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CONFIDENTIAL MATERIALS ENCLOSED

January 3, 1992

Ivan B. Rubin, Esq.
Levy, Phillips & Konigsberg
99 Park Avenue
New York, New York 10016

Re: City of New York, et ano v.
Keene Corporation, et al.
Supreme Court, New York County
Index No. 44559/84

City of New York, et ano v. AAER
Sprayed Insulations, Inc., et al.
Supreme Court, New York County
Index No. 19280/87

City of New York v. AAER
Sprayed Insulations, Inc., et al.
Supreme Court, New York County
Index No. 19288/87

Dear Ivan:

In accordance with the Confidentiality Stipulations so ordered by Referee Diamond on December 5, 1991, enclosed is a set of GAF Corporation's product formula information with respect to its asbestos-containing industrial thermal insulation products. Floor tile pattern books and samples will be made available for inspection and photographing at our offices on a mutually convenient date. Please give us at least two weeks advance notice of the date on which you would like to inspect and photograph these floor tile materials so that we will have sufficient time to obtain them from our client.

Finally, as we previously informed you, we are not yet able to furnish you with any roofing-related materials. As soon as we can, we will let you know.

Very truly yours,

Jason T. Cohen

JTC:pc
Enclosure

CALSILITE®

With the support and at the behest of the United States Government which needed to increase wartime production of shipboard insulation materials, in 1944 Ruberoid constructed a Calsilite® plant to manufacture Calsilite® pipe covering and block insulation. The plant was completed in approximately November, 1944. Some limited production of Calsilite® occurred prior to the plant's completion. GAF believes that all Calsilite® production during World War II was for the United States Navy. In June, 1947 the Calsilite® facility was shut down temporarily and all outstanding orders were cancelled. The facility was reopened on July 10, 1947 and operated on a pilot plant basis until March 7, 1949. During this research project period, production was limited and of an experimental nature. Calsilite® was again manufactured on a commercial basis by Ruberoid beginning on March 7, 1949, and then by General Aniline & Film Corporation in 1967, and then by GAF Corporation from 1968 to October, 1971.

Calsilite® was a lightweight, hard, calcium silicate insulation designed to withstand temperatures up to 1250° F. Calsilite® pipecovering was manufactured in three-foot lengths and in varying thicknesses. It was available in half-sectional pieces, and, at various times, in three-segmental and regular segmental shapes, for assembly around a pipe in single or double layers. Pipe covering normally was provided with standard weight cotton or canvas jackets applied with silicate of soda.

No "T's," elbows or joints were produced. Flat Calsilite® blocks were manufactured, at various times, in 18 or 36-inch lengths, in widths from 3 to 36 inches, and in thicknesses up to 4 inches. Six-inch wide curved segmental blocks, capable of contouring more easily for insulation of large pipes and circular vessels, also were available.

Calsilite® was manufactured by a "pan-molding" method until 1964 when Ruberoid began using a "filter-press" method or process. Pan-molded Calsilite® was grayish white and relatively smooth, with some small holes. Calsilite® filter press was grayish white with screen marks on the outer surfaces.

Calsilite®-Hi, developed in or around 1960, could withstand temperatures up to 1800° F. In the mid-to-late 1960s, Ruberoid developed Calsilite® SS, an "inhibited" product designed specifically to prevent stress corrosion and cracking of stainless steel piping.

In addition to formula changes made in connection with product development, the Calsilite® formula was adjusted often in order to compensate for changes in the quality and availability of raw materials. GAF does not have a complete set of all the formulas used in Calsilite® production nor does it have complete information about the production dates of known formulas. To the extent available, the mineral and chemical constituents and the weight of each constituent as a percentage of all solid constituents in Calsilite® production formulas are listed below, together with known dates of production.

1. Calsilite® 82: 7/2/43; 3/2/44; 6/9/47

bentonite[1]	15.0
chrysotile (3R, 4M and 4T)	14.6
gypsum	6.7
lime	23.5
silica	33.5
silicate of soda[2]	6.7

2. Calsilite® 82 NG: 7/8/43; 8/10/43; 8/13/43; 8/18/43; 8/21/43; 1/6/44; 3/2/44

bentonite	15.87
chrysotile (3R, 4M and 4T)	15.87
lime	25.52
silica	35.69
silicate of soda	7.05

3. Calsilite® 23: 5/10/44; Nov. 1944 - mid-1946

amosite (M1 and waste fiber)	5.93
bentonite	13.33
chrysotile (4M and 4T)	7.41
lime	20.74
plaster of paris	5.93
silica sand 140 mesh[3]	29.63
silicate of soda	15.80

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1 Bentonite, an aluminum silicate type of montmorillionitic clay, was purchased from The American Colloid Company. KWK and Black Hills bentonite were the two main sources of supply circa 1954.

2 Sodium silicate, also referred to as "silicate of soda" or "water glass", was purchased from Philadelphia Quartz Co. in an N grade (1:3.22 ratio of sodium to silica).

3 Silica sand also referred to as "silica flour" or "ground silica sand", was purchased from Pennsylvania Glass Sand Co. in Midville, NJ and possibly from South River Sand Co. in the same area. It was a very pure sand with very little staining from organic contaminants. 150 mesh silica sand was used in some pilot plant production (see formula nos. 13-15, below), and 120 mesh ground silica also was used in Calsilite® production at least in September and November of 1954. (See formula no. 23.)

