a/ Sample type--1. Laminated rock from Roberts Mountains Formation.
2. Coarse-grained carbonate rock from Roberts Mountains Formation.
3. Carbonate rock from lower cherty unit of Roberts Mountains Formation.
4. Diagenetically silicified laminated rock in Roberts Mountains Formation.
5. Epigenetically altered laminated rock in Roberts Mountains Formation.
6. Laminated rock, post-Roberts Mountains Formation.
7. Laminated rock, pre-Roberts Mountains Formation.
8. Coarse-grained carbonate rock that is not Roberts Mountains Formation. Samples 8124, 6952, and 6964 are from Hanson Creek Formation; all others are post-Roberts Mountains Formation.
9. Altered laminated rock not in Roberts Mountains Formation.
10. Laminated dolomite equivalent to Roberts Mountains Formation but not included in Roberts Mountains Formation.
11. Coarse-grained dolomite interbedded with sample type 10.

b/ Stratigraphic position refers only to samples from Roberts Mountains Formation.
1 indicates sample is from lower half; 2 indicates sample is from upper half; 3 indicates sample is from cherty unit; and 4 indicates stratigraphic position in Roberts Mountains Formation is not known.

c/ Bar in box indicates item looked for but not found. Mineralogic composition not determined on GX samples.

d/ Tr in Other minerals column indicates 0.05 to 0.5 percent.

e/ All oxide analyses made by Branch of Analytical Laboratories personnel, U.S. Geological Survey; Leonard Shapiro, project leader. Methods used are described by Shapiro and Brannock (1942) and are supplemented by atomic absorption. Sulfur and organic carbon content determined by I. C. Frost using reduction furnace methods. Blank box indicates item not determined.

f/ Spectrographic analyses for rocks with oxide analyses are by Branch of Analytical Laboratories personnel; other analyses are by personnel in the Branch of Exploration Research of the Geological Survey. Spectrographic results are reported in the series of 1.0, 0.7, 0.5, 0.3, 0.2, 0.15, and 0.10, etc. which are mid-points of geometric brackets whose boundaries are in the series 1.2, 0.83, 0.56, 0.38, 0.26, 0.18, 0.12, etc. The precision of a reported value is approximately plus or minus one bracket at 68 percent and plus or minus two brackets at 95 percent confidence.
N indicates the element not detected at limit of detection.
L indicates element present but below limit of determination.
L indicates element present but below limit of determination.

g/ Tr in Remarks column indicates a few grains of mineral found in heavy mineral separate.

