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Case Series Follow-up

to A Cross-Sectional Study on Morbidity & Mortality
among Vermonters Residing Near an Asbestos Mine

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Case Series Follow-up to a Cross-Sectional Study of Asbestos-Related Morbidity & Mortality among Vermonters Residing Near an Asbestos Mine

Summary

This report supplements a study published in December 2008, in which the Vermont Department of Health sought to assess the health risk, if any, to people living near the Vermont Asbestos Group mine in Eden and Lowell, Vermont.

The significant finding of this supplemental study is that all of the five asbestosis-related deaths that occurred in towns surrounding the mine during the years 1996 to 2005 can be explained by occupational exposure to asbestos. With this additional study, the Vermont Department of Health found no evidence that people who live near the mine are more likely to die of non-occupationally contracted asbestos-related diseases than people who live elsewhere in the state.

Background

Chrysotile asbestos was mined from open pits at three locations on Belvidere Mountain in the towns of Eden and Lowell in northern Vermont. The mine operated under a series of ownerships from the early 1900s until 1993. The most recent and current owner is the Vermont Asbestos Group (VAG), an employee-owned organization that acquired the mine in 1975 and operated it until it closed in 1993. Asbestos is still found at the site in various forms, including undisturbed veins of the raw mineral in the quarry walls, and several million cubic yards of partially processed rock, estimated at up to 30 million tons.

Inhalation of chrysotile asbestos has been associated with lung cancer, asbestosis (a serious scarring lung disease) and mesothelioma.[1] Studies have shown a dose-response relationship between the concentration and duration of chrysotile asbestos exposure and severity of disease.[1] That is, severity of disease is directly related to the concentration and length of time of exposure to asbestos. Asbestos-related disease is generally associated with working around concentrations of air-borne asbestos over an extended period. Exposure to asbestos combined with smoking increases a person's chances of getting asbestos-related disease.

In 2007, in the absence of current environmental sampling data and risk assessment models, the Vermont Department of Health designed a study to assess the health risk, if any, to Vermonters who lived in proximity to the mine. The study compared health outcomes of people who lived in 13 towns that either wholly or partially fell within a 10-mile radius of the mine, with health outcomes of people who lived in the rest of the state. The study made use of death certificates, hospital discharge billing records, and cancer

registry data for the most recent 10-year period (1996 to 2005) for which all data sets were available.

Study results were first presented in November 2008 and then updated on December 9, 2008. There were no significant findings for pleural malignancy, peritoneal malignancy, mesothelioma, or lung cancer.[2] The study, however, did have two findings of significance for asbestosis: 1) Vermonters who were discharged from hospital with the diagnosis of asbestosis were statistically more likely to live in towns near the mine (there were 14 such discharges) compared to those who lived in the rest of the state; and 2) Vermonters who had asbestosis listed as an underlying or contributing cause of death on their death certificate (there were five such deaths) were statistically more likely to live in towns near the mine compared to those who lived in the rest of the state. The latter statistical association remained even after known mine employees were excluded from the analysis. Two of the five were known from VAG records to have worked at the mine.

The December report cited several limitations of the study that prevented drawing conclusions about how people may have been exposed to asbestos, and there are many possible explanations. For example, people could have been occupationally exposed to asbestos even if they did not work at the VAG mine, or people may have moved in or out of the area around the mine after developing asbestosis, etc. Another limitation was that the hospital discharge data represented numbers of hospital discharges, not numbers of individuals. Therefore, one or a few individuals could have accounted for many hospital discharges.

Despite the stated limitations, the study's publication raised a great deal of controversy and concern. A joint resolution of the Vermont Legislature requested that the Vermont Department of Health investigate further and report results by April 1, 2009. The primary purpose of the additional study was to determine how the three individuals, who were not known to be VAG mine employees, may have been exposed to asbestos.

