GEOLOGICAL, GEOCHEMICAL AND GEOPHYSICAL REPORT
ON THE AGUR-ASH PROPERTY,
RIDDLE CREEK, B.C., OSOYOOS M.D.

Lat. 49° 33' N; Long. 119° 53' W

N.T.S. Map-Sheet 82E/12W

for

British Newfoundland Exploration Ltd.

by

R.R. Culbert, PhD., P.Eng.

D.G. Leighton & Associates Ltd.

31 May, 1978

CONTENTS

ILLUSTRATIONS

TABLES

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REPORT ON AGUR-ASH PROPERTY
RIDDLE CREEK, B.C.

INTRODUCTION

This report describes the results of exploration work on the AGUR-ASH property to date. This has consisted of reconnaissance geochemical surveys for uranium, a grid controlled spectrometer survey plus some geological mapping and prospecting. Work was done at intervals in the Fall of 1977 during the course of a regional exploration program covering much of the Okanagan region. Conclusions and recommendations set forth are based on the work cited above.

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

1. The AGUR-ASH property is comprised of eight unsurveyed mining claims (145 units) held in the name of British Newfoundland Exploration Ltd.

2. The property, situated 20 kilometers west of Penticton, British Columbia, is accessible via the Apex Mountain road.

3. Work on this area to date has included reconnaissance geochemical surveys for uranium, a grid controlled spectrometer survey plus some geology and prospecting.

4. The ASH-AGUR claims encompass a unique complex of highly radioactive trachytes and related rocks. There are four possibilities for economic uranium concentrations which are being kep in mind in its exploration:

   a) Hydrothermal vein deposits in surrounding rock resulting from impregnation with hydrothermal fluids related to the eruptions

   b) Concentration of uranium during later hydrothermal alterations which have affected some of these rocks

   c) "Porphyry" uranium potential based on large volumes of radioactive rock

   d) Secondary uranium concentrations, including subvolcanic channel deposits.

5. A chemical and petrographic study (staining and thin-section work) has been completed for the radioactive volcanic rocks and derived clastics. A copy of this is included. The major conclusions are as follows:

   a) The AGUR-ASH radioactive complex involves a series of porphyritic flows and ignimbrites together with apparently co-magmatic syenites and associated tuffs, breccias and sandstones.

   b) Later biotite-argillite alteration has mobilized uranium in some of these rocks. This alteration phase appears to be associated with vanadium enrichment.

   c) The most radioactive rocks tend to be boxwork syenites, felted trachytes and pink crystal tuffs or grits which have been altered by late stage radioactive fluids. Uranium concentrations in excess of 100 ppm and thorium in excess of 500 ppm have been encountered at several localities.

d) The most radioactive units tend to occur either directly below the Tertiary volcanics or within the lowermost flows of the Yellow Lake phonolites.

6. Strong uranium silt anomalies on the western edge of the trachyte flows are accompanied by equally strong anomalies in other metals, notably Mo, Cu, Zn, Ni and Co. This suggests multi-metal vein or stockwork deposits may exist in that area.

7. Despite problems in dealing with instrumental drift in a high thorium area, the reconnaissance spectrometer survey has outlined the most radioactive lithologies and will be useful in continued mapping and prospecting.

8. The following approach is recommended for 1978:

   a) Completion of grid control for the property

   b) Careful prospecting with hand scintillometer to outline zones which are unusually radioactive for their surroundings and exposure

   c) Detailed geochemistry along water courses and gullies

   d) A combined mapping, radiometric and soil geochemistry study of the radioactive zone on west margin of the Tertiary lavas.

Respectfully submitted,

R.R. Culbert, PhD., P.Eng.

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
R. R. CULBERT

31st May, 1978

GENERAL DESCRIPTIONS

Location and Access

The AGUR-ASH property is located 20 kilometers west of Penticton, B.C. The claims can be reached from Penticton by road using 4-wheel drive vehicles by passing through the Rodgers' Ranch on Riddle Creek. Geodetic coordinates are 49° 33' N, 119° 53' W. Average elevation of the claims is about 5,000 feet.

History

There is no record of uranium exploration work having been carried out in the area covered by the AGUR-ASH claims. The ASH claims, optioned from Camaplex Resources Ltd., apparently were staked purely on geological grounds, i.e. the existence of Tertiary volcanics deduced from "four-mile" government geological maps, and not from field survey data. Our own interest in this region resulted from anomalous geochemistry derived through reconnaissance surveys.

Claims

The AGUR-ASH property consists of the following mining claims held in the name of British Newfoundland Exploration Ltd.:

Property	Claims	Units	Record No.	Record Date	Expiry Date
AGUR	AGUR-1	(20)	288	26 May, 1977	26 May, 1978
	2	(9)	299	13 June, 1977	13 June, 1978
	3	(18)	300	"	"
	4	(18)	301	"	"
	5	(20)	302	"	"
	ASH- 1	(20)	292	30 May, 1977	30 May, 1978
	2	(20)	293	"	"
	3	(20)	294	"	"

GEOLOGY

Although areas of good outcrop exist on this property, bedrock exposures are rare in most parts, and the northern sector especially is overlain by glacial till and moraines. Therefore the later described sequence of radioactive volcanic flows and clastic rocks marking a rhyolite-phonolite transition near the base of Eocene Marron formation was largely derived from examination

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AGUR-ASH PROPERTY

INDEX MAP

PROJECT	PROJECT NO.	SCALE	DATE
S. B.C. URANIUM	103	1: 250,000	JAN.-1978

of properties farther south. It is not clear just how well the Riddle Creek exposures conform to that regional model, but the key member of very radioactive volcanic sandstones, pink grits and ignimbrites does outcrop or form float in a few places. These rocks have a radioactivity of 800 - 1000 cps at best where encountered, and in this as well as in appearance they are very like the unit farther south. In the ASH-AGUR case, however, they are not the most radioactive rocks about.

Quartz porphyry rhyolites and tuffs of the type underlying the phonolites elsewhere have not been found in the Riddle Creek region, but a major flow of light grey dacites occurring on the northeast side of the complex may well be the local equivalents.

The major lava unit in the Riddle Creek occurrence is a type of trachyte not met elsewhere as yet, and referred to as the rectangular porphyry to differentiate it from the rhomb-porphyry phonolites of the Yellow Lake series. The feature of singular interest about the rectangular porphyries is their radioactivity, which is almost everywhere in the 500 - 700 cps range - higher than the Yellow Lake flows by a factor of 3. This exceptional radioactivity is due largely to thorium, but the rectangular porphyries tend to range 10 - 50 ppm uranium (by chemical analysis) as compared to 2 - 5 ppm for the Yellow Lake rhomb porphyries. The actual uranium contents are likely double this in both cases, as discussed under rock chemistry.

Obviously hydrothermal action following or during eruption of the rectangular porphyry would not have to concentrate the uranium greatly to produce an ore deposit. That extensive post-eruption alterations have taken place may be clearly observed in several areas where their effects vary from yellow and orange matrix staining to almost complete kaolinization of the rock.

