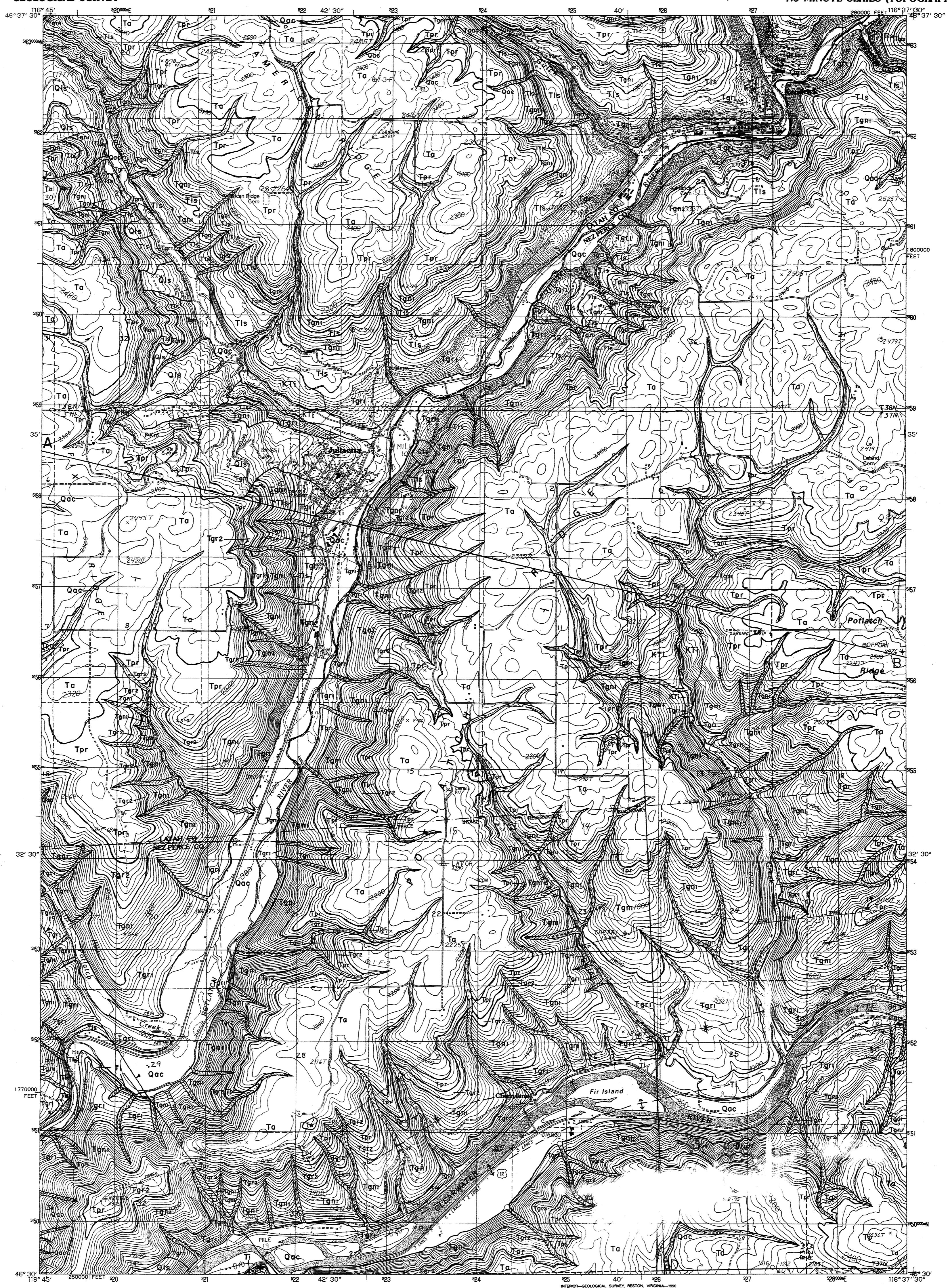


BEDROCK MAP OF THE JULIAETTA QUADRANGLE, LATAH COUNTY, IDAHO

Dean L. Garwood, John H. Bush, Gerald N. Potter
1999

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY



JULIAETTA QUADRANGLE
IDAHO
7.5 MINUTE SERIES (TOPOGRAPHIC)

