THE MT. NASSAU (RATHBONES) LIMESTONE QUARRY

The Mt. Nassau Limestone Quarry is
situated about half a mile south from the Lyell
Highway and about 13 miles from Hobart. It is at
present being operated by the estate of Mr. K. R.
Rathbone for the production of quicklime which is
burnt in kilns situated at the Main Highway.

In the year 1928 Mr. P.B. Nye,
Government Geologist, reported on the property at
Mt. Nassau, then referred to as Mr. Rathbone's property.
Nye records the geological sequence and allots a
thickness of approximately 200 feet to the Limestone
beds which occur as the mid-section of the Permian
strata. Nye states that "the stone is quarried and
burnt for the production of quicklime", but has not
given any analyses of samples of the stone.

Quarrying has been carried out on each
side of Quarry Creek. From the excavations it is
noted that the beds are dipping at a low angle
towards the west of south west. The excavations
have been carried forward until a maximum depth of
about 45 feet has been reached.

On the eastern side of the creek an
excavation has been made of a total length of approx-
imately 1,200 feet with an average width of 60 feet.
The maximum height of the quarry wall is 45 feet but
the average depth of excavation would not exceed
16 feet. It is evident that the difficulty experienced
in removing the spoil has been a controlling factor
in closing this quarry for large quantities have
been stocked within the limits of the excavation
and access to the working faces without its removal
would be difficult.

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Present quarrying operations are being
carried out on the western side of the creek. The
excavation here measures about 650 feet in length
with an average width of about 45 feet. The maximum
height of the quarry wall is 35 feet but the average
height would not exceed 24 feet. As these workings
are progressing in a westerly direction the floor
is becoming lower and as the quarry advances increas-
ing difficulty in the removal of water must be expected.

The limestone of the quarry is well bedded
in tiers ranging in thickness from 9 inches to 27
inches. The tiers are separated from each other
by bands of calcareous shales ranging to 27 inches
in thickness. The present working face has a total
height of 35 feet of which approximately 11 feet is
represented by shaly bands which have to be excluded
as spoil. After quarrying, the stone from the tiers
is broken by spalling to a size for convenient loading
by hand and at the same time a proportion of the stone
is discarded as spoil in the belief that its quality
is such as to prevent complete burning in the kilns.

It is doubtful, therefore, whether the
present operations yield more than 25% of the stone
excavated as a product for the kilns and it is obvious
that the quarry now idle did not yield a high proportion
when operating. As the amount of overburden in the
present quarry is increasing with depth the position
appears to be becoming uneconomic for a progressively
lower proportion of the product will reach the kilns.

For the purpose of this examination all
the tiers in the present quarry were sampled as also
were the principal shaly bands. A number of the tiers
in the idle quarry were also sampled. The product at

the kiln site was also sampled to determine the grade
of the kiln feed. In all 39 samples were taken and
when sampling in the quarry all the stone from the
tiers was included in the sample and there was no
discard as occurs in practice. The analyses of the
39 samples is included herewith, and for purposes
of comparison a number of analyses of samples recorded
in 1929 as from the same quarry is also attached.
Samples 19 to 22 inclusive represent the analyses
of the principal shaly bands.

ANALYSES OF SAMPLES OF MT. NASSAU LIMESTONES

PER CENT

Sample No.	SiO_2	Fe_2O_3	Al_2O_3	CaO	MgO	Ignition Loss
1	19.9	0.9	1.8	42.0	0.7	33.5
2	21.7	0.9	1.8	41.2	0.6	32.8
3	19.1	0.2	2.1	42.8	0.4	34.2
4	21.5	0.8	2.6	40.4	0.8	32.9
5.	34.4	0.9	3.1	33.0	0.6	26.7
6	18.7	0.4	1.5	43.4	0.4	34.6
7	33.1	1.3	2.5	34.1	0.5	27.6
8	15.6	0.7	1.3	45.4	0.6	36.3
9	21.4	0.9	2.5	40.7	0.6	33.0
10	41.8	2.2	5.8	25.1	0.9	21.8
11	23.4	1.1	2.8	39.3	0.7	32.0
12	33.3	1.3	2.9	33.4	0.6	27.6
13	29.3	1.2	3.7	34.9	0.5	28.8
14	52.9	2.0	7.2	17.5	0.7	15.5
15	44.6	1.9	4.7	24.6	0.6	20.8
16	31.0	1.2	4.2	33.1	0.7	27.3
17	27.0	1.1	3.5	36.3	0.6	29.8