The most radioactive lithology so far discovered in this area is a strange, light grey rock with a somewhat "felted" texture. This has been found at widely scattered locations, near the lower boundary of the rectangular porphyries. Although its relationship to other lithologies appears somewhat contradictory from one location to another, it most likely occurs as dykes.

The best exposure of the felted radioactive material is an outcrop of about 15 feet width in the north fork of Riddle Creek. Radioactivity is to 2000 cps, and no other rocks outcrop in this vicinity. The zone may be traced with scintillometers below overburden for several hundred feet, and appears to be near vertical, crossing the valley on an east-west trend. Geochemical analysis of this outcrop gave 91 ppm uranium and 360 ppm thorium. A more radioactive (to 2200 cps), but poorly exposed, occurrence of this rock has been encountered at 1350 S / 2000 W on the grid. A weathered sample of float from a small pit here gave an incredible 510 ppm thorium, but only 50 ppm uranium. This latter site is likely part of a fairly continuous zone of highly radioactive rocks that follows the western edge of the rectangular porphyry.

That "western edge" is a thoroughly interesting location. Besides some major geochemical anomalies and the "felted" rock radioactive zones, the basement here is of coarse Tertiary syenites. These occur in a variety of forms and phases, but are moderately radioactive (200 - 400 cps) and porphyritic. They are very likely comagmatic with at least part of the Tertiary phonolites. To the east, the Tertiary appears to overlie regional granodiorites directly, and these outcrop again to west of the syenites. Their radioactivity of 50 - 90 cps is typical of granodiorite.

RADIOMETRIC SURVEY

In view of the role of radioactive lithologies on AGUR-ASH property, a ground radiometric survey was planned in conjunction with the laying out and flagging of a control grid. This work was contracted out to a geophysical consulting company (Nielson Geophysics Ltd.), who carried it out during July and early August. The results have been a major disappointment. A check of their work part way through the program indicated that the energy level "windows" on their spectrometer, a McPhar Spectra 44, had been slipping. Some of the lines were redone, but results suggest that this problem continued, and the final third of these results were never submitted to us because of "instrument problems". In October part of the remaining survey work was completed by ourselves using a different instrument, and some of the previous grid lines checked as well. Although the readings for each channel could be normalized between the two instruments, their characteristics were different and inter-channel ratios are not comparable.

Interpretation of radiometric results on the AGUR-ASH property presents some unusual problems because of the high thorium background, the major radioactive lithologies and an apparent "magmatic" correlation between uranium and thorium.

There is an exceptionally strong correlation between readings on the uranium and thorium channels. This may be broken down for clarity into four main sources of co-variation:

i) Thorium 'scattering'

The uranium radiation channel is directly influenced by thorium radiation. This may be corrected to obtain the counts expected on the uranium channel were no thorium present, and the result is termed "stripped uranium". It is in this correction, however, that problems arise if the energy level windows of the channels are not set properly, especially when (as here) the thorium correction is large.

ii) Geometry

Both uranium and thorium counts increase in enclosed areas such as gullies and decrease in open areas such as ridges.

iii) Overburden

Overburden is considerably less radioactive than the rocks in this area, especially where this is transported till rather than residual soils. (Most of the property is blanketed by till.) The usual solution to geometry and overburden problems is to use the ratio of (stripped) uranium counts to those of thorium, thus using thorium as a measure of background radia-

