at PSNS | less than 5 mppcf | Pulmonary abnormalities 1st noted in X-ray |
| 1967 | disability retirement | | Asbestos found in lung during surgery |
| 1967 | compensation awarded for disability due to asbestosis | | |

* 5 mppcf is the current recommended threshold limit value for asbestos

TABLE III

August 1968

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DISTRIBUTION OF LUNG ABNORMALITIES
AMONG PIPE COVERERS AND INSULATORS

| YEARS AT PSNS | NUMBER OF WORKERS | MEDIAN AGE | INCIDENCE OF DIAGNOSED PULMONARY FIBROSIS OR OTHER ABNORMAL X-RAY FINDINGS | | |
|---|---|---|---|---|---|
| | | | NUMBER WITH PULMONARY CHANGES | PERCENT OF INCIDENCE BY GROUP | PERCENT OF INCIDENCE BY TOTAL PC&I WORK FORCE |
| 0-5 | 25 | 37 | 2 | 8% | 2% |
| 6-10 | 28 | 47 | 5 | 18% | 5% |
| 11-15 | 11 | 43 | 1 | 9% | 1% |
| 16-20 | 20 | 48 | 4 | 20% | 4% |
| 21-25 | 7 | 51 | 4 | 57% | 4% |
| 25+ | 7 | 56 | 6 | 90% | 6% |

AGGREGATE = 21.6%

TABLE IV

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MT-PMHD-009931

## INSULATION MATERIAL AND USE

AMOSITE

Use: Piping, fittings, machinery units and large or irregular surfaces

| Composition: | Long fiber asbestos | 95% |
|---|---|---|

MAGNESIA BLOCK INSULATION

Use: Tanks, boilers, valves and pipes

| Composition: | Magnesium Carbonate | 85% |
|---|---|---|
| | Long fiber asbestos | 15% |

ASBESTOS CEMENT

Use: Finishing and insulating, used over bare metals or insulation and as a filler

Composition:

Johns-Manville #301

| | |
|---|---|
| Asbestos (Crysotile) | 15% |
| Portland Cement | 17% |
| Clay | 33% |
| Mineral wool | 20% |
| Diatomaceous earth | 15% |

One-Cote

| | |
|---|---|
| Nodulated fiber and Asbestos (Crysotile) - | less than 50% |
| Portland Cement | less than 30% |
| Diatomaceous earth | less than 20% |
| Clay | less than 30% |
| Calcium sulfate or nitrate | less than 5% |
| Organics | trace |

TABLE V

August 1968

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UNIBESTOS

Use: Piping up to 30 inches in diameter, very little is used at this time

Composition: Finely ground asbestos fiber

Waterproof adhesive

ASBESTOS CLOTH

Use: Final coat or lagging on piping, valves, tanks, fittings, and machinery installations

Composition: There are three weights ranging from 1.25 to 2.4 lbs/sq. yd.

80% to 95% Crysotile or Amosite asbestos fiber with cotton fiber

FIBERGLASS

Use: Many types such as batts, sheets, molded pieces and felt are available for different applications such as vent ducts, piping and valves

Composition: Fibrous glass with binder

CORK

Use: Refrigeration and air conditioning piping

Composition: Vegetable product

RUBBER

Use: Refrigeration and air conditioning piping, replaces cork in most applications

Composition: Foam rubber



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AVERAGE TIME-WEIGHTED EXPOSURE TO INSULATION MATERIALS *

| OPERATION AND MATERIAL | PERCENT OF TIME EXPOSED NEW SHIP CONSTRUCTION | SHIP OVERHAUL |
|---|---|---|
| **Installation** | | |
| Amosite installation | 10% | 11% |
| Magnesia block insulation cutting and installing | 39% | 35% |
| Asbestos Cloth cutting, glueing and fitting | 20% | 15% |
| Asbestos Cement mixing | 1% | 1% |
| Fiberglass, Rubber, and Cork | 30% | 13% |
| **Rip-Out** | | |
| Amosite | | 4% |
| Magnesia block insulation, Amosite, and Unibestos | | 17% |
| Fiberglass, Rubber, and Cork | | 5% |
| **Prefabrication in Shop** | **Percent of Time Exposed** | |
| Magnesia block insulation, Amosite and Asbestos Cloth | 50% | |
| Fiberglass, Rubber, and Cork | 25% | |

* Based on 6 hour work day.

TABLE VI

August 1968

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MT-PWHD-009934

NEW SHIP CONSTRUCTION

| Material and Operation | Airborne Dust Concentration in Breathing Zone (Million Particles per Cubic Foot) | | Percent of Time Exposed (Average) Based on a 6 hour day |
|---|---|---|---|
| | Range | Average | |
| Amosite: Installation | 2.6 to 8.9 | 5.6 | 10% |
| Magnesia block insulation: cutting and installing | 2.4 to 13.3 | 6.1 | 39% |
| Asbestos cloth: cutting, glueing and fitting | 3.1 to 4.6 | 3.6 | 20% |
| Mixing asbestos cement | 11.5 to 82.8 | 47.5 | 1% or less |
| Fiberglass, rubber and cork | --- | --- | 30% |

TABLE VII

August 1968

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MT-PWHD 00026

SHIP OVERHAUL

| Material and Operation | Airborne Dust concentration in Breathing Zone (Million Particles per Cubic Foot) Range | Average | Percent of Time Exposed (Average) Based on a 6 hour day |
|---|---|---|---|
| INSTALLATION | | | |
| Asbestos cloth; cutting, glueing and fitting | 2.8 to 5.7 | 4.3 | 15% |
| Magnesia block insulation: cutting and installing | 3.5 to 40.5 | 16.7 | 35% |
| Amosite | 2.6 to 8.9 | 4.5 | 11% |
| Fiberglass, rubber and cork | --- | --- | 13% |
| RIPOUT | | | |
| Amosite | 1.0 to 7.7 | 4.4 | 4% |
| Magnesia block insulation and asbestos cloth | 2.6 to 6.8 | 5.0 | 17% |
| Asbestos cloth and unibestos | 2.8 to 17.4 | 6.7 | 17% |
| Fiberglass, rubber | | --- | 5% |

TABLE VIII

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MT PKWD 000000

PREFABRICATION IN SHOP

| Material and Operation | Airborne Dust Concentration in Breathing Zone (Million Particles per Cubic Foot) | | Percent of Time Exposed (Average) Based on a 6 hour day |
|---|---|---|---|
| | Range | Average | |
| Magnesia block insulation | 1.1 to 1.3 | 1.2 (cutting)<br>.32 (glueing) | 67% |
| Amosite | | 2.4 (cutting) | |
| Asbestos cloth | .39 to .41<br>.07 to .1<br>.1 to .15 | .4 (sewing)<br>.09 (glueing)<br>.13 (pinning and marking) | |
| Fiberglass, rubber and cork | --- | --- | 33% |

TABLE IX

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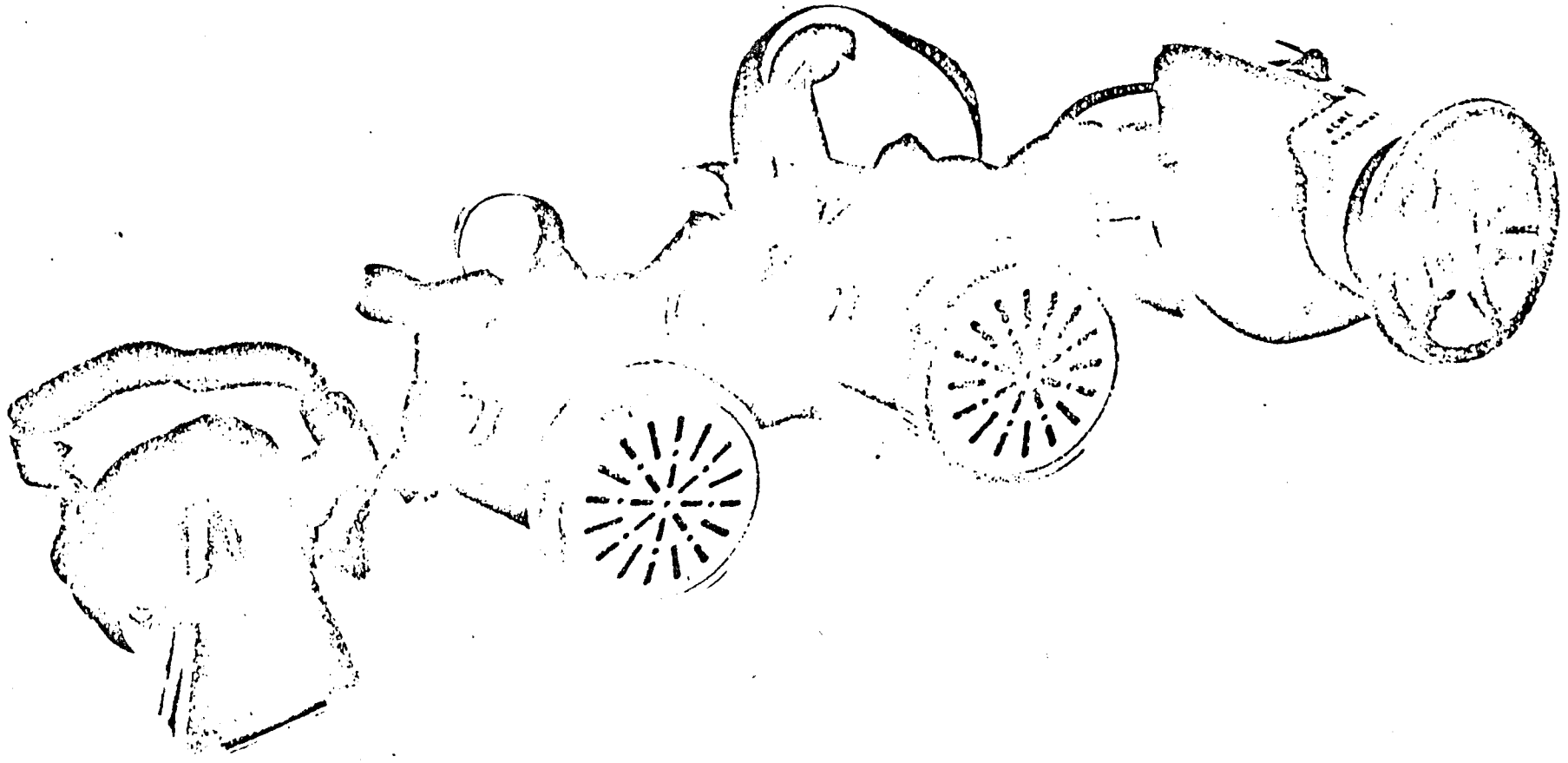

Figure 2. U.S. Bureau of Mines approved dust respirators specified for PC&I workers. Left to right: MSA Dustfoe 66; American Optical R3030; Safeline #5441; Acme "Duo-Seal" #8101R.

MT-PWHD-009938

C. VENTILATION CONTROL

The high mobility of asbestos workers aboard ship and the non-uniformity of handling, installation, or rip-out of asbestos material presents unusual ventilation problems. Local exhaust ventilation (most often a 3" or 5" diameter flexible sucker) must be used in conjunction with general ventilation to be effective. The local exhaust ventilation applied to the source of dust production is ideal, but in practice workmen find such ventilation bothersome, do not properly place it, or objects worked on are too large for effective control. General ventilation requires large volumes of air to maintain dust counts at acceptable levels in compartments where asbestos handling is done.

Ideally, the dust should be captured at the source of generation by local exhaust ventilation. General ventilation should remove and prevent build-up of dust escaping the local exhaust ventilation.

There seems to be a practical limit to the local exhaust and general ventilation available to pipe coverers and insulators. During periods of high levels of dust, ventilation techniques customarily used do not adequately keep airborne dust levels in acceptable ranges. Rip-out of old asbestos materials aboard ship is cited as a classic example.

Enclosures around dusty operations have not gained wide acceptance, but hold promise as a good control method for especially dusty asbestos operations. Portable polyethylene enclosures set up around the operations limit the spread of the dust to the rest of the ship's compartments. When such enclosures include local exhaust ventilation, capture of asbestos dust is effective. The enclosures in current use, range from plastic sheet to form one side of a hood and capture debris, to reasonably tight containments as the situation requires.

The photographs display some additional methods of applying ventilation principles to control asbestos dust generated in the work environment.



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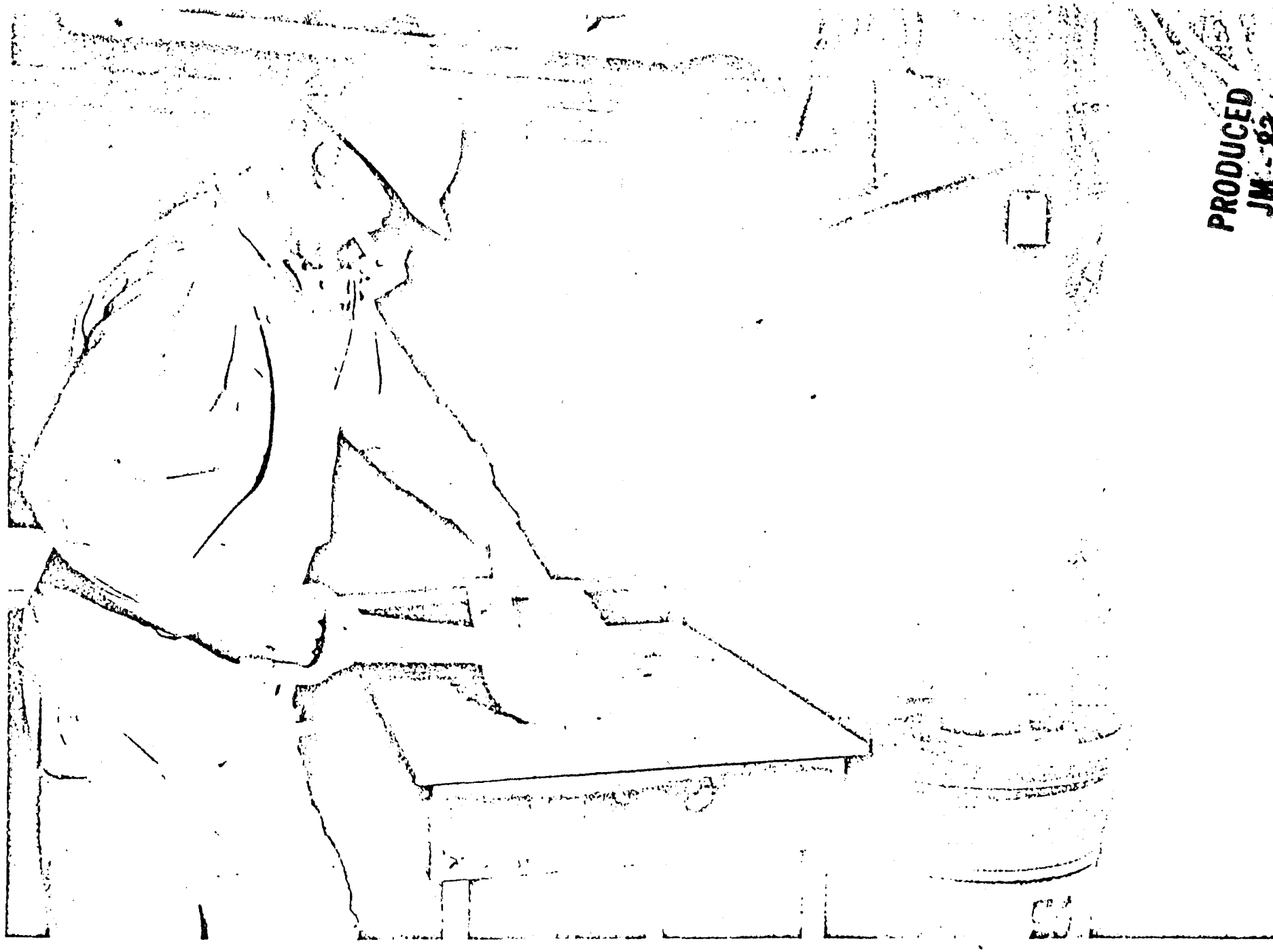


Figure 3. A portable downdraft table attached to a portable vacuum unit. The major portion of the saw cuttings are captured.

MT-PWHD-009940

# ASBESTOS EXPOSURE and CONTROL

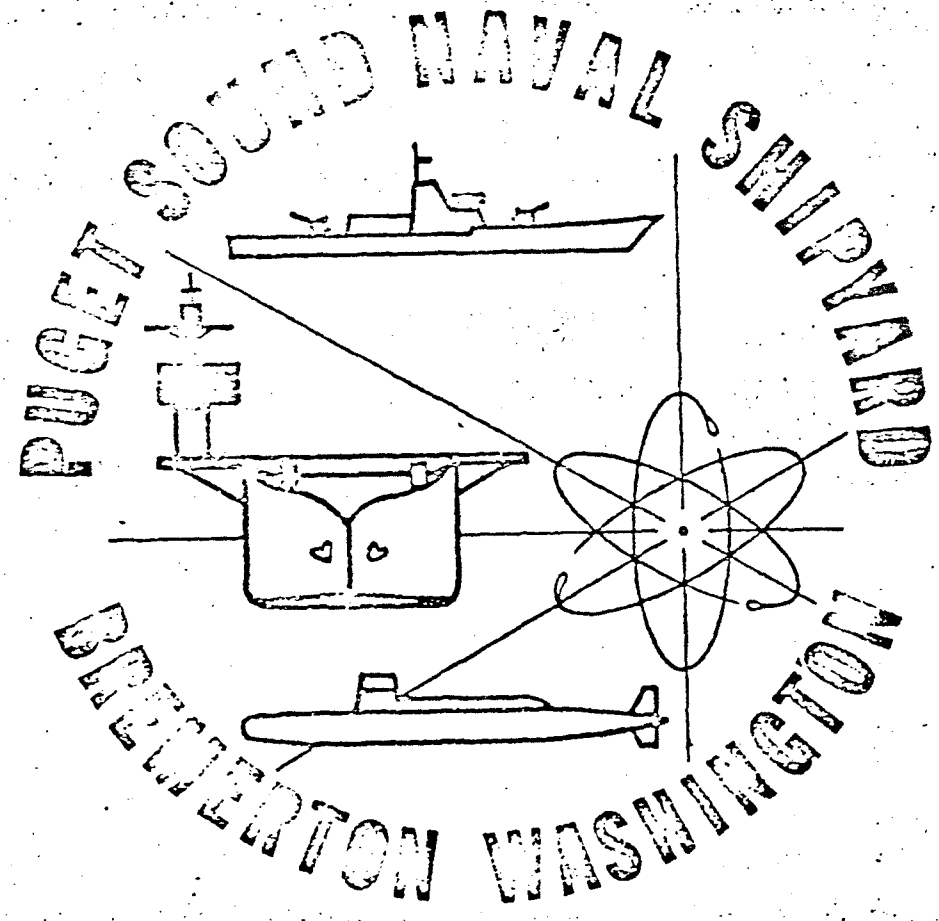


EXHIBIT # A
WITNESS # D. J. Bassmer
Pete S. Hunt, Reporter
DATE: 1-7-20

EXHIBIT NO. 2
Date 6-10-82 Case No. Bassmer
Id ____ Adm ____ Rej ____
Eileen L. Berg, N.P.
(206) 282-8545

13ND NAVSHIPYDBREM P6260(1) (Rev. 11-70)

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REVIEWED AND APPROVED March 1970

W. F. PETROVIC
Rear Admiral, USN
Commander

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MT-PWHD-009942

## A PREFACE

The complexity of the field of occupational health is ever increasing. In addition to the newer and more exotic health hazards, the older, more prosaic health hazards have a way of suddenly acquiring new dimensions with attendant re-emphasis on evaluation and control. The long-known hazard of asbestosis is one of the latter. Recent publicity has focused attention on the health-endangering proclivities of asbestos, particularly in the pipe covering and insulating trades.

E. W. McBRATNEY, M.D.
Medical Director

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# ASBESTOS EXPOSURE AND CONTROL AT PUGET SOUND NAVAL SHIPYARD

INDUSTRIAL HYGIENE DIVISION
MEDICAL DEPARTMENT
PUGET SOUND NAVAL SHIPYARD

C. A. MANGOLD, R. R. BECKETT, D. J. BESSMER

March 1970

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MT-PWHD-009944

DEPARTMENT OF THE NAVY
BUREAU OF MEDICINE AND SURGERY
WASHINGTON, D.C 20390

IN REPLY REFER TO
BUMED-732-SHB:snp
13 October 1969

From: Chief, Bureau of Medicine and Surgery
To: Commander, Puget Sound, Naval Shipyard, Bremerton, Washington 98314

Subj: Asbestos Control Measures at the Puget Sound Naval Shipyard

1. During a recent visit of LCDR S. H. Barboo, MSC, USN of the Industrial Hygiene and Safety Branch of this Bureau, it was favorably noted that the Puget Sound Naval Shipyard is conducting an excellent program for the control of asbestos dust exposures among Shipyard workers.

2. It is requested that approximately twelve large photographs of shop and ship asbestos dust control measures be furnished this Bureau for display purposes. The captioned photographs should be accompanied with a description of the exposure hazard and a narrative method of the control measures.

R. E. Faucett

R. E. Faucett
Assistant Chief for Research
and Military Medical Specialties

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MT-PWHD-009945

DEPARTMENT OF THE NAVY
BUREAU OF MEDICINE AND SURGERY
WASHINGTON, D.C. 20390

IN REPLY REFER TO
BUMED-732-SHB:snp
10 December 1969

Mr. D. J. Bessmer
Head, Industrial Hygiene Division (Code 730)
Puget Sound Naval Shipyard
Bremerton, Washington 98314

Dear Dan:

I want to send you my special thanks for the eleven photographs of the asbestos control measures. They are now on grand display in our lobby of Building 7 of the Bureau of Medicine and Surgery.

