August 3, 1972

Dr. Alfred Weissler, Acting Director
Division of Colors and Cosmetics Technology
Office of Product Technology
Food and Drug Administration
Department of Health, Education and Welfare
Washington, D. C. 20204

Dear Dr. Weissler:

Enclosed please find my final analytical results on the mineral compositions of 102 examples of standard, commercial products containing talo. These include all the specimens you sent me from Washington, except for a few (principally the pharmaceutical specimens) which I will report on separately, as well as a number that I purchased in New York and in Boston.

The analyses show that 59 of the products have no detectable amounts of any of the asbestiform minerals (by the technique employed, prpportions by weight of 1-2% or less could escape detection), 20 had small but definite percentages of tremolite, 7 had small percentages of chrysotile, 9 had small percentages of <u>both</u> tremolite and chrysotile, and 7 had substantial percentages of one or both of these asbestiform minerals.

I shall retain and preserve the original specimens, and the x-ray diffractograms, until you advise me otherwise.

With very best personal regards,

Sincerely yours,

Seymour Z. Lewin
Professor of Chemistry

TABULATION OF X-RAY DIFFRACTION ANALYSES
OF COMMERCIAL PRODUCTS CONTAINING
TALC

A. Products having no detectable amounts of asbestiform minerals (limit of detectability=ca. 1 to 2% for each mineral)

| Product | Mineral Composition | | | | | |
|---|---|---|---|---|---|---|
| | Talc | Chlorite | Phlogopite | α-Quartz | Dolomite | Other |
| 1 | 70% | 3% | 7% | n.d. | n.d. | ZnO |
| 2 | 100% | n.d. | n.d. | n.d. | n.d. | |
| 3 | 99% | n.d. | 1% | n.d. | n.d. | |
| 4 | 100% | n.d. | n.d. | n.d. | n.d. | |
| 5 | 95% | 2% | 3% | n.d. | n.d. | |
| 6 | 80% | 2% | 5% | n.d. | n.d. | ZnUd |
| 7 | 86% | 7% | 2% | 3% | 2% | |
| 8 | 95% | 2% | 3% | n.d. | n.d. | |
| 9 | 89% | 7% | 2% | 2% | n.d. | |
| 10 | 93% | 3% | 2% | 2% | n.d. | |
| 11 | 90% | 2% | 2% | 4% | 2% | |
| 12 | 100% | n.d. | n.d. | n.d. | n.d. | |
| 13 | 60% | n.d. | n.d. | n.d. | n.d. | ZnUd |
| 14 | 31% | 50% | 2% | 10% | 7% | |
| 15 | 100% | n.d. | n.d. | n.d. | n.d. | |
| 16 | -- | -- | -- | -- | -- | K,S |
| 17 | 60% | 30% | 4% | n.d. | 6% | |
| 18 | 90% | 4% | 2% | 2% | 2% | |
| 19 | 97% | 1% | 2% | n.d. | n.d. | |
| 20 | 35% | 60% | 1% | 4% | n.d. | |
| 21 | 67% | 25% | 2% | 3% | 3% | |
| 22 | 59% | 35% | 1% | n.d. | 5% | |
| 23 | 42% | 50% | 2% | 3% | 3% | |
| 24 | 94% | 1% | 2% | 3% | n.d. | |
| 25 | 95% | 2% | 3% | n.d. | n.d. | |
| 26 | 95% | 1% | 4% | n.d. | n.d. | |
| 27 | 88% | n.d. | 2% | n.d. | 10% | |
| 28 | 20% | 1% | n.d. | n.d. | n.d. | $CaCO_3$ X |
| 29 | 94% | 2% | 2% | n.d. | 2% | |
| 30 | 97% | 1% | 2% | n.d. | n.d. | |