4. Calsilite® 23 NG82: 5/10/44; Aug. 1946

asbestos (M1 and waste, amosite, 4M and 4T)	14.25
bentonite	14.25
lime	23.00
silica	31.75
silicate of soda	16.75

5. Calsilite® 88: Aug. - Oct. 1946

amosite (DS)	6.48
bentonite	13.50
chrysotile (4M)	7.02
pulverized lime[4]	26.00
scrap	10.00
silica sand	37.00

6. Calsilite® 89: 11/18/46 - 12/3/46

amosite (M1 and DS)	10.58
bentonite	12.75
chrysotile (4M)	1.80
pulverized lime	24.52
scrap	15.00
silica	34.98

7. Calsilite® 88B: 12/30/46; Jan. 1947

asbestos	12.48
bentonite	12.48
lime	24.70
sand	38.72
scrap	11.44
silicate of soda	.68

8. Calsilite® 88B/85: 4/7/47

amosite (M1 and DS)	10.88
bentonite	12.65
chrysotile (4T)	1.77
lime	25.32
sand	39.17
scrap	9.58
silicate of soda	.68

[4] Pulverized quicklime (CaO) was believed to have been purchased from Corrison Lime Co. or Warner Lime in Warner, PA. Pelletized (or "pebbled") quicklime also may have been used at times.

9. Calsilite® 116-C: Pilot plant (7/10/47; 7/14-15/47)

amosite (M1)	6.2
Celite FC[5]	6.5
chrysotile (3R and 4T)	12.4
pulverized quicklime	27.9
pulverized PHD (pressure hydrated dolomite) lime[6]	4.9
silica sand	42.1

10. Calsilite® 116-CP: Pilot plant (7/10/47; 7/14-15/47)

amosite (M1)	5.8
Celite FC	6.1
chrysotile (3R and 4T)	11.6
plaster of paris	6.2
pulverized quicklime	26.2
pulverized PHD lime	4.6
silica sand	39.5

11. Calsilite® 116-C-2(116-CC-2-22): Pilot plant (7/22-23/47)

amosite (M1)	8.94
chrysotile (3Z and 4T)	9.66
diatomaceous earth	6.51
PHD	4.89
pulverized lime	27.91
pulverized silica	42.09

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5 Celite F.C., a Johns-Manville tradename for diatomaceous earth, was used in the Calsilite® formula at least in November 1954. (See Formula no. 23, below.) However, the trade name "Celite" also may have been used as a generic term for diatomaceous earth. Dicalite, the tradename for a fresh water type of diatomaceous earth from The Great Lakes Carbon Co.'s Nevada deposit, was also used in Calsilite® production. Processed Dicalite, to which sodium silicate had been added, may have been used, as well as unprocessed Dicalite. Some diatomaceous earth also may have been purchased from one or more other producers.

6 $Ca(OH)_2$ $Mg(OH)_2$. The composition, as used in Sept. 1947, was 30.65% MgO, 41.8% CaO, 25.41% H_2O, and 2.14% miscellaneous constituents.

12. Calsilite® 116-CC-7-ES3: Pilot plant (Sept. 1947 - March 1948)

amosite (M1)	5.57
chrysotile (3T, 3Z and 4T)	12.41
diatomaceous earth, uncalcined	6.29
magnesium sulphate[7]	3.37
PHD	4.94
pulverized quicklime	26.97
silica sand 140 mesh	40.45

13. Calsilite® 46-B-H: Pilot plant (circa 11/20/47)

Celite FC	42.47
chrysotile (3R and 4T)	15.16
pulverized quicklime	32.64
silica sand 150 mesh	9.73

14. Calsilite® 46-D-H: Pilot plant (circa 11/20/47)

Celite FC	43.2
chrysotile (3R)	9.6
pulverized quicklime	32.8
silica sand 150 mesh	14.4

15. Calsilite® 46-G: Pilot plant (circa 12/4/47)

Celite FC	50.40
chrysotile (3R)	9.60
pulverized quicklime	32.80
silica sand 150 mesh	7.20

16. Calsilite® 118: Pilot plant (circa March - April 1948)

amosite (M1)	2.91	
Celite FC	12.56	
chrysotile (3T, 3Z and 4T)	7.85	
lime	27.80	
magnesium sulphate	3.36	
PHD	2.47	
sand 140 mesh	34.08	
scrap	8.97	(2.25 fiber)

7 Commercial grade epsom salts were used.

17. Calsilite® 118A: Pilot plant (3/23/48; 4/1/48)

amosite (M1)	3.92	
Celite FC	11.92	
chrysotile (3T, 3Z and 4T)	11.92	
Cyclone dust (6.76) and scrap (2.24)	9.00	(2.25 fiber)
magnesium sulphate	3.36	
PHD	2.46	
pulverized quicklime	26.44	
silica sand 140 mesh	34.06	

18. Calsilite® 118B: Pilot plant (4/1/48)

amosite (M1)	3.92	
Celite FC	11.92	
chrysotile (3T, 3Z and 4T)	8.84	
Cyclone dust (4.1), Pangborn dust (1.75) and scrap (3.15)	9.00	(2.25 fiber)
magnesium sulphate	3.36	
PHD	2.46	
pulverized quicklime	26.44	
silica sand 140 mesh	34.06	

19. Calsilite® 119B: Pilot plant (circa April - July 1948)

amosite (M1)	3.50
bentonite	4.98
Celite FC	10.54
chrysotile (3R, 3Z and 4T)	7.80
lime	23.54
magnesium sulphate	2.85
PHD	2.18
sand	30.27
scrap	14.35

20. Calsilite® 119B-FC: Pilot plant (circa summer 1948) - 1954

amosite[8]	3.78
bentonite	5.00
Celite FC	10.57
chrysotile (3R, 4T and 3Z)	8.49
magnesium sulphate	2.96
pressure-hydrated dolomite	2.19
pulverized quicklime	23.47
scrap	13.31
silica sand 140 mesh	30.23

8 M1 was used until at least Oct. 1951. A combination of M1 and W3 may have been used at certain times in 1952. MD may have been used in the Spring of 1953, and a combination of K3 and W3 used in late 1953.

