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COMPARISON TESTING

MONITORING FOR AIRBORNE ASBESTOS FIBERS:

SHEET VINYL FLOOR COVERING,

WET VERSUS DRY SCRAPING

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STATEMENT OF OBJECTIVE

The principal objective of this study was to monitor for airborne asbestos fibers, if any, that were generated during the complete removal of sheet vinyl floor covering when different methods of removal (wet versus dry scraping) were used. The effect of using different length handles on the scraping instrument was also measured.

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I. INTRODUCTION

Sheet vinyl floor coverings are widely used in many residential, institutional and commercial locations. Asbestos is used as a constituent in the felt backing of many sheet vinyl floor coverings, but there is no asbestos in the various types of top or wear layers. Attention has recently been centered on the health effects resulting from certain exposures to asbestos. SRI was retained to measure whether or not airborne asbestos fiber were produced under certain conditions of sheet vinyl floor covering removal.

RFCI recommends that the felt backing of the sheet vinyl be removed from the subflooring by a method known as "wet scraping". (See Attachment "A"). Wet scraping is essentially a wetting of the felt remaining after the wear layer has been removed and a careful scraping of the moistened felt by a suitable instrument (wide-bladed putty knife). In the past, dry scraping, that is the scraping of the felt without prior wetting, has been done. In this test both methods were used and the asbestos fibers collected and counted.

II. TEST SITE LOCATION

The site for these evaluations was a six-year-old home located in a suburban Maryland community. The attic insulation material in this home was, according to the occupant, a pink fiber glass material. This could not be confirmed since access to the attic was not feasible. The heating system in this house was forced air ventilation, and the air was filtered by the furnace unit. This operation was performed in the kitchen of the home. The total floor surface area was approximately 350 square feet. The tests were done in the Spring (March 15 and 16) of 1979. A diagram of the test site is included as Figure 1.

