Analysis of S. 852 Fairness in Asbestos Injury Resolution (FAIR) Act

September 2005

Prepared by Bates White, LLC

Contact information:

Charles E. Bates, Ph.D.
Direct 202.216.1145
Main 202.408.6110
charles.bates@bateswhite.com

Charles H. Mullin, Ph.D.
Direct 202.747.2084
Main 202.408.6110
charlie.mullin@bateswhite.com

A copy of this report can be downloaded at
http://www.bateswhite.com/news/pdf/2005_Bates_FAIR_Act_report.pdf

Table of contents

Table of exhibits

I. Executive summary

- Bates White, LLC (Bates White) is an economic consulting firm with extensive experience in statistics, econometric modeling, and economic analysis. We provide senior management with sensitivity analyses tailored to their assessment of major issues, while incorporating their overall attitudes toward risk. As part of these analyses, Bates White has led the development of several highly sophisticated, customized analytical tools that estimate clients' future asbestos liability from personal injury and property damage lawsuits.
- Bates White examined the economic viability of the Trust Fund that the Fairness in Asbestos Injury Resolution (FAIR) Act of 2005, Senate Bill 852, would create. We conclude that the Trust Fund proposed under S. 852 is not financially viable. The Fund would create entitlements to pending and future claimants that substantially exceed the $140 billion in receipts specified in S. 852.
- Two categories of claimants pose the greatest threat to the Fund's financial viability.
    - The FAIR Act would create entitlements for many individuals with lung and other cancers who were not compensated in the historical tort environment. This entitlement likely would result in at least a ten-fold increase in the number of lung and other cancer claims relative to the tort system.
    - The FAIR Act also could revive dormant claims, which have settled with most but not all defendants. These individuals could recover the difference between amounts previously collected in the tort system and the award levels specified in S. 852.
- Due to the foregoing two factors, even under conservative assumptions, S. 852 would create entitlements valued at $300 billion. The statutory funding level of the national Trust is $140 billion, leaving a $160 billion shortfall. As a result of the shortfall, the Trust Fund would sunset within three years of its inception with a debt of more than $45 billion.
- Relative to the conservative scenario of $300 billion, we quantify the potential impact of four additional risk factors. In aggregate, these additional factors could increase the entitlements to $695 billion.
    - More than 3.5 million individuals who satisfy the occupational exposure criteria of S. 852 will develop lung and other cancers between 2001 and 2055. Asbestos is only

one of many risk factors that may be causally related to these malignant conditions. As a result, very few individuals with lung and other cancers historically have had a viable claim in the tort system. In contrast to the tort system, the FAIR Act would compensate lung and other cancer patients who can demonstrate pleural changes. Both the medical literature and historical claims data from the Manville Trust suggest that the prevalence of pleural changes in the asbestos-exposed population is likely to be in the 10 percent to 25 percent range. In our conservative scenario we use 10 percent. Increasing the prevalence of pleural changes to the high end of the likely range of 25 percent raises the entitlements by $235 billion.

- Under reasonable assumptions, the size of the population in 2000 that would satisfy the occupational exposure criteria of S. 852 ranges from 27 million to 34 million. In our conservative scenario we use the lower end of this range. Increasing the size of the occupationally exposed population to 34 million could enlarge the entitlements by $90 billion, solely by raising the number of lung and other cancer claimants.
- Family members of eligible workers may be eligible for compensation under the take-home provision of the FAIR Act. In our conservative scenario we do not account for this. If eligible, spouses alone could enlarge the entitlements by $45 billion, solely by raising the number of lung and other cancer claimants.
- S. 852 may compensate dormant claimants who have settled with most but not all defendants. If dormant tort claimants (excluded under the conservative scenario) are eligible, they could increase the entitlements by $25 billion. This money would be born entirely in the first few years of the Fund's operation.

- Even under conservative assumptions, for the Trust Fund to be viable only 41 percent of future eligible claimants can file, far below the claiming rate of many asbestos torts. Depending on the realization of the four additional risk factors detailed above, the threshold claiming rate could fall as low as 14 percent.
- Our analysis differs from that of the Congressional Budget Office (CBO) in three key ways.
  - CBO assumes individuals with lung and other cancers would file claims under S. 852 at the same rate they filed claims in the tort system. However, S. 852 replaces the adversarial environment of the tort system with an administrative process and an

average entitlement of about $500,000 for qualifying individuals with lung and other cancers. In order for CBO to be correct, more than 85 percent of qualifying individuals with lung and other cancers would have to decide not to collect their $500,000 entitlement.

  - We quantify the potential impacts of dormant tort claims and take-home exposure. CBO does not account for either of these factors.
  - We estimate there will be fewer impaired non-malignant claimants than CBO. CBO based their estimate on the experience of the Manville Trust. We base our estimate on the Manville Trust audit data, which results in half the number of impaired non-malignant claims estimated by CBO.

- Likely entitlements that S. 852 would create for individuals impaired by naturally occurring asbestos or eligible claimants from Libby, Montana could further increase the shortfall of the Fund. Neither our study nor CBO's study account for these provisions.

II. Bates White, LLC

(1) Bates White, LLC (Bates White) is a national consulting firm offering services in economics, finance, and business analytics to leading law firms, FORTUNE 500 companies, and government agencies. We provide our clients with a unique combination of quantitative and analytical expertise, and an understanding of business issues across a range of industries.

(2) The Bates White Environmental & Product Liability (EPL) practice offers economic consulting, litigation support, class certification, and liability estimation services. Our systematic approach combines scientific and legal expertise with advanced analytical tools to help clients understand and quantify potential liabilities. Our methodologies and expertise evolved from our extensive experience in asbestos, where we are a recognized industry thought leader.

(3) In the context of asbestos, Bates White provides expert testimony in both bankruptcy and coverage litigation, as well as expert opinions with regard to insurance valuation, due diligence evaluations, and financial reporting services. Through the course of this work, Bates White has seen claims data from numerous defendants and insurance companies. The knowledge gained across all of those matters has been invaluable in assessing the financial viability of S. 852.

(4) As part of our work in asbestos-related matters, Bates White has led the development of several highly sophisticated, customized analytical tools that estimate clients' future asbestos liability from personal injury and property damage lawsuits. In the early 1990s, Dr. Charles Bates developed a computer model of the incidence of asbestos-related malignant diseases.[1] Over the years, Bates White has performed ongoing research to improve this model. This state-of-the-art model became the industry standard. More recently, Bates White has pioneered research on the recruitment of non-malignant claimants, and challenged epidemiological-based forecasts of future non-malignant claims.

(5) In addition to research on asbestos matters, Bates White has analyzed the historical U.S. usage of tobacco from 1920 through 2002. This research provides us the smoking history of potential lung cancer patients who could qualify under S. 852.

---

[1] Referred to as the "KPMG Incidence model," this model was developed in consultation with Dr. William Nicholson of the Mt. Sinai School of Public Health under the direction of Dr. Thomas Vasquez of KPMG.

III. Financial viability of the national trust

III.1. Summary

(6) Bates White examined the economic viability of the Trust Fund that the Fairness in Asbestos Injury Resolution (FAIR) Act of 2005, Senate Bill 852, would create. We conclude that the Trust Fund proposed under S. 852 is not financially viable. The Fund would create entitlements to pending and future claimants that substantially exceed the $140 billion in receipts specified in S. 852.

(7) Two categories of claimants pose the greatest threat to the Fund's financial viability. First, S. 852 would create an entitlement for many individuals with lung and other cancers who were not compensated in the historical tort environment. This entitlement likely would result in at least a ten-fold increase in the number of lung and other cancer claims relative to the tort system. Second, the Act may compensate dormant claimants who have settled with most but not all defendants. The cost of these dormant claimants would be born entirely in the first few years of the Fund's operation.

(8) More than 3.5 million individuals who satisfy the occupational exposure criteria of S. 852 will develop lung and other cancers between 2001 and 2055. Asbestos is only one of many risk factors that may be causally related to these malignant conditions. As a result, very few individuals with lung and other cancers were compensated in the historical tort environment. In contrast to the tort system, S. 852 would compensate lung and other cancer patients who can demonstrate pleural changes. Pleural changes are indications of abnormalities to the thin linings of the lung that may be associated with asbestos exposure. They are different from asbestosis, which is not a form of pleural change but a disease of the lung itself. Both the medical literature and historical claims data from the Manville Trust suggest that the prevalence of pleural changes in the asbestos-exposed population is likely to be in the 10 percent to 25 percent range. This level of prevalence translates into 350,000 to 875,000 individuals with lung and other cancers who are entitled to compensation under S. 852.

(9) Most asbestos claimants in the tort system name numerous defendants in their complaints, as many as 50 or 100. Through time, many of these defendants settle and others are dismissed, but a few apparently remain unresolved indefinitely. Furthermore, many defendants view claims that remain unresolved for an extended period, such as seven to 10 years, as dormant or inactive; they never expect to hear from that plaintiff again. S. 852 may compensate these dormant claimants in exactly the same manner as active tort claims.

(10) We assess the financial viability of the Trust in two stages. First, we define a conservative scenario that understates the entitlement that would be created. In this conservative scenario, we assume a 10 percent prevalence of pleural changes, exclude dormant tort claimants, and ignore other sources of claimants. Second, we assess the potential increase in the entitlement associated with each of four additional risk factors—greater prevalence of pleural changes, larger exposed population, family members of eligible individuals, and dormant tort claimants.

(11) Under the conservative scenario, S. 852 would create entitlements valued at $300 billion. The statutory funding level of the national Trust is $140 billion, leaving a $160 billion shortfall. As a result of the shortfall, the Trust Fund would sunset within three years of its inception with a debt of more than $45 billion. Accounting for the additional risk factors could raise the entitlement to $695 billion.

(12) We have not attempted to quantify the entitlement associated with three types of claimants—individuals impaired by naturally occurring asbestos, claimants from Libby, Montana, and unimpaired non-malignant claimants. Unimpaired non-malignant claimants fall into Level I and may seek reimbursement for the difference between the cost of medical monitoring covered by a claimant's health insurance and a claimant's out-of-pocket expense for monitoring. These individuals are not likely to seek medical treatment or compensation from the Fund because they are unimpaired. Furthermore, the enactment of S. 852 would eliminate the incentive to recruit these unimpaired individuals.

(13) The remainder of Section III.1 provides a more detailed description of the conservative scenario, followed by a synopsis of the additional risk factors facing the proposed Trust. Section III.2 provides an overview of the Bates White estimation methodology. Then, Section III.3 explains where our analysis differs from the August 25, 2005 CBO study.

