

FILE NAME: RT Vanderbilt (RTV)

DATE: 1981 Jan 29

DOC#: RTV099

DOCUMENT DESCRIPTION: Inter-Office Memo - NYTAL Contains Tremolite

FEB 2 1981

INTER-OFFICE MEMORANDUM

Date: January 29, 1981

To: Dr. C. S. Thompson

From: K. C. Rieger

Subject: Mineralogy of NYTAL 300(EC-1) and NYTAL 400(EC-2)

Project Code 00554-2-30-04 - Basic Mineralogy of All RTV Crude
Ores and All Mineral Products

Introduction:

A round-robin test was performed on NYTAL 300 and NYTAL 400. The careful splitting program conducted by A. M. Harvey resulted in samples for E.M.V., McCrone, the Bureau of Mines, and RTV. The question was if there was any detectable asbestos in the product.

McCrone's data, using light microscopy, states 10-15% tremolite-actinolite(90% fibrous) in EC-1 and 7-10% tremolite-actinolite(100% fibrous) in EC-2.

The purpose of this work is to determine the approximate quantity of tremolite in these products, which is obviously considerably higher than the numbers indicated by McCrone.

Procedure:

The samples were randomized in three different directions, to determine the reproducibility and compensate for the fact that no rotating sample holder was used. The net peak height (NPH) was recorded for selected peaks for tremolite, talc, serpentine, anthophyllite, anthophyllite & calcite, dolomite?, and diopside? The NPH for the later two minerals has been very small and a positive identification based on the major peak only is uncertain.

Subsequently, the samples were treated with dilute HCl (1 part HCl ~ 1 part water by weight) using our standard acid solution procedure(10 g. ~ 18.5 cc HCl solution, 2 hour digestion stirring every 15 minutes and washing with warm distilled water).

Since the material was limited, a short acid treatment was devised using one gram of material, 5 ml. acid solution for 1 minute before washing with warm distilled water.

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EC-1 and EC-2 were submitted to the Analytical Department including the samples obtained after "short" and "regular" acid solubility test for a CaO analysis.

The purpose was to have some back up data for semi-quantification of tremolite using XRD. The following minerals can contribute to CaO:

	<u>CaO</u>
tremolite*	13.4%
calcite	56.0
dolomite	30.4
diopside	~ 23.0%

*major constituent in tremolitic talc, while calcite may be present in trace quantities, and dolomite and diopside in minute trace quantities.

Results:

The net peak height for the minerals present in EC-1 and EC-2 are recorded in Table 1, 1A, and Table 2, 2A respectively.

The peaks chosen for semi-quantification are based on earlier work which shows that certain peaks are less susceptible to NPH changes with different particle size ranges.

If we use -325 m tremolite as our standard (Table 3) and average the percentage tremolite, we come to:

62% for EC-1 (N-300)
55% for EC-2 (N-400)

The percent range in our MSD sheets is recorded as 40-60% non-asbestiform tremolite and/or anthophyllite.

The data indicate that during the acid solubility test, tremolite, talc, and anthophyllite were not affected, while calcite was eliminated, and the potential traces of dolomite were reduced. Serpentine may have been affected by the acid treatment.

	<u>EC-1</u>	<u>EC-2</u>
Acid Solubility:		
short treatment	8%	8%
regular procedure	5.9%	9.5%

The CaO data obtained from the Analytical Department would indicate a 52.6% tremolite content for EC-1 and a 43.4% tremolite content for EC-2 if all the CaO content would be reported as tremolite.

This would indicate that our XRD results were somewhat over-estimated (~10%).

Conolusion:

The tremolite content in EC-1 is ~53% and in EC-2 ~43%.

KCR:dnr

cc: I. Gibbs
A. M. Harvey ✓

TABLE 1

EC-1 NYTAL 300					ACID SOL	
	①	②	③	AVER	② SHORT TREATMENT	② NORMAL PROCED.
20 TALC						
9.45	16	31	33	27	28	15
36.00	18	16	14	16	16	15
SERP.						
12.15	13	20	21	18	12	11
24.4	15	21	22	19	17	15
ANTH.						
27.6	9	11	10	10	8	7
ANTH. + CALCITE						
29.4	23	41	40	35	18	11
DOLOMITE (?)						
31.0	4	3	5	4	2	2
DIOPSIDE (?)						
29.9	5	5	5	5	6	6

TREMOLITE

EC-1
NYTAL 300-

Card #13-437

ACID SOL. ^{150% 1A}

d Å	2θ	I/I ₁	hkl	①	②	③	AVER	SHORT TREATMENT	NORMAL PROCEDURE
8.98	9.84	16	020					(2)	(2)
8.38	10.55	100	110	28	53	53	45	28	24
5.07	17.5	16	130,001						
4.87	18.2	10	111						
4.76	18.6	20	200						
4.51	19.7	20	040	15	15	17	16	17	17
4.20	21.15	35	220	7	12	12	10	8	7
3.870	23.0	16	131						
3.376	26.4	40	150,041						
3.268	27.3	75	240	30	39	38	36	30	28
3.121	28.6	100	310						
3.028	29.5	10	311,241						
2.938	30.4	40	151	33	32	28	31	34	29
2.805	31.9	45	330	12	18	20	17	11	9
2.730	32.8	16	421						
2.705	33.1	90	151						
2.592	34.6	30	112,061						
2.529	35.55	40	202,002	28	23	21	24	25	25
2.407	37.4	8	132						
2.380	37.8	30	350,400	8	8	8	8	8	6
2.335	38.6	30	351	27	22	26	25	24	25
2.321	38.8	40	421	20	19	20	20	17	16
2.298	39.2	12	420,071						
2.273	39.7	16	112						
2.206	40.9	6	242,042						
2.181	41.4	6	441						
2.163	41.8	35	171,261	17	24	25	23	22	24
2.042	44.4	18	081,280	10	7	8	8	9	12
2.015	45.0	45	202	17	17	17	17	17	16
2.002	45.3	16	351,370						
1.963	46.2	6	281,190						
1.929	47.1	6	152						
1.892	48.1	50	510	10	19	18	16	14	11
1.864	48.9	16	460,191						
1.814	50.3	16	530	6	8	9	8	7	6
1.746	52.4	6	203						
1.686	54.4	10	003,282						
1.649	55.7	40	2101						
1.639	56.1	10	480,511						

