

TALC

IN

OREGON

Talc Deposits in Oregon

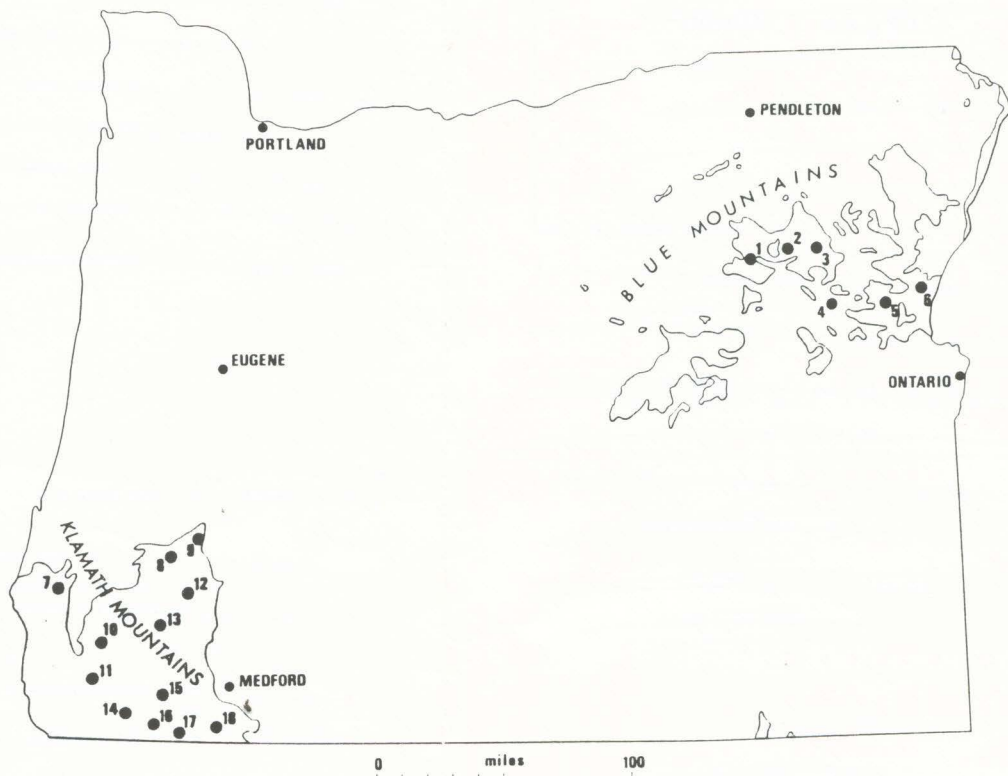


Figure 1. Oregon talc areas. Shaded areas indicate rocks of Late Jurassic and greater age. Numbered areas referred to in text: 1 = Greenhorn, 2 = Sumpter, 3 = Elkhorn, 4 = Dooley Mountain, 5 = Basin Creek, 6 = Connor Creek, 7 = Powers-Agness fault zone, 8 = Coast Range thrust, 9 = Myrtle Creek, 10 = Galice, 11 = Pearsoll Peak, 12 = Red Mountain-Upper Pleasant Creek, 13 = Greenback, 14 = Sucker Creek, 15 = Williams, 16 = Carberry Creek, 17 = Elliott Creek Ridge, 18 = Siskiyou Peak.



STATE OF OREGON

INTEROFFICE MEMO

TO: Talc File

FROM: John Beaulieu

SUBJECT: Coordination Meeting of July 1, 1986

DATE: July 3, 1986

Those in attendance included Gary Baxter, Beverly Vogt, Len Ramp, John Beaulieu. We discussed various aspects of the talc study. In no particular order our major conclusions are as follows:

The report will be in special paper format and will include a general location map for Oregon following the style of Miscellaneous Paper 20 for nickel. There will be larger scale maps in the text for key areas selected on a priority basis. A 1:500,000 map was considered but was rejected owing to poor readability. Study areas with larger scale maps will be indicated with little boxes on the small scale map. The text will include some mention of beneficiaiton. Perhaps Dick Berg can help along those lines. Another individual that will be of use will be a Mr. Clifton in the Spokane office of the U.S. Bureau of Mines. He is their talc expert and can help us with such things as references, manners of analysis, advice of the text, general information, and possible peer review.

We concluded that for first over study of this sort it will be necessary to prioritize our activities each step of the way to meet our deadlines. It is not necessary to get into exotic levels of understanding at this point. We will, however, need mineral identifications, chemical analysis and XRD. The text will include tables as well as narrative.

In collecting samples and doing field work, Len will work in cooperation with Mark. Mark will focus his attention on the northeast and asks that Len accompany him in August. Len working in the southwest may or may not have Mark's help. He has recently lost a field assistant and will seek another. Total number of samples probably will be less than the 150 originally indicated. Len feels that individual talc localities do not vary that much. There will, however, be professional judgement and field observations feeding into the ultimate decisions on how many samples to collect.

All lab data is to be done by December of 1986. If we do not have a rock prep lab available at the time, then we will probably send the samples to Reno for sample prep as well as analysis. Turn around time will be a consideration in scheduling our work. Gary indicates that good prices for rock prep can be had in Reno. All samples for analysis should be submitted by September 1. Mapping may continue into October but it will be necessary to reexamine this possibility later in the field season since all samples must be in by September 1. Again, one area of flexibility is in project design and level of detail. It is not possible to be flexible on deadlines.

Publication will be in August of 1987. The text is due in-house on April 30, 1987. A complete text means that peer review on a confidential basis by one or possible two peer reviewers will be complete and their comments will be considered and accommodated prior to submittal. (Bev should get a copy of the reviewers comments.) It also means that all lab discussion data and tables be integrated into the final text by Len before submittal. It will not be possible to expect lab treatment to be spliced into the text after submittal for publication. Gary is content to be noted in the acknowledgements as a cooperator on the project. Industry is the primary audience.

For the lab it is necessary for Gary to know what Len's goal is, what analysis does he want and when does he want them. He needs detailed information on this. We discussed the general analysis sheet prepared earlier by Gary based on earlier comments by Len. There will be mineralogic idents through XRD and petrographic microscope work. He will also look for impurities both chemical and mineralogic. There is some confusion over the difference between brightness and whiteness. Len will handle all thin section work. Gary will contact Mr. Clifton with the Bureau of Mines for clarification on analytical techniques.

Gary needs a detailed list of needs from Len. Some whole rock analysis will be conducted as we discussed. It was decided to use the Grants Pass field office numbering system. The question of a consistent numbering system for the agency was raised, but it cannot be solved at this time in the context of this one study.

Bev and Len will work out the details of base maps which will be required by Len in the completion of the study. The text including maps will be a 25+ page text, assuming typeset format.

JDB:rm

SECOND EDITION



SCIENTIFICALLY GRADED
FOR SPECIFIC USES IN
ALL INDUSTRIES



SIERRA TALC & CLAY COMPANY

GENERAL
HEADING:

SIERRA TALC DATA



SIERRA TALC &
CLAY COMPANY

5509 RANDOLPH STREET
LOS ANGELES 22, CALIF.

UNIT NO.

REPLACES NO.

Subject:

INTRODUCTION TO SIERRA TALC PORTFOLIO

March 10, 1949

Here is your Sierra loose-leaf binder.

This folder is a part of Sierra's long range plan for keeping the industries it serves informed about our many talcs.

Naturally, our constant research and development extension will result in specification changes from time to time. Replacement units will be sent to you the minute they are ready. We hope you will find this folder a convenient place to file them, that it will serve to keep your information on Sierra Non-Metallic Minerals up-to-the-minute.

The fasteners can easily be released and new units added as they are received.

We hope that you will take a few minutes to read the Sierra story on the two inside cover pages. It will help us to get better acquainted.

Unit numbers may be identified as follows:

GEN - General
AN - Analytical
PT - Paint
CER - Ceramics
STE - Steatite
COS - Cosmetics

PR - Paper
TEX - Textiles
RUB - Rubber
INS - Insecticides
ALS - Aluminum Silicates
WH - Whiting

Extra units will be mailed on request.

We trust the units as they accumulate in this binder will save you much time and be helpful to you in your work with Sierra products.

SIERRA TALC & CLAY COMPANY

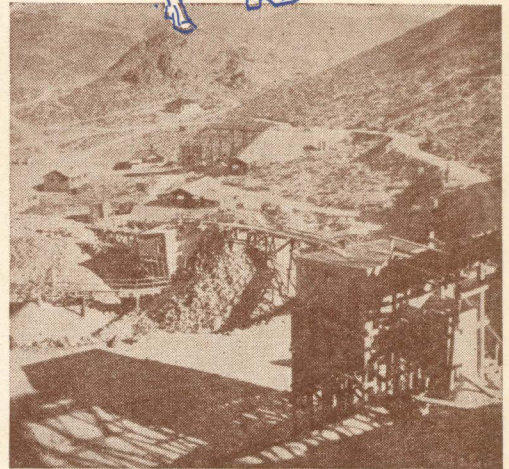
QUALITY TALCS

FOR ALL PURPOSES

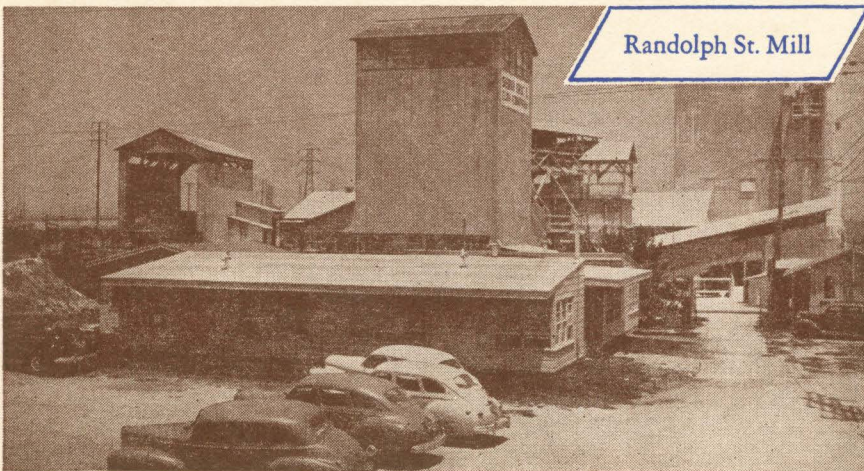
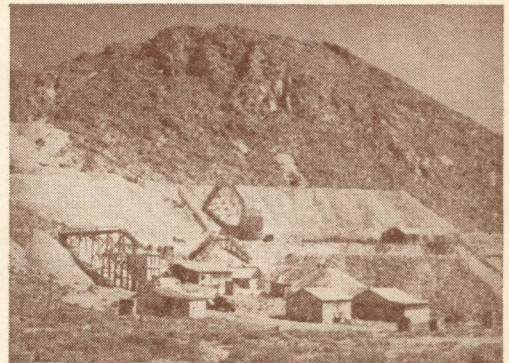
3 MILLS
14 MINES



Bay Street Mill



Keeler Mill



Randolph St. Mill



Only Sierra is able to supply all types of talcs to fill every talc need. Its 14 mines and 3 mills combine with an ultra-modern laboratory to control quality and assure customers of top value for their money.

SIERRA

TALC and
CLAY
COMPANY

5509 RANDOLPH STREET, LOS ANGELES 22, CALIFORNIA

GENERAL
HEADING:

PARTICLE SIZE DISTRIBUTION



SIERRA TALC &
CLAY COMPANY

5509 RANDOLPH STREET
LOS ANGELES 22, CALIF.

UNIT NO.

GEN-52

REPLACES NO. GEN-47

Subject:

ANALYSIS OF SUB-SIEVE PARTICLE
SIZES OF SIERRA TALCS

February 1, 1949

More attention is constantly being paid to particle size distribution in all dry pigments and inerts. The mere grading of a talc as being a given percentage through 200 mesh or 325 mesh does not begin to tell the whole story as to the true fineness of the talc. If two talcs should both screen 100% through 325 mesh, one could still be definitely coarser than the other in its sub-sieve sizes, and thus its suitability in a given product might be greater or less than the other talc.

In order that users of Sierra Talcs might know more about the talcs they are using and to assist users in selecting the right talc for the right purpose, we have completed particle size analysis of all our talcs in our own laboratories, and attach hereto tables clearly presenting this information.

As are most methods of particle size analysis, our method is based on Stoke's Law, which, stated briefly, provides that when a small sphere falls under the action of gravity through a viscous medium, it ultimately acquires a constant velocity.

By means of definite equations and careful calculations taken at definite time intervals, percentages finer than each particular size group were determined.

Care was taken to prevent flocculation and corrections were made for temperature changes during each run.

Particle size analysis by sedimentation methods under Stoke's Law presents a much more complete picture than by screening, and if it were possible to make and use screens having thousands of meshes to the inch, the following would be a comparison of screen mesh sizes with micron sizes:

149 Microns	is equivalent to	100 Mesh
74 "	is equivalent to	200 Mesh
44 "	is equivalent to	325 Mesh
20 "	would be equivalent to	625 Mesh
10 "	would be equivalent to	1,250 Mesh
5 "	would be equivalent to	2,500 Mesh
2½ "	would be equivalent to	5,000 Mesh
1 "	would be equivalent to	12,500 Mesh

Research work will be continued in our laboratory to fit the picture of particle size distribution into practical usages. Many interesting vistas not heretofore viewed as regards talc are in prospect, such as the ideal particle size distribution for each definite use. It is the aim of Sierra Talc & Clay Company to undertake this study. Figures shown represent cumulative percent finer than each indicated size as equivalent spherical diameter in microns.

SIERRA TALC & CLAY COMPANY

PAINT, PAPER, AND
TEXTILE TALCS

	<u>60</u>	<u>50</u>	<u>40</u>	<u>30</u>	<u>20</u>	<u>10</u>	<u>5</u>	<u>2</u>	<u>1</u>	<u>0.5</u>
Sierra Fibrene	100%	100%	97%	89.6%	77%	52.3%	27.3%	0%	0%	0%
Fibrene C-400	100	100	97	90	78	52	26.5	2	0	0
Fibro White	100	100	96	88	74.5	45.5	21.4	0	0	0
Special Textile	100	100	94.5	82.3	65.2	37.9	17	0	0	0

POTTERY, TILE, RUBBER, INSECTI-
CIDE, AND COMMERCIAL TALCS

Sierra White - IR	100	100	90.9	77	62.5	39	18.6	0	0	0
Sierra White #111	100	100	86.9	69.2	53.4	30.9	12.6	0	0	0
Sierra White #200	100	100	92	81	66	40	19.4	0	0	0
Sierra Pyrotalc	100	100	94.5	81	63	33.3	13	0	0	0
C. B. Ceramic 96	87	79.4	69.6	57	41.9	22	9.9	0	0	0
C. B. Ceramic 99	92	85.5	77.5	67.3	53.1	28.7	11.3	0	0	0
Monark Talc	90	84.4	77.1	67.5	55	33	15	0	0	0
LS Silver	92	79.4	69.6	57	41.9	22	9.9	0	0	0

STEATITE AND TECHNICAL
CERAMIC GRADES

Sierramic	100	100	84	67.5	54.5	33.5	16.9	0	0	0
Sierra Hi-Grade	100	100	86	70.5	55.6	34.6	17	0	0	0
Sierra Hi-Fire	100	100	89	75	58	35.5	17	0	0	0
White Mountain	100	100	90	73	54	27.5	9.9	0	0	0
Sierralite	100	100	85.8	69.6	52.9	28.9	10.5	0	0	0
Sierra Albatalc	100	100	91.7	78	62.1	36.5	16.6	0	0	0
Sierra Sagger #7	100	100	93.5	82.1	68.6	45	23.8	0.5	0	0

COSMETIC AND
TECHNICAL GRADES

Sierra Snow	100	100	90	76.5	57.6	32.5	14	0	0	0
Sierra Cloud	100	100	95.7	85	68.1	39.5	16.6	0	0	0
Trinity Super	100	100	92.2	79.9	64.1	38.5	14	0	0	0
Trinity Superfine	100	100	95.5	85	70.6	43.2	17.8	0	0	0

COSMETIC AND TECHNICAL

GRADES (CONTINUED)

	<u>60</u>	<u>50</u>	<u>40</u>	<u>30</u>	<u>20</u>	<u>10</u>	<u>5</u>	<u>2</u>	<u>1</u>	<u>0.5</u>
Sierra Vapor	100%	100%	98.6%	93.4%	83%	53.9%	24%	0%	0%	0%
Sierra Supreme #200	98.4	95.5	88	76.4	59.8	32.5	13	0	0	0
Sierra Supreme #325	100	100	100	97.6	88.3	56.1	28.5	2.7	0	0
Sierra Supreme USP	100	100	100	97.6	88.3	56.1	28.5	2.7	0	0
IS Silver Cosmetic	100	100	99	93.1	78.5	48.6	25.9	0	0	0
NS Silver	100	100	89.5	70.5	51	25	10.5	0	0	0

BAGHOUSE TALCS

Fibrene Mist	100	100	100	100	100	92.5	67	26	0	0
Sierra Mist	100	100	100	98	94.2	84.8	67.3	24.5	0	0
Silver Mist	100	100	100	98.3	94	82.7	66.5	26	0	0

NOTES

Talcs shown as "200" are milled 99.7% through 200 mesh.

Talcs shown as "325" are milled 99.6% through 325 mesh.

Sierra White is milled 99.7% through 200 mesh.

Fibrene C-400 is milled 99.9% through 325 mesh.

C. B. Ceramic Talc is milled both 96% and 99% through 200 mesh.

Sierra Cloud Talc is milled 99.6% through 325 mesh.

Sierra Vapor Talc is milled 99.9% through 325 mesh.

Fibrene Mist is the "Baghouse" Talc from the Fibrene grades.

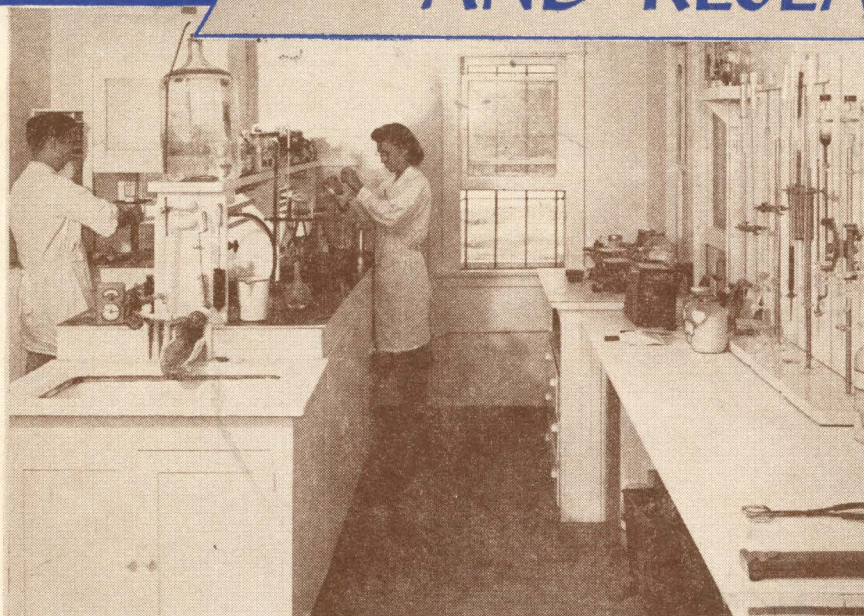
Silver Mist is the "Baghouse" Talc from the Silver Talc grades.

Sierra Mist is the "Baghouse" Talc from the Steatite and Cosmetic grades.

Monark Talc is milled 96% through 200 mesh.

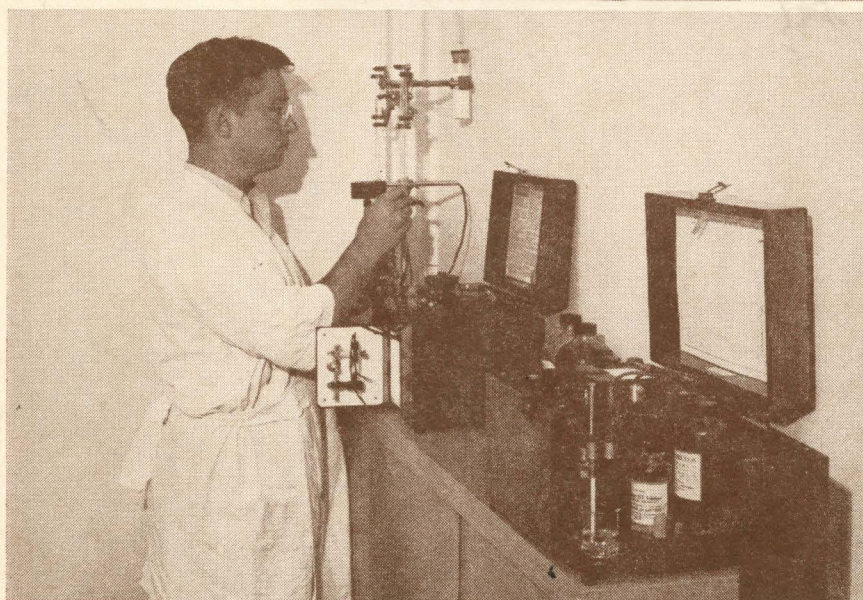
Our laboratories are your
assurance of continuous
quality.

LABORATORY TESTS AND RESEARCH



CONSTANT CONTROL

Regardless of the mines from which they come, or the type of talc to be milled, Sierra's laboratories conduct continuous tests to be sure that exact specifications are met and Sierra's quality maintained.



IMPROVED METHODS

In addition to constant control over quality, Sierra's laboratories are daily engaged in experimental work, exploring new fields for the use of talc and devising new and improved methods.



AT YOUR SERVICE

All types of chemical and physical determinations are made in Sierra's laboratories. Their facilities are available at all times to assist you in solving your problems... their findings are yours for the asking.

SIERRA

TALC and
CLAY
COMPANY

5509 RANDOLPH STREET, LOS ANGELES 22, CALIFORNIA

GENERAL
HEADING:

REPRESENTATIVE CHEMICAL ANALYSES
AND PHYSICAL CHARACTERISTICS



SIERRA TALC &
CLAY COMPANY

5509 RANDOLPH STREET
LOS ANGELES 22, CALIF.

UNIT NO.

AN-3

REPLACES NO.