Last week, while on a visit to the Pearl Harbor Naval Shipyard, I discussed your excellent asbestos control program with the Commanding Officer, Captain Barnhardt. I suggested that a member of the Industrial Hygiene Division and a member of the lagging shop visit your shipyard for the purposes of observing shop and shipboard control measures.

In the event that the Navy Industrial Hygiene Association offers papers on various aspects of Navy Industrial Hygiene, I think it would be well that Carl Mangold deliver a paper regarding asbestos control measures at Detroit in 1970.

Again, thanks for the photographs, and advise if I may retain them.

Sincerely,

Sam

S. H. BARBOO
LCDR, MSC, USN
Head, Industrial Hygiene and
Safety Branch

Copy to:
Alex Munton, PoNSY

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MT-PWHD-009946

The opinions expressed in this report are those of the authors and do not necessarily reflect those of the Department of the Navy, the Department of Defense, or any other official agency. Reference to a company or a product name does not imply approval or recommendation of the product to the exclusion of others that may be suitable.

Portions of this report were presented at the annual meeting of the Pacific Northwest Section of the American Industrial Hygiene Association at Richland, Washington on October 3 - 4, 1968.

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MT-PWHD-009947

ABSTRACT

A two and one-half year comparison of chest X-ray findings in the total work force of Puget Sound Naval Shipyard shows that 21% of the Pipe Coverers and Insulators handling asbestos have pulmonary abnormalities compared to 3.5% of the Boilermakers who have some exposure to asbestos and silica, and less than 1% of the Clerical workers with no known exposure to industrial dusts. Pulmonary abnormalities have remained high although evaluation of the asbestos dust exposure of Pipe Coverers and Insulators shows their time weighted exposures are below the current Threshold Limit Value of 5 million particles per cubic foot of air. The Threshold Limit Value may be too high and intermittent peak exposures may play a greater role than suspected. A number of engineering control methods and changes in work practices are suggested to reduce asbestos exposure.

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MT-PWHD-009948

CONTENTS

PART I CLINICAL & ENVIRONMENTAL FINDINGS

A. Introduction

B. Comparative Chest X-ray Study

C. Environmental Evaluations

D. Discussion

E. Conclusions and Summary

F. References

G. Tables and Figures

PART II CONTROL METHODS

A. Introduction

B. Respirators and Protective Clothing

C. Ventilation Controls

D. Substitution of Materials

E. Change of Work Practices

F. Educational

G. Summary

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# PART I

# CLINICAL
# AND
# ENVIRONMENTAL
# FINDINGS

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## A. INTRODUCTION

The relationship between lung disease and exposure to asbestos dust has been known for many years. Numerous authors have described many cases of asbestosis among insulation workers with regular exposure to asbestos or asbestos containing materials(1,2,3).

In 1946, Fleisher(5) found three cases of asbestosis among insulation workers in east coast Navy yards, but since each of the three individuals had worked more than 20 years in the trade and asbestos dust levels were below the Threshold Limit Value, it was concluded that pipe covering was not a hazardous trade. This conclusion was accepted at face value for many years because air samples generally showed asbestos dust counts to be near or below the Threshold Limit Value of 5 mppcf(4), but this study evaluated only ship construction, or asbestos installation which produces less airborne asbestos dust than ripout. During the early 1950's when considerable ship modernization was being done in Naval Shipyards, extensive exposure to dust from ripped out asbestos took place. Marr(6) in 1964, evaluated the asbestos exposure to installation workers during ship overhaul (rip out and installation of asbestos materials), and concluded that shipboard pipe covering and insulating was a hazardous trade. Unfortunately, Marr's dust samples were collected with a Bausch & Lomb counter, and therefore the dust levels are not directly comparable to those used in establishing the Threshold Limit Value.

In general, current literature(7,8,9,10,11) indicates that asbestos dust is hazardous to health; that the Threshold Limit Value of 5 mppcf in air is too high; that the effects of asbestos dust exposure are chronic; and that better controls are necessary.

## B. COMPARATIVE CHEST X-RAY STUDY

A Naval shipyard encompasses a variety of industrial operations and provides a reasonably large population with a multiplicity of exposures for study. Puget Sound Naval Shipyard's occupational health program includes semiannual 14x17 inch chest x-rays on individuals involved in potentially lung-hazardous duties. In addition, a voluntary program of annual 70 mm chest x-rays includes almost all other personnel. Complete medical records are available for all employees. Prompted by Marr's work, in July 1965 a study was initiated to compare the incidence of lung abnormalities among various occupational groups in the Shipyard.



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The study covered a two and one-half year period during which statistical analyses were made of all positive x-ray findings likely related to occupational causes. Specific diagnosis and degree of lung damage were not considered. However, the majority of the positive findings were classified by qualified physicians as pulmonary fibrosis. Results of this study are shown in Table I.

It is clear that pipe coverers and insulators and their closely associated work group, the boilermakers, have a significantly higher incidence of pulmonary abnormalities than other trade groups. Specifically, further attention was focused on the pipe coverers and insulators because of their exceptionally high rate of positive chest x-rays.

Table II shows the incidence of positive x-ray findings in pipe coverers and insulators by median age and years employed in the Shipyard. The apparent anomaly of higher median age and higher percent of positive x-ray findings in the 6-10 year employment group is due to a number of workers hired with previous employment and exposure to asbestos. A very high incidence of positive lung findings in pipe coverers and insulators with over 20 years exposure is noted. Balzer reports(13) a 25% incidence of asbestosis in insulators exposed 20 or more years.

The work histories of the 22 men with positive x-ray findings were reviewed to determine the lapsed time between first known exposure to asbestosis and first observed x-ray changes. These data are presented in Table III.

It is probable that very short intervals between first exposure and observed chest x-ray findings indicate causes other than an occupational exposure to asbestos. Case number 7 was the only diagnosed case of asbestosis. This was confirmed by chest surgery. He was retired for disability and received compensation at a rate of three-fourths pay for the rest of his life.

C. ENVIRONMENTAL EVALUATIONS

The impinger has been used as a sampling device for asbestos dust at this Shipyard since the early 1940's, although it has some recognized limitations such as low collection efficiency. Accordingly, the midget impinger was chosen for this study so that data collected would be comparable to previous data and also comparable with the current Threshold Limit Value. The Threshold Limit Value was established on data collected by the Standard Procedure for Sampling and Counting Dust, adopted by the 5th annual meeting of the National Conference of Governmental Industrial Hygienists in 1942(14), which specifies impinger collection and light field microscopic counting methods.



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The insulation materials described in Table IV are commonly used by most insulators at this Shipyard. The amosite and crysotile asbestos products are similar to those used by employees in other studies[6,12,13].

Airborne asbestos dust samples were collected aboard several ships of various sizes, ranging from destroyers to aircraft carriers, and in the shop complex. The dust sample data represents that dust found in an insulator's breathing zone. The results are summarized in Tables V, VI, and VII together with an estimate of the time spent on each type of operation. This estimate is for extended work periods as workers are assigned specific jobs which may take a few days or several months to complete.

Particle size distributions were determined for 20% of the samples counted. The geometric mean diameter did not exceed 2.3 microns for any sample. Many asbestos fibers were below the resolution limit of the light field microscope[11]. As was expected, the number of fibers in the sample was related to the type of material, fiber content and method of sampling.

Observation of work patterns indicates that most exposures occur during intermittent peak dust levels throughout the day. Figure 1 shows a time-exposure pattern for a typical operation.

## D. DISCUSSION

Lung changes are the possible effects of many factors which are not shown by our data. For example, knowledge of the smoking status of personnel would be of interest, as would positive diagnoses of the chest x-ray findings. However, we feel that these data show without doubt that we do have a problem with asbestos. The percentage of pipe coverers and insulators having positive x-ray findings are compared to other occupational groups is too outstanding to be without meaning, in spite of other possible contributing factors. Claims for compensation for asbestosis which have been paid after thorough investigation tend to confirm this concept. The data also show, as would be expected, that the number of positive findings increases with age and length of exposure.

The data presented in Tables V, VI, and VII indicate that the controls established at this Shipyard have been adequate to maintain asbestos dust exposures below the Threshold Limit Value, giving consideration to time weighting and asbestos content of materials. In most cases, the exposures have been below the proposed lowered Threshold Limit Value of two million particles per cubic foot of air[16]. In spite of this, pipe coverers and insulators display a high incidence of



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pulmonary abnormalties detectable by X-ray even though most cases are not specifically diagnosed as asbestosis, but more often as pulmonary fibrosis, probably because diagnosis of asbestosis in the early stages is difficult.

Figure 1 shows that peak exposures considerably above the Threshold Limit Value frequently occur during the work day of a pipe coverer and insulator. It is reasonable that these peak exposures could be responsible for lung damage, even though the time-weighted exposure is within what has been considered to be safe limits. If the rate of lung clearance is less than the rate of arrival of dust, the rate of accumulation increases[15].

## E. CONCLUSIONS AND SUMMARY

A two and one-half year comparison of the chest X-ray findings of the working population of a Naval shipyard shows that about 21% of all the pipe coverers and insulators have positive X-ray findings compared to 3.5% for the boilermakers and about 1% or less for other occupations with no known asbestos exposure. A very high incidence of positive lung finding in pipe coverers and insulators with over 20 years exposure is evident.

Exposures depend on work habits, asbestos content of materials, type of job, and protection used. Considering time weighting factors and asbestos content of materials, pipe coverers and insulators received exposures below current and proposed Threshold Limit Values for asbestos dust. Peak exposures during the work day often exceeded Threshold Limit Values up to ten times.

The high incidence of pulmonary changes may be explained by:

a. Intermittent peak exposures which are of more importance than formerly recognized, based on the knowledge of lung loading characteristics.

b. Threshold Limit Values which are too high;

c. Methods of assessing exposures may not reflect the true airborne concentration of asbestos dust.

In general, workers handling, sawing, cutting or ripping-out asbestos materials produce considerable amounts of very fine asbestos fibers and particles in their breathing zone. The larger particles fall rapidly, but the tiny unseen particles between 0.1 and 100 microns average diameter remain suspended for hours. Particles of this size range enter the lung easily, and are trapped, where they provoke an



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irritating and inflammatory reaction. The disabling pneumonoconiosis, asbestosis, is caused by prolonged exposure to fine asbestos dust. The amount of pulmonary fibrosis is proportional to the amount of dust breathed daily and the years of exposure. Exposure to low concentrations of asbestos dust does not necessarily imply that asbestosis will develop, so that careful control of the environment will reduce the probability of serious pulmonary effects.

The Threshold Limit Value refers to the airborne concentration of asbestos fiber or dust and represents conditions under which workers may be exposed daily without adverse effect, based on an eight-hour day and pathological evidence.

The TLV of 5 million particles per cubic foot of air was proposed in 1938, and adopted in 1942 by the American Conference of Governmental Industrial Hygienists, along with the impinger collection and light field microscopy techniques for evaluation. This value has remained until about 1968, a period of almost 30 years, until epidemiological evidence showed that perhaps the TLV was too high.

The notice of intended changes of the TLV's published in 1969 recommends lowering the allowable airborne concentration to 2 million particles per cubic foot counted by light field microscopy, or 12 fibers greater than 5 microns in length per milliliter of air when counted on filter membranes at 430X phase contrast magnification. Revisions under consideration by the American Conference of Governmental Industrial Hygienists would lower the TLV for asbestos to 5 fibers greater than 5 microns in length, per milliliter of air.

Recent studies compiled by the Bureau of Occupational Health and Safety, U.S. Department of Health, Education and Welfare, suggest that 20% of all deaths of asbestos workers is due to lung cancer, which is 7 times the expected rate in a normal population. Other researchers have suggested that cigarette smoking roughly doubles the risk of cancer in this work group.

The evidence in Part I of this report and the work of other researchers suggests that the Threshold Limit of 5 mppcf is too high, and supports lowering the values.

Lowering the TLV, and reduction of exposures of PC&I workers will require a sustained, detailed program of control. Otherwise, the threat of pulmonary abnormalities and asbestosis will remain high. The success will largely depend on how well the control measures suggested in Part II are applied.



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G. TABLES AND FIGURES


| | |
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| TABLE II | Incidence of Positive Chest X-ray Findings in Pipe Coverers & Insulators Versus Years of Employment in Shipyard |
| TABLE III | Work History of Pipe Coverers & Insulators With Positive Chest X-ray Findings |
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| TABLE VII | Airborne Dust - New Ship Construction |
| FIGURE 1 | Peak Exposure Pattern from Sawing and Handling Preformed Magnesia Block |




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TABLE I

INCIDENCE OF POSITIVE CHEST X-RAY FINDINGS IN OCCUPATIONAL GROUPS

| Occupational Group | No. of Persons In Group | No. With Pos. X-Ray Findings | Percent Having Pos. X-Ray Findings |
|---|---|---|---|
| Shipfitters | 890 | 6 | 0.7 |
| Sheetmetal Workers | 489 | 6 | 1.2 |
| Forge Workers | 32 | 0 | 0.0 |
| Welders | 998 | 11 | 1.1 |
| Machinists | 536 | 1 | 0.2 |
| Marine Machinists | 490 | 0 | 0.0 |
| Boilermakers | 115 | 4 | 3.5 |
| Electricians | 574 | 0 | 0.0 |
| Pipe Coverers & Insulators | 104 | 22 | 21.2 |
| Pipefitters | 765 | 6 | 0.8 |
| Shipwrights & Joiners | 228 | 0 | 0.0 |
| Electronics Mechanics | 280 | 0 | 0.0 |
| Painters | 263 | 4 | 1.5 |
| Riggers | 664 | 1 | 0.1 |
| Temporary Service Mechanics | 143 | 1 | 0.7 |
| Clerical Workers | 420 | 1 | 0.2 |

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TABLE II

INCIDENCE OF POSITIVE CHEST X-RAY FINDINGS IN PIPECOVERS & INSULATORS
VERSUS
YEARS OF EMPLOYMENT IN SHIPYARD

| Years Employed At Shipyard | Number Of Employees | Median Age | Number With Positive X-Rays | Percent Of Group | Percent Of Total Workers |
|---|---|---|---|---|---|
| 0-5 | 27 | 37 | 2 | 7 | 2 |
| 6-10 | 30 | 47 | 5 | 17 | 5 |
| 11-15 | 12 | 43 | 1 | 8 | 1 |
| 16-20 | 21 | 48 | 4 | 19 | 4 |
| 21-25 | 7 | 51 | 4 | 57 | 4 |
| 25+ | 7 | 56 | 6 | 86 | 6 |

The positive X-ray findings shown in Tables II and III reflect all reported abnormalities, and do not imply diagnosed asbestosis.

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TABLE III

WORK HISTORY OF PIPE COVERERS & INSULATORS WITH POSITIVE CHEST X-RAY FINDINGS

| Case No. | Age When Hired | Year Hired | Years PC&I At Other Activity | Years PC&I At Shipyard | Years Total Employment As P&I | Year Pos. Chest X-Ray First Recorded | Years Between First Exposure and First Positive X-Ray |
|---|---|---|---|---|---|---|---|
| 1 | 22 | 1933 | 0 | 33 | 33 | 1959 | 26 |
| 2 | 22 | 1933 | 0 | 33 | 33 | 1954 | 21 |
| 3 | 18 | 1936 | 0 | 30 | 30 | 1958 | 22 |
| 4 | 27 | 1939 | 0 | 27 | 27 | 1963 | 24 |
| 5 | 26 | 1941 | 0 | 25 | 25 | 1947 | 6 |
| 6 | 39 | 1941 | 0 | 25 | 25 | 1953 | 12 |
| 7 | 31 | 1942 | 8 | 17 | 25 | 1961 | 19 |
| 8 | 30 | 1944 | 2 | 22 | 24 | 1951 | 9 |
| 9 | 25 | 1945 | 0 | 21 | 21 | 1963 | 18 |
| 10 | 28 | 1947 | 0 | 20 | 20 | 1965 | 18 |
| 11 | 19 | 1947 | 0 | 20 | 20 | 1964 | 17 |
| 12 | 36 | 1951 | 2 | 15 | 17 | 1963 | 14 |
| 13 | 38 | 1952 | 0 | 14 | 14 | 1962 | 10 |
| 14 | 45 | 1952 | 2 | 14 | 16 | 1958 | 8 |
| 15 | 35 | 1953 | 5 | 13 | 18 | 1962 | 14 |
| 16 | 49 | 1960 | 3 | 6 | 9 | 1960 | 3 |
| 17 | 38 | 1958 | 2 | 8 | 10 | 1960 | 4 |
| 18 | 54 | 1961 | 6 | 5 | 11 | 1966 | 10 |
| 19 | 31 | 1961 | 0 | 5 | 5 | 1961 | 0 |
| 20 | 57 | 1961 | 10 | 5 | 15 | 1962 | 6 |
| 21 | 47 | 1963 | 0 | 3 | 3 | 1965 | 2 |
| 22 | 22 | 1965 | 0 | 1 | 1 | 1966 | 1 |

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TABLE IV

ASBESTOS INSULATION MATERIALS

| | |
|---|---|
| Amosite: 95% long fiber asbestos | Used on piping, fittings, machinery units and large or irregular surfaces. |
| Magnesia block: 15% asbestos, 85% magnesium carbonate | Used on tanks, boilers, valves, pipes |
| Asbestos cement: | Several brands in common use: Usually contains 10-25% asbestos fibers and less than 30% cement. Used as a smooth finish over cloth or metal. |
| Unibestos: | Fine asbestos fibers mixed with a waterproof adhesive. Used as a pipe insulation, very little installed at present. |
| Asbestos cloth: | 80-95% crysotile or amosite fibers with cotton. Used for a covering over amosite or magnesia block on valves, piping, tanks and fittings. |

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TABLE V

SHIP OVERHAUL

| Material and Operation | Airborne Dust Concentration In Breathing Zone (Million Particles per Cubic Foot) | | Percent of Time Exposed (Average) |
|---|---|---|---|
| | Range | Average | |
| INSTALLATION | | | |
| Asbestos cloth; cutting, fitting, glueing, and installing | 2.8-5.7 | 4.3 | 15% |
| Magnesia block; cutting, installing | 3.5-40.5 | 16.7 | 35% |

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TABLE VI

SHOP PREFABRICATION

| Material and Operation | Airborne Dust Concentration In Breathing Zone (Million Particles per Cubic Foot) | | Percent of Time Exposed (Average) |
|---|---|---|---|
| | Range | Average | |
| Magnesia block | 1.1-1.3 | 1.2 (cutting, glueing) | |
| Amosite | 0.4-4.7 | 2.4 (cutting, fitting, applying) | 67% |
| Asbestos cloth | 0.1-4.0 | 0.2 (cutting, fitting, sewing) | |
| Fibrous glass, rubber, cork | -- | - (cutting, fitting) | 33% |

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TABLE VII

NEW SHIP CONSTRUCTION

| Material and Operation | Breathing Zone Dust Concentration (mppcf) | | Estimated Average Percent Time Exposed |
|---|---|---|---|
| | Range | Average | |
| Amosite: Installation | 2.6-8.9 | 5.6 | 10% |
| Magnesia block: Cutting & installing | 2.4-13.3 | 6.1 | 39% |
| Asbestos cloth: Cutting, fitting, glueing | 3.1-4.6 | 3.6 | 20% |
| Asbestos cement: Mixing | 11.5-82.8 | 47.5 | 1% |
| Fibrous glass, rubber, cork: Cutting, fitting, installing | -- | -- | 30% |

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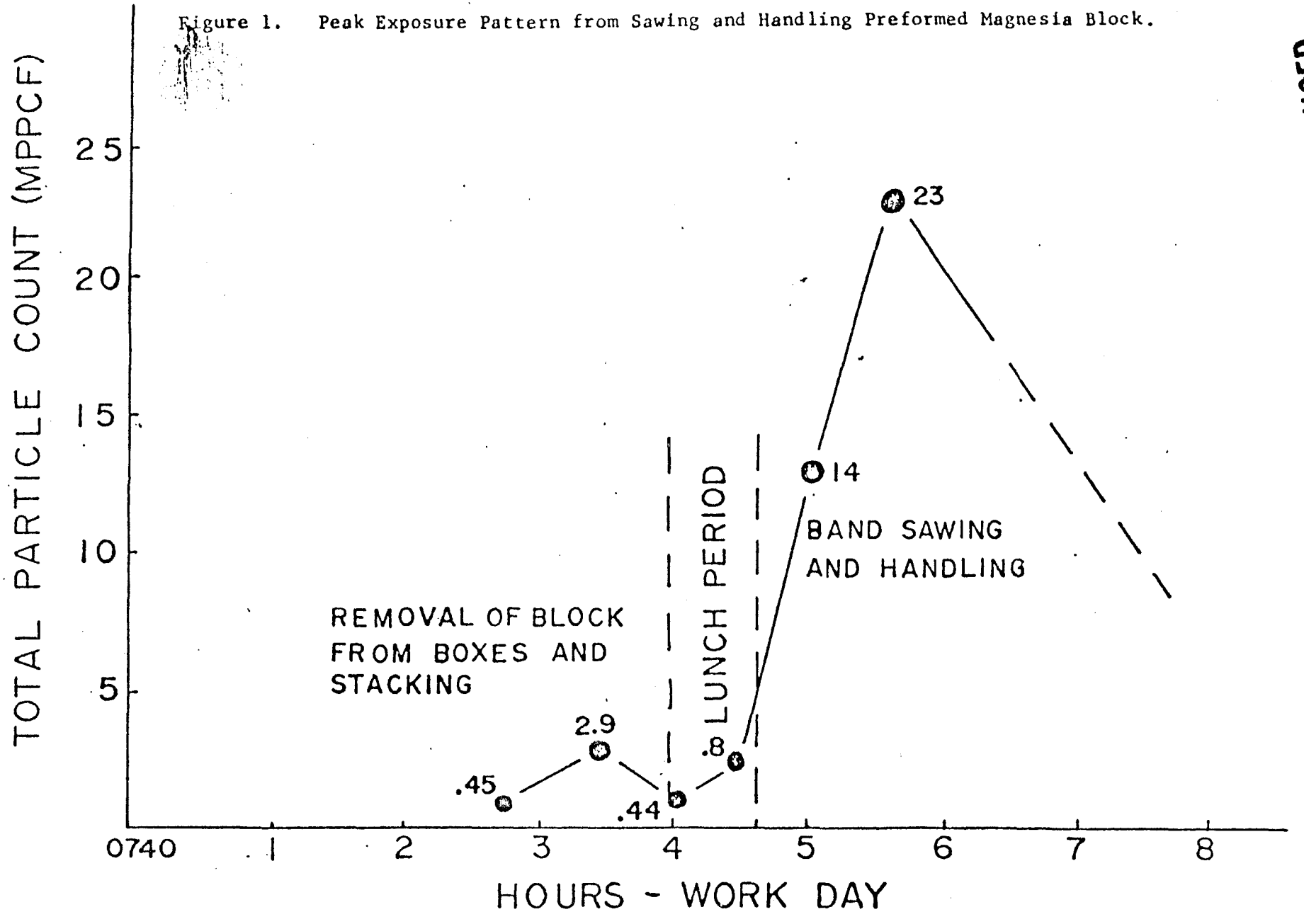
Figure 1. Peak Exposure Pattern from Sawing and Handling Preformed Magnesia Block.