21. Calsilite® 46H: Pilot plant (circa 10/5/48)

chrysotile (3R)	9.64
diatomaceous earth	50.25
pulverized lime	32.75
pulverized silica	7.37

22. Calsilite® 46-H-3: Pilot plant (circa 10/14/48)

bentonite	4.18
chrysotile (3R and 4T)	11.13
diatomaceous earth	35.65
pulverized lime	33.70
silicate	1.85
silica soda	12.95

23. Calsilite® 119-HS-510 and 119B-HS-510: 1954 - 12/21/56; 2/8/57 - ?

amosite [9]	4.08
bentonite	5.38
Celite FC	13.91
chrysotile (3R and 4T)	9.14
magnesium sulphate	3.19
pulverized quicklime	25.12
scrap	6.63
silica sand 140 mesh	32.55

24. Calsilite® Modified 119-HS-510: Jan. 1957

amosite	13.2
bentonite	5.4
Celite FC	13.9
magnesium sulphate	3.2
pulverized quicklime	25.1
scrap	6.65
silica sand 140 mesh	32.55

9 The original amosite blend for this formula was of MD, K3 and W3. On June 28, 1954, the blend was changed to a blend of D11, K3 and W3. By November 20, 1956, the blend had been changed to D11, DX and W3.

25. Calsilite® XF-119-HS-510-P: Sept. 1957; Oct. 1957; Nov. 1957

amosite (D11, DX, W3, D3 and SW)	7.05
bentonite	5.16
Celite	13.93
chrysotile (3R and 4T)	6.19
magnesium sulphate	3.21
quicklime	25.21
scrap	6.59
silica sand 140	32.66

26. Calsilite® XC-20: Oct. 1961

amorphous silica (Tripoli)[10]	31.41
amosite (DX, D11 and AW)	9.41
bentonite	5.16
chrysotile (5R)	3.54
diatomaceous earth (Dicalite or Celatom)[11]	15.76
lime	34.72

27. Calsilite® XC-24: Oct. 1961

amorphous silica (Tripoli)	19.75
amosite (DX, D11 and AW)	9.41
bentonite	4.94
chromite	2.48
chrysotile (5R)	3.54
diatomaceous earth	23.04
lime	31.57
limestone	5.27

28. Calsilite® XC-25: Oct. 1961; Jan. 1962

amorphous silica (Tripoli)	31.41
amosite (DX and D11)	6.78
China clay[12]	5.16
chrysotile (4T-3 and 5R)	6.17
diatomaceous earth	15.76
lime	34.72

10 Tripoli, also referred to as "pozzolano," was a volcanic ash.

11 Celatom is the tradename of diatomaceous earth purchased from Eagle Picher.

12 China clay, also referred to as kaolin clay, was a hydrous aluminum silicate purchased primarily from Georgia and South Carolina suppliers.

29. Calsilite® XC-26: Oct. 1961

amorphous silica (Tripoli)	33.40
amosite (DX and D11)	6.78
chrysotile (4T-3 and 5R)	6.17
diatomaceous earth	16.73
lime	36.92

30. Calsilite® XC-34: Circa 4/27/62

amorphous silica (Tripoli)
amosite (DX, D11 and AW) [Percentages unknown]
bentonite (or China clay?)
chrysotile
diatomaceous earth
lime

31. Calsilite® XC-51: Nov. 1962

amorphous silica	24.10
amosite (D11, W3 and AW)	9.75
China clay	5.38
chrysotile (5R)	3.33
diatomaceous earth (Dicalite 677)	23.08
quicklime	34.36

32. Calsilite® XC-55: Dec. 1962; Mar. 1963

amorphous silica	27.41
amosite (D11 and W3)	10.15
#80 China clay	5.08
chrysotile (Johnson's or 5R)	3.81
diatomaceous earth (Dicalite)	19.29
quicklime	34.26

33. Calsilite® XC-57: Mar. 1963; April 1963

amorphous silica	27.16
amosite (W3)	11.42
#80 China clay	5.08
chrysotile (5R)	3.55
diatomaceous earth (Dicalite)	19.04
quicklime	33.75

34. Calsilite® Filter Press Formula (FP 60?): Circa 2/17/64

amosite (W3)	10.0
chrysotile (5R)	4.5
diatomaceous earth (Dicalite)	51.3
lime	34.2

35. Calsilite® FP 61: Circa 2/15/65

amorphous silica (Tripoli)	2.0833
amosite (W3)	9.375
chromite	2.0833
chrysotile (5R)	4.271
diatomaceous earth (Dicalite)	48.073
lime	32.031
sodium silicate (SS20)	2.0833

36. Calsilite® FP 62: Circa 2/15/65

amosite (W3)	9.574
chromite	2.1275
chrysotile (5R)	4.362
diatomaceous earth (Dicalite)	49.096
lime	32.731
sodium silicate (SS20)	2.1275

37. Calsilite® FP 64: Aug. 1965

amosite (W3)	9.57
China clay	1.06
chromite	2.13
chrysotile (5R)	4.36
diatomaceous earth (Dicalite)	49.10
lime	32.71
sodium silicate (SS20)	1.06

38. Calsilite® FP 65: Aug. 1965

amosite (W3)	9.66
China clay	1.07
chromite	2.15
chrysotile (5R)	4.40
diatomaceous earth (Dicalite)	49.52
lime	32.99
sodium silicate (SS20)	.21

39. Calsilite® FP 66: Aug. 1965; Oct. 1965

amosite (W3)	9.67
China clay	1.07
chromite	2.15
chrysotile (5R)	4.41
diatomaceous earth (Dicalite)	49.60
lime	33.04
sodium nitrate	.05

40. Calsilite® FP 67: Oct. 1965; Dec. 1965; Jan. 1966

amosite (W3)	9.57
clay	2.13
chromite	2.13
chrysotile (5R)	4.36
diatomaceous earth (Dicalite)	49.07
lime	32.70
sodium nitrate	.05