AN-2

Subject:

REPRESENTATIVE CHEMICAL ANALYSES
AND PHYSICAL CHARACTERISTICS

February 1, 1949

PAINT, PAPER, AND TEXTILE TALCS

<u>REPRESENTATIVE ANALYSES</u>	<u>Silica SiO₂</u>	<u>Magnesia MgO</u>	<u>Alumina Al₂O₃</u>	<u>Lime CaO</u>	<u>Iron Fe₂O₃</u>	<u>Soda, Na₂O Potash, K₂O</u>	<u>Loss on Ignition</u>
Sierra Fibrene	53.40	27.50	1.61	7.40	.23	.80	8.47
Fibrene C-400	56.03	28.14	1.18	5.46	.28	.48	7.95
Fibro White	48.12	28.20	6.87	5.67	.29	.75	9.55
Special Textile	58.88	28.95	2.76	1.91	.94	.26	6.05

PHYSICAL
CHARACTERISTICS

	<u>Acid Sols. as CaO</u>	<u>Specific Gravity</u>	<u>pH Value</u>	<u>Color</u>	<u>Particle Shape</u>	<u>App.Dens. lbs./ft.³</u>	<u>Fineness</u>
Sierra Fibrene	7.70	2.81	9.4	98	AP	23.80	99.6/325
Fibrene C-400	5.10	2.79	9.1	98	AP	21.85	99.8/325
Fibro White	4.70	2.80	9.4	96	APG	21.20	99.5/325
Special Textile	1.51	2.83	9.3	96	G	26.20	99.2/325

STEATITE AND TECHNICAL CERAMIC GRADES

<u>REPRESENTATIVE ANALYSES</u>	<u>Silica SiO₂</u>	<u>Magnesia MgO</u>	<u>Alumina Al₂O₃</u>	<u>Lime CaO</u>	<u>Iron Fe₂O₃</u>	<u>Soda, Na₂O Potash, K₂O</u>	<u>Loss on Ignition</u>
Sierramic	59.62	29.91	2.05	.91	.94	.49	5.98
Sierra Hi-Grade	60.20	30.37	1.86	.76	.88	.24	5.41
Sierra Hi-Fire	46.79	31.06	11.85	.36	.83	.38	9.36
White Mountain	59.80	29.55	2.14	1.09	.81	.23	5.50
Sierralite	32.28	30.42	22.65	.67	.75	.38	13.09
Sierra Albatalc	57.46	28.82	1.48	3.93	.39	.54	6.84
Sierra Sagger #7	33.75	19.88	31.70	1.05	3.16	.25	9.51

PHYSICAL CHARACTERISTICS	Acid Sols. as CaO	Specific Gravity	pH Value	Color	Particle Shape	App.Dens., lbs./ft. ³	Fineness
Sierramic	1.20	2.74	9.3	93	MG	26.86	96/325
Sierra Hi-Grade	0.72	2.74	9.3	96	MG	26.70	96/325
Sierra Hi-Fire	0.52	2.76	9.2	94	MG	27.10	99.6/200
White Mountain	1.68	2.76	9.4	95	MG	27.10	96/325
Sierralite	1.09	2.80	9.1	91	MG	27.58	99.6/200
Sierra Albatale	3.50	2.80	9.1	94	APG	24.80	99/325
Sierra Sagger #7	1.12	2.74	9.1	88	PG	25.86	99.7/200

POTTERY, TILE, RUBBER, INSECTICIDE, AND COMMERCIAL TALCS

REPRESENTATIVE ANALYSES	Silica SiO ₂	Magnesia MgO	Alumina Al ₂ O ₃	Lime CaO	Iron Fe ₂ O ₃	Soda, Na ₂ O Potash, K ₂ O	Loss on Ignition
Sierra White - IR	51.44	27.72	1.92	8.39	1.35	.15	9.02
Sierra White #111	41.86	29.07	12.29	4.53	1.05	0	10.91
Sierra White #200	53.51	25.29	1.49	6.56	1.13	1.05	11.16
Sierra Pyrotalc	31.20	33.50	21.61	1.53	1.94	.26	12.40
C. B. Ceramic	56.29	28.31	1.07	9.26	0.43	1.06	4.02
LS Silver	55.60	27.56	1.18	8.59	0.61	1.06	5.41
Monark	53.40	27.50	1.61	7.40	0.23	.80	8.63

PHYSICAL CHARACTERISTICS	Acid Sols. as CaO	Specific Gravity	pH Value	Color	Particle Shape	App.Dens., lbs./ft. ³	Fineness
Sierra White - IR	8.20	2.72	9.1	89	MG	28.44	99.7/200
Sierra White #111	4.30	2.80	9.3	92	MG	28.44	99.7/200
Sierra White #200	7.91	2.72	9.1	91	MG	28.44	99.7/200
Sierra Pyrotalc	1.49	2.80	9.5	87	MG	27.58	99/325
C. B. Ceramic	2.50	2.85	9.4	95	TA	38.37	96-99/200
LS Silver	2.68	2.82	9.4	94	TA	32.05	99.7/200
Monark	8.00	2.81	9.4	98	A	26.80	96/200

COSMETIC AND TECHNICAL GRADES

<u>REPRESENTATIVE ANALYSES</u>	<u>Silica SiO₂</u>	<u>Magnesia MgO</u>	<u>Alumina Al₂O₃</u>	<u>Lime CaO</u>	<u>Iron Fe₂O₃</u>	<u>Soda, Na₂O Potash, K₂O</u>	<u>Loss on Ignition</u>
Sierra Snow	58.01	29.76	2.55	1.78	.79	.12	6.77
Sierra Cloud							
Trinity Super	59.73	30.65	1.85	0.85	.99	.40	5.34
Trinity Superfine							
Sierra Vapor	61.67	31.23	.78	0.54	.68	.07	4.83
Sierra Supreme #200	60.01	30.12	1.96	0.68	.80	.62	5.23
Sierra Supreme #325	59.80	30.82	2.01	0.35	1.01	.34	5.52
Sierra Supreme USP	58.70	31.80	2.33	0.03	1.05	.28	5.67
IS Silver Cosmetic	58.57	28.08	1.32	5.34	.35	.44	5.58
NS Silver	59.01	27.36	1.07	6.79	.37	.47	4.88

<u>PHYSICAL CHARACTERISTICS</u>	<u>Acid Sols. as CaO</u>	<u>Specific Gravity</u>	<u>pH Value</u>	<u>Color</u>	<u>Particle Shape</u>	<u>App.Dens. lbs./ft.³</u>	<u>Fineness</u>
Sierra Snow	1.94	2.74	9.4	96	G	26.86	99.7/200
Sierra Cloud						25.60	99.6/325
Trinity Super	.98	2.83	9.1	98	PG	25.86	99.7/200
Trinity Superfine						24.62	99.6/325
Sierra Vapor	.60	2.74	9.2	97	G	20.75	99.6/325
Sierra Supreme #200	.84	2.83	9.1	98	HP	27.62	99.2/325
Sierra Supreme #325	.55	2.78	9.2	99	HP	21.50	99.8/325
Sierra Supreme USP	.34	2.76	9.3	99	HP	19.45	99.8/325
IS Silver Cosmetic	3.20	2.85	9.4	97	PGA	28.50	99.6/325
NS Silver	1.48	2.85	9.4	97	PGA	32.35	99.7/200

FINE MICRON TALCS

REPRESENTATIVE ANALYSES

Fibrene Mist from Fibrene Talcs.
Sierra Mist from Steatite and Cosmetic Talcs.
Silver Mist from Silver Talcs.

No chemical analyses furnished. These talcs are the accumulation of the baghouse collector from all grades, and the analyses would be the average of those grades of their type.

REPRESENTATIVE CHEMICAL ANALYSES
AND PHYSICAL CHARACTERISTICS

AN-3

Page 4

PHYSICAL CHARACTERISTICS	Acid Sols. as CaO	Specific Gravity	pH Value	Color	Particle Shape	App.Dens. lbs./ft. ³	Fineness
Fibrene Mist	7.70	2.81	9.4	98	AP	10.59	Impalpable Dust
Sierra Mist	1.51	2.83	9.3	96	G	9.41	Impalpable Dust
Silver Mist	1.21	2.81	9.2	97	TA	13.98	Impalpable Dust

NOTES

Key to Particle Shape:

- AP - Acicular, Platey
- G - Granular
- TA - Tremolitic, Acicular
- MG - Massive, Granular
- PG - Platey, Granular
- HP - Highly Platey
- PGA - Platey, Granular, Acicular
- P - Platey

Color determined on Pfaltz & Bauer Reflectometer, % of reflection against Magnesium Carbonate as 100.

Apparent density per Scott Volumeter.

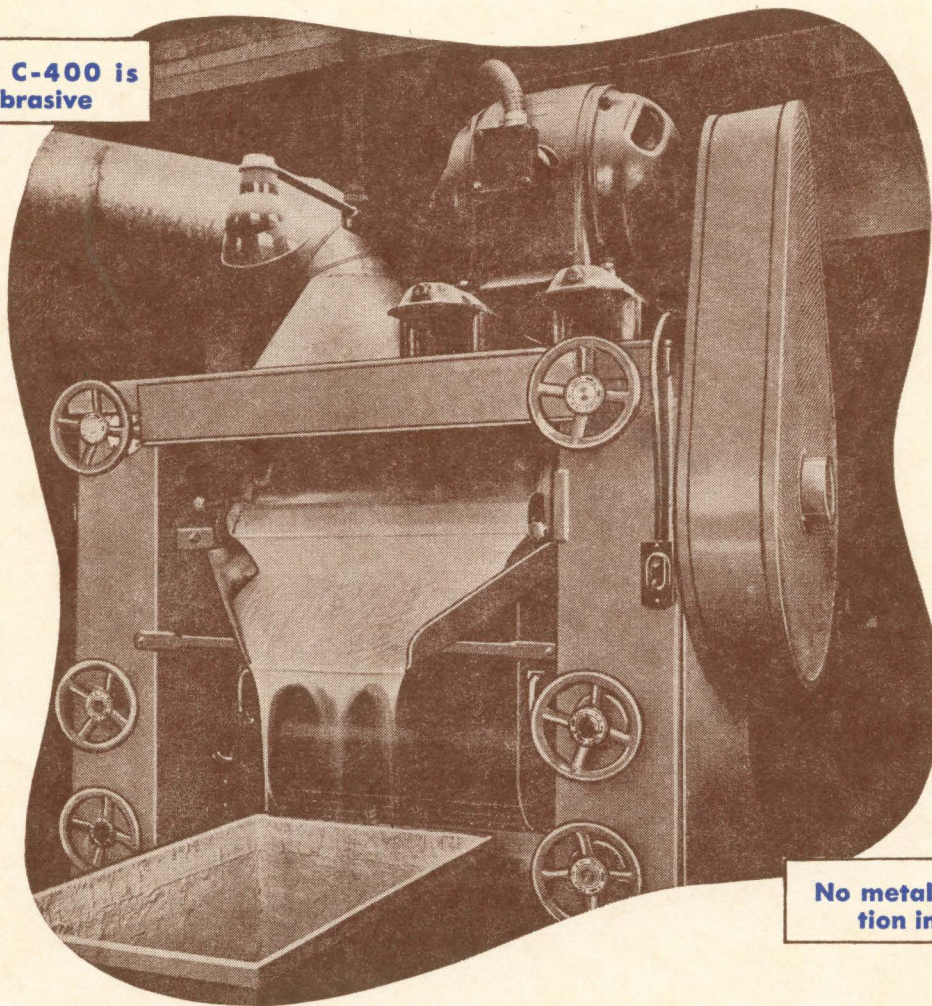
TEST METHOD FOR ACID SOLUBLES:

Boil 1 gm. of talc with 50 cc of 1/10 N Sulfuric Acid and about 50 cc of distilled water. Then titrate to a faint pink with 1/10 N Sodium Hydroxide using a few drops of phenolphthalein as indicator. The difference between the volume of acid and the required volume of Sodium Hydroxide multiplied by 0.28 equals the % of acid soluble substances calculated as CaO.

FIBRENE

*C-400 is Sierra's top quality talc
and the standard of many leading paint manufacturers*

**FIBRENE C-400 is
non abrasive**



No metal discoloration in whites

Other Sierra Brands

SIERRA FIBRENE

Medium oil absorption
White fibrous

FIBRO WHITE

An intermediate,
all-duty talc

FIBRENE DUST

Fine micron size
Highest oil absorption

SIERRA CLOUD

Soft granular structure
for sanding sealers

SIERRA SUPER

Low lime, white
non-fibrous

SIERRA WHITE

A low priced talc for
the economy field

Sierra, from its three mills and fourteen mines, produces a talc to meet every paint need. Skilled cross-blending and special milling technique combine with constant laboratory control to make Sierra Talc the leader in the extender field.

SIERRA

**TALC and
CLAY
COMPANY**

5509 RANDOLPH STREET, LOS ANGELES 22, CALIFORNIA

GENERAL
HEADING:

SIERRA TALCS FOR
PAINT MANUFACTURING



SIERRA TALC &
CLAY COMPANY

5509 RANDOLPH STREET
LOS ANGELES 22, CALIF.

UNIT NO.

PT-6

REPLACES NO.

PT-3

Subject:

SPECIFICATIONS, CHARACTERISTICS, RECOMMENDATIONS

November 15, 1948

Sierra Talc & Clay Company produces the most complete line of paint talcs in the United States, its mines yielding practically all known types. Long experience in the needs of the industry and extensive laboratory research have resulted in a line that fits every paint need. All Sierra paint talcs are graded to rigid specifications widely published and adhered to. The result is that the paint manufacturer, by using Sierra talcs, can eliminate his extender troubles and can rely on uniformity from bag to bag and from car to car.

Each lot of talc produced in Sierra's three mills is under the constant care of a control chemist, and test reports are furnished the paint manufacturer on request.

Talc (Magnesium Silicate) is recognized as the best paint extender available to the manufacturer due to its inertness and high suspension and durability characteristics.

The following Sierra grades are recommended for paint manufacturing. Specifications and descriptive information are shown for each grade.

Fibrene C-400
Sierra Fibrene
Fibro White
Fibrene Mist

Sierra Super #325
Sierra Cloud
Sierra White #111

Tests shown were run by the following methods:

1. Acid Solubles are determined as follows: Boil 1 gm of talc with 50 cc of 1/10 N Sulfuric Acid and about 50 cc of distilled water. Then titrate to a faint pink with 1/10 N Sodium Hydroxide using a few drops of phenolphthalein as indicator. The difference between the volume of acid and the required volume of Sodium Hydroxide multiplied by 0.28 equals the % of acid soluble substances calculated as CaO.
2. Color is determined on dry milled talc by use of the Pfaltz and Bauer Reflectometer. $MgCO_3$ is used as the standard of 100.
3. Oil absorption is reported by both the Gardner-Coleman and the Spatula rub-out methods. Spencer-Kellogg's "SUPERIOR" linseed oil was used.
4. Apparent density is determined by the Scott Volumeter Method. In this method determination is made of the fluffed up volume of the material.

For chemical analyses see Sierra Bulletin AN-2. For particle size distribution analyses see Sierra Bulletin GEN-47. Complete loose leaf talc portfolio available on request.

FIBRENE C-400

Fibrene C-400, a high oil absorption, high consistency, fibrous talc was developed in Sierra's laboratory early in World War II to meet the stiff requirements of the Navy and Maritime Commission, and C-400 still passes the Navy and Maritime specifications.

Better than 40,000 tons were furnished for war-time use without a single rejection. Experience with C-400 during the war resulted in its adoption as the standard of the industry. So uniform was C-400 that in many cases it was passed by war-time inspectors on its own label without testing. This same strict quality is being maintained in peace time.

Fibrene C-400 has the following outstanding characteristics. For more complete information see Bulletin PT-4.

1. Its combination of platy and acicular particles gives it extreme exterior durability.
2. It is continuously the whitest talc on the market.
3. It is the finest ground of all commercially milled talcs.
4. It is non-abrasive and contains no over-size crystalline particles, making possible its use on highly polished roller mills without scratching or taking on metal discoloration.
5. It wets easily and quickly.
6. It speeds up production time, grinding in one-half to one-third the time of other leading talcs, thus materially reducing costs.
7. It promotes pigment dispersion; stretches out to the limit the hiding pigments, permitting a higher extender content where desired, thus again reducing costs.
8. On a cost basis per gallon of finished paint, Fibrene C-400 is cheaper than competitive low-priced talcs.

Specifications

Screen Test	99.6-99.9/325	pH Value (Beckman)	9.1
Apparent Density		Specific Gravity	2.78
Scott Volumeter	21.3 lbs/ft ³	Lbs./Solid Gal.	23.16
Oil Absorption		One lb. bulks/gal.	0.04318
Gardner-Coleman	45-47 ml/100 gm	Color	98-99
Spatula Rub-out	36-37 lbs/100#	Color in oil	White
Acid Solubles as CaO	5-6.5%		

SIERRA FIBRENE

Sierra Fibrene is produced from the same type of raw materials as is C-400 but is of medium oil absorption and carries a slightly higher lime content. It is not graded to pass the most rigid of government specifications but is otherwise superior to competitive materials.

Specifications

Screen Test	99.5-99.7/325	pH Value (Beckman)	9.4
Apparent Density		Specific Gravity	2.79
Scott Volumeter	22.6 lbs./ft. ³	Lbs./solid Gal.	23.24
Oil Absorption		One lb. bulks/gal.	0.04303
Gardner-Coleman	42.5-44 ml/100 gm	Color	98-99
Spatula rub-out	33-35 lbs/100 lbs.	Color in oil	White
Acid solubles as CaO	6-8%		

FIBRO WHITE

Fibro White is an intermediate grade - intermediate in quality, price, and composition. It is semi-fibrous, medium oil absorption, and is comparable in all respects to competitive talcs produced on the Pacific coast. While the color is not equal to Fibrene C-400 and Sierra Fibrene, it has excellent extender characteristics.

Specifications

Screen Test	99.3-99.5/325	pH Value (Beckman)	9.4
Apparent Density		Specific Gravity	2.75
Scott Volumeter	24.85 lbs/ft. ³	Lbs/solid gal.	22.91
Oil Absorption		One lbs. bulks/gal.	0.04365
Gardner-Coleman	42-43 ml/100 gm	Color	94-96
Spatula rub-out	34-36 lbs/100 lbs.	Color in oil	Grey-
Acid solubles as CaO	5-6%		white

FIBRENE MIST

Fibrene Mist is a product of the baghouse - the collection of the extreme fines that pass off the air stream of the mill into the dust collector. It is Sierra's finest particle size paint talc, approximately 67% finer than 5 microns. Due to its extremely light bulking and high oil absorption, it is an excellent product to raise the consistency of paints. It can be added direct to the paint mixer for this purpose and requires little grinding due to its softness of texture, all harsh and heavy particles being removed in the air stream.

Specifications

Screen Test	100/325	pH Value (Beckman)	9.4
Apparent Density		Specific Gravity	2.79
Scott Volumeter	13.9 lbs/ft. ³	Lbs/solid gal.	23.24
Oil Absorption		One lb. bulks/gal.	0.04303
Gardner-Coleman	51-55 ml/100 gm.	Color	98-99
Spatula rub-out	45-47 lbs/100 lbs.	Color in Oil	White
Acid solubles as CaO	6-8%		

SIERRA SUPER #325

Sierra Super is recommended for all uses where a highly platy particle shape talc is desired. It is Sierra's purest talc, chemically graded close to 1% lime and of very white color. It has good exterior durability. Sierra Super is recommended wherever extreme low lime content is called for.

Specifications

Screen Test	99.5-99.7/325	pH Value (Beckman)	9.2
Apparent Density		Specific Gravity	2.76
Scott Volumeter	23 lbs/ft. ³	Lbs/solid gal.	22.99
Oil Absorption		One lb. bulks/gal.	0.04350
Gardner-Coleman	45-46 ml/100 gm.	Color	98-99
Spatula rub-out	36-37 lbs/100 lbs.	Color in oil	White -
Acid solubles as CaO	0.75-1.3%		Blue-Green undertone

SIERRA CLOUD

Sierra Cloud is a steatite type talc - massive, granular - low lime, high oil absorption. Due to its uniform particle shape, consisting of small spheres and being relatively free of platy and acicular particles, it is excellent for sanding sealers and lacquer undercoaters. Under the microscope the particles all lay in the same plane and do not tend to stand on edge. This makes a smooth surface when sanded for spray or brush coats of lacquers or synthetics.

Specifications

Screen Test	99.5-99.7/325	pH Value (Beckman)	9.3
Apparent Density		Specific Gravity	2.73
Scott Volumeter	27.45 lbs/ft. ³	Lbs/solid gal.	22.74
Oil Absorption		One lb. bulks/gal.	0.04398
Gardner-Coleman	43-44 ml/100 gm.	Color	95.5-96.5
Spatula rub-out	32-33 lbs/100 lbs.	Color in oil	Light
Acid solubles as CaO	1.5-2.5%		greenish grey

SIERRA WHITE #111

Sierra White meets the industry's demand for a low-priced talc. It is darker in color than the other Sierra grades and finds application for all paints where color is not a factor. It is relatively soft, low bulking, and low oil absorption. Its particle structure is of the steatite type - granular - non-fibrous.

Specifications

Screen Test	95-97/325	pH Value (Beckman)	9.6
Apparent Density		Specific Gravity	2.69
Scott Volumeter	31.25 lbs/ft. ³	Lbs/solid gal.	22.41
Oil Absorption		One lb. bulks/gal.	0.04462
Gardner-Coleman	41-42.5 ml/100 gm.	Color	92
Spatula rub-out	32-33 lbs/100 lbs.	Color in oil	Grey to
Acid solubles as CaO	4.5-5.5%		light buff



UNIT NO.

PT-4

REPLACES NO.

Subject:

I. MAGNESIUM SILICATE PIGMENTS
IN EXTERIOR HOUSE PAINTS

June 1, 1948

This report comprises studies of five grades of talc - two of western manufacture and the three best known eastern talcs. These are designated as follows:

Fibrene C-400
Sierra Fibrene
Eastern Talc No. 11 - Low Oil
Eastern Talc No. 12 - High Oil
Eastern Talc No. 13 - Medium Oil

These five talcs were considered as to chemical composition, physical characteristics, and particle size and shape, grinding properties in the paint, and physical properties and storage stability of the finished paints.

Each of the five talcs were made up into an exterior white house paint of the following basic formula:

PIGMENT		VEHICLE	
Basic Sulfate White Lead	16.7%	Body Q Linseed Oil - 1 part	} - 89%
Basic Carbonate White Lead	9.5	White Refined Linseed Oil - 9 parts	
Zinc Oxide	30.9	(Acid value 6 to 8)	
Titanium dioxide, Anatase	14.3	Driers and thinners	11%
Talc	28.6		100%
	100.0%		

The Basic Sulfate White Lead in this formula was in combination with the zinc oxide in the form of 35% leaded zinc oxide. The paints were prepared at a pigment volume concentration (in the dry film) of 32.7%.

Octoate driers were used at a dosage of 0.51% lead (Pb) and 0.02% manganese (Mn) based on the total oil.

The entire paint was mixed in quart batches and ground in a laboratory pebble mill containing porcelain pebbles of the following pebble charge:

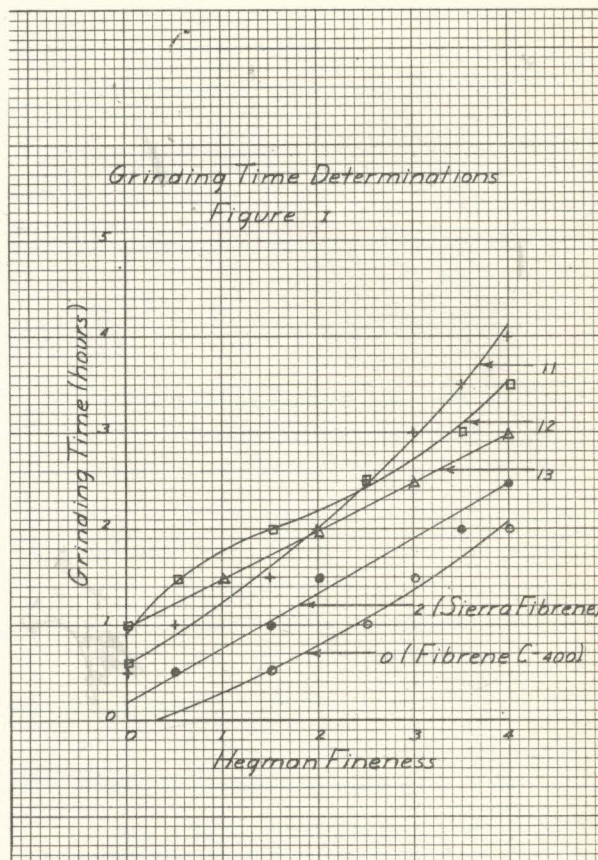
35 pebbles - $1\frac{1}{2}$ " diameter
11 pebbles - 1" diameter
82 pebbles - $\frac{3}{4}$ " diameter

The mill rotated at a constant speed of 65 r.p.m. The inside dimensions of the jar were 7" in diameter and 7" long.

EASE OF GRINDING

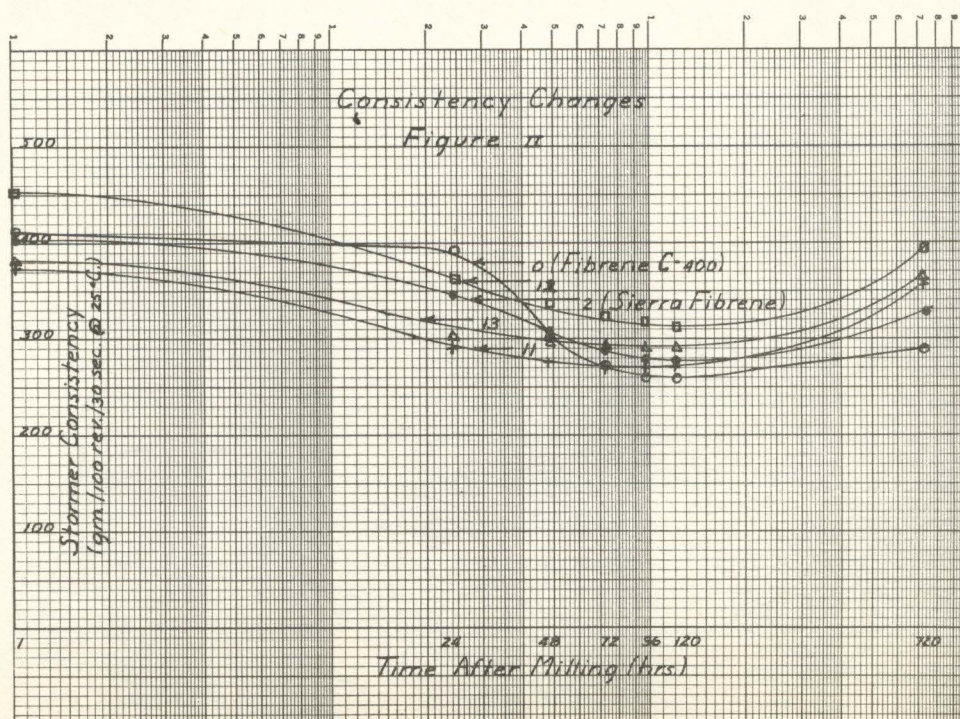
Samples of the paint were taken out at 1/2 hour intervals and checked for fineness with a Hegman fineness gauge. The results thus determined are shown by Figure I. When a fineness of 4 was reached, the grinding was discontinued.

It will be noted that the two Sierra talcs reached a fineness of 4 in about half the time of the three Eastern talcs.