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# PART II

## CONTROL METHODS

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## A. INTRODUCTION

Even though some exposures to asbestos have been reduced over the past 20 years, exposures still appear too high based on results of studies shown in Part I, and leave no doubt that occupational exposures to asbestos materials cause injury.

A four point program was drafted to further reduce exposures.

First, a respirator program was initiated to immediately reduce exposures until other control methods could be developed.

Secondly, the work practices were examined to identify the most hazardous operations and to suggest alternate methods. For example, wetting of amosite materials reduced the airborne asbestos dust production 50 to 60%. The change of work practices gave the greatest promise for the reduction of airborne asbestos dust as an immediate engineering control, with minimum expenditures.

Thirdly, engineering controls which have a far reaching effect, but take longer to initiate are: (1) substitution of materials, (2) new methods, and (3) techniques of ventilation control.

Fourth, an educational program was initiated to help workers understand the potential hazards and the reasons why a change in approach to the control of asbestos was needed. This educational program was based on a survey of pipe coverers and insulators that revealed much misunderstanding regarding asbestos exposure and its effects.

Part II presents some of the methods employed to reduce airborne asbestos exposures. While it is by no means complete, it represents the opinions of the authors that control must follow:

a. Adequate respiratory protection;

b. Change of work practices and handling methods;

c. Engineering controls such as ventilation;

d. An educational program to retrain workers to use less dusty methods;

e. Substitution of less hazardous materials.

The ultimate goal is to reduce the exposure level to a point where workmen are no longer affected.



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B. RESPIRATORS AND PROTECTIVE CLOTHING

Respirators were first issued to pipe coverers and insulators at PSNS early in the 1950's, and were required in 1960. The emphasis waxed and waned until about 1967 when the Industrial Hygiene Division began urging strict compliance based on epidemiological data which showed that asbestos was still a serious occupational health problem.

In January 1968, dust respirators were made mandatory because a survey showed that 76% of the insulators did not use a respirator. About 50% of all insulators did not have a respirator in their possession.

Poor face fit, breathing resistance, and comfort were given as reasons for non-compliance, although enforcement was lax.

A laboratory program was started to find respirators suitable for long periods of wear. Of the ten best dust respirators commercially available, four were selected that were U.S. Bureau of Mines approved and gave a good face fit, good visibility, and lowest breathing resistance. They were:

a. Mine Safety Appliance Company
   MSA Dustfoe 66 (#10-76869)
   Cushion Face Piece (#10-41501-N)
   Dustfoe 66 Filter (#10-73056)--- Box of 50

b. American Optical Company
   R-3030 Respirator with the R-30 "Red Devil" filter for dusts and mists.
   A/O Filter R-30

c. Safeline Respirator #5441
   Safeline Filters #5905

d. Acme "Duo-Seal" Dust Respirators #8101-R
   Dust Filter (Lambs wool) 8147 EW
   Filter Holder 5021-R

Some of the rejected respirators failed the simple tests when used on the job. The respirators now supplied are largely accepted by the workmen and provide effective filtration of at least 90% of the airborne particles and fibers that are of the size most often trapped by the lungs (1 to 100 microns in size).

Even though usage is not 100%, the insulators usually wear the respirators during peak dusty conditions. This, alone, effectively reduces the peak intermittent exposures thought to play a large role in the development of asbestosis.



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On 15 August 1969, a Naval Ship Systems Command Notice directed that protective coveralls would be worn by all employees engaged in shipboard rip-out of asbestos which produces high airborne dust levels. The coveralls were to be cleaned before each use in an attempt to limit personal clothing contamination. Coveralls were to be removed before removal of the respirator to limit exposure.

The Industrial Hygiene Division recommended disposable, plastic impregnated, paper coveralls with zippers, costing about $1.00 each, because they were cheap compared to procurement and laundry costs of cotton, twill, or duck coveralls. The plastic finish on the paper coveralls reduces the number of fiber penetrations and disposal of the garment aids dust control. In addition, packing, laundry, transportation, and re-distribution costs are eliminated. When the paper coveralls are taped at the sleeve and pant cuffs, the worker is essentially enclosed, yet the paper garments are permeable to air and do not trap body moisture.



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Figure 1. Insulator shown wearing an approved respirator and disposable paper coveralls. The canvas or plastic refuse bag is conveniently located.

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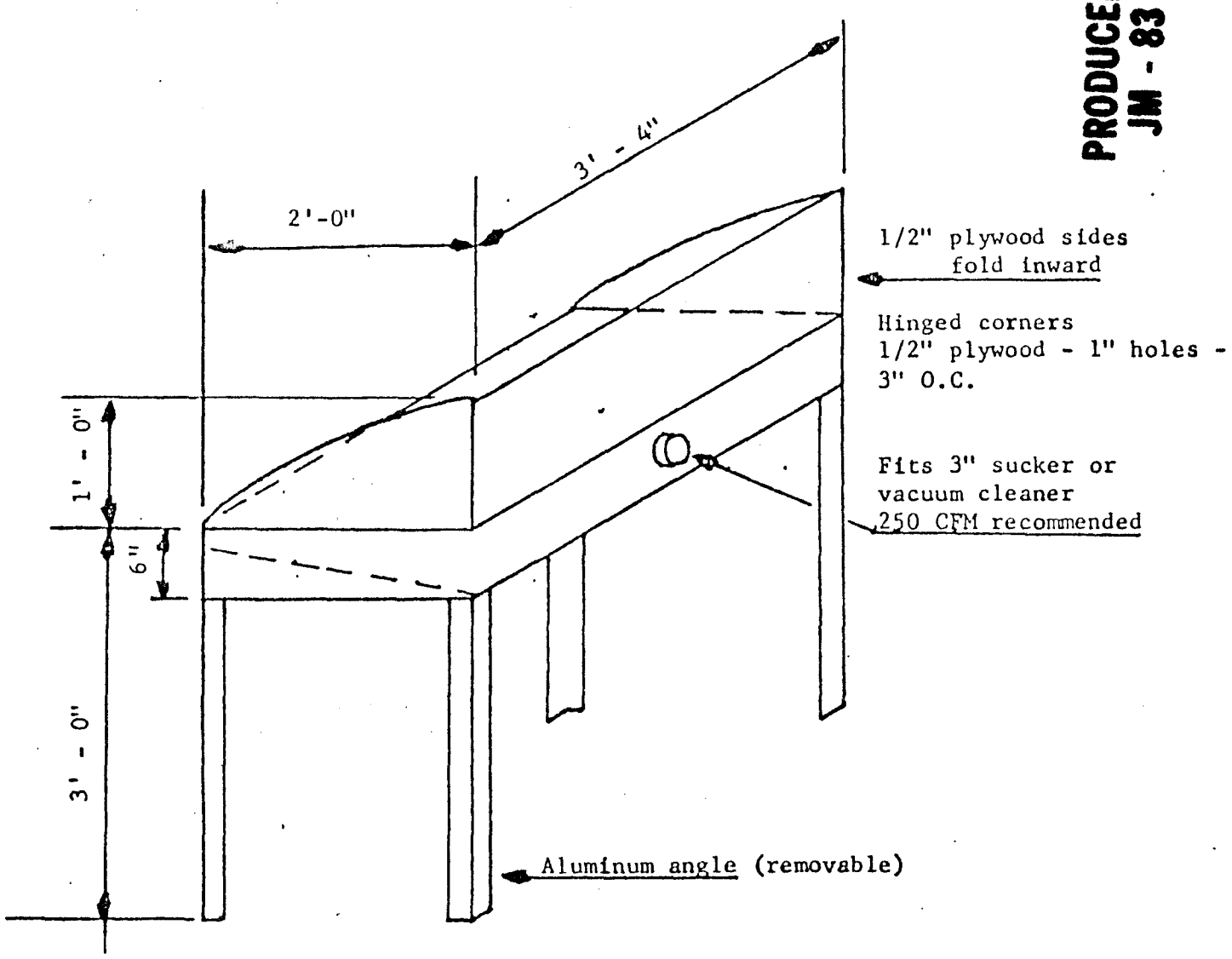


FIGURE 4. PORTABLE DOWN DRAFT CUTTING TABLE FOR TEMPORARY LOCATIONS.

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Figure 5. A "Torit" downdraft dust collector for shop use or where large amounts of material are used. This unit is not portable.

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Figure 6. A portable vacuum unit shown sucking up asbestos scraps. This method is preferred to sweeping.

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Figure 7. Local exhaust ventilation applied to sewing operations.

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D. SUBSTITUTION OF MATERIALS

One of the most direct methods of reducing asbestos dust exposure is the substitution of less hazardous materials.

Fiberglass products have been applied where asbestos materials have traditionally been used for insulation aboard ship. Fiberglass dusts are not presently known to produce an adverse physiological response in the lung. A magnesium or calcium carbonate rigid block material containing only 15% asbestos fibers is used for much of the piping. Only minimum exposure occurs unless the block material is sawed, broken, or ripped off.

Substitution is limited only by technical requirements, such as temperature range, and the willingness to change the design or specifications. Identifying, testing and applying new insulation materials takes considerable time. Therefore, changes in application and substitution are likely to appear gradually as technological advances occur.

For example, "Ceramic Foam," a new rigid insulation material, has been introduced by Dow Chemical Company in 1969. Ceramic foam is an entirely inorganic, closed cell, vitreous material that is incombustible and resistant to chemical attack. The material has a density of 8 lbs. per cu. ft.; heavier than plastic foams but having greater structural strength for piping, tanks, vessels, low temperature storage and block foam building insulation. The temperature range is from cryogenic to more than 1400°F., and is impervious to moisture.

In May 1968, the PSNS Pipe Shop requested planning and design branches to substitute other insulation material for asbestos products as a measure to reduce airborne asbestos dust exposure to tradesmen.

The Naval Supply Systems Command prohibited the use of asbestos materials for carton packing in 1969.

Such measures of substitution will eventually reduce the overall exposure to workmen.



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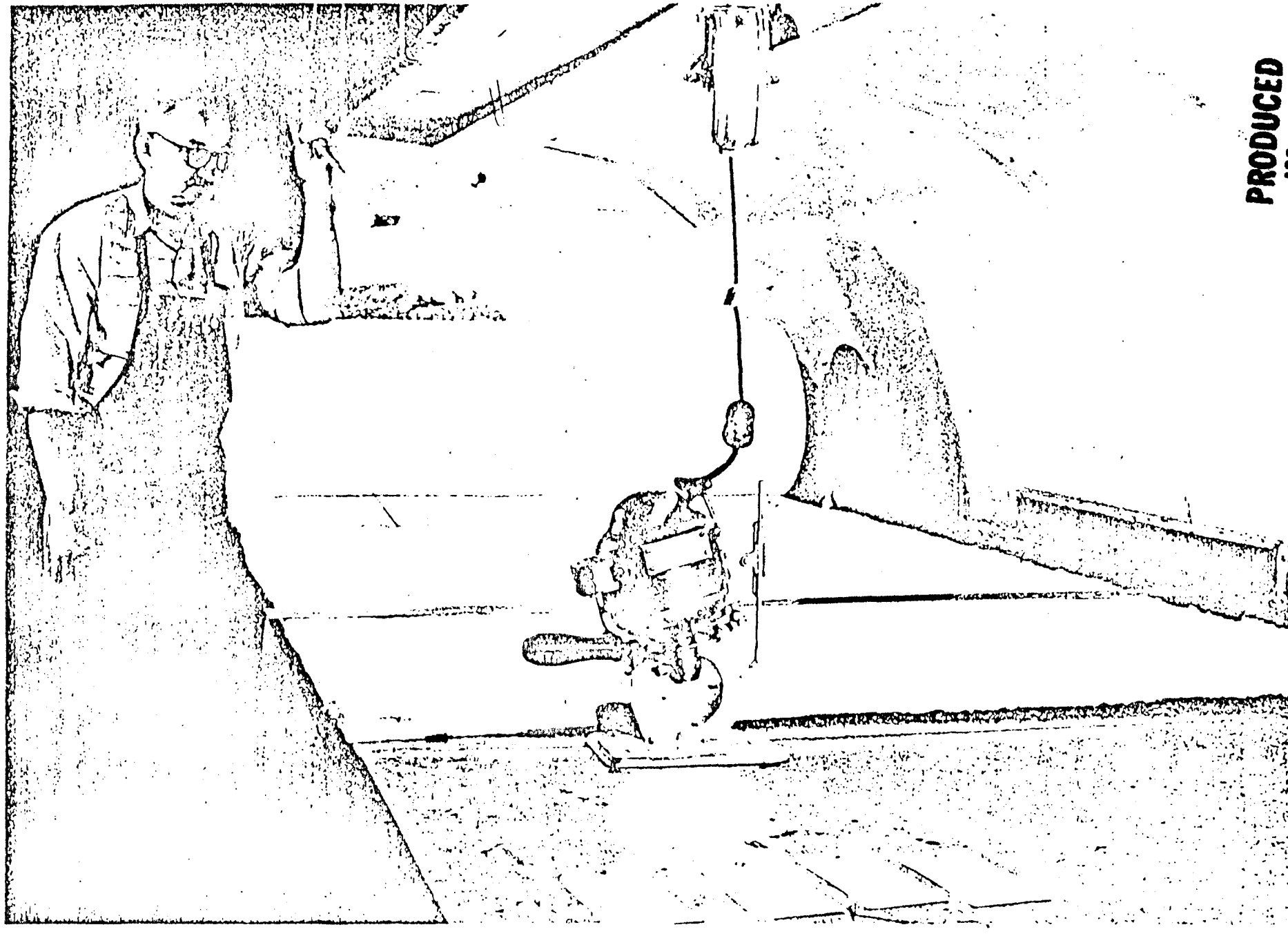


Figure 8. Substitution of fiberglass insulation for amosite (95% asbestos) substantially reduces asbestos exposures. Compare with Figure 9.

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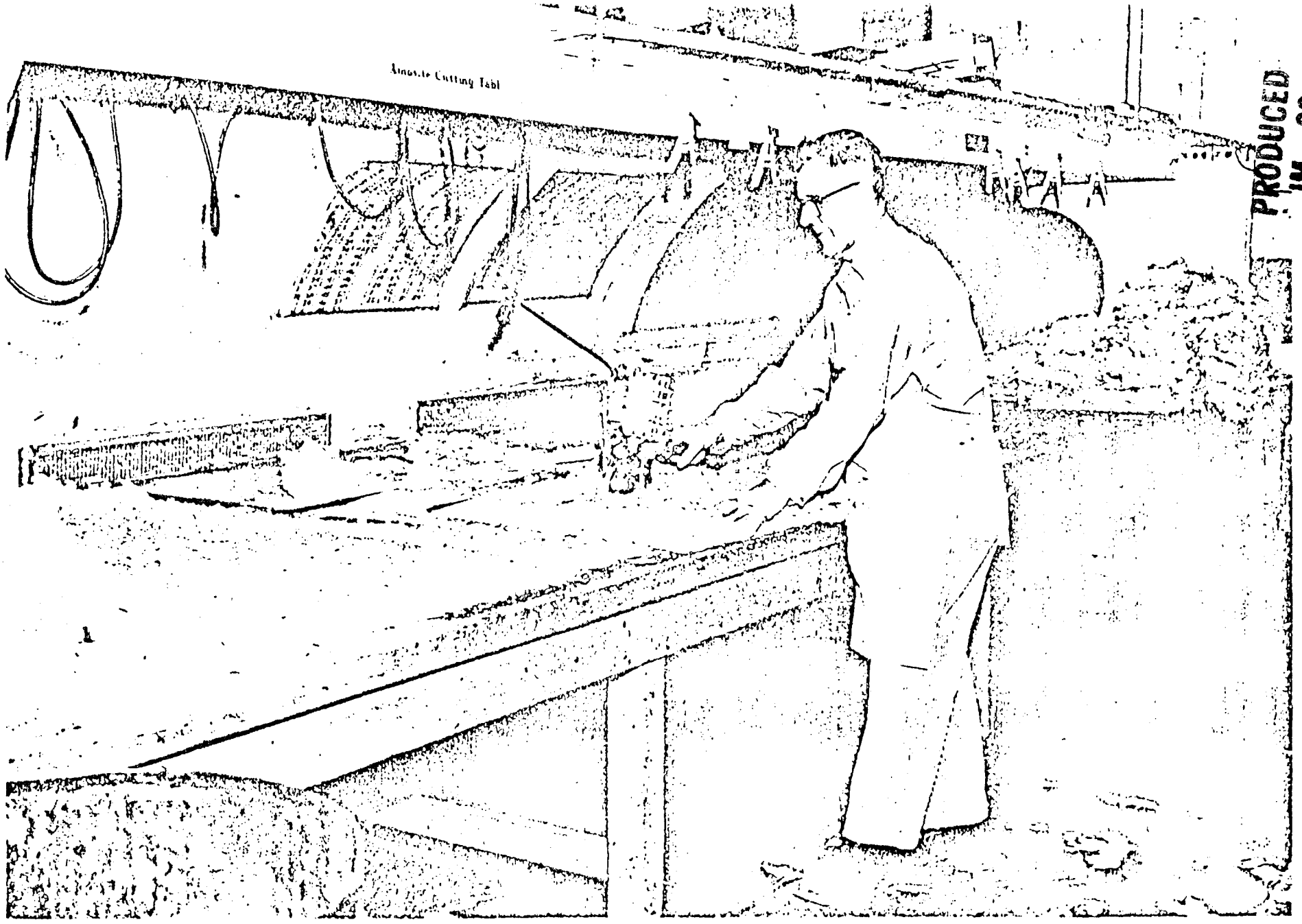


Figure 9. Amosite is a major source of airborne asbestos dust aboard ship, and in the shop.

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E. CHANGE OF WORK PRACTICES

Until asbestos substitutes are in full use, the most significant reductions in airborne asbestos dust can be accomplished by changes in work practices. The worker often applies the materials in a manner that leads to high concentrations of dust in the breathing zone regardless of ventilation supplied, location, or packaging. For example, one worker may carefully pre-wet the materials while another will not, yet pre-wetting is known to reduce airborne asbestos dust production from 50 to 60%. Such changes in work practices will largely depend on the identification of dusty processes, and development of new work methods. Education and training will allow the worker to accept a realistic role in his own health protection. For management, a careful review will show that asbestos dust reduction practices provide better control at little or no extra cost.

The change of work practices can be divided into several categories, each containing methods that do not require large expenditures, extensive engineering, or special ventilation technique.

(1) Pre-fabrication in shops and on the job site.

(a) Materials are removed from containers under ventilated conditions because this source produces much fine dust. Pre-wetting by dipping or spraying reduces dust levels.

(b) Dust collection systems are attached to power saws to capture dust at the point of generation.

(c) All machines or process tables have waste container systems to prevent the material from falling on the floor. Otherwise foot traffic would keep the dust dispersed for long periods.

(d) Wetting down asbestos material of any type reduces airborne dust production. If the materials are to be used later, a plastic bag will retain the moisture and contain any dust.

(e) Pre-fabrication of asbestos materials in the shop is done under adequately ventilated conditions. Such pre-fabrication in the shop saves time aboard ship, and reduces cutting by workers on the job. Pre-cut sections are packaged and identified in the shop and delivered directly to the job site. All of the pieces are kept together, breakage is reduced, and dust is contained.

(f) The modular assembly of piping and insulation under ventilated conditions holds promise because of the time saved, minimizing ship assembly time and uncontrolled exposures.