WES000845

TABLE 2

EC-2 NYTAL 400					ACID SOL.	
	①	②	③	AVER.	② SHORT TREATMENT	② NORMAL PROCEDURE
20 TALC						
9.45	16	15	16	~16	14	18
36.00	21	21	21	21	23	22
SERP.						
12.15	13	13	12	13	12	13
24.4	17	16	16	16	14	14
ANTH.						
27.6	2.5	2.5	4	3	3	~ 3 ?
ANTH. + CALCITE						
29.4	17	16	15	16	4	7
DOLOMITE(?)	~					
31.0	~ 2.5	—	1 ?	1	—	1 ? ?
DIOPSIDE(?)						
29.9	—	~ 1.5	1 ?	1	—	1 ? ?

EC-2
NYTAL 400

Card #13-437



TABLE 2A
ACID SOL.

TREMOLITE

d Å	2θ	I/I ₁	hkl	①	②	③	AYER	SHORT TREATM.	NORMAL PROCEDURE
8.98	9.84	16	020						
8.38	10.55	100	110	22	20	21	21	20	25
5.07	17.5	16	130,001						
4.87	18.2	10	111						
4.76	18.6	20	200						
4.51	19.7	20	040	15	15	14	15	14	15
4.20	21.15	35	220	6	5	6	6	5	6
3.870	23.0	16	131						
3.376	26.4	40	150,041						
3.268	27.3	75	240	23	22	21	22	20	27
3.121	28.6	100	310						
3.028	29.5	10	311,241						
2.938	30.4	40	151	25	26	27	26	25	32
2.805	31.9	45	330	9	8	9	9	7	8
2.730	32.8	16	421						
2.705	33.1	90	151						
2.592	34.6	30	112,061						
2.529	35.55	40	202,002	25	28	30	28		
2.407	37.4	8	132						
2.380	37.8	30	350,400	6	4	4	5	5	6
2.335	38.6	30	351	21	21	20	21		
2.321	38.8	40	421						
2.298	39.2	12	420,071						
2.273	39.7	16	112						
2.206	40.9	6	242,042						
2.181	41.4	6	441						
2.163	41.8	35	171,261	22	19	19	20	19	22
2.042	44.4	18	081,280	8	9	8	8	9	9
2.015	45.0	45	202	13	12	13	13	13	13
2.002	45.3	16	351,370						
1.963	46.2	6	281,190						
1.929	47.1	6	152						
1.892	48.1	50	510	9	6	7	7	9	8
1.864	48.9	16	460,191						
1.814	50.3	16	530	5	4	5	5	4	5
1.746	52.4	6	203						
1.686	54.4	10	003,282						
1.649	55.7	40	2101						
1.639	56.1	10	480,511						

WES000847

TREMOLITE

Card #13-437

TREMOLITE

ST. LAW. CO, N.Y. - 325m

TABLE 3

d Å	2θ	I/I ₁	hkl		EC-1	EC-2	
8.98	9.84	16	020		[2 TREMOLITE]		
8.38	10.55	100	110	41			
5.07	17.5	16	130,001				
4.87	18.2	10	111				
4.76	18.6	20	200	8			
4.51	19.7	20	040	31	57.6	48.4	
4.20	21.15	35	220	10			
3.870	23.0	16	131				
3.376	26.4	40	150,041				
3.268	27.3	75	240	51			
3.121	28.6	100	310				
3.028	29.5	10	311,241				
2.938	30.4	40	151	49	63.3	53.0	
2.805	31.9	45	330	15			
2.730	32.8	16	421				
2.705	33.1	90	151				
2.592	34.6	30	112,061				
2.529	35.55	40	202,002	43	55.8	65.1	
2.407	37.4	8	132				
2.380	37.8	30	350,400	11			
2.335	38.6	30	351	36	69.4	58.3	
2.321	38.8	40	421	22			
2.298	39.2	12	420,071				
2.273	39.7	16	112				
2.206	40.9	6	242,042				
2.181	41.4	6	441				
2.163	41.8	35	171,261	40	70.0	50.0	
2.042	44.4	18	081,280	23			
2.015	45.0	45	202	18			
2.002	45.3	16	351,370				
1.963	46.2	6	281,190				
1.929	47.1	6	152				
1.892	48.1	50	510	12			
1.864	48.9	16	460,191				
1.814	50.3	16	530	10			
1.746	52.4	6	203				
1.686	54.4	10	003,282				
1.649	55.7	40	2101				
1.639	56.1	10	480,511		62%	53%	0848