III.1.1. Conservative scenario

(14) The conservative scenario invokes the following assumptions, all of which lower the estimated entitlement:

- Set the prevalence of pleural changes to 10 percent, the low end supported by the medical literature

- Exclude dormant tort claimants, modeled as claims filed prior to 2000
- Prohibit family members of eligible individuals
- Estimate the size of the exposed population at the low end supported by the economic literature
- Omit environmental asbestos-exposure claims and claimants from Libby, Montana

(15) Under these assumptions, S. 852 would create an entitlement of $300 billion. That $300 billion would be spread across 560,000 individuals at an average of $525,000 per person. In order for the Trust Fund to be viable, 59 percent of qualifying individuals would have to decide not to collect their $525,000 entitlement.

(16) Exhibit 1 displays the conservative scenario disaggregated into the disease categories contained in S. 852—mesothelioma, lung cancer categories, other cancer, and non-malignant categories. Mesothelioma accounts for nine percent of the claimants and 22 percent of the aggregate entitlement. Lung cancer in conjunction with asbestosis, Level VIII, accounts for 12 percent of the claimants and 20 percent of the aggregate entitlement. Impaired non-malignant conditions (categories II-V) account for 17 percent of the claimants and five percent of the aggregate entitlement.

Exhibit 1: Conservative scenario entitlements by disease category

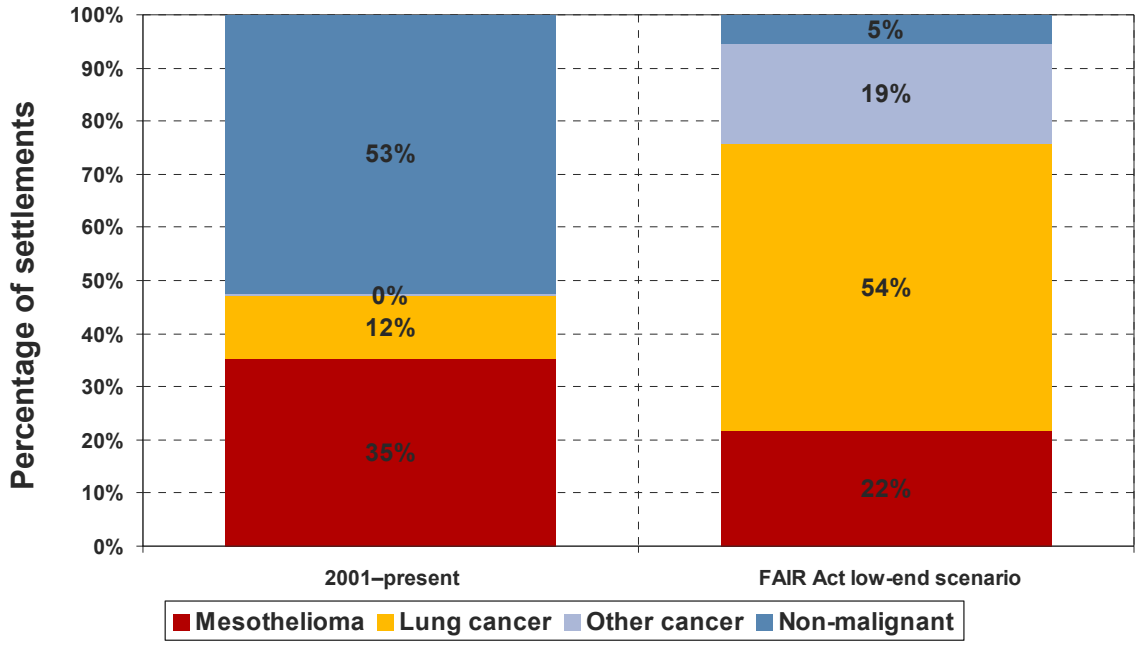
Disease	Category	Count	Dollars
Mesothelioma	IX	49,000	$64 B
Lung cancer	VIII	67,000	$58 B
	VII	139,000	$102 B
Other cancer	VI	212,000	$55 B
Non-malignant	II–V	94,000	$16 B
	I	N/A	$0 B
Administrative costs	N/A	N/A	$5 B
All		561,000	$300 B

(17) The financial viability of the national Trust depends crucially on the number of claimants in categories VI and VII. Level VI covers individuals diagnosed with other cancers (colorectal, laryngeal, esophageal, pharyngeal, and stomach) who also display pleural changes. Level VII covers individuals diagnosed with lung cancer who also display pleural changes. Taken

together, these two categories represent half of all outflows and are the primary reason the national Trust would sunset in just a few years.

(18) Such a large share of payments allocated to individuals with lung and other cancers is a major departure from the tort system. Exhibit 2 compares the allocation of payments by disease under S. 852 and the recent tort system. Under S. 852, 73 percent of the entitlements go to individuals with lung and other cancers, while these same claimants received about 12 percent of total settlement payments in the tort system. The reason for the low share of settlement payments in the tort system is that lung and other cancers lack the strong epidemiological link that mesothelioma has to asbestos. Furthermore, individuals with these cancers are difficult to recruit.

Exhibit 2: Payments by disease under S. 852 and in the tort system



(19) Claimants with mesothelioma, a rapidly fatal cancer, received the highest settlement values historically. The high compensation is attributable to the strong epidemiological link between mesothelioma and asbestos exposure. Thus, even though mesothelioma claimants represent fewer than five percent of the claimants, they have received 35 percent of total settlements payments in the tort system.

(20) In contrast to mesothelioma, non-malignant claimants represent over 90 percent of claimants, yet have received just 53 percent of total settlement payments. The vast majority of these non-malignant claimants is unimpaired and receives relatively small amounts for their claims. However, they have been inexpensive to recruit using mass screening techniques and, because of their large numbers, collectively have received a substantial share of historical settlements.

(21) As mentioned above, potential claimants for lung and other cancers lack the strong epidemiological link to asbestos that mesothelioma has. Furthermore, a number of other substantial risk factors exists for these cancers, such as smoking. Also, these claims are much more expensive to recruit and prosecute as mass recruiting techniques are not cost effective for cancer claims. Under the proposed legislation, however, all malignant conditions receive compensation with equal ease, provided they meet the medical and exposure criteria.

III.1.2. Additional risk factors

(22) The conservative scenario likely undervalues the entitlement that S. 852 would create. In particular, the conservative scenario probably understates both the prevalence of pleural changes and the size of the eligible population. Furthermore, it ignores the provisions in S. 852 for family members of eligible workers (take-home exposure), dormant tort claims, environmental asbestos exposure, and claimants from Libby, Montana. We quantified the potential incremental entitlement for each of these risk factors, except environmental asbestos exposure and Libby, Montana.

- $235 billion—greater prevalence of pleural changes among the eligible population
- $ 90 billion—larger eligible population
- $ 45 billion—family members of eligible workers (take-home exposure)
- $ 25 billion—dormant tort claimants

(23) In aggregate, these additional factors could increase the entitlements to $695 billion. Exhibit 3 displays the number of claims and associated entitlements disaggregated by disease categories should half of the potential risk factors materialize. Under these assumptions, S. 852 would create an entitlement of $495 billion. That $495 billion would be spread across one million individuals, averaging $500,000 per person. In order for the Trust Fund to be

viable, more than 70 percent of qualifying individuals would have to decide not to collect their $500,000 entitlement.

Exhibit 3: Estimated entitlement should half of the potential risk factors materialize

Disease	Category	Count	Dollars
Mesothelioma	IX	56,000	$67 B
Lung cancer	VIII	80,000	$65 B
	VII	309,000	$222 B
Other cancer	VI	455,000	$118 B
Non-malignant	II–V	106,000	$17 B
	I	N/A	$0 B
Administrative costs	N/A	N/A	$5 B
All		1,006,000	$495 B

(24) The remainder of this section provides a brief review of each of these risk factors. The appendices contain detailed explanations of both the methodologies and the results.

III.1.2.1. The prevalence of pleural changes among the eligible population

(25) Whether occupationally exposed workers with lung or other cancers qualify for compensation under S. 852 depends on the presence or absence of pleural changes. The medical research on pleural changes does not directly quantify the prevalence of pleural changes in the S. 852 eligible population. Instead, the literature provides estimates in specific occupations or samples of convenience (e.g., the hospitalized population). This research estimates the prevalence to be as high as 90 percent for asbestos insulation workers with 30 years of prior exposure and as low as one percent for the general population.[2]

(26) Further, the estimates reported in the literature likely understate the presence of pleural changes in the eligible population. First, most of the studies are conducted on active workers who are, on average, younger than the S. 852 eligible population. Given the broad agreement in the literature that pleural changes related to asbestos form only many years after the initial exposure, pleural changes should be more prevalent in an older population. Second, most of

[2] The appendix summarizes the medical research on the prevalence of pleural changes.

the medical studies rely on x-rays to assess the prevalence of pleural changes. However, studies demonstrate that x-rays do not reveal all pleural changes. For example, CT scans and autopsies pick up pleural changes that are missed on x-rays.

(27) Accounting for the limitations of these studies, the prevalence of pleural changes in the eligible population is likely to be in the 10 percent to 25 percent range. Further, this range is supported by historical claims data from the Manville Trust.[3]

(28) In our conservative scenario we use 10 percent. Increasing the prevalence of pleural changes to 25 percent, the high end of the likely range, raises the entitlements by $235 billion.

III.1.2.2. The size of the eligible population

(29) Under reasonable assumptions, the size of the population in 2000 that would satisfy the occupational exposure criteria of S. 852 ranges from 27 million to 34 million. The combination of U.S. Census data and Bureau of Labor Statistics (BLS) data provide estimates of the occupationally exposed population in any given year. The range in the potentially exposed population stems from uncertainty concerning occupational mobility.

(30) Over time, many workers move from one occupation to another. In particular, individuals enter and exit occupations involving asbestos exposure. The economic literature on occupational mobility indicates that in any given year at least two percent and, more likely, five percent of occupationally exposed workers move to white-collar jobs. As the rate of movement across occupations increases, more individuals will work in an asbestos-related occupation.

(31) In our conservative scenario we use the lower end of this range, 27 million people. Increasing the size of the occupationally exposed population to 34 million people could increase the entitlements by $90 billion, solely by raising the number of lung and other cancer claimants.

---

[3] The appendix summarizes the analysis of the Manville Trust data in regards to the prevalence of pleural changes.

III.1.2.3. Family members of eligible workers (take-home exposure)

(32) Family members of eligible workers may qualify for compensation under the take-home provision of S. 852. The Act imposes three criteria on family members. First, the family member must satisfy the medical criteria. Second, the family member must have lived with the eligible individual during the time that individual was exposed. Third, the family member must pass review by the Physicians Panel. Mandatory review by the Physicians Panel is unique to family members and creates an additional level of uncertainty as to what would happen to these claimants.