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(g) For small applications, asbestos cements are placed in a plastic bag, water is added, and the mixture is then kneaded. Often the correct amount of asbestos cement can be sent in the mixing bag to the work site from the shop along with the materials to be applied. Asbestos cements produce high levels of asbestos dust when handled dry.

(2) Installation.

(a) Unpacking, handling, and applying asbestos materials aboard ship contribute significantly to overall exposures. Pre-wetting, pre-packaging, and careful handling does reduce breathing zone exposure. Throwing asbestos materials contributes significantly to airborne dusts, a practice largely accepted.

(b) Hand sawing, cutting, and jacket stripping are performed under ventilated conditions but not all dust is captured. Respirators should be worn by the exposed individual, because hand sawing or breaking, produces excessively high dust levels throughout small compartments.

(c) Portable dust collectors or exhaust blowers are used to collect asbestos dust at their source and exhaust them outside the ship. Exhausting into adjoining spaces is avoided.

(d) Asbestos cloth with a built-in or re-wettable adhesive is used to reduce airborne dusts. Plain asbestos cloth produces relatively high levels of airborne fibers when ripped or handled vigorously.

(3) Application of Cements.

(a) Most asbestos cement products are mixed at dockside and delivered to the work site aboard ship. Some cements which harden rapidly on addition of water are mixed at the site.

(b) The bags of cement are emptied without shaking to reduce dusts.

(c) When the bag is emptied, the material is dropped the shortest distance to avoid dispersion of asbestos dust.

(d) Empty bags are placed in containers, wet down, then removed from the ship.

(e) Mixing areas are selected. Ventilated mixing stations at dock side, open air mixing, or adequate local exhaust ventilation are required to keep large scale asbestos cement mixing from producing excessive airborne dusts.



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(f) U.S. Bureau of Mines approved respirators are worn by personnel mixing asbestos cements.

(g) Surfaces scraped clear of old asbestos cement are pre-wet. Wetting the tools also aids in dust reduction.

4. Removal ("Rip-out")

a. Ships under overhaul have large amounts of asbestos material removed. The removal produces high airborne concentrations of dust in ships' compartments for weeks at a time. The pipe coverers and insulators attempt to isolate the area with curtains, portable partitions, or enclosure of the work area to provide capture of the dust by ventilation, and prevent spreading of dust to adjacent work areas.

b. When rip-out produces high dust levels, PC&I personnel wear coveralls and respirators. Other trades usually have no protection and are excluded from the work area.

c. Materials are sawed into sections for removal instead of ripping with a bar. Removal in this manner produces less rubble. A cast-cutter such as used by the medical profession produces excellent results and little dust.

d. Plastic drop cloths are suspended beneath work areas to catch falling scraps and debris that produces dust.

e. Asbestos scrap is collected in bins, and wet down prior to removal.

f. In inaccessible places, asbestos materials are placed in plastic bags. Burlap bags are no longer used because the fine dust sifts from the bags when they are moved.

g. Exhaust ventilation is provided at the source of rip-out. General exhaust ventilation is provided to the compartment to prevent accumulation of asbestos dust in air.

5. Housekeeping for Shop and Ship

a. Periodic cleaning of work area, especially at the end of each shift, contributes greatly to dust reduction. The longer materials lie the more widespread they become, producing considerable airborne dust.

b. Foot traffic produces considerable dust from fallen asbestos scrap, shavings, or debris. The simple procedure of placing cutting or work stations away from general foot traffic significantly reduces dust.



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c. Surplus materials are picked up and placed in cartons or plastic bags.

d. Industrial vacuum cleaners are excellent to remove settled asbestos dust and other material around cutting benches. They provide some ventilation when attached to ventilated cutting tables when other sources of ventilation are not available.

e. The use of brooms, fox-tail brushes or rags is discouraged for clean-up of asbestos dust, because of the high dust levels produced. Such fine dust once re-dispersed remains suspended in air for many hours.

f. Scrap materials are placed in disposable plastic bags. At the end of the shift the bags are taped shut and removed from the work location as refuse.

g. Large pieces of scrap materials are placed in containers and wet down to reduce dust.



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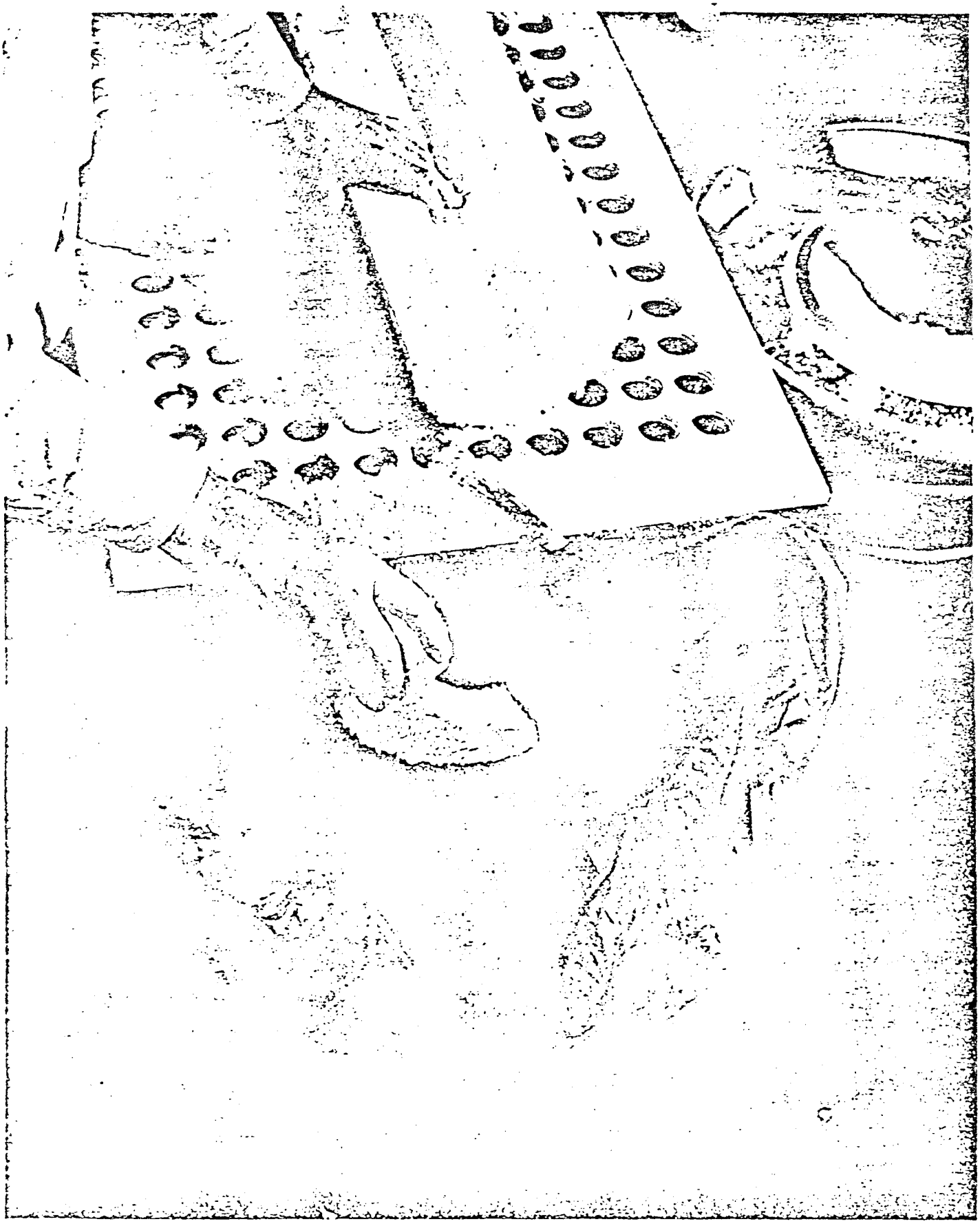

Figure 10. Asbestos refuse collected in polyvinyl plastic bags are sealed and removed from the ship. This reduces a major source of asbestos dust and simplifies clean-up.

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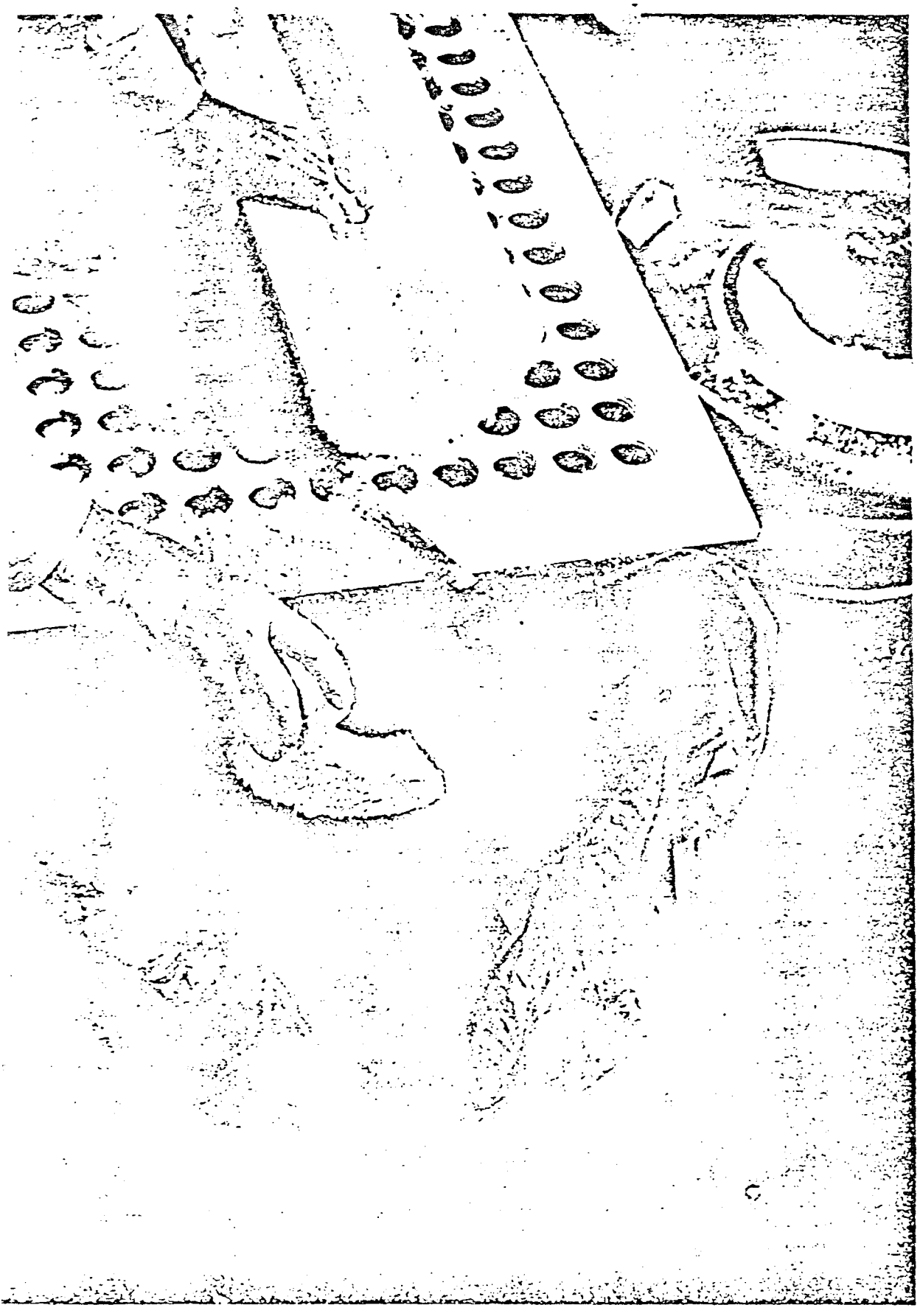

.0. Asbestos refuse collected in polyvinyl plastic bags are sealed and removed from the ship. This reduces a major source of asbestos dust and simplifies clean-up.

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Figure 11. Magnesia block insulation is relief sawed under controlled conditions in the shop to minimize sawing aboard ship.

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Figure 12. Magnesia-asbestos cement is pre-mixed at dockside under controlled conditions. Dry cement mixed i onfined spaces aboard ship produces high dust levels.

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Figure 13. Sealing magnesia block in p' tic bags reduces airborne dust during handling and reduces ›akage.

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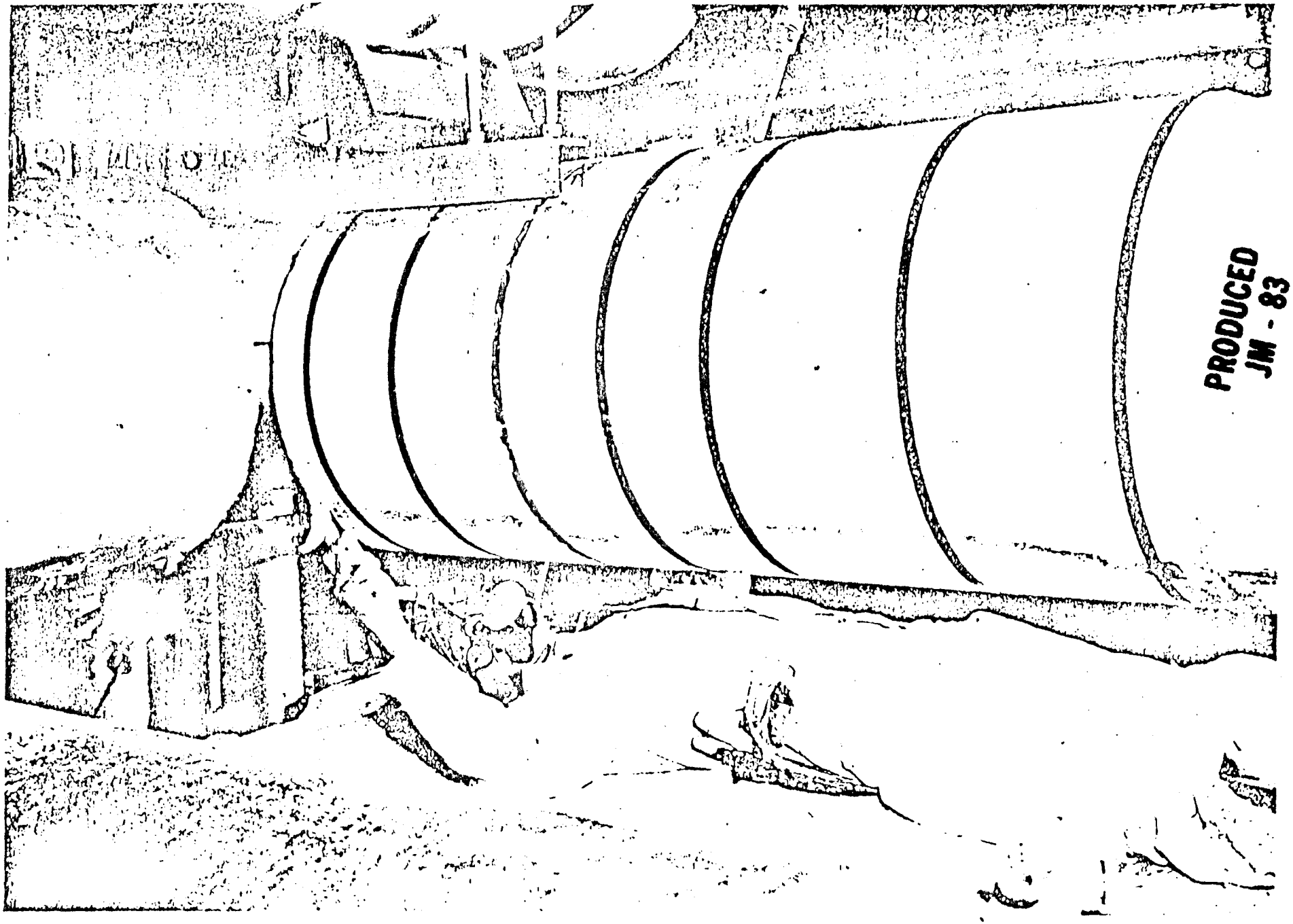


Figure 14. Plastic or canvas drop cloths prevent debris from falling to lower levels aboard ship, and facilitate clean-up.

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F. EDUCATIONAL

A sustained, detailed educational program appears essential to continue an asbestos dust control program. A survey revealed asbestos workers did not fully understand the hazards of asbestos, nor had they received formal training explaining the medical and environmental controls. In June, 1969, lectures and demonstrations were given to win their acceptance, allay fears, and carefully explain proposed changes of work practices, and the effects of breathing asbestos dust.

Many doubted that the proposed changes would be helpful, or resented some of the inconveniences, such as respirators.

The lecture series explained improved methods for minimizing exposure of insulation workers, and encouraged them to recommend methods of their own through the U.S. Navy Beneficial Suggestion program.

Also, the lectures explained the medical aspects, tests, the meaning of chest X-rays, and methods of environmental testing. The scientific reasoning for control rules, or equipment use, was carefully explained to insure intelligent application.

The results were excellent; most of the workers began applying changes in work methods that reduced exposures. The Beneficial Suggestion program provided several excellent changes, and identified a number of problem areas worthy of environmental control.

Most of all, the attitude of the workers changed to one of interest and cooperation. No adverse reaction or worker-employer difficulties developed as a result of the presentation of all the facts regarding the health and environment of pipe coverers and insulators.

The authors believe that the change of work practices, which relies largely on the individual worker, could not have been accomplished without the educational program.

Training programs should be sustained because workers forget, new methods develop, and worker feed-back of problems and ideas is important.

A follow-up educational program is warranted to convince PC&I workers not to smoke. The risk of lung cancer among asbestos workers who smoke is nearly 2:1 compared to PC&I workers who do not smoke.



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G. SUMMARY

The control of asbestos materials and the dust produced required a 5 point program to reduce exposures to acceptable levels.

The evidence of excessive pulmonary abnormalities among pipe coverers and insulators implied that overexposures were still occurring even though the Threshold Limit Value of 5 million particles per cubic foot asbestos dust in air had been applied for the last 20 years.

Proposed reductions in the 1970 Threshold Limit Value for asbestos dust to 2 million particles per cubic foot means that more effective control measures must be applied. The respirators and change of work practices provided an immediate solution, but substitution of less hazardous materials, and engineering controls, such as improved ventilation methods, must ultimately be applied. They hold greater promise for direct material control and engineered applications which eliminate human decision related to asbestos dust on the job.



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EXHIBIT NO. 3
Date 6-10-82 Case No. Bessmer
Id ____ Adm ____ Rej ____
Eileen L. Berg, N.P.
(206) 282-8545

Code 700

# SAFETY Review

Defs Ex L for Id
Hearing
1-4-80

EXHIBIT Def E DATE ____
WITNESS Expert
Mary A. Whitney 682-1427



## In This Issue:


SAFETY EQUIPMENT CONTROL
WHO IS RESPONSIBLE FOR SAFETY?
SUCCESSFUL FOOT PROTECTION PROGRAM
BULK PROPANE SYSTEM
JIG FOR BUILDING PIPE STAGING
ASBESTOSIS
SAFETY CAPSULES


Safety costs money—lack of safety costs infinitely more. We must pursue an effective, efficient safety program with the same vigor we pursue an effective, efficient program of shipbuilding, conversion and repair.

R. K. James

RADM R. K. JAMES, USN
*Chief, Bureau of Ships*


OCTOBER 1962
VOLUME 19 NO. 10

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OFFICE OF INDUSTRIAL RELATIONS
WASHINGTON, D.C.

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# *ASBESTOSIS*

*Prepared by Capt. H. M. Robbins, MC, USN, and W. T. Marr, Industrial Hygienist, Long Beach Naval Shipyard*

IN 1930, the first cases of asbestosis were reported in the United States. A few years later (1934), amosite, a type of asbestos, was found to be comparatively light in weight and an excellent insulator for shipboard work. By 1937, manufacturing problems were solved and the material was used productively aboard naval vessels. During the war years, shipyards had a great influx of employees in all trades, and pipe covering was no exception. Asbestos was used extensively. In 1943, a medical survey team noticed the dusty working conditions of pipe coverers and a study was made of the working environment of these employees in four shipyards. High dust concentrations were found at the time and X-ray examinations given to over 1,000 pipe coverers. Only three employees, each with more than 20 years' experience in working with asbestos material, were found to have asbestosis. This low incidence of disease and the extensive number of years the affected employees worked in the material led the investigators to conclude pipe covering to be a relatively safe operation in shipyards. Exhaust ventilation and respiratory protection were still recommended as good practices. The "extensive years" gives us an extremely important clue to watch.

Medical evidence indicates the requirement for many years of exposure to develop asbestosis.

Shipyards have two work areas, the insulation shop and aboard ship, where there is a potential exposure to asbestos fibers. Pads, like small pillows for shipboard fittings, are made in the shop. Here asbestos cloth is cut to size and filled with a type of asbestos called amosite. Recently, in this shipyard, fibrous glass has replaced amosite as the filler for these pads. Aboard ship, a great variety of insulation is performed. Insulation blocks are shaped with a saw, pads are applied to fittings, insulation cement is applied to blocks and covered with asbestos cloth. These, and other operations, take place in nearly all compartments; however, most work is done in the machinery spaces. By far the greatest potential exposure to asbestos fibers occurs during ripout of old insulation for ship overhaul or reconversions.