AGUR - ASH PROPERTY RADIOMETRIC DATA

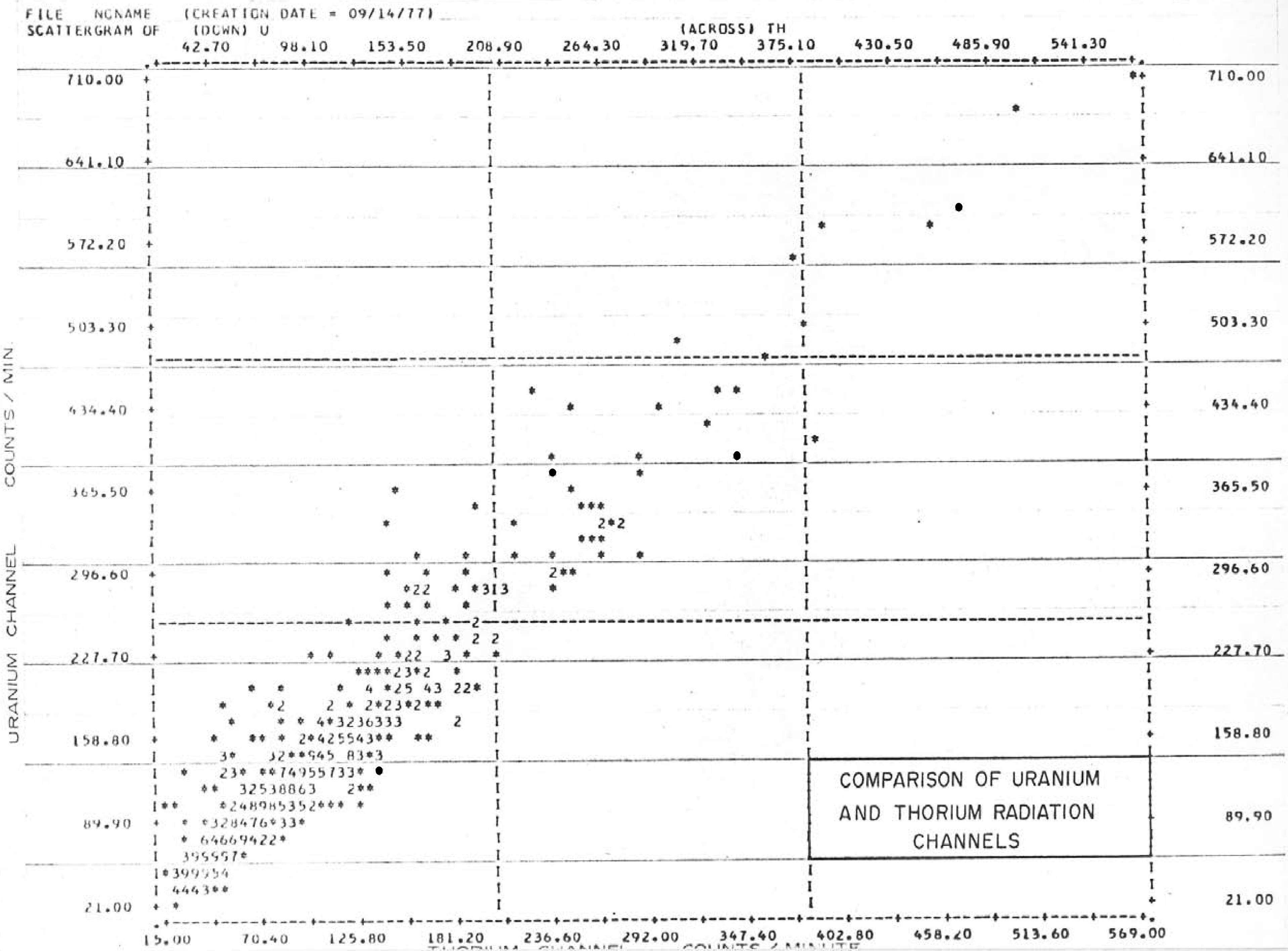

FIG. 2

CO-ORDS		TOTAL CNT	POT CHN	URN CHN	THR CHN	STR URN	U/TH	U/K	RESID URAN	NOTES
0450N	0000E	6978	564	130	102	71	0.70	0.19	-17	
0450N	0100E	7000	648	140	70	99	1.42	0.21	34	
0450N	0200E	7702	670	130	78	84	1.09	0.17	13	
0450N	0300E	6266	560	102	80	55	0.70	0.14	-17	
0450N	0400E	6946	508	106	90	53	0.60	0.16	-26	
0450N	0500E	6990	594	130	98	73	0.75	0.18	-12	
0450N	0600E	6914	536	140	126	67	0.53	0.22	-38	
0450N	0700E	6426	664	136	72	94	1.31	0.20	27	
0450N	0800E	6004	568	114	84	65	0.78	0.16	-10	
0450N	0900E	6210	530	106	50	77	1.54	0.20	26	
0450N	1000E	6452	582	112	88	61	0.69	0.15	-17	
0450N	1100E	6730	610	86	90	33	0.38	0.07	-46	
0450N	1200E	6270	710	112	68	72	1.07	0.13	8	
0450N	1300E	5492	650	96	58	62	1.08	0.12	5	CLIFF !!!!
0450N	1400E	5774	562	110	70	69	0.99	0.17	4	SKREE
0450N	1500E	5232	536	74	70	33	0.48	0.08	-32	
0450N	1525E	5284	544	68	36	47	1.31	0.10	6	
0300N	0000E	8700	728	140	106	78	0.74	0.15	-12	
0300N	0100E	7160	554	132	108	69	0.64	0.20	-23	
0300N	0200E	6498	542	110	78	64	0.83	0.17	-6	
0300N	0300E	6982	632	126	72	84	1.17	0.18	17	
0300N	0400E	6654	588	120	68	80	1.19	0.19	16	
0300N	0500E	8120	710	142	106	80	0.76	0.16	-10	
0300N	0600E	7092	652	126	94	71	0.76	0.15	-11	HYDRO LINE 6+75E
0300N	0700E	6032	596	130	74	87	1.18	0.21	18	
0300N	0800E	5962	554	112	60	77	1.29	0.19	19	BOGGY CREEK
0300N	0900E	5142	438	86	66	47	0.73	0.16	-14	
0300N	1000E	6682	598	110	58	76	1.32	0.17	19	
0300N	1100E	5746	470	114	60	79	1.32	0.25	21	
0300N	1200E	5140	498	68	48	40	0.84	0.10	-9	BOGGY CREEK
0300N	1300E	6002	536	90	38	68	1.79	0.16	25	
0300N	1400E	6396	606	144	52	113	2.19	0.26	61	SKREE
0300N	1500E	5760	480	94	48	66	1.38	0.19	16	
0300N	1525E	5318	448	78	42	53	1.28	0.16	8	STEEP
0150N	0000E	7716	728	158	120	88	0.74	0.18	-13	
0150N	0100E	7866	790	148	120	78	0.66	0.14	-23	OUT CROP
0150N	0200E	6904	552	140	86	90	1.05	0.25	13	
0150N	0300E	7482	728	120	106	58	0.55	0.11	-32	
0150N	0400E	6726	588	116	110	52	0.48	0.13	-42	
0150N	0500E	6512	584	122	104	61	0.60	0.16	-28	
0150N	0600E	5804	528	116	56	83	1.49	0.22	28	
0150N	0700E	5254	474	76	80	29	0.37	0.09	-43	
0150N	0800E	5798	504	80	94	25	0.27	0.07	-57	
0150N	0900E	5642	490	78	54	46	0.87	0.12	-7	
0150N	1000E	5274	456	94	68	54	0.80	0.17	-9	
0150N	1100E	6492	630	126	82	78	0.96	0.17	4	
0150N	1200E	6098	622	108	78	62	0.81	0.14	-8	
0150N	1300E	5986	526	120	68	80	1.19	0.22	16	
0150N	1400E	4490	232	90	52	59	1.15	0.55	7	
0150N	1500E	5004	456	106	78	60	0.78	0.20	-10	
0150N	1600E	5766	504	94	68	54	0.80	0.15	-9	
0000	0000E	8058	754	154	164	59	0.36	0.12	-74	
0000	0100E	8072	766	162	120	92	0.77	0.18	-9	
0000	0200E	7596	634	140	148	54	0.37	0.14	-67	