(33) We omit take-home exposure in the conservative scenario. If we treat only spouses in the same manner as specified for the qualifying workers themselves, then the take-home exposure provision increases the entitlement $45 billion, solely by raising the number of lung and other cancer claimants.[4] This increase would be larger if we allow other family members to qualify for payment as well.

III.1.2.4. Dormant tort claimants

(34) Most asbestos claimants in the tort system name numerous defendants in their complaints, as many as 50 or 100. Through time, many of these defendants settle and others are dismissed, but a few typically remain unresolved indefinitely. Furthermore, many defendants view claims that remain unresolved for an extended period, such as seven to 10 years, as dormant or inactive; they never expect to hear from that plaintiff again. S. 852 may compensate these dormant claimants in exactly the same manner as active tort claims.

(35) We exclude dormant tort claimants, modeled as claims filed prior to 2000, in the conservative scenario. If dormant claimants are eligible, they could increase the entitlements by $25 billion. Further, this money would be born entirely in the first few years of the Fund's operation.

---

[4] We assumed a five percent prevalence of pleural changes for spouses. The appendix reviews the medical literature on the prevalence of pleural changes among the general population, which supports our assumption.

III.1.2.5. Environmental asbestos exposure and claimants from Libby, Montana

(36) Under S. 852, residents of Libby, Montana with qualifying diseases are entitled to compensation from the Fund without having to satisfy the exposure criteria. Depending on the results of an *Agency for Toxic Substances and Disease Registry* study, this provision can be extended to other locations. Further, S. 852 allows a claimant who has been exposed to naturally occurring asbestos to file an exceptional medical claim with the Fund. These provisions could further increase the entitlement created by the FAIR Act. We did not quantify the impact of these additional factors in our study.

III.2. Bates White estimation methodology

(37) The Bates White methodology combines a wide range of data sources and estimation techniques to analyze the financial viability of the national Trust. First, we estimate the number and value of pending claims. Second, we forecast the number and calculate the value of future claims. Third, we compare those claim values against the Trust Fund receipts to assess the financial viability of the Fund.

III.2.1. The number and value of pending claims

(38) As the Congressional Budget Office (CBO) has pointed out, there is no comprehensive information regarding the numbers, types, and outcomes of asbestos claims that individuals have filed. However, there are several sources that allow us to estimate the number of pending claims by disease category, their filing dates, and the awards they collected over time. These data sources include RAND Corporation's estimates, Manville Trust data, and our own in-house data sets.

(39) RAND Corporation provides estimates of annual claim filings through 2002.[5] We extrapolate the RAND estimates to 2005 based on incidence rates from epidemiological models. Then, we disaggregate the three RAND disease categories—mesothelioma, lung and other cancers, and non-malignant—into the S. 852 categories based on Manville Trust data. We utilize Manville data collected under both the 1995 and 2002 Trust Distribution Procedures (TDPs) inclusive of the 1995 TDP audit data.

(40) In lieu of estimating each pending claimant's collateral source compensation (recoveries in the tort system), we estimate average tort recoveries by disease, plaintiff law firm tier, and year of filings. In general, tort recoveries rise with the severity of the alleged disease, the strength of the plaintiff law firm, and the time elapsed since filing.

(41) Finally, we calculate the value of pending claims by subtracting the average collateral source compensation from the schedule value.

---

[5] RAND Institute for Civil Justice, *Asbestos Exposure*, 2005.

III.2.2. The number and value of future claims

(42) We use three models to estimate the number of future claims—one for mesothelioma, another for lung and other cancers, and a third for impaired non-malignant claims. We model the number of future mesothelioma cases using the historical incidence of mesothelioma and estimates of the exposed population through time. This technique is an updated version of Nicholson's (1982) methodology.[6] This model also estimates the number of excess lung and other cancers caused by asbestos exposure.

(43) S. 852 allows lung and other cancers from all causes to file with the Fund so long as they demonstrate pleural changes. Therefore, we supplement the number of excess cancers with the number of background cancers with coincidental pleural changes. To forecast the number of individuals with lung and other cancers who display coincidental pleural changes, we utilize a model of the U.S. population that tracks occupation, age, smoking status, mortality, cancer incidence, and prevalence of pleural changes. The model starts with the 1950 eligible population that we estimate by combining scientific studies that identify occupations with asbestos exposure and government labor data that provide the number of individuals in these occupations. We advance this population forward in time, taking into account additions to the labor force, mobility in eligible occupations, mortality, smoking behavior, incidence of lung and other cancers, and the prevalence of pleural changes. The model produces an estimate of the number of qualifying lung and other cancers claimants between 2001 and 2055, as well as their smoking history.

(44) We project the number of impaired non-malignant claims in two steps. First, we estimate the number of impaired historical non-malignant claims based on the Manville Trust audit data. Second, we extrapolate the number of impaired non-malignant claims in direct proportion to the size of the alive exposed population.

(45) After calculating the number of eligible future claimants by disease level we calculate the inflation-adjusted total cost of claims in each year. In adjusting for cost-of-living changes, we use CBO's consumer price index projections.

---

[6] William J. Nicholson, George Perkel and Irving J. Selikoff, "Occupational exposure to asbestos: population at risk and projected mortality—1980–2030," *American Journal of Industrial Medicine*, 3: 259–311, 1982.

III.2.3. The viability of the national Trust

(46) We compare estimated outflows from the Trust to revenues to assess the financial viability of the Fund. If the Fund is not viable, we compute the shortfall and sunset year.

(47) Outflows include both monies paid to claimants, as well as administrative costs, and debt service. We adopt the administrative cost estimates and start-up time used by CBO and the 10-year treasury rate for debt service as forecast by CBO. Similarly, inflows include both the monies collected and interest earned on surpluses. Again, we adopt the timing of receipts used by CBO and the 10-year treasury rate as forecast by CBO for rate-of-return on investments.

(48) Finally, we compare our entitlement estimates to the Fund's inflows. The national Trust sunsets if the value of unpaid approved claims plus debt exceed the next 10 years' revenues.

III.3. Differences from the August 25, 2005 CBO study

(49) Our analysis differs from that of the Congressional Budget Office (CBO) in three key ways. First, we differ on the number of future lung and other cancer claims. Second, we quantify potential risk factors that were identified, but not assessed by CBO. Third, we estimate there will be fewer impaired non-malignant claimants than CBO.

(50) First, CBO and Bates White employed different assumptions about the fraction of qualified individuals with lung and other cancers who would collect their entitlement. The CBO methodology implicitly assumes individuals with lung and other cancers would file claims under S. 852 at the same rate they filed claims in the tort system. However, S. 852 replaces the adversarial environment of the tort system with an administrative process and an average entitlement of about $500,000 for qualifying individuals with lung and other cancers.[7] In order for CBO to be correct, more than 85 percent of qualifying individuals with lung and other cancers would have to decide not to collect their $500,000 entitlement.

(51) In contrast to CBO, Bates White employed epidemiological models to estimate the number of individuals who would have valid lung and other cancer claims under S. 852. Then, we assessed the maximum number of individuals who could file their claim for the Trust to be solvent.

(52) Second, CBO recognizes potential entitlements for dormant tort claims and take-home exposure, but does not account for either of them in its estimates. Our internal data sources and models of the U.S. population allow us to quantify the potential impacts of these two factors.

(53) Third, we estimate there will be fewer impaired non-malignant claimants than CBO. CBO based their estimate on the experience of the Manville Trust, although the details of that estimate were not available to us. We base our estimate on the Manville Trust audit data, which results in half the number of impaired non-malignant claims estimated by CBO. Further, CBO implicitly assumes that unimpaired non-malignant claims will continue to be

[7] In contrast to S. 852, the Manville Trust payment for lung cancer has been under $10,000 since the 1995 TDP. Similarly, the payment for other cancers has been under $5,000 since the 1995 TDP.

recruited at high rates, which results in $1 billion for medical monitoring of Level I claimants.

(54) With regard to other aspects of S. 852, our estimates and those of CBO are qualitatively similar. In particular, the outlays associated with mesothelioma claims and lung cancer claims with asbestosis are aligned.

(55) In summary, the Fund creates an entitlement for lung and other cancer patients who were not compensated in the historical tort environment and revives dormant tort claims. These two factors account for most of the differences between CBO's finding and our results.

IV. Appendices

IV.1. Bates White methodology overview

(56) The Bates White methodology combines a wide range of data sources and estimation techniques to analyze the financial viability of the national Trust. First, we estimate the number and value of pending claims. Second, we forecast the number and calculate the value of future claims. Third, we compare the pending and future claim values against the Trust Fund receipts to assess the financial viability of the Fund.

IV.1.1. Number and value of pending claims

(57) Under the FAIR Act, individuals who have an outstanding claim in the tort system or with existing trusts on the date of the enactment of S.852 would have five years to file with the Fund. These pending claims are eligible to collect the difference between the scheduled compensation for their disease level and the amount they already collected in the tort system. First, we estimate the number of pending claims. Then, we value these claims at their scheduled values minus the amount already collected in the tort system (i.e., collateral source compensation).

IV.1.1.1. The number of pending claims

(58) As CBO has pointed out, there is no comprehensive information regarding the numbers, types, and outcomes of asbestos claims that individuals have filed. However, there are several sources that allow us to estimate the number of pending claims by disease category and filing date. These data sources include RAND Corporation's estimates, Manville Trust data, and our own in-house data sets.

(59) We first estimate the number of pending claims, by disease category, which are filed through 2005. We start with RAND's estimate of the annual number of claimants who have filed asbestos-related claims through 2002. Exhibit 4 displays these estimates.

Exhibit 4: The RAND estimate of historical claim counts by disease

Year	Mesothelioma	Lung and other cancer	Non-malignant
Pre-1995	12,839	31,646	241,148
1995	1,306	3,624	43,283
1996	1,312	2,887	43,824
1997	1,347	3,132	28,978
1998	1,387	2,828	38,539
1999	1,520	2,863	40,815
2000	1,776	2,623	52,055
2001	1,893	3,639	89,308
2002	1,856	3,148	50,112

(60) We extend RAND's data in two ways. First, we map the three RAND disease categories—mesothelioma, cancers other than mesothelioma, and non-malignant—into the nine S. 852 categories using the experience of the Manville Trust as a guide. Exhibit 5 displays the results of that mapping for malignant disease categories.