280000 FEET (116° 37' 30")
116° 37' 30"

ROAD LEGEND
Improved Road
Unimproved Road
Trail

Interstate Route U.S. Route State Route

JULIAETTA, IDAHO
PROVISIONAL EDITION

1	2	3
4		5
6	7	8

ADJOINING 7.5' QUADRANGLE NAMES
1 Troy
2 Little Bear Ridge
3 Texas Ridge
4 Green Knob
5 Lapwai
6 Lapwai
7 Caldecott North
8 Gifford

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U.S. GEOLOGICAL SURVEY
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T 99-4. Bedrock Geologic Map of the Juliaetta Quadrangle,
Latah County, Idaho, by John H. Bush, Dean L. Garwood, and
Gerald N. Potter, 1999, scale 1:24,000, 3 sheets

PROVISIONAL MAP
Produced from original
manuscript drawings. Information shown as of date of
field check.
To place on the projected North American Datum of 1983,
move 3.7 meters east and 7.7 meters north
(1.5 meters north and 7.7 meters east)
There may be private inholdings within the boundaries of any
Federal or State reservations shown on this map.

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BEDROCK MAP OF THE JULIAETTA QUADRANGLE, LATAH AND NEZ PERCE COUNTIES, IDAHO

Dean L. Garwood, John H. Bush, Gerald N. Potter
1999

INTRODUCTION

The bedrock map of the Juliaetta quadrangle represents a compilation of previous research and additional field work. The loess distribution of the Palouse Formation and the colluvium on steep canyon walls were not illustrated in keeping with the emphasis on bedrock mapping. Locally, good outcrops occur in canyon areas. However, contacts are rarely exposed across much of the map and most contact lines are interpretive. Regional maps by Rember and Bennett (1979), and Swanson and others (1977, 1979a, 1980), and maps by Bond (1963) and Anderson (1991) were used to assist with mapping and compilation. Maps by Hooper and Webster (1982) and Hooper and others (1985) from nearby areas in Washington were also used for stratigraphic comparisons. The basalt chemistry was determined by the GeoAnalytical Laboratory at Washington State University (Table 1&2). Paleomagnetism was done in the field with the use of a fluxgate magnetometer, and in places was checked in the laboratory at the Idaho Geological Survey.

A major geologic feature on the Juliaetta quadrangle is the northwest-southeast trending fault. The geomorphic and rock data clearly indicate the presence of this fault, which is a high angle fault with 200 to 400 feet of displacement. However, in the field the precise location of the trace of the fault is covered and exposures are rare where rock units should be offset. The offset patterns illustrated are primarily based on interpretation and not on identifiable field exposures. Bond (1963) first mapped the fault and referred to it as the Cottonwood fault. Swanson and others (1979a) also noted this fault. The other major structural feature which influences rock patterns is an anticline-syncline pair with low-angle dipping limbs across the southern end of the quadrangle. The axial traces of these folds are approximately located.

DESCRIPTION OF MAP UNITS

Prebasalt rocks here and on surrounding quadrangles have been previously mapped as several different units including Precambrian undifferentiated, Precambrian pre-Belt Supergroup, metamorphosed Belt Supergroup, Cretaceous metamorphosed and unmetamorphosed Idaho batholith rocks, and Tertiary Potato Hill volcanics (Tullis, 1940, 1944; Bond, 1978; Rember and Bennett, 1979; Swanson and others, 1980; and Anderson, 1991). For this map, the basement rocks were divided into a Precambrian-Cretaceous mixed unit of schist, gneiss, and granitoid rocks, and a Cretaceous-Tertiary unit of intrusive rocks. The majority of the exposures belong primarily to the Columbia River Basalt Group with local outcrops of sedimentary interbeds belonging to the Latah Formation. The stratigraphic nomenclature for the Columbia River Basalt Group is based on that presented by Swanson and others (1979b). The group is divided into four formations: from base upward, these are the Imnaha, Grande Ronde, Wanapum, and Saddle Mountains.

