

PRELIMINARY STUDY
ON THE
POSSIBLE RELEASE OF ASBESTOS FIBRES
DURING
THE OPERATION OF HAND-HELD HAIR DRYERS

ENVIRONMENTAL HEALTH DIRECTORATE
HEALTH PROTECTION BRANCH
DEPARTMENT OF NATIONAL HEALTH AND WELFARE

MAY 1979

Introduction

Recently concern has been expressed in the United States about the possible release of asbestos fibres during the operation of hand-held hair dryers. In order to evaluate the situation in Canada a number of hair dryers were obtained from Canadian manufacturers whose products were known to utilize asbestos liners. Two models (Sunbeam Odyssey 1000 AD-90 and Sunbeam Jet Set HD-75) which were stated to be asbestos-free by the manufacturer were also included in the test for comparative purposes. A total of 17 hair dryers were obtained for testing. Two of these had been previously aged for an unknown period and were obtained from a servicing depot (Philips Mini Dry HP-1805 and Philips Hi'n Dry HP-1800). It was decided to employ a test procedure which would simulate normal use conditions as closely as possible. Accordingly hair dryers were operated in an air-tight chamber and the concentration of asbestos fibres in the chamber was then determined.

Sampling Method

After a 15 minute pre-run outside the chamber to eliminate accumulated dust particles the hair dryers were operated for 30 minutes in a one cubic metre enclosed stainless steel chamber. Before each test the chamber was flushed with 10 cubic metres of medical breathing air filtered through a 0.01 μ m filter. The dryer was turned off and the ambient air in the chamber was sampled for

1 hour at a rate of 2.4 litres per minute; equivalent to approximately 15% of the chamber volume. Fibres were collected on a 25 millimetre 0.6 micrometre "Nuclepore" filter coupled to a precalibrated "Bendix" personal sampling pump. Control samples were obtained in the same manner after flushing with filtered air and prior to the introduction of another hair dryer for testing.

Analytical Method

The filter samples were analyzed by transmission electron microscopy using the direct carbon-coated "Nuclepore" technique described by Anderson and Long in "Preliminary Interim Procedure for Fibrous Asbestos", U.S. Environmental Protection Agency, July 31, 1976. The asbestos-like fibres were identified on the basis of a 3/1 aspect ratio and their characteristic tubular morphology. Twenty grid squares (72 x 72 μ m), 10 from each of 2 grids, were examined at a magnification of x 10,000.

Statistical Consideration

In fibre analysis, fibres must be randomly and uniformly distributed over the area of the filter which is counted. In this study the fibres present in 20 grid openings (72 x 72 μ m) were counted and the mean grid opening fibre count was determined. The 95% confidence intervals were also calculated for each measurement; i.e., the range of values within which the mean value of all the

grid squares may be expected to lie. Therefore, these ranges should be used when comparing results to determine whether there is a real difference between observed results. These ranges are given in Table II.

Results and Conclusion

The results of this preliminary study are presented in Table I, II and III. The sensitivity of the method (i.e., the concentration corresponding to one fibre detected in the sample area counted) was 0.02 fibres/cc. The levels found are, in general, at or near the detection limit of the method employed. There is no statistically significant difference observed between the results obtained with the new and aged hair dryers. The dryers that were asbestos-free gave results that were quite similar to those obtained from most of the asbestos-containing hair dryers.