(61) The RAND mesothelioma category maps directly into S. 852 Level IX. The RAND lung and other cancer category maps into seven S. 852 classifications, plus two groups of claimants who would not receive compensation under S. 852. In the first step, the Manville Trust data divide lung and other cancer claimants into four categories—lung cancer with underlying conditions (asbestosis and pleural conditions), two lung cancer categories without underlying pleural conditions, and other cancers. The fourth column of Exhibit 5 displays this distribution. The other cancer claims map directly to S. 852 Level VI. The two lung cancer categories without underlying pleural conditions would not be compensated under S. 852. Finally, we separate the lung cancer category with underlying conditions into six S. 852 classifications based on the type of underlying condition—asbestosis or pleural changes—and smoking status. To determine the smoking status, we use the ratio of smoker, non-smoker and former-smoker lung cancer claimants in the Manville data.

Exhibit 5: Mapping of the RAND historical malignant claim estimates into S. 852 categories

RAND category	Filings through 2002	Manville category	Percentage of Manville category	FAIR Act level	Distributed filings
Mesothelioma	25,236	VII—Mesothelioma	100%	IX—Mesothelioma	25,236
Lung and other cancers	56,390	VI—Lung cancer with underlying conditions	65%	VIII—Lung cancer Non-smoker	4,631
				VIII—Lung cancer Former smoker	5,018
				VIII—Lung cancer Current smoker	20,276
				VII—Lung cancer Non-smoker	1,079
				VII—Lung cancer Former smoker	1,168
				VII—Lung cancer Current smoker	4,482
		VI—Lung cancer non-smokers without underlying conditions	7%	—	3,947
		V—Lung cancer without underlying conditions	10%	—	5,639
		IV—Other cancers	18%	VI—Other cancers	10,150

(62) Exhibit 6 displays the mapping of the single RAND non-malignant category into the S. 852 non-malignant categories. We rely on the Manville Trust audit data to construct this mapping. From 1995 through 1998, the Manville Trust retained independent x-ray B-readers to determine whether a sample of submitted claims met the requirements of their asserted categories. According to the results of this audit, eight percent of Manville's non-malignant would satisfy the medical criteria of S. 852 Levels II through V. The remainder may qualify for medical monitoring under S. 852 Level I. In contrast, CBO assumes that 15 percent of non-malignant claims would satisfy the medical criteria of S. 852 Levels II through V. Finally, the Manville Trust data provide sufficient information to separate Levels II and III from Levels IV and V. Bates White assumes that claims divide equally between the two categories within each category pair.

Exhibit 6: Mapping of the RAND historical impaired non-malignant claim estimates into S. 852 categories

RAND category	Filings through 2002	Percentage of Manville category	S. 852 Level	Distributed filings
Non-malignant	51,870	0.5%	V	3,242
		0.5%	IV	3,242
		3.5%	III	22,693
		3.5%	II	22,693

(63) Second, we augment the RAND data to incorporate claims filed since 2002. For mesothelioma, lung and other cancer claims, we trend the historical filings to incidence estimates obtained from epidemiological models. Specifically, we first estimate the average ratio of filings to incidences between 2000 and 2002. We then apply this ratio to incidences between 2003 and 2005 to estimate the number of claims filed since 2002. Similarly, we estimate the impaired non-malignant claims filed since 2002 by trending the historical filings to the alive exposed population.

IV.1.1.2. The value of pending claims

(64) To estimate the value of pending claims, we multiply the number of pending claims in each S. 852 category by its scheduled value and subtract the compensation they have collected in the tort system (i.e., collateral source compensation) through 2005.

(65) To approximate the collateral source compensation, we sum the estimated dollar amounts received by different types of claims in each year since their filing.[8] First, we estimate the average awards for each disease by law firm tier. For this calculation, we combine the RAND estimate of total awards through 2002 ($49 billion) and the number of claims in each disease category with in-house estimates of the ratio of awards for different types of diseases and law firm tier. Exhibit 7 displays the resultant average claim values by disease category and law firm tier.

[8] Similar to CBO, in our conservative scenario, we do not account for dormant tort claims. We proxy dormant tort claimants with claimants who filed before 2000.

Exhibit 7: Average compensation values by disease category and law firm tier

Law firm tier	Mesothelioma	Lung cancer	Other cancer	Non-malignant
High	$1,730,000	$355,000	$170,000	$63,000
Medium	$640,000	$205,000	$105,000	$30,000
Low	$375,000	$125,000	$65,000	$17,000
Average	$915,000	$230,000	$115,000	$37,000

(66) Second, we distribute these awards over time using in-house estimates of the lag between filing date and settlement date. Exhibit 8 displays the percentage of compensation collected over time, on average, by disease category.

Exhibit 8: Percentage of compensation collected over time by disease category

Years since filing	Cumulative percentage of total settlements received			
	Mesothelioma	Lung cancer	Other cancer	Non-malignant
0	58%	22%	23%	36%
1	93%	63%	77%	66%
2	99%	91%	95%	89%
3	99%	97%	97%	97%
4	100%	100%	99%	99%
5	100%	100%	100%	100%

IV.1.2. Entitlement for future claims

(67) We use three models to estimate the number of future claims—one for mesothelioma, another for lung and other cancers, and a third for impaired non-malignant claims.

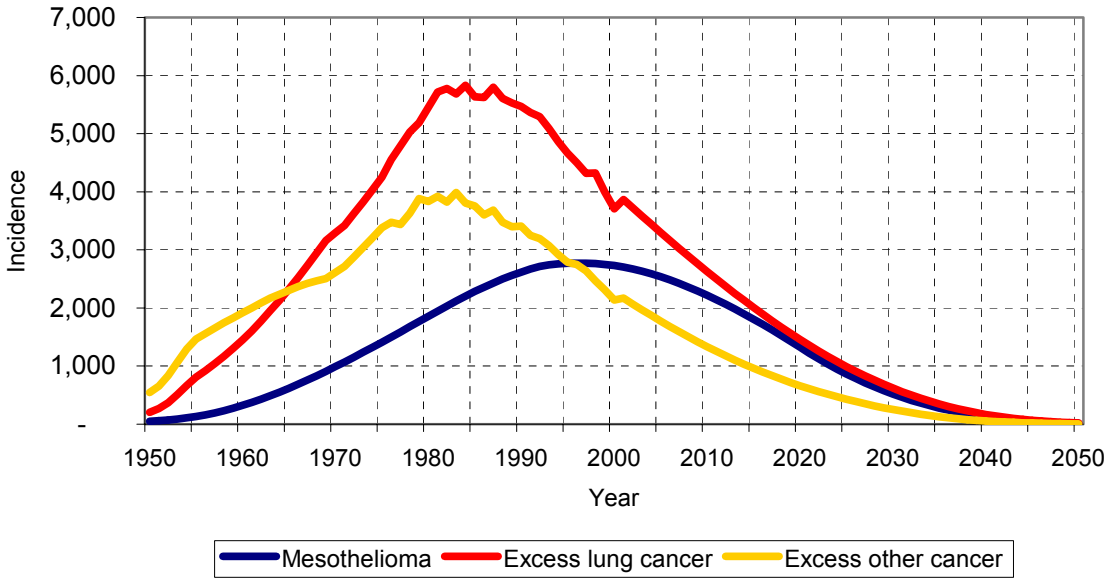
IV.1.2.1. Number of mesothelioma claims

(68) We model the number of future mesothelioma cases using the historical incidence of mesothelioma and estimates of the exposed population through time. This technique is an updated version of Nicholson's (1982) methodology.[9] This model also estimates the number

[9] William J. Nicholson, George Perkel and Irving J. Selikoff, "Occupational exposure to asbestos: population at risk and projected mortality—1980–2030," *American Journal of Industrial Medicine*, 3: 259–311, 1982.

of excess lung and other cancers caused by asbestos exposure. Exhibit 9 displays the incidence of mesothelioma, as well as the incidence of excess lung and other cancer associated with asbestos exposure.

Exhibit 9: Incidence of mesothelioma, excess lung cancer, and excess other cancers



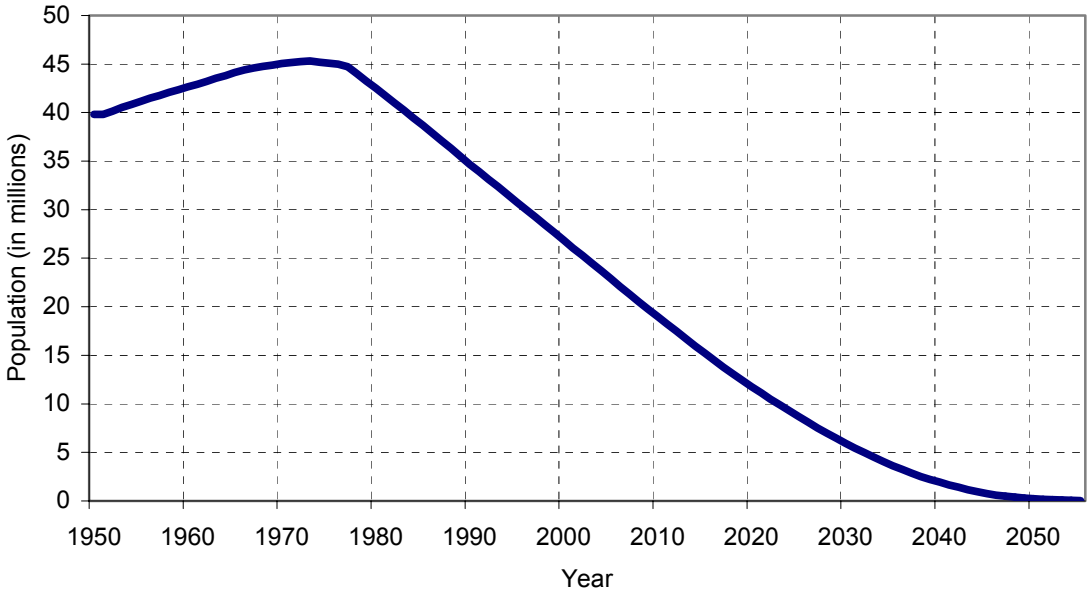
IV.1.2.2. Number of lung and other cancer claims

(69) S. 852 allows lung and other cancers from all causes to file with the Fund so long as they demonstrate pleural changes. Therefore, we supplement the number of excess cancers with the number of background cancers with coincidental pleural changes. To forecast the number of individuals with lung and other cancers who display coincidental pleural changes, we utilize a model of the U.S. population that tracks occupation, age, smoking status, mortality, cancer incidence, and prevalence of pleural changes.

(70) The model starts with the 1950 eligible population that we estimate by combining scientific studies that identify occupations with asbestos exposure (e.g., see Cocco and Dosemeci; 1999) and U.S. census data that provide the number of individuals in these occupations. For each subsequent year, we include two additional groups of people. First, we add the 18 year-olds who join the eligible occupations based on U.S. census data. Second, we add the workers

who switch into eligible occupations from other occupations[10] We estimate the number of workers who switch into eligible occupations from the Panel Study of Income Dynamics (PSID) database (e.g., see Kambourov and Manovskii; 2004). Based on these inputs, between 27 million and 34 million workers who satisfy the S. 852 occupational criteria were alive in 2000. Exhibit 10 displays the number of workers who satisfy the S. 852 exposure criteria and remain alive for each year between 1950 and 2055, anchored at 27 million in 2000.

