

SOAPSTONE IN MADISON COUNTY, NORTH CAROLINA

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by

Edwin H. Bentzen III

Abstract

In line with the Silvis Report program, "Recovery and Use of Talc from North Carolina Soapstone," this project was undertaken to locate, sample, and process soapstone from deposits in Madison County, North Carolina. Twenty-three deposits were located, and found to contain talc in promising quantity and quality.

Introduction

Soapstone production in Madison County has been reported as far back as 1868. J. L. Stuckey, in his book, North Carolina: Its Geology and Mineral Resources, reported: "The only known attempts to produce cut soapstone for other than local use were on Walnut Creek near Marshall, Madison County in 1868 when blocks containing up to 15 and 20 feet were quarried for iron furnace linings in Green County, Tenn." T. G. Murdock reported in the Division of Mineral Resources Economic Paper No. 65, The Mining Industry in North Carolina From 1937 to 1945, five operations in Madison County. He states: "In the period prior to World War II, there was some activity in Madison County. J. B. Bailey reported some mining operations in the Laurel Creek District, and operated a mill at Marshall for a while. The Western Carolina Talc Company, Asheville, was active for several years in the Marshall area, reporting mining operations at the Tipton, Shalton, [Shelton], Edwards, Brackens and Peters Cove mines, and operating a mill for the production of crayons and ground talc at Marshall."

Details of location and size of these operations, and quality of ore produced have not been recorded in any files readily accessible to the public. In an effort to alleviate this situation, a project was proposed and carried out. As an indication of the need and desire for this information, five companies have requested copies of this report, even before the work was one-half completed.

Objective

The objective of this project was to locate and evaluate ores of soapstone throughout Madison County. Processing was aimed at producing the best product, not necessarily the one with the best yield. It had been determined that color would be the primary factor in outlining end product uses.

Procedure

Sample Descriptions - The samples used in this study were collected from old soapstone mine dumps and outcrops in the area from Marshall to Sams Gap. The exact locations are given in Table 1, "Location of Soapstone Deposits," by North Carolina Grid Location. In Table 2, "Descriptions of Soapstone Mines and Outcrops," the workings at each deposit are briefly described. This information is based on the recollections of residents of the area and people who worked in the mines. Special thanks are given to Mr. Charlie Capps, Route 6, Box 197, Marshall, for most of the information concerning the underground workings. Most of these mines were, at one time or another, operated by Western Carolina Talc Company.

Sample Testing - Each sample was tested using the procedure detailed in Table 3, "Ore Dressing Test Data." An investigation as to the effects of repeated cleaning on the recovery and color was also

undertaken. On one sample, the colors and yields were recorded as the process progressed from wet grinding through magnetic separation, flotation, and as many as three cleaners. The results are shown in Figure 1, "Process Vs. Color and Yield."

Results

The results of the work on this project have been tabulated in a series of tables. It is hoped that the presentation of data in this manner will simplify the interpretation of results by those in industry who are primarily interested in a specific combination of factors.

Table 4, "Processing Results," tabulates the weight yield of each product obtained in the evaluation tests. The cleaner tails (middlings) are combined as one weight fraction. The difference between the total weight and one hundred percent is the result of losses.

Table 5, "Reflectance Color," tabulates the reflectance color for each ore sample and for two products from each. Colors were taken on the head feed ground to minus 100 mesh, the cleaner concentrate ground to about 90 percent minus 100 mesh, and the leached concentrate ground to the same degree as the cleaner concentrate.

Tables 6, 7, and 8 - "Chemical Analyses, Head Feed"; "Chemical Analyses, Cleaner Flotation Concentrate" and "Chemical Analyses, Leached Concentrate" - respectively, tabulate the changes in analyses due to flotation and leaching. A complete analysis of the leached concentrate was not made, because it was believed that leaching would cause little change in values, except for loss on ignition, acid soluble material, and iron.