| Product | Mineral Composition | | | | | |
|---|---|---|---|---|---|---|
| | Talc | Chlorite | Phlogopite | α-Quartz | Dolomite | Other |
| 31 | 47% | 50% | 2% | 3% | 8% | |
| 32 | 80% | 7% | 3% | 2% | 8% | |
| 33 | 55% | 40% | 2% | n.d. | 3% | |
| 34 | 78% | 7% | 4% | 3% | 8% | |
| 35 | 78% | 5% | 2% | 10% | 5% | |
| 36 | 79% | 4% | 2% | 15% | n.d. | |
| 37 | 38% | 50% | 5% | n.d. | 7% | |
| 38 | 87% | 5% | 4% | 2% | 2% | |
| 39 | 94% | 3% | n.d. | 3% | n.d. | |
| 40 | 66% | 25% | 1% | 3% | 5% | |
| 41 | 81% | 8% | 4% | 2% | 5% | |
| 42 | 89% | 6% | 2% | n.d. | 3% | |
| 43 | 96% | n.d. | 1% | 3% | n.d. | |
| 44 | n.d. | n.d. | n.d. | n.d. | n.d. | ZnO, K |
| 45 | 65% | 30% | 1% | n.d. | 4% | |
| 46 | 48% | 40% | n.d. | 5% | 7% | |
| 47 | 100% | n.d. | n.d. | n.d. | n.d. | |
| 48 | 88% | 4% | 2% | 2% | 4% | |
| 49 | 100% | n.d. | n.d. | n.d. | n.d. | |
| 50 | 95% | 5% | n.d. | n.d. | n.d. | |
| 51 | 100% | n.d. | n.d. | n.d. | n.d. | |
| 52 | 85% | 8% | 4% | 3% | n.d. | |
| 53 | 90% | 4% | 2% | 2% | 2% | |
| 54 | 90% | 3% | 3% | n.d. | 4% | |
| 55 | 78% | 15% | 2% | 5% | n.d. | |
| 56 | 86% | 7% | 2% | 3% | 2% | |
| 57 | 79% | 15% | 1% | n.d. | 5% | |
| 58 | 96% | n.d. | n.d. | 4% | n.d. | |
| 59 | 90% | n.d. | n.d. | 3% | n.d. | S |

B. Products having small amounts of Tremolite -- more than 1%, but not more than (5±2)% by weight

| Product | Mineral Composition | | | | | |
|---|---|---|---|---|---|---|
| | Talc | Chlorite | Phlogopite | ∝-Quartz | Dolomite | Tremolite |
| 60 | 61% | 30% | n.d. | n.d. | 7% | 2% |
| 61 | 35% | 40% | 2% | 3% | 18% | 2% |
| 62 | 89% | 2% | 1% | 3% | n.d. | 5% |
| 63 | 87% | 2% | 2% | 4% | n.d. | 5% |
| 64 | 84% | 5% | 3% | 2% | 3% | 3% |
| 65 | 79% | 15% | n.d. | n.d. | 4% | 2% |
| 66 | 85% | 5% | 3% | n.d. | 2% | 5% |
| 67 | 75% | 15% | 1% | n.d. | 5% | 4% |
| 68 | 78% | 15% | n.d. | n.d. | 5% | 2% |
| 69 | 96% | 1% | 1% | n.d. | n.d. | 2% |
| 70 | 26% | 60% | n.d. | 5% | 7% | 2% |
| 71 | 84% | 10% | n.d. | 3% | n.d. | 3% |
| 72 | 86% | 5% | 3% | 4% | n.d. | 2% |
| 73 | 79% | 10% | 1% | 3% | 5% | 2% |
| 74 | 92% | n.d. | n.d. | n.d. | 5% | 3% |
| 75 | 75% | 5% | 2% | n.d. | 15% | 3% |
| 76 | 75% | n.d. | 5% | 5% | 10% | 5% |
| 77 | 91% | n.d. | 4% | 2% | n.d. | 3% |
| 78 | 85% | 2% | 1% | 4% | 3% | 5% |
| 79 | 86% | 5% | 4% | n.d. | 2% | 3% |

C. Products having small amounts of Chrysotile -- more than 1%, but not more than (5+2)% by weight.

| Product | Mineral Composition | | | | | |
|---|---|---|---|---|---|---|
| | Talc | Chlorite | Phlogopite | α-Quartz | Dolomite | Chrysotile |
| 80 | 48% | 40% | n.d. | 8% | n.d. | 4% |
| 81 | 80% | 7% | 1% | 6% | 4% | 2% |
| 82 | 76% | 12% | 2% | 4% | 3% | 3% |
| 83 | 81% | 6% | 5% | n.d. | 4% | 4% |
| 84 | 87% | 4% | 1% | n.d. | 3% | 5% |
| 85 | 83% | 5% | 2% | n.d. | 8% | 2% |
| 86 | 82% | 4% | 2% | 4% | 4% | 4% |

D. Products having small amounts of both Tremolite and Chrysotile -- more than 1%, but not more than (5±2)% of each by weight.