SURFICIAL DEPOSITS

Qac Alluvium and Colluvium (Holocene)-- Stream, slope-wash, and debris-flow deposits. Composition variable, commonly reworked mixtures of loess, basalt, and prebasalt fragments. Most areas in the upper drainages are stream deposits that grade laterally into loess of the Palouse Formation and contain slope-wash deposits derived from the loess-covered hills. Lower drainages contain sand and coarser poorly sorted fragments of both basalt and prebasalt rocks. Steep short drainages commonly have small fans of poorly sorted cobbles and boulders at their junctions with Little Potlatch Creek.

Qls Landslide (Pleistocene-Holocene)-- Large mass-movement deposits generally consisting of slump blocks of basalt and sediment interbeds.

LATAH FORMATION

Tls Latah Sediments (Miocene)-- Clay, silt, and sand deposits that crop out between basalt flows. Basalt talus tends to cover these nonresistant units and lateral extent is in most places more than illustrated. Drobny (1981) describes the interbed between Grande Ronde flows in the northeastern part of the quadrangle.

COLUMBIA RIVER BASALT GROUP

SADDLE MOUNTAINS FORMATION

Tp Pomona Member (Miocene)-- A medium-grained, medium-gray basalt lacking obvious phenocrysts. Exposures are very rare and highly weathered. Distribution on the Juliaetta quadrangle is based in part on mapping by Swanson and others (1980). Chemistry suggests Pomona but does not accurately identify it.

Ta Asotin Member (Miocene)-- A dense, aphyric flow of normal polarity with microphenocrysts of plagioclase and olivine. This basalt, along with Wilbur Creek basalt is believed to have flowed westward across the quadrangle in shallow channels developed in the Priest Rapids Member of the Wanapum Formation (Swanson and others, 1979a). In general, its thickness increases southward towards the center of the paleochannel.

Tw Wilbur Creek Member (Miocene)-- Dense, dark-gray, aphyric to sparsely plagioclase-phyric flow of normal polarity lacking olivine in hand sample. Like the Asotin member, the Wilbur Creek flowed into shallow valleys eroded into the Priest Rapids Member. One isolated exposure of this member was discovered in the southern part of the quadrangle.

WANAPUM FORMATION

Tpr Priest Rapids Member (Miocene)-- The member consists of medium to coarse-grained basalt of reverse polarity with microphenocrysts of plagioclase and olivine in a groundmass of intergranular pyroxene, ilmenite blades, and minor devitrified glass. The unit ranges from 100 to 200 feet in thickness. The variation in thickness is considered to have been caused by erosion after emplacement. Three exposures were analyzed (Tables 1&2) and verified as the Lolo chemical type of Wright and others, (1973).

Tgr2 GRANDE RONDE FORMATION

Second Reverse Member (Miocene)-- Consists of one to two fine-grained to very fine-grained flows of Grande Ronde chemical type (Wright and others, 1973, 1979; Swanson and others, 1979b; Reidel and others, 1989). The unit ranges from 0 to 200 feet thick. Although commonly fine-grained and glassy, they are abundantly plagioclase-microphyric. Based on 11 samples (Tables 1&2) the flows have intermediate to very low MgO (3.33 to 4.21 wt%) and high to very high TiO₂ (2.20-2.54 wt%) for Grande Ronde flows. They are tentatively correlated with the Wapshilla Ridge unit of Reidel and others, (1989).

Tgn1 First Normal Member (Miocene)-- Consists of several fine-grained aphyric flows of Grande Ronde chemical type (Wright and others, 1993) ranging from 500 to 600 feet in total thickness. The flows (Tables 1&2) are dominated by the intermediate to high-Mg and relatively low TiO₂ flows of Reidel and others (1989) and are tentatively correlated to their China Creek unit.