A composite made up from the above samples
showed the presence of P_2O_5 : 0.1% and MnO : 0.02%

ANALYSES OF SAMPLES OF MT. NASSAU LIMESTONES

Sample No.	SiO_2	Fe_2O_3	Al_2O_3	CaO	MgO	Ignition Loss
18	43.2	2.0	4.8	24.3	0.6	20.9
19	53.8	3.1	11.7	10.7	1.2	12.5
20	54.2	2.8	9.5	13.1	1.2	13.0
21	59.5	3.6	10.3	8.9	1.2	10.4
22	50.2	3.4	9.9	15.0	1.1	14.9
23	25.3	1.0	1.8	38.7	0.7	31.3
24	17.6	0.6	1.2	44.1	0.5	35.5
25	30.4	0.9	4.1	33.0	0.8	27.1
26	28.4	0.9	2.0	36.6	0.7	29.8
27	22.6	2.0	1.8	40.0	0.7	32.5
28	24.3	0.9	1.7	39.0	0.6	31.8
29	30.0	1.0	2.1	35.5	0.6	28.9
30	29.5	1.0	2.0	36.0	0.6	29.2
31	41.2	1.7	5.0	25.5	1.0	22.2
32	16.9	0.6	2.0	43.0	0.9	35.1
33	30.0	1.3	4.2	33.0	0.9	27.9
34	26.0	1.4	2.2	37.2	0.8	30.7
35	42.6	1.6	5.8	24.8	1.0	21.3
36	29.2	1.1	2.4	35.9	0.6	29.9
37	31.3	1.1	3.1	34.2	0.7	28.5
38	26.50	1.14	2.51	36.80	0.70	30.40
39	24.88	1.00	1.82	38.80	0.66	31.72

ANALYSES OF MT. NASSAU LIMESTONES (1929)

$CaCO_3$	$MgCO_3$	MgO	SiO_2	Fe_2O_3	$\frac{Fe_2O_3}{Al_2O_3}$	Al_2O_3	P_2O_5	SO_3	H_2O	Ignition Loss
59.89	-	1.09	31.40	-	1.79	4.45	-	-	-	-
86.40	-	0.72	10.32	-	0.91	2.27	-	-	-	-
68.90	-	1.09	25.40	-	1.29	3.39	-	-	-	-
68.93	-	0.36	26.64	-	1.86	2.54	-	-	-	-
70.70	-	0.24	23.56	-	2.14	3.74	-	-	-	-
63.60	-	0.50	30.04	-	1.86	4.50	-	-	-	-
78.49	-	0.60	17.60	-	1.60	2.40	-	-	-	-
63.26	-	1.01	29.72	-	1.56	2.64	-	-	-	-
65.26	-	1.23	27.28	-	1.64	2.7	-	-	-	-

Reference to the Analysis shows that the Kiln feed (samples 38,39) have a Calcium Carbonate content of approximately 69%. This grade has been gained by selective methods which have resulted in the discard of a large proportion of the stone quarried. It will also be noticed that several of the tiers of stone have yielded an analyses of a higher grade than the Kiln feed.

The following table shows the analyses of the tiers in their essentials only, i.e., Silica, Lime and Loss on Ignition. The progressive average grade of stone for 9,11,13,15 etc. tiers has also been calculated and recorded.

The average grade of stone for the first (bottom) nine tiers contains 72% of CaO and Ignition Loss, recorded here as $CaCO_3$ as compared with 69% for the Kiln feed. Similarly for 11 tiers and 13 tiers the grade is 68.9% and 65.2% respectively. The two latter figures are in excess of sample 38 and only slightly less than those for sample 39 which are the individual analyses of the two samples of the Kiln feed.

(TABLE: See pages 8 and 8A).

The analyses show that it is only in the upper tiers that there is an appreciable falling off in grade and they suggest that for at least 13 tiers the entire product, after excluding the shaly bands, could be sent to the Kilns for burning and the resultant product be equal to that now being produced. An increase in production and a saving in manpower should result.