Exhibit 10: Conservative scenario eligible population estimates



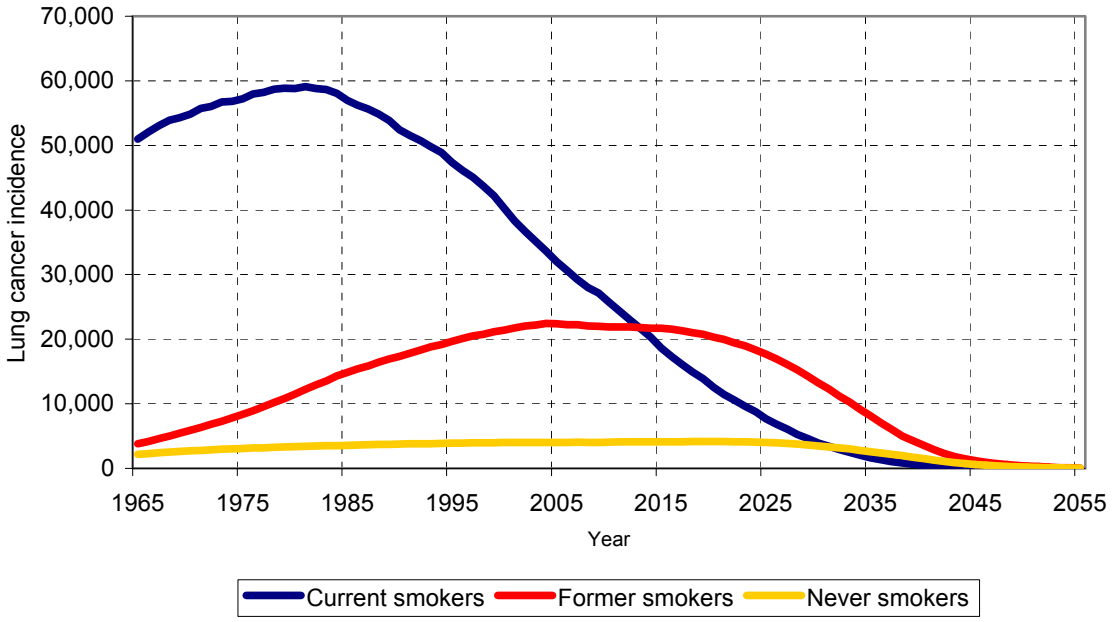
(71) As we age this population, we track mortality, smoking behavior, incidence of lung and other cancers, and the prevalence of pleural changes. We obtain smoking prevalence, initiation, and cessation rate estimates from National Cancer Institute studies.[11] We use data from the U.S. Human Life-Table Database to determine mortality by sex, age, and calendar year for 1950 through 2002. We use 2002 mortality rates for 2003 to 2055 since mortality data are not

[10] We quantify the effect of a higher mobility rate (five percent) as one of our possible scenarios.

[11] National Cancer Institute. David Burns, Lawrence Garfinkel and Jonathan Samet, "Cigarette Smoking Behavior in the United States," *Smoking and Tobacco Control Monograph No. 8*, 2:259–311, 1996.

available for those years.[12] Exhibit 11 displays the estimated incidence of lung cancers among occupationally eligible workers by smoking status between 1965 and 2055.

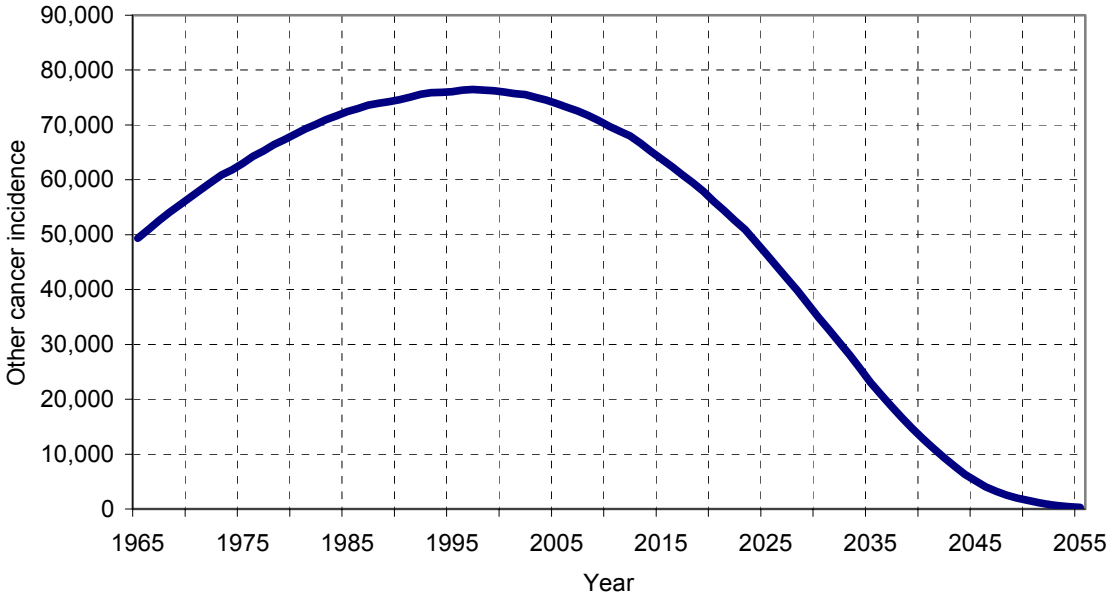
Exhibit 11: Background incidence of lung cancers in the eligible population



(72) Exhibit 12 displays the estimated incidence of other cancers among occupationally eligible workers by smoking status between 1965 and 2055.

[12] Using 2002 mortality rates for 2003 through 2055 overstates future mortality from general causes, which leads to an understatement of asbestos-related malignant conditions.

Exhibit 12: Background incidence of other cancers in the eligible population



(73) Finally, we overlay the prevalence of pleural changes to determine how many of these background cancers would qualify for compensation under S. 852.

IV.1.2.3. Number of impaired non-malignant claims

(74) We project the number of impaired non-malignant claims in two steps. First, we estimate the number of impaired historical non-malignant claims based on the Manville Trust audit data. Section IV.1.1.1 describes these calculations. Second, we extrapolate the number of impaired non-malignant claims in direct proportion to the size of the alive exposed population (see Exhibit 10).

IV.1.2.4. Value of future claims

(75) After calculating the number of eligible future claimants by disease category and year, we assign claimants the inflation-adjusted scheduled value for their disease categories. In adjusting for cost-of-living changes, we use the CBO consumer price index projections.

IV.1.3. S. 852 financial model

(76) We assess the financial viability of the Trust Fund using a standard financial model. We adopt the following from the CBO analysis:

- Fund revenues
- Administrative costs
- Only mesothelioma claims are exigent and paid within one year of filing
- Non-exigent claims are paid in equal installments over four years
- Fund established in 2006
- Fund starts paying exigent claims in 2006
- Fund starts paying non-exigent claims in 2007

We assume the Fund could borrow at the 10-year Treasury rate as projected by the CBO.

(77) Under the FAIR Act, the Fund sunsets when the unpaid costs of approved claims and previous borrowing are greater than what the Fund can borrow against its revenues in the next 10 years. In calculating the present value of Fund revenues, we use the 10-year Treasury rate as the discount factor.

IV.2. The prevalence of pleural changes

(78) Whether occupationally exposed workers with lung or other cancers qualify for compensation under S. 852 depends on the presence or absence of pleural changes. The medical research on pleural changes does not directly quantify the prevalence of pleural changes in the S. 852 eligible population. Instead, the literature provides estimates in specific occupations or samples of convenience (e.g., the hospitalized population). This research estimates the prevalence to be as high as 90 percent for asbestos insulation workers with 30 years of prior exposure and as low as four percent for the general population.

(79) Further, the estimates reported in the literature likely understate the presence of pleural changes in the eligible population. First, most of the studies are conducted on active workers who are, on average, younger than the S. 852 eligible population. Given the broad agreement in the literature that pleural changes related to asbestos form only many years after the initial exposure, pleural changes should be more prevalent in an older population. Second, most of the medical studies rely on x-rays to assess the prevalence of pleural changes. However, studies demonstrate that x-rays do not reveal all pleural changes. For example, CT scans and autopsies pick up pleural changes that are missed on x-rays.

(80) Accounting for the limitations of these studies, the prevalence of pleural changes in the eligible population is likely to be in the 10 percent to 25 percent range. Further, this range is supported by historical claims data from the Manville Trust.

(81) The remainder of Appendix IV.2 provides a more detailed description of pleural changes. Section IV.2.1 defines pleural changes. Section IV.2.2 reviews the medical literature concerning pleural changes. Finally, Section IV.2.3 discusses the prevalence of pleural changes among historical tort claimants.

IV.2.1. Definition of pleural changes

(82) Pleural changes are abnormalities to the thin linings of the lungs. Pleural plaques are the most common form of pleural changes. Plaques are discrete areas of thickening usually seen in the lower chest, and are commonly associated with asbestos exposure. Diffuse pleural thickening and pleural calcifications are other forms of pleural changes. In contrast, asbestosis is not a disease of the pleurae; it is a disease of the lung itself. Further, the ILO x-ray scoring system is used for lung conditions, not conditions of the pleurae. Therefore, an

x-ray based ILO score of 1/0 or higher may signal the development of asbestosis, but the ILO score contains no direct information about the pleurae.

(83) Although pleural changes are easy to diagnose at autopsy, they are harder to identify on chest x-rays, the most common diagnostic tool in the litigation context.[13] Computerized tomography (CT) scans pick up pleural plaques that are missed on x-rays, making the observed prevalence a low estimate of the true prevalence. If CT scans were to replace x-rays as the preferred diagnostic tool, the prevalence of plaques may increase. On the other hand, excessive pleural fibrosis has other causes that may be misdiagnosed as plaques. For example, scaring from tuberculosis pleuritis, emphysema, hemothorax, drugs, irradiation, subpleural fat deposits, old rib fractures, and muscle bundles can be misdiagnosed as plaques, making the observed prevalence a high estimate of the true prevalence.

(84) Further, most of the studies are conducted on active workers who are, on average, younger than the S. 852 eligible population. Given the broad agreement in the literature that pleural changes related to asbestos form only many years after the initial exposure, pleural changes should be more prevalent in an older population. One study concludes that a complete analysis of the effects of asbestos requires a sample 35 to 40 years from onset of exposure.[14] Such an elderly sample is often difficult to find.