CO-ORDS		TOTAL CNT	POT CHN	URN CHN	THR CHN	STR URN	U/TH	U/K	RESID URAN	NOTES
0000	0300E	6812	670	134	78	88	1.14	0.18	17	
0000	0400E	4036	218	76	48	48	1.01	0.44	-1	
0000	0500E	6972	622	100	74	57	0.77	0.12	-11	
0000	0600E	6032	582	80	66	41	0.63	0.09	-20	
0000	0700E	5932	548	106	56	73	1.31	0.18	18	
0000	0800E	5502	516	96	68	56	0.83	0.15	-7	
0000	0900E	5786	540	112	72	70	0.98	0.18	3	
0000	1000E	5738	538	102	66	63	0.97	0.16	1	
0000	1100E	5818	530	116	68	76	1.13	0.21	12	
0000	1200E	5744	562	140	76	96	1.26	0.26	26	
0000	1300E	5772	546	100	60	65	1.09	0.16	7	GULLY 12+75E
0000	1400E	5938	494	132	58	98	1.70	0.30	41	OUT CROP
0000	1500E	5170	434	106	70	65	0.94	0.23	0	
0000	1575E	5032	548	80	42	55	1.33	0.13	10	
0150S	0000E	10280	894	260	190	150	0.79	0.30	-2	
0150S	0100E	6938	652	166	76	122	1.61	0.28	52	BOGGY
0150S	0200E	6856	586	122	88	71	0.81	0.18	-7	
0150S	0300E	6246	486	100	88	49	0.56	0.15	-29	
0150S	0400E	6948	690	134	90	81	0.91	0.16	1	
0150S	0500E	7404	640	142	102	83	0.81	0.19	-5	
0150S	0600E	6580	570	120	70	79	1.14	0.20	14	
0150S	0700E	5080	336	68	66	29	0.45	0.13	-32	
0150S	0800E	6158	584	126	54	94	1.76	0.22	40	HYDRO LINE 7+75E
0150S	0900E	6486	624	94	64	57	0.89	0.12	-4	
0150S	1000E	7048	678	136	92	82	0.90	0.17	1	OUT CROP
0150S	1100E	5664	576	86	60	51	0.86	0.11	-7	
0150S	1200E	6262	566	126	82	78	0.96	0.20	4	
0150S	1300E	5376	502	88	94	33	0.36	0.10	-49	SKREE
0150S	1400E	7622	708	176	86	126	1.47	0.26	49	RAVINE
0150S	1500E	5688	596	86	50	57	1.14	0.12	6	
0300S	0000E	10020	826	184	180	79	0.44	0.15	-65	
0300S	0025E	10358	860	246	186	138	0.74	0.28	-10	
0300S	0050E	10682	838	260	180	155	0.87	0.34	10	
0300S	0075E	10242	650	228	178	125	0.70	0.41	-18	
0300S	0100E	8598	616	196	144	112	0.78	0.35	-6	
0300S	0125E	7940	598	172	112	107	0.96	0.30	11	
0300S	0150E	11296	696	294	222	165	0.75	0.65	-9	
0300S	0175E	11356	692	324	224	194	0.87	0.88	17	SWAMPY FLAT
0300S	0200E	11124	788	276	224	146	0.65	0.41	-30	VALLEY WITH CREEK
0300S	0225E	7056	620	142	114	76	0.67	0.19	-21	CREEK
0300S	0300E	7224	634	118	88	67	0.76	0.15	-11	
0300S	0400E	8850	998	182	138	102	0.74	0.14	-12	
0300S	0500E	7282	676	112	104	51	0.50	0.11	-38	
0300S	0600E	6574	592	128	84	79	0.95	0.19	3	
0300S	0700E	5506	522	82	78	36	0.47	0.10	-34	
0300S	0800E	6216	522	132	72	90	1.26	0.26	23	HYDRO LINE
0300S	0900E	5710	538	100	64	63	0.98	0.16	1	
0300S	1000E	5996	578	100	50	71	1.42	0.16	20	
0300S	1100E	5866	562	102	64	65	1.02	0.16	3	
0300S	1200E	5450	448	106	64	69	1.08	0.23	7	OUT CROP
0300S	1250E	7610	708	154	98	97	0.99	0.20	11	
0300S	1300E	8194	780	168	88	117	1.33	0.21	38	RAVINE
0300S	1400E	6452	614	116	60	81	1.36	0.18	23	
0300S	1500E	5400	516	92	44	66	1.51	0.17	19	

CO-ORDS		TOTAL CNT	POT CHN	URN CHN	THR CHN	STR URN	U/TH	U/K	RESID URAN	NOTES
0300S	1540E	6230	590	110	72	68	0.95	0.16	1	
0450S	0000E	15750	1076	354	362	144	0.40	0.31	-131	
0450S	0050E	14956	1022	366	330	175	0.53	0.41	-78	
0450S	0100E	16336	1278	399	332	206	0.62	0.31	-48	
0450S	0150E	15494	1246	346	362	136	0.38	0.21	-139	MAIN RD
0450S	0200E	13988	1144	328	332	136	0.41	0.23	-118	MAIN RD
0450S	0250E	14488	1152	338	268	183	0.68	0.29	-25	
0450S	0300E	11668	838	276	218	149	0.69	0.36	-22	
0450S	C400E	14756	1092	352	264	199	0.76	0.35	-6	
0450S	0500E	12182	940	256	210	134	0.64	0.25	-32	MAIN RD 4+50E
0450S	0600E	8364	750	202	136	123	0.91	0.27	10	VALLEY
0450S	C7C0E	6616	604	132	92	78	0.86	0.19	-2	5+00E
0450S	0800E	6752	598	130	70	89	1.28	0.21	24	CREEK 5+75E
0450S	0900E	6240	538	102	78	56	0.73	0.15	-14	
0450S	1000E	7044	690	104	78	58	0.76	0.11	-12	
0450S	1100E	5718	450	106	80	59	0.75	0.21	-13	OUT CROP
0450S	1200E	6212	540	124	62	88	1.42	0.23	28	OUT CRCP
0450S	1300E	7184	696	140	76	96	1.26	0.19	26	OUT CRCP
0450S	1400E	5480	460	70	70	29	0.42	0.09	-36	
0450S	1500E	7208	594	120	98	63	0.65	0.16	-22	STEEP RAVINE
0450S	1575E	6200	508	84	48	56	1.17	0.14	6	SKREE
0600S	0000E	15728	1322	404	294	234	0.80	0.32	6	CREEK
0600S	0050E	14748	1130	380	312	199	0.64	0.37	-40	
0600S	0100E	14668	1004	418	306	241	0.79	0.63	5	
0600S	0200E	15588	1104	422	330	231	0.70	0.50	-22	
0600S	0250E	15326	1076	394	336	199	0.59	0.44	-57	
0600S	030CE	10808	800	234	238	96	0.41	0.24	-90	
0600S	0350E	12964	920	350	276	190	0.69	0.49	-23	
0600S	0400E	14440	1142	316	286	150	0.53	0.24	-70	
0600S	0450E	16028	1238	380	314	198	0.63	0.31	-43	MAIN RD
0600S	0500E	9024	870	196	134	118	0.88	0.20	6	CREEK
0600S	0600E	6602	660	124	80	77	0.97	0.16	4	
0600S	0700E	7142	6C6	136	92	82	0.90	0.20	1	
0600S	0800E	6846	744	116	88	65	0.74	0.11	-13	HYDRO LINE
0600S	0900E	6602	632	116	108	53	0.50	0.12	-39	
0600S	10C0E	6480	604	106	76	62	0.82	0.14	-7	
0600S	1100E	6802	558	106	98	49	0.50	0.13	-36	
0600S	1200E	6720	632	122	62	86	1.39	0.18	26	
0600S	1300E	5922	534	114	60	79	1.32	0.21	21	
0600S	1350E	7730	796	138	88	87	0.99	0.15	8	SKREE SLOPE
0600S	1400E	10590	1074	190	110	126	1.15	0.16	31	STEEP VALLEY
0600S	1500E	5922	556	84	58	50	0.87	0.12	-6	14+00E AT
0600S	1525E	5166	484	94	54	62	1.16	0.18	8	BOTTOM
0750S	0000E	12334	986	306	226	175	0.78	0.41	-2	
0750S	0050E	13088	876	358	234	222	0.95	0.61	38	
0750S	C100E	10650	752	256	208	135	0.65	0.39	-29	
0750S	0150E	12358	858	358	222	229	1.03	0.64	54	
0750S	0200E	12466	1046	338	258	188	0.73	0.35	-12	CREEK
0750S	C250E	14904	1154	410	306	233	0.76	0.43	-2	
0750S	0300E	17630	1352	504	392	283	0.74	0.48	-7	
0750S	C350E	15250	1122	406	336	211	0.63	0.43	-45	
0750S	0400E	12268	1006	278	240	139	0.58	0.25	-49	
0750S	0500E	9980	852	260	130	155	0.87	0.33	10	CREEK
0750S	C600E	8064	716	170	124	98	0.79	0.21	-6	MAIN RD 5+10E

