

HEALTH HAZARDS OF THE ROOFING TRADE --
a Pilot Study of Boston Area Roofers

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Introduction

At the request of Local 33 of the United Union of Roofers, Waterproofers, and Allied Workers, a comprehensive assessment of 55 active and retired union members was performed in March, 1982. This was a pilot study of roofers with particular attention given to evaluating dermatologic, pulmonary, and neurologic function in workers with varying periods of work in the roofing trade.

Background

Roofing is one of the most hazardous trades in U.S. industry. In addition to obvious safety hazards, roofers are exposed daily to a variety of toxic materials which have been shown to cause cancer, lung disease, skin disease, and neurologic disorders. Despite these health risks, definitive research on the hazards of roofing is lacking. The NIOSH publication *Health and Safety Guide for the Commercial Roofing Industry* (1) presents an overview of the many health risks, but stresses the need for more detailed studies -- especially of the rapidly growing one-ply technology.

The work histories of roofers are quite complex. Many of them work for over 10 different roofing companies at hundreds of different jobs over the course of a lifetime. Some do stay with one company for many years, but particularly among younger workers, this is unusual. Roofers are often frequently laid off for varying periods -- especially in the winter.

The union runs an apprentice program which lasts for three years, and includes regular classroom training in addition to work experience. At the completion of apprenticeship, the apprentice becomes a roofing mechanic, and is qualified to perform all aspects of roofing work. Most mechanics interviewed reported performing all or nearly all aspects of the job, and few reported specialization. Roofing companies do specialize however, and so a roofer who stays

with a single firm may work mostly on one particular type of roof.

Roofing technology is in a state of transition. The coal tar pitch (called simply "pitch") roof was the most common for large and commercial buildings many years ago, but has now been almost completely eliminated. Asphalt is still quite common, but it too is being replaced by the "one-ply" or membrane roofing technology. While asphalt roofing implies fairly standard work practices, one-ply roofs are installed by many different methods. Each manufacturer of one-ply roofing systems has its own recommended practices. These are taught to roofers and roofing companies by manufacturers' representatives. Instruction in the most common systems is a part of apprentice training. Because one-ply roofing is new and requires special training, it is often not performed by older roofers.

Waterproofing workers are included in the Roofers Union, and so were included in this screening. They tend to work for companies that specialize in waterproofing, and so have done little roofing per se. Their exposures are to asphalt, and to a lesser extent to compounds much like those used for one-ply roofing. All of the waterproofers in our sample, had also done at least some roofing as well.

Methods

Fifty-five workers ranging in age from 21 to 76 years (mean, 43 years), were evaluated on March 2 and 4, 1982. There was one woman. The age distribution (see Table 1) shows that the population consisted essentially of two groups -- a young group, eleven of whom were apprentices (see below), and an older group, 7 of them retired. Table 2 shows the length of employment as a roofer for the population screened.

Assessment of Health Effects

An occupational and general health history (Appendix 1) was administered by questionnaire. The questionnaire was mailed to all participants prior to the screening. An interviewer reviewed each questionnaire with the respondent at the start of the examination.

Pulmonary function tests (spirometry) were administered according to modifications of the American Thoracic Society guidelines, which we have described elsewhere (2). Forced Vital Capacity and Forced Expiratory Volume at one second were calculated for every participant for whom valid measurements were obtained.

Chest x-rays -- PA and both oblique views, were obtained. The films were read by a radiologist (a certified "B" reader) using the ILO/UC system of 1980 (3).

A physical examination was performed which included an evaluation by a dermatologist where indicated.

A complete blood count and liver profile were performed.

A battery of neuropsychological tests were performed, similar to those we have performed on other groups of workers (4). The battery included the digit span and visual memory tests from the Wechsler memory scale, a paired words similarities test, block design, digit symbol substitution, dynamic continuous performance (CPT), the Santa Anna dexterity test, and the Profile of Mood States. Raw scores were adjusted for the confounders age and education, and then the scores of those who reported frequent work on one-ply roofs were compared to all the others in the group.

Results

Work history

Table 3 and Figure 1 show two different measures of work experience by type of roof. To derive Table 3, the total working years of each roofer were apportioned by the reported percent of time spent working on each type of roof. Figure 1 reports type of work performed most frequently in the previous year. As expected, there is little long-term experience with one-ply roofing, and pitch has fallen well behind asphalt in years of exposure.

work injuries

The roofers screened reported work-related accidents and injuries frequently. Thirty-two percent reported having received a kettle flash burn (when the large fired kettle on wheels used to melt the pitch or asphalt becomes too hot, it can ignite, causing flames to shoot out unpredictably). Forty-seven percent had received other types of work-related burns, 42% suffered falls, 26% back injuries, and 30% other work-related accidents.

neurological complaints

In the questionnaire, each participant was asked to read through a list of neurological symptoms, and indicate which of these had been experienced while working as a roofer, and to indicate which type of roofing was being performed when the symptom was noted. A wide range of problems were reported, and were often associated with all types of roofing. Roofers reported symptoms of headache and lightheadedness particularly frequently when working with one-ply roofing systems (Table 4). Lower rates of these two symptoms (commonly seen with solvent exposure) were seen in other types of roofing. The high rate of irritability reported while working on pitch roofs may have resulted from lack of clarity of the question; workers commonly experience skin *irritation* while working with pitch.