IV.2.2. Medical literature

(85) Within the medical literature on asbestos exposure, pleural conditions have not received as much attention as asbestosis. We searched MedLine, a public on-line bibliography sponsored by the National Library of Medicine for topics related to the current issues. All searches included asbestos and cancer, and excluded mesothelioma. There were 53 citations for pleural conditions, 128 citations for pleural disease, and 425 citations for asbestosis.

(86) Our literature review focuses on pleural conditions, but contains some information on the prevalence of 1/0 or greater ILO x-ray readings (1/0 x-ray). The prevalence of a 1/0 x-ray is

---

[13] Pleural changes have been termed "almost invisible" on standard chest x-rays. See Norwood Wilner and Allan Feingold, *Asbestos Medicine on Trial—A medical/Legal Outline Volume 1: Non-Malignant Disease,* Andrews Professional Books, 1995, p. 197.

[14] IJ Selikoff, EC Hammond, and H Seidman, "Latency of asbestos disease among insulation workers in the United States and Canada," Cancer, 1980, 46(12): 2736-40.

usually greater than the prevalence of a non-malignant pleural condition within the same sample. Ideally we would like the prevalence of bilateral conditions, but these estimates were not always available. Because most asbestos-related conditions are bilateral, using a diagnosis of "pleural abnormality" in addition to "bilateral pleural abnormality" should not change the results in any meaningful way.

(87) Although we surveyed the medical literature concerning studies of European populations, we focus our review on studies of the U.S. population. Evidence suggests that Europeans experience a higher prevalence of pleural changes. There are many hypotheses for the higher prevalence in Europe, but no definitive answer. Since the reason for the difference across continents is unsettled and including European-based studies would increase the prevalence estimates, we excluded these studies.

(88) Below, we divide the literature on pleural changes into the following four categories based on the populations studied:

- Occupationally exposed workers
- Household members of occupationally exposed workers
- General population
- Unexposed individuals

(89) Studies of occupationally exposed workers vary greatly with respect to the intensity of asbestos exposure experienced by the studied individuals. Correspondingly, the studies display a large range in the estimated prevalence of pleural changes. Overall, these studies find a higher prevalence of pleural changes than those found in populations with weaker connections to asbestos exposure.

(90) Below, we provide a brief overview of the literature for each of the four categories. We focus our review on studies that are cited frequently, applied sound methodologies, and employed relatively large sample sizes. We classify the exposure intensity of each study's sampled population based on the job exposure matrices (JEMS) developed by Cocco and Dosemeci (1999). The JEMS are based on industrial hygiene studies that relate industry and occupation to measures of asbestos exposure. Following the literature review, we calculate the prevalence of pleural changes in the S. 852 eligible population.

IV.2.2.1. Occupationally exposed workers

(91) The prevalence of pleural conditions depends on the intensity of asbestos exposure and therefore varies by occupation. Insulation workers are exposed to a high concentration of asbestos fibers at work, and consequently have a relatively high prevalence of pleural conditions. On the other hand, sheet metal workers face lower exposure and lower prevalence.

(92) Depending on the study, between nine percent and 51 percent of the samples have pleural conditions. Within each study, the prevalence rises with the time since first exposure. For example, Baker et al. (1985) found that New York City sheet metal workers with less than 10 years of union membership had one percent prevalence, while those with more than 30 years experience had 70 percent prevalence. Exhibit 13 summarizes seven articles on the prevalence of non-malignant asbestos-related conditions in workers who had occupational exposure to asbestos.

Exhibit 13: The prevalence of pleural changes among individuals with asbestos exposure

First author, year	Sample	Sample size	Exposure severity of worker	Condition	Prevalence
Baker, 1985	White male sheet metal workers	824	Medium	Pleural abnormalities	51%
McLoud, 1985	Persons from asbestos-product plants and asbestos clinics	1,373	High	Pleural plaques	16%
Michaels, 1987	Currently employed sheet metal workers	707	Medium	Pleural abnormalities	9%
Robins, 1988	Plant workers producing asbestos-containing building materials	182	High	Bilateral pleural plaques	30%
Schwartz, 1990	Male sheet metal workers	153	Medium	Bilateral pleural thickening	18%
Selikoff, 1965	Insulation workers	1,117	High	"Abnormal" x-rays	49%
Sprince, 1985	White male plumbers and pipe fitters	153	High	Bilateral pleural thickening	18%

IV.2.2.2. Household members of occupationally exposed workers

(93) We reviewed two studies of the prevalence of pleural conditions among household members of occupationally exposed workers. As displayed in Exhibit 14, these two studies estimate the prevalence of pleural conditions among household members at 19 percent and 26 percent. These estimates likely overstate the prevalence of pleural conditions among household members. In particular, both studies analyzed household members of workers with high intensities of asbestos exposure. It is likely that studies of the household members of workers with low to medium intensities of exposure would find a low prevalence of pleural conditions. Further, only eight percent of S. 852 eligible workers experienced high intensities of workplace exposure.

Exhibit 14: The prevalence of pleural changes among household members of occupationally exposed workers

First author, year	Sample	Sample size	Exposure severity of worker	Condition	Prevalence
Anderson, 1979	Household members of factory asbestos workers	678	High	Pleural abnormalities	26%
Sider, 1987	Wives of insulation workers (pipe coverers and asbestos removers)	93	High	Pleural changes	19%

IV.2.2.3. General population

(94) Studies of the general population consider samples in which some, but not all, of the individuals were exposed to asbestos. The evidence considered is typically routine x-rays from hospital patients or autopsy results. The prevalence of pleural conditions is substantially lower in these studies than in studies of individuals with known occupational exposure. As displayed in Exhibit 15, the prevalence of pleural conditions is four percent to six percent in the four studies that concentrate on the pleurae. A fifth study, Epstein (1984), finds the prevalence of x-rays graded 1/0 or higher at 18 percent. When the single lung disease (1/0) study is removed from Exhibit 15, the average prevalence across the studies is five percent.

Exhibit 15: The prevalence of pleural changes among the general population

First author, year	Sample	Sample size	Exposure severity of worker	Condition	Prevalence
Albelda, 1982	Patients admitted to the University of Pennsylvania Hospital	824	Low	Bilateral pleural thickening	6%
Epstein, 1984	Patients admitted to an urban university medical center	200	Low	X-ray 1/0 or greater	18%
Frumkin, 1980	Autopsy subjects at Durham VA hospital	434	Low	Pleural thickening	6%
Rogan, 2002	NHANES II: US population aged 34 to 74	1,060	Low	Pleural thickening	4%
Wain, 1985	Autopsy subjects at Durham VA hospital	434	Low	Bilateral pleural plaques	4%

IV.2.2.4. Unexposed individuals

(95) In addition to studies of the general population, a number of studies focus on individuals with no known asbestos exposure. Some of these papers focus on these individuals directly, while other papers use them as a control group for those with exposure. As seen in Exhibit 16, the prevalence of pleural conditions is zero percent to two percent in these unexposed samples. These studies confirm that pleural conditions are rare among individuals without asbestos exposure.

Exhibit 16: The prevalence of pleural changes among the unexposed population

First author, year	Sample	Sample size	Exposure severity of worker	Condition	Prevalence
Anderson, 1979	Urban New Jersey residents who appeared for routine chest x-rays	325	None	Pleural abnormalities	2%
Castellan, 1985	Blue collar employees	1,422	None	Pleural abnormalities	0%
McLoud, 1985	Male faculty and employees of large university	717	None	Diffuse pleural thickening	0%
Meyer, 1997	Meta analysis	Six studies	None	1/0 x-ray	2%

(96) S. 852 Section 2(14) gives zero percent to five percent as the prevalence range of pleural conditions in the unexposed and general populations. Our literature review produces a similar range. Once again, the Bates White estimates understate the number of medically eligible workers because we consider only those potential claimants with pleural conditions. Were we to include patients with an ILO x-ray score of 1/0, the number of individuals meeting the medical eligible criteria would increase for Level II through Level VI (Level VII explicitly excludes ILO scores as a form of evidence).

IV.2.2.5. Pleural conditions among the S. 852 eligible population

(97) We combine government employment data with the medical literature to estimate the prevalence of pleural conditions in the S. 852 eligible population. We provide separate estimates for occupationally exposed workers and their household members. For both estimates we restrict our attention to studies of pleural conditions. Recall that medical studies consistently find a lower prevalence of pleural conditions than 1/0 x-rays. Therefore, incorporating the x-rays studies into our estimates would raise the estimated prevalence of pleural conditions.

(98) We estimate a 12 percent prevalence of pleural conditions among occupationally exposed workers. We attain this estimate in three steps. First, we divide the working population by industry and occupation based on government employment data. Second, we categorize these industry and occupation groups as having high, medium, low, or no exposure to asbestos according to the medical and industrial hygiene literatures. Finally, we use estimates of the prevalence of pleural conditions by intensity of exposure from the medical literature.

(99) In particular, workers with high exposures have a prevalence of 29 percent and represented eight percent of the eligible population. Workers with medium exposure have a prevalence of 22 percent and represented 25 percent of the eligible population. Workers with low exposure have a prevalence of seven percent and represent 67 percent of the eligible population. The weighted average of the prevalence of pleural conditions across these three groups is 13 percent.

(100) We estimate a five percent prevalence of pleural conditions among household members of occupationally exposed workers. The two studies of household member prevalence produce estimates of 19 percent and 26 percent. However, as previously noted, these studies focused on household members of workers with high exposure and likely overstate the prevalence of

household members more generally. Therefore, we chose to treat the five percent prevalence of pleural conditions among the general population as a lower bound for prevalence among household members.

IV.2.3. Evidence from claims data

(101) The Manville Trust audit data provide an alternative estimate of the prevalence of lung and pleural changes. Combining the audit data with the yield from medical screening companies indicates that 14 percent to 24 percent of the S. 852 eligible population has underlying pleural changes.

(102) Exhibit 17 displays the audit results reported in a Pennsylvania State University and University of Pennsylvania study of Manville Trust audit data. The study considered 6,482 Manville Trust claimants, 31 percent of whom asserted pleural conditions and 67 percent asserted ILO evidence of 1/0 or greater. The study found that 19 percent of claimants had no asbestos-related abnormalities, 45 percent displayed pleural conditions, and 36 percent had ILO evidence.