Table 9, "Location of Soapstone Processing Plants," gives the location of the mills that treated material removed from the mines. All

eight plants cut blocks, or rough rectangular shapes, that were easy to handle, store, and ship. These blocks were sent to other plants in Murphy, North Carolina, Chatsworth, Georgia, and the plant in Marshall, North Carolina for sawing into steel marking crayons. Five of the plants, including the plant in Marshall, cut the crayons and boxed them for shipping. Only two of the processing plants made use of the powder and scraps generated in the sawing operation. The plant in Flag Pond, Tenn., and the plant in Marshall ground the scraps and waste into fine powder that was used for foot powder in World War II.

Four marble outcrops are listed in Table 10, "Locations of Marble Outcrops Within the Soapstone District." Although there is no direct visible correlation between these carbonate deposits and the soapstone deposits, they do lie along the strike of the soapstone mines.

Spectroscopic examination of the magnetic fractions disclosed the presence of Fe, Cr, Mn, Mg and Zn in all the samples. The exact amount of each has not been determined. However, Table 11, "Zinc Analysis of Selected Magnetic Fractions," shows level of Zn to be very low.

Discussion

Field inspection and conversations with local people indicate that there has been a tremendous activity in soapstone mining in Madison County. The exact amount will probably never be known. But the fact exists that, until now, no publication has documented the extensive operations that were carried out in Madison County.

The samples collected probably do not represent the true character of the ore in place. Samples collected and processed represent waste and scraps from mining operations that took place over 20 years ago. The weathering that has taken place over this length of time has undoubtedly

affected the quality of the final products in the present study. It is thought that the acid leached product would have properties close to those of a product floated from freshly mined ore. The color of leached products ranged from 73 to 87, with the green filter. This is in the range of color used by the textile, and some other low cost filler, industries. In order to enter the cosmetic, and other high priced, markets, colors of 86 and better must be produced consistently. Other physical specifications not within the scope of these tests, must also be met to enter high priced markets.

Conversations with people that worked in the mines indicate that the deposits are irregular in character, but all agreed that the deposits were widening out when mining operations ceased.

Mineralogical examination of the deposits was not undertaken in detail, but the mineralogy observed does not clearly indicate the origin of the deposits. Carbonate and calcium minerals are present in the soapstone and no remnants of olivine have been observed. This would seem to point to a sedimentary origin. However, accessory minerals all seem to carry a ratio of 9:1 MgO to FeO, the same ratio present in the olivine bodies of North Carolina, which might cause them to be interpreted as igneous in origin.

Conclusions

- 1) There were more than 23 operating soapstone mine locations in the Madison County area.
- 2) The samples tested were old and weathered.
- 3) Fresh ore would probably produce a better product.
- 4) The products produced might qualify for textile and low priced fillers, but they do not seem to qualify for the cosmetic markets.

5) Although the deposits do not appear to be interconnected, they are reported to widen with depth.

6) The origin of the soapstone is uncertain.

Recommendations

Detailed mapping of the Madison County area should be undertaken to determine the structural relations of soapstone deposits to one another. Detailed mapping would undoubtedly uncover more soapstone deposits in the same area.

If a company is interested in putting one or more of the old mines back into operation, core drilling should be systematically carried out to outline size and shape of the deposits, and the quality of products that can be produced from fresh material.

More work should be undertaken to locate the old soapstone mines in other parts of the State.