dermatological findings

Two suspected skin carcinomas were identified. The first was a suspected basal cell carcinoma in a retired 64 year old roofer who reported considerable work with pitch and asphalt, and had done a small amount of one-ply roofing in recent years. He reported having lesions on the backs of both hands that failed to heal. The second suspected carcinoma was a squamous cell carcinoma in a 66 year old roofer with a similar work history. He reported increased skin and eye photo-sensitization associated with his work. Most workers had developed sun-related (actinic) skin conditions (Table 5).

chest x-rays

Approximately 50% of those tested had some abnormality on chest x-ray (Table 6). Linear opacities were observed in two roofers, both of whom had worked in shipyards before becoming roofers. Bilateral pleural thickening was noted in 18. The prevalence of bilateral pleural thickening is roughly 50% after 10 years of work, and about 10% in those with less than 10 years of work (Table 7).

pulmonary function

Fifty-two acceptable PFTs were performed. Three roofers had values for FVC below 80% of predicted, and six had values of FEV1.0 less than 80% of predicted.

"Heavy" smokers show a decrement in pulmonary function over "light" smokers, as shown in Table 8. "Light" smokers were defined as those with total lifetime cigarette consumption less than the median (approximately 9900 pack-days in this population), and "heavy" smokers as those with consumption greater than the median.

For roofers with more than ten years of experience, pulmonary function declines consistently with years worked (Table 9).

All subjects were questioned on their asbestos exposure history. Table 10 shows the data on pulmonary function stratified by asbestos exposure -- either "ever exposed", or "never exposed". Because asbestos exposure was occasional and sporadic among these roofers, and was generally incidental to their main work, a more quantitative exposure variable was not practical. Asbestos exposed roofers had lower (but not statistically significantly lower) FVC and FEV1 than non-exposed roofers.

When the data were stratified by presence or absence of bilateral pleural thickening, those with this condition were found to have lower mean values of FVC and FEV1 than those without it. The difference was not statistically significant however (Table 11).

neuropsychological testing

No statistically significant differences ($P < .05$) were found on any of the neuropsychological variables between those reporting frequent exposure to one-ply roofing, and the rest of the sample.

Discussion

The screening was performed in a period of bad weather, which meant both that attendance was poor, and that many of the roofers who did come had not been working for some time. The former means that the sample size is quite restricted, and the latter that acute or recent exposures could not be evaluated. In particular we found very few roofers with substantial recent exposure to one-ply roofing -- which we hypothesized might result in decrements in neuropsychological function. Such decrements were not observed.

The frequencies of neurological complaints are suggestive of hazardous exposures but are difficult to quantify meaningfully. The data do however indi-

cate that one-ply roofing results in more complaints per worker ever exposed than the other technologies. The union reports that one of the major reasons that pitch was phased out as a roofing material was that it was quite irritating to the eyes, throat, etc. These findings suggest that one-ply roofing may be no less noxious to work with.

The frequent skin problems were expected, both from the previous studies (1), and because these roofers frequently did not wear gloves, and often used gasoline or other solvent hand cleaners.

The prevalence of pleural changes in this moderately asbestos-exposed population is consistent with what we have found in studies of other construction trades in which asbestos work is not a normal part of the job (2).

The difficulty of small numbers was particularly apparent in analysis of the pulmonary function data. Stratification by both cigarette consumption and length of work resulted in greater decrements in function in the lowest exposure category than were expected. These results could not be explained by other known exposures, and are probably the result of random variation in the small groups which resulted from the stratifications.

The observed decline in pulmonary function with years worked after the first ten years is probably not due to an age effect because the data were age (and height) standardized. Thus there does appear to be some effect of employment over and above that expected from age alone.

Conclusion

This was a small pilot study of construction workers involved in all aspects of the roofing trade. The sample size was small, and definitive findings were not expected. The presence of bilateral pleural thickening, with associated reduction (though not significant) of FVC and FEV1 is suggestive of some asbestos-

related pulmonary disease in this moderately exposed population. Self-reported symptoms of neurological effects were associated with all types of roofing work. The possibility of neuropsychological disease due to solvent exposure in one-ply roofing was difficult to investigate for a number of reasons: 1) small sample size; 2) inclement weather with the consequence of little work in the recent past; 3) in a fairly random collection of roofers, many do little or no one-ply work; and 4) one-ply roofing is largely restricted to young workers and apprentices.

This pilot study has demonstrated that roofers experience respiratory, neuropsychological, and skin disorders that are likely to be associated with their work. A larger study is needed before it will be possible to quantify the extent of these problems. The rapid growth of the one-ply technology also argues for studies which could identify its possible hazards before too many years of exposure have occurred.