41. Calsilite® FP 70: 3/9/66 - 3/22/66

amosite (W3)	8.74
China clay	2.17
chromite	2.17
chrysotile (5R)	3.42
diatomaceous earth (Dicalite)	50.80
lime	33.37
sodium nitrate	.05

42. Calsilite® FP 71: 3/22/66 - 4/1/66

amosite (W3)	9.04
China clay	2.25
chromite	2.25
diatomaceous earth (Dicalite)	51.85
lime	34.55
sodium nitrate	.06

43. Calsilite® FP 72: April 1966

amosite (W3)	8.82
China clay	2.19
chromite	2.19
chrysotile (5R)	4.46
diatomaceous earth (Dicalite)	50.55
lime	33.68
soda ash	.11

44. Calsilite® FP 76: Aug. 1966; Sept. 1966

amosite (W3)	[Percentages unknown]
clay	
diatomaceous earth (Dicalite)	
lime	
sodium nitrite	

45. Calsilite® FP 77: 9/14/66 - 2/13/67

amosite (W3)	9.5
diatomaceous earth (Dicalite)	54.3
lime	36.2
sodium nitrite	varied daily

46. Calsilite® FP 78: 2/13/67 - 5/13/67

amosite (W3)	9.0
diatomaceous earth (Dicalite)	54.6
lime	36.4

47. Calsilite® FP 80: 5/26/67 - 6/15/67; 10/27/67 - ?; 2/8/68 - 3/24/68

amosite[13]	8.39
diatomaceous earth (Dicalite)	54.97
lime	36.64

48. Calsilite® FP 81: 6/15/67 - 7/20/67; 8/7/67 - 10/27/67

amosite (W3)	7.84
diatomaceous earth (Dicalite)	55.30
lime	36.86

49. Calsilite® FP 82: 7/20/67 - 8/7/67

amosite (W3)	7.57
diatomaceous earth (Dicalite)	55.46
lime	36.97

50. Calsilite® FP 84: 3/24/68 - May 1968

amosite (K3)	8.6
diatomaceous earth (Dicalite)	54.9
lime	36.5

51. Calsilite® Inhibited Formula FP 100: Mar. 1968; May 1968

amosite (K3)	9.44
diatomaceous earth (Dicalite)	45.85
lime	36.76
sodium silicate (SS20)	7.95

[13] W3 was used in early 1967; DX and K3 were used in 10/67.

52. Calsilite® Special Inhibited Formula:		May 1968
amosite (K3)	9.56	
diatomaceous earth (Dicalite)	44.10	
lime	36.78	
sodium silicate (SS20)	9.56	

ASBESTOS PAPER AND MILLBOARD PRODUCTS

Asbestos paper, millboard and laminated products were manufactured by Ruberoid from 1928 to 1967, and then by General Aniline & Film Corporation in 1967, and then by GAF Corporation from 1968 to 1981.

Asbestos Paper

Asbestos paper was designed to be used alone or in the manufacture of other products. It was manufactured in various thicknesses, according to customer specifications. Asbestos paper had a temperature limit of 250 degrees F. Its primary constituent was chrysotile asbestos, generally a mixture of grades 5 to 7. Other constituents included sulphite pulp, diatomaceous earth and starch, although in the early years of manufacture this product may have consisted only of chrysotile and starch (which was sometimes in the form of tapioca).

The following formulas for asbestos paper products for the years 1960-1981 were derived from examinations of thousands of "Beater Furnish Reports" and "Commodity Specification and Cost Sheets", each of which reports the mix of constituents during production of a specific product on a specific day during the years 1960-1981. (The available "Beater Furnish Reports" and "Commodity Specification and Cost Sheets" and are not complete for that entire time period.) The percentage for each constituent in a given product is expressed as an average of all available "Beater Furnish Reports" and "Commodity Specification and Cost Sheets" for that product. In addition, the range of variation from the average is expressed as a plus or minus factor for each constituent.

1. E-500 and 501 Commercial Paper (Regular) (also known as Roll & Tape; Commercial 6# - 16#): 1969-81

chrysotile	89.0 ± 4.0%
bleached sulphite[1]	4.5 ± 2.0%
Celite[2]	4.5 ± 2.0%
starch	2.5 ± 2.0%
burtonite[3] (often used)	Traces not exceeding .5%
borax (occasionally used)	Traces not exceeding .5%

2. E-501 Lo-Organic Paper (also known as Roll & Tape): 1975-81

chrysotile	99.0 ± 1.0%
starch[4]	1.0 ± 1.0%
burtonite	Traces not exceeding 1.0%

3. E-500 Commercial Paper (with whiting): 1968, 1969

chrysotile	86.0 ± 3.0%
bleached or brown sulphite	5.0 ± 3.0%
whiting[5]	4.0 ± 1.0%
Celite	4.0 ± 1.0%
starch	Traces not exceeding 2.0%

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1 Bleached sulphite is wood pulp bleached white. Kraft may have been a name used for this product at other companies. Brown sulphite is unbleached wood pulp.

2 Celite is a Johns-Manville tradename for diatomaceous earth.

3 Burtonite is a trade name for a guar gum plant product formerly manufactured by the Burton J. Greenstreet Co. in Texas. Today, this product is more commonly known as Lycoid MD-7A.

4 Starch is uncooked or partially cooked anionic modified corn starch. Tapioca was used through the 1930's, but by 1940 starch had replaced tapioca as a constituent.

5 Whiting is ground limestone.

4. E-500 Commercial Paper (with whiting): 1960

chrysotile	89.6 ± 1.0%
bleached sulphite	2.0%
starch	2.3 ± 1.0%
whiting	4.1%
Save all[6]	2.0%
burtonite	Traces not exceeding 1%
borax	Traces not exceeding 1%

The following formulas for asbestos paper products were derived from documents dated during the period 1938-1940. GAF does not have a complete set of formulas for that period nor does it have complete information about the production dates of known formulas.