Sample information

Sample number	Sample type a/	Locality	Stratigraphic position b/	Rock type	Insoluble residue	Calcite	Dolomite	Quartz (total)	Quartz (detrital)	Quartz (secondary)	Clay (total)	Illite	Kaolinite	Chlorite	Other clay	K feldspar	Plagioclase feldspar	Other minerals d/
						Locality 1				Coal Canyon			sec.	17	and	20,	T. 25 N.,	R. 49 E.,
8001	1	1	1		76	2	22	45	43	2	29	17	12	–	–	1	Tr	Tr Fe oxide
8002	1	1	1		11	53	36	8	8	–	1	1	Tr	–	–	2	–	Tr Fe oxide
8003	1	1	1		7	80	13	4	4	–	Tr	Tr	–	–	–	3	Tr	Tr Fe oxide, Tr pyrite
8004	1	1	1	GX	Sample													
8005	1	1	1		33	35	32	23	23	–	7	4	3	Tr	–	3	Tr	Tr Fe oxide
8006	1	1	1		34	53	13	19	19	–	9	6	–	3	–	6	Tr	Tr Fe oxide
8007	1	1	1		31	45	24	20	20	Tr	6	3	–	3	–	4	Tr	1% Fe oxide
8008	1	1	1		39	40	21	29	29	–	6	3	–	3	–	3	Tr	1% Fe oxide
8009	1	1	1		31	45	24	22	22	Tr	6	3	–	3	–	3	Tr	Tr Fe oxide
8010	4	1	1		82	15	3	80	30	50	2	2	–	–	–	–	–	–
8011	1	1	1		24	55	21	19	19	–	5	3	–	2	–	Tr	–	Tr Fe oxide
8012	1	1	1		17	66	23	10	10	–	6	3	–	3	–	1	–	Tr Fe oxide
8013	1	1	1		20	70	10	17	15	2	2	1	–	1	–	1	–	
8014	1	1	1		13	72	15	12	12	–	–	–	–	–	–	1	Tr	Tr Fe oxide
8015	1	1	1		7	85	8	5	5	–	2	1	–	1	–	1	–	Tr Fe oxide
8016	1	1	1		9	75	16	7	7	–	1	–	–	1	–	1	Tr	Tr Fe oxide
8017	5	1	1		89	1	10	85	10	75	3	1	Tr	3	–	1	–	Tr Fe oxide
8018	5	1	1		89	2	9	72	22	50	11	6	5	Tr	–	5	–	
8019	5	1	1	GX	Sample													
8020	5	1	1		94	0	6	90	25	65	3	3	–	–	–	1	Tr	
8021	1	1	1	GX	Sample													
8022	1	1	1	GX	Sample													
8023	5	1	1		30	50	20	26	13	13	3	2	–	1	–	1	Tr	Tr Fe oxide
8024	1	1	1		48	30	22	33	33	–	12	8	4	–	–	2	Tr	1% Fe oxide
8025	1	1	1		33	23	44	25	20	5	5	3	–	2	–	2	Tr	1% Fe oxide
8026	2	1	1		13	80	7	11	9	2	1	–	–	1	–	1	Tr	Tr Fe oxide, Tr pyrite
8027	1	1	1		GX	Sample												
8028	1	1	1		60	18	22	45	45	–	10	6	–	4	–	4	Tr	1% Fe oxide
8029	1	1	2		50	24	26	29	29	Tr	15	10	4	1	–	5	Tr	1% Fe oxide
8030	1	1	2		40	35	25	22	22	–	10	6	–	4	–	7	Tr	1% Fe oxide, Tr pyrite
8031	1	1	2		28	45	27	17	17	–	9	4	–	5	–	2	Tr	Tr Fe oxide
8032	1	1	2		55	20	25	41	41	–	10	–	10	–	–	3	Tr	1% Fe oxide
8033	1	1	2	GX	Sample													
8034	1	1	2		31	30	39	21	21	–	9	4	–	5	–	1	Tr	
8035	1	1	2	GX	Sample													
8036	1	1	2		53	12	35	34	34	–	16	8	–	8	–	2	Tr	1% Fe oxide
8037	1	1	2		29	50	21	20	20	–	6	6	–	–	–	3	Tr	Tr Fe oxide
8038	1	1	2		33	22	45	20	20	–	9	4	5	–	–	2	Tr	1% Sapiolite, 1% Fe oxide
8039	1	1	2		30	55	15	22	22	–	4	1	2	1	–	4	Tr	Tr Fe oxide
8040	1	1	2		30	40	30	21	16	5	6	6	–	–	–	2	Tr	1% Fe oxide
8041	1	1	2		54	16	30	41	41	–	6	6	–	–	–	6	Tr	1% Fe oxide
8042	1	1	2		23	50	27	14	14	–	5	5	–	–	–	2	1	1% Fe oxide
8043	1	1	2		39	30	31	24	24	–	13	13	–	–	–	1	Tr	1% Fe oxide
8044	1	1	2		40	25	35	26	26	–	10	10	–	–	–	2	Tr	2% Fe oxide
8045	1	1	2		43	24	33	25	25	–	13	13	–	–	–	4	Tr	1% Fe oxide
8046	5	1	2	GX	Sample													
8047	1	1	2		48	20	32	35	35	–	11	11	–	–	–	1	Tr	1% Fe oxide
8048	8	1	–		4	90	6	3	3	–	1	1	–	–	–	Tr		Tr Fe oxide, Tr pyrite
8049	6	1	–		21	31	48	10	10	–	9	9	–	–	–	1	Tr	1% Fe oxide
8050	6	1	–		21	24	55	13	13	–	7	7	–	–	–	1	–	
8051	1	1	2		23	50	27	15	15	–	6	6	–	–	–	1		Tr Fe oxide, Tr pyrite

Mineralogic composition (in percent) c/ (Determined by petrographic, x-ray diffraction, and chemical studies). Tr indicates 0.05 to 0.5 percent. H_2O^- and H_2O^+ not considered.