Figure 1 - Type of Job Performed Most Often in Past Year

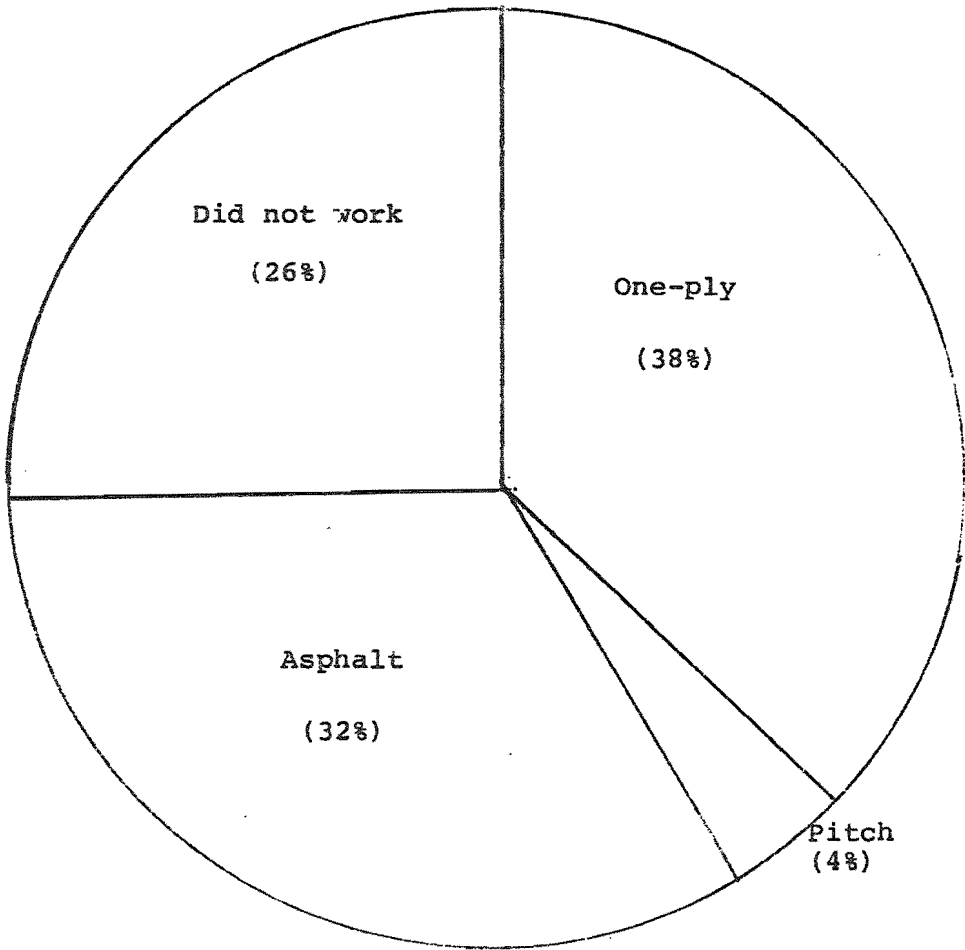


TABLE 1 - AGE DISTRIBUTION IN ROOFERS

		AGE (YRS) (N = 55)				
		20-29	30-39	40-49	50-59	60-69
Males		14	5	16	14	5
Females		1	0	0	0	0
		15	5	16	14	5

TABLE 2 - DURATION AS A ROOFER

YEARS (N = 55)							
0-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40
17	4	1	9	10	4	6	4

TABLE 3 - YEARS WORKED BY TYPE OF JOB

(Number (%) of roofers studied)

<u>Years Worked</u>	<u>Pitch</u>	<u>Asphalt</u>	<u>One-ply</u>	<u>Waterproofing</u>
0 - 5	43(79)	29(53)	47(90)	47(94)
6 - 10	7(13)	8(15)	4 (8)	1 (2)
11 - 15	2 (4)	14(26)	1 (2)	1 (2)
16 - 20	1 (2)	1 (2)	0	0
21 - 25	0	2 (4)	0	0
26 - 30	1 (2)	0	0	1 (2)
	54(100)	54(100)	52(100)	50(100)

TABLE 4 - FREQUENCY AND NUMBER OF REPORTED SYMPTOMS BY TYPE OF JOB PER TOTAL NUMBER OF WORKERS EVER EXPOSED

Symptoms	TYPE OF JOB							
	Pitch		Asphalt		One-ply		Waterproofing	
Memory/Concentration								
Difficulty Concentrating	.11	6 *	.06	3	.20	8	.15	4
Confused or disoriented	.05	3	.04	2	.18	7	.07	2
Difficulty remembering	.07	4	.10	5	.08	3	.22	6
Have to use notes	.02	1	.06	3	.03	1	.07	2
Hard to understand reading	0	0	.02	1	.03	1	.04	1
Motor/Sensory								
Incoordination	.02	1	.02	1	.10	4	.07	2
Changes in gait	0	0	0	0	.03	1	0	0
Weakness - arms/hands	.05	3	.02	1	.13	5	.07	2
Weakness - legs/feet	.09	5	.06	3	.10	4	.15	4
Difficulty grasping	.04	2	0	0	.05	2	.04	1
Numbness tingling - fingers	.04	2	.02	1	.10	4	.04	1
Numbness tingling - toes	.04	2	.02	1	.05	2	.04	1
Constitutional								
Loss of appetite	.16	9	.08	4	.15	6	.15	4
Sleeps alot	.05	3	.02	1	.13	5	.11	3
Tire easily	.11	6	.10	5	.15	6	.22	6
Light-headed	.15	8	.10	5	.45	18	.30	8
Heart palpitations	.04	2	.02	1	.08	3	.11	3
Headaches	.11	6	.08	4	.30	12	.11	3
All symptoms	1.6	88	1.1	56	2.5	101	2.3	63

*Frequency per number of workers reporting ever having worked on that type of roof, and number of workers reporting symptom.