CONSISTENCY AND STORAGE STABILITY

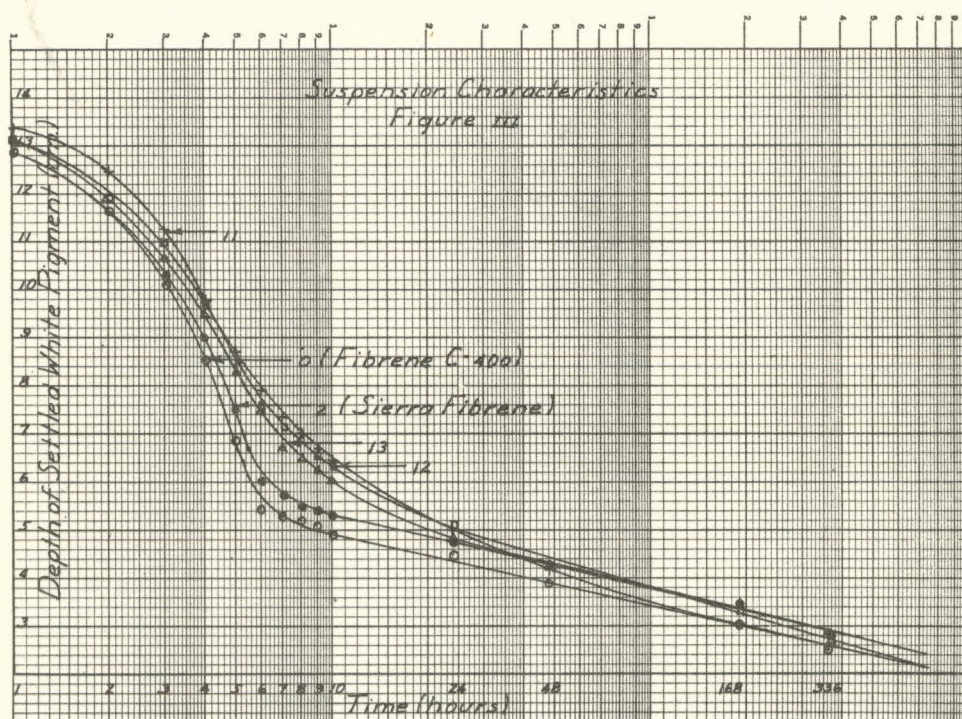
Consistency of all paints was determined immediately and at 24-hour intervals for five days, then after a total storage of 30 days. Results of these consistency determinations are shown by Figure II.



SUSPENSION CHARACTERISTICS

An effort was made to obtain an approximate estimate of the suspension characteristics of each talc by an accelerated sedimentation test. This consisted of mixing a portion of each paint with an equal volume of mineral spirits and measuring the depth of settled pigment at intervals. The results of this accelerated settling are shown by Figure III.

In addition to this accelerating procedure, long term storage of the actual paints without addition of thinner is under way in order to ascertain the existence or absence of correlation with the accelerated settling test. These results will be added to this bulletin when available.

HIDING POWER CHARACTERISTICS

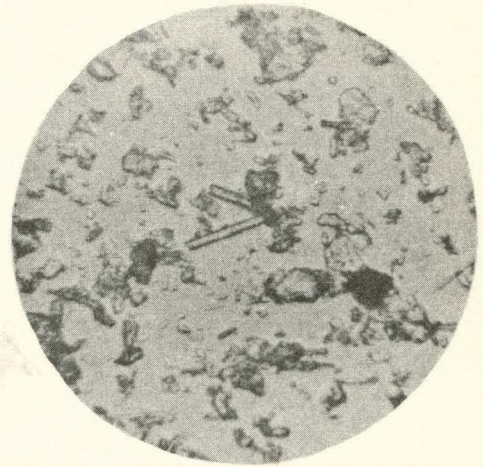
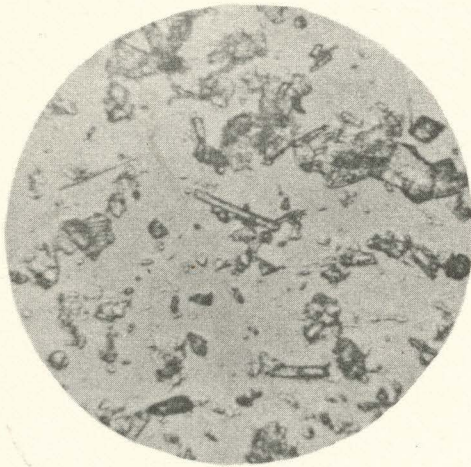
Brush-outs of each paint were made on standard hiding power charts, having the gray and white chevron patterns, in triplicate for each paint. The variations of hiding power on individual brush-outs of the same paint in all cases showed some variation as well as variations between each of the five paints. The range of variations in hiding power by the brush-out method suggested that some differences may exist, but the results were inconclusive so that definite deductions could not properly be drawn.

The hiding powers of the individual paints, as well as between the different paints, ranged from 150 sq. ft. per gallon to 190 sq. ft. per gallon.

These determinations suggested the possibility that paints containing Sierra talcs may demonstrate 5% to 10% higher hiding power than those made with the Eastern talcs. Verification of this indication would enable partial replacement of the expensive white pigments by Sierra talc. It is known that talc contents as high as 47% of the total pigment may be safely used in this type of paint without detriment to durability.

PHOTOMICROGRAPHS

The study of particle shape is of growing importance to the manufacturer of any product using pigments. Tied in with chemical analysis and particle size analysis the photomicrographs tell an important story to the chemist. The following were taken at a magnification of approximately 590 diameters:



FIBRENE C-400

Two exposures of C-400 were taken in order to show a larger field and a better distribution of the particles. Note the typical combination of laminar and fibrillar-shaped particles which gives the talc its desirable characteristics for paint manufacture - laminar for smooth impervious film - fibrillar for improved suspension.



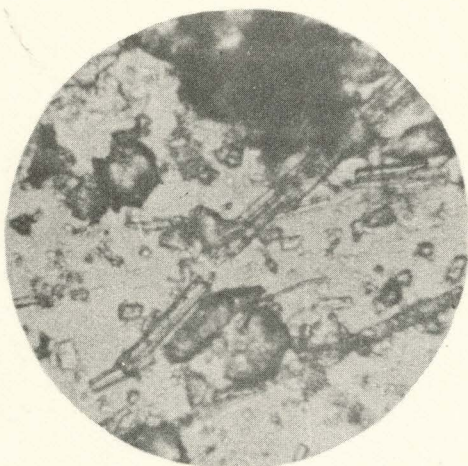
Note the greater fibrosity of Sierra Fibrene, also the absence of any extreme over-sized particles in both Fibrene and Fibrene C-400.

SIERRA FIBRENE



EASTERN SAMPLE NO. 11

Note the extreme range in the size and shape of the particles. Two fields were required to illustrate this properly. These oversized particles probably account for the slow grinding rate of the paint made with this material. See Section No. 5.



EASTERN SAMPLE NO. 12

In this talc there is an extreme range in the shape of the particles as well as in size. Extremely fibrous particles are quite prevalent. These particles appeared to be composed of bundles of particles of the same length but smaller in cross-sectional area which is typical of tremolite - the mineral from which the eastern talcs are altered.



EASTERN SAMPLE NO. 13

Sample No. 13 appeared to be very similar to Sample No. 11 except that more fines were present and fewer oversized particles were found.

SUMMARY

1. Particle size distribution analyses, coupled with photomicrographic examinations, disclose that the two Sierra talcs contain substantially fewer particles coarser than 325 mesh, as well as a substantially higher percentage of particles smaller than 25 or 30 microns than do the three eastern talcs examined.

Particles of this size are of greater importance to the appearance of the paint film than are smaller particles. Since the dry film thickness of a normal house paint will be only about 25-30 microns, the presence of particles larger than 25-30 microns will appear distinctly in the film as coarse particles.

2. The importance of the larger percentage of particles smaller than 25-30 microns which were found in the Sierra talcs is graphically disclosed by Figure I in which the Sierra talcs were found to grind and disperse to a given fineness with greater ease than the eastern talcs which contain greater percentages of particles larger than 25 to 30 microns.
3. The greater ease of dispersion of the Sierra talcs is related directly to the chemical composition and the particle shape characteristics shown in the photomicrographs. The greater ease of dispersion of the Sierra talcs and the absence of the harder tremolitic particles (Mohs hardness 4 compared to Mohs hardness 1 for true talc) will insure against abrasion on any type of mill and grinding on a steel roller mill without metal discoloration of the paint.
4. When grinding on stone mills this greater ease of dispersion and absence of hard particles promotes greater production per hour of mill use at a given standard fineness of grind. It causes less wear on the stones and thereby reduces the frequency of mill dressing.
5. The same properties of the extender pigment will reduce the grinding time in pebble mills for other types of paints by as much as 50%. (See Figure I.)
6. With respect to storage stability, preliminary indications suggest a more stable paint consistency during storage when Sierra talcs are used than would be found when using talc type extenders of eastern origin. Note the greater increase in consistency of the paint made with the eastern talcs at the end of thirty days storage as shown in Figure II.
7. Sierra Fibrene and Fibrene C-400 are considerably whiter when dispersed in paint media than the three eastern talcs. The outstanding whiteness of Sierra talc will insure the production of cleaner tints, especially in interior flat wall paints, while also affording opportunity for some reduction of white opaque pigment in all paints without sacrifice of hiding power as compared to those made with the eastern talcs.

CHEMICAL AND MINERALOGICAL COMPOSITION

	Fibrene C-400	Sierra Fibrene	Eastern Talcs		
			Sample #11	Sample #12	Sample #13
Moisture loss at 105° C.	0.10%	0.42%	1.17%	0.26%	0.29%
Chemically combined water H ₂ O	4.22	3.63	2.53	3.52	2.11
Carbon dioxide CO ₂	4.06	4.75	1.44	2.50	2.70
Silica SiO ₂	55.40	54.80	60.10	61.80	58.75
Alumina Al ₂ O ₃	1.44	1.15	0.74	1.06	0.71
Iron oxide Fe ₂ O ₃	0.04	0.18	0.08	0.24	0.26
Titania TiO ₂	0.03	0.12	None	None	None
Manganese oxide MnO ₂	0.003	0.006	0.10	0.06	0.10
Lime CaO	5.90	6.24	5.93	5.30	7.60
Magnesia MgO	26.95	26.82	27.05	26.40	28.20
Soda Na ₂ O	1.28	1.71	0.33	0.31	0.31
Potash K ₂ O	0.48	0.72	0.14	0.13	0.10
TOTAL	99.903	100.546	99.61	101.58	101.13
Total Calcium and Magnesium Silicates	88.25	87.86	93.08	93.50	94.55
Acid solubles as CaO	5.17	6.04	1.83	3.18	3.43

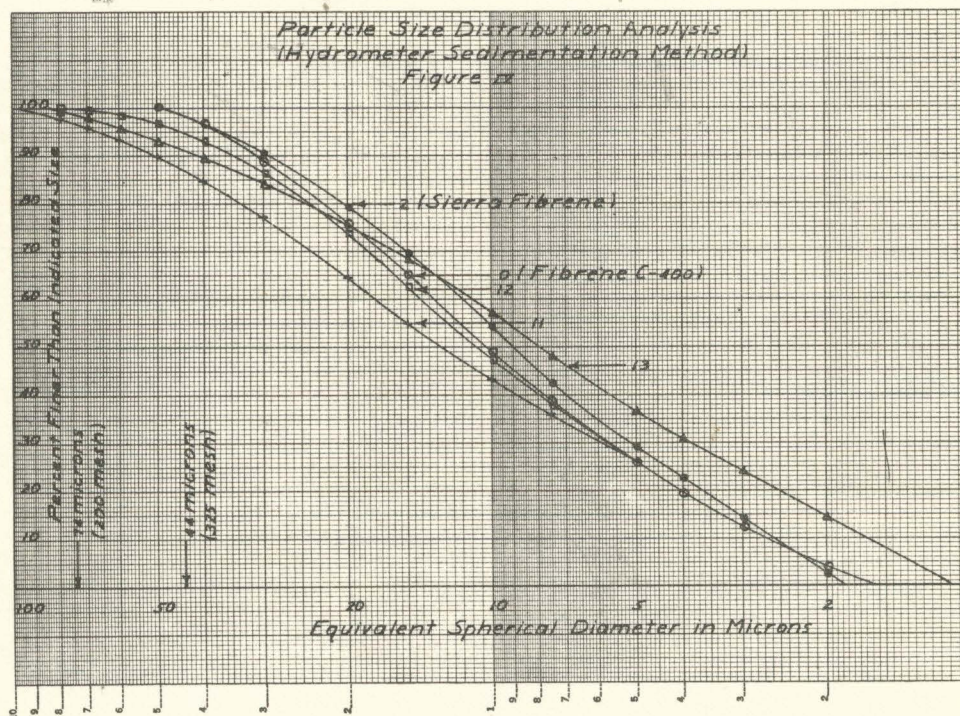
A petrographic study of the five talcs, together with observation of the photomicrographs shown on Pages 4 and 5, indicate the presence of large particles of tremolite in the three eastern talcs, amounting petrographically to about 35%. Tremolite is a hydrous calcium magnesium silicate having the formula $\text{Ca}_2(\text{Mg,Fe})_5(\text{OH})_2(\text{SiO}_4\text{Oll})_2$ as compared to pure talc $\text{H}_2\text{Mg}_3(\text{SiO}_3)_4$. Tremolite has a Mohs hardness of 4 compared to a hardness of 1 for talc. This would help to account for the slower grinding and the greater abrasiveness of the eastern talcs. Sierra talcs are more completely altered from the basic mineral tremolite than are the eastern talcs and thus are softer.

The physical characteristics of each of these talcs were found to be as follows:

	Fibrene C-400	Sierra Fibrene	Eastern Talcs		
			Sample #11	Sample #12	Sample #13
Milled product color	99	99	97	96	97
Color, in oil	White	White	Light Gray	Gray	Light Gray
Screen analysis					
% through 325 mesh	99.9	99.8	97.6	98.7	99.6
Oil absorption:					
Gardner-Coleman					
ml oil/100 gm. pigment	46.5	44.0	35.0	51.5	36.3
Spatula rub-out					
lbs.oil/100# pigment	36.2	34.0	29.4	39.2	29.8
Specific gravity	2.78	2.79	2.82	2.82	2.82
Weight per solid gallon	23.16	23.24	23.49	23.49	23.49
One pound bulks gallons	0.04318	0.04303	0.04257	0.04257	0.04257

The oil absorption and color-in-oil determinations were made in Varnish Makers linseed oil - acid number less than 1.

Particle size distribution analyses were made on each sample as illustrated in Figure IV below.



DISCUSSION

Sierra talcs, on account of transcontinental freight rates, will be of higher initial cost than the eastern talcs, but an important part of the increased cost will be compensated for by the saving in grinding time and wear and tear on the mills with attendant costly shut downs for repairs. In addition there is the probability of a saving in white opaque pigments if some more accurate method of hiding power than that of the "brush-out" procedure is carefully studied.

2. Based on current prices and current freight rates, the increased cost per lb. of Sierra talcs as compared to the eastern talcs will be from $\frac{1}{4}\text{¢}$ per lb. to $1\frac{1}{2}\text{¢}$ per lb. depending on the location of the paint manufacturer's plant. At the usual content of 2 to 3 lbs. of talc per gallon of paint, the increased cost per gallon of finished paint will range from 1 to 3 cents per gallon. This increase is negligible compared to the many advantages gained.
3. The greater whiteness and softness of the Sierra talcs and their more desirable particle size distribution will result in the highest quality appearance of the paint film in the hands of the user. This will result in substantially fewer complaints by customers due to the presence of coarse particles in the paint film when less satisfactory talcs are used.
4. In addition to the properties discussed and reported on in this bulletin, large white pigment manufacturers have made durability tests with Sierra talcs as against eastern talcs for five-year periods, reporting Sierra talcs fully equal in durability to the eastern talcs and superior in mildew resistance.
5. Subsequent reports to be added to this bulletin will describe the consistency changes and can stability results to the maximum commercial period of 6 months.

GENERAL
HEADING:

PAINT TALCS



SIERRA TALC &
CLAY COMPANY

5509 RANDOLPH STREET
LOS ANGELES 22, CALIF.

UNIT NO.

PT-5

REPLACES NO.

Subject:

GOVERNMENT SPECIFICATIONS
PAINT INERTS AND EXTENDERS

October 15, 1948

INTRODUCTION

As a service to the paint industry, Sierra Talc & Clay Company has assembled into one bulletin for convenient reference all of the existing government specifications for the more important paint inert and extenders. These specifications, together with what are believed to be a number of pertinent comments regarding their relative merits and disadvantages, are listed below. The materials covered are talc or magnesium silicate; precipitated calcium carbonate; natural, water ground calcium carbonate; natural chalk; surface treated calcium carbonate; and silica.

It is to be noted that there are various inconsistencies and lack of uniformity among the specifications issued by the government agencies for talc or magnesium silicate. Specification TT-M-90 has caused a great deal of confusion among western paint manufacturers because of its peculiar oil absorption requirements. It is suggested that all of these talc specifications be combined to form a single specification for magnesium silicate to be used in government paint manufacture. This proposed specification is shown on page 4 of this bulletin.

FEDERAL SPECIFICATIONS BOARD

Federal Specifications Board TT-M-90 (10/29/42) supersedes Army-Navy Aeronautical Board AN-TT-M-91. Copy at Superintendent of Documents, Washington 25, D.C., for 5¢.

<u>MAGNESIUM SILICATE</u>	<u>TT-M-90</u>	<u>AN-TT-M-91</u>
Type	Natural Mag. Silicate	Natural Mag. Silicate
Retention on 325 mesh screen, maximum	3%	2%
Moisture loss at 105° C., maximum	1%	1%
Loss on ignition, maximum	12%	-
Oil absorption, lbs. oil per 100# pigment Method 419, Spec. TT-P-141a	20-30	-
MgO	20-34%	-
SiO ₂	40-64%	-
Magnesium and calcium silicates, minimum		90%
Calcium oxide, maximum		7%

- NOTE: 1. No western talcs pass this specification. Only two eastern talcs come within the oil absorption range and they only by a fraction of 1%, namely 29.4 and 29.6.
2. The wide range in oil absorptions would cause wide deviations in consistency of the finished paint.
3. The wide range in chemical composition could produce a talc that would conceivably contain only 60% magnesium silicate.
4. The high loss on ignition could permit up to 10% calcium oxide.
5. Oil absorptions should be revised to be within the range of 30-40.

NAVY DEPARTMENT

Copies of specifications from Bureau of Supplies and Accounts, Navy Department, Washington 25, D. C.

CALCIUM CARBONATE, PRECIPITATED - 52-C-28 - 5/15/45

Color - Equal to sample.
Oil absorption, rub-out - $\pm 20\%$ of sample.
Consistency test paint - within 5KU of a standard paint.
Abrasion test: As white as standard after grinding with steel balls.
Retention on 325 mesh, maximum 0.5%
Specific gravity 2.65-2.75
CaCO₃, minimum 96%
MgCO₃, maximum 2%
SiO₂, maximum 0.5%
Fe₂O₃, maximum 0.05%
CaSO₄, maximum 1%
Al₂O₃, maximum 0.30%
H₂O, maximum 0.25%

Precipitated type excludes western dry calcium carbonates.

MAGNESIUM SILICATE - 52M2b - 10/15/45

	<u>TYPE A</u>	<u>TYPE B</u>
Type	Fibrous	Fibrous or non-fibrous
Calcium and magnesium silicates, minimum	90%	88%
CaO, maximum	7%	7%
Retention on 325 mesh, maximum	3%	3%
Moisture at 105° C., maximum	1%	1%

Properties of paint - both types:

Gloss not greater than standard.

Viscosity: Not over 1 KU less nor 4 KU greater than standard.

Reflectance: Not over 3 units less than standard.

Type B in paint permits up to 25% Diatomaceous Silica to assist in reaching reflectance specification.

Fibrene C-400, Type A, passes Type A.

Fibrene C-400, regular, passes Type B.

SILICA - 52S5d - 7/1/41

SiO ₂ , not under	98%
Loss on ignition, not over	1.5%
Retention on 325 mesh, not over	3%

Sierra has no silica to pass this specification.

WHITING - 52W1e - 1/2/42

Type:	Natural chalk, microscopically
CaCO ₃ , not under	95%
Insoluble in HCl, not over	3.5%
Iron and alumina, not over	0.8%

NOTE: Sierrasil AAA (crystalline type) recommended for this specification although it and all western whittings are not strictly natural chalks.

U. S. MARITIME COMMISSION - "52MC" SERIES

Copies: Chief Materials Section, U. S. Maritime Commission, Technical Division,
Washington 25, D. C.

CALCIUM CARBONATE - 52-MC-28 - 9/11/43

Type A	Natural, water ground
Type B	Surface treated
Retention on 325 mesh, maximum	1%
Consistency tests have to be met according to specification.	
Composition:	
Moisture at 105° C., maximum	0.5%
CaCO ₃ , Type A, not under	97.5%
Type B, not under	98.5%
Inorganic impurities: Type A	2% maximum
Type B	1% maximum
Specific gravity: Type A	2.65-2.75
Type B	2.60-2.70
Color	Equal to standard
Oil absorption	± 10% of standard

Sierra has no calcium carbonate of either the water ground or surface treated types.

MAGNESIUM SILICATE - 52-MC-523 - 10/9/45 (Superseded 52-MC-11)

	<u>TYPE I</u>	<u>TYPE II</u>
Type	Fibrous or Fibrous-Plate	
Oil absorption, ml oil/20 gms. talc	6-9	9-12
Retention on 325 mesh, maximum	3%	3%
Moisture at 105° C., maximum	1%	1%
Loss on ignition, maximum	9%	9%
SiO ₂	45-70%	45-70%
MgO	25-35%	25-35%
Combined Al and Fe as R ₂ O ₃ , maximum	6%	6%
CaO, maximum	9%	9%
Flatting (60°) gloss of standard paint not over 14.		

Sierra Fibrene passes Type I.

Fibrene C-400 passes Type II.

CALCIUM CARBONATE - 52MC524 - 11/27/45 (Superseded 52MC33)

CaCO ₃ , not under	96%
SiO ₂ , not over	0.50%
Fe ₂ O ₃ , not over	0.05%
Al ₂ O ₃ , not over	0.30%
Moisture, not over	0.25%
Specific gravity	2.63-2.73
Oil absorption, lbs./100 lbs.	9.15-15.0
Retention on 325 mesh, not over	1%
Retention on 100 mesh	None

Sierrasil AAA passes this specification.

AMERICAN SOCIETY FOR TESTING MATERIALS

Copies from ASTM, 260 South Broad Street, Philadelphia 2, Pa., 25¢ each.

MAGNESIUM SILICATE - D605-42 (1942)

Silica	40-56%
MgO	20-32%
Loss on ignition	4-7%
Moisture, maximum	1%
Retention on 325 mesh, maximum	2%

Sierra Cloud or Sierra Super pass this specification.

SUMMARY

1. The calcium carbonate and silica specifications are good and satisfactory.
2. Sierra Talc and Clay Company believes no advantage could be gained by having so many specifications for magnesium silicate, each with its weaknesses.
3. As a suggestion the following specification is recommended to cover all government specifications for magnesium silicate:

	<u>TYPE "A"</u>	<u>TYPE "B"</u>
Microscopic	Fibrous or fibrous-platey	
Oil absorption ml oil/20 gms. talc	9.5-10.5	7-9
Retention on 325 mesh, maximum	2%	2%
Moisture at 105° C., maximum	1%	1%
Loss on ignition	9%	9%
Combined calcium and magnesium silicates, minimum	88%	88%
Calcium oxide, maximum	7%	7%

With this specification, consistency and flattening effects need not be specified at all, as the oil absorption limits should take care of these points. It will be noted that this proposed specification comprises essentially the best features of both 52M2b and 52MC523 and if adopted would insure the paint manufacturer and the government agency receiving a proper grade of magnesium silicate and yet make it possible for all good producers to comply.

Sierra solicits the cooperation of both the various government agencies and the paint manufacturers toward the simplification and, if possible, the unification of government specifications.

CERAMIC TALCS



**FOR
LOW TEMPERATURE
WHITEWARES**

TALCS FOR WALL TILE

MONARK TALC . . . maximum whiteness . . . excellent pressing characteristics.

CB CERAMIC 96 . . . excellent pressing characteristics . . . high tremolite content.

Talc has proved of great value in low-fired, cast and dry-pressed ceramic ware because of its good working characteristics and low maturing temperature. High talc bodies are notably craze resistant.

Many ceramists utilize the clay-talc eutectic of 60% talc and 40% clay.

DINNERWARE ARTWARE POTTERY

CB CERAMIC 96 and 99 . . . promotes high specific gravity slip . . . rapid casting. for low shrinkage bodies.

SIERRA WHITE PCP . . . excellent casting . . . low firing. Especially recommended where a cream-ivory color is desired.