Table 1

Location of Soapstone Deposits

<u>Location Name</u>	<u>Lab. No.</u>	TVA <u>Quad Map No. 191-</u>	<u>N. C. Grid Location</u>	
			<u>North</u>	<u>East</u>
Edwards #3	3686	NW	808,400	926,600
Brackens	3709	NE	809,400	928,500
Shelton	3710	NW	808,700	925,900
Wolf Branch	3711	NW	809,500	924,900
Devils Den	3712	NW	801,250	918,400
Hamlin	3713	NE	812,200	932,300
Peters Cove	3714	NE	823,050	941,800
Parker	3716	NE	798,650	941,200
Tipton	3720	SW	773,150	905,400
Goforth	3721	SW	764,300	897,700
Mashburn	3722	SW	776,200	903,500
Carver	3723	NW	807,700	925,500
Wilson	3725	SW	757,900	892,800
Guy Roberts	3739	SW	791,600	914,400
Sodom	3740	NW	801,100	906,600
George Lewis	3741	NW	803,600	920,900
Jasper Roberts	3742	NE	815,100	934,300
Higgins Creek	3806	NE	835,450	959,100
Laurelton Chapel	3834	NE	810,950	933,500
Little Foster Cr.	3859	NE	811,200	931,400
Edwards #1	3860	NE	809,100	927,250
Edwards #2	3861	NE	808,700	927,100
R. Franklin	3862	NW	810,800	907,400

Table 2

Descriptions of Soapstone Mines and Outcrops

<u>Location Name</u>	<u>Description of Workings</u>
Edwards #3	One shaft about 100 feet deep.
Brackens	One shaft 225 feet deep, 40-foot drift at bottom. Deposit 40 feet thick at bottom.
Shelton	Two shafts 80 feet deep, 100 feet apart, connected. Winze 80 feet deep. Lower drifts of 50 feet each. Deposit 40 feet thick at bottom.
Wolf Branch	Float material. Outcrop not visible.
Devils Den	Three shafts: #1 - 40 feet deep, 8 feet thick at bottom; #2 - 80 feet deep; #3 - 90 feet deep. #2 and #3 connected by a 30-foot incline. Deposit at 2 and 3 - 20 feet thick at bottom.
Hamlin	One shaft - 30 feet deep.
Peters Cove	Two shafts plus numerous pits. #1 - 25 feet deep; #2 - 50 feet deep. Drift 30 feet each way. Deposit 18 feet thick at bottom.
Parker	Old pit mined for hearthstones.
Tipton	Two shafts 8 feet and 9 feet deep plus one open cut. Also known as Old County Home mine. First mined 1868.
Goforth	One adit 120 feet long. Deposit 18 feet thick.
Marshburn	One shaft 20 feet deep, one adit 150 feet long.
Carver	One shaft 40 feet deep.
Wilson	Open cut 25 feet long.
Guy Roberts	One shaft 190 feet deep.
Sodom	One shaft 80 to 90 feet deep. Drift 25 feet each way.
George Lewis	One shaft 80 feet deep. One adit 50 feet long.
Jasper Roberts	One adit.

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Table 2

Descriptions of Soapstone Mines and Outcrops

(continued)

<u>Location</u> <u>Name</u>	<u>Description of Workings</u>
Higgins Creek	One adit 50 to 60 feet long.
Laurelton Chapel	One shaft 20 feet deep.
Little Foster Cr.	One small pit.
Edwards #1	One shaft 60 feet deep. Drift 100 feet.
Edwards #2	One small shaft.
R. Franklin	Open cut exposes 8 to 10-foot thick vein.

NORTH CAROLINA STATE MINERALS RESEARCH LABORATORY

Table 3

ORE DRESSING TEST DATA

Lab. No. _____

Test No. _____

Operator _____

Date _____

Object of Test Flotation of Talc

	Color									
	Wt %			Green	Blue	Amber				
Magnetics	xx									
Ro. Tails	xx									
Cl. Tails #1	xx									
Cl. Tails #2	xx									
Cl. Conc.	xx			xx	xx	xx				
Losses	xx									
Total	100.0									
Head Fd. to Leach	100.0									
Leached Conc.	xx			xx	xx	xx				
Head Feed	100.0			xx	xx	xx				