TABLE 5 - SKIN CONDITIONS

<u>Condition</u>	<u>N</u>
Basal cell carcinoma and actinic changes of comedones and furrows	1
Suspected squamous cell carcinoma and actinic changes of comedones and furrows	1
Comedones and furrows only	1
Comedones only	2
Other skin conditions	40
Normal skin	10
	55

TABLE 6 - X-RAY RESULTS

<u>X-ray report</u>	<u>N</u>
Bilateral pleural thickening	18
Other unilateral pleural abnormality	8
Small linear opacities	2
Normal	28
No x-ray report	1

TABLE 7 - FREQUENCY OF BILATERAL PLEURAL THICKENING BY
YEARS WORKED

	Years of Work			
	1-10	11-20	21-30	31-40
Bilateral Pleural Thickening	2 (9.5%)	5 (50%)	6 (43%)	5 (50%)
All Others	19 (90.5%)	5 (50%)	8 (57%)	5 (50%)

TABLE 8 - MEAN FVC AND FEV-1 FOR SMOKERS AND NONSMOKERS

	Nonsmokers	Light smokers	Heavy smokers
% of Predicted	97.7	99.8	96.0
FVC	(n=8)	(n=21)	(n=24)
FEV-1	97.0	99.2	86.7
	(n=8)	(n=21)	(n=24)

TABLE 9 - MEAN FVC AND FEV-1 BY YEARS WORKED

% of Predicted:	Years of Work			
	1-10	11-20	21-30	31-40
FVC	95.8 (n=19)	101.6 (n=10)	100.3 (n=14)	94.2 (n=10)
FEV-1	96.3 (n=19)	99.2 (n=10)	90.9 (n=14)	84.5 (n=10)

TABLE 10 - MEAN FVC AND FEV-1 BY ASBESTOS EXPOSURE

% of Predicted:	Asbestos	
	Never Exposed	Ever Exposed
FVC	100.4 (n=11)	97.1 (n=42)
FEV-1	96.7 (n=11)	92.3 (n=42)

TABLE 11 - MEAN FVC AND FEV-1 BY PRESENCE OR ABSENCE OF
BILATERAL PLEURAL THICKENING

% of Predicted	Bilateral Pleural Thickening	
	Absent	Present
FVC	98.4 (n=35)	96.6 (n=18)
FEV-1	94.4 (n=35)	90.9 (n=18)

REFERENCES

1. National Institute for Occupational Safety and Health, Health and Safety Guide for the Commercial Roofing Industry, NIOSH, Division of Technical Services, #78-194, Cincinnati, Ohio, 1978.
2. Dagg TG, Baker EL, Green R. Asbestos-Related Disease Among Boston Area Sheet Metal Workers. Report to NIOSH from the Harriet Hardy Institute, NIOSH, #82-0841, 1982.
3. ILO/UC International Classification of Radiographs of Pneumoconioses, 1971, (No. 22 revised), Occupational Safety and Health Series, International Labor Organization, Geneva.
4. Baker EL, Feldman RG, White RF, Harley JP, Dinse GE. Development of a Neurobehavioral Test Battery - Standardization of Technique and Guidelines for Use in Medical Monitoring Programs, submitted for publication, 1982.

Please answer the questions in this questionnaire as completely as possible. The questions can be answered by circling the number of the best answer or by filling in a blank with a number or word.

PLEASE USE PENCIL AND PRINT ALL ANSWERS!

Personal Data

- ### Occupational History

- (6a continued on next page . . .)

4. plumber
5. carpenter
6. other

6b. For how many years did you work in that job? _____ (33-34)

7a. Considering all the work you've done as a roofer, what percentage of your time has been spent on each of the following jobs?

1. asphalt roofing job _____ % (35-37)
2. coal tar pitch job _____ % (38-40)
3. resaturation of existing roof _____ % (41-43)
4. tear-off operation _____ % (44-46)
5. one-ply job _____ % (47-49)
6. water proofing _____ % (50-52)

b. Which of the above have you done most often in:

1. the past year? _____ ☐ (53)
2. the past 2 weeks? _____ ☐ (54)

8. Have you ever worked in a shipyard? 1. Yes 2. No Dates _____ (55)

9. Have you ever worked in the manufacture/use of any of the following?
dates

- a. asbestos blankets (for heat shielding) 1. yes 2. no _____ (56)
- b. asbestos-cement pipes and sheets 1. yes 2. no _____ (57)
- c. asbestos insulation 1. yes 2. no _____ (58)
- d. asbestos textiles 1. yes 2. no _____ (59)
- e. friction products (brakes) containing asbestos 1. yes 2. no _____ (60)
- f. transite pipes 1. yes 2. no _____ (61)
- g. asbestos shingles 1. yes 2. no _____ (62)
- h. paint mixed with asbestos 1. yes 2. no _____ (63)

(9a continued on next page)

Dates

i. cement mixed with asbestos 1. yes 2. no _____ (64)

j. asbestos paper 1. yes 2. no _____ (65)

10. Have you ever worked with lead or copper sheet in roofing projects?

1. yes 2. no _____ (66)

If yes, please describe.