CO-ORDS	TOTAL CNT	POT CHN	URN CHN	THR CHN	STR URN	U/TH	U/K	RESID URAN	NOTES
0750S 0700E	7174	680	130	116	62	0.54	0.13	-35	MAIN RD 5+80E
0750S 0800E	7136	606	134	80	87	1.10	0.21	14	
0750S 0900E	7020	632	132	86	82	0.96	0.19	5	
0750S 1000E	7032	694	148	70	107	1.54	0.21	42	
0750S 1100E	6922	640	106	98	49	0.50	0.11	-36	MAIN RD 9+75E
0750S 1200E	5222	454	98	64	61	0.95	0.19	0	
0750S 1300E	5408	572	98	64	51	0.80	0.12	-10	
0750S 1400E	7006	698	116	98	59	0.61	0.12	-26	OUT CROP
0750S 1500E	6732	684	130	82	82	1.01	0.16	8	RAVINE
0900S 0000E	10072	856	198	148	112	0.76	0.20	-9	
0900S 0100E	9176	692	216	162	122	0.76	0.33	-9	
0900S 0150E	10902	814	250	164	155	0.95	0.34	21	
0900S 0200E	43402	2628	1420	1138	762	0.67	1.72	-74	VALLEY
0900S 0250E	15696	978	442	346	242	0.70	0.80	-22	
0900S 0300E	12056	880	326	250	181	0.73	0.47	-14	BOGGY
0900S 0350E	9836	790	250	214	126	0.59	0.32	-43	BOGGY
0900S 0400E	9874	746	218	208	97	0.47	0.25	-67	BOGGY
0900S 0450E	14078	1122	378	286	212	0.74	0.38	-8	BOGGY
0900S 0500E	10514	678	270	200	154	0.77	0.56	-5	BOGGY
0900S 0550E	8952	826	190	160	97	0.61	0.18	-33	BOGGY CREEK
0900S 0600E	9758	596	280	240	141	0.59	0.92	-47	BOGGY
0900S 0650E	9084	482	232	178	129	0.73	0.99	-14	BOGGY
0900S 0700E	11578	868	278	200	162	0.81	0.35	3	
0900S 0800E	6718	638	164	118	95	0.81	0.24	-4	
0900S 0900E	7092	756	134	92	80	0.88	0.14	0	MAIN RD
0900S 1000E	6412	600	120	52	89	1.73	0.20	37	MAIN RD
0900S 1100E	6590	602	118	96	62	0.65	0.15	-21	
0900S 1200E	6300	640	108	68	68	1.01	0.14	4	
0900S 1300E	5806	540	88	52	57	1.11	0.14	5	
0900S 1400E	6300	624	116	66	77	1.18	0.17	15	OUT CROP
0900S 1500E	8180	856	176	106	114	1.08	0.19	23	RAVINE
1050S 0000E	18122	1038	566	394	338	0.86	1.59	38	
1050S 0100E	9964	878	220	146	135	0.93	0.24	15	
1050S 0200E	14292	962	408	302	233	0.77	0.66	0	
1050S 0300E	9214	714	270	186	162	0.87	0.51	13	
1050S 0400E	9664	796	224	186	116	0.63	0.26	-32	
1050S 0500E	8642	650	138	172	88	0.52	0.26	-50	
1050S 0600E	10454	734	298	198	183	0.93	0.60	25	
1050S 0700E	12016	1048	260	256	112	0.44	0.18	-87	
1050S 0800E	11496	696	282	272	124	0.46	0.55	-86	
1050S 0900E	6676	640	130	82	82	1.01	0.18	8	HYDRO LINE
1050S 1000E	6766	634	130	92	76	0.84	0.16	-4	
1050S 1100E	6034	574	114	74	71	0.96	0.17	2	MAIN RD
1050S 1200E	6468	682	100	96	44	0.46	0.09	-39	
1050S 1300E	6364	700	92	68	52	0.77	0.09	-11	MAIN RD
1050S 1400E	6328	666	92	72	50	0.70	0.10	-16	MAIN RD
1050S 1500E	5036	492	38	32	69	2.17	0.18	31	
1200S 0000E	14350	848	472	318	288	0.91	1.72	43	
1200S 0050E	13870	862	364	298	191	0.64	0.65	-38	
1200S 0100E	29450	1694	800	772	353	0.46	0.97	-218	
1200S 0150E	37778	2234	1184	908	659	0.73	1.49	-11	OUT CROP
1200S 0200E	11958	924	292	156	201	1.29	0.38	74	
1200S 0300E	8720	678	200	118	131	1.12	0.33	31	
1200S 0400E	6464	528	148	102	89	0.87	0.28	0	

CO-ORDS	TOTAL CNT	POT CHN	URN CHN	THR CHN	STR URN	U/TH	U/K	RESID URAN	NOTES
1200S 0500E	5982	484	132	92	78	0.86	0.27	-2	
1200S 0600E	7342	668	146	120	76	0.64	0.17	-25	
1200S 0700E	8214	528	182	132	105	0.80	0.41	-4	BOGGY CREEK
1200S 0800E	4330	214	96	64	59	0.92	0.78	-2	
1200S 0900E	9492	712	236	178	133	0.75	0.37	-10	
1200S 1000E	8830	708	196	138	116	0.84	0.28	1	MAIN RD 9+75E
1200S 1100E	5824	556	104	58	70	1.22	0.17	13	
1200S 1200E	5862	580	80	68	40	0.60	0.09	-23	
1200S 1300E	5652	502	90	58	56	0.97	0.15	0	
1200S 1400E	6410	672	84	76	40	0.53	0.07	-29	
1200S 1500E	5250	540	72	46	45	0.99	0.10	-2	
1350S 0000E	9844	636	230	184	123	0.67	0.44	-24	
1350S 0100E	9250	794	268	186	160	0.86	0.40	11	
1350S 0150E	11718	842	306	248	162	0.66	0.44	-31	
1350S 0200E	12016	914	316	198	201	1.02	0.43	43	
1350S 0250E	22648	1382	700	518	400	0.77	1.19	11	
1350S 0300E	7156	552	186	110	122	1.11	0.41	27	
1350S 0400E	7632	530	186	106	124	1.18	0.45	33	
1350S 0500E	7118	536	120	100	62	0.62	0.18	-25	
1350S 0600E	6730	526	170	102	111	1.09	0.38	22	
1350S 0700E	6318	540	124	66	85	1.30	0.23	23	
1350S 0800E	10556	874	270	198	155	0.79	0.33	-2	
1350S 0850E	11790	1022	268	236	131	0.56	0.22	-53	
1350S 0900E	11612	916	268	228	136	0.60	0.28	-43	
1350S 0950E	9662	810	254	186	146	0.79	0.34	-2	
1350S 1000E	11362	1014	292	236	155	0.66	0.28	-29	CREEK @ 9+90E
1350S 1050E	12418	984	280	240	141	0.59	0.26	-47	MAIN RD 50 M S
1350S 1100E	8986	638	208	128	134	1.05	0.39	26	
1350S 1150E	10734	878	276	168	178	1.06	0.36	42	DRY CREEK
1350S 1200E	7440	728	164	110	100	0.91	0.20	5	
1350S 1300E	5894	508	94	58	60	1.04	0.16	3	
1350S 1400E	5938	568	92	74	49	0.67	0.12	-19	
1350S 1490E	4500	446	42	44	16	0.38	0.04	-30	
1500S 0000E	10274	804	220	156	129	0.83	0.27	2	
1500S 0100E	11142	928	276	214	152	0.71	0.30	-17	
1500S 0200E	8086	538	172	160	79	0.50	0.31	-51	
1500S 0300E	10062	780	206	194	93	0.48	0.21	-61	
1500S 0400E	9714	798	216	162	122	0.76	0.26	-9	
1500S 0500E	9372	654	224	174	123	0.71	0.39	-17	
1500S 0600E	6964	558	152	132	75	0.57	0.24	-34	
1500S 0700E	6456	700	132	70	91	1.31	0.17	26	
1500S 0800E	5714	432	96	64	59	0.92	0.20	-2	
1500S 0900E	10664	820	214	174	113	0.65	0.23	-27	
1500S 1000E	10530	920	290	210	168	0.80	0.34	2	MAIN ROAD
1500S 1100E	10826	796	252	208	131	0.63	0.33	-33	CREEK
1500S 1200E	10688	802	232	172	132	0.77	0.29	-6	MAIN ROAD
1500S 1300E	7920	720	144	120	74	0.62	0.15	-27	
1500S 1400E	5870	564	78	58	44	0.77	0.10	-12	
1500S 1500E	7338	704	118	98	61	0.63	0.12	-24	
1500S 1580E	4670	488	76	48	48	1.01	0.13	-1	
0600N 0000	7854	706	166	106	104	0.99	0.22	13	
0600N 0100W	6450	468	142	82	94	1.15	0.35	20	
0600N 0200W	4316	342	84	36	63	1.76	0.27	22	
0600N 0300W	11184	916	208	226	77	0.34	0.14	-100	