Ratio of given to tourmaline

Weight percent of major oxides, organic carbon, and sulfur determined by chemical methods e/

Sample number	Ratio of given to tourmaline	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O^-	H_2O^+	TiO_2	P_2O_5	MnO	CO_2	Organic C	S
8001	1:1															1.34	.23
8002	1:1															0.34	.07
8003	2:1															.20	.05
8004																	
8005	1:1															.32	.05
8006	1:1															.32	.07
8007	1:2															.32	.07
8008	1:2															.26	.06
8009	1:1															.30	.07
8010	1:1															.33	.24
8011	2:1															.57	.05
8012	1:1															.24	.09
8013	1:1															.19	.03
8014	1:1															.30	.07
8015	1:1	6.1	0.00	0.00	0.06	1.5	50.7	0.04	0.28	0.00	0.72	0.04	0.00	0.00	40.6	.37	.06
8016	1:1															.31	.04
8017	1:1	85.7	1.2	.3	.08	2.2	3.9	.06	.42	.02	.73	.10	.00	.00	4.4	.11	.04
8018	1:1	79.8	3.7	.81	.14	3.1	4.1	.02	1.1	.15	1.2	.21	.05	.04	5.2	.17	.04
8019																	
8020																.12	.04
8021																	
8022																	
8023	2:1															.31	.05
8024	1:1															.09	.05
8025	1:1															.08	.04
8026	1:1															.06	.03
8027																	
8028	1:1															.04	.04
8029	1:2	39.0	5.4	.57	.66	6.4	22.0	.03	1.6	.23	1.4	.28	.03	.00	22.2	.27	.06
8030	1:3															.08	.03
8031	1:4															.12	.04
8032	1:5															.12	.07
8033																	
8034	1:5															.15	.04
8035																	
8036	1:1															.15	.06
8037	1:1															.53	.06
8038	1:1															.24	.05
8039	1:1	24.1	2.3	.56	.24	3.6	35.8	.06	.80	.10	1.2	.14	.02	.00	30.5	.15	.07
8040	1:1															.49	.05
8041	2:1															0.18	0.04
8042	3:1															.46	.03
8043	1:1															.15	.04
8044	2:1															.16	.06
8045	1:1															.33	.04
8046																	
8047	1:1															.22	.04
8048	2:1	3.0	0.00	0.03	0.04	1.4	52.0	0.02	0.10	0.06	0.58	0.02	0.00	0.00	42.6	.13	.04
8049	1:1															.39	.06
8050	1:1															.59	.05
8051	4:1															.37	.06

Elemental composition as determined from spectrographic data except gold and mercury determined by atomic absorption f/