There is still much to be learned in the area of measurement and evaluation of asbestos fibers in the working environment. The general feeling is that asbestosis is caused by breathing relatively long fibers (10-25 microns) and that the fine asbestos dust is relatively inert. At this time, the recommended maximum allowable concentration is 5 million particles per cubic foot. Control of asbestos dust and fibers is relatively easy in the pad shop. A water supply pipe, filled with small holes, is located directly over the asbestos cloth on the end of the cutting table. As the cloth is drawn onto the table, the cloth is dampened. This cloth remains damp throughout the process of filling, sewing, and installing pins in the pads. Additional exhaust ventilation has been installed in the shop and is now operated constantly during working hours. Dust studies were made while dry cloth and amosite were in use and the ventilation off. These counts were generally in the range of 5 to 20 mppcf. Under improved conditions, the count is generally below 1 mppcf.

A pipe coverer's working environment on board ship is constantly changing, making it difficult to obtain an average dust exposure. Almost any concentration of dust and fibers can be found under varying conditions. The highest counts, of course, are during ripout where 200 mppcf are not uncommon. Due to the constantly changing work positions and areas of pipe coverers, adequate ventilation is not possible. The worker's best protection is to avoid careless creation of dusty conditions, use damp material when possible, and wear respiratory protection constantly. There is, at present, no known cure for asbestosis. Once a person has contracted the disease he has suffered a loss of health which cannot be redeemed.

For an educational program, a tape recording was made of an interview with a former employee who is now receiving disability compensation for asbestosis. This recording, along with discussion, has been presented on several occasions to encourage employees to use every means to protect themselves from exposure to asbestos fibers. Films are also periodically shown on the use of respirators.



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# LAWYER'S NOTES

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Eileen L. Berg, N.P.
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1939 · · 1964

AMERICAN

# Industrial Hygiene

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Rice Hotel, Houston, Texas
May 3-7, 1965

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MT-PWHD-009994

# Asbestos Exposure During Naval Vessel Overhaul

WILLIAM T. MARR

*Medical Department, Long Beach Naval Shipyard, Long Beach, California*

A study among insulation workers in a shipyard has revealed several men on disability compensation and one death due to asbestosis. Exposures occur during the fabrication and installation of asbestos insulations and during removal of insulation for repairs or overhaul of ships. X-ray examinations are not adequate for control as cases usually take a minimum of seven years to develop.

## Problem

THE LONG BEACH Naval Shipyard insulation shop has 60 to 80 employees working primarily aboard ship applying insulation containing asbestos to the steam power plants. Five employees, averaging 15 years exposure, have retired on disability compensation due to asbestosis. One employee, after 10 years employment as a pipecoverer and insulator, received disability compensation for seven years prior to his death in 1962. Extensive physical examinations and autopsy reports leave no doubt his death was due to asbestosis. He worked mostly on farms and in restaurants before his employment in the shipyard and denied any previous employment in a dusty trade.

Breathing asbestos fibers, usually over a period exceeding 10 years, causes this insidious industrial disease.[1,2,3] A non-productive cough and progressive shortness of breath that can lead to disability are the most striking symptoms.[4,5]

This report covers: (a) material used, (b) working environment, (c) fiber counts, (d) x-ray findings, (e) discussion, and (f) summary.

## Material

Asbestos is a commercial name applied to several varieties of fibrous minerals. These varieties are two distinct mineral groups, serpentine and amphibole, that differ considerably in composition and physical properties.[6] Chrysotile, the fibrous form of serpentine, comes from Canada and constitutes about 95% of the total world production of asbestos. It is a magnesium silicate with iron, nickel, manganese, or aluminum often replacing part of the magnesium. The fibrous form of amphibole has four principal varieties, amosite, anthophyllite, tremolite, and crocidolite. These four are various silicates of iron, calcium, magnesium, and sodium.

The replacement of one element by another in varying proportions is a unique characteristic of asbestos causing a change in its physical properties. For example, machinery crushes chrysotile into fine soft silky-feeling fibers which are strong, flexible and can be woven into cloth. Amosite, which comes from South Africa, has long coarse fibers suitable for a blanket-type of insulation material. Amosite has been used in large quantities on naval ships since before World War II. Other than amosite, the amphibole mineral type of asbestos is weak and brittle.

Most authorities believe that all types of asbestos can cause asbestosis.[7] Medical science has not conducted sufficient research to determine the possible different effects of the mineral or which variety is the most hazardous.

Employees in the insulation trade also use fiberglass, magnesia, diatomaceous earth, and other inert substances that can complicate air sampling and the exposure hazard. Shipboard insulators use about ten different types of insulation material containing different varieties and a varying quantity of asbestos. Table I gives a list of material used in shipboard insulation and its composition. The table also shows the percentage of time the employee works with the material and his exposure in millions of particles per cubic foot.



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TABLE I
Materials and Exposures in Shipboard Insulation Jobs

| Material (Used aboard ship by pipecoverers and insulators) | Percentage of working time aboard ship (with each material) | Exposure Concentrations (length of exposure time varies from minutes to hours) | | |
|---|---|---|---|---|
| | | particle range in microns | | fiber range in microns |
| | | 0–5 | 5–10 | 1–40 |
| 1. 100% Amosite asbestos blanket | | mppcf | mppcf | mppcf |
| Installing | rarely | | Installed damp | |
| Removing | 3.0 | 1.4–3.0 | 1.6–2.0 | 0.5–8.0 |
| 2. 85% Magnesia and 15% amosite asbestos blocks and pipe sections | | | | |
| Installing | 39.0 | 1.4–6.0 | 0.1–0.4 | 0.1–1.8 |
| Removing | 1.5 | 0.5–3.0 | 0.1–2.0 | trace–1.2 |
| 3. Calcium silicate and 10% amosite asbestos blocks and pipe sections | | | | |
| Installing | 42.0 | 0.9–2.8 | 0.2–3.0 | trace |
| Removing | 2.0 | 0.4–1.1 | 0.4–0.9 | trace |
| 4. 100% Chrysotile asbestos filler and binder | | | | |
| Installing | 1.5 | mixed as cement | and applied wet | |
| Removing | 0.5 | 0.9–4.9 | 0.9–1.6 | trace |
| 5. 15% Chrysotile and 85% rock wool filler and binder | | | | |
| Installing | 1.5 | mixed as cement | and applied wet | |
| Removing | 0.5 | 0.5–4.7 | 0.7–1.7 | trace |
| 6. 80-95% Chrysotile asbestos cloth | | | | |
| Installing | 8.0 | 0.3–1.8 | 0.2–1.4 | trace |
| Removing | 0.6 | 0.2–1.9 | 0.3–2.0 | trace |
| 7. Fiberglass | | | | |
| Installing | 1.0 | | | |
| Removing | rarely | | | |

Working Environment

These employees, known as pipecoverers and insulators, face a potential exposure to asbestos fibers in the insulation shop and on board ship.

Employees in the shop make pads shaped like small pillows for easy installation and removal from shipboard fittings, control valves, and pipe joints. A bolt of asbestos cloth is on a roller at the end of the layout and cutting table. Directly over the bolt a water spray system allows water to dampen the cloth as an employee draws it on the table. The employee measures and marks the material into appropriate sizes and cuts it with a rotary electric hand cutter. Another worker then stitches the cloth on a power sewing machine and passes it to another table where fiberglass is cut to size and stuffed into the opening. Finally, an employee closes the pad by sewing, trims it with a power cutter, and attaches rings to aid in the installation aboard ship. The cloth remains damp during the work process making dust control methods relatively easy in the shop. General exhaust ventilation operates continually, assisted by large doors and windows allowing for cross-ventilation.

Aboard ship pipecoverers and insulators perform a great variety of installations in most compartments, especially in the firerooms and enginerooms. Several of these tasks are shown in Figures 1, 2 and 3. These men wire insulation block and insulation pipe sections in position around machinery and pipe. They make the surface smooth first by mudding with 85% magnesia plaster and then wrapping with asbestos cloth glued in position with a fire retarding waterproof adhesive. The amosite blanket, rarely used now, was generally used rather than preformed blocks and pipe sections until 1962. Employees apply rock wool mud to this amosite blanket followed by portland cement and

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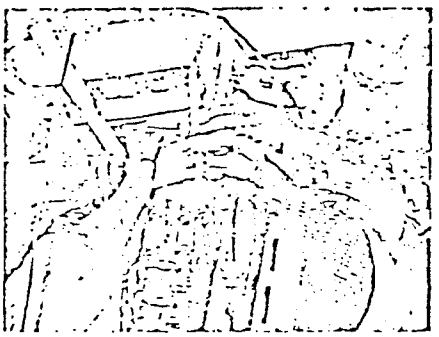

FIGURE 1. Removing insulation during overhaul.

asbestos cloth to form a smooth finish. They apply glass sheets to ventilation ducts and wrap it with fiberglass or asbestos cloth. These men wrap fiberglass around fittings, control valves, and pipe joints, then attach the pads from the shop into position.

During ship overhaul, repair, and remodernization, pipecoverers and insulators remove all the various types of insulation they have applied. As shown in Table I, this small portion of time spent in removing excessively dry insulation gives a high exposure to asbestos dust.

Adequate ventilation for pipecovers and insulators is rarely possible with our present ventilating system, which consists of 3,600 cfm exhaust fans with connections for four 5-inch flexible ducts. These portable exhaust fans are usually placed on the main deck and the ducts routed into the work area. The flow at each exhaust-duct entrance varies from 800 to 1500 lfm depending on the distance from the exhaust fan to the work process. This precept exhaust system designed especially for welding and burning work is not adequate for our pipecoverers and insulators because their work processes and work positions vary.

Dust control by use of water during shipboard work appears to be practical only during application of amosite, a material seldom applied in our shipyard because of the excessive dust it causes during removal. The best protection for these employees is to avoid careless creation of dusty conditions by the use of damp material when possible, and the wearing of dust respirators constantly.

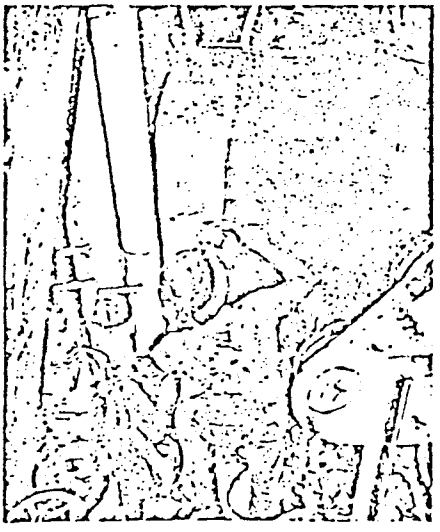

FIGURE 2. Applying filler and binder.



FIGURE 3. Sawing pipe sections.

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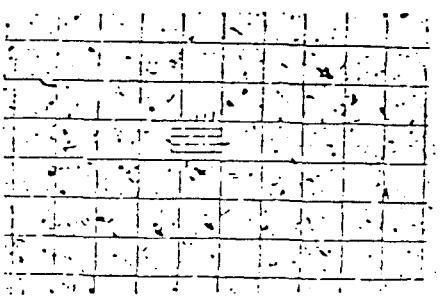

FIGURE 4. Photomicrograph of dust sample taken during insulation removal. Small squares are 20 microns.



FIGURE 5. Photomicrograph of dust sample taken during application of insulation blocks.

## Fiber Counts

There are no established figures for a maximum allowable concentration of asbestos fibers in pipe covering operations or for short duration massive exposures. Because study in a textile mill in 1938 found no cases of asbestosis where the count by impinger light field was below 5 mppcf, this figure became the recommended maximum allowable concentration.[8] An asbestos operation in Canada has had no new cases of asbestosis in 15 years where the particle count is below 1 mppcf for dust below 10 microns.[9] One U. S. industry uses 5 mppcf below 10 microns and 1 mppcf above 10 microns as their MAC.[10]

Pathologists find fibers exceeding 400 microns in lungs during autopsy.[11] These long fibers do not settle in air as rapidly as spherical particles. They are less than one micron in thickness and their needle-like form allows them to stand on end and work down into the lungs.

The Saranac Laboratory experiments by animal exposure to asbestos indicated that asbestosis is a mechanical rather than a chemical action.[12] The researchers also considered fibers greater than 10 microns the most harmful. This is not in agreement with recent studies in South Africa where authorities consider fibers less than 5 microns the most harmful.[13]

Dust counts, taken with the Bausch and Lomb Dust Counter, appear in Table I. The low counts on sampling do not appear to give an adequate indication of the actual hazard. During sawing of blocks and pipe sections and removal of old insulation, the work environment appears extremely dusty. Respirator filters often clog after an hour's work removing insulation.

Fibers from 3 to 60 microns in length received special attention during this study (Figures 4 and 5). If fibers were present but count revealed less than one mppcf, they appear in Table I as a trace.

## X-Ray Findings

It is common practice for industrial hygienists to use information from periodic physicals to assure themselves that exposure controls are adequate. X-ray examinations on new employees in asbestos are not of value for this assurance; on the contrary, this information can be extremely misleading as it usually takes a minimum of seven years exposure for cases of asbestosis to develop.[14,15,16] It also appears that some people are susceptible while others escape harm during the same exposure.[17]

A medical team surveyed five shipyards in 1945 to investigate the health hazard due to insulation work.[18] Only three cases of asbestosis appeared in 1074 x-ray examinations. These three employees had worked in asbestos material for more than 20 years. Insulation material and work methods have remained essentially the same since that study. The greatest change, starting right after the war, is the removal of insulation during overhaul and repair. Many of our employees

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now have over 20 years in the insulation trade in contrast to the survey in 1945 where only 51 of the 1074 employees had over 10 years experience in insulation work.

## Discussion

The world's consumption of asbestos has increased from 500,000 tons in 1942 to 2,400,000 tons in 1961.[5a] Recent studies recognize asbestosis as a serious health hazard.[20,21,22]

Asbestos exposure during shipboard insulation differs from exposure in mining and manufacturing processes of this material. In these industries employees usually continue at one job with the same material and their exposure is relatively constant. This is not true for shipboard insulation where the pipecoverers and insulators work location, work position, and material constantly change. Under these conditions it is impossible to determine the exposure of the employee without spending hours in observation and sampling. Samples taken as in Table I are only bases for discussion concerning their exposure.

We do not know whether our cases of asbestosis came from massive exposure during removal of old insulation or from many years of exposure by susceptible individuals during all types of insulation work.

## Summary

The Long Beach Naval Shipyard has several men on disability compensation and one death due to asbestosis. Many of these employees have more than 20 years' experience as pipecoverers and insulators working primarily aboard ship.

Asbestos exposure during ship overhaul and repair varies extensively giving an entirely different problem from exposure in mining and manufacturing operations. The maximum allowable concentration for pipe covering operations or for short duration massive exposures is unknown. There still remains a difference of opinion among medical authorities on a MAC and the effects of long-fiber and short-fiber asbestos. Chest x-ray examinations of employees exposed to asbestos can be misleading as it usually takes a minimum of seven years for cases of asbestosis to develop. Shipboard pipecovering and insulating during overhaul and repair is a hazardous trade. Employees in this trade should wear respirators when exposed to dry insulation material containing asbestos.

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APPENDIX 'B'

EXHIBIT NO. #5
Date 6-11-82 Case No. Bessmer
ID ____ Adm ____ Rej ____
Eileen L. Berg, N.P.
(206) 282-8545

Marine Pipe Covering
and
Insulating

Shop 56

May 1961

PRODDEPTEREM P4800 (1)

Puget Sound Naval Shipyard
Bremerton, Washington

13ND-3717 (REV. 10-54)

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1112 STACK

PUGET SOUND NAVAL SHIPYARD
Bremerton, Washington

# Marine Pipe Covering and Insulating

Shop 56

May 1961

PRODDEPTBREM P4800 (1)

Reviewed and
Approved 7-17-61

Colin W. Edwards

Colin W. Edwards
Master Mechanic
Shop 56
(Reviewing Official)

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MT-PWHD-010002

GENERAL SAFETY AND HEALTH PRACTICES

For your personal safety on the job, it is necessary that safety rules be followed at all times. Accidents of an unavoidable nature seldom occur. Most cases are caused by personal carelessness.

The pipecoverer should be familiar with the General Safety Rules, published by the Shipyard. A few of the more important General Safety Rules, and some of the specific rules pertaining to your job, are listed as follows:

1. Use personal safety equipment provided for your protection.

2. Report any unsafe condition as soon as noted.

3. Never engage in horseplay or practical jokes.

4. Watch where you are going.

5. Heed warning signs.

6. Carry sharp instruments in a sheath.

7. Cut materials away from yourself, never towards you.

8. Do not pull towards your face when twisting wire with your pliers or sewing.

9. Always bend the ends of wire so that they will lie smoothly against the insulation.

10. Secure material and equipment so it cannot be knocked off when working from staging or above other personnel.

11. Do not pile material in passageways or hatchways.

12. Do not spread drop cloths over an opening or uneven surface.

13. Always keep one hand free when carrying material.

14. Handle amosite and glass materials carefully to avoid their dusts.

15. Goggles must be worn while working with silicate.

16. Power equipment can be extremely dangerous. Use great caution when working with the power knife, sewing machine, stapler, band saw, or sander.

17. Place scrap styrofoam or cork pieces over sharp fastening devices to prevent injury to co-workers during glass board installation.



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18. Sprinkle amosite with water whenever possible to keep dust down.

19. See that your chest is X-rayed at least once a year to detect the possibility of silicosis or asbestosis.



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INDUSTRIAL DUSTS

Characteristics of the pipe covering and insulating operations in the shipbuilding industries are such that proper personal safety precautions must be adhered to at all times. Each individual pipe coverer and insulator employee is required to check out and use a respirator when working in insulating areas where there is any danger from exposure to harmful insulating dusts. Supervisors should insure that their men are properly protected at all times with proper safety equipment and adequate ventilation. Supervisors are not relieved of responsibility by merely instructing their men to use safety equipment, they are obligated to follow up and insure that protective measures have been implemented for their crew's health and welfare.

Industrial dusts of all forms have long been thought of as a production evil. Sometimes taken quite seriously, and sometimes taken with a grain of salt, or we might add sardonically, with a micron of silicosis!

Proper control of all harmful industrial dusts can be obtained only through the combined efforts of the workers and management working together to minimize exposures to critical dusts and fumes.

The "old timer" or "smart character" may look on humorously as an informed and cooperating worker carefully adjusts his respirator before ripping off reams of amosite or asbestos piping insulation preparatory to a piping alteration. However, it will be the cooperating worker who will have the healthier pair of lungs at the end of the day.

While "Pneumoconiosis" is the technical term applicable for such infections as Miner's Asthma, "Miner's Phythisis," "Grinder's Rot," and many others, "Asbestosis" and "Silicosis" are the two most harmful and common lung infections of the pipe covering and insulating trade.

As of recent years these two diseases or infections had become important enough for the Naval Medical Department to compile a health survey of all pipe covering operations in the construction of Naval vessels. Four shipyards were examined, two private yards, and two Naval shipyards, with the following conclusions or analysis:

The infectuous characteristics of insulating materials, such as diatomaceous earth (a form of amorphous Silica), asbestos dust, glass or rock wool, and Magnesia, are harmful and do damage to the respiratory system when breathed in excessive and constant amounts.

The nature of the pipe covering operations are such that constant exhaust ventilation must be maintained at the rate of 10 to 15 complete air changes per hour in critical areas where insulating materials are being cut by bandsaw, ground, mixed, or molded. All pertinent machines must be equipped with separate exhaust systems.



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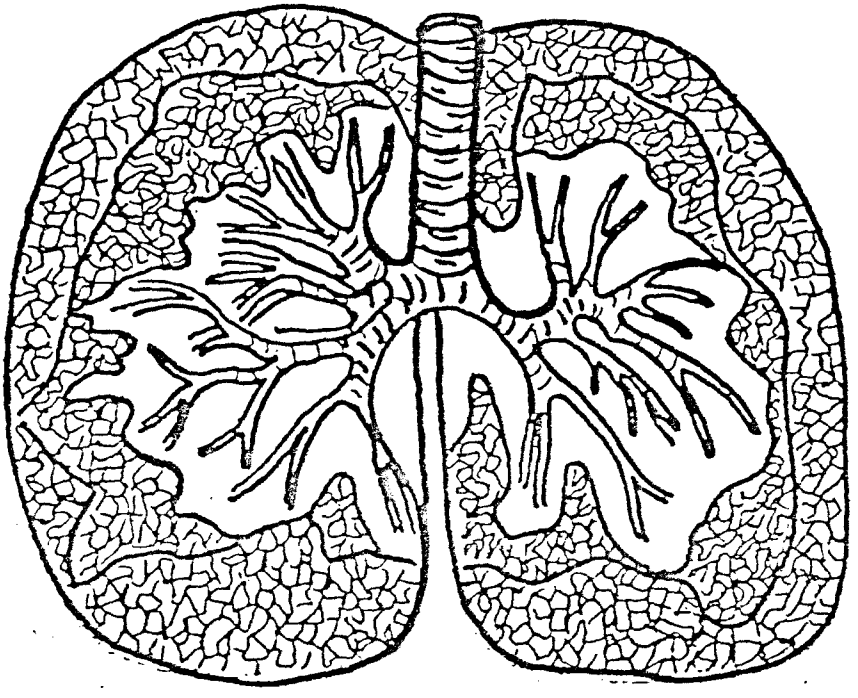
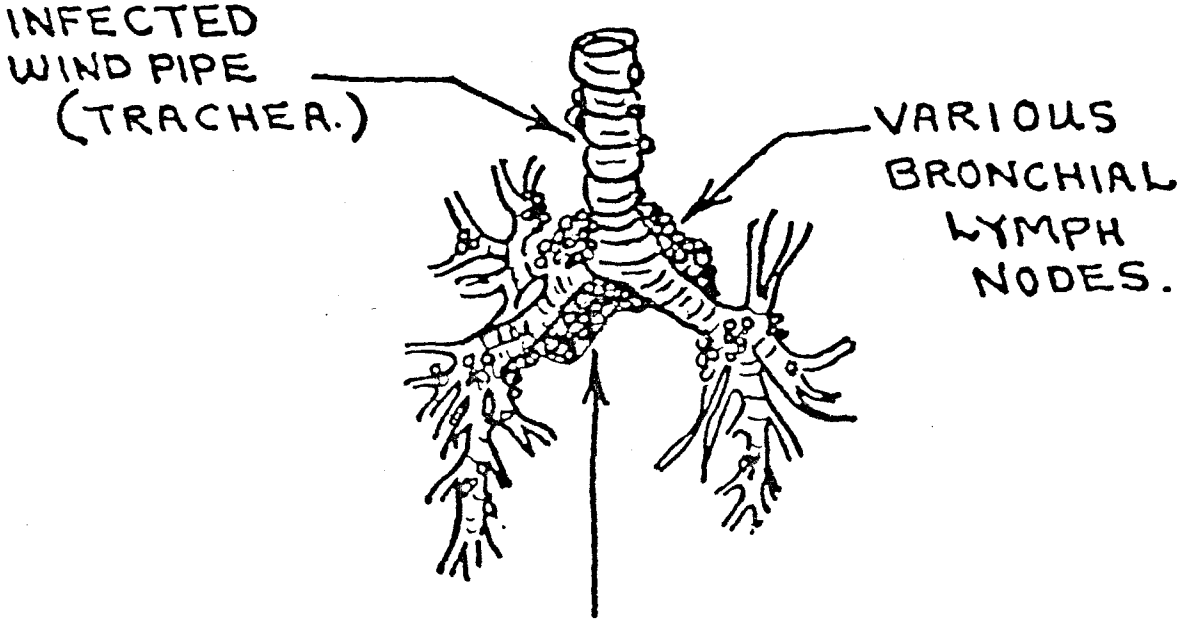
# HUMAN LUNG
CUT AWAY VEIW
SHOWING WIND PIPE.