The upper tiers of stone may need selective treatment.

Compared with the product of other limestone

Tier No.	Sample No.	Sample Thick-ness.	Band Thick-ness.	Total Thick-ness.	Total Thick-ness. Lime-stone	SiO$_2$ %	Av. SiO$_2$ %	CaO %	Av. CaO %	% Loss on Ignition	Average Loss on Ignition %	Average CaCO$_3$ %
1	1	21	-	21	-	19.9		42.0		33.5		
2	2	21	4	46	42	21.7		41.2		32.8		
3	3	11½	3	60½	53½	19.1		42.8		34.2		
4	4	11	2	73½	64½	21.5		40.4		32.9		
5	5	21	1	95½	85½	34.4		33.0		26.7		
6	6	18	3	116½	103½	18.7		43.4		34.6		
7	7	15	5½	137	118½	33.1		34.1		27.6		
8	8	13		150	131½	15.6		45.4		36.3		
9	9	14		164	145½	21.4	23.3	40.7	40.1	33.0	32.1	72
10	10	14	4	182	159½	41.8		25.1		21.8		
11	11	11	4½	197½	170½	23.4	24.8	39.3	37.6	32.0	31.3	68.9
12	12	12	4	213½	182½	33.3		33.4		27.6		
13	13	11	5	229½	193½	29.3	25.6	34.9	37.2	28.8	31.0	68.2
14	14	9	7	245½	202½	52.9		17.5		15.5		
15	15	15½	21	282	218	44.6	28.1	24.6	35.6	20.8	29.6	65.2
16	16	27	22	331	245	31.0	24.2	33.1	35.9	27.3	29.2	65.1
17	17	20	27	378	265	27.0	28.2	36.3	35.9	29.8	29.2	65.1
18	18	17	12	407	282	43.2	28.8	24.3	35.2	20.9	28.1	63.3

Tier No.	Sample No.	Sample Thickness.	Band Thickness.	Total Thickness.	Total Thickness. less Bands.	SiO₂ %	Av. SiO₂ 1.	Av. SiO₂ 2.	Av. SiO₂ 3.	CaO %	Av. CaO 1.	Av. CaO 2.	Av. CaO 3.	%Loss on Ignition	Av. L.O.I 1.	Av. L.O.I 2.	Av. L.QI. 3.	Av. CaCO₃ %
1	27	19		19	19	22.6				40.0				32.5				
2	23	19	6	44	38	25.3				38.7				31.3				
3	24	19	1½	64½	57	17.6				44.1				35.5				
4	25	4	2	70½	61	30.4				33.0				27.1				
5	26	21	1½	93	82	28.4				36.6				29.8				
6	28	20	8	121	102	24.3				39.0				31.8				
7	29	18	5	144	120	30.0				35.5				28.9				
8	30	21	2	167	141	29.5				36.0				29.2				
9	31	9½	3	179½	150½	41.2	22.2	31.0	26.6	25.5	31.4	33.4	37.5	22.2	25.5	27.7	30.5	68
10	32	6	2	187½	156½	16.9				43.0				35.1				
11	33	8	3	198½	164½	30.0	21.8	31.1	26.4	33.0	30.9	33.1	37.5	27.9	25.3	27.7	30.6	68
12	37	16	8	222½	180½	31.3				34.2				28.5				
13	36	22	15	259½	202½	29.2	21.0	31.0	27.0	35.9	28.8	31.5	37.0	29.9	23.6	26.7	30.3	67.3
14	34	18	16	293½	220½	26.0				37.2				30.7				
15	35	13½	8	315	234	42.6	20.6	34.6	27.8	24.8	26.9	30.1	36.2	21.3	22.1	25.7	29.8	66
16	38					26.5				36.8				30.4				
	39					24.88				38.8				31.7				
Av. of 38&39						25.68				37.8				31.1				68.9

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quarries in Tasmania, where Calcium Carbonate content
at times exceeds 90%, the Limestone of Mt. Nassau is
a low grade one. As the depth of overburden is increasing
rapidly, a progressively higher proportion of the stone
quarried will be discarded, and the necessity for
opening new quarry faces will have to be considered.
Suitable sites are available in the district.

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Department of Mines,
HOBART.
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