Conditions				Reagents (lbs per ton)						
Process	(Min) Time	% Solids	pH			AF-73		H ₂ SO ₄		
Jaw Crush - 3/4"										
Hammer Mill - 1/16"										
Pebble Mill	30	50								
Ferro Filter										
Condition	1					0.66				
Float	5									
Clean F.P. #1	3									
Clean F.P. #2	3									
Leach	30	25						6.00		

Remarks:

Pebble mill with high density alumina pebbles.
 Pass through Ferro Filter 4 times.
 Condition in cell at 1200 rpm with Aero Froth 73.
 Float for 5 min., or until froth no longer supports particles.
 Clean for 3 min., or until froth no longer supports particles.
 Repeat cleaner step.
 Filter and dry all products at 150° F.
 Leach 50 gr. for 30 min. at 25% solids at 85 to 95° C with H₂SO₄.
 Record colors on head, cleaner concentrate, and leached concentrate using a Photovolt reflectance testing machine.

FIGURE 1

Process vs. Color and Yield

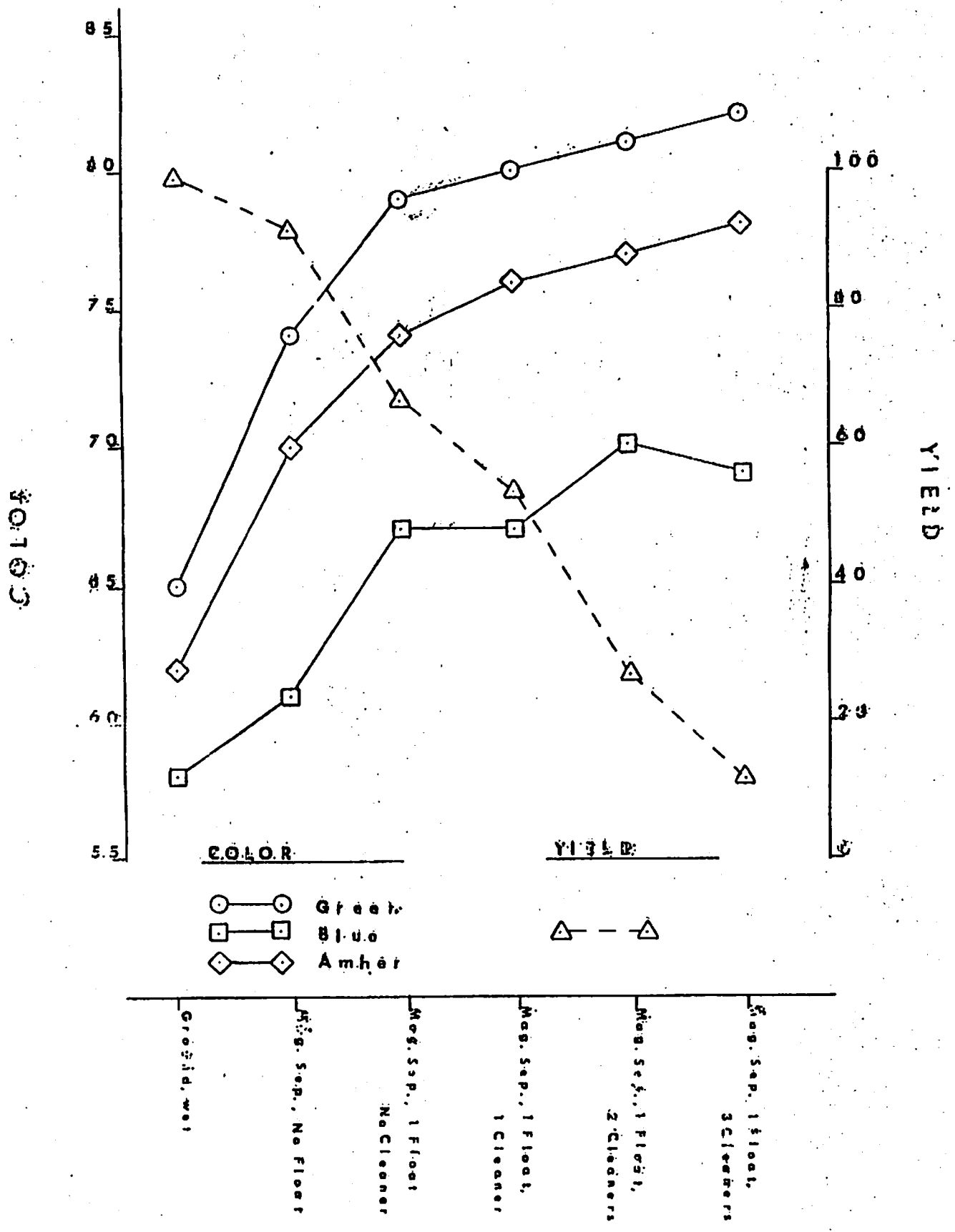


Table 4

<u>Location Name</u>	<u>Lab. No.</u>	<u>Flotation Yield - % of Head Feed*</u>				<u>% Yield Leach</u>	<u>Overall % Yield</u>