LYMPH NODE DEVELOPEMENTS
FROM BREATHING HARMFUL
INDUSTRIAL DUSTS.

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MT-PWHD 010006

Further, all layout tables, sewing rooms, fabricating rooms, shop and ship compartments where insulating operations are taking place must be properly ventilated to provide 5 to 10 complete air changes per hour.

"Asbestosis" and "Silicosis" result from breathing relatively long asbestos fibers, 15 to 75 microns in length or 3/1000 of an inch, complicated or further antagonized by additional particles of diatomaceous earth, and other insulating materials.

An example of the lung structure with its delicate parts has been included to stress the importance of proper safety or health precautions while performing pipe covering and insulating operations.



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JM - 83

MT-PWHD-010007

SSIC 4308-1

NAVSHIPYD PUGET DEPT. & CODE 200 (260.4)

, 51 ORIGINATING CODE N/A DEPT. N/A

NAME & TITLE Owens-Illinois Glass Company - Kaylo Division
Toledo 1, Ohio

IDENTIFICATION/SERIAL NO.

NO./VESSEL CLASS (if applicable)

RER/COMPANY NAMES INVOLVED Owens-Illinois Glass Co.

LOCATION

CRIPTION OF CONTENTS Application & Performance data
on Kaylo Heat Insulation -

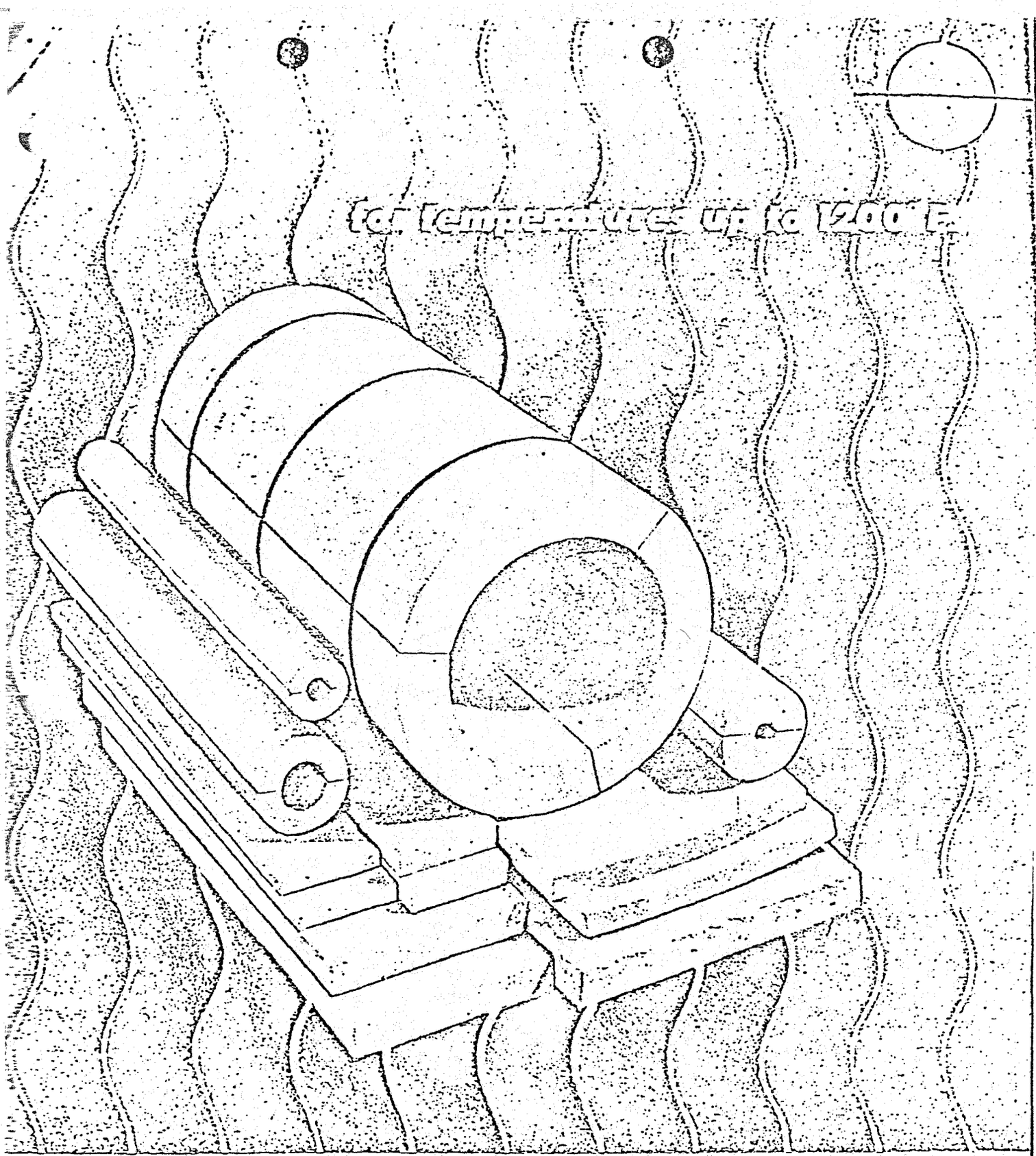
Thermal Insulation

EXHIBIT NO. PLE. B
Date 6-18-82 Case No. BASSINER
Id ____ Adm ____ Rej ____
Eileen L. Berg, N.P.
(206) 282-8545

PRODUCED

nly for technical/reference manuals, specifications drawings, etc.

MT-PWHD-010008




ENS ILLINOIS

SS COMPANY, Toledo 1, Ohio

KAYLO

HEAT INSULATION

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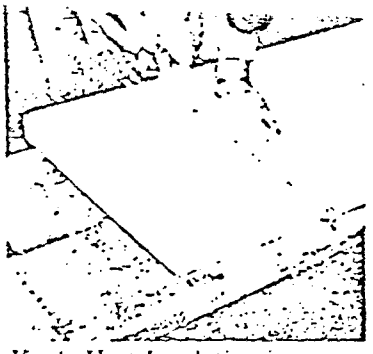
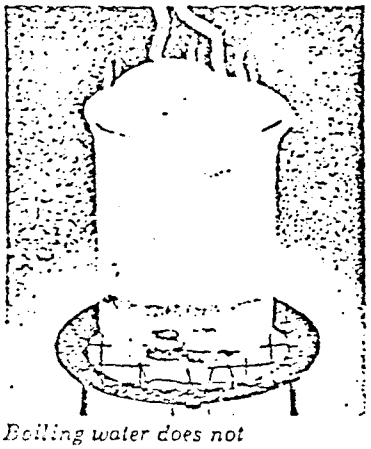
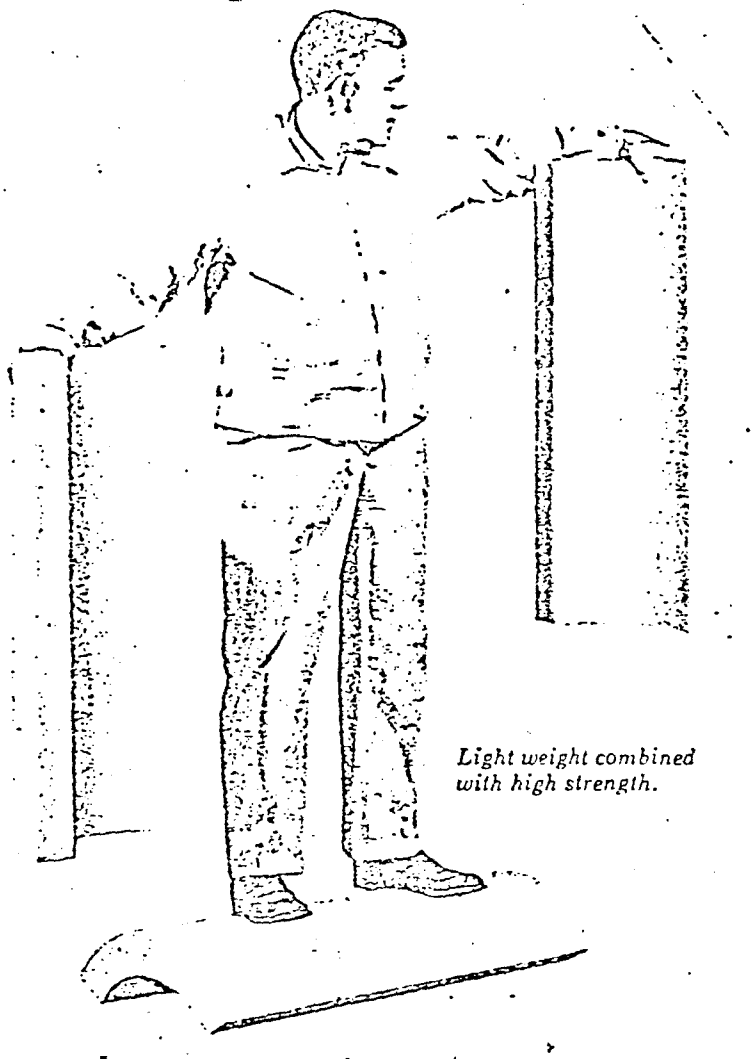
MT-PWHD-010009



*Kaylo Heat Insulation is easily cut with ordinary tools.*



*Boiling water does not break it down.*



*Light weight combined with high strength.*

# KAYLO®

## HEAT INSULATION

HYDROUS CALCIUM SILICATE

Kaylo Heat Insulation is made of a chemical compound of lime and silica developed by Owens-Illinois Glass Company. Although not glass, it is made of materials similar to those used in glass, and with which Owens-Illinois has had long experience. The technical name is hydrous calcium silicate. Since it is a chemically reacted material, it contains no added binder. For mechanical effects, a small amount of asbestos fiber is included at the time of manufacture.

Few materials have been so thoroughly tested. Owens-Illinois began work on hydrous calcium silicates in 1938, but no material was offered to the general market until 1943. Thousands of installations since that time have proved field superiority, yet research and product development are still continuing.

Kaylo Heat Insulation is made both as block and as molded pipe insulation, with the widest range of sizes, forms and thicknesses of any high temperature insulation available. Kaylo hydrous calcium silicate combines the most desirable physical characteristics of heat insulating materials to a degree not equalled by other materials in the market. This means outstanding performance and practical application for the user.

### PERFORMANCE

Kaylo Heat Insulation is *effective up to 1200°F*, performing efficiently on temperatures through the hot water and low pressure steam range and also through temperatures in the superheated steam range. Therefore, a single material can be used for high temperatures which usually require combinations of two different insulating materials.

The *low coefficient of conductivity*, or "k", of Kaylo Heat Insulation places it among the most efficient insulations for temperatures up to 1200°F. (The name "Kaylo" is derived from the fact that "k" is low for the material.) Its high insulation value comes from the extremely small pore structure. So small and numerous are its insulating air spaces that they present a material internal surface of approximately 100 acres per cubic foot of insulation.

*Water does not break down Kaylo Heat Insulation.* Even when saturated, it retains about 85% of its strength. After being soaked for long periods of time and then dried, it returns to its original thermal efficiency and strength, without apparent shrinking or warping.

*Kaylo Heat Insulation is effective after long service.* It remains strong and efficient over the years and shows little shrinkage after exposure to temperatures up to 1200°F.

### APPLICATION

With a weight of only *11 pounds per cubic foot*, handling, shipping and application are simplified.

Kaylo Heat Insulation has flexural strength, compressive *strength and resistance to abrasion far above normal requirements* for heat insulation. Breakage during installation, [illegible].

Block or pipe insulation *can be cut, scored or sawed with ordinary tools* of the trade. The material is *non-irritating to the skin* and non-toxic.

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IM 83

MT PWHD 016010

*Type* Asbestos Paper and Rollboard

# Thermal Insulation Products

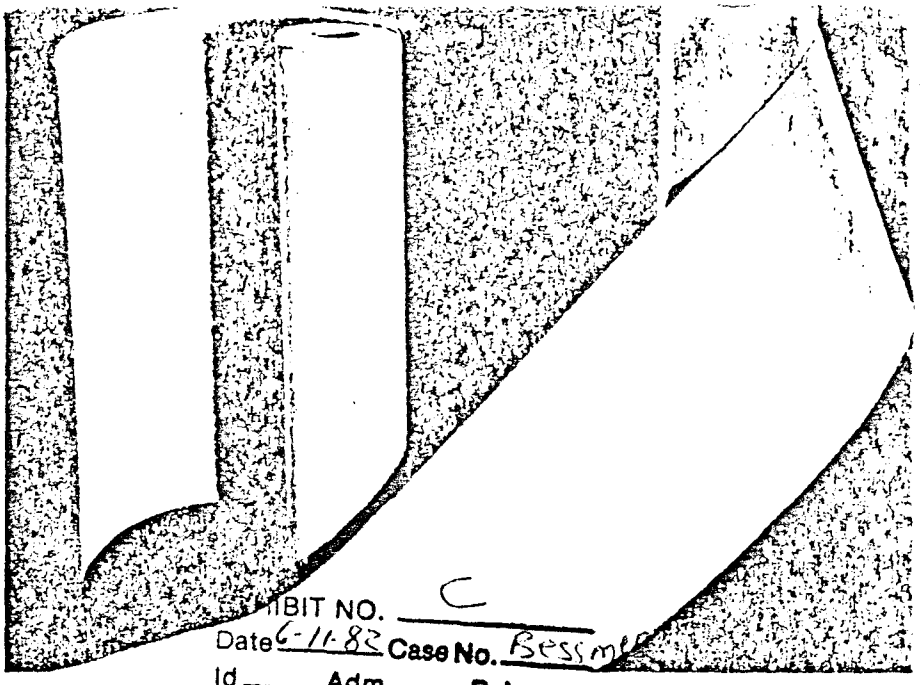


EXHIBIT NO. C
Date 6-11-82 Case No. Bessmer
Id ____ Adm ____ Rej ____
Eileen L. Berg, N.P.
(206) 282-8545

## J-M ASBESTOS PAPER AND ROLLBOARD

DESCRIPTION: A felted sheet material in thicknesses from .006" to .125" composed principally of asbestos fiber and a small percentage of binder. Available in standard rolls of various widths and sizes, also in tape form. Johns-Manville makes a variety of types to fit the needs of home, shop and industry. Used where an insulation of minimum thickness is required to protect against fire, heat or corrosion. Many specialty uses.

### AVAILABLE TYPES:

Commercial Asbestos Paper and Rollboard — A medium length fiber paper with high fiber content (minimum 95%). Satisfactory for most general purpose uses in plant, shop or home. A safety covering for heating ducts. Good for temperatures up to 400F (or to 800F where loss of strength is not critical).

Non-Burn Asbestos Paper — A medium length fiber paper with high fiber content. Suitable for continuous service at 400 F.

Long Fiber Asbestos Paper—Made with high grade long asbestos fiber (minimum fiber content 88%). For use as a thermal insulation; gasketing; base sheet for saturating.

Special Long Fiber Asbestos Paper for Electrolytic Cells—A high quality paper, uniform throughout, for use as diaphragms in electrolytic cells.

Doublex Asbestos Paper — Completely inorganic, will not burn, char or smoke. Has high wet strength. Developed for use as neon sign pattern paper. Also used as liner for foundry funnels and pouring gates. Temperature limit 800F (or 1200F where some embrittlement and loss of strength is not critical).

Asbestos Welding Paper — A 32-lb. paper, 1/16" thick, with low organic content, used to protect adjacent parts from heat, smoke, sparks during welding. Also used to control cooling rate in annealing process.

Type GT Asbestos Paper—Asbestos paper integrally combined on the paper machine with a reinforcement of strong glass threads. It can be used "as is" wherever a strong heat-and-flame-resistant sheet is needed.

### ADVANTAGES

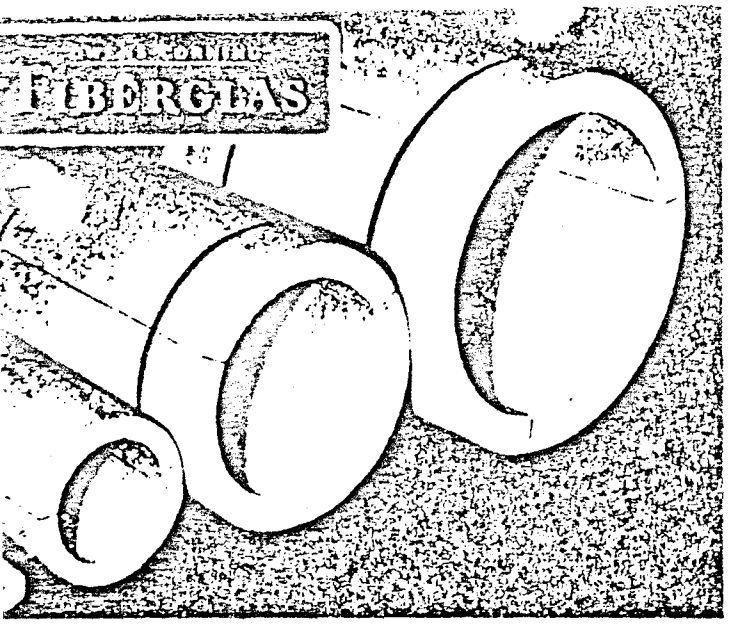
#### Excellent Mechanical Properties

Fast, easy to apply and safe to handle; amply strong for most needs.

#### Heat Resistant

J-M Asbestos Paper will withstand high temperatures that would damage conventional papers and rollboards.

EXHIBIT A
PRODUCED JM - 83




piping to 1200°F.

EXHIBIT B

IN1.C5

October, 1956

*high temperature insulation for indoor and outdoor piping up to 1200°F. operating temperature*

EXHIBIT NO. 1
Date 6-1-82 Case No. Bassman
Adm Rej
Eileen L. Berg, N.P.
282-8545

# Kaylo pipe insulation

*Kaylo* Pipe Insulation, a white, rigid hydrous calcium silicate heat insulation, manufactured by Owens-Illinois Glass Company and distributed nationally by Owens-Corning Fiberglas Corporation, effectively insulates indoor and outdoor piping up to 1200°F.*

*This thoroughly tested and field-proven material contains the physical properties most desired for efficient, durable insulation work. Kaylo Pipe Insulation's thermal effectiveness, high strength and moisture resistance are unattained by most other insulating materials.*

*A chemically reacted material, Kaylo Pipe Insulation contains no added binder. For mechanical effects, a small amount of asbestos fiber is included at the time of manufacture.*

## jackets

**canvas** —Kaylo Sectional Pipe Insulation includes standard canvas jackets, at no additional charge, on thicknesses up to and including 2½". Standard canvas is available on segmental forms at a slight additional cost. Bands are available for use with this product at slight additional charge and will be furnished on request.

6 oz. and 8 oz. canvas jackets are available for all types, sizes and thicknesses of Kaylo Pipe and Tube Insulation at an additional charge. These jackets are factory applied on Sectional Pipe and Tube Insulation. On Multi-segmental forms, they are furnished but not adhered.

## sizes

**thickness** Kaylo Pipe Insulation is available in thicknesses from 1" to 3" depending upon pipe size. Kaylo Tube Insulation is available in thicknesses of 1" and 1½".

**pipe sizes** —Kaylo Pipe Insulation is available to fit pipe from ½" to 39" in diameter. Kaylo Tube Insulation will fit copper tubing from ½" to 3⅛" in diameter.

**ms**—Kaylo Pipe Insulation is available in sectional or multisegmental form depending upon pipe size. All insulation is furnished in 3' sections.

*T. M. Owens-Illinois Glass Co.

## offers . . .

**high efficiency**—Among the most efficient insulations for temperatures up to 1200°F. Low "k" results from extremely small and numerous insulating air spaces.