Methods

The Vermont Department of Health designed a protocol *(Appendix A)* and questionnaire *(Appendix B)* for contacting next of kin for all 19 individuals in the state who had asbestosis listed on their death certificate. The questionnaire asked about work and residential history, asbestos-related military activities (such as work in a naval shipyard or boiler room, etc.), and hobbies. Next of kin were interviewed by phone using the study questionnaire.

To de-duplicate hospital discharge data, the Health Department received permission from the Vermont Department of Banking, Insurance, Securities & Health Care Administration (BISHCA) to use personal identifiers (date of birth, sex and county of residence) to de-duplicate the records. However, for privacy reasons, BISHCA rules prohibit any comparison of the hospital discharge data with the information on the death certificates, so it was not possible to match individuals with hospital discharges to individuals who

died. Furthermore, the hospital discharge data set does not provide any information about the patient's occupation, so it was not possible to investigate how the patients may have been exposed to asbestos.

Results

The Vermont Department of Health found that all of the asbestosis deaths in towns surrounding the mine during the years 1996 to 2005 were men who had occupational exposure to asbestos. Results are detailed in *Appendix C, Tables 1 and 2.*

Of the five deaths that occurred in the area surrounding the mine, four of the next of kin agreed to participate in the health department's interviews. Among the four study participants, three reported knowing how exposure to asbestos may have occurred. One participant reported not being sure how exposure may have occurred, but also that the decedent had worked at the mine. In all, two of the four moved to Vermont after developing asbestosis apparently from occupational exposure, and two worked at the mine. The individual whose next of kin chose not to participate was known from VAG employee records to have worked at the mine.

Of the 14 deaths that occurred in the rest of the state, nine of the next of kin agreed to participate in the health department's interviews. Among the nine participants, six reported knowing how exposure to asbestos may have occurred. Three of the nine moved to Vermont after developing asbestosis, and one worked at the VAG mine.

Results from the de-duplication of hospital discharges are detailed in *Table 3*. In the area surrounding the mine, the 14 discharges represented 10 individuals. For the rest of the state, the 164 discharges represented 108 individuals. Although the number of hospital discharges that occurred in the area surrounding the mine remains statistically higher than the number that occurred in the rest of the state, it was not possible to tell exposure history for individuals from the hospital discharge data set. However, the health department was able to determine that all of the 10 individuals are male, which suggests an occupational source of exposure. Any exposure that is not occupational would be expected to affect men and women in more equal proportions.

Conclusions

This study found that all five of the deaths from asbestosis that occurred in the area surrounding the mine during the years 1996 to 2005 can be explained by occupational exposure to asbestos. When taken together with the earlier conclusions of the December 9, 2008 report, this study confirms that there is no evidence that people living in the 13 towns surrounding the mine have a higher risk of dying from non-occupational asbestos-related diseases than people elsewhere in the state of Vermont.

The hospital discharge findings do not diminish that conclusion. This study does not indicate that asbestosis hospitalizations or deaths were caused by living near the mine.

Recommendations

The Vermont Department of Health recommends:

A. That the Agency of Natural Resources and the Vermont Department of Health, partnering with federal agencies, continue with planned environmental sampling at the perimeter of the mine, on the mine site, and with other sampling as indicated.

B. That the public be advised to stay off the mine for health and safety reasons, and that access to the mine be restricted.

Literature cited:

1 International Programme on Chemical Safety (IPCS). *Chrysotile*. Geneva: World Health Organization; 1998.

2 Vermont Department of Health. *A Cross-Sectional Study of Asbestos-Related Morbidity and Mortality in Vermonters Residing Near an Asbestos Mine;* Dec 9, 2008.

• Appendix A •

Steps Taken to Identify and Contact Next of Kin

- Next of kin were identified using death certificates and obituaries, and traced using several resources, such as the decedent's death certificate, the next of kin's death certificate, phone books, directory assistance, obituaries, news sources, Google, online information services and Social Security Death Index.

- Next of kin were sent a letter notifying them that they would be contacted by the Health Department and asked to participate in the study. In the letter, they were provided a telephone number to call if they wished to opt out of participation.