		<u>Magnetics</u>	<u>Ro. Tails</u>	<u>Middlings</u>	<u>Cl. Conc.</u>		
Edwards #3	3686	6.1	25.6	30.7	34.9	98.6	34.4
Brackens	3709	4.9	20.4	26.2	44.2	98.6	43.6
Shelton	3710	5.6	20.4	35.1	38.9	98.6	38.4
Wolf Branch	3711	3.0	53.6	29.7	12.3	97.8	12.0
Devils Den	3712	2.3	26.4	39.5	30.0	98.4	29.5
Hamlin	3713	2.1	41.1	39.6	15.0	98.6	14.8
Peters Cove	3714	7.1	32.2	38.9	19.7	98.2	19.3
Parker	3716	8.1	25.5	28.1	35.6	98.4	35.0
Tipton	3720	14.3	22.0	16.0	45.6	98.2	44.8
Goforth	3721	10.9	38.0	21.4	27.8	98.8	27.5
Mashburn	3722	13.3	26.6	26.1	31.7	98.6	31.3
Carver	3723	4.9	28.2	34.0	31.0	98.4	30.5
Wilson	3725	28.2	39.4	17.3	13.6	98.4	13.4
Guy Roberts	3739	4.2	26.0	32.1	35.6	98.8	35.2
Sodom	3740	6.9	30.0	32.2	28.8	98.4	28.3
George Lewis	3741	3.7	26.0	30.8	36.6	99.0	36.2
Jasper Roberts	3742	4.0	33.6	27.4	32.7	98.2	32.1
Higgins Creek	3806	1.6	44.2	29.9	21.4	98.2	21.0
Laurelton Chapel	3834	2.6	22.4	28.9	43.7	98.4	43.0
Little Foster Cr.	3859	1.1	24.9	37.8	32.4	99.8	32.3
Edwards #1	3860	1.3	28.2	37.4	30.0	98.4	29.5
Edwards #2	3861	1.2	22.9	35.0	38.4	98.6	37.9
R. Franklin	3862	1.8	35.4	42.7	16.9	98.0	16.6