**simplified dimensional standards** Sizes are designed to permit nesting of one size over another to produce greater thicknesses than available in single layer or to produce "broken joint" concept.

**water resistance** Kaylo Pipe Insulation retains an appreciable percentage of its strength even after complete saturation in water. After a cycle of soaking and drying, it returns to its original thermal efficiency and strength with no shrinkage or warping.

**high strength** High flexural strength, compressive strength and resistance to abrasion far above normal requirements for heat insulation, greatly reduce installation and service breakage.

**easy fabrication** Ordinary tools of the trade sufficient for all cutting, sawing or scoring. Non-irritating to the skin and non-toxic. Offers pleasant handling characteristics.

**long life** —Remains strong and efficient over the years. Dimensionally stable with little shrinkage. Has superior life characteristics over other types of high temperature insulations.

**versatility** —Performs efficiently at temperatures through the hot water and low pressure steam range in addition to temperatures in the superheated steam range. One high temperature material to do the job usually requiring combinations of two different insulating materials.

## limitations

Kaylo Pipe Insulation is designed for temperatures up to 1200°F. and is not recommended when operating temperatures of piping exceed this limit.

PRODUCED JM - 83

MT-PWHD-010012

February 14, 1961

EXHIBIT
A

EXHIBIT NO. E
Date 6/14/82 Case No. Bessmer
Id ____ Adm ____ Rej ____
Eileen L. Berg, N.P.
(206) 282-8545

Mr. Albert Edwards, Industrial Hygiene Eng.
Indiana State Board of Health
1330 West Michigan St.
Indianapolis, Indiana

Dear Mr. Edwards:

As requested in your letter of February 13, we list the ingredients of Careytemp Insulation:

1. Flexbond 811, a Polyvinyl Acetate Copolymer Emulsion,
   Made by Colton Chemical Co.
   1747 Chester Ave.
   Cleveland, Ohio

2. Union Carbide R-20 Silicone, a silicone waterproofing,
   Made by Union Carbide Corp., N.Y.C.

3. Cardosol NC 1107, a phenol-formaldehyde resin emulsion,
   Made by Irvington Chemical Division
   of Minn. Mining & Mfg. Co.
   500 Doremus Ave.
   Newark, New Jersey

4. Carboxy, Methyl Cellulose #7E
   Made by Hercules Powder Co.
   Wilmington, Delaware

5. Asbestos Fibre, mined and milled in Canada by a subsidiary of The Philip Carey Mfg. Co.

6. Spun Glass Roving with #707 Coating, Code #R01M89-1A,
   Made by Fiberglass Corporation
   Philadelphia, Pa.

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7. Bentonite Clay,
   Made by American Colloids Co.
   Skokie, Illinois

8. Expanded Perlite, 2 to 2.5 lbs. per cubic foot,
   Made from Nu Alexite Ore and furnished by
   Great Lakes Carbon Co.
   18 E. 48th St.
   New York, N. Y.

Over-exposure to any siliceous dust in a closely confined, unventilated area may cause irritation. However, none of the materials used in our formulation of Careytemp is toxic.

This is our first complaint, and we will be happy to furnish you any additional information upon your request.

Sincerely,

L. A. Pechstein
Assistant Secretary

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Dft 4
3 79

DJB8702
Daniel J Bussnar
Asbestos Cases
STCT/WA
4/10/82

(130)

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(Blanket License No. B-1099)

KEASBEY & MATTISON COMPANY
MANUFACTURERS OF ASBESTOS AND MAGNESIA PRODUCTS SINCE 1873
AMBLER, PENNSYLVANIA

RECEIVED
JUN 9 1982
Levinson, Friedman, Vaugen
Duggan, Diana & Horowitz

EXECUTIVE OFFICES

March 8, 1943.

# FILE COPY

KMJ No. 2831

W. W. F. Shepherd, Esq.,
Turner & Newall Ltd.,
Spotland, Rochdale.

Dear Mr. Shepherd:

Subject: Dr. Leroy U. Gardner's Asbestos Dust Experiments.

Further to this subject, I now have pleasure in handing you herewith photostat copy of Dr. Gardner's letter of February 24, 1943 to Mr. Vandiver Brown, and also copy of the "Outline of Proposed Monograph on Asbestosis."

I have found this outline to be extremely interesting. It brings out a number of important new developments, but we feel that reference to the question of cancer susceptibility should be omitted from the report since it is inconclusive.

I would appreciate receiving any comments which you may have to make concerning the enclosed outline, and also will forward you the final report as soon as received.

Yours sincerely,

KEASBEY & MATTISON COMPANY

em:ck
Encl.

First Follow
Second Follow

EXHIBIT NO PLE A
Date 6-1-82 Case No. Bossmeyer
Id. ___ Adm ___ Rej ___
Brown L. Berg, N.P.
(206) 282-8545

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JM - 83

MT-PWHD-010015

THE SARANAC LABORATORY
FOR THE STUDY OF TUBERCULOSIS
OF THE EDWARD L. TRUDEAU FOUNDATION
SARANAC LAKE, N.Y.

February 24, 1943

Mr. Vandiver Brown
Johns-Manville Corporation
22 East 40th Street
New York, New York

Dear Mr. Brown:

I have at last succeeded in analyzing most of our voluminous experimental data and assessing the results. I realize that this should have been completed before this, but the emergency has left me short-handed in the Laboratory and also necessitated my doing a good deal of extra traveling. I hope that the sponsors of our study of asbestosis will be charitable and realize that the work has far exceeded its original scope.

We have done over 40 different experiments, many of them divided into several parts, which involved exposure of animals for 1 to 3 years to various dusts. The business of preparing microscopic sections and chemically analyzing the tissues on more than 800 animals has been a job in itself. My time for studying sections and analyzing data has been so limited that we are behind our schedule. I have still not had time to write a full report of this work which will of necessity be monographic. However, for the benefit of the contributors, I am submitting a table of contents and an annotated outline to indicate conclusions and the line of argument that will be developed. The latter itself occupies 15 pages, but I hope they will find it sufficiently interesting to read. I shall work on the final manuscript as I have opportunity.

There are a few experiments still in progress which should be completed by the time we are ready for them. The work on methods of dust determination, I consider important enough to include in the study. The question of cancer susceptibility now seems more significant than I had previously imagined. I believe I can obtain support for repeating it from the cancer research group. As it will take two or three years to complete such a study, I believe it would better be omitted from the present report. If it should become possible to make this study, I hope that I may count on some of your members to supply me with enough pure, long fibre asbestos for the purpose.

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Naturally, I shall welcome any criticism that you or any of the other contributors would care to offer. Should any of them want to discuss details, I would be pleased to meet with them. May I take this opportunity to thank all the sponsors through you for the support that we have had.

Sincerely yours,

Leroy U. Gardner

Leroy U. Gardner, M. D.
Director

LUG:EBH

DX 26-59

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Rss

# OUTLINE OF PROPOSED MONOGRAPH ON ASBESTOSIS

Saranac Laboratory Study under Grant from Asbestos Association

## PART I HUMAN ASBESTOSIS

I Human Pathology - a study of 28 autopsy cases, Illustrated

2 X-ray Patterns in Asbestosis, Illustrated

3 Ash and Mineral Values in Human Asbestosis

4 Complications of Asbestosis

(a) Susceptibility to infection

i Tuberoulous
ii Non-Tuberculous
iii Cancer of the lung

5 Disablilty, causes and comparison with silicosis

6 Diagnosis

(a) History of adequate exposure
(b) X-ray film pattern
(c) Physical examination
(d) Asbestosis bodies in sputum, their significance

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PART II Experimental Asbestosis

I Methods

(a) Inhalation exposure to plant dusts.
(b) Injection into lungs through trachea of pure minerals.
(c) Injection of pure minerals into other organs.

2 Species Susceptibility

Man, guinea pigs, rabbits, cats, white mice and rats dogs.

3 Peculiar Characteristics of Asbestosis

(a) Unusual localizaion of chrysotile fibre in lungs.
(b) Rate of resultant tissue reaction more rapid than to quartz.
(c) Reaction to chrysotile not progressive after exposure ceases; again the reverse of the situation in silicosis
(d) Asbestosis Bodies

i Composition and methods of formation.
ii Occurence in different species.
iii Formation does not parallel development of fibros
iv Gradual disappearance after exposure ceases.

4 Comparative Effects of Different Asbestiform minerals.

(a) Canadian Chrysotile.
(b) Arizona Chrysotile, low iron.
(c) Crocidolite
i Bolivian specimen, stiff and elastic.
ii South African, soft and flexible.
(d) Anthophyllite
(e) Amosite.
(f) Tremolite.

5 Effects of Control Minerals

(a) Grannular Serpentine, same chemical composition as chrysotile.
(b) Glass Wool, a synthetic silicate fibre.
(c) Brucite, a fibrous magnesium hydroxide almost free of silica

6 Chemical Composition of Asbestiform minerals in Relation t Irritation.

(a) Nothing in composition correlated with relative irrita capacity.
(b) Preliminary acid treatment

i Hydrochloric acid
ii Carbonic acid

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(c) Effects of Aluminum

7 Physical Properties in Relation to Irritation

(a) Length of fibre
(b) Effect of Crushing
(c) Heat treatment

8 Nature and Significance of Asbestosis Body

(a) Formation
(b) Protective effect preventing further irritation
(c) Ultimate solubility in tissue

9 Theories of Action of Asbestiform Minerals

(a) Chemical - reasons for considering invalid
(b) Mechanical - experimental demonstration of.

10 Complications

(a) Infection, tuberculosis and other varieties
(b) Cancer of lung - experimental data suggestive but not proven

11 Disability

12 Essential Features of Hazardous Exposure

(a) Nature of dust - fibrous component and size factors
(b) Atmospheric Concentrations - probably lower than for quartz

i Inadequacy of standard impinger sampling method which does not collect the dangerous fibres
ii Electrostatic precipitator sampling preferable but method must be modified

(c) Duration of Exposure

13 Recommendations for a New Standard of Safe Atmospheric Concentrations of Asbestos Dust

(a) The Quasi-official standard of 4 to 5 million particle per cu. ft.
(b) Work upon better method of sampling

(c) Necessity for comparison of results with X-ray finding in employees

14 Prevention

(a) Chemical means not practical

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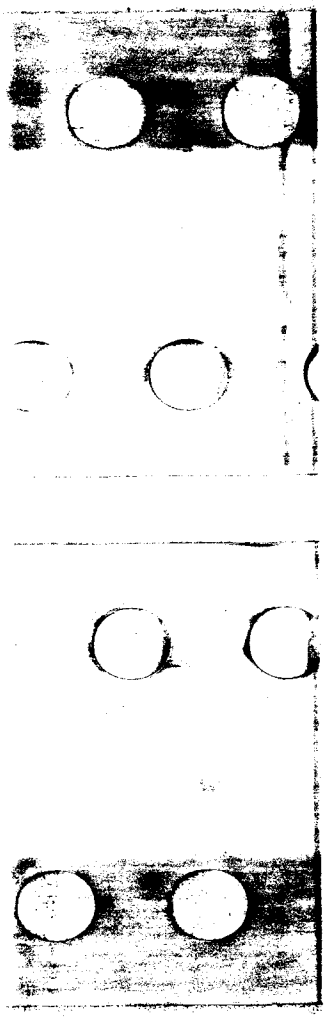
i Acidosis necessary to dissolve fibre in lungs worse than Asbestosis
ii Aluminum Therapy inapplicable
iii Chief reliance still upon dust prevention with special emphasis upon the fibrous components



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MT-PWHD-010021

ASBESTOSIS - ANNOTED OUTLINE INDICATING RESULTS

PART I - HUMAN ASBESTOSIS

I Human Pathology and X-ray Patterns - Description

Based upon 23 human autopsies

2 Ash and Mineral Values in Human Lungs.

3 Complication of Asbestosis

(a) Susceptibility to Infection

i Tuberculous- High incidence in English experience not duplicated in surveys of American Plants. Available autopsy statistics deceiving because of selection of material.

ii Non-Tuberculous- The same reason probably applies should be checked by analysis of absenteeism among asbestos workers.

iii Cancer of Lung — Ditto, but there are now on record 10 cases of lung cancer in asbestos workers. Compared to the total number of autopsies on asbestosis, this incidence is excessiv No such frequency has been discovered in silicosis or other forms of pneumoconiosis except the Schneeberg mines of radioactive ores. The evidence is suggestive but not conclusive that asbestosis may precipitate the development of cancer in susceptible individuals.

4 Disability

Clinical experience suggests that truly disabling asbestosis is manifested by less striking X-ray changes than a corresponding degree of silicosis. Such disability in asbestosis is due to disease within the lungs and not to secondary heart disease. As in silicosis, associated pulmonary infection increases the amount & severity of the dust fibrosis with resultant accentuation of disability. There is urgent need for a careful physiological study of pulmonary function in asbestosis of varying severity. Undoubtedly, there are many diagnosable cases with no significant disability.

5 Diagnosis depends upon three factors.

(a) History of adequate exposure, usually 6 to 8 years, sometimes longer, at work where both the concentration and character of the "asbestos" dust are hazardous.

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(b) Evidence of disease in a characteristic X-ray pattern.

(c) A physical examination which reveals certain characteristics signs and may reveal evidences of disability if present.

(d) Asbestosis bodies in the sputum are confirmatory when the previous factors are all positive. However, the bodies may be absent, particularly in the absence of bronchitis infection.
Asbestos bodies unsupported by other evidence do not make a diagnosis. Occasional ones have been found in about 15 autopsy specimens of persons with no known exposure and no fibrosis, probably of non-occupational origin.

**********

## PART II Experimental Asbestosis

### I Methods

(a) Inhalation Exposures to Plant Dust - Specific fibrosis in lungs, but no changes elsewhere.

(b) Injections of Suspensions of Pure Minerals into Trachea - Similar results.

(c) Injection of Suspensions of Pure Minerals into other organs - Fibres dissolved; no asbestosis bodies; tissue reaction confined to phygocytosis and encapsulation. Compare the asbestos cases of human subjects

### II Species Susceptibility

Unlike free silica, asbestos does not produce its specific effect in any organ of any species of animal. It causes fibrosis only in the lungs of man and those of a few of the species tested.

| Species | Fibrosis | Asbestos Bodies | Species | Fibrosis | Asbestos Bodies |
|---|---|---|---|---|---|
| Man | 4+ | 4+ | Cat | + | ± |
| Guinea Pig | 2+ | 3+ | White Mouse | 0 | ± |
| Rabbit | + | ±* | White Rat | 0 | 0 |
| | | | Dog | 0 | 0 |

(* ± = very small atypical asbestos bodies)

### III Peculiar Characteristics of Asbestosis

(a) Localization of fibrous minerals in lungs differs from that of granular dust particles.

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i Fibres like chrysotile having a certain degree of flexibility and elasticity accumulate within the finest air tubes; granular dust is carried further on and is widely scattered through the terminal air spaces.

(b) Rate of tissue reaction to asbestos is much more rapid than to an active dust like quartz. Evidences of formation appear as soon as sufficient concentration of fibres has localized in specific areas; with quartz, there is a latent period of months.

(c) Reaction to asbestos does not progress on cessation of exposure. Young scar tissue that may have formed, contracts and becomes more dense but the area of involvement decreases in size. In silicosis, the young nodules become larger after exposure ceases.

(d) Asbestosis Bodies are a specific concommitant of this form of pneumoconiosis. They are due to a deposit of protein and iron upon the surface of inhaled fibres. In guinea pigs they form after about 60 days of contact with the tissue. They are abundant in man and guinea pigs, (See paragraph 2 above) but much larger in the former probably because the larger sized air tubes admit larger fibres. In cats, rabbits and mice, there is an atypical coating of a few of the fibres after much longer residence in the lungs; in rats and dogs no bodies could be discovered. From paragraph 2 it is apparent that their occurence does not parallel development of fibrosis. In lung injection experiments, the bodies have not developed until after fibrosis is well advanced. The number of bodies seems to decrease several years after exposure ceases.

V Comparative Effects of Different Asbestosis Minerals

(a) Canadian Chrysotile - highly irritating.

(b) Arizona Chrysotile (low in iron) equally irritating and produces just as many asbestosis bodies as the Canadian product with over 11 times as much iron.

(c) Crocidolite - The South African blue asbestos is known to cause asbestosis. Only a limited supply of this material in pure form was available, most of it was used earlier in the work in non-productive experiments. For the later critical injection tests into the lungs, a Bolivian variety was substituted because of its high purity. Its fibres were much straighter, stiffer and more elastic than the cottony South African variety. Perhaps because of these peculiarities, it has not given reactions comparable to chrysotile. It produced asbestosis bodies but did not localize in the terminal air tubes nor cause any fibrosis. Tests now being repeated with a typical South African crocidolite with physical characteristics simulating chrysotile.



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(d) Anthophyllite - stiff, straight fibres - atypical asbestosis bodies forms slowly but no localization or fibrosis in lungs.

(e) Amosite - Ditto.

(f) Amphibole - Ditto.

(g) Tremolite - Ditto but very few asbestosis bodies - Observation being continued.

V Control Mineral

(a) Granular Serpentine of same chemical composition as chrysotile is inert causing no fibrosis in lungs or other organs. It attracts iron from the lungs but of course, no "bodies" develop.

(b) Glass Wool (a synthetic silicate) fibres are not inhalable from air-borne suspensions, apparently because of their stiffness (the diameter is not responsible as some used were less than 1 micron thick) On injection into the lungs, they do not localize in the air tubes but are widely scattered. They cause no fibrosis. After 3 or 4 months in contact with lung fluid, a few glass fibres take up iron but remain smooth. They never show the swollen ends and lateral projections of the true asbestosis bodies.

(c) Brucite of interest because it is a fibrous mineral practically free of silica (0.9%). Crystallographically the arrangement of its Mg and OH groups in each unit cell is similar to that in chrysotile. The sample used also contained about 16% iron, probably from contaminating magnetite. The fibres are stiff and needle like. Observations not yet completed but after 2 months in the lungs, typical asbestosis bodies develop but there is as yet no fibrosis. The fibre are scattered through the lung instead of being localized inside the terminal air tubes and tissue reaction occurs around, instead of within the tubes.

VI Chemical Composition in Relation to Irritation

(a) Nothing in the following chemical compositions can be correlated with variations in capacity to provoke tissue reaction.

(See Table Next Page)

26-66 (4)

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| | Chryso-tile | Crocid-olite | Antho-phyllite | Anosite | Amphi-bole | Tremolite | Brucite |
|---|---|---|---|---|---|---|---|
| $SiO_2$ | 37.43% | 34.99% | 57.43% | 48.23% | 55.04% | 56.20% | 0.90% |
| $Fe_2O_3$ | 2.35% | 16.27% | 0.81% | 4.06% | 3.08% | 7.21% | 6.72% |
| FeO | 0 | 4.29% | 0 ? | 33.85% | 0 | 0 | 9.36% |
| $Al_2O_3$ | 0.36% | 1.02% | 0.25% | 1.09% | 1.69% | 0.56% | 0.46% |
| CaO | 0.05% | 0.79% | 0.44% | 2.01% | 12.22% | 4.45% | 0.40% |
| MgO | 38.77% | 12.25% | 29.54% | 6.29% | 23.29% | 20.62% | 53.99% |
| $Na_2O$ | 0.29 | 6.92 | 0.52 | 0.33 | 0.40 | 6.78 | 0.91 |
| $K_2O$ | 0.08 | 0.57 | 0.13 | 0.10 | 0.12 | 0.99 | 0.16 |
| Loss <105° | 4.30 | 0.02 | 0.62 | 0.68 | 0.32 | 0.34 | 0.53 |
| >105° | 14.92 | 2.56 | 2.42 | 1.51 | 3.59 | 2.78 | 26.66 |

(b) Acid treatment of chrysotile fibres

i One hour in dilute or concentrated HCL does not alter appearance of fibre but after such treatment it rapidly dissolves and disappears on injecting into living tissues.

ii Treatment with $CO_2$ bubbled through water or lung juice suspensions of chrysotile fibres causes partial solution with liberation of silica and magnesia.

(c) Colloidal allumina does not neutralize the effects of asbestc as it does quartz. On injecting chrysotile suspended in aluminum hydrate solution, fibrosis and asbestos bodies develop at the usual rate. It remains to demonstrate whether th fibres become coated with a layer of aluminum monohydrate as has been proved in the case of quartz. If they have, the coa does not affect their capacity to irritate tissue.

VII Physical Properties in Relation to Irritation of Lung Tissue

(a) Length of Fibre

Short chrysotile fibres under 3 microns are practically inert. 20 to 50 micron fibres cause typical fibrosis.
The effects of longer ones could not be tested for technical reasons.

(b) Crushing completely destroys the fibrous structure of chrysotile. With loss of structure, all capacity to irritate disappears.

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(c) Heat At ignition temperatures, water is driven off but the fibre structure is preserved. Fibres become extremely brittle. The physical change alters typical localization within the lungs, no fibrosis develops, reaction limited to phagocytosis. No asbestosis bodies formed.

VIII Nature and Significance of Asbestosis Bodies

(a) Bodies probably result from deposition of iron and organic matter on a slowly dissolving fibre of asbestos. The source of the iron is more likely to be the lung tissue than the mineral itself as the coating is just as heavy on fibrous minerals of low iron content as upon those high in iron.

(b) The effect of asbestosis body formation is assumed to be protective although it has not been possible to isolate a large enough quantity of these structures in unaltered form for purposes of test. The smooth rounded ends presented by the bodies would not be mechanically irritating.