Tgr1 First Reverse Member (Miocene)-- Consists of fine-grained aphyric flows of Grande Ronde chemical type (Wright and others, 1973; Swanson and others 1979b) and Reidel and others (1989). Regional chemical comparisons and correlations westward towards Green Knob suggest they correlate to the Center Creek unit of Reidel and others, (1989) and Bond (1963). Based on 11 samples the TiO₂ content is between 2.13 and 2.44 wt%, similar to that reported for Center Creek flows by Reidel and others (1989). The MgO content ranges from 3.00 to 4.66 wt%.

Ti IMNAHA FORMATION

Imnaha Basalt (Miocene)-- A basalt flow that is typically plagioclase-phyric. The unit is exposed along the Clearwater and Potlatch Rivers on the southern part of the quadrangle.

PREBASALT ROCKS

Kti Intrusive Rocks (Cretaceous-Tertiary)-- Consists of a foliated to non-foliated diorite to quartz diorite. The quartz diorite crops out in Juliaetta and Middle Potlatch Creek. The diorite is best-exposed in Pine Creek in the southeast portion of the quadrangle. This exposure was previously unmapped. In the field the diorite exhibits both granitoid and gneissic textures.

PKm Mixed Rocks (Precambrian-Cretaceous)-- Consists of mixed units of gneiss, quartzite, and diorite. Gneiss is poorly exposed on the southwest side of Middle Potlatch Creek and consists of alternating dark biotite-rich and light quartz-feldspathic bands. Banding thickness is variable generally ranging from 1 mm to 10 cm. Where the gneissic banding is not as well developed, the rock has a granitoid appearance. The quartzites are light colored and consist of approximately 95-99 percent coarse-grained recrystallized quartz and up to 5 percent biotite. They crop out in close association with the gneiss on the southwest side of Middle Potlatch Creek.

The dioritic rocks are not well exposed. Examination of the exposure of PKm on the Juliaetta quadrangle shows the gneiss, the diorite, and the quartzite in close spatial association.