Sierra is familiar with all of the problems faced by the ceramist due to maintaining a well equipped laboratory, with ceramic engineer service. These facilities are constantly available to assist the ceramist with his problems.

Other Sierra brands, made to special specifications, are available for ceramic use. Information on request.

SIERRA

**TALC and
CLAY
COMPANY**

5509 RANDOLPH STREET, LOS ANGELES 22, CALIFORNIA

GENERAL HEADING: SIERRA LOW TEMPERATURE
CERAMIC TALCS



SIERRA TALC &
CLAY COMPANY

5509 RANDOLPH STREET
LOS ANGELES 22, CALIF.

UNIT NO. CER-6 REPLACES NO. CER-4

Subject: CHEMICAL AND PHYSICAL CHARACTERISTICS
AND FIRED DATA

July 1, 1948

Talc has come to be recognized as a handy tool to the ceramist in the manufacture of low temperature ceramic bodies. Its well-known characteristic of increasing hardness of bisque at very low temperatures, while inhibiting crazing, has enabled the ceramic manufacturer to produce better ware at greatly increased production rates.

This information is presented as a guide to the ceramist in selecting the proper talc for the proper use. No attempt is made to evaluate our talcs in commercial ceramic bodies. Rather have we attempted to show the general characteristics of each of our low-temperature talcs both straight and in a hypothetical clay-talc body in order to assist the ceramist in selecting the most adaptable talc for each type of ware he wishes to produce.

Four Sierra Talcs are presented in this bulletin, and the following information is intended to show how the chemical and physical characteristics of each indicate their specific usefulness in different types of ceramic bodies. Fired results on C.B. Ceramic 99 are not shown because fired results are very close to C.B. 96. However, each shows slightly different working and casting characteristics.

These four talcs are:

C. B. Ceramic 96 Talc
C. B. Ceramic 99 Talc
Monark Talc
Sierra White Talc

Each of these talcs is rigidly controlled by selective mining and sorting of the ore both at the mines and at the milling plants. Composite samples taken from each carload of material are carefully checked for chemical and physical properties as well as fired characteristics. Modern engineering methods are utilized in mining and processing operations and careful technical control of the finished product is maintained. Extensive reserves of crude talc, combined with uniformity of finished product, give the ceramic manufacturer assurance of a good supply of talc for many years.

REPRESENTATIVE CHEMICAL ANALYSES

<u>Talc</u>	<u>Silica</u> <u>SiO₂</u>	<u>Alumina</u> <u>Al₂O₃</u>	<u>Iron</u> <u>Fe₂O₃</u>	<u>Lime</u> <u>CaO</u>	<u>Magnesia</u> <u>MgO</u>	<u>Alkalies</u> <u>Na₂O & K₂O</u>	<u>Ignition</u> <u>Loss</u>
CB 96 and 99	56.29	1.07	0.43	9.26	28.31	1.06	4.02
Monark	53.40	1.61	0.23	7.40	27.50	0.80	8.63
Sierra White	53.51	1.49	1.13	6.56	25.29	1.05	11.16

	<u>Acid Sols.</u> <u>as CaO - %</u>	<u>pH</u> <u>Value</u>	<u>Screen Analysis</u>	<u>Specific Gravity</u>
CB 96 and 99	2.50	9.4	CB 96 96.0/200 CB 99 99.5/200	2.85
Monark	8.00	9.4	96.0/200	2.81
Sierra White	7.91	9.2	99.9/200	2.72

PARTICLE SIZE DISTRIBUTION

	(Equivalent Spherical Diameter - Percent Finer)								
	<u>80</u>	<u>70</u>	<u>60</u>	<u>50</u>	<u>40</u>	<u>30</u>	<u>20</u>	<u>10</u>	<u>5</u>
CB 96	100	92	80	67	54	39	23	8	0
CB 99	100	97	89	80	69	54	33	12	0.5
Monark	98	93	87	80	72	61.5	50	29	6
Sierra White	100	99	96	92	86	76.5	62	37.5	13

FIRED CHARACTERISTICS

All samples were dry pressed on a Carver Laboratory Press to 8000 lbs. per square inch into a disc of 1-1/8" diameter, 1/4" thick. The straight talcs were tested for fired characteristics as shown in the following tables. All talcs were likewise tested in a mix consisting of 60% talc and 40% semi-plastic California Clay.

BULK SPECIFIC GRAVITY

<u>Temp. °F</u>	<u>CB 96</u>			<u>Monark</u>		<u>Sierra White</u>	
	<u>Mix</u>	<u>Str.</u> <u>Talc</u>		<u>Mix</u>	<u>Str.</u> <u>Talc</u>	<u>Mix</u>	<u>Str.</u> <u>Talc</u>
Green	2.02	2.01		2.04	2.06	2.10	2.14
1800	1.84	--		1.78	--	1.87	--
1900	1.80	--		1.76	1.76	1.93	2.00
2000	1.85	1.77		1.79	1.76	1.95	1.98
2100	1.83	1.82		1.89	1.81	2.00	2.05
2200	1.93	1.81		2.11	1.85	2.13	2.12
2300	2.08	1.95		2.11	2.01	2.18	2.29
2400	--	2.09		--	--	--	2.50

FIRED CHARACTERISTICS (CONTINUED)

DIAMETER SHRINKAGE - %

Temp. °F	CB 96		Monark		Sierra White	
	Mix	Str. Talc	Mix	Str. Talc	Mix	Str. Talc
1800	0.70*	--	0.26*	--	0.79	--
1900	0.61*	--	0.26*	--	0.61	1.83
2000	0.35*	0.78*	0.00	0.31	1.92	1.22
2100	0.09*	0.17*	0.88	0.57	1.14	2.54
2200	0.79	0.10*	2.63	0.79	2.88	3.32
2300	2.10	0.88	3.25	2.02	3.41	5.25
2400	--	2.01	--	5.55	--	7.51

VOLUME SHRINKAGE - %

1800	5.98*	--	4.28*	--	1.93*	--
1900	7.70*	--	4.08*	4.14*	1.10	4.62
2000	6.85*	9.42*	3.22*	2.66*	3.34	2.26
2100	6.31*	7.25*	2.23*	1.46*	4.94	1.80
2200	0.00	7.43*	13.10	1.83	10.80	10.70
2300	6.70	0.83*	11.40	10.15	12.70	17.60
2400	--	6.77	--	21.40	--	23.90

ABSORPTION - %

1800	14.6	--	17.34	--	12.4	--
1900	16.5	--	17.50	19.95	13.0	12.5
2000	15.7	19.2	16.80	19.95	12.8	9.0
2100	14.5	17.9	13.20	17.40	10.3	11.5
2200	12.6	17.7	5.52	17.50	7.7	10.8
2300	8.0	12.5	0.00	11.90	1.2	6.7
2400	--	12.4	--	0.00	--	0.1

APPARENT POROSITY - %

1800	26.8	--	30.9	--	23.2	--
1900	29.8	--	30.9	35.1	25.0	--
2000	28.4	35.8	30.0	35.0	25.6	17.8
2100	26.5	32.5	24.7	31.6	20.6	23.6
2200	24.4	34.0	12.8	32.4	16.5	22.9
2300	18.0	24.4	0.0	23.9	2.5	16.3
2400	--	23.8	--	--	--	0.3

APPARENT SPECIFIC GRAVITY

1800	2.50	--	2.57	--	2.43	--
1900	2.56	--	2.55	2.72	2.56	2.66
2000	2.52	2.67	2.56	2.72	2.60	2.41
2100	2.50	2.70	2.52	2.64	2.52	2.68
2200	2.56	2.74	2.42	2.73	2.55	2.76
2300	2.54	2.58	2.10	2.64	2.19	2.74
2400	--	2.81	--	--	--	2.56

* Expanded

IDENTIFICATION AND USES

CB 96 AND 99: Both of these talcs are identical with the exception of a difference in screen analyses and particle size distribution. Each has been found to be particularly suited for casting and jiggering bodies. They produce slips of high specific gravity and low viscosity with a minimum of water, which means a rapid casting time. They fire white and show a comparatively long firing range. Both talcs have exceptionally low dried and fired shrinkages.

CB 96 is particularly recommended for use in wall tile bodies. At this fineness, the particle size distribution and particle shape are at an optimum point to produce best pressing characteristics.

CB 99 is similar to CB 96 except it is milled to a greater fineness. It has excellent craze-free characteristics when incorporated in ceramic bodies and finds wide usage in low-temperature artware.

MONARK: Monark Talc is white firing due to low iron content. It has excellent pressing characteristics which make it particularly beneficial in wall tile bodies.

SIERRA WHITE: This material is particularly well suited for various types of semi-vitreous bodies where a cream colored product is desirable. It has good working characteristics in both cast and jigger bodies. It is particularly adapted to low-temperature artware due to its low maturing temperature.

Further laboratory results and suggestions on all these talcs are available on request. Our research laboratory and technical ceramic staff are at your constant service.

GENERAL
HEADING:

CERAMIC TALC



SIERRA TALC &
CLAY COMPANY

5509 RANDOLPH STREET
LOS ANGELES 22, CALIF.

UNIT NO.

CER-7

REPLACES NO.

CER-2

Subject:

SIERRALITE - A MAGNESIUM-
ALUMINUM-SILICATE

February 23, 1949

Sierralite is a unique mineral in that it is a magnesium-aluminum-silicate. When incorporated in ceramic bodies, Sierralite greatly improves their heat shock properties. This attribute has been used to good advantage by manufacturers of:

1. Sanitary ware.
2. Kiln furniture.
3. Cordierite.

SANITARY WARE

When a very small percentage (3-4%) of Sierralite is incorporated in a sanitary ware body, sufficient cordierite is developed to allow much more rapid firing than is customary. Kilns which are only 115 feet long are being used to fire sanitary ware containing Sierralite.

Sanitary ware manufacturers are successfully employing 3-4% Sierralite in their bodies because they find that this:

1. Promotes vitrification.
2. Improves thermal shock characteristics and allows more rapid firing.
3. Improves heat shock characteristics of the finished ware.
4. Does not thicken slip.

The small percentage of Sierralite used acts as a moderate easily controlled flux in firing the ware. Firing cycles may be speeded up considerably without dunting or cracking of the ware. Due to its physical structure, Sierralite does not thicken slip as do some types of talc.

KILN FURNITURE

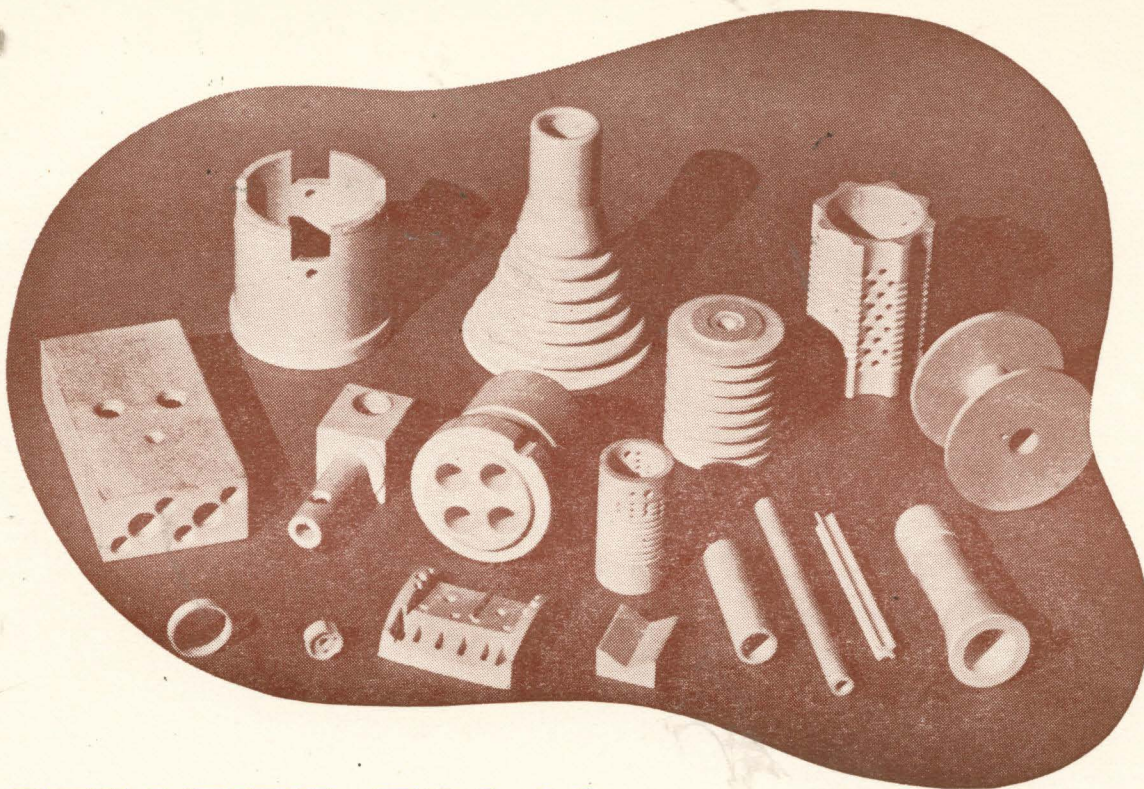
Sierralite has proved of considerable value in saggers and kiln furniture because:

1. Heat shock properties of the kiln furniture are greatly improved due to lower coefficient of expansion. This means more trips through the kiln before failure.
2. Sag properties of Sierralite are good. This is a weak point of talcs which are high in CaO. Sierralite has a low CaO content.

Proper percentage of Sierralite is dependent upon the service conditions in which the kiln furniture is to be used. This varies from 33-1/3% for pottery furniture to 10% for vitreous ware furniture.

CORDIERITE

When any Sierralite-clay blend is fired, a certain amount of cordierite is formed. In our test work, maximum cordierite development was obtained with a blend containing 50% Sierralite and 50% clay. This mix very closely approximates the theoretical cordierite composition and results in lowest thermal expansion of any Sierralite-clay mix.



STEATITE TALCS

FOR HIGH TEMPERATURE CERAMICS

Sierra, with the largest reserve of high grade talc, had the privilege of supplying the bulk of steatite talc during the war, when electronic and spark plug industries were faced with the problem of tremendous increase in production under very rigid specifications on their products. Wartime requirements gave impetus to the development of talcs to be used in all types of cordierite bodies, such as kiln furniture, radiants, cooking ware and sanitary ware.

SIERRA BRANDS FOR SPECIFIC PURPOSES

FOR

Radio Insulators and Spark Plugs

SIERRA HI-GRADE

SIERRAMIC

WHITE MOUNTAIN

FOR

Kiln Furniture

Refractories

Radiants

Ovenware

Sanitary Ware

SIERRA ALBATALC

SIERRALITE

SIERRA HI-FIRE

SIERRA SNOW

Since the end of the war Sierra has continued to produce such talcs on a basis of quality equal to the rigid requirements of war time. Sierra is also producing steatite talcs, with controlled alumina content, to meet the particular needs of each type of product.

Sierra's well-known steatite brands, listed on this page, are held to strict chemical and physical control through years of laboratory and mill experience combined with expert mining knowledge.

Our laboratories are at your service to help solve your particular problems.

SIERRA

**TALC and
CLAY
COMPANY**

5509 RANDOLPH STREET, LOS ANGELES 22, CALIFORNIA

GENERAL
HEADING: STEATITE



SIERRA TALC &
CLAY COMPANY

5509 RANDOLPH STREET
LOS ANGELES 22, CALIF.

UNIT NO. STE-8

REPLACES NO. STE-1 AND 7

Subject: FIRED DATA ON STEATITE TALCS

July 1, 1948

Experience gained by pressure on the steatite industry during the war years and since has resulted in production of the following talcs to meet the exacting requirements of this industry:

Sierramic Talc
Sierra Hi-Grade Talc
Sierra Hi-Grade #71 Talc
Sierra Oasis #7 Talc
White Mountain Talc

Test Methods - Based on standard test control methods for the steatite industry established at the meeting of the American Ceramic Society at Uniontown, Pennsylvania, in September, 1943.

Approved test body is 90% Talc and 10% A-1 United Feldspar. Tests are based on approved test discs of 1.125" diameter and 0.25" thickness, pressed at 8,000 pounds per square inch, and fired at various temperatures to complete vitrification. Data is included of "STR. TALC" (100% Talc) and "MIX", which is the aforementioned standard body. Additional tests made in our laboratories to maintain uniformity are screen test, particle size distribution, chemical analysis, fired color, and determination of calcium carbonate.

FIRED CHARACTERISTICSBULK SPECIFIC GRAVITY

Temp. °F	Sierramic		Sierra Hi-		Sierra		Sierra Oasis		White	
	Talc		Grade Talc		Hi-Grade #71		#7 Talc		Mountain	
	Mix	Str. Talc	Mix	Str. Talc	Mix	Str. Talc	Mix	Str. Talc	Mix	Str. Talc
Green	2.13	2.17	2.14	2.18	2.11	2.15	2.09	2.15	2.17	2.19
2325	2.56	2.47	2.63	2.49	2.51	2.42	2.48	2.34	--	--
2350	2.58	2.49	2.64	2.53	2.55	2.46	2.50	2.36	2.53	2.30
2375	2.59	2.52	2.66	2.55	2.56	2.48	2.52	2.39	2.55	2.32
2400	--	--	--	--	2.59	2.55	2.54	2.41	2.56	2.34

DIAMETER SHRINKAGE

2325	5.47%	4.85%	5.81%	5.12%	4.63%	4.20%	4.11%	3.55%	--	--
2350	5.64	5.12	5.92	5.39	4.94	4.50	4.24	3.72	3.78%	3.23%
2375	5.72	5.39	6.06	5.69	4.97	4.67	4.29	3.85	3.95	3.40
2400	--	--	--	--	5.20	5.24	4.29	4.06	4.08	3.68

VOLUME SHRINKAGE

2325	21.4%	17.4%	22.8%	17.3%	20.9%	16.3%	20.0%	13.7%	--	--
2350	22.0	18.3	23.1	18.8	21.9	17.7	21.0	14.9	18.5%	10.5%
2375	22.3	19.1	23.5	19.8	22.2	18.5	21.2	15.1	19.2	11.1
2400	--	--	--	--	22.9	21.2	21.5	16.8	19.7	12.2

ABSORPTION

2325	0.33%	4.30%	0.30%	4.32%	0.22%	5.20%	0.16%	6.40%	--	--
2350	0.11	3.57	0.28	3.61	0.05	4.00	0.16	5.84	0.24%	6.82%
2375	0.00	2.83	0.00	2.76	0.05	3.79	0.00	5.62	0.14	6.23
2400	--	--	--	--	0.00	2.33	0.00	4.92	0.00	5.88



UNIT NO. STE-9 REPLACES NO. CER-3

Subject: ALBATALC - a new white-firing ceramic talc
for moderate absorption ceramics.

July 1, 1948

ALBATALC is designed as an intermediate quality ceramic talc between the pure steatite talcs and the high-lime, low-firing talcs.

ALBATALC fires white - free of iron specks.

The good working characteristics of pure steatite talc are maintained in ALBATALC, making it very suitable for dry pressing, extruding, and casting. The intermediate lime content serves as a flux to produce vitrification at a lower temperature than is possible with the pure steatite grades.

For these reasons ALBATALC is recommended for use in certain types of electrical porcelains where zero absorption and maximum electrical qualities are not required. It is also recommended for gas radiants and heater parts.

Representative chemical analysis, physical and firing characteristics are as follows:

			Minimum	Maximum
Silica SiO_2	57.46	Acid solubles as CaO	3.00%	4.00%
Magnesia MgO	28.82	Dry color	92	96
Alumina Al_2O_3	1.48	Screen test through 325 mesh	98%	99%
Lime CaO	3.93	Diameter shrinkage @ 2350° F	3.50%	4.50%
Iron Fe_2O_3	.39	Absorption at 2350° F	3.50%	4.50%
Soda & Potash K_2O & NaO	.54	Fired color	White, no iron specks	
Loss on Ignition	6.84			

REMARKS

1. The moderate lime content of ALBATALC imparts a desirable fluxing action and good firing range.
2. The shrinkage is moderate and controllable.
3. ALBATALC fires white and free of specks.
4. ALBATALC is non-abrasive on dies.

CONCLUSION

Sierra pioneered a large portion of the research and development work done during the war on Steatite talc and has marketed for years several grades of low-firing, high-lime ceramic talcs that have made possible much of the expansion in California ceramics. ALBATALC fills an important need between these two extremes.

Fired data above is shown only at one temperature. Further fired tests and additional technical data will follow in subsequent bulletins. In the meantime, we are in active production with established successful users. Samples will be furnished on request.



Sierra Cosmetic Talcs

A SIERRA TALC FOR EVERY COSMETIC PURPOSE

High Grade Face Powder

Sierra Super 200 & 325
Sierra Supreme
Sierra Select

Economy Grades Face Powder

Sierra Cloud
Sierra Cosmetic 325
Sierra Silver 325

High Bulk Dusting Powders

Sierra Super 325

Economy Grades Dusting Powders

Sierra Snow
Sierra Cosmetic 200
Sierra Silver 200
Sierra Special No. 1-D
Sierra White
LS Silver

Baby Powders

Sierra Super 200 & 325
Sierra Supreme
Sierra Cosmetic 325

Pharmaceuticals

Sierra Super 325
Sierra Vapor
Sierra USP

To Sierra's credit, many cosmetic manufacturers were able to meet demands during the war when shortage of supplies and government restrictions worked a severe hardship on the industry, for most grades of talc were restricted to the war industries. The large variety of talcs available from Sierra's mines made delivery possible.

Since hostilities ended, Sierra's laboratory and engineering resources have been devoted to production of high quality California and Nevada talcs, superior to even pre-war standards. Experience in milling and mining technology, gained during the war, is resulting in constantly improving quality.

All Sierra cosmetic talcs are graded to constant uniformity. Sierra's laboratory is well equipped for all tests of interest to cosmetic manufacturers... color, texture, grit content, bulking, acid solubles and particle size.

SIERRA

TALC and
CLAY
COMPANY

5509 RANDOLPH STREET, LOS ANGELES 22, CALIFORNIA

GENERAL
HEADING: A STUDY OF THE PURITY OF COSMETIC
AND PHARMACEUTICAL TALCS



SIERRA TALC &
CLAY COMPANY

5509 RANDOLPH STREET
LOS ANGELES 22, CALIF.

UNIT NO. COS-4 REPLACES NO.

Subject: SIERRA SUPREME U.S.P. TALC

June 1, 1948

Production of a cosmetic talc of U.S.P. purity has been accomplished by Sierra Talc & Clay Company following three years of research and production refinements since the end of the war.

SIERRA SUPREME U.S.P. TALC, combining the finest physical characteristics desired by the cosmetic manufacturer with the extreme purity demanded by the pharmaceutical house, is introduced by means of this bulletin.

The highest grades of Italian, French, and North Carolina talcs were compared with Sierra Supreme U.S.P. Talc in this study. Each talc was tested fully for its chemical and physical characteristics with particular emphasis on a study of their purity and freedom from skin irritating particles.

The following conclusions can be made as a result of these tests:

1. Sierra Supreme U.S.P. is the purest of the four talcs tested. Note the low lime (CaO) content in Table I and the low acid soluble content in Table III. Sierra Supreme U.S.P. and the French talc are the only talcs found to meet all the requirements of the U. S. Pharmacopoeia XIII. See Table II.
2. In the grit decantation test shown in Table III, Sierra U.S.P. shows the low percentage of 0.15%. The French talc is next with 4.15%.
3. In the photomicrographs over-sized, irregular-shaped particles and needles are noted in the Italian and North Carolina talcs. Sierra Supreme U.S.P. Talc is composed of smooth, uniformly-shaped particles of narrow size range. The bulk of these particles is platey, indicating a smooth talc of non-irritating structure.
4. These purity factors assure the necessary purity for pharmaceutical purposes. They make possible the production of baby powders, foot powders, heat rash powders, and anti-irritants under the U.S.P. label.
5. Physically, Sierra Supreme U.S.P. Talc has the following advantages over the other talcs tested:
 - a. It is the whitest of the four talcs, assuring uniformity of color in the most delicate face powder tints.
 - b. Sierra Supreme U.S.P. contains absolutely no grit by the "bite test" and but a small fraction of the grit contained in the other talcs by the decantation test. Safer technical powders and smoother, less irritating face and dusting powders can be formulated with Sierra Supreme U.S.P. Talc.
 - c. Sierra Supreme U.S.P. will eliminate wear and tear on the delicate dies used by the tablet manufacturer and is safer for internal consumption.

- d. Sierra Supreme U.S.P. is the lightest bulking talc tested. This makes possible a larger, more attractive package on an equal net weight basis.
- e. Sierra Supreme U.S.P. Talc is free of "shiners" (micaceous particles) and excels in hiding or covering power. This indicates the possibility of formulating a face powder containing a lower percentage of the hiding pigments which tend to offset "slip" - yielding a face powder of exceptional smoothness at a lower cost.
- f. Sierra Supreme U.S.P. is a tested and controlled talc produced to strict specifications, packed in net clean 50# sealed valve-type paper bags, untouched by human hands, from dry, clean mines free of moisture and organic material. Sierra Supreme U.S.P. is SAFE.