**Table I - Fibre count and approximate lengths (range)
of asbestos-like fibres**

Sample Number	Company and Model	Fibre count		Length Range (μ m)	
		sample	control	sample	control
1	Sunbeam Dial and Dry AD-95	1	0	0.8	-
2	Sunbeam Odyssey 1000 AD-90*	4	2	0.3 - 1.2	0.6 - 0.7
3	G.E. Power Pro PD-300	3	1	0.6 - 2.0	4.0
4	Sunbeam Jet Set HD-75*	1	1	3.1	4.0
5	GS Iona 1350 PD-1350-PD-3	2	0	2.0 - 4.0	-
6	GS Iona Voyageur M1200 PD-2	6	2	0.8 - 6	2.5 - 3.0
7	GE Pro Turbo Deluxe 1200 TD-200	1	0	2.4	-
8	GE Porta Pro PD-400	8	1	1.0 - 4.4	3.0
9	Sunbeam Brush & Blow PHD-1	3	0	3.0 - 4.0	-
10	Lotus (1400 W) 4089	5	2	1.2 - 20+	1.5 - 2.0
11	Sunbeam Li'l Red Devil HD-85	2	0	0.7 - 0.8	0
12	GE Power Brush PB-200	5	2	0.7 - 7.0	0.9 - 1.7
13	GE Pro Turbo TD-100	3	0	1.6 - 3.0	-
14	Philips Mini Dry HP-1805	2	0	0.6 - 1.0	-
15	Philips Hi'n Dry HP-1800	8	1	0.6 - 4.0	1.5
16	GE Pro 650 PD-700	0	2	-	0.6 - 1.5
17	GS Iona Voyageur M1200 PD-2	11	0	1.5 - 7.0	-

* The Sunbeam Odyssey 1000 and Jet Set were included in the test for comparative purposes. The manufacturer advised that asbestos was not used in their construction.

**Table II - Fibre concentrations obtained by
transmission electron microscopy**

Sample Number	Company and Model	Fibre concentrations*(fibres/cc)	
		<u>Sample</u> Average range****	<u>Control</u> Average range
1	Sunbeam Dial and Dry AD-95	0.02 (0 - 0.07)	0
2***	Sunbeam Odyssey 1000 AD-90	0.1 (0 - 0.18)	0.05 (0 - 0.12)
3	G.E. Power Pro PD-300	0.07 (.004 - 0.19)	0.02 (0 - 0.07)
4***	Sunbeam Jet Set HD-75	0.02 (0 - 0.07)	0.02 (0 - 0.07)
5	GS Iona 1350 PD-1350-PD-3	0.05 (0 - 0.12)	0
6	GS Iona Voyageur M1200 PD-2	0.15 (0.02 - 0.27)	0.05 (0 - 0.12)
7	GE Pro Turbo Deluxe 1200 TD-200	0.02 (0 - 0.07)	0
8	GE Porta Pro PD-400	0.19 (0.06 - 0.33)	0.02 (0 - 0.07)
9	Sunbeam Brush & Blow PHD-1	0.07 (0 - 0.16)	0
10	Lotus (1400 W) 4089	0.12 (0 - 0.25)	0.05 (0 - 0.12)
11	Sunbeam Li'l Red Devil HD-85	0.05 (0 - 0.12)	0
12	GE Power Brush PB-200	0.12 (0.02 - 0.22)	0.05 (0 - 0.12)
13	GE Pro Turbo TD-100	0.07 (0 - 0.16)	0
14**	Philips Mini Dry HP-1805	0.05 (0 - 0.12)	0
15**	Philips Hi'n Dry HP-1800	0.19 (0.01 - 0.33)	0.02 (0 - 0.07)
16	GE Pro 650 PD-700	0	0.05 (0 - 0.15)
17	GS Iona Voyageur M1200 PD-2	0.27 (0.13 - 0.40)	0

* The values quoted are for a 1m³ chamber; to obtain ambient air levels in a typical 10m³ bathroom the above values should be divided by a factor of ten.

** Aged hair dryer (aging period unknown).

*** The Sunbeam Odyssey 1000 and Jet Set were included in the test for comparative purposes. The manufacturer advise that asbestos was not used in their construction.

**** 95% confidence interval levels.

**Table III - Fibre concentrations (>5 μm) obtained by
transmission electron microscopy**

Sample Number	Company and Model	Fibre concentrations*(fibre/cc) >5 μm
6	GS Iona Voyageur M1200 PD-2	0.03
10	Lotus (1400 W) 4089	0.05
17	GS Iona Voyageur M1200 PD-2	0.05

* The values quoted are for a 1 m^3 chamber; to obtain ambient air levels in a typical 10 m^3 bathroom; the above values should be divided by a factor ten.

** No fibres >5 μm were detected on 14 of the 17 hair dryers analysed.