Sample number	Fe (Expressed in weight percent)	Mg	Ca	Ti	Mn (Expressed in parts per million)	B	Ba	Co	Cr	Cu	La	Mo	Nb	Ni	Pb	Sc	Sr	V	Y	Zn	Zr	Hg	Au	Remarks g/
8001	5.	3.	7.	.05	150	150	300	5	200	30	50	50	10	100	100	15	200	2,000	100	1,000	100	2.80	<0.02	Abundant graptolites. Very clayey. 1 ppm Be
8002	.1	7.	>20.	.1	100	50	500	N	100	10	20	10	L	30	30	L	300	300	20	N	200	0.60	<.02	
8003	.1	3.	>20.	.015	50	2	100	N	15	5	N	N	N	L	20	N	500	70	2	N	50	.15	<.02	Tr fluorite, Tr amphibole
8004	.7	7.	>20.	.1	100	20	200	N	100	10	N	N	N	20	15	L	500	300	20	N	50	.35	<.02	
8005	1.	5.	>20.	.1	100	30	200	N	50	10	20	5	N	20	20	L	300	700	20	N	150	.15	<.02	Tr amphibole
8006	1.5	5.	>20.	.15	150	50	300	5	70	10	20	N	N	50	20	L	300	1,000	20	500	300	.65	<.02	Tr amphibole
8007	1.5	5.	>20	.1	150	50	200	N	50	15	20	5	N	20	30	L	500	700	20	300	200	.76	<.02	
8008	1.5	5.	>20	.1	150	50	200	N	50	15	20	5	N	70	30	L	500	500	20	200	150	.30	<.02	Tr fluorite
8009	1.	5.	>20.	.15	150	30	200	N	50	15	20	5	N	20	20	L	700	700	20	N	150	.15	<.02	Tr amphibole
8010	.2	.7	10.	.03	150	50	200	N	10	10	N	N	L	10	N	N	200	100	N	N	100	.12	<.02	
8011	.7	5.	>20	.05	150	15	300	N	30	10	N	10	N	15	30	L	700	500	15	N	50	.12	<.02	
8012	.7	5.	>20.	.05	200	10	150	N	20	10	N	10	N	15	20	L	1,000	200	15	N	70	.16	<.02	
8013	.3	2.	>20	.02	100	5	100	N	5	10	N	5	N	7	15	N	1,000	30	L	N	20	.04	<.02	Tr epigenetic zoisite, fluorite and amphibole
8014	.3	2.	>20	.03	100	10	100	N	20	5	N	N	N	5	10	N	1,000	200	10	N	50	.01	<.02	Tr fluorite and amphibole
8015	.1	1.	>20	.01	50	2	100	N	5	1	N	N	N	N	N	N	1,000	7	N	N	20	.01	<.02	
8016	.3	3.	>20	.03	100	20	100	N	20	5	20	5	N	10	10	N	700	500	20	N	70	.12	<.02	
8017	.2	1.	2.	.03	70	2	70	N	5	2	N	N	N	5	N	N	30	15	N	N	70	.60	<.02	
8018	.5	2.	2.	.15	50	50	500	N	20	5	N	5	N	15	N	N	30	200	10	N	200	.80	<.02	Tr amphibole
8019	.7	.2	3.	.2	150	50	500	N	10	10	20	5	L	15	L	L	N	200	15	N	100	2.60	<.02	
8020	.5	.7	2.	.1	100	20	500	N	5	30	20	N	L	10	N	L	N	70	10	N	100	2.40	<.02	
8021	.5	1.5	>20.	.05	200	20	70	N	30	5	20	N	L	10	10	N	700	300	15	N	50	0.04	<.02	
8022	.7	1.5	15.	.15	200	30	100	5	30	10	30	5	L	15	15	L	200	150	20	N	200	.22	<.02	
8023	1.5	5.	20.	.15	200	20	300	N	30	10	20	N	N	7	10	L	300	50	15	N	200	.12	<.02	About half of quartz is epigenetic
8024	3.	5.	15.	.3	200	70	500	5	100	10	20	N	L	20	15	7	100	150	20	N	200	.22	<.02	
8025	1.5	7.	20.	.15	200	50.	300	N	50	10	20	N	L	20	15	L	100	300	20	N	150	.09	<.02	Tr amphibole
8026	.7	3.	>20.	.05	300	20	150	N	20	10	20	7	N	10	15	N	200	150	20	200	300	.15	<.02	
8027	1.0	7.	>20.	.15	200	30	200	L	50	15	20	5	L	15	20	L	200	200	20	N	150	.01	<.02	