| Product | Mineral Composition | | | | | | |
|---|---|---|---|---|---|---|---|
| | Talc | Chlorite | Phlogopite | Quartz | Dolomite | Tremolite | Chrysotile |
| 87 | 28% | 50% | n.d. | 4% | 12% | 4% | 2% |
| 88 | 61% | n.d. | n.d. | 5% | 25% | 4% | 5% |
| 89 | 68% | 1% | 3% | 8% | 10% | 5% | 5% |
| 90 | 55% | n.d. | 3% | 7% | 25% | 5% | 5% |
| 91 | 23% | 1% | 4% | 60% | 3% | 4% | 5% |
| 92 | 61% | n.d. | 3% | 6% | 20% | 5% | 5% |
| 93 | 55% | 1% | 4% | 6% | 25% | 5% | 4% |
| 94 | 43% | 4% | 3% | 6% | 35% | 4% | 5% |
| 95 | 87% | n.d. | n.d. | 5% | 4% | 2% | 2% |

E. Products having substantial amounts of Chrysotile and/or TRemolite -- more than (5±2)% by weight.

| Product | Mineral Composition | | | | | | |
|---|---|---|---|---|---|---|---|
| | Talc | Chlorite | Phlogopite | α-Quartz | Dolomite | Tremolite | Chrysotile |
| 96 | 66% | n.d. | 3% | 6% | 7% | 8% | 10% |
| 97 | 31% | 1% | 1% | 5% | 35% | 12% | 15% |
| 98 | 39% | n.d. | 3% | 40% | 6% | 2% | 10% |
| 99 | 37% | 3% | 3% | 40% | 6% | 3% | 8% |
| 100 | 78% | 7% | 4% | n.d. | 2% | 3% | 6% |
| 101 | 53% | 8% | 3% | 7% | 4% | 25% | n.d. |
| 102 | 65% | n.d. | n.d. | 3% | 15% | 10% | 7% |

## NOTES TO THE TABULATED DATA

1. All products tested were standard and commercial brands, purchased in drug stores or the drug departments of department stores or super-markets in the cities of Washington, D. C., New York, and Boston.

2. All data are based upon continuous scan x-ray powder diffraction patterns. The precision, in terms of average deviation, is of the order of magnitude of ±2% absolute for each of the mineral species reported. The data are given in units of percentage composition by weight.

3. The limits of detectability by the method employed are of the order of magnitude of 1 to 2% by weight for each of the mineral species cited.

4. A. Where an asbestiform mineral was indicated by the x-ray pattern as being present to a definitely detectable extent, its presence was verified by the use of optical microscopy to disclose the presence of significant numbers of fiber particles.

   B. Where the asbestiform mineral was indicated by the x-ray pattern as being present at the just barely detectable level, this was verified (or rejected) by employing the step-scan technique over the regions of the questionable diffraction peaks.

5. The following minerals were estimated by comparing the sum of the integrated intensities at the diffraction angles listed below, with the corresponding summed integrated intensities at the same angles of standards composed of the pure mineral.

| Mineral | Two-Theta Values Summed |
|---|---|
| Dolomite | 31.0 - 31.2; 44.8-45.0; |
| α-Quartz | 20.4 - 20.6; 26.6-27.0; 39.3-39.7; |
| Chlorite | 6.3-6.5; 12.4-12.8; 19.0-19.2; 25.0-25.4 |
| Phlogopite | 8.6-9.0; 25.9-26.1; 28.1-28.3; |

6. Only two of the asbestiform minerals were detected in the products tested. Each of these was estimated by comparison with standards made up by mixing the pure mineral with pure talc in various proportions by weight. For both unknowns and standards, the parameter measured was the ratio of the integrated intensity of a diffraction peak, relative to that of an internal standard. The internal standard employed was 5% by weight of $Zn(OH)Cl$. The integrated intensities were summed at the following diffraction angles:

| Asbestiform Mineral | Two-Theta Values Summed |
|---|---|
| Chrysotile | 12.0 - 12.4; 24.3-24.8 |
| Tremolite | 10.4 - 10.6; 27.4-27.6; 29.4-29.7; 30.6-30.9; 33.2-33.4 |

7. Talc was determined by difference.

8. The following abbreviations are employed:

n.d. = not detectable
$ZnO$ = zinc oxide
$ZnUd$ = zinc undecylenate
K = kaolin
S = starch
$CaCO_3$ = calcite
X = phase not identified because deemed unimportant.