CO-ORDS		TOTAL CNT	POT CHN	URN CHN	THR CHN	STR URN	U/TH	U/K	RESID URAN	NOTES
0600N	0400W	10666	870	224	166	128	0.77	0.24	-6	
0600N	0500W	26974	1690	770	568	441	0.78	0.81	16	
0600N	0600W	21706	1128	494	380	274	0.72	0.72	-15	
0600N	0700W	18380	1178	552	302	377	1.25	0.87	144	
0600N	0800W	10648	690	210	168	112	0.67	0.31	-23	
0600N	0900W	12728	884	264	274	105	0.39	0.25	-107	
0600N	1000W	16058	1120	446	308	267	0.87	0.57	30	
0600N	1100W	10946	778	242	158	150	0.95	0.35	21	
0600N	1200W	7102	508	186	128	112	0.88	0.47	4	
0600N	1300W	12764	928	338	206	218	1.06	0.48	55	
0600N	1400W	10314	752	272	144	188	1.31	0.48	69	
0600N	1500W	7674	626	168	126	95	0.76	0.25	-10	
0600N	1600W	9900	802	252	166	156	0.94	0.35	21	
0600N	1700W	9510	786	228	124	156	1.26	0.33	51	CREEK 16+70W
0600N	1800W	17038	1256	412	376	194	0.52	0.33	-91	
0600N	1900W	9120	746	200	136	121	0.89	0.27	8	
0600N	2000W	9980	860	190	174	89	0.51	0.16	-51	
0600N	2100W	10088	822	228	174	127	0.73	0.27	-13	
0600N	2200W	10536	840	264	178	161	0.91	0.35	17	
0600N	2300W	7026	536	140	86	90	1.05	0.27	13	
0600N	2400W	8724	706	218	126	145	1.15	0.36	39	
0600N	2500W	10710	838	236	190	126	0.66	0.27	-26	
0450N	0100W	8866	832	170	136	91	0.67	0.16	-21	
0450N	0200W	7668	660	162	124	90	0.73	0.22	-14	
0450N	0300W	10152	826	254	180	149	0.83	0.33	4	
0450N	0400W	27328	1626	792	578	457	0.79	1.02	25	
0450N	0500W	11650	806	218	222	89	0.40	0.21	-85	
0450N	0600W	12544	924	352	236	215	0.91	0.52	30	
0450N	0700W	17890	1164	510	350	307	0.88	0.73	40	
0450N	0800W	11990	826	306	236	169	0.72	0.47	-15	
0450N	0900W	13604	912	374	284	209	0.74	0.60	-10	
0450N	1000W	9438	640	214	186	106	0.57	0.36	-42	
0450N	1100W	10582	928	290	190	180	0.95	0.35	27	ROAD (SEC)
0450N	1200W	27518	1672	836	648	461	0.71	1.15	-21	OUT CROP
0450N	1250W	26756	1642	860	592	517	0.87	1.32	75	
0450N	1300W	21494	1488	646	526	341	0.65	0.70	-52	
0450N	1400W	8636	662	168	132	91	0.69	0.23	-18	
0450N	1500W	11890	994	266	208	145	0.70	0.25	-19	
0450N	1600W	17004	1230	394	362	184	0.51	0.31	-91	
0450N	1700W	7826	670	180	100	122	1.22	0.29	34	
0450N	1800W	10472	922	212	136	133	0.98	0.21	20	
0450N	1900W	9412	722	218	134	140	1.05	0.34	28	
0450N	2000W	7300	604	122	102	63	0.62	0.15	-25	
0450N	2100W	10200	828	262	170	163	0.96	0.36	25	
0450N	2200W	7292	656	138	104	77	0.75	0.17	-12	
0450N	2300W	6564	484	108	76	54	0.84	0.20	-5	
0450N	2400W	7462	602	144	104	83	0.81	0.22	-6	
0450N	2500W	10278	778	212	178	109	0.61	0.24	-34	
0300N	0100W	8860	724	218	120	149	1.24	0.35	46	
0300N	0200W	9290	746	246	142	163	1.15	0.40	46	
0300N	0300W	9574	756	240	146	155	1.07	0.37	35	
0300N	0400W	10154	856	254	160	161	1.01	0.30	30	
0300N	0500W	10328	728	238	164	143	0.87	0.37	9	
0300N	0600W	10636	830	252	182	146	0.81	0.32	0	