For those firms not requiring a certified U.S.P. talc, Sierra offers the same material under the brand name of SIERRA SUPREME 325. Physical characteristics throughout are identical. Chemically, Sierra Supreme 325 will not be graded to pass U. S. Pharmacopoeia XIII. Sierra Supreme is also available in 200 mesh - with the physical differences common to a 200 mesh talc. Specifications will be furnished on request.

TABLE I
CHEMICAL ANALYSIS

<u>Constituent</u>	<u>Italian</u>	<u>French</u>	<u>North Carolina</u>	<u>Sierra Supreme U.S.P.</u>
Moisture loss at 105° C.	0.08%	0.06%	0.04%	0.10%
Chemically combined water	5.00	5.56	5.71	5.30
Carbon Dioxide CO ₂	1.12	0.32	0.85	0.27
Silica SiO ₂	58.65	58.55	56.47	58.70
Alumina Al ₂ O ₃	2.10	2.70	2.88	2.33
Iron Oxide Fe ₂ O ₃	0.79	0.72	2.33	1.05
Titania TiO ₂	Trace	None	None	None
Manganese Oxide MnO ₂	0.0025	None	None	0.0017
Lime CaO	0.14	0.14	0.52	0.03
Magnesia MgO	31.25	32.15	31.67	31.80
Soda Na ₂ O	0.17	0.17	0.19	0.21
Potash K ₂ O	0.05	0.06	0.07	0.07
Total	99.35	100.43	100.73	99.86

TABLE II
U.S.P. XIII DETERMINATIONS

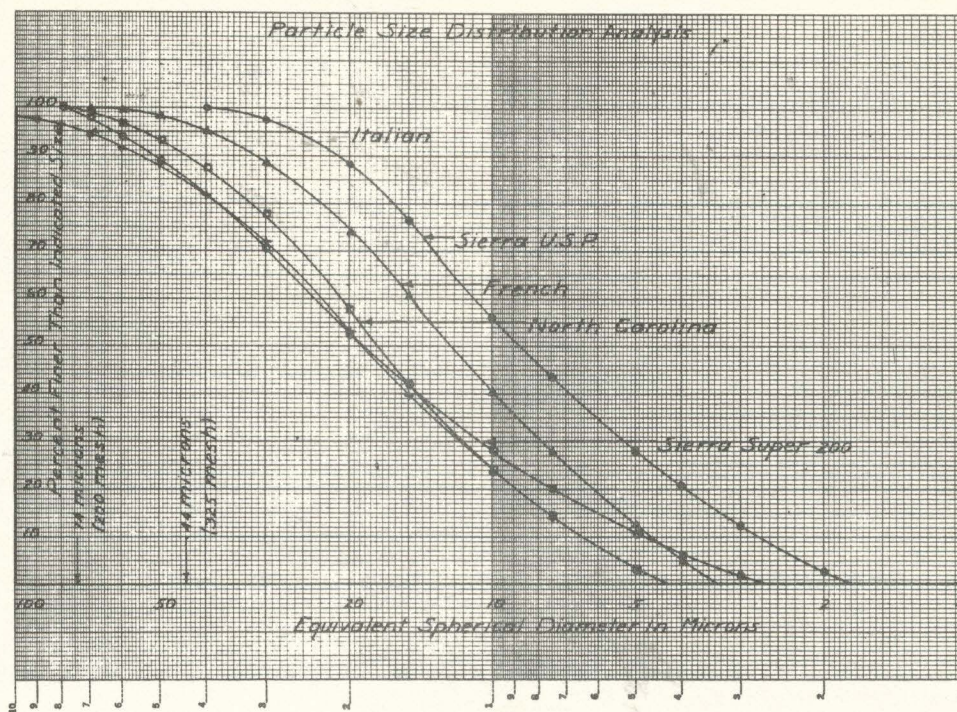
	<u>U.S.P. XIII Requirement</u>	<u>Italian</u>	<u>French</u>	<u>North Carolina</u>	<u>Sierra Supreme U.S.P.</u>
Loss on ignition (1 hr. at 850° C)	5.00% Max.	3.53%	2.69%	2.97%	3.12%
Acid soluble substances	10.00 mg. Max.	21.0 mg.	6.5 mg.	12.7 mg.	7.9 mg.
Water soluble substances	5.00 mg. Max.	2.8 mg.	3.6 mg.	4.0 mg.	3.2 mg.
Reaction to litmus	Neutral	Neutral	Neutral	Neutral	Neutral
Water soluble iron	None	None	None	None	None

TABLE III
PHYSICAL CHARACTERISTICS

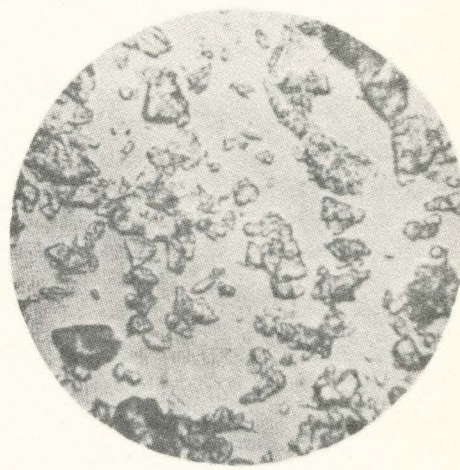
	<u>Italian</u>	<u>French</u>	<u>North Carolina</u>	<u>Sierra Supreme</u> <u>U. S. P.</u>
Specific Gravity	2.78	2.76	2.78	2.76
Screen analysis	99.95/100 98.70/200 88.6/325	99.8/200 97.0/325	99.6/200 94.6/325	99.9/325
Acid solubles as CaO	1.43%	0.45%	1.08%	0.34%
Milled color	97.5	98	98	99
Bulking lbs/ft ³ Scott Volumeter	24.70	25.77	21.73	19.45
Slip	Excellent	Very Good	Excellent	Very Good
Grit (bite test)	Gritty	Slight Grit	Slight Grit	No Grit
pH Value (1 to 5 dilution)	9.1	8.69	8.63	9.37
Grit Decantation Residue (Weight %)	6.15	4.15	5.20	0.15

TABLE IV
PARTICLE SIZE DISTRIBUTION ANALYSES

	Percent Finer Than Indicated Size			
<u>Equivalent Spherical</u> <u>Diameter in Microns</u>	<u>Italian</u>	<u>French</u>	<u>North Carolina</u>	<u>Sierra Supreme</u> <u>U. S. P.</u>
200	100	100	100	100
100	98.0	100	100	100
90	97.3	100	100	100
80	95.9	100	100	100
70	94.0	99.6	99.1	100
60	91.4	99.1	96.7	100
50	88.3	98.3	93.4	100
40	82.0	95.0	87.8	100
30	72.0	89.0	78.0	97.6
20	52.9	73.9	58.0	88.3
15	39.5	60.4	42.0	76.5
10	23.4	40.3	23.4	56.1
7.5	14.0	27.9	14.0	43.7
5	3.6	12.6	3.6	28.5
4	0	5.0	0	21.0
3	0	0	0	12.5
2	0	0	0	2.7
1	0	0	0	0



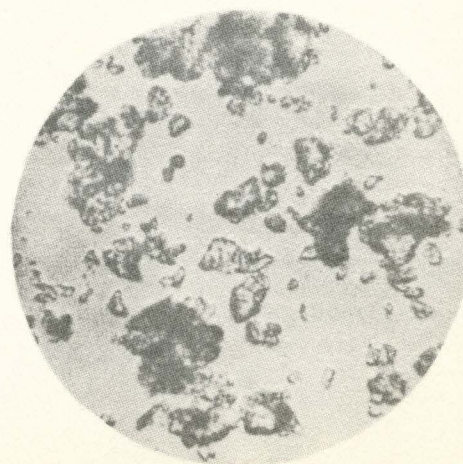
ITALIAN



FRENCH



NORTH CAROLINA



SIERRA SUPREME U.S.P.

GENERAL
HEADING: COSMETICS



SIERRA TALC &
CLAY COMPANY

5509 RANDOLPH STREET
LOS ANGELES 22, CALIF.

UNIT NO. COS-6 REPLACES NO. COS-5

Subject: REPRESENTATIVE SPECIFICATIONS
ON SIERRA COSMETIC TALCS

December 15, 1948

Grade	ACID SOLUBLE SUBSTANCES			APPARENT DENSITY		Slip ⁶ Rating	Grit ⁷ Residue (%)	Milled Color ⁸
	TGA ¹ (%)	USP ² (mg)	Sierra ³ (%)	Scott ⁴ (lbs/ft ³)	TGA ⁵ (lbs/ft ³)			
Sierra White 200	13.37	73.5	7.30	27.50	52.10	F	10.90	91
Sierra Snow	3.94	26.2	1.94	28.00	52.10	G	1.83	96
Sierra Cloud	3.60	23.4	1.94	27.45	50.90	G	1.03	96
Trinity Super	2.80	18.0	0.98	25.60	50.90	X	2.09	98
Trinity Superfine	2.91	17.0	0.98	23.00	45.50	X	0.61	98
Sierra Vapor	2.80	17.7	0.60	21.50	37.80	F	0.54	96
Sierra Supreme 200	2.66	15.7	0.84	26.80	54.30	E	0.81	98
Sierra Supreme 325	0.94	8.0	0.50	19.45	38.40	E	0.15	98
Sierra Supreme USP ⁹	0.94	8.0	0.35	19.45	38.40	E	0.15	98

NOTES

- (1) Tested in accordance with the Toilet Goods Association Specification No. 10, Method No. 11. Issued June 1, 1942.
- (2) United States Pharmacopoeia XIII.
- (3) Sierra Talc & Clay Co. Method: Boil 1 gm talc with 50 ml N/10 H₂SO₄ for one minute. Titrate while hot with N/10 NaOH using phenolphthalein indicator. 50 minus NaOH titer multiplied by 0.281 equals percent acid soluble substances calculated as CaO.
- (4) Scott Volumeter bulking of the "fluffed" materials as lbs/ft³.
- (5) Toilet Goods Association Specification No. 10, Method No. 12, reported as lbs. per cu. ft. For grams per milliliter divide by 62.43.
- (6) Key: E - excellent; X - extra good; G - good; F - Fair.
- (7) Figures shown represent the percent mineralogical constituents, determined petrographically, having a Mohs hardness greater than that of talc, in the decantation residue.
- (8) Diffuse reflectance of a smooth plane surface of the powdered material. Measured using a Pfaltz & Bauer Universal Reflectometer and freshly prepared MgO as standard of 100 percent reflectance.

- (9) This material is manufactured, tested, and certified to meet all the requirements of USP XIII. See Bulletin COS-4 "Sierra Supreme USP" for detailed description.

The reader is referred to Bulletin AN-2, dated August 20, 1948, for complete chemical analyses, and to Bulletin GEN-47, dated October 1, 1948, for particle size distribution analyses of all of the above-mentioned talcs.

RECOMMENDATIONS

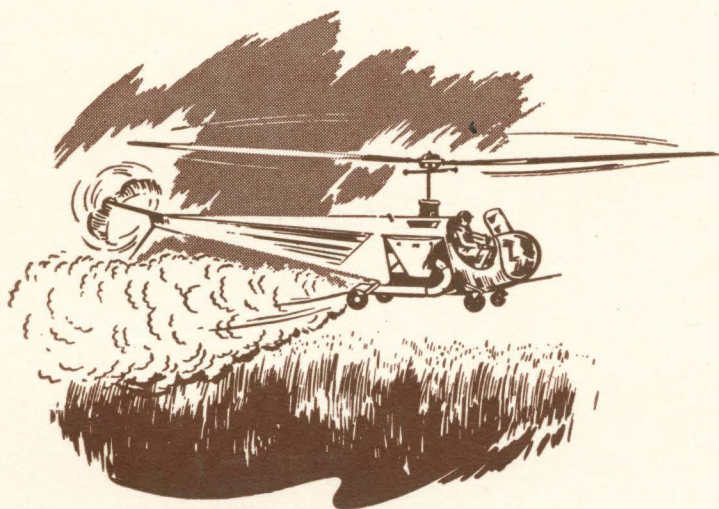
- | | |
|--------------------|--|
| SIERRA WHITE | - For economy grade dusting powders. |
| SIERRA SNOW | - Formerly sold also as TRINITY COSMETIC 200. For economy grade dusting powders. |
| SIERRA CLOUD | - Formerly sold also as TRINITY COSMETIC 325. For economy grade face and dusting powders. |
| TRINITY SUPER | - Formerly sold as SIERRA SUPER 200. For high grade face and dusting powders. |
| TRINITY SUPERFINE | - Formerly sold as SIERRA SUPER 325. For high grade face and dusting powders. |
| SIERRA VAPOR | - For high bulking, low lime powders and pharmaceuticals. |
| SIERRA SUPREME 200 | - For low bulking, dust free face powders. |
| SIERRA SUPREME 325 | - For grit free, high bulking, extra white, low lime powders. |
| SIERRA SUPREME USP | - For all pharmaceutical purposes, tablets, baby powders, foot powders, anti-irritants, etc. |

SIERRA INSECTICIDE CARRIERS

When selecting an insecticide carrier, great consideration must be given to the property of fully releasing the killer when applied to vegetation. Many non-metallic minerals are utilized for the purpose of acting as a diluent or carrier in the preparation or manufacture of insecticides.

Since each killer has its own peculiar physical and chemical characteristics, a carrier must be used which is compatible, mixes easily, and gives the most efficient coverage of vegetation.

Sierra Talc and Clay Company has made an intensive study of these varied requirements and now produces several different types of carriers, each of which, because of its own peculiar characteristics, is especially adapted to the manufacture of a particular type of insecticide.



SIERRACAL PYROTALC

High alumina talc . . . low acid-solubles . . . free flowing . . . non-abrasive . . . good adhesion. Excellent for airplane dusting.

SIERRA WHITE TALC

Free flowing characteristics . . . medium acid-solubles . . . Excellent for alkaline killers.

INCA CLAY

Neutral clay - Montmorillite type (pH 6.0-7.0) . . . very highly absorbent . . . excellent for concentrates.

MARTER WHITE

An aluminum Silicate . . . low acid-solubles . . . fine particle size . . . excellent for sprays.

SIERRA

TALC and
CLAY
COMPANY

5509 RANDOLPH STREET, LOS ANGELES 22, CALIFORNIA



July 9, 1948

UNIT NO.

INS-2

REPLACES NO.

INS-1

TECHNICAL DESCRIPTION

Subject:

Many non-metallic minerals are utilized as diluents or carriers in the preparation of insecticides. Each killer has its own peculiar physical and chemical characteristics and the carrier which is compatible, mixes easily and gives the most efficient coverage of vegetation should be selected for the job. Consideration must be given to the carrier which most fully releases the killer when it reaches the vegetation.

Sierra Talc & Clay Company produces several different types of carriers, each of which has its own particular characteristics. The following materials are being used by insecticide manufacturers:

Sierra Pyrotalc
Sierra White Talc
Marter-white
Inca Clay

TEST METHODS

Data on these diluents was obtained by identical methods which are used in control work in our laboratories. A brief description of several of these tests is given.

ACID SOLUBLES MATERIAL: Boil 1 gm. of talc with 50 cc. of 1/10 N Sulfuric Acid and about 50 cc. of distilled water. Then titrate to a faint pink with 1/10 N Sodium Hydroxide using a few drops of phenolphthalein as indicator. The difference between the volume of acid and the required volume of Sodium Hydroxide multiplied by 0.28 equals the % of acid soluble substances calculated as CaO.

OIL ABSORPTION is reported as milliliters (ml) of oil absorbed by 20 grams of talc or clay by the drop method.

APPARENT DENSITY is determined by two methods:

1. Scott Volumeter Method is a method of determining the fluffed up volume of the material.
2. TGA Method is a method of determining the packed density of the material. It is also known as the STURGES METHOD.

pH VALUE determined by Beckman pH Meter 1 to 5 dilution.

SIERRA PYROTALC

Sierra Pyrotalc is a hydrous magnesium aluminum silicate. This is an unusual material chemically in that it is neither a true talc nor a pyrophyllite. It is an excellent carrier for dusts.

Sierra Pyrotalc has the following characteristics:

1. It is soft and free of grit and will not be abrasive on mixing or dusting equipment.

2. While it is smooth in texture, it is soapy rather than having the dry slip of talc. This property causes it to have excellent adherence to vegetation.
3. Although the pH is high, the percent of acid soluble material is lower than is generally found in talcs.
4. Due to its free flowing characteristics and excellent adherence, it is recommended for airplane dusting.
5. It releases all killers quickly on contact and has been approved for DDT.

Chemical analysis and physical specifications are as follows:

SiO ₂	32.10%	Acid solubles as CaO	1.55%
MgO	30.35	pH Value	9.1
Al ₂ O ₃	22.06	Specific gravity	2.80
CaO	.65	Apparent density lbs/ft. ³	
Fe ₂ O ₃	2.99	Scott Volumeter	27.58
Alkalies K ₂ O)	.15	TGA Method	53.20
Na ₂ O)		Oil absorption	9.3
Moisture at 105° C	.15		
Loss on Ignition	11.48		

Sierra Pyrotalc is milled to a fineness of 99 per cent minus 325 mesh, which produces a particle size distribution as follows:

<u>Equivalent Spherical Diameter in Microns</u>	<u>Percent Finer Than Indicated Size</u>
60	100
50	98
40	93
30	86
20	71
10	36
7.5	22
5	10
2	2
1	1

SIERRA WHITE TALC - IR GRADE

Sierra White is derived from our steatite grades of talc and has the following characteristics:

1. It is soft and should show minimum abrasion on mixing and application equipment.
2. The platey structure promotes good adherence to vegetation.
3. High pH and a rather high percentage of acid solubles material make this an ideal carrier for use with an alkaline killer.

Chemical analysis and physical specifications are as follows:

SiO ₂	51.44%	Acid solubles as CaO	7.91%
MgO	27.72	pH Value	9.2
Al ₂ O ₃	1.92	Specific Gravity	2.80
CaO	8.39	Apparent density lbs./ft. ³	
Fe ₂ O ₃	1.35	Scott Volumeter	28.44
Alkalies K ₂ O)		TGA Method	59.50
Na ₂ O)	.15	Oil Absorption	7.7
H ₂ O 105° C	.20		
Loss on Ignition	9.02		

Sierra White is milled to a fineness of 99.7 percent minus 200 mesh (96.00 percent minus 325 mesh) which produces a particle size distribution as follows:

<u>Equivalent Spherical Diameter in Microns</u>	<u>Percent Finer Than Indicated Size</u>
60	90.5
50	82
40	73.5
30	63
20	49
10	29
5	15
2	6
1	3
0.5	1

MARTER-WHITE

Marter-white is a hydro-thermally altered aluminum silicate. The crude ore has a very fine particle size and breaks down readily in water. Marter-white is a unique product and has exceptional adhesiveness on plant growths. Due to its high oil absorption it may prove advantageous in both dusts and sprays. Although the pH value is high, the acid soluble portion is rather low.

Chemical analysis and physical specifications are as follows:

SiO ₂	71.51%	Acid solubles as CaO	1.93%
Al ₂ O ₃	16.29	pH Value	9.1
Fe ₂ O ₃	2.13	Specific gravity	2.68
CaO	1.08	Apparent density lbs./ft. ³	
MgO	1.03	Scott Volumeter	26.0
MnO ₂	0.01	TGA Method	51.0
Alkalies K ₂ O)		Oil absorption	8.15
Na ₂ O)	0.34		
TiO ₂	0.25		
Moisture 105° C	0.35		
Ignition Loss	2.38		

Marter-white is milled to a fineness of 99.0 percent minus 325 mesh which produces a particle size distribution as follows:

<u>Equivalent Spherical Diameter in Microns</u>	<u>Percent Finer Than Indicated Size</u>
60	98.5
50	97
40	95
30	93
20	87.5
10	68
7.5	56
5	39
4	29.5
3	17
2	0

INCA CLAY

This is a California Fuller's Earth with high absorbent characteristics and a pH value of 6.0 to 7.0. It has the characteristics of absorbing oily insecticides and imparting superior dissemination of the killer throughout the entire dust mass. Inca Clay is particularly adaptable for mixing with killers in the preparation of concentrates which are then extended by use of other common carriers or diluents. It may also be used to advantage in the preparation of wettable dusts and in other cases where an absorbing agent is required.

Chemical analysis and physical specifications are as follows:

SiO ₂	55.15%	pH Value	6.0-7.0%
Al ₂ O ₃	11.87	Specific gravity	2.33
Fe ₂ O ₃	6.45	Apparent density lbs./ft. ³	
CaO	0.11	Scott Volumeter	21.85
TiO ₂	0.39	TGA Method	35.50
MgO	2.78	Oil absorption	19.9
MnO ₂	0.17	Screen: 99 percent minus 200 mesh	
Na ₂ O	1.61		
K ₂ O	0.45		
H ₂ O 105° C	13.81		
Loss on ignition	8.09		

SIERRA

ALUMINUM SILICATES

SIERRA PRODUCES
ALUMINUM SILICATES
FOR USE IN THE
MANUFACTURE OF
THESE PRODUCTS

Paint

Insecticides

Battery Boxes

Phonograph Records

Paper Products

Asphaltic Products

Rubber

Plastics

Linoleum

Abrasives

The greatly increased demand by industry for non-metallic minerals has led Sierra to explore this field, with the result that a number of large deposits are being worked. As a result Sierra is now providing a more complete non-metallic service by the production of several aluminum silicates.

A large deposit of many thousands of tons of aluminum silicates has been opened in the Mojave Desert. These are now being processed by Sierra, for use in a wide variety of products. Principal uses for Sierra's aluminum silicates are listed on this page at the left.

SIERRA

**TALC and
CLAY
COMPANY**

5509 RANDOLPH STREET, LOS ANGELES 22, CALIFORNIA



UNIT NO. ALS-6 REPLACES NO ALS-1, 2 & 4

Subject: ANALYTICAL AND DESCRIPTIVE DATA

June 13, 1949

Sierrasil is a white, soft, hydro-thermally altered aluminum silicate and is recommended where low iron, low manganese, low oil absorption, and a relatively grit-free product is called for. Chemical analysis and representative physical tests are as follows:

CHEMICAL ANALYSIS

Moisture loss at 105° C.	1.24%	Titania, TiO ₂	0.15%
Chemically combined water, H ₂ O	8.54	Manganese oxide, MnO ₂	0.0014
Carbon dioxide, CO ₂	0.35	Lime, CaO	1.25
Sulfur trioxide, SO ₃	1.14	Magnesia, MgO	0.46
Silica, SiO ₂	64.52	Soda, Na ₂ O	0.72
Alumina, Al ₂ O ₃	22.02	Potash, K ₂ O	0.93
Iron oxide, Fe ₂ O ₃	0.33	TOTAL	100.40

Sierrasil is produced in three grades differing only in fineness of grind:

Sierrasil 96 - 96% through 200 mesh
Sierrasil X - 98-99% through 325 mesh
Sierrasil XXX - 99.6-99.8% through 325 mesh

MISCELLANEOUS CHEMICAL AND PHYSICAL PROPERTIES

Acid solubles as CaO	0.45%	Specific gravity	2.57
Milled product color	95	pH (1 to 5 dilution)	8.0
Color in oil	Light grey		

Sierrasil 96 is recommended for use as a white-firing ceramic clay for pottery and tile.

Sierrasil X and Sierrasil XX find application in the following industries where a neutral inert material is desired as a filler:

Abrasive wheels	Insecticides	Oil well drilling	Putty
Asphaltic products	Linoleum	Paint	Roofing
Cleaning compounds	Mastic compounds	Paper	Rubber
Floor finishing	Metal polish	Plastics	Soap

CONCLUSIONS

Sierrasil is recommended wherever an alkaline mineral filler is called for. It has exceptional adhesiveness and good absorption characteristics as well as superior suspension characteristics.

It does not break down in asphaltic compounds under heat. It imparts good mixing characteristics and good tensile and elongation strength to rubber and is equally good for both natural and synthetic rubbers. It adds hardness to paint films. Its superior adhesiveness recommends it to insecticides. It is a neutral and strengthening mineral when used in plastics. Its slight abrasiveness is of value in the milder adhesives.



UNIT NO. ALS-7

REPLACES NO.