*Difference is losses

Table 5

Reflectance Color

<u>Location Name</u>	<u>Lab. No.</u>	<u>Head Feed</u>			<u>Cleaner Conc.</u>			<u>Leached Conc.</u>		
		<u>Green</u>	<u>Blue</u>	<u>Amber</u>	<u>Green</u>	<u>Blue</u>	<u>Amber</u>	<u>Green</u>	<u>Blue</u>	<u>Amber</u>
Edwards #3	3686	63	74	71	81	71	79	86	80	81
Brackens	3709	74	67	69	82	77	79	83	77	78
Shelton	3710	77	63	73	81	71	80	84	75	80
Wolf Branch	3711	54	37	52	65	45	64	73	60	68
Devils Den	3712	76	69	74	82	75	80	84	77	80
Hamlin	3713	68	50	65	75	60	73	79	73	75
Peters Cove	3714	68	60	64	78	68	74	80	68	76
Parker	3716	62	40	61	77	58	75	81	66	78
Tipton	3720	69	56	66	81	67	79	81	71	79
Goforth	3721	64	52	61	80	68	77	82	75	78
Mashburn	3722	67	50	65	80	66	79	83	71	80
Carver	3723	70	59	67	81	74	78	83	76	79
Wilson	3725	54	47	52	76	64	73	80	71	75
Guy Roberts	3739	71	59	68	79	68	76	79	70	76
Sodom	3740	76	69	70	82	75	78	82	76	79
George Lewis	3741	78	66	74	87	78	84	87	81	84
Jasper Roberts	3742	73	62	68	80	69	77	81	73	77
Higgins Creek	3806	64	45	62	75	59	74	76	66	78
Laurelton Chapel	3834	69	48	73	76	53	77	79	66	80
Little Foster Cr.	3859	76	56	79	83	70	86	86	77	88
Edwards #1	3860	76	69	76	80	73	79	82	76	83
Edwards #2	3861	79	68	80	80	73	81	85	78	85
R. Franklin	3862	71	57	71	77	67	77	80	72	80

Table 6

Chemical Analyses, Head Feed

<u>Location Name</u>	<u>Lab. No.</u>	<u>Chemical Analyses, %</u>									
		<u>SiO₂</u>	<u>MgO</u>	<u>Ratio SiO₂/MgO</u>	<u>CaO</u>	<u>Na₂O</u>	<u>K₂O</u>	<u>Al₂O₃</u>	<u>LOI</u>	<u>Fe₂O₃</u>	<u>Acid Sol.</u>
Edwards #3	3686	59.9	30.4	1.97	0.1	0.02	0.01	0.4	5.1	4.0	3.5
Brackens	3709	59.9	28.1	2.13	0.7	0.04	0.15	0.8	4.8	5.1	3.2
Shelton	3710	59.7	28.9	2.07	0.2	0.05	0.02	0.6	4.9	5.1	2.4
Wolf Branch	3711	59.0	20.4	2.89	3.6	0.11	0.11	4.5	3.8	7.7	9.5
Devels Den	3712	59.5	27.7	2.15	0.3	0.05	0.03	1.0	4.8	6.1	2.6
Hamlin	3713	56.2	26.0	2.16	0.8	0.07	0.08	2.6	5.1	8.0	5.3
Peters Cove	3714	55.8	28.2	1.98	0.2	0.04	0.06	2.0	5.7	7.3	8.3
Parker	3716	57.5	26.5	2.17	0.5	0.09	0.16	1.4	5.6	7.7	9.4
Tipton	3720	46.8	30.8	1.52	0.4	0.07	0.05	1.4	14.6	5.7	26.3
Goforth	3721	46.7	29.8	1.57	0.7	0.07	0.05	4.7	11.7	6.1	18.5
Mashburn	3722	51.2	30.4	1.68	0.3	0.04	0.05	2.3	9.1	6.1	14.6
Carver	3727	56.6	28.7	1.97	0.2	0.09	0.20	1.5	5.7	5.8	5.8
Wilson	3725	39.3	24.4	1.61	3.8	0.06	0.07	10.2	12.3	10.2	25.8
Guy Roberts	3739	58.4	27.4	2.13	0.4	0.07	0.05	3.6	5.3	5.4	2.6
Sodom	3740	57.5	27.1	2.12	2.5	0.08	0.07	2.6	5.2	5.2	3.8
George Lewis	3741	59.2	28.0	2.11	1.5	0.04	0.05	2.7	4.8	4.0	2.2
Jasper Roberts	3742	52.6	24.5	2.15	4.8	0.06	0.07	4.2	7.8	5.5	11.2
Higgins Creek	3806	55.9	24.0	2.33	4.1	0.08	0.15	4.7	4.8	6.3	8.1
Laurelton Chapel	3834	59.7	27.3	2.19	0.8	0.06	0.05	0.6	4.6	6.6	7.4
Little Foster Cr.	3859	60.5	28.1	2.15	0.2	0.05	0.06	1.6	4.8	4.4	2.0
Edwards #1	3860	59.1	26.8	2.21	0.8	0.05	0.09	2.6	5.0	5.2	2.7
Edwards #2	3861	60.0	28.4	2.11	0.1	0.04	0.03	1.3	5.0	4.7	2.2
R. Franklin	3862	59.1	28.3	2.09	0.2	0.05	0.08	1.5	5.4	5.3	4.8