11. What type of hand cleaner do you usually use at the end of a day's work?

_____ ☐ _____

(67)

12. If you have worked on asphalt roofing jobs, please answer the questions in the following section. Otherwise, go on to question # 13.

Asphalt roofing job

a. How old were you when you first worked on a coal-tar-pitch roofing job? _____

(68-69)

b. On the average, what percentage of your time has been spent doing each of the following chores?

1. kettleman _____ %

(70-72)

2. putting down insulation _____ %

(73-75)

3. mopman _____ %

(76-78)

Please leave blank									
Card No.		2		1					
I.D. No.		☐	☐	☐	☐	☐	☐	☐	2-6

4. papersetter _____ %

(7-9)

5. hot lugger _____ %

(10-12)

#12 continued on next page.

c. While on asphalt jobs, what percentage of your time did you wear:

1. a respirator (excluding a bandana or paper mask) _____ %

(13-15)

Dates _____

2. goggles _____ % Dates _____

(16-18)

13. If you have worked on coal tar pitch jobs, please answer the questions in the following section. Otherwise, go on to question #14.

a. How old were you when you first worked on a coal tar pitch roofing job? _____

(19-20)

b. On the average, what percentage of your time has been spent doing each of the following jobs?

1. kettleman _____ %

(21-23)

2. putting down insulation _____ %

(24-26)

3. mopman _____ %

(27-29)

4. papersetter _____ %

(30-32)

5. hot lugger _____ %

(33-35)

c. While on coal tar pitch jobs, what percentage of your time did you wear:

1. a respirator (excluding a bandana or paper mask?)

(36-38)

_____ %

2. Goggles _____ %

(39-41)

Dates _____

14. If you have worked on a tear-off job, please answer the questions in the following section. Otherwise, go on to question #15.

Tear-off job (ripper)

- a. How old were you when you first worked on a tear-off job? _____ (42-43)
- b. On the average, what percentage of your time has been spent doing each of the following chores?
1. running a cutting machine _____ % (44-46)
 2. cutting or ripping by hand (as with a bar) _____ % (47-49)
 3. collecting loose material by hand and placing in a wheel barrow _____ % (50-52)
 4. using power broom _____ % (53-55)
 5. dumping _____ % (56-58)
- c. On the average, what percentage of the roofs that you were tearing off were:
1. asphalt? _____ % (59-61)
 2. pitch? _____ % (62-64)
- d. Were roofs usually wet before tear-off operations began?
1. yes 2. no (65)
- e. While on tear-off jobs, what percentage of your time did you wear:
1. a respirator (excluding a bandana or paper mask) _____ % (66-68)
Dates _____
 2. goggles _____ % Dates _____ (69-71)

15. If you have ever been involved in the resaturation of an existing roof, please describe your usual job activities in this type of operation.

(72)

16. If you have worked on a one-ply roofing job, please answer the questions in the following section. Otherwise, go on to question #17.

One-ply roofing system

- a. How old were you when you first worked on a one-ply roofing job?

(73-74)

- b. Considering only one-ply jobs, what percentage of your time was spent using non-adhered systems (where no solvent was used)?

(75-77)

1. If involved in non-adhered systems, has heat welding of laps ever been your primary duty?

1. yes 2. no

(78)

Please leave blank

Card No. 3 1

I.D. No. 2-6

- c. Considering only one-ply jobs, what percentage of your time was spent using adhered systems, where adhesives (glues, solvents) were used to anchor the sheeting? %

(7-9)

1. Please describe your usual job duties in adhered systems.

(10)

- d. While working on one-ply jobs, what percentage of your time did you wear:

1. a respirator (excluding a bandana or paper mask)? %

(11-13)

Dates _____

2. goggles %

Dates _____

(14-16)

3. gloves %

Dates _____

(17-19)

Symptoms

Please indicate if you have ever experienced any of the following symptoms while working on an asphalt, coal tar pitch, one-ply, waterproofing, or tear-off job. If yes, place a check mark under the appropriate type(s) of job(s).

	Pitch	One-ply	Waterproofing	Tear-off	Asphalt	
17. Have you had <u>loss of appetite</u> ?	—	—	—	—	—	(20)
18. Have you <u>tired more easily</u> than expected for the amount of activity you do?	—	—	—	—	—	(21)
19. Have you felt <u>lightheaded</u> or dizzy?	—	—	—	—	—	(22)
20. Have you had <u>difficulty concentrating</u> ?	—	—	—	—	—	(23)
21. Have you been <u>confused</u> or <u>disoriented</u> ?	—	—	—	—	—	(24)
22. Have you had more than usual <u>trouble remembering things</u> ?	—	—	—	—	—	(25)
23. Have your <u>relatives</u> noticed that you have <u>trouble remembering things</u> ?	—	—	—	—	—	(26)
24. Have you had to <u>make notes</u> to remember things which used to be easy to remember?	—	—	—	—	—	(27)
25. Have you found it hard to <u>understand</u> the meaning of newspapers, magazines, and books you have read?	—	—	—	—	—	(28)
26. Have you felt <u>irritable</u> more than is usual for you?	—	—	—	—	—	(29)
27. Have you felt <u>depressed</u> more than is usual for you?	—	—	—	—	—	(30)
28. Have you ever had <u>heart palpitations</u> even when not exerting yourself?	—	—	—	—	—	(31)