Exhibit 17: Pleural conditions and ILO scores from the Manville Trust audit data

Claimant assertion	Audit findings			
	None	Pleural conditions	ILO evidence	Total
None	0.1%	0.9%	0.4%	1%
Pleural conditions	5.2%	21.3%	4.7%	31%
ILO evidence	13.4%	22.8%	31.2%	67%
Total	**18.6%**	**45.0%**	**36.3%**	**100%**

(103) Claims with ILO evidence may or may not have pleural conditions. At the time of the audit, the Manville Trust assigned a greater value to claimants with ILO evidence than to claimants with solely pleural conditions. Therefore, the audit data classify anyone with both ILO evidence and pleural conditions as having ILO evidence.

(104) In addition to impairment, S. 852 Level II through Level VI require auxiliary medical evidence of either pleural changes or an ILO x-ray score of at least 1/0 for compensation. Based on the Manville Trust audit data, 81 percent of Manville claimants would satisfy that criteria. S. 852 Level VII requires evidence of auxiliary medical evidence of pleural changes

and explicitly excludes ILO evidence. The audit data indicate that 45 percent of Manville claims have pleural conditions and no ILO evidence. An additional 36 percent of Manville claimants have ILO evidence and may have pleural conditions. Therefore, 45 percent to 81 percent of Manville claimants would satisfy the criteria for Level VII.[15]

(105) The vast majority of the audited Manville Trust claimants were recruited at mass screening events. Medical screening companies advertise that they yield evidence to support claims on behalf of 30 percent of all screened workers. Assuming that the population of individuals who attend mass screening events are a random sample of those individuals who satisfy the occupational criteria of S. 852, then about 30 percent of the eligible population could file a claim.

(106) Combining the audit data with the yield from medical screening companies indicates that 24 percent (30 percent times 81 percent) of the S. 852 eligible population would pass the auxiliary medical criteria of S. 852 Level II through Level VI. Further, 14 percent to 24 percent (30 percent times 45 or 81 percent) would pass the auxiliary medical criteria of S. 852 Level VII.

[15] Section IV.1.1.1 concluded that eight percent of non-malignant claimants show impairment according to the Manville Trust audit data. This finding is consistent with 81 percent of the same claimants having pleural conditions or ILO evidence, as neither pleural conditions or ILO evidence indicate impairment.

IV.3. Results under alternative scenarios

(107) This section presents the detailed results under additional risk factors. The risk factors include increasing prevalence of pleural changes (25 percent) in the eligible population, including dormant tort claims, raising the number of non-malignant claims due to a weaker interpretation of medical criteria, increasing the size of the eligible population, accounting for spouses who may file under the take-home provision, and incorporating an estimate of the percentage of eligible claimants who would file. The following exhibits briefly describe the scenarios considered.

Exhibit 18: Increase prevalence of pleural changes to 25 percent

Disease	Category	Baseline scenario		Marginal increase	
		Count	Dollars	Count	Dollars
Mesothelioma	IX	49,000	$64 B	0	$0 B
Lung cancer	VIII	67,000	$58 B	0	$0 B
	VII	139,000	$102 B	206,000	$152 B
Other cancer	VI	212,000	$55 B	314,000	$83 B
Non-malignant	II–V	94,000	$16 B	0	$0 B
	I	N/A	$0 B	0	$0 B
Administrative costs	N/A	N/A	$5 B	0	$0 B
All		561,000	$300 B	520,000	$235 B

Exhibit 19: Dormant tort claimants file with the Fund

Disease	Category	Baseline scenario		Marginal increase	
		Count	Dollars	Count	Dollars
Mesothelioma	IX	49,000	$64 B	13,000	$7 B
Lung cancer	VIII	67,000	$58 B	25,000	$13 B
	VII	139,000	$102 B	4,000	$1 B
Other cancer	VI	212,000	$55 B	8,000	$1 B
Non-malignant	II–V	94,000	$16 B	25,000	$3 B
	I	N/A	$0 B	0	$0 B
Administrative costs	N/A	N/A	$5 B	0	$0 B
All		561,000	$300 B	75,000	$25 B

Exhibit 20: Weaker interpretation of medical criteria for non-malignant claims

Disease	Category	Baseline scenario		Marginal increase	
		Count	Dollars	Count	Dollars
Mesothelioma	IX	49,000	$64 B	0	$0 B
Lung cancer	VIII	67,000	$58 B	0	$0 B
	VII	139,000	$102 B	0	$0 B
Other cancer	VI	212,000	$55 B	0	$0 B
Non-malignant	II–V	94,000	$16 B	337,000	$25 B
	I	N/A	$0 B	0	$0 B
Administrative costs	N/A	N/A	$5 B	0	$0 B
All		561,000	$300 B	0	$25 B

Exhibit 21: Larger population satisfies occupational criteria

Disease	Category	Baseline scenario		Marginal increase	
		Count	Dollars	Count	Dollars
Mesothelioma	IX	49,000	$64 B	0	$0 B
Lung cancer	VIII	67,000	$58 B	0	$0 B
	VII	139,000	$102 B	37,000	$24 B
Other cancer	VI	212,000	$55 B	49,000	$12 B
Non-malignant	II–V	94,000	$16 B	0	$0 B
	I	N/A	$0 B	0	$0 B
Administrative costs	N/A	N/A	$5 B	0	$0 B
All		561,000	$300 B	86,000	$36 B

Exhibit 22: Qualified spouses of eligible workers claim with the Fund

Disease	Category	Baseline scenario		Marginal increase	
		Count	Dollars	Count	Dollars
Mesothelioma	IX	49,000	$64 B	0	$0 B
Lung cancer	VIII	67,000	$58 B	0	$0 B
	VII	139,000	$102 B	38,000	$26 B
Other cancer	VI	212,000	$55 B	44,000	$12 B
Non-malignant	II–V	94,000	$16 B	0	$0 B
	I	N/A	$0 B	0	$0 B
Administrative costs	N/A	N/A	$5 B	0	$0 B
All		561,000	$300 B	82,000	$38 B

Exhibit 23: Eighty percent of qualified claimants file with the Fund

Disease	Category	Baseline scenario		Marginal increase	
		Count	Dollars	Count	Dollars
Mesothelioma	IX	49,000	$64 B	(8,000)	($12 B)
Lung cancer	VIII	67,000	$58 B	(13,000)	($11 B)
	VII	139,000	$102 B	(28,000)	($20 B)
Other cancer	VI	212,000	$55 B	(42,000)	($11 B)
Non-malignant	II–V	94,000	$16 B	0	$0 B
	I	N/A	$0 B	0	$0 B
Administrative costs	N/A	N/A	$5 B	0	$0 B
All		561,000	$300 B	(91,000)	$0 B

Exhibit 24: 25 percent prevalence of pleural changes and dormant claims file with the Fund

Disease	Category	Baseline scenario		Marginal increase	
		Count	Dollars	Count	Dollars
Mesothelioma	IX	49,000	$64 B	13,000	$7 B
Lung cancer	VIII	67,000	$58 B	25,000	$13 B
	VII	139,000	$102 B	210,000	$153 B
Other cancer	VI	212,000	$55 B	322,000	$84 B
Non-malignant	II–V	94,000	$16 B	25,000	$3 B
	I	N/A	$0 B	0	$0 B
Administrative costs	N/A	N/A	$5 B	0	$0 B
All		561,000	$300 B	595,000	$260 B

IV.4. References

Albelda, Steven M., David M. Epstein, Warren B. Gefter, and Wallace T. Miller. "Pleural thickening: its significance and relationship to asbestos dust exposure." *Am Rev Respir Dis* 126:4 (1982 Oct): 621–4.

Anderson, Henry A., Ruth Lilis, Susan M. Daum, and Irving J. Selikoff. "Asbestos Among Household Contacts of Asbestos Factory Workers." *Environmental Asbestos Disease* (1979): 387.

Baker, Edward L., Timothy Dagg, and Reginald E. Greene. "Respiratory illness in the construction trades. I. The significance of asbestos-associated pleural disease among sheet metal workers." *J Occup Med* 27:7 (1985 Jul): 483–9.

Bégin, Raymond and John W. Christman. "Deatailed Occupational History." *American Journal of Respiratory and Critical Care Medicine* 163:3 (March 2001): 598–599.

Berry, G., M.L. Newhouse, J.C. Wagner. "Mortality from all cancers of asbestos factory workers in east London 1933-80." *Occup Environ Med* 57:11 (2000 Nov): 782–5.

The Budget and Economic Outlook: Fiscal Years 2006 to 2015. "CBO's Economic Projections for 2005 to 2015." <http://www.cbo.gov/showdoc.cfm?index=6060&sequence=10>.

Burns, Patricia Brissette and G. Marie Swanson. "The Occupational Cancer Incidence Surveillance Study (OCISS): risk of lung cancer by usual occupation and industry in the Detroit metropolitan area." *American Journal of Industrial Medicine* 19:5 (1991): 655–71.

Case, Bruce W. and André Dufresne. "Asbestos, Asbestosis, and Lung Cancer: Observations in Quebec Chrysotile Workers." *Environmental Health Perspectives* 105:5 (1997).

Castellan, Robert M., Wayne T. Sanderson, and Martin R. Petersen. "Prevalence of radiographic appearance of pneumoconiosis in an unexposed blue collar population." *Am Rev Respir Dis* 131:5 (1985 May): 684–6.

Chapman, Stephen J., William O.C. Cookson, A. William Musk, and Y.C. Gary Lee. "Benign Asbestos Pleural Disease." *Current Opinion in Pulmonary Medicine* 9:4 (2003): 266–271.

Churg, Andrew. "Asbestos Fibers and Pleural Plaques in a General Autopsy Population." American Association of Pathologists.

Cocco, P. and M. Dosemeci. "Peritoneal cancer and occupational exposure to asbestos: results from the application of a job-exposure matrix." *American Journal of Industrial Medicine* 35:1 (1999 Jan): 9–14.

Congressional Budget Office. "Projections for 10-year Treasury Rates and Consumer Price Index." <http://www.cbo.gov/showdoc.cfm?index=6060&sequence=10>.

Congressional Budget Office. "S. 852: Fairness in Asbestos Injury Resolution Act of 2005: As reported by the Senate Committee on the Judiciary on June 16, 2005." August 25, 2005.

Coultas, D.B. and J.M. Samet. "Occupational lung cancer." *Clin Chest Med* 13:2 (1992 Jun): 341–54.

Coultas, D.B., R.E. Zumwalt, W.C. Black, and R.E. Sobonya. "The epidemiology of interstitial lung diseases." *Am J Respir Crit Care Med* 150:4 (1994 Oct): 967–72.

Cugell, David W. and David W. Kamp. "Asbestos and the Pleura: A Review." *Chest* 125 (2004). <http://www.chestjournal.org> (28 July 2005).