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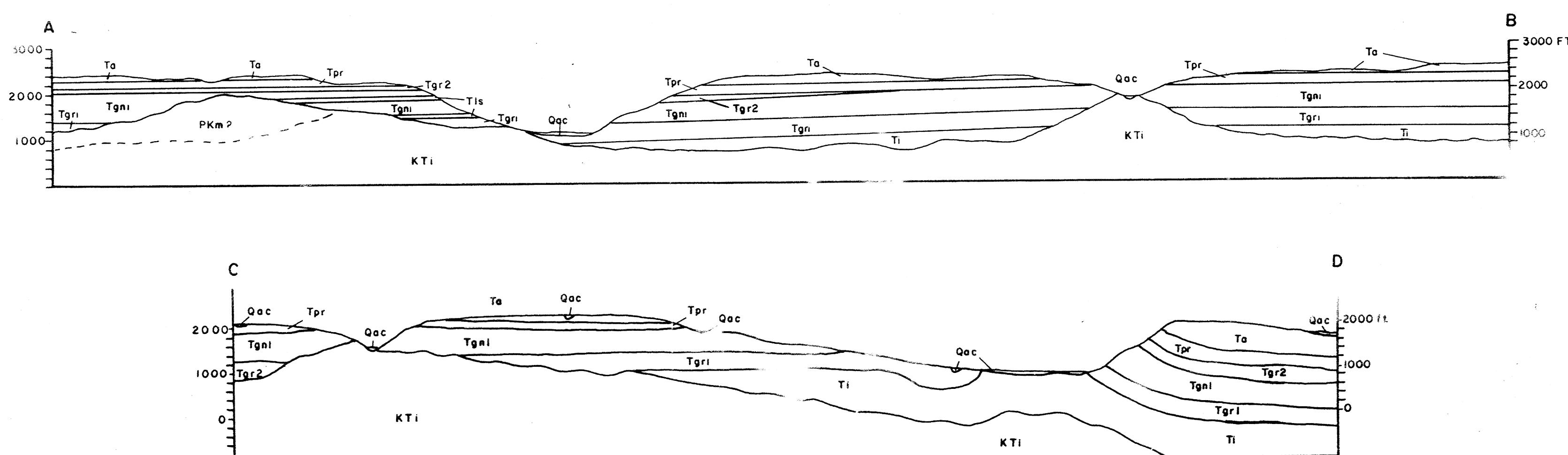
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SYMBOLS

- ~~~~ Contact approximately located
- ~~~~~ Approximate anticline axial trace
- ~~~~~ Approximate fault trace (ball on downthrown side)
- ~~~~~ Attitude of basalt flows
- ~~~~~ Approximate syncline axial trace
- C-18 Location of chemistry reported in Table



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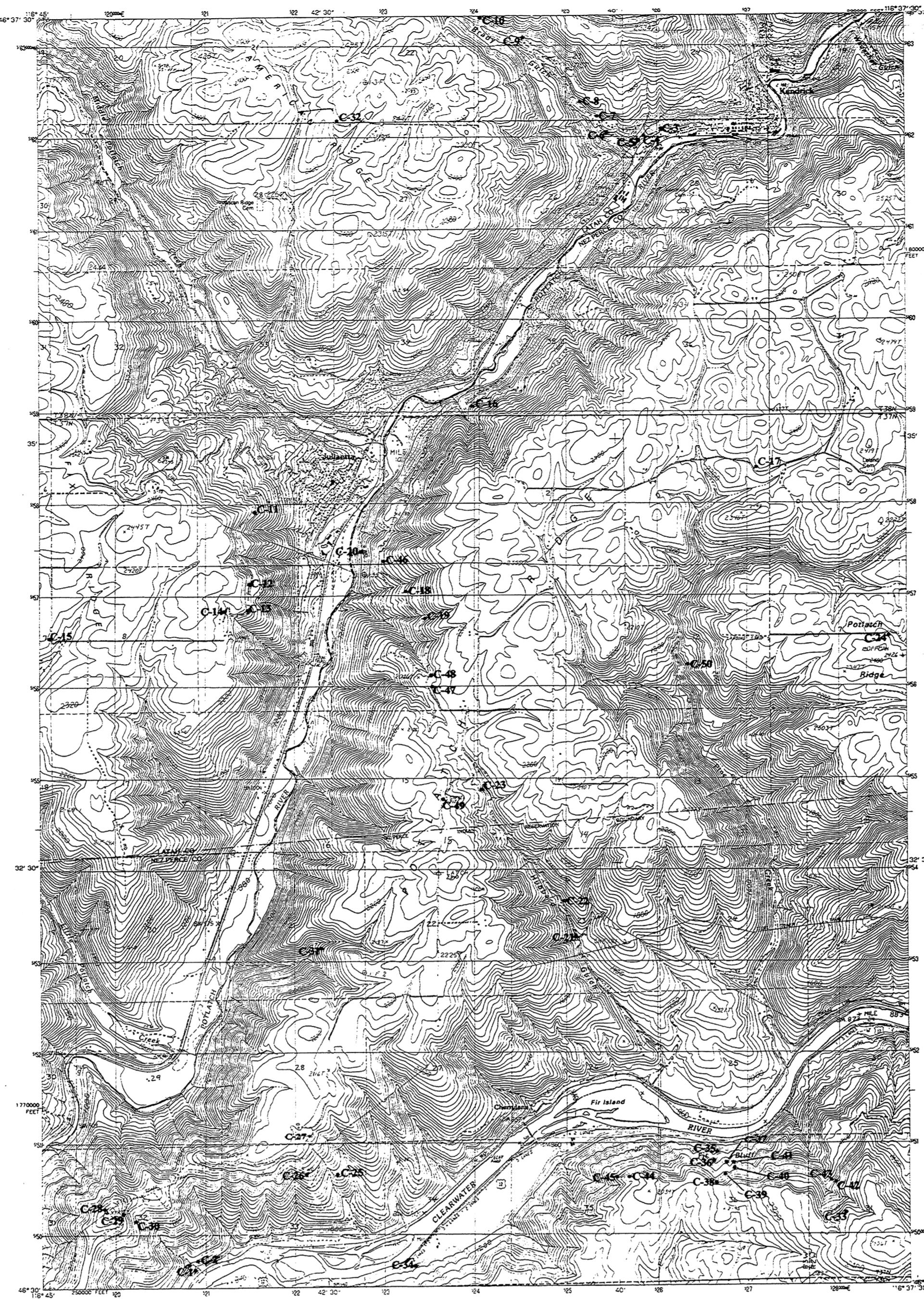


Table 1. Whole rock major oxide chemistry for the Juliaetta quadrangle

Sample #	Unit	SiO ₂	Al ₂ O ₃	TiO ₂	FeO	MnO	CaO	MgO	K ₂ O	Na ₂ O	P ₂ O ₅
C-1	Tgr ₁	54.32	14.08	2.137	11.56	0.192	8.17	4.66	1.54	3.01	0.33
C-2	Tgr ₁	54.41	14.07	2.165	11.47	0.192	8.15	4.55	1.63	3.01	0.335
C-3	Tgr ₁	54.52	13.97	2.153	11.97	0.196	8.04	4.36	1.44	3.02	0.334
	Tgr ₁	54.91	13.6	2.435	12.46	0.194	7.62	3.6	1.58	3.19	0.383
	Tgr ₁	54.95	13.62	2.356	12.1	0.19	7.69	3.98	1.54	3.2	0.368
C-6	Tgr ₁	54.79	13.97	2.286	11.83	0.189	7.87	3.97	1.56	3.16	0.36
C-7	Tgr ₁	57.32	13.55	2.212	11.4	0.215	6.62	3.06	2.1	3.2	0.327
C-8	Tgr ₁	57.44	13.46	2.186	11.39	0.221	6.7	3	2.1	3.17	0.359
C-9	Tgn ₁	55.07	14.12	1.835	11.37	0.203	8.19	4.33	1.44	3.13	0.318
C-10	Tgn ₁	54.87	14.09	1.8	11.47	0.2	8.16	4.65	1.38	3.08	0.312
C-11	Tgr ₂	55.88	14.19	2.292	10.51	0.211	7.84	3.89	1.58	3.2	0.398