9. In several instances, the same brand of product was purchased in different places at different times, to check on the constancy of composition of the mineral mixture. Considerable variations were found. See product numbers 14 and 15; 22, 22 and 23, 23 and 25. In other instances, constancy within the precision of the analytical method was observed (e.g., in the case of product No. 7).

## KEY TO PRODUCT NAMES

| Product Number | Product Name | Further Identification |
|---|---|---|
| 1 | AMMENS POWDER, MEDICATED | Bristol-Myers (No. IF25) |
| 2 | AMOLIN DEODORANT POWDER | Norwich |
| 3 | AQUAMARINE COOLING SPRAY BATH POWDER | Revlon (143) |
| 4 | BAGATELLE AMBER DUSTING POWDER | Corand (DCH) |
| 5 | BOURJOIS BATH POWDER | |
| 6 | CALDESENE MEDICATED POWDER | Pennwalt (5274) |
| 7 | CASHMERE BOUQUET BODY POWDER | Colgate-Palmoliv |
| 8 | CHANEL NO. 5 BATH POWDER | |
| 9 | COUNTESS ROCHEAU CAKE DUSTING POWDER | Jergens |
| 10 | CREPE DE CHINE DUSTING POWDER, MILLOT | House of Fragrance (L1132 |
| 11 | CREPE DE CHINE POUDRE MIST, MILLOT | House of Fragrance |
| 12 | CUTICURA TALCUM POWDER | Purex (07170) |
| 13 | DESENEX | WTS-Pharmacraft |
| 14 | DESITIN BABY POWDER | Pfizer (1139Z) (3/29/72) |
| 15 | DESITIN BABY POWDER | Pfizer (115A) (5/10/72) |
| 16 | DIAPARENE BABY POWDER | Breon (E10@0) |
| 17 | DOROTHY GRAY "SECRET OF THE SEA" DUSTING POWDER | |
| 18 | EMERAUDE TALCUM POWDER | Coty (355-4010) |
| 19 | ENGLISH LEATHER | Mem |
| 20 | FABERGE "MUSIC" DUSTING POWDER | (2891) |
| 21 | FRIENDSHIP GARDEN DUSTING POWDER | Shulton (3/27/72) |
| 22 | FRIENDSHIP GARDEN DUSTING POWDER | Shulton (5/9/72) |
| 23 | FRIENDSHIP GARDEN DUSTING POWDER | Shulton (7/13/72) |
| 24 | HEAVEN SENT AEROSOL BATH POWDER MIST | Rubinstein |
| 25 | HEAVEN SENT BATH POWDER | Rubinstein |
| 26 | HELEN PRESSL "LITTLE LADY" | |
| @7 | IMPORTA, SPAIN MENS' TALC | |
| @8 | ISIS FLORAL TALCUM POWDER | |
| 29 | JOHNSON'S BABY POWDER | (028Q) |
| 30 | JOHNSON AND JOHNSON MEDICATED POWDER | (3612) |
| 31 | KOSCOT BEAUTY DUST--OIL OF MINK | |
| 32 | LANVIN ARPEGE DUSTING POWDER | (1288) |
| 33 | LANVIN ARPEGE ROWDERED MIST | |
| 34 | LANVIN ARPEGE TALC | |
| 35 | LEWIS BABY POWDER | |
| 36 | LOVES FRESH LEMON GLOSSY POWDER | Manley & James |
| 37 | MACY'S SCENTED BORATED TALCUM | |
| 38 | MACY'S TALCUM, APPLE | (2K4) |
| 39 | MARCELLE DUSTING POWDER, HYPO-ALLERGENIC | |
| 40 | MARY CHESS PERFUMED DUSTING POWDER | |