Table 7

Chemical Analyses, Cleaned Flotation Concentrate

Location Name	Lab. No.	Chemical Analyses, %									
		SiO ₂	MgO	Ratio SiO ₂ / Mgo	CaO	Na ₂ O	K ₂ O	Al ₂ O ₃	LOI	Fe ₂ O ₃	Acid Sol.
Edwards #3	3686	61.5	29.2	2.11	0.6	0.03	0.02	0.2	4.9	3.4	1.1
Brackens	3709	61.5	29.0	2.12	0.4	0.02	0.03	0.4	4.8	4.0	0.7
Shelton	3710	61.2	28.8	2.13	0.1	0.03	0.01	0.4	4.8	4.7	0.7
Wolf Branch	3711	60.0	25.2	2.38	1.9	0.08	0.07	1.4	4.1	7.3	2.8
Devils Den	3712	60.9	28.6	2.13	0.0	0.04	0.02	0.8	4.7	4.7	0.7
Hamlin	3713	60.1	27.0	2.23	0.2	0.05	0.05	1.3	4.8	6.8	1.6
Peters Cove	3714	60.8	28.4	2.14	0.1	0.04	0.02	1.3	4.8	4.7	1.3
Parker	3716	61.4	28.2	2.18	0.2	0.03	0.02	0.4	4.9	4.0	1.1
Tipton	3720	60.0	30.6	1.96	0.2	0.04	0.02	0.3	5.4	2.8	2.3
Goforth	3721	59.1	30.5	1.94	0.1	0.06	0.02	0.5	4.9	3.0	1.3
Mashburn	3722	60.0	30.8	1.95	0.1	0.04	0.02	0.0	4.9	3.0	1.1
Carver	3723	59.6	29.8	2.00	0.1	0.03	0.05	0.7	4.7	4.4	1.0
Wilson	3725	60.3	29.5	2.04	0.1	0.07	0.02	1.7	5.4	3.4	2.3
Guy Roberts	3739	59.7	27.6	2.16	0.2	0.06	0.04	2.4	4.7	4.6	1.3
Sodom	3740	60.3	28.9	2.09	0.3	0.04	0.03	1.6	4.8	3.9	1.0
George Lewis	3741	60.6	29.7	2.04	0.3	0.03	0.02	1.2	4.7	2.9	0.9
Jasper Roberts	3742	58.5	28.2	2.07	0.6	0.03	0.02	2.6	5.2	4.6	2.5
Higgins Creek	3806	60.0	27.1	2.21	1.3	0.07	0.13	0.9	4.9	5.5	2.7
Laurelton Chapel	3834	60.0	27.9	2.15	0.3	0.04	0.03	0.6	4.9	5.9	3.3
Little Foster Cr.	3859	61.1	28.7	2.13	0.1	0.04	0.03	1.0	4.7	4.1	0.8
Edwards #1	3860	60.0	27.9	2.15	0.4	0.04	0.03	1.8	4.8	4.9	1.2
Edwards #2	3861	61.3	28.4	2.16	0.1	0.04	0.03	1.0	4.7	4.2	0.7
R. Franklin	3862	60.6	29.0	2.09	0.2	0.04	0.03	0.5	4.8	4.5	1.4