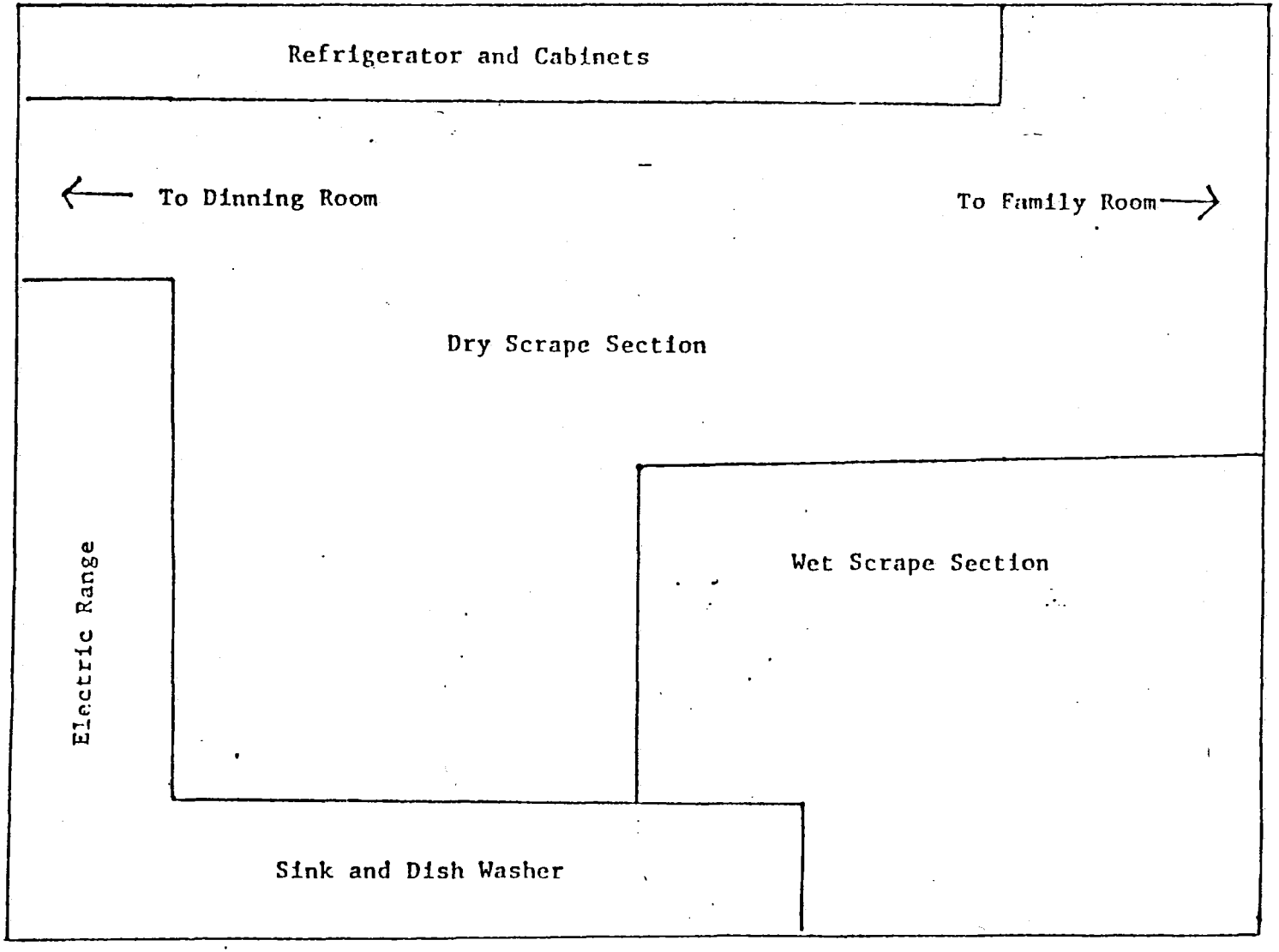


FIGURE 1. Site Plan

III. METHODOLOGY

1. Complete Removal

The operations were not done according to RFCI Recommended Work Practices (See Attachment "A") in that dry scraping was also done.

2. Determination of Airborne Asbestos Fibers

The NIOSH method for determining asbestos fibers in the air was employed (See Attachment "B", NIOSH Method No. P&CAM 239, "Asbestos Fibers in Air").

IV. SUMMARY OF RESULTS

The following Table lists the TWA concentrations of airborne asbestos fibers measured at the test site for the specified operations. TWA concentrations are stated assuming a full-days exposure to the conditions that existed during the test period.

NOTE: The OSHA Standard for a safe workplace allows a concentration of 2 fibers per cc of air on an 8-hour time-weighted average (TWA).

Table No. 1

Operation	8 Hr. TWA (Asbestos Fibers/cc)	
	Mechanic 1	Mechanic 2
Wear Layer Removal	0.1637	0.0844
Wet Scrape	0.4093	
Dry Scrape	2.0248	1.1207
Dry Scrape	0.8279	1.0583

V. CONCLUSION.

Deviation from the recommended RFCI work practice (wet scraping) resulted in a 2-5 fold increase in asbestos exposure. These data reinforce the need to follow the recommended practice of wetting the felt backing prior to scraping. Dry scraping should never be done.

VI. COMPLETE REMOVAL

Discussion

An existing sheet vinyl floor covering was removed by using both wet and dry scraping. First the wear layer was removed according to standard practice and the part of the floor was dry scraped and the rest was wet scraped. A water-detergent solution was used for the wetting. Two different length handles were also used in the scraping, Mechanic 1 used a regular handle on a stiff bladed putty knife while Mechanic 2 used a handle of 3-4 feet.

Sampling Procedure:

The sampling protocol was designed to:

1. Evaluate the background asbestos levels in the home and outside ambient air. This was accomplished using area samples taken several days before the test sampling.

2. Determine any increase above background concentrations of asbestos fibers. Personal samples were taken for each worker during the operation. Separate filters were used for each phase of the operation. Dry scraping was done in two phases so there are two samples for each worker for dry scraping.

See Figure 1, for a diagram of the sampling area.

Sampling Results:

The result of the individual-filter analyses is shown below in Table 2.

Table 2

Description	Filter No.	Air Vol. (liters)	Time (min)	Fibers/ sq. mm*	Total Fiber/cc	Asbestos** Fiber/cc	8-Hr TWA
Background Samples							
Outside	AB-9	760	380	0	0	0	
Outside	C-1089	766	383	0	0	0	
Kitchen	XX009	748	374	0	0	0	
Wear Layer Removal							
Mechanic 1	AB-12	150	75	39	0.218	0.1637	0.16
Mechanic 2	AB-2	140	70	14	0.0844	0.0844	0.08
Wet Scrape							
Mechanic 1	AB-14	110	55	96	0.4837	0.4093	0.40
Dry Scrape							
Mechanic 1	AB-13	126	63	327	2.168	2.0248	2.02
Mechanic 1	AB-11	80	40	96	1.0035	0.8279	0.82
Mechanic 2	AB-10	126	63	191	1.2669	1.1207	1.12
Mechanic 2	AB-15	90	45	121	1.1259	1.0583	1.05

*Fibers/sq. mm of total filter surface area.
**Analyst estimated that about 90% of the fibers were asbestos.

Evaluation

The background samples obtained prior to and on the day of the test showed no asbestos fibers. Asbestos fiber concentrations found during the wear layer removal were very low (0.1637 and 0.0844 fibers/cc). As sometimes happens when the wear layer is removed, a good deal of the felt was separated from the subfloor and removed with the wear layer. The strips of wear layer were rolled and placed in trash bags for disposal. The higher concentration was from the worker who bagged the material.

Wet scraping, which took 55 minutes, resulted in a concentration of 0.4093 fibers/cc. Dry scraping samples, however, showed concentrations ranging from 0.8279 to 2.0248 fibers/cc. Dry scraping was done with two different length handles. The results from the worker using the longer handle (1.1207 and 1.0583) are, on the average, a good deal lower than the results from the worker using the short handle (2.0248 and 0.8279). The longer handle does provide, as would be expected, some protection from the asbestos concentration.

Conclusion

The contrast between the asbestos fiber concentration values found following wet versus dry scraping clearly indicate the need and desirability to follow the recommended RFCI work practice of wetting scraping. The comparison between long and short handles, while not as great a difference as wet versus dry scraping, shows that longer handles are also more desirable if they can be practically used.