CO-ORDS		TOTAL CNT	POT CHN	URN CHN	THR CHN	STR URN	U/TH	U/K	RESID URAN	NOTES
0300N	0700W	16390	1032	444	296	272	0.92	0.69	44	
0300N	0800W	17064	1184	468	312	287	0.92	0.56	47	
0300N	0900W	19952	1352	568	418	326	0.78	0.64	9	OUT CROP
0300N	1000W	28992	1664	886	680	492	0.72	1.52	-13	
0300N	1100W	23000	1398	710	504	418	0.83	1.18	39	OUT CROP
0300N	1200W	18426	1256	564	420	321	0.76	0.78	3	
0300N	1250W	30216	1834	960	722	542	0.75	1.38	6	MAIN RD
0300N	1300W	11832	982	278	238	140	0.59	0.26	-46	
0300N	1400W	22800	1614	668	550	350	0.64	0.61	-62	
0300N	1500W	13846	1164	324	270	167	0.62	0.26	-42	
0300N	1600W	12520	1064	278	194	165	0.85	0.25	10	
0300N	1700W	8670	782	168	120	98	0.82	0.18	-3	
0300N	1800W	9816	758	202	188	93	0.50	0.22	-57	OUT CROP
0300N	1900W	11060	874	266	220	138	0.63	0.30	-35	
0300N	2000W	7930	614	142	146	57	0.39	0.16	-62	
0300N	2100W	7712	654	164	122	93	0.77	0.23	-9	
0300N	2200W	8370	710	184	130	108	0.84	0.25	0	
0300N	2300W	12728	1008	308	238	170	0.72	0.32	-16	
0300N	2400W	16606	1164	468	370	254	0.69	0.57	-28	
0300N	2500W	10814	726	288	216	163	0.76	0.55	-7	
0150N	0100W	7730	702	150	118	81	0.69	0.17	-18	
0150N	0200W	7970	680	154	120	84	0.71	0.19	-17	
0150N	0300W	7916	722	164	114	98	0.86	0.20	0	
0150N	0400W	8890	738	208	146	123	0.85	0.29	3	
0150N	0500W	14958	1058	438	302	263	0.87	0.63	30	
0150N	0600W	27742	1676	884	652	501	0.76	1.43	8	
0150N	0700W	21732	1482	616	470	344	0.73	0.62	-10	
0150N	0800W	21188	1440	590	468	319	0.68	0.60	-33	
0150N	0900W	20318	1402	602	468	331	0.71	0.68	-21	
0150N	1000W	34774	2178	1128	754	692	0.92	1.25	132	
0150N	1100W	15534	1126	418	288	251	0.87	0.49	28	
0150N	1200W	23732	1636	658	516	359	0.70	0.57	-27	
0150N	1250W	18976	1302	576	324	388	1.20	0.75	139	
0150N	1300W	14004	1038	390	282	227	0.80	0.49	8	
0150N	1400W	15428	1158	364	338	168	0.50	0.30	-90	
0150N	1500W	8998	788	168	136	89	0.66	0.17	-23	
0150N	1600W	8060	830	152	106	90	0.86	0.15	0	
0150N	1700W	11782	1008	284	200	168	0.84	0.28	9	
0150N	1800W	12166	1020	262	234	126	0.54	0.21	-57	
0150N	1900W	8882	782	178	124	106	0.86	0.20	1	
0150N	2000W	8768	778	182	142	99	0.70	0.20	-17	
0150N	2100W	8212	694	194	132	117	0.89	0.29	7	OUT CROP
0150N	2200W	8262	432	224	186	116	0.63	1.41	-32	
0150N	2300W	8896	810	162	150	75	0.50	0.14	-48	
0150N	2400W	7852	572	212	114	146	1.28	0.51	48	
0150N	2500W	8854	768	170	138	90	0.65	0.18	-24	
0000	0100W	8628	732	228	142	145	1.03	0.35	28	
0000	0200W	9654	894	216	172	116	0.68	0.21	-22	
0000	0300W	8204	708	156	138	76	0.55	0.17	-38	
0000	0400W	9808	802	202	142	119	0.84	0.24	2	
0000	0500W	11398	978	262	236	125	0.53	0.23	-59	
0000	0600W	17030	1136	464	402	231	0.58	0.58	-73	
0000	0700W	18114	1132	560	388	335	0.87	1.06	40	
0000	0800W	19134	1290	574	416	333	0.80	0.76	18	

CO-ORDS	TOTAL CNT	POT CHN	URN CHN	THR CHN	STR URN	U/TH	U/K	RESID URAN	NOTES
0000 0900W	17348	1242	494	410	257	0.63	0.55	-54	MAIN RD
0000 1000W	11842	940	270	214	146	0.68	0.28	-23	
0000 1100W	12506	986	314	226	183	0.81	0.35	5	
0000 1200W	8700	988	234	160	141	0.88	0.22	10	
0000 1200W	9822	934	218	168	120	0.72	0.20	-15	
0000 1300W	12876	862	362	298	189	0.64	0.63	-40	
0000 1400W	8112	764	184	104	123	1.19	0.24	33	
0000 1500W	9480	848	184	164	89	0.54	0.16	-44	
0000 1600W	10242	788	234	164	139	0.85	0.31	5	
0000 1700W	10330	844	242	148	156	1.06	0.31	34	
0000 1800W	11844	944	256	186	148	0.80	0.26	0	
0000 1900W	9186	806	208	148	122	0.83	0.24	0	
0000 2000W	9634	820	236	138	156	1.13	0.32	41	
0000 2100W	8874	766	172	124	100	0.81	0.20	-4	
0000 2200W	8570	756	184	128	110	0.86	0.23	2	
0000 2300W	8796	708	144	132	67	0.51	0.14	-42	
0000 2400W	8404	600	194	134	116	0.87	0.37	4	
0000 2500W	8742	724	166	130	90	0.70	0.19	-18	
0150S 0100W	10026	1026	276	240	137	0.57	0.23	-51	
0150S 0200W	10050	876	240	172	140	0.82	0.27	1	
0150S 0300W	10920	886	260	190	150	0.79	0.30	-2	
0150S 0400W	11254	974	240	164	145	0.89	0.23	11	
0150S 0500W	11802	928	322	220	194	0.89	0.42	21	MAIN RD
0150S 0600W	9392	806	214	198	99	0.50	0.22	-58	
0150S 0700W	40892	2412	1376	1008	793	0.79	2.17	50	
0150S 0750W	14074	1044	440	312	259	0.83	0.65	19	CREEK
0150S 0775W	14226	998	430	262	278	1.06	0.70	74	
0150S 0800W	12592	984	326	222	197	0.89	0.39	22	
0150S 0900W	34494	2038	1164	784	710	0.91	1.98	129	
0150S 1000W	12102	832	350	210	228	1.09	0.66	62	
0150S 1100W	12698	924	302	240	163	0.68	0.35	-25	
0150S 1200W	11728	900	308	166	212	1.28	0.44	77	
0150S 1250W	10712	804	264	188	155	0.83	0.37	4	CREEK
0150S 1300W	10396	856	230	130	154	1.19	0.29	45	
0150S 1400W	10714	862	228	192	117	0.61	0.23	-36	
0150S 1500W	6954	540	138	98	81	0.83	0.24	-4	
0150S 1600W	10192	722	200	100	142	1.42	0.31	54	
0150S 1700W	9006	758	194	152	106	0.70	0.23	-18	
0150S 1800W	9486	764	182	112	117	1.05	0.23	21	
0150S 1900W	8380	716	182	134	104	0.78	0.23	-7	
0150S 2000W	10482	844	274	166	178	1.07	0.38	43	
0150S 2100W	10540	812	256	168	158	0.95	0.36	22	
0150S 2200W	21846	1406	634	526	329	0.63	0.79	-64	
0150S 2300W	16218	1070	408	336	213	0.64	0.49	-43	
0150S 2400W	9418	548	170	78	124	1.60	0.38	53	
0150S 2500W	14762	1064	316	320	131	0.41	0.25	-115	
0300S 0100W	11986	1060	320	208	199	0.96	0.33	34	
0300S 0200W	9516	752	228	156	137	0.88	0.32	10	
0300S 0300W	9666	714	242	192	131	0.68	0.38	-22	
0300S 0400W	12162	1002	332	226	201	0.89	0.39	23	
0300S 0500W	10910	826	290	194	177	0.92	0.44	22	
0300S 0600W	12584	942	320	262	168	0.64	0.38	-35	
0300S 0700W	14116	1036	340	292	171	0.59	0.34	-54	
0300S 0800W	12146	958	318	240	179	0.75	0.37	-9	