Subject: TECHNICAL DATA AND COMPARISON WITH
COMPETITIVE ALUMINUM SILICATE

July 12, 1949

	SIERRASIL X	SIERRASIL XXX	SIERRASIL 96	SIERRASIL V	COMPETITIVE ALUMINUM SILICATE
Acid Solubles as CaO	0.31%	0.45%	0.28%	3.53%	1.69%
Iron Content as Fe ₂ O ₃	0.27%	0.33%	0.48%	2.03%	2.89%
Manganese as MnO	0.004%	0.0014%	0.004%	0.04%	0.05%
Color, Reflectometer	94	95	94	78	89
Screen Analysis, %/325	98-99	99.3-99.7	-	99.7	98-99
Screen Analysis, %/200	-	-	95-98	-	-
Surface Mean Diameter					
Microns	3.86	4.50	5.30	4.73	3.50
@ Indicated Porosity	0.479	0.500	0.468	0.526	0.546
Oil Absorption					
Gardner-Coleman, ml/20 gm	6.70	7.15	6.70	6.40	8.15
Spatula Rub-out, lbs/100 lbs	28.0	31.2	27.8	27.2	34.0
Consistency (g. 100 rev/30 sec) 50% Suspension @ 25° C.	158	194	139	120	155

NOTE: Lower iron means better color dry and in oil.

Lower manganese means reduced oxidizing effect in hard rubber storage battery boxes.

Lower oil absorption means less oil used in production of paint products such as floor fillers, putty, sealers, etc., and less gums used in records, asphaltic products, and rubber.

GENERAL
HEADING:

TEXTILE TALC



SIERRA TALC &
CLAY COMPANY

5509 RANDOLPH STREET
LOS ANGELES 22, CALIF.

UNIT NO.

TEX-1

REPLACES NO.

Subject:

SIERRA SPECIAL TEXTILE TALC

March 10, 1949

Sierra Special Textile Talc is used as a filler or sizing material in combination with starch and other ingredients for what is known as "the back-filling of cotton". The starch solution with the talc added is made up hot and applied to the cotton goods by means of running the textiles through and between two rollers, one of which picks up the sizing or filling material in solution and applies it to the back of the cotton goods. The material is then run through driers that dry the material at which time the filling material is no longer visible. The net effect is to fill the pores in the more loosely woven types of cotton goods, so that extra weight and body is given to the cotton goods. In the case of printed cotton goods in colors, this being applied to the back leaves the front of the cotton goods with the printed finish in good condition. In the case of plain goods or colored goods, not of the printed design type, a heavier coating is often applied. The type of filler or size added depends upon the percentage of the filler that the textile mill wants to get into the cotton goods and the type of finish of the goods. A formula for preparing a cotton filling size will vary according to the type of textile that they want to produce, but we quote the following as a representative formula for a filling mixture:

Thick boiling starch (corn preferred)	100 lbs.
Finishing oil (a mixture of sulfonated 18% cocoanut oil, Triethylolomine and white spindle oil)	12 qts.
Paraffine wax, melted	1 gal.
Talc	250 lbs.

The starch is first heated with the finishing oil and then the paraffine wax added, after which the talc is added. The whole thing is cooked at a sufficient temperature to bring the starch up to a body and incorporate all the ingredients. Then the material is ready for use as above outlined.

The principal requirement for a talc in this formula is one that is soft and free of grit. Our talcs are produced to yield not over 1% of grit. The reason for the requirements on grit content rather than on chemical analysis is based on the fact that after the cotton goods are filled and are sent to the textile mill, they have to be cut with knives or scissors and sewed. In the process of making clothes or other textile goods out of the finished cotton, if the filling mixture contains abrasive material, there is wear and tear on the cutting knives and heating up of the needles due to friction. This causes more trouble than anything else in the textile mill. Our talc is designed to give good filling characteristics, good color, and freedom from abrasiveness.

This talc has been sold for years to leading textile mills in the United States. Our business with the textile mills is the development of years of work with them. We are recognized as the leading supplier of textile talcs in the United States.

GENERAL
HEADING:

WHITING



SIERRA TALC &
CLAY COMPANY

5509 RANDOLPH STREET
LOS ANGELES 22, CALIF.

UNIT NO.

WH-1

REPLACES NO.

Subject:

DESCRIPTION AND TECHNICAL INFORMATION
SIERRACAL APEX WHITING

February 16, 1949

SIERRACAL APEX is Sierra's trade name for a new whiting (calcium carbonate) mined from extensive deposits in Nevada and processed in Los Angeles.

SIERRACAL APEX differs from most other western whittings in that it is of sedimentary origin (semi-amorphous), of fine grain size and uniformity of particle shape, more nearly similar to the extensive limestone deposits of the Middle West.

Most of the other whittings produced in California are of the recrystallized type having a distinct rhombohedral crystal structure, characterized by sharp edges and distinct crystal shapes, whereas SIERRACAL APEX has a particle structure free of jagged crystalline edges and distinctly amorphous in appearance.

The recrystallized calcium carbonate whittings have a tendency to agglomerate in a rubber, shellac, or resin compound and to make for difficult milling in either an open or banbury type mixer.

SIERRACAL APEX permits quicker and more thorough mixing, tends to eliminate agglomerates, and due to its non-crystalline structure tends to yield smoother batches in rubber and less surface noise and die wear in records.

SIERRACAL APEX is produced in two grades - APEX 95 and APEX 98 - differing only in fineness. Chemical and physical characteristics in comparison with the recrystallized whiting are listed below:

CHEMICAL ANALYSIS

	<u>APEX</u>	<u>RECRYSTALLIZED WHITING</u>
Silica, SiO_2	0.51%	0.24%
Alumina, Al_2O_3	0.99	0.37
Iron, Fe_2O_3	0.10	0.06
Calcium Oxide, CaO	54.68	55.18
Magnesia, MgO	0.24	0.09
Alkalies, Na_2O and K_2O	0.03	0.06
Moisture at 105°C .	0.04	0.02
Ignition Loss	42.99	43.39
Purity as CaCO_3	97.67	98.57

PHYSICAL CHARACTERISTICS

	<u>APEX 95</u>	<u>APEX 98</u>	<u>RECRYSTALLIZED WHITING</u>	
			<u>B-200</u>	<u>AAA</u>
Screen analysis	95-96%/325	99.5-99.8/325	95-96/325	99.5-99.8/325
Surface mean diameter (dm) by air permeability	6.42	4.99	7.59	6.35
Oil absorption (Gardner Coleman) ml/20 gm.	4.5-4.8	4.5-4.8	4.8-5.0	5.0-5.3
Color	88	88	98	98

PARTICLE SIZE DISTRIBUTION

EQUIVALENT SPHERICAL DIAMETER IN MICRONS	PERCENT FINER THAN INDICATED SIZE			
	APEX 95	APEX 98	RECRYSTALLIZED TYPE	
			95-96/325 B-200	99.5-99.8/325 AAA
80	99.7	100	100	100
70	99	100	98.7	100
60	98	100	96	100
50	95.5	100	90	100
40	90.5	99	80.5	100
30	82	95	66	90
20	69	84	47	67
15	60	72	37	51
10	46.5	56	26	34.5
7.5	35.5	44	20	25.5
5	20	27	13.5	17
2	5.5	7.5	5.7	7
1	2.9	4.4	2.9	3.5
0.75	2.0	3.0	2.0	2.5
0.50	0.9	1.0	1.0	1.1
0.40	0.0	0.0	0.0	0.0

COMMENTS

Comparison of the particle size distribution of the two different types of whiting ground to an equivalent fineness indicate that the tendency of SIERRACAL APEX to prevent agglomeration is not due to its particle size but rather to its physical structure and particle shape.

MEMO

DATE: January 14, 1987

TO: Lab Capital Outlay File

FROM: John B.

SUBJECT: XRD

On January 14, Gary Baxter, Ron Geitgey, Jerry Gray, Mark Ferns, Don Hull and I met to discuss the purchase of an XRD. The decision was made to make the purchase. This memo summarizes major points that arose in the discussion.

In a worst case scenario, part of a person will be required from existing staff to be involved with sample prep, running of the machine and interpretation of data. If this part of a person is a shared part coming from many projects, then no one individual will be affected to the extent that his geologic identity is distorted. The idea however, is to have the operation of the machine and the sample prep under the guidance of lab staff so that proper evolution of the laboratory into the future is not hindered.

Gary indicated that his workload involving paper work, nonmetallic analyses and sample prep, some metallic sample prep and curation etc. is an overload situation at the present time. He will not be available to easily give $\frac{1}{4}$ to $\frac{1}{2}$ of his time to the operation of a new piece of equipment. This underscores the need for proper consideration of staffing in programming equipment into the Department operation.

A properly staffed XRD will be a benefit to the Department because it will allow more strategic sample collection in the field, more thorough analysis of samples in the lab and better quality control.

In deciding to move ahead on the purchase, we are saying all of the minor decisions leading to the purchase should be moved on in an expeditious fashion. Thus, any bidding requirements should be met as soon as possible. Ron should travel to the location of the XRD to field test and kick the tires and we should be developing warranty language or concepts that we feel are appropriate and justified within the industry. It does sound that we have a trustworthy person peddling the instrument, but we do need written legal assurances in terms of a warranty. I have spoken to John Nielsen about securing additional floor space in this building for storage of delivered lab equipment.

JDB:ab

State of Oregon
DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES
Branch Office
239 S.E. "H" Street
Grants Pass, Oregon

Oct. 7, 1963

To: Ralph

From: Len

Mr. Wm. LaFaunce has been quarrying and selling small quantities of soapstone through his new art store in Medford. He has been getting most of it from a claim in sec. 8, T. 41 S., R. 5 W. on the head of Steve's Fork but is actively lining up new sources. He expects the demand to increase.

LR:amj

RECEIVED
OCT 8 1963

STATE DEPT. OF GEOLOGY
& MINERAL INDS.

Sincerely,


Len

State of Oregon
DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES
Branch Office
239 S.E. "H" Street
Grants Pass, Oregon
January 3, 1964

RECEIVED
JAN 6 1964
STATE DEPT. OF GEOLOGY
& MINERAL INDS.

To: Ralph
From: Len

Mr L. A. Bratcher of Ashland sent out a few samples of soapstone to prospective buyers and recently got a telephone request to quote a price on his bulk product f.o.b. rail car, Ashland. The request was from the Industrial Minerals and Chemical Co., Berkley, California. They said that his product (sample) was superior to that which they were grinding (according to what Bratcher told me over the phone). Anyway Bratch wanted me to advise him as to what kind of a price to quote to them. I told him over the phone that I thot bulk "soapstone" sold for about 10 dollars a s.t. f.o.b. cars, but that I'd see if I could come up with a more accurate figure.

My hope was that perhaps you could get some firsthand info from one of the Portland talc grinders as to what they have to pay. Any ideas you may have on this will be appreciated. Best regards & happy 1964.

Sincerely



Called Len 1-6-64

MEMO

DATE: August 21, 1986

TO: Len Ramp and Mark Ferns

FROM: Don H.

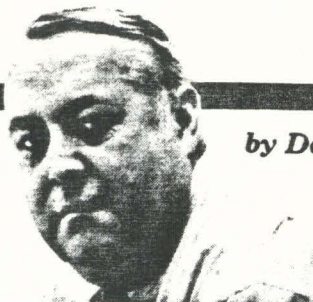
SUBJECT: Talc Project

The enclosed editorial describes the recent OSHA decision to establish regulations for tremolite and actinolite. For this reason it will be especially important to examine the mineralogy of talc deposits in Oregon in detail.

DAH:ab

CC: John B.





by Don Michard

RECEIVED - PTLD

JUN 21 1986

DEPT. OF GEOLOGY

OSHA surprise threatens hard rock aggregate producers

On June 20, 1986, the Occupational Safety and Health Administration surprised the crushed stone industry by issuing a standard entitled "Occupational Exposure to Tremolite and Actinolite." This standard, scheduled to become effective July 21, 1986, would regulate tremolite and actinolite as stringently as asbestos.

Those substances are present, in trace amounts, in hard rock deposits, such as granite and trap rock. These represent nearly 25% of the domestic crushed stone production, and are the predominant aggregate materials found in most of the eastern seaboard states, Minnesota, and Wisconsin.

In a letter to Asst. Secretary of Labor John Pendergrass, Robert Bartlett, President of the National Stone Assn., said: "Trace amounts of tremolite and actinolite, in their nonasbestiform state, are ubiquitous in hard rock deposits. This fact will be of concern to vast numbers of construction firms whose projects involve work with construction aggregates. Some construction firms will be subject to the new OSHA exposure standards for tremolite and actinolite, and they will be able to comply only by conducting expensive, time consuming monitoring (which presently may not be technologically feasible) or by obtaining appropriate certificates from construction aggregates producers. . . . The new exposure hazard has the unintended effect of impeding the use of crushed granite and crushed traprock as construction aggregates."

Reacting quickly, the National Stone Assn. requested that OSHA stay the application of the standard, and also filed an affidavit with the Second Circuit Court of Appeals, requesting a stay.

These developments took place as this edition of *Pit & Quarry* was in final production stages, before the matter was resolved. At this time, we cannot report whether the standard has been suspended. However, readers should take note of the fact that OSHA committed two errors, in our opinion, in its handling of this new standard. (OSHA does not directly regulate crushed stone producers, however, it does regulate the activities of contractors, ready-mixed concrete producers, and others who buy industry products. A regulation that affects the customer also affects the producer.)

First, the suspect materials—tremolite and actinolite—need not be regulated as stringently as asbestos, based on current evidence. And second, OSHA did not offer the opportunity for public comment before releasing the proposed standard.

OSHA did not look into the feasibility of compliance by

those who use crushed stone materials affected. Furthermore, OSHA's rulemaking record does not contain evidence justifying the imposition of a 0.2 fiber/cc standard for nonasbestiform tremolite and actinolite in the crushed stone and user industries. There is no reason to suspect that employees face a significant health risk as a result of exposure to trace amounts of nonasbestiform tremolite and actinolite that occur in certain types of stone.

The crushed stone industry was unaware that such a standard was forthcoming. In fact, two years ago, OSHA publicly stated its intention to eliminate nonasbestiform materials from its asbestos related standard, which was being drafted at the time. As a result, the National Stone Assn., and other affected groups, did not file public comments on the 1984 OSHA proposal to revise the asbestos standard. Quite properly, they believed there was no need to comment, and turned their attention to other matters.

Now, two years later, OSHA has changed its tune, by including the non-hazardous materials in the standard, and threatening a large percentage of domestic aggregate production with an unwieldy, expensive regulation. Enforcement of the standard could prove disruptive to the use of graded hard rock as a raw material in many commercial applications, in addition to construction.

Part of President Bartlett's letter to the Labor Department states: "Given that OSHA did not announce that it intended to regulate nonasbestiform tremolite, antophyllite, and actinolite, the National Stone Association (and others adversely affected by the expansion of the regulation) should have the right to be heard by OSHA on this matter of major concern and impact to the industry."

Since its formation about 15 years ago, OSHA has been the subject of many a controversy. Still, its overall impact has been a positive one and the American workplace has become safer as a result of the properly motivated efforts of OSHA. However, there have also been abuses—represented by the tremolite/actinolite exposure standard.

Today a major segment of the crushed stone industry faces severe problems because of an ill-conceived OSHA standard, that was dropped into the industry's lap like a bombshell.

Hopefully, by the time this edition is circulated, the standard will be suspended, and OSHA can develop a more realistic occupational exposure standard that covers genuine hazardous substances, and does not disrupt businesses that rely on the availability of crushed stone products.

Date

ROUTING AND TRANSMITTAL SLIP

TO: (Name, office symbol, room number, building, Agency/Post)	Initials	Date
1. LEN RAMP		
2.		
3.		
4.		
5.		

Action	File	Note and Return
Approval	For Clearance	Per Conversation
As Requested	For Correction	Prepare Reply
Circulate	For Your Information	See Me
Comment	Investigate	Signature
Coordination	Justify	

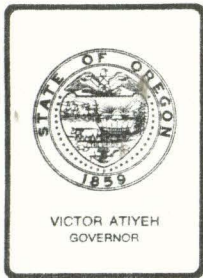
REMARKS

I've put out the word to a few people on the district to get maps to me on known talk deposits. I hope I'll be able to send more data to you in the future.

G. Capra

DO NOT use this form as a RECORD of approvals, concurrences, disposals, clearances, and similar actions

FROM: (Name, org. symbol, Agency/Post)	Room No.—Bldg.
	Phone No.



Len Grants Pass

Department of Geology and Mineral Industries
ADMINISTRATIVE OFFICE

910 STATE OFFICE BLDG., 1400 SW 5th AVE., PORTLAND, OR 97201-5528 PHONE (503) 229-5580

INVITATION TO BID

Talc Project

The Department of Geology and Mineral Industries is engaged in a study of the talc deposits within the State of Oregon. About 80 samples will be collected during the 1986 field season. XRD scans will be used as the screening step to determine which samples warrant further testing. Because subsequent tests take considerable time it is imperative that the XRD scans be obtained in a timely manner. Powdered samples will be provided.

The services you are requested to bid on are as follows:

1. Prepare randomly oriented powder pack mounts suitable for the determination of bulk mineralogy via XRD. Provide strip chart recorder scans: 2° to 65° 2θ , 1° 2θ per minute. NO INTERPRETATION IS NECESSARY AS THIS WILL BE DONE BY DEPARTMENT STAFF.

BID: Mounting and XRD Scans.....\$/sample

The bidder will also provide: (a) précis of method of sample mounting to be employed, (b) description of XRD equipment to be used, and (c) estimate of the turn-around-time expected. The bidder must provide information about scheduled shut-down(s) or other factors that would delay return of XRD Scans. (The critical period for this project is October 1986). Samples are to be retained until end of project.

le/word/talc

GB/sf

Gary Baxter
15 Sept 1986

TALC

Text due 1 April 87

Publication deadline

- July 1987

Lab data deadline

- December 1986

Sampling prep & in Aug 1 Sept

- 150 samples in 1986

Characterization Tests (Tentative)

Chemistry*

SiO₂
Al₂O₃
Fe₂O₃
MgO
CaO
Na₂O
K₂O
TiO₂
P₂O₅
MnO
Rb
Sr
Y
Ba
Zr
LOI
pH
10 trace metals

ask George

Physical

Brightness - 150 samples

+ Thin section - 20 samples

XRD - 150 samples

Whiteness - 20 samples

len handle ?

find out industry standards
on whiteness & brightness
from Clifton

* use field office NO₂ AVG-etc
Make do XRD interpret?

*req. for 20 samples

Au - 150 samples

+ Mineralogy



STATE OF OREGON

INTEROFFICE MEMO

TO: Len

DATE: August 21, 1985

FROM: Mark

SUBJECT: Talc Study:

I don't see where I can add much to your outline for the Talc Study. I maybe able to get some microprobe or oxygen isotope data for the larger deposits if we need it.

One of our peer reviewers might be Jack Rice at the University of Oregon. He's a metamorphic petrologist who has done quite a bit of work on talc reactions.

I've run across a couple of small talcose veins while mapping this summer. They are associated with gold veins and completely missing in the literature.

Take care!

August 28, 1985

To: Don & John

From: Len Ramp

Subject: Talc & Soapstone Study

Enclosed is a copy of a rough outline of the proposed talc study and Mark's letter commenting on it.

Please make suggestions to revise and improve the outline.

I have started listing talc occurrences as I remember or get word of any.

So far I have seven listed and haven't done any research.

Len

LR:rep

Encl: 3 pages of outline

Photo copy of Mark's letter

**Table 2. Typical Dry Brightness of
Mineral Pigments**

<u>Pigment</u>	<u>Brightness</u>
Perfect Difuser	= 100
Reflectance Grade BaSO ₄	= 98.5 - 99.5
MgO (fumed)	= 98.0
Titanium Dioxide	= 95 - 98
Zinc Oxide	= 96 - 98
Calcium Carbonate (Syn.)	= 94 - 97
Calcium Carbonate (Nat.)	= 85 - 95
Talc	= 70 - 95
Clays	= 70 - 94
Barytes (bleached)	= 90 - 95
Silica (Syn.)	= 90 - 95
Gypsum	= 80 - 90
Mica	= 70 - 75

MINERAL PIGMENTS - AN OVERVIEW

Kenneth R. Hancock
Easton, Pennsylvania

PREPRINT
NUMBER

85-42



OUTLINE TALC & SOAPSTONE STUDY

Sent Photo
Copy to Don +
John 8/27/85

I Research & Planning Phaze (winter 85-86)

- (a) Gather & review literature on subject
- (b) Review & compile information on known occurrences in Oregon
- (c) Determine laboratory testing requirements
- (d) Select areas for field work

II Field Work Phaze (summer 1986)

- (a) Make preliminary visits to as many occurrences as possible doing reconnaissance sketch mapping, noting geologic relations and preliminary sampling.
- (b) Select areas that may justify more detailed mapping and sampling on basis of availability of time and funding.
- (c) Complete field work
- (d) Do preliminary petrographic work prior to submitting samples for analysis.

III Compile report utilizing data collected. This should probably be a Special Paper about the size of the nickel study entitled "Talc and Soapstone in Oregon".

Report should embody grades, specifications, uses, a description of geologic environment of talc occurrences. Report should probably include small-scale maps of SW and NE Oregon showing ultramafic rocks and noting all known deposits. Individual large-scale maps of deposits may be page size in report or larger fold-up in pocket maps.

IV Cost of Project (Major Items)

Completion date target - May 1987

Starting date - January 1986

Total time involved - 17 months

Field work may be on 10 to 12 occurrences and involve a total of about 40 man-days.

Out of town travel per diem to NE Oregon may involve 10 to 15 days. Mark will do preliminary NE Oregon work. One trip to Montana talc mines of 4 days may be desirable for Len if judged worthwhile.

V Lab work on 20 to 30 samples may be desirable following petrographic work.

Analyses for SiO_2 , MgO , CaO , Fe , Al_2O_3 , K_2O , H_2O (LOI) will probably be required. Au may be present in some talcy shear zones with accompanying sulfides. Other valuable metals such as Pt, cobalt and nickel may also be present.

VI Peer review

Will discuss Peer Review with Mark Ferns. Perhaps someone like Norm Peterson and seek out a U.S. Bu Mines specialist.

VII Potential Markets

Will (May) contact talc grinders in Portland area to run suitability tests of bulk samples from one or more of the better-looking deposits.

VIII Necessary Training

I believe we are or will be adequately trained when necessary research is completed

so that no special training is needed. If any industrial minerals conferences become available where pertinent subject matters is being discussed we should seriously consider attendance.

A look at some of the known talc-carbonate zones should be included and if any potentially large tonnage deposits are found, perhaps the facilities of Albany BuMines Metallurgical Research Center to grind and concentrate by floatation and other techniques should be included. The carbonate residue may even have potential use or contain metal values, e.g., genthite in Cow Creek area.

Other rocks known to contain talc such as talc-chlorite schist, talc-tremolite schist etc., should be checked out where information and time are available.



STATE OF OREGON

INTEROFFICE MEMO

TO: John B.

DATE: April 7, 1986

FROM: Don H.

SUBJECT: Industrial Minerals Marketing

In the months ahead we will need to explore various alternative approaches to marketing of industrial mineral commodities from Oregon mines at both domestic and foreign consuming localities.

As the Port of Portland prepares to develop a new facility for bulk mineral cargo shipments we should intermittently talk to Port officials to share the results of our industrial mineral studies and exchange ideas on possible Port business related to industrial mineral exports. Concurrently, we should evaluate sources of free information, support and guidance from the major railroads serving Oregon.

You should contact the marketing departments in Burlington Northern, Southern Pacific and Union Pacific to share our plans for industrial mineral studies and obtain their guidance on the future direction of our projects. It is entirely possible that one or more railroads would want to participate directly in these investigations.

Please plan to share the preliminary results of discussions with railroads regarding marketing of Oregon minerals at the Governing Board meeting on June 2-3, 1986. We plan to devote a significant portion of the agenda at that time to discussion of industrial mineral opportunities vis-a-vis the economic development of eastern Oregon.

DAH:ab

CC: Jerry Gray
Len Ramp ✓
Howard Brooks



STATE OF OREGON

INTEROFFICE MEMO

TO: Staff

DATE: June 28, 1985

FROM: Howard C. Brooks

SUBJECT: TALC

Mark and I visited the Yellowstone and Treasure Chest talc mines near Ennis and Dillon, Montana on June 13, 1985. General descriptions of the mines are provided in the attached copies of pages from: Berg, Richard B., 1979, Talc and chlorite deposits of Montana: Montana Bureau of Mines and Geology Memoir 45. The following supplements the information provided therein.

Yellowstone Mine: We were taken on a guided tour of the mine by Guy Jeske, Mine Superintendent. He seemed very knowledgeable about the talc business in general as well as the Yellowstone operation and answered all our questions except those about prices received for cosmetic grade material.

At the Yellowstone mine the talc occurs as veins in dolomite. The veins range from less than a millimeter to about 100 feet thick. Most of the rocks in the pit area contains some talc. The talc to dolomite ratio is about 1.5 to 10.

The bulk of production is from rock that runs 30 to 40 percent talc. Rock is graded visually by the shovel operator as it is removed from bench faces. Rock judged to contain less than 30 percent talc is wasted or stockpiled depending on talc content. Rock running 30 percent or more talc is trucked to one of two areas where it is crushed to -6" + 2" and hand sorted. There are two sorting systems, one for low grade and one for high grade. We did not learn the difference between the two grades. The low grade is sorted by pickers removing pieces of talc from the belts. Waste is removed from the belts in the other area. Talc output per day is 300-400 tons from low grade ore and 150 tons from high grade. Because of the picking procedure the product from the low grade ore is higher grade than that from the high grade ore.