C-12	Tgr ₂	56.33	13.85	2.394	11.02	0.19	7.15	3.53	1.77	3.31	0.453
C-13	Tpr	50.1	13.65	3.23	13.66	0.226	9.25	5.26	1.2	2.63	0.785
C-14	Ta	49.79	16.18	1.422	8.98	0.186	12.98	7.43	0.53	2.31	0.184
C-15	Tgr ₁	50.21	16.32	1.439	8.63	0.167	13.51	6.72	0.53	2.26	0.187
C-16	Tgr ₁	57.51	13.66	2.196	11.23	0.184	6.64	3.07	1.89	3.27	0.329
C-17	Tp	50.91	16.07	1.461	9.56	0.17	10.93	7.8	0.59	2.3	0.211
C-18	Tp	55.89	14.13	2.295	11.11	0.192	7.85	3.53	1.46	3.14	0.401
C-19	Tgr ₂	55.87	13.61	2.35	12.26	0.19	6.76	3.33	1.79	3.4	0.445
C-20	Tgr ₁	54.37	13.97	2.128	11.85	0.188	8.1	4.47	1.44	3.15	0.328
C-21	Tgn ₁	54.97	13.96	1.997	11.68	0.206	8.01	4.17	1.64	3	0.368
C-22	Tgn ₁	55.11	14.14	1.924	11.71	0.208	7.99	4.02	1.47	3.09	0.349
C-23	Tp	55.86	15.47	2.01	8.53	0.144	8.9	3.85	1.9	2.79	0.541
C-24	Ta	50.69	16.67	1.423	9.1	0.15	11.45	7.55	0.51	2.27	0.186
C-25	Tgr ₂	55.51	13.71	2.23	11.2	0.213	7.77	4.21	1.54	3.23	0.388
C-26	Ta	51.85	15.25	1.367	11.02	0.206	10.17	6.12	0.7	3.02	0.298
C-27	Tw	54.46	14.22	1.905	10.87	0.171	8.36	4.8	1.85	2.86	0.51
C-28	Tpr	50.41	13.47	3.25	13.39	0.234	9.17	5.28	1.2	2.8	0.78
C-29	Tgr ₂	56.42	13.39	2.523	10.71	0.19	7.08	3.43	1.98	3.28	0.46
C-30	Tgn ₁	54.88	14.25	1.709	10.59	0.205	8.71	4.9	1.39	3.1	0.268
C-31	Tgr ₂	55.55	13.61	2.485	11.81	0.198	7.08	3.72	1.88	3.21	0.459
C-32	Ta	51.03	15.95	1.468	9.66	0.161	11.17	7.52	0.56	2.29	0.198
C-33	Tp	56.79	15.6	2.053	7.78	0.128	8.63	3.58	1.88	3.02	0.532