	Pitch	One-ly	Waterproofing	Tear-off	Asphalt	
29. Have you had a <u>seizure</u> ?	☐	☐	☐	☐	☐	(32)
30. Have you had <u>headaches more often than is usual for you</u> ?	☐	☐	☐	☐	☐	(33)
31. Have you slept more often than is usual for you?	☐	☐	☐	☐	☐	(34)
32. Have you been bothered by <u>incoordination</u> or loss of balance?	☐	☐	☐	☐	☐	(35)
33. Have you noticed a <u>change in your gait</u> or the way you walk?	☐	☐	☐	☐	☐	(36)
34. Have you had any <u>loss of muscle strength</u> in your <u>arms or hands</u> ?	☐	☐	☐	☐	☐	(3)
35. Have you had any <u>loss of muscle strength</u> in your <u>legs or feet</u> ?	☐	☐	☐	☐	☐	(3)
36. Have you had <u>difficulty moving your fingers or grasping things</u> ?	☐	☐	☐	☐	☐	(3)
37. Have you had <u>numbness, tingling, or "pins and needles"</u> in your:						
a. fingers (lasting more than 1 day)	☐	☐	☐	☐	☐	(4)
b. toes (lasting more than 1 day)	☐	☐	☐	☐	☐	(4)
38. While on a roofing job, have you ever experienced a burning feeling in your:						
a. throat	1. yes	2. no				(
b. nose	1. yes	2. no				(
c. eyes	1. yes	2. no				

If yes to any of the above, please describe the type of job you were on.

39. In the summer, when you first expose your skin to 30 minutes of sun, how does your skin react? (45)
1. always burns, never tans
 2. usually burns, tans only with difficulty
 3. sometimes mildly burns, tans above average
 4. rarely burns, tans easily
40. Have you ever had multiple warts of the face and neck? 1. yes 2. no (46)
41. Do you presently have any skin lesions (irritations) that have failed to heal and have been present for 3 or more months? 1. yes 2. no (47)
42. If you have ever worked on a coal tar pitch roof (including tear-off work), please answer the questions in the following section. Otherwise, go on to question #43.

- | | | |
|---|--------------|------|
| a. Have you ever noticed your skin being more sensitive to sun? | 1. yes 2. no | (43) |
| b. Have you ever noticed your eyes being more sensitive to sun? | 1. yes 2. no | (49) |
| c. Have your face and neck ever developed a deep yellowish-brown (not tan) color? | 1. yes 2. no | (50) |
| 1. If yes, did this color go away within a year? | 1. yes 2. no | (51) |
| d. Have you ever experienced recurrent episodes of hives? | 1. yes 2. no | (52) |

Accidents

43. While on a roofing job, have you ever experienced a:
- a. kettle flash burn? 1. yes 2. no (53)
 - b. other thermal burn? 1. yes 2. no (54)
 - c. fall? 1. yes 2. no (55)
 - d. back injury? 1. yes 2. no (56)
 - e. other accident? 1. yes 2. no (7)

#43 continued on next page.

If yes to any of part(s) of #43, please give dates and describe the type of roofing job you were involved in.

Medical History

44. Has a doctor ever told you that you have had any of the following conditions?

			Date of diagnosis	
a. acute bronchitis (of brief duration)	1. yes	2. no	_____	(58)
b. chronic bronchitis (long-term)	1. yes	2. no	_____	(59)
c. pleurisy	1. yes	2. no	_____	(60)
d. bronchiectasis	1. yes	2. no	_____	(61)
e. asthma	1. yes	2. no	_____	(62)
f. asbestosis	1. yes	2. no	_____	(63)
g. tuberculosis	1. yes	2. no	_____	(64)
h. water in the lungs	1. yes	2. no	_____	(65)
i. chest injury	1. yes	2. no	_____	(66)
j. other chest trouble	1. yes	2. no	_____	(67)
k. diabetes (or "sugar")	1. yes	2. no	_____	(68)
l. epilepsy	1. yes	2. no	_____	(69)
m. slipped disc	1. yes	2. no	_____	(70)
n. concussion	1. yes	2. no	_____	(71)
o. skull fracture	1. yes	2. no	_____	(72)
p. nerve or brain damage	1. yes	2. no	_____	(73)
q. alcohol-related nerve disease	1. yes	2. no	_____	(74)
r. other _____	1. yes	2. no	_____	(75)

45a. Have your arms, hands, legs, or feet ever been injured by fracture, frostbite, crush, amputation, arthritis, or any other event?

1. yes 2. no

(7)

If no to 45a, please go on to #46.

If yes to 45a: _____

b. right arm or hand? 1. yes 2. no

(8)

If yes, describe. _____

c. left arm or hand? 1. yes 2. no

(9)

If yes, describe. _____

d. right leg or foot? 1. yes 2. no

(10)

If yes, describe. _____

e. left leg or foot? 1. yes 2. no

(11)

If yes, describe. _____

46a. Do you now use any medications prescribed by a physician? 1. yes 2. no (12)

If no to 46a, please go on to #47.