The so called "main vein" which is nearly pure talc is 80 to 100 feet wide, about 1000 feet long, and dips about 45°. Drilling has not "bottomed" the vein at depths of 300 feet which at present is considered the economic limit of open pit mining.

Cost of producing lump talc ready for shipment from the mine is \$46 per ton. After grinding the talc is sold for \$150 to \$200 per ton depending on quality.

Presently about 30% of Yellowstone talc is used in making paper. Talc is blended in paper pulp for the purpose of diffusing pitch which if not otherwise treated or removed tends to clot and thereby cause blemishes in the paper. The talc remains as an otherwise inert filler in the paper. Talc from the Yellowstone mine differs from most other talc in that it has nodular rather than platy structure. Because of its nodular structure the Yellowstone talc provides more surface area and therefore can adsorb more pitch than platy talcs. Nodular talc is poorly suited for cosmetics in that it is not as "slick" as the platy talc.

Approximately 150,000 tons of lump talc is recovered and shipped annually from about 3,000,000 tons of material stripped and mined. Presently about 50 percent of the mine product is trucked to Cyprus's mill at Three Forks, Montana where it is ground. Lump talc is also shipped for grinding to mills owned by Cyprus in other areas including Trenton, New Jersey; Alpine, Alabama; Grande Island, Nebraska and Los Angeles, California. Cyprus also owns 60 percent of a mill in Japan.

Jeske said he believes the Yellowstone Mine could continue to operate for 50 years or more. He bases this on past experience which indicates that new ore will be found as reserves are mined. He thinks the potential for reserves in the mine area is greater than elsewhere in the world. Approximately, 2,000,000 tons of minus 2 inch rock averaging 30 to 40 percent talc has been stock-piled and probably will eventually be beneficiated. This is screen undersize material that cannot be hand sorted economically. This type material accumulates continually.

Jeske told us that talc is easily upgraded by flotation and that most of the Vermont production is from flotation of rock containing 30% - 40% talc. Quality of pure talc is graded by brightness or reflectivity. The GEB (General Electric Brightness) scale is generally used by the industry. White is 100 on the GEB scale. Yellowstone talc is 70+. Most of it is near white. Ninety percent of the markets for talc require high brightness. Brightness of some talc can be improved by bleaching with hypochlorite.

Treasure Chest Mine: Our guide at this mine was Tom Reynolds, mine supervisor. He answered our questions about the deposit and how the talc was mined and recovered but provided very little information on the economics of the operation.

At the Treasure Chest mine the talc occurs in two tabular bodies about 125' thick and dipping 30° - 35°. Dip of the talc bodies is with but steeper than the hill slope. Most of the vein material is talc but there is some waste in the form of mixed dolomite and quartz. Some of the ore is hand sorted. Most of the talc is pale green to buff to nearly white. Some is gray to near - black. The darkest gives a near - white streak.

Talc production amounts to about 200,000 tons annually. The stripping ratio is about 17 to 1. Between 19 and 25 people are employed depending on the season. Exploration and development drilling (1 drill, 2 people) is maintained throughout the summer months. The ore is contract hauled but the stripping and mining are done by Pfizer. The talc is crushed, washed and ground at a Pfizer owned plant 8 miles south of Dillon. We did not visit the plant. Approximately 600,000 tons of low grade and screen under-size material has been stockpiled for future beneficiation.

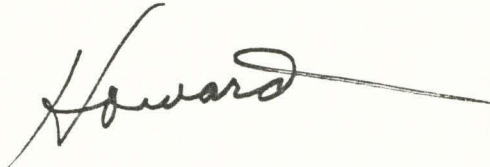
HCB/jd

cc: Don

John B.

Len Ramp ✓

Jerry Gray

A handwritten signature in black ink, appearing to read "Howard", with a long horizontal line extending to the right.

R-9 Treasure mine

Location: N½ sec. 14, T. 7 S., R. 6 W., Madison County. Mine Gulch 7½-minute quadrangle. Approximately 16 miles (26 km) east of Dillon.

Accessibility: The haul road for this mine is along the Left Fork of Stone Creek.

Ownership: Pfizer, Incorporated.

Description: Mining of this deposit began at the openpit Treasure State mine, which was closed when a larger body of talc to the east was mined at the Treasure Chest mine, also an openpit mine. More recently the Treasure State and Treasure Chest ore bodies have been mined from one large pit now known as the Treasure mine, which is an important producer of high-quality talc. Talc mined here is hauled to Pfizer's mill at Barretts siding 8 miles (13 km) south of Dillon, where it is sorted, pulverized and bagged for shipment.

The ore body at the Treasure mine is a tabular body of talc formed by the almost complete replacement of dolomitic marble. Only a few blocks of unreplaced dolomitic marble remain within the talc body. The west-striking layer of talc is cut by numerous high-angle faults that trend northwest. Movement on all of these faults is such that the southwest block has moved up relative to the northeast block. One such fault, known as the Treasure Fault, separates the Treasure Chest ore body to the east from the Treasure State ore body to the west. Seemingly the same talc layer forms both ore bodies but has been offset along the Treasure Fault.

The Treasure Chest ore body ranges in thickness from 30 to 50 meters (96 to 160 ft.), is 360 meters (1,188 ft.) long, and the dip ranges between 45 and 65° N. The Treasure State ore body is reported to range from 20 to 30 meters (66 to 98 ft.) in width where exposed in the pit. It is more than 100 meters (330 ft.) long and dips approximately 45° N.

The hanging wall at the Treasure mine is Dillon Granite Gneiss, and the footwall is garnet-biotite schist. Both the gneiss and schist have been extensively altered, the biotite being altered to chlorite, the plagioclase to white mica. The altered footwall schist presents a problem in slope stability when the overlying steeply inclined layer of talc is removed. Olson reported that in the mid-1960s the waste-to-ore ratio at this mine was 3:1 or 4:1 and that by 1976 it had increased to something on the order of 15:1.

Garihan identified graphite, limonite, chlorite, gypsum(?), apatite and rutile in talc at this mine. Although interesting mineralogically, those minerals do not occur in sufficient concentration to significantly affect the quality of the talc.

Sources of information: Garihan, 1973a, p. 149-156; Olson, 1976, p. 121-125.

R-10 Beaverhead mine

Location: SE¼ sec. 14, T. 7 S., R. 6 W., Madison County. Mine Gulch 7½-minute quadrangle. Approximately 16 miles (26 km) east of Dillon.

Accessibility: The haul road for this mine goes up Cottonwood Creek after branching from the Ruby River road.

Ownership: Cyprus Industrial Minerals.

Description: The Beaverhead mine is situated just across a ridge southeast of the Treasure mine, and the talc body at the Beaverhead mine may be in the same layer of marble as the ore body at the Treasure mine. The strike of the dolomitic marble at the Beaverhead mine is roughly west and the dip is 35 to 70° N. The footwall schist at the Treasure mine is similar to the schist exposed in the hanging wall at the Beaverhead mine, suggesting the possibility that the deposits are on opposite limbs of an isoclinal fold. The footwall at the Beaverhead mine is dolomitic marble, which is underlain by amphibolite. The best talc at the Beaverhead mine is in the upper part of the ore body close to the contact with the overlying biotite schist, which has been severely altered.

The talc body at the Beaverhead mine is at least 800 feet (244 m) long and is offset by relatively minor faults. Olson and Garihan suggested that the talc body pinches out along strike rather than being displaced by faults. The horizontal width of the talc body ranges between 25 and 100 feet (8 and 31 m) where exposed in the mine. Blocks of unreplaced dolomitic marble are numerous within the talc body.

The Beaverhead mine has increased substantially in size in recent years as the result of a major stripping program in 1974 and 1975 and additional stripping in 1976. Because the ore body dips into the hillside, much overburden must be removed as the mine is deepened.

Talc from the Beaverhead mine is hauled to Alder, 25 miles (40 km) to the northeast, where it is

An adit, which is now caved at the portal, may have been driven in search for copper. Some talc is scattered on the dump at this adit. Chalcopyrite and malachite are trace constituents of some of the talc exposed here.

A concordant layer of talc 1.5 to 2 feet (0.4 to 0.6 m) thick, some of which is lava talc, is exposed in two small pits on the east side of the small gully just west of the adit. These pits are situated along the south boundary of sec. 31, T. 8 S., R. 1 W., close to the unconformity between the Precambrian metamorphic rocks and Flathead Quartzite. An additional shallow exploration trench 25 feet (8 m) long exposed additional hard lava talc in the same layer of dolomitic marble.

Talc also is exposed in two shallow cuts in marble on the east side of the small gully just east of the area shown in **Sheet 1-D**. Concordant talc pods 2 to 4 inches (5 to 10 cm) thick are exposed in these cuts. Another poorly defined talcose zone 5 feet (1.5 m) thick is exposed in a small prospect pit north of these cuts toward Cherry Gulch. The chemical analysis of a specimen of unusually hard block talc from this pit is given in **Table 3**. The specimen contains irregular patches of small grains (4 μm) of an opaque mineral and a trace of apatite. Although there are some patches of relatively coarse-grained talc in the specimen, most of the talc grains are about 4 μm across. Some of the lava talc from this prospect has been selectively mined for the carving market.

The presence of bentonite in this small area surrounded by pre-Belt rocks is unusual. Presumably volcanic ash accumulated in a depression or a small pond along the ridge and subsequently was altered to bentonite. The bentonite may be equivalent in age to the Oligocene felsic tuff mapped by Hadley (1969b) 1.7 miles (2.7 km) to the southwest. The mineralogy of the sand-size fraction of this smectite clay shows that it is of volcanic origin and not a result of hydrothermal alteration of metamorphic rocks. Biotite, plagioclase, K-feldspar, quartz, zircon, partly devitrified glass, a zeolite and calcite were identified in the >325 mesh (>44 μm) fraction of six samples of bentonite. None of the pits within the area of the bentonite occurrence exposed bedrock under the bentonite, but the deepest pit is only 15 feet (4.5 m) deep.

GR-3 Yellowstone mine

Location: Sec. 4, T. 9 S., R. 1 W., Madison County. Cameron 15-minute quadrangle. Approximately 13 miles (29 km) south of Ennis.

Accessibility: The Johnny Gulch road is the haul road for the mine.

Ownership: Cyprus Industrial Minerals.

Description: The Yellowstone mine, which is one of the largest talc mines in the United States, is an important producer of high-purity talc. The following description of the geology of the mine is based mainly on the work done by James (1956) and to a lesser extent Perry (1948), Olson (1976) and the author's observations.

Talc occurs in fine-grained dolomitic marble forming pods and layers generally concordant to the layering (relict bedding?) in the marble. Many of the pods are less than 1 foot (0.3 m) thick and are offset along small shears that are similar to those shown in the sketch of a pit face on the Burlington Northern mine (**fig. 21**). James (1956, p. 4) reported talc lenses 70 feet (21 m) or more in length and 35 feet (11 m) thick in the Johnny Gulch area but pointed out that most lenses are much smaller. Because of the small size of most talc bodies at the Yellowstone mine it is impractical to selectively mine pure talc and all of the ore is hand sorted. Talc is picked from waste at a sorter situated at the pit, and the higher-grade ore is sorted at the main facility at Johnny Gulch where the waste is removed from the talc. Ore that is of such low grade that it cannot be hand sorted is stockpiled and will undoubtedly be an important source of talc in the future.

Raw talc from this mine ranges in color from green through pale green and light gray to white. Unlike some of the other talc mines, the Yellowstone mine has no chlorite in association with the talc.

Impetus was given to the development of this mine during World War II because of the presence of block or lava talc here. Lava talc was in demand because it could be machined into objects such as insulators and then fired without cracking. Typical talc, sometimes designated ceramic or cosmetic talc depending on purity, contains many minute fractures and will easily break if subjected to physical or thermal stress. Lava talc, because of its durability, is also in demand by talc carvers, who are particularly interested in material that contains dendritic patterns of black manganese minerals. Most lava talc is white or cream and is not translucent as is the typical pale-green ceramic or cosmetic talc.

James (1956, p. 2) reported that some of the dolomitic marble has been altered to coarse-grained

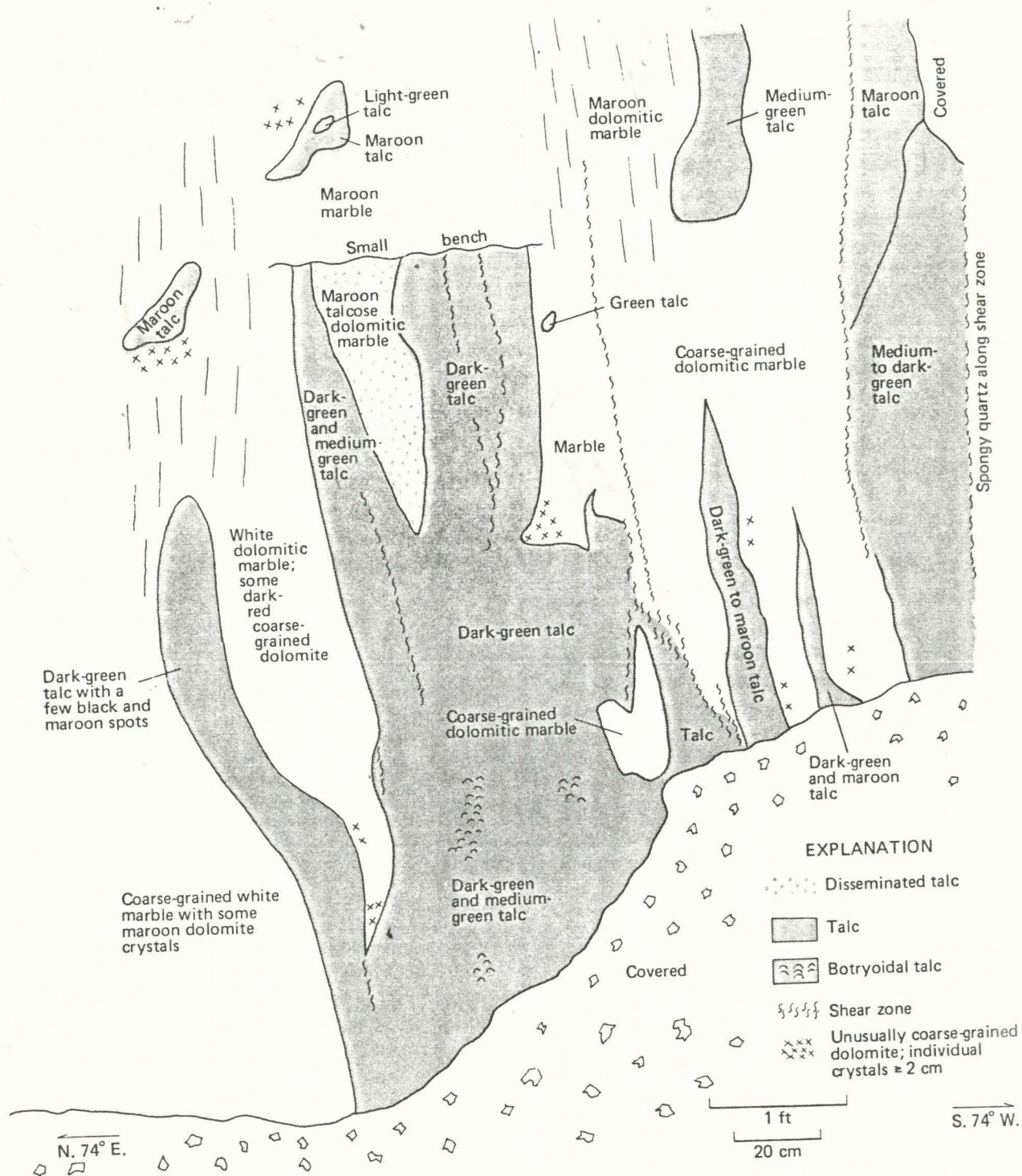


Figure 21—Burlington Northern mine, Gravelly Range. Projection of pit face on a vertical plane perpendicular to layering of the marble (R. B. Berg, September 1976).

siderite (red weathering) and ankerite. Lava talc was mined from a deeply weathered part of a zone of siderite and ankerite in the marble. Because lava talc has been found only near the surface, it presumably formed from typical talc by weathering, but a comparison of a chemical analysis of lava talc and analyses of ceramic talc shows no significant difference (Table 5).

Although lava talc was important in the early development of the Yellowstone mine, essentially all of the production from this mine has been ceramic- or cosmetic-grade talc, which has found a variety of uses from the paper industry to the plastics industry.

The talc in this area was reportedly discovered by Lewis Clark on his homestead in the early part of the twentieth century. Significant development of the property was begun in 1942 when the 240-foot (72-m) Madison Tunnel was driven by the Tri-State Minerals Company and a 75-foot (23-m) shaft was sunk by the U.S. Bureau of Mines. The first shipment of lava talc was made in December 1942 and consisted of 4,000 pounds (1,812 kg). Perry (1948, p. 9) reported that in 1943 and 1944, 127 tons (115 mt) of lava-grade talc was shipped. Sierra Talc acquired the mine in 1948 and began openpit mining of ceramic or cosmetic talc rather than the lava talc. The mine, formerly known as the Mountain Talc mine, was renamed the Yellowstone mine. The choosing of this new name as related by James D. Mulryan, Western Area Production Manager of Cyprus Industrial Minerals, is quoted from Olson (1976, p. 109):

The original name of the Yellowstone Mine was the Mountain Talc Mine. Sierra Talc, largely through my father's efforts, acquired the property in 1948. The mine was renamed the Yellowstone Mine at that time and the story behind this is that Henry Mulryan and Otis Booth, both of Sierra Talc, were driving to Montana to look over the property after having acquired it. One commented to the other that since they had now bought the mine, they ought to figure out some sort of name for it. About that time, there was occasion for a panic-type stop in the car they were driving, and a bottle of Yellowstone whiskey, which had been under the front seat, rolled out and hit the passenger on the foot. They felt that this must have been an omen of some sort, and the mine was named Yellowstone Mine. It is therefore named for the Yellowstone whiskey, in spite of the fact it is only about 50 miles from West Yellowstone, Montana.

In 1964 the Yellowstone mine changed ownership when Cyprus Mines Corporation acquired Sierra Talc. The mine has been a significant producer of high-purity talc and will continue to be a major producer in the foreseeable future.

GR-4 Queen claim

Location: SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 8, T. 9 S., R. 1 W., Madison County. Cameron 15-minute quadrangle. Approximately 19 miles (30 km) south of Ennis.

Accessibility: The mine on this claim is 100 feet (31 m) south of the Johnny Gulch road.

Owner: Cyprus Industrial Minerals.

Description: A small amount of talc has been mined from the eastern end of the northern cuts, where the greatest concentration of talc is now exposed (fig. 22). Although talc is exposed in other cuts, they seem to be exploration cuts. The host rock is fine-grained dolomitic marble exposed at the mine and in outcrops to the west. Pale-green talc at the mine is in conformable layers generally 4 to 10 inches (10 to 25 cm) thick. Some of the talc is of lava grade.

GR-5 Burlington Northern mine

Location: NW $\frac{1}{4}$ sec. 3, T. 9 S., R. 1 W., Madison County. Cameron 15-minute quadrangle. Approximately 18 miles (29 km) south of Ennis.

Accessibility: A short road leads to the prospect from the Johnny Gulch road.

Ownership: Burlington Northern, Incorporated, Energy and Minerals Department.

Description: The description of this deposit was provided by Ed Houser of Burlington Northern, Incorporated. The deposit can be divided into three areas, the northern, central and southern—each showing a predominance of green talc chips in the soil. The best talc is in the central zone, followed by the southern, then the northern. American Chemet removed several thousand tons in the early 60s from a pit in the central zone. A sketch of a pit face is shown in Figure 21.

Talc in the deposit is principally of the light-green variety, but all colors and shades are seen. The host rock generally is slightly siliceous light-tan to light-gray microcrystalline to fine-grained dolomitic marble. Very coarsely crystalline dolomitic marble also occurs on the property, but

TALC

March 9, 1971

Mr. R. T. Gilman
Suite 101
1246 Broughton Street
Vancouver, British Columbia
Canada

Dear Mr. Gilman:

Thank you for your letter inquiring about a shipment of talc from the Port of Portland.

We have checked with the Port and they advise us that the talc originates at a mine in Montana and is the property of the United Sierra Division of Cyprus Mines Corp., 523 W. 6th Street, Los Angeles, California 90014.

Sincerely yours,

Ralph S. Mason
Mining Engineer

RSM:lk

TALC

March 9, 1971

Mr. R. T. Gilman
Suite 101
1246 Broughton Street
Vancouver, British Columbia
Canada

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Sincerely yours,

Ralph S. Mason
Mining Engineer

RSM:lk

R. T. GILMAN
MINING - MINERALS

SUITE 101 - 1246 BROUGHTON ST.,
VANCOUVER 5, B. C.

February 26th. 1971

The Department of Mines,
Portland,
Oregon.

Dear Sirs;

I am informed that a shipment of some eight to twelve thousand tons of Talc Rock is to be shipped by vessel from the port of Portland to Ghent in Europe during March-April.

As I am in need of a large quantity of Talc, in British Columbia, I am taking the liberty of enquiring from you if you know of the origin of this shipment, and would give it to me so that I can communicate with owners of the mine.

RTG/pl

Yours very truly,

R. T. Gilman

609(885-5111)

D

MAR 4 1971

UNITED SIBERIAN
CYPRUS MINES INC

1201 TRINCON N. J. 08608

MINE IN
MONTANA

November 1, 1973

Mrs. Oliver W. Hallam
2900 South 24th Street
Lincoln, Nebraska 68502

Dear Mrs. Hallam:

Thank you for your letter inquiring about talc.

We would like to suggest that John H. Pugh, 2891 Elk Lane, Grants Pass, Oregon 97526, might be able to provide you with a specimen. Mr. Pugh operates a small quarry and sells blocks and pieces of talc ~~for~~ artistic and industrial use.

Sincerely yours,

Ralph S. Mason
Deputy State Geologist

RSM:lk

Mrs. Oliver W. Hallam
2900 South 24th Street
Lincoln, Nebraska 68502

Oct 24, 73

Dept. of Geology and Mineral Resources
466 9 State Office Bldg.
Portland, Oregon 97201 -

RECEIVED
OCT 26 1973

Dear Sirs;

STATE DEPT. OF AGRIC. & FORESTRY
MINERAL IND.

Through the kindness of Russell Smith of the Dept. of Geology, University of Nebraska - I received the information that you might be able to assist me in obtaining a piece of soapstone.

My daughter, who lives in Wisconsin (La Crosse,) sent me a small piece of Carved soapstone for our 40th wedding anniversary this summer and since then I've wanted to have a piece of the mineral to place along side - it is truly beautiful - I would be so grateful for any information - time, postage etc -
Sincerely,
Mrs. Oliver Hallam.

April 30, 1968

Mr. R. R. Porton, President
Sculpture Associates, Ltd.
114 E. 25 Street
New York, N.Y. 10010

Dear Mr. Porton:

Thank you for your letter inquiring about soft stones
suitable for carving.

Here is a list of building stone producers in the State
which may be of interest to you. Most of the volcanic tuffs
are quite soft but harden somewhat upon aging. The Rainbow
Rock in particular possesses the quality of being easily
shaped when quarried but can subsequently be fired and glazed
like any ceramic product. The firing and glazing darken the
rather vivid colors somewhat.

Mr. William La Faunce, 522 North Riverside Avenue,
Medford, Oregon, produces blocks of talc having mixed colors
in sizes from 10 to 100 pounds.

We have not yet assembled a report on building and sculpture
stones in the State but hopefully one will be prepared eventually.

Sincerely yours,

Ralph S. Mason
Mining Engineer

RSM:lk
Encl.

SCULPTVRE ASSOCIATES

Ltd.

April 29, 1968

State of Oregon
Dept. of Geology
and Mineral Industries
Portland, Oregon

Att: Ralph S. Mason

Dear Sir:

In 1960 we wrote to you concerning soft stones for carving, and we were informed that a survey was in process, a report of which would be sent to us.

We hope that we may still be able to have the report and any other pertinent information which has since become available.

Very truly yours,

R R Porton

R. R. Porton, Pres.

RECEIVED
APR 29 1968

DEPARTMENT OF GEOLOGY
& MINERAL IND.

114 E. 25 ST., N.Y., N.Y. 10010

State of Oregon
DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES
Branch Office
239 S.E. "H" Street
Grants Pass, Oregon
January 3, 1964

RECEIVED
JAN 6 1964
STATE DEPT. OF GEOLOGY
& MINERAL INDS.

To: Ralph
From: Len

Mr L. A. Bratcher of Ashland sent out a few samples of soapstone to prospective buyers and recently got a telephone request to quote a price on his bulk product f.o.b. rail car, Ashland. The request was from the Industrial Minerals and Chemical Co., Berkley, California. They said that his product (sample) was superior to that which they were grinding (according to what Bratcher told me over the phone). Anyway Bratch wanted me to advise him as to what kind of a price to quote to them. I told him over the phone that I thot bulk "soapstone" sold for about 10 dollars a s.t. f.o.b. cars, but that I'd see if I could come up with a more accurate figure.