Table 8

Chemical Analyses, Leached Concentrate

<u>Location</u> <u>Name</u>	<u>Lab.</u> <u>No.</u>	<u>Chemical Analyses, %</u>		
		<u>LOI</u>	<u>Fe₂O₃</u>	<u>Acid</u> <u>Soluble</u>
Edwards #3	3686	5.0	3.6	1.4
Brackens	3709	4.8	3.6	0.6
Shelton	3710	4.7	4.0	0.3
Wolf Branch	3711	4.2	6.8	1.5
Devils Den	3712	4.7	4.6	0.6
Hamlin	3713	4.4	6.3	1.4
Peters Cove	3714	4.9	4.5	1.3
Parker	3716	4.8	3.8	0.7
Tipton	3720	5.2	2.7	1.5
Goforth	3721	4.8	2.9	0.8
Mashburn	3722	4.8	2.9	0.6
Carver	3723	4.7	4.4	0.5
Wilson	3725	4.6	3.4	1.0
Guy Roberts	3739	4.8	4.5	1.3
Sodom	3740	4.9	3.5	0.9
George Lewis	3741	4.8	2.9	0.7
Jasper Roberts	3742	5.2	4.5	1.1
Higgins Creek	3806	4.7	5.4	1.7
Laurelton Chapel	3834	4.7	5.8	1.9
Little Foster Cr.	3859	4.7	4.1	0.6
Edwards #1	3860	4.8	4.8	0.9
Edwards #2	3861	4.6	4.2	0.7
R. Franklin	3862	4.7	4.5	0.8

Table 9

Location of Soapstone Processing Plants

<u>Location Name</u>	<u>TVA Quad Number</u>	<u>N. C. Grid Location</u>		<u>Type of Work Performed</u>
		<u>North</u>	<u>East</u>	
Marshall	191-SW	766,000	906,350	Ground powder. Cut blocks & pencils.
Devils Den	191-NW	801,200	918,100	Cut blocks and pencils.
Shelton	191-NW	808,700	925,900	Cut blocks.
Edwards	191-NW	808,700	926,800	Cut blocks.
Brackens	191-NE	810,400	928,800	Cut blocks.
Peters Cove	191-NE	822,900	940,000	Cut blocks and pencils.
Sodom	191-NW	801,150	906,300	Cut blocks and pencils.
Flag Pond	190-SE	610,950*	3,018,100*	Ground powder. Cut blocks & pencils.

* Tennessee Grid Locations

Table 10

Location of Marble Outcrops Within the Soapstone District

<u>Location Name</u>	<u>TVA Quad Number</u>	<u>N. C. Grid Location</u>	
		<u>North</u>	<u>East</u>
Big Laurel	191-NW	806,550	920,600
Walnut Creek	191-SW	771,700	899,900
Redmon Dam	191-SW	764,750	899,650
Bear Creek Ch.	191-SW	758,000	897,500

Table 11

Zinc Analysis of Selected Magnetic Fractions

<u>Location Name</u>	<u>Lab Number</u>	<u>Mag. Frac. as % of Head Feed</u>	<u>Analysis % Zn</u>	<u>Calc. Zn* in Head Feed</u>
Brackens	3709	4.9	0.019	0.0009
Devils Den	3712	2.3	0.015	0.0003
Peters Cove	3714	7.1	0.018	0.0013
Tipton	3720	14.3	0.024	0.0034
Wilson	3725	28.2	0.010	0.0028
Sodom	3740	6.9	0.014	0.0010
Little Foster Creek	3859	1.1	0.013	0.0002
Edwards #1	3860	1.3	0.022	0.0003

* Calculated assuming 100 % of Zn in head feed was recovered in magnetic fraction.