1. Commercial Asbestos Paper, 43A - Code 011 and Code 011U for Untreated Paper: Circa 7/24/39

chrysotile	96.8%
tapioca	3.2%
enzymes[7]	59 cc - Trace
5AC wax coating[8]	Trace

2. 10 - 12# Asbestos Paper - Code 011: Circa 9/15/38

chrysotile	97.0%
stayco	2.9%
5AC wax coating	Trace

3. 10 - 12# Asbestos Paper - Code 011U: Circa 9/15/38

chrysotile	96.8%
tapioca	3.2%
enzymes	59 cc - Trace

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6 Save all is water enriched with chrysotile and other formula constituents collected during the production process and reused in subsequent productions.

7 GAF does not know the specific type or source of these enzymes.

8 GAF knows nothing about this constituent except its name as shown.

4. 1/16" Asbestos Paper - Code 011U: Circa 10/31/38

chrysotile	98.4%
tapioca	1.6%
enzymes	29.5 cc - Trace

5. .050 Asbestos Felt - Code 021: Circa 11/3/38

chrysotile	99.9%
tapioca	.9%
enzymes	12 cc - Trace

6. .010 Special Asbestos Paper - Code 051: Circa 9/26/38

chrysotile	98.9%
tapioca	1.1%
enzymes	24 cc - Trace

7. .010 and .015 Asbestos Electric Paper - Code 041: Circa 9/26/38

chrysotile	88.0%
sulphite	8.8%
tapioca	3.2%
enzymes	56 cc - Trace

8. .031 -.036 Special Asbestos Paper: Circa 11/3/38

chrysotile	98.9%
tapioco	1.1%
enzymes	16 cc - Trace

9. #6 Asbestos for Corrugating - Code 200: Circa 8/8/38

chrysotile	92.1%
bleached sulphite	1.8%
tapioca	6.1%
enzymes	118 cc - Trace
Bennett size[9]	unknown - Trace

9 GAF knows nothing about this constituent except its name as shown.

10. #6 Asbestos for Corrugating - Code 200; Circa 9/15/38

chrysotile	92.1%
bleached sulphite	1.8%
tapioca	6.1%
enzymes	118 cc - Trace

11. 5-1/2 lb. Asbestos for Corrugating - Code 200: Circa 2/8/40

chrysotile	92.1%
bleached sulphite	1.8%
tapioca	6.1%
enzymes	Trace

12. 6# Asbestos Sponge Felt - Code 511: Circa 7/19/39

chrysotile	76.6%
sulphite tailings	10.0%
sponge	6.7%
tapioca	6.7%
enzymes	118 cc - Trace

13. 6# Asbestos for Corrugating - Code 512: Circa 9/26/38

chrysotile	91.3%
sulphite tailings	1.8%
tapioca	5.4%
Bennett size	1.5%
enzymes	103 cc - Trace

14. 6# Aristo Asbestos Felt, for Pipe Cover - Code 512: Circa 9/26/38

chrysotile	88.9%
sulphite tailings	1.8%
tapioca	4.9%
Bennett size	4.4%
enzymes	98 cc - Trace

15. .026 - .038 Caliper Asbestos Paper - Code 575: Circa 11/22/38

chrysotile	98.3%
tapioca	1.7%
enzymes	29.5 cc - Trace

16. .035 - .041 Caliper Asbestos Paper - Code 581: Circa 11/23/38

chrysotile	98.4%
tapioca	1.6%
enzymes	29.5 cc - Trace

17. .039 - .044 Caliper Asbestos Paper - Code 582: Circa 11/22/38

chrysotile	98.3%
tapioca	1.7%
enzymes	29.5 cc - Trace

18. 10# Asbestos Felt, 36" wide - Code 602: Circa 9/25/39

chrysotile	89.9%
sulphite	6.3%
tapioca	3.8%

19. 10# Asbestos Felt - Code 602: Circa 9/25/39

chrysotile	89.9%
sulphite	6.3%
tapioca	3.8%

20. 20# Asbestos Felt, 36" wide - Code 603: Circa 10/20/38

chrysotile	85.1%
felt	12.1%
tapioca	2.3%
enzymes	35.5 cc - Trace

21. 16# Asbestos Felt, 36" wide - Code 604: Circa 10/3/38

chrysotile	92.1%
bleached sulphite	9.9%
tapioca	3.0%
enzymes	53 cc - Trace

22. 23-25.0# Asbestos Felt 36" wide - Code 561: Circa 11/3/38

chrysotile	79.2%
dry felt	7.9%
wood flour[10]	11.9%
tapioca	1.0%
enzymes	16 cc - Trace

Rollboard

Rollboard was an asbestos paper product, consisting of plies of asbestos paper bonded together without glue to create thicknesses varying from 1/16 to 1/8 of an inch. Rollboard had a temperature limit of 250 degrees F. The following are formulas for rollboard from the years 1970-77 and were derived in the same manner as the GAF asbestos paper formulas from the years 1960-1981:

1. E-507 Rollboard (also known as 1/16" Rollboard; .062 - .066 Ply machine): 1970

chrysotile	91.0%
bleached sulphite	3.1%
Celite	4.1%
starch	.8%
burtonite	.4%
borax	.2%
blackshield[11]	.3%

2. E-507 Rollboard (also known as 1/16" Rollboard; .062 - .066 Ply machine): 1971-77

chrysotile	90.0 ± 2.0%
bleached sulphite	4.1 ± 1.0%
Celite	4.0 ± 1.0%
starch	1.0 ± 1.0%
burtonite	Traces not exceeding .5%

The following formula for rollboard was derived from a single document dated December 19, 1938.