My hope was that perhaps you could get some firsthand info from one of the Portland talc grinders as to what they have to pay. Any ideas you may have on this will be appreciated. Best regards & happy 1964.

Sincerely

Can. L. A. 1-6-64



State of Oregon
DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES
Branch Office
.239 S.E. "H" Street
Grants Pass, Oregon

Oct. 7, 1963

To: Ralph

From: Len

Mr. Wm. LaFaunce has been quarrying and selling small quantities of soapstone through his new art store in Medford. He has been getting most of it from a claim in sec. 8, T. 41 S., R. 5 W. on the head of Steve's Fork but is actively lining up new sources. He expects the demand to increase.

LR:amj

RECEIVED
OCT 8 1963

STATE DEPT. OF GEOLOGY
& MINERAL INDS.

Sincerely,


Len

TALC, PYROPHYLLITE, AND GROUND SOAPSTONE

The domestic market of talc, pyrophyllite, and ground soapstone is the largest in the world since the United States produces and consumes over one-third of the world's production. Within the United States the largest markets are the states in the northeast quarter and the Pacific Coast. In 1938, the United States produced 212,775 short tons, imported 22,127 short tons, and exported 7,118 short tons of this material, making a total domestic consumption of 197,766 short tons. California produced 30,059 tons and Washington 174 tons while New York (86,423 tons), Georgia, North Carolina, Vermont, Maryland, Pennsylvania, and Virginia produced the remaining 96,119 tons.

In order of importance (1938), the consuming industries are paint, ceramic, roofing, paper, and rubber which take 77% of the United States output with toilet preparations, fillers, foundry facing, crayon, and other industries consuming the remainder. Talc and pyrophyllite are marketed in three forms: crude, sawed or manufactured, and ground.

The following table shows approximately the demand of the consuming industries upon the principal producing states.

	New York	Calif.	Wash.	Vermont	N.Car.	Georgia
Paint	90% (48,000T)	Minor	--	Minor	--	--
Ceramic	48% (14,000T)	30% (9,000T)	Minor	--	--	--
Roofing	--	--	Minor	50% (14,000T)	--	30% (9,000T)
Paper	70% (19,000T)	--	--	70% (8,000T)	--	--
Rubber	Some	--	--	Some	Large	Some
Toilet.Prep.	--	1800 T	--	--	Some	--

pH value of diatomite and pyrophyllite important: Miller
 pH of 5.6
 Talc neutral

The average value of the commodity during 1938 was \$10.82 per short ton. Prices ranged from \$4 per ton for roofing grade to \$20 per ton for paint white crayon and toilet grades brought as high as \$150 per ton. California talc brought the highest average of from \$17 to \$20 per ton with New York next at \$11 to \$17. Current (December, 1939) quotations are substantially the same.

Following is a list of buyers of talc, pyrophyllite, and ground soapstone arranged according to the grades mentioned above.

Crude:

California:

W.K. Thompson. 1949 N.Vermont Ave., Los Angeles
Henry Rising & Co., 424 S.Broadway, Los Angeles
Western Talc Co., 1901 E. Slauson Ave., Los Angeles

Oregon:

Miller Products Co., Portland

Sawed and Manufactured:

California:

W.K. Thompson, 1949 N. Vermont Ave., Los Angeles

Ground:

California:

Braun-Knecht-Heimann Co., Ltd., San Francisco
Commercial Minerals Co., San Francisco
W.K. Thompson, 1949 N.Vermont Ave., Los Angeles

Oregon:

Miller Products Co., Ft.of SW Lincoln, Portland

Unclassified:

California:

Blue Star Mines., Ltd., 840 San Julian St., Los Angeles
Pacific Coast Talc Co., 2149 Bay St., Los Angeles

TYPICAL CHARACTERISTICS

	Mistron 139	Mistron F-128	Mistron T-076	Mistron HGO-75	Mistron HGO-55	Mistron Vapor	Mistron MSC	Mistron Micropaque	Mistron 18
Combined Ca & Mg Silicates (%)	89-91	89-91	89-91	90-92	90-92	90-92	89-91	-	89-91
Acid Solubles as CaO (%)	3-6	3-6	3-6	.5-1.5	.5-1.5	.5-1.0	3-6	-	3-6
Approximate Maximum Particle Size - Microns	30	20	15	15	12	*	15	8	6
Approx. Hegman Fineness	4-5	4.5-5.5	5.25-6	5-5.5	5.5-6	5.5-6.5	5.5-6	5.5-6.5	6+
Oil Absorption Spatula Rub-out (lbs./100 lbs.)	35-37	38-40	42-44	50-52	55-60	**	33-35	38-42	60-65
Gardner-Coleman Method (ml./20 g.)	9-10	10-10.5	10-11	13-14	15-16	18-20	8-9	9-10	16-18
Specific Surface m ² /g.	7-8	8-9	10-12	10-12	14-16	***	10-12	11-13	17-19
Index of Refraction	1.59	1.59	1.59	1.59	1.59	1.59	1.59	2.15	1.59
Specific Gravity	2.79	2.79	2.79	2.76	2.76	2.75	2.79	3.36	2.79
Weight per Solid Gallon	23.24	23.24	23.24	22.99	23.24	22.91	23.24	27.99	23.24
One lb. Bulks/Gallon	.04303	.04303	.04303	.04350	.04303	.04365	.04303	.03573	.04303
Particle Shape	Acicular Platy	Acicular Platy	Acicular Platy	Acicular Platy	Platy	Platy	Acicular Platy	Mixed	Acicular Platy

* Grand Island - 8; Los Angeles - 10

** Grand Island - 65-70; Los Angeles 55-60

*** Grand Island - 18-20; Los Angeles 14-16

The following are typical characteristics of our most important paint talcs:

	<u>Fibrene C-300</u>	<u>Fibrene C-400</u>	<u>Fibrene C-500</u>	<u>I.S. Silver</u>	<u>Sierra Cloud</u>	<u>Sierra Whites</u>
Combined Ca & Mg Silicates (%)	89-91	89-91	89-91	89-91	86-92	80-85
Screen Analysis % thru 325 mesh	98-98.5	99.2-99.6	99.6-99.9	99.2-99.6	99.2-99.6	(200 mesh) 99.2-99.5
Acid Solubles as CaO (%)	3-6	3-6	3-6	1-3	4-6	10-15
Approx. maximum Particle Size (microns)	60	46	46	70	46	100
Approx. Hegman Fineness	2.-2.5	2.5-3.	3.-3.5	2.	2.-3.	1.-2.
Oil Absorption Spatula Rub-out (lbs. /100 lbs.)	27-28	27-29	28-30	28-30	30-32	26-28
Gardner-Coleman Method ml/20 g.	6-7	6.5-7.5	7-8	6.5-7.5	7-8	8-8.5
Weight per Solid Gallon	23.24	23.24	23.24	23.74	22.74	22.41
1 lb. Bulks/Gal.	.04303	.04303	.04303	.04212	.04227	.04462
Particle Shape	Acicular Platy	Acicular Platy	Acicular Platy	Crystalline	Acicular Platy	Granular Massive

The Fibrenes are the best known of our paint talcs. They are soft and very white and of good chemical purity. These talcs differ from one another only in particle size. They are used in virtually all protective coatings where extreme fineness of grind is not required.

NS and IS Silver are crystalline talcs, white but texture is relatively hard. Their major uses are: Traffic paints, floor finishes.

Sierra Cloud is a soft talc of good color whose main uses are: Industrial primers and sanding sealers.

The Sierra Whites are economy talcs and are used where maximum chemical purity is unnecessary. Large quantities are used in powdered water paints and joint cements.

House of Arts and Crafts

SOAPSTONE, WALNUT AND OTHER MATERIALS FOR SCULPTURE •

PAINTINGS

SCULPTURE

CERAMICS

522 North Riverside

MEDFORD, OREGON

Telephone 772-5171

*Send to
Ralph*

Art Instructor

Dear Sir:

We sell soapstone to schools and colleges - minimum order 500 lbs. 10¢ lb. F.O.B. Medford, Oregon.

Shipped in mixed colors, natural shape as mined, with one end trimmed so will stand up for sculpture. Pieces vary in size from 10 lbs. to 100 lbs. May be cut with hand saw to size wanted - Easy to work.

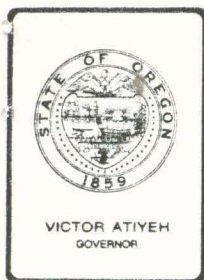
Yours sincerely,

Reference and users past 2 - 3 years:

Gary Hendrix - Art Instructor at Hedrick Junior High,
Medford, Oregon

Dr. Doerter, Art Director S.O.C., Ashland, Oregon

Jack Teeters, Art Instructor, Medford High, Medford,
Oregon



Department of Geology and Mineral Industries

1129 S.E. SANTIAM ROAD, ALBANY, OREGON 97321 PHONE (503) 967-2039

January 9, 1981

Robert Porton, President
Sculptor's Supplies, Ltd.
99 East 19th St.
New York, New York 10003

Dear Mr. Porton:

We have one producer of block talc which is mined and sold for carving purposes. The address is Steatite of Southern Oregon, Inc., 2891 Elk Lane, Grants Pass, Oregon 97526, phone (503) 479-3646.

We have other producers of harder material such as the picture rock from the McDermitt area. One of the producers is Miller Mining and Minerals, 1256 49th St., Sweet Home, Oregon 97386, phone (503) 367-2226.

Sincerely,

Jerry J. Gray
Economic Geologist

JJG/bjd

Jenny Gray
Please handle

SCULPTOR'S SUPPLIES, LTD.

Q

December 30, 1980

Dr. Don A. Hull, State Geologist
Dept. of Geology & Mineral Industries
1069 State Office Building
1400 SW Fifth Avenue
Portland, Oregon

Dear Dr. Hull:

We are looking for stones that are suitable for carving, more especially the softer variety of them, in all colors that are available. We sell large amounts of this type of material, especially alabaster.

We wonder if you wouldn't be kind enough in assisting us to find out where we can locate these types of stones.

Thank you.

Sincerely,

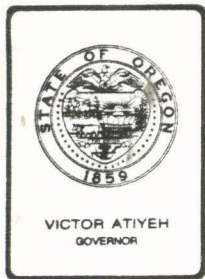

Robert Porton
President

RP:bw

RECEIVED-PT 9

JAN 5 - 1981

DEPT OF GEOLOGY
P. M. H. H. H. H. H.



Department of Geology and Mineral Industries
ADMINISTRATIVE OFFICE

1005 STATE OFFICE BLDG., PORTLAND, OREGON 97201 PHONE (503) 229-5580

May 1, 1983

Herman Martinson
121 N.W. 12th Ave.
Canby, Oregon 97013

Dear Mr. Martinson:

In answer to your question about Oregon's deposits of talc, the Department's Bulletin 100, (Geology and Mineral Resources of Josephine County, Oregon, price \$9.00) lists the location of one talc mine and states there are several other deposits of talc in Josephine County. The one talc mine listed is owned by John Pugh of 2891 Elk Lane, Grants Pass, Oregon 97526.

Ivan Akers, R.R. # 2, Box 810, Prairie City, Oregon 97869, reported that he has found a large talc deposit, you may wish to contact him.

Sincerely,

Jerry J. Gray
Economic Geologist

JJG:ab

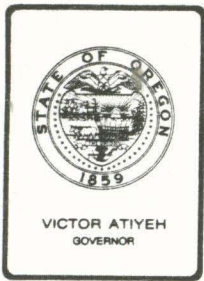
Canby Oregon
April 26, 1983

Oregon Dept of Geology & mineral Industries
Portland, Ore
Dear Sirs:

I am interesting in knowing if there are any soap stone deposits in Oregon. And if so where they are located and what the regulations are on digging etc.

I would appreciate any information you have.

Thank you
yours truly
Herman Martinson
12177 2412th Ave
Canby Ore 97013



Department of Geology and Mineral Industries
ADMINISTRATIVE OFFICE

1005 STATE OFFICE BLDG., PORTLAND, OREGON 97201 PHONE (503) 229-5580

March 10, 1983

Mr. Ivan Akers
R. R. #2, Box 810
Prairie City, Oregon 97869

Dear Mr. Akers:

In answer to your questions about talc, a copy of that chapter from the U. S. Bureau of Mines Mineral Facts and Problems is enclosed.

The talc deposits and that industry of southwest Oregon are described in the September 1978 issue of the Ore Bin by Norm Peterson.

Two firms which operate talc mines in Montana that you may wish to contact are Cyprus Industrial Minerals, 555 S. Flower Street, Los Angeles, California 90017; and Pfizer, Inc., Box 1147, Dillon, Montana 59725.

Sincerely,

Jerry J. Gray
Geologist

JJG:bj
Encl.

IVAN AKERS
R.R. 2 BOX 810
PRARIE CITY, OR.
97869

STATE OF OREGON
DEPARTMENT OF GEOLOGY
and
MINERAL INDUSTRIES
STATE OFFICE BLDG.
PORTLAND, OREGON 97201

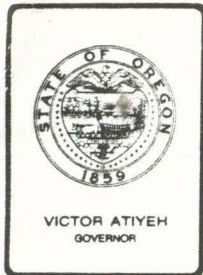
DEAR SIR:

I have a FEBRUARY 1946 ISSUE OF
THE ORE-BIN page 15 with a LISTING
in the PORTLAND and LOWER COLUMBIA
AREA, OF USERS OF THE MINERAL TALC
WOULD IT BE POSSIBLE FOR YOU TO
UP-DATE THAT LIST AND SEND ME A
COPY.

MY PARTNER & I HAVE A DEPOSIT
OF THIS TYPE OF MINERAL both FOLIATED
and MASSIVE. 5050 FT. LONG 325 FT. AVE. WIDTH
AND ONE CLIFF 200 FT. HIGH AND ANOTHER CLIFF 100 FT.
HIGH. THERE'S OTHER TYPES OF MAGNESIUM IN
THE AREA THAT'S PROCESSABLE.

Thank you, sincerely

Ivan R. Akers



Department of Geology and Mineral Industries
ADMINISTRATIVE OFFICE

1005 STATE OFFICE BLDG., PORTLAND, OREGON 97201 PHONE (503) 229-5580

February 27, 1984

Mr. Rosenberger
234 South Sec. St.
Springfield, Oregon 97477

Dear Mr. Rosenberger:

In answer to your question about soapstone, the material is being mined commercially by John H. Pugh, 2891 Elk Lane, Grants Pass, Oregon 97526, phone (503) 536-2215. Mr. Ivan Akers, R.R. #2, Box 810 Prairie City, Oregon 97869 has some talc mining claims.

Sincerely,

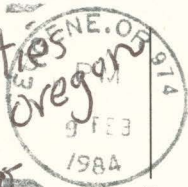
Jerry J. Gray
Economic Geologist

JJG:ab

Mt. Shasta



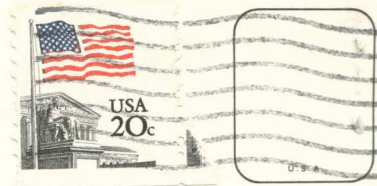
Hi,
Am in search of
information of localities
within the state of Oregon
that will lead me to
soapstone.



THANK YOU
NORM
ROSENBERGER

235 SOUTH 5th ST
SPRINGFIELD, OR
97477

Fritz Vibe Enterprises, 4335 Orange Grove Ave.,
Sacramento, California 95841



the Continental card

DEPT. of GEOLOGY

1069 STATE OFFICE B

PORTLAND, OR

97201

MT. SHASTA, CALIFORNIA. Surrounded by an area which invites year-round recreation, this mountain peak in northern California is one of the most beautiful in the Northwest. An extinct volcano, the peak reaches an altitude of over 14,000 feet



Regal

© Mike Roberts Color Productions

JOHN H. PUGH
President

STEVE F. PUGH
Vice-President

STEATITE of SOUTHERN OREGON, INC

2891 ELK LANE • GRANTS PASS, OREGON 97527
(503) 479-3646

Sept. 6, 1987

Ore. Dept. of Geology
& Mineral Industries
910 State Office Bldg.
Portland, Ore. 97201

Attn: Messrs.

Jerry J. Gray &
Ronald P. Geitgey

Gentlemen:

I would give my eye teeth for a chance to read this Publication, especially the Price section, but \$530 isn't in my budget at this time.

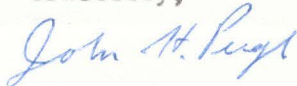
Would you have any idea where I might be able to read a copy of this Publication?

Thought you might be interested in the test results of the 3 Talc samples, each from different claims, I had analyzed. Test results look very good.

We have one West German and two Southern Oregon companies interested in purchasing the grinding grade we do not use for Sculpturing stone.

Special thanks for displaying our stone at the State Capitol.

Sincerely,



John H. Pugh

12th August 1987

The Economics of
TALC & PYROPHYLLITE 1987
New Fifth Edition

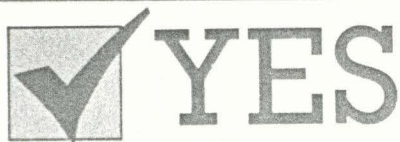
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Name

in BLOCK letters please

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Signed

Mr. John H. Pugh,
 Steatite of Southern Oregon, Inc.,
 2891 Elk Lane,
 Grants Pass,
 Oregon 97527,
 USA

Please check that your
 address is correct.

Current Roskill Studies on Minerals for Pulp and Paper

TITANIUM DIOXIDE · TALC · SODIUM SULPHATE · KAOLIN

TITANIUM

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TALC & PYROPHYLLITE

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*The Economics of Talc & Pyrophyllite 1987

Fifth Edition, June 1987 ISBN 0 86214 946 0
250 pages; 161 tables; plus appendices
£300; US\$530; DM1060

*The Economics of Titanium 1986

Fifth Edition, October 1986 ISBN 0 86214 934 7
315 pages; 158 tables; 5 figures
£515; US\$900; DM1800

DATE : 14-AUG-87

HG SCHLICKER & ASSOC. - TALC

CODE	SAMPLE NAME	DD-MMM-YY	HH:MM	SiO2 %	AL2O3 %	FeO %	TOTFeO	MnO %	CaO %	MgO %	K2O %	Na2O %	P2O5 %	Ni %	Wt %	CR %	Wt %	FeO
TRA1	HGS-HP2	12-AUG-87	00:10	60.78	2.44	0.038	4.95	0.051	0.04	30.83	0.00	0.00	0.006	0.1573	0.0039	0.2295	4.4600	
				0.0002	0.0031	0.0000	0.0002	0.0004	0.0011	0.0001	0.0000	0.0004	0.0004					
				0.5500	99.1400													
TRA1	HGS-HP3	12-AUG-87	06:20	61.81	1.60	0.020	4.50	0.054	0.00	31.12	0.00	0.00	0.001	0.1519	0.0058	0.2273	4.0500	
				0.0004	0.0011	0.0000	0.0000	0.0001	0.0009	0.0001	0.0000	0.0005	0.0001					
				0.5000	99.1100													
TRA1	HGS-HP10	12-AUG-87	06:21	61.38	1.79	0.021	4.97	0.049	0.00	30.70	0.00	0.00	0.000	0.1503	0.0063	0.2376	4.4700	
				0.0005	0.0017	0.0000	0.0000	0.0003	0.0010	0.0001	0.0000	0.0000	0.0006					
				0.5500	98.9100													

Please note that these are unnormalized values.

Fe is given as FeO (TOT FeO) and all H2O, CO2 and other volatiles are lost in the fusion process.

Because we don't analyze for volatiles, to use the analyses you must normalize the major elements (SiO2 through P2O5) to 100% and always quote the results as being "normalized on a volatile-free basis with Fe as FeO".

Also provided in the last three columns are:

FeO = 0.9 Fe as FeO
Fe2O3 = 0.1 Fe as Fe2O3

} as used in Mg' value calculations

TOTAL = Total of unnormalized values for major elements SiO2-P2O5 with Fe as FeO.

*A rough estimate of loss on ignition is 100 - Total - in the order of 1% (which seems very low for talc).
Let us know if you would like us to make a direct LOI measurement to check.*

NORTHWEST TESTING LABORATORIES, INC.

CONSTRUCTION INSPECTION
MATERIALS INSPECTION
CHEMICAL ANALYSIS
PHYSICAL TESTING

5405 N. Lagoon Avenue
P.O. Box 17126
Portland, Oregon 97217-0126
Phone: (503) 289-1778

NON-DESTRUCTIVE TESTING
WELDING CERTIFICATION
SOIL TESTING
ASSAYING

August 3, 1987

H.G. Schlicker and Associates
7 S.E. 97th Avenue
Portland, Oregon 97216

Attn: Mr. Herbert G. Schlicker

Subject: Analysis performed on one (1) sample
received on 8-3-87 per your request

Report:

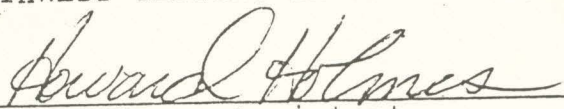
Item: Talc HP-2

Analysis:

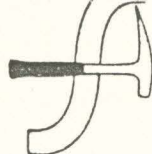
	<u>Brightness (%)</u>
Magnesium Carbonate Standard	98
Talc, HP-2 Sample	88

Note: This sample was tested as a -325 mesh material

Sincerely,
NORTHWEST TESTING LABORATORIES, INC.


Howard Holmes, Assistant
Supervisor, Chemistry

Report Number 307558



H.G. Schlicker & Associates, Inc.

7 S.E. 97th Avenue • Portland, Oregon 97216 • (503)257-9666

Geologists • Engineers

BULK SAMPLE ANALYSIS FOR ASBESTOS

REPORT

Report No.

ORDER NO. 87-317

Page No.

DATE July 30, 1987

CLIENT: Steatite of Southern Oregon

Project:

Date Analyzed: July 29, 1987

SAMPLE IDENTIFICATION			
LABORATORY NUMBER	HP-2	HP-3	HP-10
ADDITIONAL IDENTIFICATION INFORMATION	5 lb. chunk	5 lb. chunk	5 lb. chunk
GROSS APPEARANCE	White with dark streak	Dark on partings	Dark on partings
HOMOGENEOUS?	Yes	Yes	Yes
OBTVIOUS LAYERS?	Chlorite	Chlorite	Chlorite
FIBROUS?	No	No	No
COLOR?	Gray; powder, white	Gray; powder, white	Gray; powder, white
DOES THE SAMPLE CONTAIN ASBESTOS?	No	No	No
ASBESTOS (Type & Percent) 1. Chrysotile 2. Amosite 3. Crocidolite 4. Other, specify			
TOTAL PERCENT ASBESTOS			
OTHER FIBROUS MATERIALS (Type & Percent) 1. Fibrous glass 2. Cellulose 3. Other, specify			
NONFIBROUS MATERIALS (Description & Percent)	Talc; thin seams of chlorite	Talc; thin seams of chlorite	Talc; thin seams of chlorite

Analytical Analysis Method: EPA recommended PLM with dispersion staining

Sampled by: John Pugh

Reviewed and Approved By:

Analyzed by: H. G. Schlicker

ASSOCIATES
J. DOUGLAS GLESS, PG
RUSSELL J. RALLS, PG

PRINCIPALS
HERBERT G. SCHLICKER, PG, PRESIDENT
JOHN A. TALDOTT, PE, VICE PRESIDENT

Olmstead Associates

Manufacturers' Representatives

RR 1 Box 50, Valley View Drive, Gorham, Maine 04038

Telephone (207) 839-2979 Fax (207) 781-4383 Telex 294139 COMMA UR

July 6, 1987

John Pugh
President
Steatite of Southern Oregon
2891 Elk Lane
Grants Pass OR 97526

Dear Mr. Pugh:

It was a pleasure discussing steatite with you today. My clients (Norwegian Talc Deutschland of Bad Soden-Salmunster, West Germany) are looking for 1000 tonnes of steatite lumps sized 15 cm (about 5 inches) and smaller.

This material should be white in color and have approximately the following analysis.

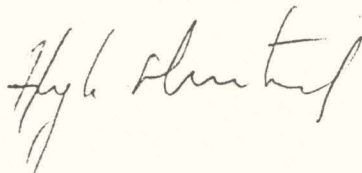
MgO	30%
Al ₂ O ₃	0.5 - 1.0% max.
SiO ₂	59 - 63%
Fe ₂ O ₃	0.5%
CaO	0.7%
Na ₂ O-K ₂ O	0.4%
Loss on Ignition	less than 5.5%

Please give us your F.O.B. mine price and also the price delivered to the closest international port (Portland?), packed in 100 lb bags or other suitable boxes/bags and loaded into 22 foot containers.

I look forward to hearing from you, whereupon I will telex your price and other details to NTD for consideration.

Best regards.

Cordially,



Hugh D. Olmstead
President