8028	1.5	7.	20.	.2	200	50	300	5	70	10	20	7	L	20	20	5	150	150	20	N	200	.15	<.02	Tr amphibole
8029	.7	3.	>20.	.15	150	50	300	N	70	7	N	N	N	15	N	N	300	150	10	N	100	.09	<.02	Tr amphibole
8030	.7	5.	>20.	.1	200	20	300	N	30	10	20	N	N	5	10	L	300	200	20	N	200	.09	<.02	
8031	2.	10.	>20.	.15	300	70	200	N	50	10	20	N	N	15	20	L	300	200	20	N	200	.09	<.02	Tr amphibole
8032	2.	5.	20.	.2	200	70	300	5	70	10	20	5	L	20	15	7	200	100	20	N	300	.26	<.02	Tr amphibole, 1 ppm Be
8033	2.	7.	>20.	.15	200	70	300	5	70	10	20	10	N	20	20	5	200	300	20	N	70	.09	<.02	1 ppm Be
8034	2.	7.	>20.	.15	200	70	150	5	70	7	20	L	N	15	15	5	500	100	20	N	70	.01	<.02	Tr amphibole
8035	2.	7.	>20.	.15	300	70	300	N	70	10	20	L	N	15	15	L	500	20	20	N	100	.01	<.02	
8036	2.	7.	20.	.2	200	100	300	7	70	10	20	5	N	20	20	5	200	70	20	N	150	.15	<.02	Tr amphibole and fluorite
8037	1.	5.	>20.	.15	200	50	200	N	50	7	20	N	N	10	15	L	1,000	70	20	N	150	.12	<.02	Tr amphibole and epidote
8038	2.	7.	20.	.15	200	100	200	5	70	10	20	7	N	20	30	L	300	70	30	N	150	.15	<.02	
8039	.5	7.	>20.	.05	150	2	100	N	20	5	N	N	N	7	N	N	500	50	2	N	70	.09	<.02	Tr amphibole and ephalerite
8040	1.5	7.	>20.	.15	300	50	200	N	70	7	20	N	N	10	20	L	700	70	20	N	200	.01	<.02	Tr amphibole
8041	1.5	7.	20.	.2	200	100	500	N	70	15	20	N	N	20	15	5	200	300	20	N	700	0.30	<0.02	
8042	2.	7.	>20.	.1	300	50	150	L	30	7	20	5	2	15	20	L	1,500	50	10	N	50	0.12	<.02	
8043	3.	7.	>20.	.15	200	70	150	5	70	10	20	L	2	20	30	5	300	100	15	N	70	.15	<.02	
8044	3.	7.	>20.	.2	300	100	200	5	70	10	20	N	2	20	20	5	200	100	20	N	100	.01	<.02	
8045	1.5	7.	20.	.2	300	100	300	5	70	15	20	N	2	20	30	5	200	50	15	N	200	.01	<.02	
8046	5.	.7	7.	.1	300	300	200	30	500	20	70	5	10	150	15	30	N	300	30	N	500	3.00	.04	Fe oxide seam. 1 ppm Ag, 700 ppm As, 100 ppm W
8047	2.	5.	20.	.15	500	70	100	5	50	50	20	N	5	20	30	L	150	70	20	N	150	0.16	<.02	
8048	.1	1.	>20.	.005	70	2	50	N	7	1	N	N	3	N	N	N	3,000	20	N	N	10	.01	<.02	
8049	1.5	7.	>20	.1	200	70	150	L	50	50	20	10	N	15	20	L	1,000	500	20	N	150	.09	<.02	
8050	.7	1.5	>20.	.1	200	70	1,000	L	50	10	50	N	N	15	10	L	2,000	200	50	N	70	.60	<.02	
8051	1.	5.	>20	.15	200	20	70	L	30	30	20	N	N	10	20	L	700	50	10	N	100	.26	<.02	

PLATE 2-- MINERALOGIC AND CHEMICAL COMPOSITION OF 246 SAMPLES OF THE LAMINATED LIMESTONE UNIT OF THE ROBERTS MOUNTAINS FORMATION AND RELATED FORMATIONS, NORTH-CENTRAL NEVADA

By
Thomas E. Mullens

U.S. Geological Survey
OPEN FILE REPORT
This map is preliminary and has not been edited or reviewed for conformity with Geological Survey standards or nomenclature.