If yes to 46a: _____

b. Please list the medications and when you are supposed to take them.

47. In the past, have you ever taken:

a. tranquilizers 1. yes 2. no

Date/Name of medication

(13)

b. anti-anxiety pills 1. yes 2. no

(14)

c. sleeping pills 1. yes 2. no

(15)

#47 continued on next page.

			Date/Name of medication	
d. breathing medication	1. yes	2. no	_____	(16)
e. other (list)	1. yes	2. no	_____	(17)

Symptoms

Cough

48. Do you usually cough (5 or more days a week) on getting up, first thing in the morning? (Include cough with first smoke or on first going out-doors; exclude a single cough or clearing of the throat.)

1. yes 2. no (18)

49. Do you usually cough (5 or more days a week) during the day or at night?

1. yes 2. no (19)

If no to 49, please go on to #50.

If yes to 49a:

b. How would you describe this cough?	1. dry
	2. loose
	3. sometimes dry/sometimes loose

(20)

50a. Do you usually cough as much as 4-6 times a day? 1. yes 2. no (21)

If no to 50a, please go on to #51.

If yes to 50a:

b. Do you cough like this on most days for as much as 3 months at a time?

1. yes 2. no

 (22)

c. For how many years have you had this cough? _____
--

(23)

Phlegm

51. Do you cough up phlegm (thick spit) at all on getting up, or after your first smoke, or first thing in the morning?

1. yes 2. no (24)

52a. Do you bring up phlegm, from your chest, throughout the rest of the day?

1. yes 2. no (25)

If no to 52a, please go on to #53.

If yes to 52a:_____

b. Do you bring up phlegm like this on most days for as much as 3 months during the year?

1. yes 2. no

(26)

c. For how many years have you had this cough where you brought up phlegm? _____

(27-28)

Dates

53. Have you ever coughed up blood? 1. yes 2. no _____

(29)

54a. During the past 3 years, have you had any chest illnesses that have kept you from your usual activities for as much as a week?

1. yes 2. no

(30)

If no to 54a, please go on to #55.

If yes to 54a:_____

b. Briefly describe this illness: _____

c. Did you cough up phlegm (more than usual) with any of these illnesses?

1. yes 2. no

(31)

d. How many illnesses like this have you had in the past 3 years? _____

(32)

Wheezing

55a. Does your chest ever sound wheezy or whistling? 1. yes 2. no

(33)

If no to 55a, please go on to #56.

If yes to 55a:_____

b. Does this happen on most days (5 or more days a week)? 1. yes 2. no

(34)

c. Does this happen on most nights (5 or more a week)? 1. yes 2. no

(35)

56a. Does your chest ever feel tight or your breathing become difficult?

1. yes 2. no

(36)

If no to 56a, please go on to #57.

If yes to 56a:_____

b. Is this tightness or difficulty in breathing continuous? 1. yes 2. no

(37)

c. If not, is your breathing completely normal between attacks?

1. yes 2. no

(38)

d. How many attacks have you had in the past 3 years? _____

(39)

Shortness of Breath

57a. Are you ever short of breath when you walk up stairs?

1. yes 2. no

(40)

If no, go to 58, if yes:

b. Do you become short of breath when you walk up $\frac{1}{2}$ flight?

1. yes 2. no

(41)

c. Do you become short of breath when you walk up 1 flight?

1. yes 2. no

(42)

d. Do you become short of breath when you walk up 2 flights?

1. yes 2. no

(43)

e. If you do not become short of breath after 2 flights, how many flights can you walk up without experiencing any breathing difficulty? _____

(44)

f. For how many years have you had shortness of breath walking up stairs? _____

(45-46)

58a. Do you have to walk slower than people of your own age because of shortness of breath?

1. yes 2. no

(47)

If no, go to 59, if yes:

b. For how many years have you noticed this? _____

(48-49)

59a. Do you have to stop because of shortness of breath when walking on level ground at your own pace?

1. yes 2. no

(50)

If no, go to 60, if yes:

b. For how many years have you noticed this? _____

(51-52)

Habits

60. Do you now regularly drink alcohol-containing beverages (more than once a month)?

1. yes 2. no

(53)

61. Have you ever regularly drunk alcohol-containing beverages?

1. yes 2. no

(54)

If no to 60 and 61, go on to 63a, if yes:

62a. How often do/did you drink five or more drinks? (circle answer)

(55)

- | | |
|--------------------|-------------------------|
| 1. Daily | 5. once a month |
| 2. 4-6 times/week | 6. less than once/month |
| 3. 1-3 times/week | 7. a few times/year |
| 4. 2-3 times/month | 8. Never |

b. How many drinks do/did you average each week? (1 drink = one beer, one glass of wine, or shot of liquor; 1 quart beer = 3 drinks, $\frac{1}{2}$ pint of liquor = 5 drinks; 1 pint of liquor = 10 drinks.)

(56)

- | | |
|----------|-----------------|
| 1. 0 | 5. 22-42 |
| 2. 1-7 | 6. 43-70 |
| 3. 8-14 | 7. More than 70 |
| 4. 15-21 | |

c. For how many years have you been drinking alcohol: (If you quit for more than 1 year, subtract number of years quit.)