- The letter was followed by a phone call. The first call was made during normal business hours. If this was not successful, the Health Department called at night and during weekends.

- If the next of kin was not reached after three attempts, they were not included in the study.

• Appendix B •

Study Questionnaire

Date first call Callers Initials
Date second call Callers Initials
Date final call Callers Initials

Exposure Assessment of Individuals who died with Asbestosis listed as a Contributing Cause of Death between 1996- 2005

1. What is your relation to _____
    a. Spouse
    b. Father
    c. Father in law
    d. Uncle
    e. Other
    f. Pleas describe_____

2. Were you aware that _____death certificate listed asbestosis as the cause or contributing cause of death?
    a. Yes
    b. No
    c. Don't Know
    d. Refuse

3. Do you know how he may have been exposed to asbestos? Was he possibly exposed to asbestos in his work? Please describe.

4. Did he work at the Vermont Asbestos Group mine located in Lowell and Eden Vermont at any time during his life?
    a. Yes
    b. No
    c. Don't know
    If yes, how long did he work at the mine? _____ years

5. Please describe to the best of your knowledge_____ work history including length time at each job. (Try to collect the following information for each job.)
    • Job title
    • Type of Industry
    • Name of employer
    • What did a typical work day include?
    • Are you aware of any dust fume radiation chemical or biological hazards in the work place?

- Job title
- Type of Industry
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- Job title
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- What did a typical work day include?
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6. Did he wear a respirator while working any of these jobs? (By respirator I mean an appliance fitting over the nose and mouth to protect the lungs from dust, smoke, or other irritants.)
   a. Yes
   b. No
   c. Don't Know

7. Did he wear his work clothes home to be cleaned?
   a. Yes
   b. No
   c. Don't know

8. Did he have any history of military service?
   a. Yes
   b. No
   c. Don't Know
   If yes,
      1. What was his job classification _____
      2. Which branch _____
      3. Where was he stationed? _____
      4. When did he serve? _____

9. Was _____a union member ?
   a. Yes
   b. No
   c. Don't Know
   If yes, which union? _____

10. Please describe all the places he lived including how long he lived there starting with the most recent and working back to the best of your ability. Please list address if available.

Year Place of Residence

11. Are you aware if any Vermont Asbestos Group mine gravel was used on his property for any reason such as driveway fill or insulation?

12. Did he smoke?

a. Yes (includes did smoke and then quit) If yes how much_____
b. No
c. Don't Know

13. What were his hobbies?

14. May I please call you again if I have additional questions?
a. Yes
b. No

Thank you very much for taking the time to speak with me. The information you have provided today has been very helpful. Again my name is _____from the Vermont Department of Health. Should you have an questions please don't hesitate to call _____ Thank you, Good bye.

• Appendix C •

Study Results

Table 1

Study Participation of Next of Kin

	Total	Rest of State	Towns Near Mine
Number of deaths:	19	14	5
• Number of males	19	14	5
• Number of females	0	0	0
Next of kin participated in interview	13	9	4
Next of kin did not participate:	6	5	1
• Chose not to participate	2	1	1
• Phone line out of service	2	2	0
• Not reachable after 3 tries	2	2	0

Table 2

Results of Next of Kin Interview, 1996-2005

Next of kin reported —	Total (n=13)	Rest of State (n=9)	Towns near Mine (n=4)
Aware asbestosis listed on death certificate	11	8	3
Decedent smoked	11	8	3
Knowing how asbestos exposure may have occurred	9	6	3
Decedent moved to Vermont after developing asbestosis	5	3	2
Decedent worked at VAG mine	3	1	2
Decedent served in the military *	10	8	2

* NOTE: Some military service jobs are in settings — such as a naval shipyard or boiler room — where asbestos exposure may have been an occupational hazard.

Table 3

Results of Hospital Discharge De-duplication

	Total	Rest of State	Towns near Mine
Number of discharges	178	164	14
Number of individuals	118	108	10
Number of males	115	105	10
Number of females	3	3	0