| Product Number | Product Name | Further Identification |
|---|---|---|
| 41 | MENNEN BABY MAGIC POWDER | (B112) |
| 42 | MENNEN QUINSANA FOOT POWDER | (H202) |
| 43 | MERCK TALC, PRODUCT NO. 6460, LOT NO. 6460) | (8039301) |
| 44 | MEXSANA 2387-D MEDICATED POWDER | Plough |
| 45 | OLD SPICE BODY TALCUM | Shulton |
| 46 | PERSIAN LILAC DELUXE DUSTING POWDER | April Showers (LFN) |
| 47 | PERSIAN LILAC SPRAY BATH POWDER | April Showers (B200E) |
| 48 | POND'S PERFUMED TALC BODY DEODORANT DREAM FLOWER | (115B) |
| 49 | PRINCE MATCHABELLI BELOVED SPRAY POWDER | |
| 50 | QUEST DEODORANT POWDER | |
| 51 | REPLIQUE SPRAY BATH POWDER | Parfums Raphael (004) |
| 52 | RIVIANA FOODS - ITALIAN STEARIN TALC | For Rice |
| 53 | SEPTEMBER MORN BY POND'S | (19B) |
| 54 | SEVEN WINDS AFTER BATH TALC | DuBarry (021085) |
| 55 | U S P TALC | |
| 56 | VASELINE INTENSIVE CARE BABY POWDER | (I 209) |
| 57 | YVES SAINT LAURENT RIVE GAUCHE SPRAY TALC | |
| 58 | Z B T BABY POWDER | (M1021) |
| 59 | ZEASORB SUPER ABSORBENT MEDICATED POWDER | Stiefel |
| 60 | AMBUSH-DANA DUSTING POWDER | |
| 61 | APRIL SHOWERS | (9884) |
| 62 | AVON UNFORGETTABLE PERFUMED TALC | |
| 63 | BELOVED PERFUMED DUSTING POWDER, PRINCE MATCHABELLI | |
| 64 | COTY FACE POWDER RACHEL | |
| 65 | DESERT FLOWER SPRAY BATH POWDER | Shulton (F 1 BKI) |
| 66 | EMERAUDE DUSTING POWDER | Coty |
| 67 | EMERAUDE SPRAY DUSTING POWDER | Coty (1 AEY) |
| 68 | FABERGE FLAMBEAU DEODORANT SPRAY POWDER | (37 WBF) |
| 69 | JEAN NATE SPRAY BATH POWDER | (1 N 247) |
| 70 | JERIS TALC, FLESH | |
| 71 | JOLIE MADAME DUSTING POWDER, BALMAIN | |
| 72 | LADY ESTHER FACE POWDER, RACHEL | |
| 73 | MAX FACTOR FACE POWDER, RACHELLE | |
| 74 | MEDICATED COMFORT POWDER | Parke-Davis |
| 75 | OH! de LONDON TALC | Yardley (498) |
| 76 | TO KNOW ME IS TO LOVE ME - TINKERBELL | Tom Fields, Ltd. |
| 77 | TOUCH AND GLOW FACE POWDER, CREAMY PEACH | Revlon |
| 78 | TOUJOURS MOI BATH POWDER | Corday |
| 79 | YARDLEY APRIL VIOLETS | (4908) |
| 80 | CHANTILLY DUSTING POWDER | Houbigant (11F) |
| 81 | CASHMERE BOUQUET | [redacted] |
| 82 | JEAN NATE TALC | [redacted] |
| 83 | MENNEN SHAVE TALC | (B 81) |
| 84 | SHOWER TO SHOWER BODY POWDER | Johnson & Johnson (5507BG) |
| 85 | PURE BABY POWDER, DART DRUG | (K 11C) |
| 86 | POND'S DREAM FLOWER PERFUMED TALC | (O 13D) |

| Product Number | Product Name | Further Identification |
|---|---|---|
| 87 | ALMAY HYPO-ALLERGENIC FACE POWDER | |
| 88 | CONSTANCE CARROLL, BOUQUET TALC | |
| 89 | DJER-KISS TALCUM | Kerkoff |
| 90 | FLAMINGO DUSTING POWDER, TUSSY | (L1047) |
| 91 | LANDER LILACS AND ROSES TALC | |
| 92 | MAVIS TALCUM | Vivaudou |
| 93 | MAVIS BODY POWDER | Vivaudou |
| 94 | TANGEE | Luft-Tangee |
| 95 | ZBT BABY POWDER | (B0048) |
| 96 | BLANCHARD'S DUSTING POWDER | |
| 97 | BORN WILD DUSTING POWDER | Del Labs |
| 98 | LANDER GARDENIA AND SWEET PEA TALC | |
| 99 | LANDER LILACS AND ROSES DEODORANT BODY TALC | |
| 100 | MISS DIOR DUSTING POWDER | |
| 101 | TAI WINDS SPRAY TALC | (Avon (DCC 1272 2-14-72,HWS) |
| 102 | TOSCA DUSTING POWDER | |