10 GAF knows nothing about this constituent except its name as shown.

11 GAF knows nothing about this constituent except its name as shown.

3. Rollboard - Regular 1/8" Commercial Rollboard: Circa 12/19/38

chrysotile	92.3 %
tapioca	1.7 %
enzymes	29.5 cc - Trace

This Rollboard was made by plying two or more sheets of .035 - .038 asbestos paper, 36-3/4% wide, on the plying machine in the Millboard Department. Silicate of Soda was used in plying the 2-ply 1/16" Rollboard. Rye Flour was used in plying the 3- and 4-Ply Rollboard using the following formula:

28 Lbs. Rye Flour
30 Gals. Water
1 Gal. Silicate of Soda
7 Lbs. Pearl Starch

Millboard

Millboard was a stiffer product than asbestos paper or rollboard and was manufactured in sheets of varying thicknesses according to customer specifications. Millboard consisted generally of chrysotile asbestos, (usually grades 5D, 5R and 6D), sulphite pulp and often other constituents, bonded with Portland cement and/or starch. In later years, at least as early as 1974, latex was added as a binder. The following formulas for millboard products from the years 1960-1981 were derived in the same manner as the GAF asbestos paper formulas for those years:

1. E-100 CommercialMillboard (also known as Standard Insulation Board and Soft Millboard): 1968-81

chrysotile	92.0 ± 8.0%
Portland cement	8.0 ± 8.0%
burtonite	Traces not exceeding .5% in years 1974-1978

2. E-101 Commercial Millboard: 1960; 1972-81

chrysotile	84.0 ± 8.0%
Portland cement	16.0 ± 8.0%
burtonite	Traces not exceeding .5% in years 1972-78

3. E-101 Millboard (Regular or Mineralboard): 1978-79

chrysotile	70.5%
Portland cement	29.5%
burtonite (occasionally used)	Traces not exceeding .5%

4. E-102 Commercial Millboard (also known as Extrahard Millboard): 1960; 1969-71

chrysotile	70.0 ± 10.0%
Portland cement	30.0 ± 10.0%

5. E-104 Foundriboard[12]: 1969-79

chrysotile	65.0 ± 4.0%
Portland cement	35.0 ± 4.0%
burtonite	Traces not exceeding .5% in years 1975-78

6. E-101- L (Latex) Regular Millboard[13]: 1974-81

chrysotile	79.0 ± 4.0%
Portland cement	17.0 ± 5.0%
latex (GAF, Goodrich or Goodyear)	3.0 ± 2.0%
burtonite	Traces not exceeding .5%

7. E-109 Hi-Temp (low organic) Millboard: 1975-81

chrysotile	98.0 ± 1.0%
Portland cement	2.0 ± 1.0%

8. E-109 Hi-Temp Millboard[14]: 1979-81

chrysotile	89.0 ± 1.0%
Portland cement	11.0 ± 1.0%

9. Starch Board: 1979-80

chrysotile	88.0%
bleached sulphite	2.0%
starch	10.0%

12 A different formula consisting of 51.5% chrysotile and 48.5% Portland cement may have been used on occasion in 1978 and 1979.

13 A different formula consisting of 68% chrysotile, 28% Portland cement, and 3% latex may have been used circa December 1978.

14 A different formula consisting of 85% chrysotile and 15% Portland cement may have been used on occasion.

10. Commercial Millboard: 1969; 1973

chrysotile	89.0 ± 2.0%
bleached sulphite	5.0 ± 1.0%
Celite	4.0%
Starch (two types)	
Type 1	.1 ± .30%
Type 2	1.0 or 3.0%
burtonite (two types)	
Type 1 used if Borax was included in formula	.6%
Type 2 used if Borax was not included in formula	.3 ± .05%
borax (used in some batches)	.3%

11. Commercial Millboard 10-209: 1979

chrysotile	70.0%
Portland cement	30.0%

12. Regular Millboard 101 with whiting: 1971-75

chrysotile	63.0 or 69.0%
Portland cement	25.0 or 21.0%
whiting	12.0 or 10.0%

The following formulas for millboard products were derived from documents dated during the period 1938-40. GAF does not have a complete set of formulas for that period nor does it have complete information about the production dates of known formulas:

1. Soft Board - Code 100: Circa 12/15/38

chrysotile	84.3%
Portland cement	11.9%
lime	3.8%

2. Medium Hard Board - Code 101: Circa 12/15/38

For 1/16" through 1/8":

chrysotile	78.1%
Portland cement	18.4%
pebble lime	3.5%

For 3/16" and over:

chrysotile	81.1%
Portland cement	15.3%
pebble lime	3.6%

3. Hard Mill Board - Code 102: Circa 12/15/38

chrysotile	72.8%
Portland cement	23.9%
pebble lime	3.3%

4. Hard Mill Board, Special 1/16" - Code 202: Circa 12/15/38

chrysotile	73.7%
Portland cement	20.8%
pebble lime	5.5%

5. 1/4" Glass House Board for Montgomery Discs - Code 106: Circa 12/19/38

scrap (millboard broke)	80.4%
unbleached sulphite	4.5%
Portland cement	8.4%
pebbled lime	4.5%
starch	2.2%

6. 9/16" Mill Board - Code 107: Circa 12/19/38

chrysotile	85.0%
Portland cement	10.0%
pebble lime	3.8%
silicate of soda	1.2%

7. Foundriboard: Circa 12/19/38

chrysotile	65.8%
Portland cement	30.9%
lime	3.3%

This product was made in thicknesses from 1/16" to 1/2", usually 3/16", and of a maximum size of 42" by 48".

Corrugated Asbestos Paper

Corrugated asbestos paper was designed to be used alone or in the manufacture of other products. It was made in three types: 1/4 inch thickness per ply (4 plies/inch); 1/8 inch thickness per ply (6 plies/inch) and 1/16 inch thickness per ply (8 plies/inch). It was manufactured by adhering 36" to 37 1/2" wide flat sheets of asbestos paper (usually six pound paper) with silicate of soda to sheets of the same paper which had been corrugated using characteristic "Roman Arch" shaped corrugations, 26-28 to the foot. Its constituents were those of the asbestos paper from which it was constructed. Corrugated asbestos paper was sold in 250 and 500 square foot rolls.