(57)

1. less than 5 years
2. 5-9 years
3. 10-14 years
4. 15-20 years
5. more than 20 years.

d. Has a doctor ever diagnosed or treated you for an alcohol-related condition (alcoholism)?

1. yes 2. no

(58)

Smoking History

Cigarettes

63a. Have you ever smoked cigarettes? (Answer "no" if you have smoked less than 1 cigarette a day or less than 20 packs in your lifetime.)

1. yes 2. no

(59)

If no, go on to question 66, if yes:

b. How old were you when you started smoking? _____

(60-61)

Now would you please answer the questions in the appropriate category.

64. FOR EX-CIGARETTE SMOKERS - (Answer only if you have not smoked within the past month).

a. How old were you when you quit smoking? _____

(62-63)

b. Throughout the period during which you smoked, what was the average number of cigarettes per day that you smoked?

(64-65)

c. Did you usually inhale? 1. yes 2. no

(66)

d. Before you quit smoking, were there periods of time (6 months or more) during which you did not smoke?

1. yes 2. no

(67)

1) If yes, for how many years did you not smoke? _____

(68-69)

65. FOR CURRENT CIGARETTE SMOKERS - (Answer only if you have smoked in the past month).

a. Currently, how many cigarettes per day do you smoke? _____

(70-71)

b. Throughout the entire period during which you have smoked, what is the average number of cigarettes per day that you have smoked? _____

(72-73)

c. Do you usually inhale? 1. yes 2. no

(74)

d. What brand of cigarettes do you usually smoke?

(75-76)

e. Have you ever quit smoking for six months or more?

1. yes 2. no

(77)

1) If yes, for how many years did you quit? _____

(78-79)

Please leave blank
Card No. 5

ID No. ☐ ☐ ☐ ☐ ☐

(2-6)

Cigars

66a. Have you ever smoked cigars? (Answer "no" if you have smoked less than 1 cigar a week.)

1. yes 2. no

(7)

If no, go to question 69, if yes:

b. How old were you when you started smoking cigars? _____

(8-9)

Now, would you please answer the questions in the appropriate category?

67. FOR EX-CIGAR SMOKERS - (Answer only if you have not smoked cigars within the past month.)

a. On the average, how many cigars per week did you smoke? _____

(10-11)

b. Throughout the period during which you smoked, what was the average number of cigars per week that you have smoked? _____

(12-13)

c. Did you ever inhale? 1. yes 2. no

(14)

d. Did you ever quit smoking cigars for 6 months or more?

1. yes 2. no

(15)

1) If yes, for how many years did you quit? _____

(16-17)

68. FOR CURRENT CIGAR SMOKERS - (Answer only if you have smoked cigars within the past month.)

a. Currently, how many cigars per week do you smoke? _____

(18-19)

b. Throughout the period during which you have smoked, what is the average number of cigars per week that you have smoked? _____

(20-21)

c. Do you usually inhale? 1. yes 2. no

(22)

d. Have you ever quit smoking cigars for 6 months or more?

1. yes 2. no

(23)

1) If yes, for how many years did you quit? _____

(24-25)

Pipes

69a. Have you ever smoked a pipe? (Answer "no" if you have smoked less than 1 ounce of tobacco a month or less than 12 ounces in your lifetime.)

1. yes 2. no

(26)

If no, go on to Page 19; if yes:

b. How old were you when you started smoking a pipe? _____

(27-28)

Now would you please answer the questions in the appropriate category?

70. FOR EX-PIPE SMOKERS - (Answer only if you have not smoked a pipe within the past month.)

a. How old were you when you quit smoking a pipe? _____

(29-30)

b. Throughout the period during which you smoked a pipe, what was the average number of ounces (pouches) of tobacco that you smoked per week? _____

(31)

c. Did you ever inhale? 1. yes 2. no

(32)

d. Before you quit smoking a pipe, were there periods of time (6 months or more) during which you did not smoke a pipe?

1. yes 2. no

(33)

1) If yes, how many years did you not smoke a pipe? _____

(34-35)

71. FOR CURRENT PIPE SMOKERS - (Answer only if you have smoked a pipe within the past month.)

a. On the average, how many ounces (pouches) of tobacco do you smoke per week? _____

(36)

b. Throughout the period during which you have smoked, what is the average number of ounces of tobacco that you have smoked per week? _____

(37)

c. Do you usually inhale? 1. yes 2. no

(38)

d. Have you ever quit smoking a pipe for 6 months or more?

1. yes 2. no

(39)

1) If yes, for how many years did you not smoke a pipe? _____

(40-41)

Please complete the following work history; begin with your present job and list all part-time and full-time jobs that you have had. If you don't remember the names and addresses of all the employers you've worked for as a sheet metal worker, leave that part blank. Do not call the Union for that information. Describe in detail all those jobs where there might have been harmful exposures.

<u>Employer (Name, Address)</u>	<u>Job Title</u>	<u>Dates of Employment</u> From - To	<u>Describe your Duties</u> <u>on the Job</u>	<u>List Toxic</u> <u>Exposures*</u>

continue on back

* (For example, lead, asbestos, silica, welding fumes, dust, carbon monoxide, solvents, etc.)