(c) If they were capable of causing irritation, the fibrosis in the lungs should progress after exposure ceases which it does not.

(d) The gradual disappearance of bodies (and fibres) long after exposure points to ultimate solubility in tissue fluids.

(e) The bodies are probably a fortuitous concommitant rather than a cause of fibrosis.

IX Theories of Irritant Action of Asbestiform Minerals

(a) Chemical These experiments do not confirm the theory that asbestosis is merely a form of silicosis resulting from free silica liberated in the solution of a silicate molecule. If this were true asbestos, like quartz, should cause fibrosis in any organ of any species for the experiments have shown that injected asbestos dissolves in these locations. However, it does not cause such reaction in any location but the lungs of [illegible] species.

(b) Mechanical Irritation

We are proposing the theory of mechanical irritation which is manifested only in the lungs because this organ is the only one whose normal physiological functions involve a high degree of mobility. Experiments designed to prove the necessity for motion in this tissue have failed for technical reasons.
For this theory to be applicable, it is necessary that the fibres be concentrated in the fine terminal air tubes. It has been shown that only chrysotile of the asbestiform minerals thus far has the proper physical characteristics to insure such localization. It is also essential that the fibre shall persist long enough before it dissolves in the lungs of species like mice, rats, dogs. It apparently dissolves so rapidly that it exerts no irritation. Similarly rapid solution may explain in part, the lack of fibrosis in organs other than the lungs.

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The fibres must be long enough so that they cannot be completely surrounded by phagocytic cells which would prevent contact of these round, broken ends with the delicate cells supporting the air tubes. Observation has demonstrated that these conditions are realized in guinea pigs treated with long fibre chrysotile and fibrosis results. With the other asbestiform minerals that have been tested, some or all of the prerequisite were lacking and no fibrosis developed.

(c) If the irritation were chemical, fine serpentine which has the same chemical composition as chrysotile should have also caused fibrosis. The crushed chrysotile should have been more active than intact fibres, because of the greater surface areas exposed to body fluids. On the assumption that chrysotile, like quartz, becomes coated with a very thin layer of aluminum on treatment with colloidal aluminum hydroxide, capacity to cause fibrosis should be destroyed if the action were chemical but such is not the case.

(d) The heavy coating resulting from asbestosis body formation apparently does stop tissue reaction but here the effects are probably mechanical for reasons cited.

(e) Heat sufficient to alter chemical structure destroys power to irritate but it also alters essential physical characteristi that affect localization of the fibres in the lungs.

X Complications

(a) Susceptibility to Infection

i Tuberculous - Asbestos behaves like most other mineral dusts in this respect and not like quartz which specifically increase native susceptibility to the tubercle bacillus. This infection may spread for a time but then heals. The resultant fibrosis accentuates that caused by the mineral fibre.

ii Non-Tuberculous - of no greater frequency than in animals inhaling dusts of other kinds. Occasional epidemics of pneumonia occur in our dust rooms, but these are due to methods of housing rather than to dust; they ~~can~~ also occur in unexposed animals.

iii Cancer of Lung

No experiments were particularly designed to elucidate this point but certain evidence suggests that asbestosis may actually favor development of tumors in susceptible species.

1 In guinea pigs, rabbits, rats, cats and dogs lung tumors are rare.

2 When these species were subjected to 2 to 3 years inhalation of asbestos dust, the incidence of lung tumor was not increased.

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3 Some strains of white mice do develop tumors without apparent cause.

4 Such a strain of white mice was unintentionally used in three inhalation experiments with asbestos.

5 Of 11 mice inhaling long fibre asbestos for 15 to 24 months 8 developed malignant tumors in their lungs and 6 of them had tumors in other organs. The incidence rate 81.8% is excessive.

6 Of 22 mice inhaling short fibre asbestos for not longer than 12 months only 3 developed lung tumors. Rate 13.6%

7 As controls, we have only the experience with mice in other dust experiments.
For short periods, there were 51 mice exposed to 4 other kinds of dust for 10 to 12 months. Incidence of lung tumor 1.9%.
For long periods, there were 143 mice exposed to 4 different kinds of dust, including pure quartz, 23 to 31 months. For all this group of mice the average incidence of lung tumor was 13.8%: the highest rate (25%) was in a subgroup exposed to flint dust.

Thus the incidence of lung cancer in the long fibre asbestos mice was over 15 times the average for mice inhaling other dusts for comparable periods and over 3 times the maximum for any other group Mice exposed to the practically inert short fibre asbestos showed fewer lung tumors although 7 times more than those in short exposur to other dusts.

These observations are suggestive but not conclusive evidence of a cancer stimulating action by asbestos dust. They are open to several criticisms. The strain of mice was not the same in the asbestos experiment as in many of the others cited; apparently the former were unusually susceptible. Not enough animals survived in the dust for longer than the 15 months apparently necessary to produce many tumors. There were no unexposed controls of the same strain and age and no similar controls exposed to other dusts. It is hoped that this experiment can be repeated under properly controlled conditions to determine whether asbestos actually favors cancer of the lung.

XI Disability

Cannot be determined in animals. The accidental deaths were from the same causes met with in all our dust inhalation experiments.

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XII Essential Factors of Hazardous Exposure

(a) Nature of Dust

i The hazrds increases with the proportion of intact fibres in the dust. Granular material and crushed fibre are inert diluents.

ii The long fibres must be thin enough (1-3 Microns) and short enough (under 50 Microns?) to be inhaled.

iii Very short fibres (under 3 Microns) are practically inert.

(b) Atmospheric Concentration Still under study.

Apparently this factor is lower than in the case of dusts composed of granular minerals but methods of estimation are misleading.

i The average standard Public Health Service impinger count in the long fibre asbestos dust room was 40 million particles per cu. ft. of air. This concentration caused fibrosis visible to the naked eye in 20 to 24 months. For comparison the average impinger counts in an experiment with pure quartz was 120 million particles per cu. ft. and fibrosis developed at about the same rate.

ii However, impinger counts are deceptive because by this method of sampling very few fibres, which are the significant elements in the dust are collected.

iii Sampling with an electrostatic precipitator is a much more efficient means of collecting fibres from air-borne suspensions. Samples from our long fibre asbestos room showed that the dust in the air contained 32.5% of fibres few of which had been collected or counted in the impinger sample. The latter sampled largely the inert granular particles.

iv As ordinarily employed precipitator samples are weighed and the results expressed in mg. per cubic foot of air. There is no means of converting such values into numbers of particles particularly when these vary in size, shape and specific gravity.

v Simultaneous sampling with precipitator and standard impinger yielded the respective values of 0.65 mg and 60 million particles per cubic foot of air.

vi Theoretically the best index of hazard would be either the number or weight of fibrous elements in the dust.

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(b) Apparently aluminum, which is so effective against free silica has little influence upon fibrous chrysotile.

(c) However, it would be of great theoretical interest to treat a few cases with real dyspnoea from asbestosis by aluminum inhalation. We are by no means certain whether the favorable results upon advanced silicotics are due to a chemical neutralization of quartz in the lungs. Aluminum might have some peculiar general pharmacological effect which influences dyspnoea.

(d) Chief reliance must still be based upon control of dust in the air and, in view of these experiments, particularly upon the fibrous components of such dust.

Louis Gladden

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9390(FA-287)
Ser 113
30 JUL 1969

From: Officer in Charge, Naval Ship Engineering Center, Philadelphia Division
To: Commander, Naval Ship Engineering Center

Subj: Asbestos; hazards of; NAVSECPHILADIV Project FA-287

Ref: (a) NAVSEC ltr 6101C:EC:an, 9390, Ser 278 of 7 Apr 1969
(b) NAVSECPHILADIV ltr 6764:MA:lal, 9390(FA-287), Ser 688 of 24 Apr 1969

Encl: (1) Report of Travel

1. By reference (a), NAVSECPHILADIV was directed to participate in an asbestos hazard survey to be jointly conducted by NAVSEC and BUMED. As described in reference (b), visits are to be made to selected Naval and private shipyards to personally observe practices, capabilities, and hazard problems attending the use of insulation aboard ships. Accordingly, this report of travel to three shipyards is submitted for your information as enclosure (1).

J. W. Murdock
J. W. MURDOCK
By direction

Copy to:
OP 98
BUMED 732
NAVMAT 046
NAVSHIPS 072C, 00A
NAVSEC 6000, 6100, 6101B, 6101C, 6101E, 6105, 6153F
NAVSECSDIEGODIV 6673
NAVSECNORDIV 6603

NAVSECPHILADIV 6700B01, 6712, 6720, 6723, 6760, 6764(4)

EXHIBIT J-45 DATE
WITNESS Bessmer
Mary A. Whitney 682-1427

EXHIBIT 32 DATE
WITNESS
DIANE C. STANLEY 682-1427

6704:MA:lal
9300(M-267)
Ser 1189

REPORT OF TRAVEL

I. Subject and Purpose of Trip:

Selective visits to several naval and private shipyards have been proposed to personally observe the practices, capabilities and the hazard problems encountered in the lagging and pipe covering operational procedures aboard ships and in the fabrication shops.

II. Places Visited:

Long Beach Naval Shipyard, Long Beach, Ca.
Puget Sound Naval Shipyard, Bremerton, Wa.
Lockheed Shipbuilding and Construction Company, Seattle, Wa.

III. Dates of Visit:

23 to 27 Jun 1969

IV. Persons Making Trip:

Mr. E. Cherowbrier, Project Coordinator, NAVSEC
Mr. M. Amauth, Materials Engineer, NAVSECPHILADIV
Mr. B. Walters, Engineering Technician, NAVSHIPYDPHILA

V. Persons Contacted:

Long Beach Naval Shipyard

CAPT C. M. Hart, Shipyard Commander
CDR J. Smith, Shipyard Medical Officer
Mr. Clifford Krieger, Safety Supt.
Mr. Sheldon Manning, Industrial Hygienist
Mr. G. C. Carmine, General Foreman II, 56 Shop

Enclosure (1)

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Puget Sound Naval Shipyard

Dr. E. W. McBratney, Medical Officer
Mr. D. J. Bessemer, Industrial Hygienist
Mr. Carl Mangold, Assistant Industrial Hygienist
Mr. C. R. Chute, General Foreman II, 56 shop
Mr. Sacker, General Foreman II, 56 shop

SUNSHINE 13, Seattle, Wa.

Mr. E. T. Meyers, Jr., Chief Engineer
Mr. P. Sias, Value Analysis Engineer

Lockheed Shipbuilding and Construction Company

Mr. B. J. Lehman, Chief Engineer
Mr. R. L. Stevenson, Value Engineer
Mr. J. Paul, Safety Engineer

J. P. Stevens Company and Carolina Narrow Fabric Company

Mr. J. Frey, Representative

VI. Background

As directed by NAVSEC, a mail survey of Naval and private shipyards has been conducted by NAVSECPHILADIV to determine the extent to which asbestos-containing materials are being employed on piping, ducts and boilers of naval vessels. In order to personalize this survey, selective visits have been authorized to candidate shipyards to observe what and where insulating materials are being used in the shops and ships, the mode of application of these materials, the availability of safety manuals and safety equipment and how closely the recommended precautions are being followed. The effectiveness of substitute materials for asbestos is to be evaluated and incorporated in recommendations to NAVSEC upon completion of the overall study.

VII. Observations:

A. Long Beach Naval Shipyard



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1. The insulation pad shop of this shipyard has been remodelled by the installation of a lowered ceiling to enclose the rafters and thereby help eliminate overhead particle accumulations which later could be air-borne. Additional exhaust ventilation has been supplied to maintain a relatively dust-free atmosphere. A roll of asbestos cloth conforming to Federal Specification SS-C-466, U. C., 80% asbestos and 20% cotton, was on a roller at the end of the layout and cutting table. A water spray system was being utilized to dampen the cloth as it was unrolled. The cloth is measured and cut by a rotary electric hand cutter while damp. The cloth was being stitched on a power sewing machine and formed into pads which enveloped an Owens-Corning fiber glass felt mat designated as W-1200-6 and conforming to military specification, MIL-I-16411, type II, as a replacement for asbestos felt (MIL-I-1791, type A, plain). These pads are utilized on control valves and pipe joints and are suitable for temperatures up to 1200 F, depending upon their thickness.

The effectiveness of a Stryker Cast Cutter in minimizing dust production by making the initial cut through the insulation during rip-out operations was demonstrated.

2. No rip-out operations were underway on board the USS CANBERRA (CA-70) at the time of this visit. Precautions to be taken during tearing out of old insulation were discussed with the shop Foreman, the Safety Officer and the Industrial Hygienist. Dust samples have been collected aboard ship and counted in the laboratory by the method approve in 1942 by the Association of Industrial Hygienists utilizing an impinger, light field technique and the Bausch and Lomb Dust Counter. Particle size evaluations have also been determined in as much as fiber length has played an important part in the development of asbestosis among pipe coverers and insulators. Plastic bags are used for collecting ripped out insulation and are sealed and removed to collecting vehicles on the dock. Ventilation is provided on the ship during insulation applications and the workers observed were wearing respirators where any possibility of dust proliferation existed.

3. Chilled water system piping and ventilation ducts were insulated with elastomeric plastic foam conforming to MIL-P-15280. The plastic foam is suitable for temperature ranges from -20 F to 150 F. Rewetable asbestos cloth manufactured by H. K. Porter Company was lagged over the elastomeric foam insulation.



Enclosure (1)

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4. Johns-Manville Cerafelt, a refractory fiber felt, conforming to MIL-I-23139, suitable for use up to 2300 F, was being used for the stress relieving of pipe joints, thereby eliminating the use of asbestos felt (MIL-I-15091, type A, plain) which has been used in up to 5 inches thickness for this purpose. Molded calcium silicate, conforming to MIL-I-2781, grade III, class e, for thermal pipe insulation for 1200 F is being used to replace grade III, class e (fibrous asbestos insulation) of this same specification for use on hot piping systems.

5. Block calcium silicate conforming to MIL-I-2819, class III, suitable for use up to 1500 F is used on hot water tanks, machinery, boiler steam drums, and main steam flanges. This insulation is applied as a 4 inch thick layer, secured in place with 16 gauge iron wire, and is overlayed with open wire mesh and then coated with magnesia cement conforming to SS-C-160, type I. Following setting of the cement, the component is lagged with asbestos cloth, U. C., 80% asbestos and 20% cotton or rewettable asbestos cloth manufactured by H. K. Porter Company.

6. A meeting held with the Commanding Officer and the Medical Officer of the shipyard revealed that an all out effort is being made to minimize asbestos dust exposure in their shipyard. The Commanding Officer indicated that when new replacement materials became available, the pipe covering shop has adopted them in all possible areas of application. He also indicated that the shipyard will modify existing insulation specifications if necessary, to meet the shipyard's needs to lessen the exposure of the pipe coverer-insulator to unnecessary respiratory hazards. The wearing of respirators during dust producing operations has been made mandatory and each respirator must be equipped so that replacement filters can be inserted at the first sign of respiratory difficulty caused by a filter clogged with fibrous dust.

B. Puget Sound Naval Shipyard

1. We visited the medical department and the industrial hygiene division of this naval shipyard and contacted the industrial hygienist and his assistant. The laboratory has long been oriented to dust counting by approved techniques of the American Hygiene Association. All shop and ship insulation procedures are monitored and the counting of dust particles is a continuing operation. The laboratory, in addition to nuclear monitoring capabilities, has facilities for metallographic and organic analyses and is manned by a health physicist and chemists. X-ray film records of pipe coverers have been maintained for the past 15 years and have revealed an incidence of 21% asbestosis for this category of workers as opposed to 3% for boiler makers who are only accidentally exposed to asbestos dust. A contemplated study to be conducted will involve simultaneous photographing of the exact location and position of sampling devices relative to the



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worker and the operation. Worker habits, such as smoking, will be correlated with the findings.

The medical officer concurred in the magnitude and importance of this study and pledged full support.

2. The pipe covering shop had good housekeeping practices with good exhaust facilities, adequate wetting down with a reduction to at least half the previous count of air-borne particles when dry handling of portable insulation covers was practiced. The chief materials used in the shop for portable covers are asbestos cloth (SS-C-466, grade A, 90% asbestos for use on metals up to 500 F) and fiber glass fill (MIL-I-16411, type II suitable for temperatures up to 1200 F). The portable covers are fitted with Dergen hooks which facilitate installation of the covers on flanges and valves aboard ship.

3. The USS DETROIT (AOE-4) was visited to observe shipboard operations. No ripping out of old insulation was in evidence. However, during such operations respirators are worn on a continual basis. The industrial hygienist issues and supervises the utilizing of respirators and feels that the Safeline and American Optical devices offer least consumer resistance.

4. The chilled water piping system was insulated with elastomeric plastic foam (MIL-P-15280, temperature range from -20 to 180 F). Painting of the external surfaces was conducted with a suitable paint system in conformity with NAVSHIPS Technical Manual 9190. Ventilation ducts however, were covered with fibrous glass board (MIL-I-742) and covered with rewettable asbestos cloth.

5. Hot piping systems were insulated with molded thermal pipe insulation composed of calcium silicate, conforming to MIL-I-2781, grade III class e, with a temperature range up to 1200 F. This is a suitable replacement for fibrous asbestos insulation grade III, class f, of the aforementioned specification.

6. Calcium silicate insulation block conformity to MIL-I-2619, temperature range up to 1500 F, was used to insulate boiler steam drums, deaerating feed tanks, water heaters and machinery. These blocks are used as a replacement for asbestos felt (MIL-I-15091, type A, plain).



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7. It was revealed that molded cork pipe insulation conforming to MIL-P-829 and having a use temperature range of -20 F to 40 F currently is being used on refrigeration systems on newly constructed ships.

8. Both asbestos cloth, grade U. C., 80% asbestos conforming to SS-C-466 and a rewettable asbestos cloth manufactured by H. K. Porter were used as lagging on all piping systems, vent ducts and machinery depending upon availability of existing materials.

9. Fiber glass felt, conforming to MIL-I-16411, temperature range up to 1200 F, is used to insulate machinery, the void space around flange joints, under portable insulation covers and on irregular surfaces. This use of fiber glass felt replaces that of asbestos felt conforming to MIL-I-15091, type A, plain.

10. Preformed fibrous glass pipe insulation (MIL-I-22344) is used on piping systems to withstand temperatures up to 370 F. This substitution is satisfactory for the replacement of preformed asbestos fibrous pipe insulation, MIL-I-2781, grade II, class c.

C. Lockheed Shipbuilding and Construction Company

1. A discussion meeting was held with the Value Analysis Engineer at SUBSHIPS in Seattle, Washington. Mr. Sias expressed concern with the present insulation practices aboard ships. He felt that many areas are being over-insulated and in many instances with the wrong material and that studies should be conducted with alternate materials of varying thicknesses and overall performance be evaluated.

2. The shipbuilding facility has no shop for the manufacture of portable insulation covers since all installations are performed by private contractors.

3. Visits to the USS NASHVILLE (LPD-13) and the USS RATHBURNE (DE-1057) revealed mechanics installing glass bulkhead insulation (MIL-I-742) and blocking off diesel exhaust muffles with calcium silicate material conforming to MIL-I-2519. Calcium silicate blocks (MIL-I-2519) with a temperature range up to 1500 F are used on boiler steam drums and high and low pressure main propulsion turbines. A coating of magnesia cement (SS-C-16 type I) is subsequently applied.



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4. Rewettable asbestos cloth supplied by H. K. Porter was used on all piping systems and machinery throughout the ship except in those areas where elastomeric foam plastic was employed.

5. At a meeting with the Lockheed head engineer, it was revealed that all Lockheed insulation installations conform with standards of the Department of Labor, the U. S. Coast Guard and the U. S. Maritime Commission. Safety practices employed on the ships are controlled by private contractors who also are the insulation installers. Therefore, Lockheed has no direct control over personnel employed by private subcontractors. However, if noticeable violations of safety are observed, the Lockheed management will issue strict warnings to the violator.

6. A conference was held at SUPSHIPS Office in Seattle with Lockheed personnel, the value analysis engineer and Mr. J. Frey representing J. P. Stevens and Carolina Narrow Fabric Company. Various samples of fiber glass cloth and glass tape were exhibited. The supplier of the yarn was Owens-Corning Company and the fabricators were J. P. Stevens and Carolina Narrow Fabric Company. These yarns have low abrasion and high elongation values and may contain 1% lubrication for ease of fabrication. Stevens' style #1925 and #84205 have been specifically designed as shipboard lagging and jacketing material for use over insulation where the temperature of the insulated surface is between 125 F and 1000 F. The lagging fabrics #1925 and #84205 are finished with treatment #9383 to set the weave and reduce fraying when cut. Other finishes are available if fabric is to be torn. Style #1925 was designed to replace 2.25 lb/sq yd asbestos fabric on turbine blanket, fittings and flange covers. It may be used on both surfaces of removable covers and for wrapping engine exhaust pipes. Style #84205 was designed to replace 0.75, 1.05, 1.11 and 1.45 lb/sq yd asbestos fabrics as a lagging or jacketing material over insulation where the surface temperature is between 125 F and 1000 F. Mr. Frey indicated that Benjamin Foster Company has a adhesive (Insulfast #30) that is compatible with J. P. Stevens fiber glass cloth. The adhesive must be applied independently since a rewettable glass fabric is not currently available. It was also suggested that 3" fiber glass tape be used over elastomeric foam plastic in areas where sailor-proofing is required aboard ship.

M. Annuth

M. ANNUTH

B Walters

B. WALTERS

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Enclosure (1)

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