Air Cell

Air cell was a corrugated asbestos paper product manufactured from 1928 to approximately 1958. It was constructed of layers to the thickness specified by the customer of 36 or 37-1/2 inch wide flat asbestos paper which was adhered to corrugated asbestos paper with silicate of soda. The corrugations of this product had a characteristic "Roman Arch" shape. As of 1938, the corrugated paper component had 28 corrugations per lineal foot. Each ply was 1/4 inch thick and air cell came in three standard thicknesses -- 2-ply, 3-ply, and 4-ply. Air cell pipe covering, sheets and blocks were sold. Often a canvas, cloth or pyroxiline jacket was applied to the outer surface of air cell pipe covering with an adhesive, usually a starch or cereal paste. 2-1/2 brass lacquered bands were provided for each canvas-jacketed section of air cell pipe covering to hold it to the pipe. With the pyroxyline jacket, three 1-inch wide black japan bands were supplied with each section. Air cell had a temperature limit of 250 degrees - 350 degrees F. Prior to 1935, air cell may have been sold only under the name "Celasbestos", which was available in 5, 6, 7 and 8 ply versions as well as 1-4 ply versions.

Watcocell

Watcocell was a corrugated asbestos paper product manufactured as Watcocel from 1928 to 1934, as Supercell from 1935 to 1942 and as Watcocell from 1942 to 1960. In 8-ply per inch Watcocell, the corrugations were 1/16" thick; in 6-ply, the corrugations measure about 1/8" thickness. Watcocell was sold in rolls, sheets and blocks. Watcocell's temperature limit was 250 degrees F.

Imperial Insulation

Imperial insulation was manufactured from at least 1936 to approximately 1960. It had a temperature limit of 500 degrees - 700 degrees F. Imperial paper consisted of two plies of flat asbestos paper which were passed through an indenting roll resulting in a waffle-like appearance with closely spaced square indentations. Imperial pipecovering was wound on a mandrel to achieve the desired thickness and canvas-covered. In early years of production, layers of Imperial may have been stapled together or stitched with strands of wire rather than wound on a mandrel. Imperial sheets and blocks were made of layers of Imperial paper glued to the desired thickness with a fireproof glue, such as silicate of soda. This product was sold with a canvas, asphalted felt or pyroxylin jacket.

Aristo Insulation

The years of manufacture of Aristo Insulation are unknown, except that it was listed for sale in and around 1940. It was a corrugated asbestos paper product with carefully measured indentations and 23-25 laminations per inch of thickness. Its temperature limit was 700 degrees - 750 degrees F. The asbestos paper used in this product was treated with a surface treatment, possibly Bennett size. This product was sold in a standard thickness of one inch, but often was used in thicknesses up to and exceeding three inches. Standard canvas and waterproof jackets were available for this product.

Sponge Felt

Sponge felt was manufactured from 1936 to approximately 1960. It consisted of asbestos sponge paper made by imbedding small pieces of sponge into asbestos paper. Its temperature limit was 750 degrees F. It was sold in 36-inch wide rolls, sheets and blocks which were produced in the same manner as Imperial products.

Woolfelt

Woolfelt, a wool or rag felt insulation manufactured from 1928 to approximately 1959, did not contain asbestos, but was sometimes sold with an asbestos paper liner or backing paper. Tar-lined woolfelt was sold with a tar paper liner which did not contain asbestos. Twin-purpose woolfelt was sold with a liner of asphalt coated asbestos paper.

Anti-Sweat Pipe Covering

Manufactured until approximately 1958, anti-sweat pipe covering was intended exclusively for residential use on cold water pipes. At least as early as 1936 this product was composed of an inner layer of asphalt-saturated asbestos paper followed by a ½ inch layer of woolfelt, 2 layers of asphalt-saturated asbestos paper, another ½ inch layer of woolfelt and two final layers of asphalt-saturated asbestos paper. The outermost layer had a flap extending at least 3 inches beyond the longitudinal joint. GAF does not know whether a jacket was ever provided with this product. This product was sold in 36 inch wide rolls and had a temperature limit of 50 degrees F.

Frost-Proof Pipe Covering

Practically nothing is known of this product which was apparently constructed of a layer of felt made from cattle, goat or other animal hair with layers of asphalt-saturated asbestos paper and a layer of woolfelt. Its years of manufacture, appearance and temperature limit are unknown to GAF.

Range Boiler Jacket

This product consisted of a series of plies of corrugated asbestos paper built up to the required thickness on Mandrells that were the same size as the range boilers the product was designed to fit. The corrugated paper used was a coarse variety with four plies per inch of thickness. These jackets were furnished in two sections -- upper half and lower half. Five extra-wide bands were provided to attach the jacket to the range boiler. The outside surface was painted or covered with canvas. GAF does not know the years of manufacture of this product.

INSULATING CEMENTS

1. 115 Insulation Cement

115 Insulation Cement was a chrysotile asbestos product which, in some instances, was produced at Ruberoid/GAF's Vermont facility and in other instances was purchased from various other asbestos suppliers and resold. Some of the product purchased from other suppliers may have been milled again at Ruberoid/GAF's Vermont facility prior to resale. Asbestos insulation cements produced at GAF's Vermont facility could generally be distinguished from asbestos insulation cements produced by other manufacturers inasmuch as the Vermont product was a slip chrysotile asbestos rather than a cross vein asbestos and was generally of a lower grade and contained a greater percentage of impurities, such as dirt and rock particles. It is believed that this product was sold from at least as early as 1937 to 1975. It is believed that the "115" designation was employed from approximately 1950 to 1975 and the designation "Grade B" was also employed in years prior to 1950.

The basic ingredients of this cement product were:

chrysotile determined to pass the 0-0-1-15 Quebec test
impurities (dirt, rock, earth)

The particular formulas utilized by entities which purchased this product for construction are not known by GAF, but this product was normally mixed with Portland cement, water and/or other substances.