C-34	Tgn ₁	55.97	14.21	1.786	10.76	0.189	7.95	4.17	1.49	3.22	0.249
C-35	Tgn ₁	57.33	13.61	2.230	11.26	0.182	6.71	3.13	1.95	3.30	0.322
C-36	Tgn ₁	56.07	14.27	1.774	10.54	0.193	8.03	4.14	1.63	3.10	0.252
C-37	Tgn ₁	55.05	13.97	1.906	11.79	0.193	7.93	4.14	1.50	3.17	0.345
C-38	Tp	50.55	16.06	1.447	9.71	0.169	11.22	7.67	0.62	2.40	0.190
C-39	Tp	50.23	13.59	3.28	13.81	0	9.32	5.03	1.10	2.62	0.78
C-40	Tp	55.75	13.86	2.521	11.54	0	7.10	3.38	2.20	2.99	0.460
C-41	Tp	54.86	13.89	2.219	12.10	0	7.83	3.87	1.57	3.17	0.385
C-42	Tp	54.49	13.77	2.544	12.42	0.199	7.30	3.56	1.94	3.30	0.385
C-43	Tp	54.70	13.81	2.230	12.40	0.21	7.89	3.85	1.46	3.07	0.386
C-44	Ta	50.29	16.49	1.438	9.18	0.169	11.60	7.84	0.47	2.38	0.175
C-45	Ta	50.81	15.91	1.525	9.79	0.155	10.99	7.41	0.73	2.46	0.224
C-46	Tgn ₁	54.95	14.15	1.828	11.21	0.205	8.28	4.32	1.4	3.35	0.311
C-47	Ta	50.97	15.9	1.483	9.78	0.158	10.89	7.36	0.61	2.63	0.208
C-48	Tpr	50.03	13.74	3.28	13.62	0.211	9.31	4.94	1.08	2.96	0.83
C-49	Ta	50.1	16.09	1.414	9.4	0.152	11.34	8.3	0.45	2.58	0.164
C-50	KTi	61.07	18.17	0.691	5.64	0.91	6.22	2.47	1.78	3.64	0.226

Table 2. Whole rock trace element chemistry for the Juliaetta quadrangle

Sample #	Unit	Ni	Cr	Sc	V	Ba	Rb	Sr	Zr	Y	Ga	Cs	Zn	Pb	La	Ce	Th	
C-1	Tgr ₁	13	37	30	347	540	38	330	177	36	13.4	24	62	111	3	8	45	3
C-2	Tgr ₁	15	43	33	355	526	38	331	181	36	14.8	20	70	114	8	25	45	3
C-3	Tgr ₁	9	39	29	338	529	39	333	185	36	15.0	21	65	1				