Epstein, David M., Wallace T. Miller, Eddy A. Bresnitz, Marc S. Levine, and Warren B. Gefter. "Application of ILO Classification to a Population without Industrial Exposure." *AJR American Journal of Roentgenol* 142:1 (1984): 53–8.

Evans, Amlyn L. and Fergus F. Gleeson. "Radiology in pleural disease: state of the art." *Respirology* 9:3 (2004 Aug): 300–12.

Finkelstein, Murray M., and Jerome J. Vingilis. "Radiographic abnormalities among asbestos-cement workers. An exposure-response study." *Am Rev Respir Dis* 129:1 (1984 Jan): 17–22.

Friedman, Arnold C., Stanely B. Fiel, Mary S. Fisher, Paul D. Radecki, Annas. Lev-Toaff, and Dina F. Caroline. "Asbestos-Related Pleural Disease and Asbestosis: A Comparison of CT and Chest Radiography." *AJR American Journal of Roentgenol* 150:2 (1988): 269–75.

Frumkin, Howard, Glenn Pransky, and Irene Cosmatos. "Radiologic detection of pleural thickening." *Am Rev Respir Dis* 142:6:1 (1990 Dec): 1325–30.

Gitlin, Joseph N., Leroy L. Cook, Otha W. Linton, and Elizabeth Garrett-Mayer. "Comparison of "B" Readers' Interpretations of Chest Radiographs for Asbestos Related Changes." *Academic Radiology* 11:8 (2004): 843–56.

Harries, P.G., F.A.F. Mackenzie, G. Sheers, J.H. Kemp, T.P. Oliver, and D.S. Wright. "Radiological survey of men exposed to asbestos in naval dockyards." *Br J Ind Med* 29:3 (1972 Jul): 274–9.

Hedenstierna, Göran, Rolf Alexandersson, Birgitta Kolmodin-Hedman, Alfred Szamosi, and Jan Tollqvist. "Pleural plaques and lung function in construction workers exposed to asbestos." *Eur J Respir Dis* 62:2 (1981): 111–22.

Hessel, P.A., J.F. Gamble, and J.C. McDonald. "Asbestos, asbestosis, and lung cancer: a critical assessment of the epidemiological evidenc." < http://thorax.bmjjournals.com> (25 July 2005).

Hillerdal, G. "Non-malignant asbestos pleural disease." *Thorax* 36:9 (1981 Sep): 669–75.

The Human Life-Table Database. "United States of America: 1901–1999." <http://www.lifetable.de/data/MPIDR/USA_1901-1999.txt>.

Jones, R.N., T. McLoud, and S.D. Rockoff. "The radiographic pleural abnormalities in asbestos exposure: relationship to physiologic abnormalities." *J Thorac Imaging* 3:4 (1988 Oct): 57–66.

Kambourov, Gueorgui and Iourii Manovskii. "Rising Occupational and Industry Mobility in the United States: 1968–1993, Second Version." *PIER Working Paper* Archive 04-012 (2004). Penn Institute for Economic Research, Department of Economics, University of Pennsylvania.

Kambourov, Gueorgui, and Iourii Manovskii. "Rising occupational and industry mobility in the United States: 1968–1993, Second Version." *PIER Working Paper* 04-012 (2004 Apr).

Lerchen, Mary L., Charles L. Wiggins, Jonathan M. Samet. "Lung cancer and occupation in New Mexico." *J Natl Cancer Inst* 79:4 (1987 Oct): 639–45.

Lliddell, F.D.K. "Joint action of smoking and asbestos exposure on lung cancer." *Occupational and Environmental Medicine* 59 (2002): 494–95.

Localio, A. Russell, Allen Kunselman, and Bryan Crissinger. *The Manville Personal Injury Settlement Trust X-Ray Audit: An Assessment of the Identification of the Underlying Disease Process Implications for Medical Review by Certified B-readers.* Hershey, PA: Penn State University College of Medicine and Philadelphia, PA: Center for Clinical Epidemiology and Biostatistics. February 24, 1998.

Magnani, Corrado and Massimo Leporati. "Mortality from lung cancer and population risk attributable to asbestos in an asbestos cement manufacturing town in Italy." *Occup Environ Med* 55:2 (1998 Feb): 111–4.

McLoud, Theresa C., Barry O. Woods, Chales B. Carrington, Gary R. Epler, Edward A. Gaensler. "Diffuse pleural thickening in an asbestos-exposed population: prevalence and causes." *AJR American Journal of Roentgenol* 144:1 (1985 Jan): 9–18.

Meyer, J.D., S.S. Islam, A.M. Ducatman, and R.J. McCunney. "Prevalence of small lung opacities in populations unexposed to dusts. A literature analysis." *Chest.* 111:2 (1997 Feb): 404–10.

Meyer, John D., Syed S. Islam, Alan M. Ducatman, and Robert J. McCunney. "Prevalence of small lung opacities in populations unexposed to dusts. A literature analysis." *Chest* 111:2 (1997 Feb): 404–10.

Michaels, David, Stephen Zoloth, Margot Lacher, Edwin Holstein, Ruth Lilis, and Ernest Drucker. "Asbestos Disease in Sheet Metal Workers: II. Radiologic Signs of Asbestosis Among Active Workers." *American Journal of Industrial Medicine* 12:5 (1987): 595–603.

Miller, Albert. "Pleural plaques and lung function." *Am J Respir Crit Care Med* 15:165:2 (2002 Jan): 305–6.

Morabia, A., S. Markowitz, K. Garibaldi, E.L. Wynder. "Lung cancer and occupation: results of a multicentre case-control study." *Br J Ind Med* 49:10 (1992 Oct): 721-7.

Muravov, O.I., W.E. Kaye, M. Lewin, Z. Berkowitz, J.A. Lybarger, S.S. Campolucci, and J.E. Parker. "The usefulness of computed tomography in detecting asbestos-related pleural abnormalities in people who had indeterminate chest radiographs: the Libby, MT, experience." *Int J Hyg Environ Health* 208:1–2 (2005): 87–99.

National Cancer Institute. Surveillance, Epidemiology, and End Results. <http://seer.cancer.gov/>.

Neuberger John S. and R. William Field. "Occupation and lung cancer in nonsmokers." *Reviews on Environmental Health* 18:4 (2003 Oct–Dec): 251–67.

Nicholson, William J., George Perkel, and Irving J. Selikoff. "Occupational Exposure to Asbestos: Population at Risk and Projected Mortality—1980–2030." *American Journal of Industrial Medicine* 3 (1982). 259–311.

Ohar, Jill, David A. Sterling, Eugene Bleecker, and James Donohue. "Changing Patterns in Asbestos-Induced Lung Disease." *Chest* 125:2 (February 2004): 744–53.

Peipins, Lucy A., Michael Lewin, Sharon Campolucci, Jeffrey A. Lybarger, Aubrey Miller, Dan Middleton, Christopher Weis, Michael Spence, Brad Black, and Vikas Kapil. "Radiographic abnormalities and exposure to asbestos-contaminated vermiculite in the community of Libby, Montana, USA." *Environ Health Perspect* 111:14 (2003 Nov): 1753–9.

Price, B. "Radiographic abnormalities and asbestos exposure: Libby, Montana." *Environ Health Perspect* 112:2 (2004 Feb): A82–3.

RAND Institute for Civil Justice. *Asbestos Exposure*. 2005.

Related Articles, Links

Robins, Thomas G., and Margaret A. Green. "Respiratory morbidity in workers exposed to asbestos in the primary manufacture of building materials." *American Journal of Industrial Medicine* 14:4 (1988): 433–48.

Rogan, Walter J., N. Beth Ragan, and Gregg E. Dinse. "X-ray evidence of increased asbestos exposure in the US population from NHANES I and NHANES II, 1973-1978. National Health Examination Survey." *Cancer Causes Control* 11:5 (2000 May): 441–9.

Ruggles, Steven, Matthew Sobek, Trent Alexander, Catherine A. Fitch, Ronald Goeken, Patricia Kelly Hall, Miriam King, and Chad Ronnander. *Integrated Public Use Microdata Series: Version 3.0*. Minneapolis, MN: Minnesota Population Center,.2004.

Schwartz, David A. "New developments in asbestos-induced pleural disease." *Chest* 99:1 (1991 Jan): 191–8.

Schwartz, David A., Laurence J. Fuortes, Jeffrey R. Galvin, Leon F. Burmeister, Lynn E. Schmidt, Bruce N. Leistikow, Frank P. Lamarte, and James A. Merchant. "Asbestos-induced Pleural Fibrosis and Impaired Lung Function." *Am Rev Respir Dis* 141:2 (1990 Feb): 321–6.

Selikoff, I.J., E.C. Hammond, H. Seidman. "Latency of asbestos disease among insulation workers in the United States and Canada." *Cancer* 15:46:12 (1980 Dec): 2736–40.

Selikoff, I.J., J. Churg, and E.C. Hammond. "The occurrence of asbestosis among insulation workers in the United States." *Ann N Y Acad Sci* 132:1 (1965 Dec 31): 139–55.

Sider, Lee, Elizabeth A. Holland, Thomas M. Davis, and David W. Cugell. "Changes on Radiographs of Wives of Workers Exposed to Asbestos." *Radiology* 164:3 (1987 Sep): 723–6.

Smoking and Tobacco Control Monograph 8: Changes in Cigarette-Related Disease Risk and Their Implications for Prevention and Control. National Institutes of Health, National Cancer Institute. 1997.

Sprince, Nancy L., Christine Oliver, and Theresa C. McLoud. "Asbestos-related disease in plumbers and pipefitters employed in building construction." *J Occup Med* 27:10 (1985 Oct): 771–5.

U.S. Census Bureau. Intercensal Estimates. <http://www.census.gov/popest/datasets.html>.

Van Cleemput, J., H. De Raeve, J. Verschakelen, and B. Nemery. "The "gold standard" for past asbestos exposure." *Am J Respir Crit Care Med* 1:165:1 (2002 Jan): 134.

Van Cleemput, Joris, Hilde De Raeve, Johny A. Verschakelen, Jozef Rombouts, Ludovic M. Lacquet, and Benoit Nemery. "Surface of localized pleural plaques quantitated by computed tomography scanning: no relation with cumulative asbestos exposure and no effect on lung function." *Am J Respir Crit Care Med* 163:3:1 (2001 Mar): 705–10.

Wain, Stephanie L., Victor L. Roggli, and William L. Foster Jr. "Parietal pleural plaques, asbestos bodies, and neoplasia. A clinical, pathologic, and roentgenographic correlation of 25 consecutive cases." *Chest* 86:5 (1984 Nov): 707–13.

Wilner, Norwood S. and Allan Feingold. *Asbestos Medicine on Trial—A Medical/Legal Outline*. Andrews Pubns. 1995.