2. 214 Insulation Cement

214 Insulation Cement was also a chrysotile asbestos product which, in some instances, was produced at GAF's Vermont facility and in other instances was purchased from various other asbestos suppliers and resold. Some of the product purchased from other suppliers may have been milled again at Ruberoid/GAF's Vermont facility prior to resale. Ruberoid/GAF's Vermont product was a lower grade cement which contained a greater percentage of impurities, such as dirt and rock particles, making it lightly mottled and giving it an overall darker appearance. It is believed that this product was sold from at least as early as 1937 to 1975. It is believed that the "214" designation was employed from

approximately 1950 to 1975 and the designation "Grade BB" was also employed in years prior to 1950.

The basic ingredients of this cement product were:

chrysotile determined to pass the 0-0-2-14 Quebec test
impurities (dirt, rock, earth)

The particular formulas utilized by entities which purchased this product for construction are not known by GAF, but this product was normally mixed with Portland cement, water and/or other substances.

3. Calsilite® Insulation Cement

Calsilite® Insulation Cement was a combination of chrysotile asbestos fiber, ground Calsilite® pipe covering or block, and Portland and other cements. The basic formula of this cement product was as follows:

ground Calsilite® pipe-covering or block	36.8
chrysotile	45.0
Lumnite cement, an aluminum silicate cement (approximate formula: 60% calcium aluminate, 12% calcium silicate, 13% ferrite, 15% ferrous oxide)	13.6
Portland cement	4.6

Prior to 1954, Calsilite® Insulation Cement of the following formulations may have been sold:

ground Calsilite® pipe-covering or block	41.0
Vermont 7k chrysotile	49.0
calcined gypsum	10.0

and

ground Calsilite® pipe-covering or block	45.0
Vermont 7k chrysotile	55.0

It is believed that this product was made with Vermont-produced asbestos and thus contained certain impurities, such as rock, dirt and earth particles. This product was never widely or frequently sold. To the extent such sales took place, they ceased completely in or around 1960.

4. Other Insulation Cements

In unknown years prior to 1955 which varied by product, Ruberoid listed for sale the following other insulation cements. Except as stated below, little is known about these products, including the specific years they were offered, the constituents and, except as indicated, whether or not they were manufactured or produced by Ruberoid.

a. Grade AA Insulating Cement - Grade AA was manufactured by Ruberoid using a high grade of pure asbestos fiber together with suitable binding materials that had low conductivity. It was designed to yield a hard, durable surface. The formula for this product is unknown except that in 1938 it consisted of:

chrysotile	65%
clay[1]	30%
Portland cement	5%

In 1945 it consisted of:

chrysotile	68.5%
CSW clay	27.0%
Portland cement	4.5%

Its temperature limit was 1200 degrees F.

b. Grade A Insulating Cement - This was a factory-prepared cement consisting of fibers which were not as long as those used in the better grade AA, together with suitable binding materials. The formula for this product is unknown except that in 1938 and 1945 it consisted of:

chrysotile	67%
CSW clay	28%
Portland cement	5%

Its temperature limit was 1000 degrees F.

c. Grade H F - Hard Finish - This was a hard finish cement designed to be used as a final protective coating over

[1] GAF knows nothing about this constituent, or about "CSW clay" (see formula b, below), except its name as shown.

other coats of cement. It had a smooth, glossy, hard finish. Grade HF was recommended to be applied in a 1/4" thick layer. The formula for this product is unknown except that in 1938 and 1945 it consisted of:

chrysotile	70%
Portland cement	20%
Medusa cement[2]	10%

It had a temperature limit of 1500 degrees F and was a prepared cement manufactured by Ruberoid.

d. Grade HF - Hard Finish #48 High Gloss - This was another hard finish cement manufactured apparently in 1945 and possibly other years. The formula for this product is unknown except that in 1945 it consisted of:

chrysotile	16.7%
Portland cement	16.7%
Guaging cement	33.3%
diatomaceous earth	33.3%

e. Grade H. T. - High Temperature Cement - This cement was designed to withstand temperatures of 1600 to 1800 degrees. This material was not designed to be used for finishing purposes.

f. Grade 203 Insulating Cement - Grade 203 had a screen test of approximately 0-0-8-8 which was intended to result in a light, fluffy cement. It was practically free of grit and dirt. The formula for this cement is unknown except that in 1938 it consisted of:

chrysotile	68.5%
clay	27.0%
Portland cement	4.5%

Its temperature limit was 1200 degrees F.

g. Grade 016 Insulating Cement - This 100% chrysotile cement had a screen test of approximately 0-0-1-16 which made it the lowest grade cement sold by Ruberoid/GAF.

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[2] GAF knows nothing about this constituent, or about "Guaging Cement" (see formula d, below) except its name as shown.

h. Satin Finish Cement - This product consisted of the following formulation:

chrysotile	87%
Portland cement	10%
Medusa cement	3%

i. Grade A-11 Insulating Cement - This product consisted of vermiculite, chrysotile, and binding substances. It was recommended for temperatures up to 1500 degrees F, or 1800 degrees F if the applicator did not intend to reclaim the material. Grade A-11 was designed to be an insulation material, not a finishing cement.

j. Coverkote - Coverkote was designed to be a weatherproof coating for insulated surfaces, rather than an insulating cement. It was a combination of emulsified asphalt and 25-28% chrysotile. It was a black plastic material particularly designed for protection of insulation on large tanks and vessels and for insulated equipment such as smoke breechings and ducts. The temperature limit for Coverkote was 400 degrees F.

k. Rock Wool Cement - Little is known about this product which was apparently available from Ruberoid in the late 1940's and early 1950's. It consisted of a mixture of rock wool and chrysotile asbestos and had a temperature limit of 1500 degrees F.