CO-ORDS		TOTAL CNT	POT CHN	URN CHN	THR CHN	STR URN	U/TH	U/K	RESID URAN	NOTES
0300S	0900W	12800	970	292	270	135	0.50	0.28	-74	
0300S	1000W	11426	988	300	218	173	0.80	0.32	1	
0300S	1100W	11886	906	332	206	212	1.03	0.48	49	
0300S	1200W	11068	854	256	192	145	0.76	0.31	-8	
0300S	1300W	8534	718	204	154	114	0.75	0.28	-11	
0300S	1400W	9782	784	198	156	107	0.69	0.22	-19	
0300S	1500W	9252	776	192	150	105	0.70	0.22	-18	
0300S	1600W	7988	686	186	110	122	1.11	0.29	27	
0300S	1700W	11718	1052	260	172	160	0.93	0.24	21	
0300S	1800W	8658	680	208	156	117	0.76	0.32	-9	
0300S	1900W	10686	898	232	176	130	0.74	0.24	-11	
0300S	2000W	11682	1034	278	192	167	0.87	0.27	13	
0300S	2100W	11158	760	270	184	163	0.89	0.44	15	
0300S	2200W	11042	864	258	174	157	0.90	0.32	16	O/C
0300S	2300W	11788	1002	348	278	187	0.67	0.40	-28	O/C
0300S	2400W	22906	1434	670	548	353	0.64	0.89	-57	O/C
0300S	2500W	10714	830	280	168	182	1.09	0.41	46	
0450S	0100W	17614	1258	482	386	258	0.67	0.50	-34	
0450S	0200W	15024	1110	410	332	218	0.66	0.46	-36	
0450S	0300W	18986	1366	588	370	374	1.01	0.70	92	
0450S	0400W	9104	592	252	180	147	0.82	0.67	2	
0450S	0500W	12154	806	388	228	256	1.12	0.94	76	
0450S	0600W	12390	1074	302	248	158	0.64	0.26	-35	
0450S	0700W	11374	956	288	194	175	0.91	0.33	20	
0450S	0800W	10710	732	248	268	93	0.35	0.31	-115	
0450S	0900W	21058	1312	682	542	368	0.68	1.39	-37	
0450S	1000W	28642	1660	986	612	632	1.03	2.28	175	O/C
0450S	1100W	13176	830	362	260	211	0.81	0.72	9	
0450S	1200W	9610	736	192	170	93	0.55	0.22	-44	
0450S	1300W	10402	844	210	180	105	0.59	0.21	-39	
0450S	1400W	11220	958	238	252	92	0.37	0.17	-104	
0450S	1500W	10086	918	212	150	125	0.84	0.21	1	
0450S	1600W	8970	708	214	128	140	1.09	0.34	32	
0450S	1700W	9942	774	212	180	107	0.60	0.25	-37	
0450S	1800W	9940	594	252	182	146	0.81	0.66	0	
0450S	1900W	10718	766	256	188	147	0.78	0.38	-3	
0450S	2000W	10308	838	226	184	119	0.65	0.25	-28	
0450S	2100W	12520	942	348	256	200	0.78	0.47	0	
0450S	2200W	14114	950	408	306	231	0.76	0.68	-4	
0450S	2300W	11078	784	270	208	149	0.72	0.40	-15	
0450S	2400W	19830	1274	618	572	287	0.50	1.08	-140	
0450S	2500W	9810	838	232	142	149	1.06	0.29	32	
0600S	0100W	14180	858	344	164	249	1.52	0.60	115	
0600S	0200W	20926	1038	604	282	441	1.56	1.69	222	
0600S	0300W	9618	594	220	110	156	1.42	0.51	61	
0600S	0400W	9300	476	240	132	163	1.24	1.08	53	
0600S	0500W	12046	856	248	168	150	0.90	0.30	14	
0600S	0600W	11892	714	274	156	183	1.18	0.54	56	
0600S	0700W	19590	1056	536	332	344	1.04	1.13	89	
0600S	0800W	13908	848	326	212	203	0.96	0.53	35	
0600S	0900W	16214	982	460	200	344	1.72	1.14	185	
0600S	1000W	20630	1182	538	306	361	1.18	0.81	125	
0600S	1100W	18308	1098	514	314	332	1.06	0.90	90	
0600S	1200W	8666	556	156	98	99	1.01	0.30	13	

CO-ORDS		TOTAL CNT	POT CHN	URN CHN	THR CHN	STR URN	U/TH	U/K	RESID URAN	NOTES
900S	900W	24446	1292	996	363	783	2.13	9.37	502	
900S	950W	23358	1328	1028	292	859	2.94	5.85	633	
900S	1000W	20468	1192	736	326	547	1.68	2.12	297	
900S	1100W	17272	1036	640	250	495	1.98	1.99	300	S
900S	1150W	15368	1108	592	198	477	2.41	1.18	319	
900S	1200W	17510	1000	668	244	526	2.16	2.75	335	S
900S	1250W	19448	972	820	290	652	2.25	49.91	428	
900S	1400W	13702	636	380	160	287	1.80	1.79	156	
900S	1500W	12852	720	280	134	202	1.51	0.57	90	
900S	1600W	10948	484	276	82	228	2.79	1.39	154	
900S	1700W	12954	772	356	126	283	2.25	0.82	177	
900S	1800W	16558	956	572	224	442	1.98	1.75	265	
900S	1900W	11866	636	312	126	239	1.90	0.96	133	
900S	2000W	12886	704	348	108	285	2.64	0.96	192	
900S	2100W	10880	548	244	102	185	1.81	0.76	96	
900S	2200W	10948	540	252	86	202	2.35	0.84	125	
900S	2300W	10574	640	172	64	135	2.11	0.31	73	
900S	2400W	10336	464	248	94	193	2.06	1.20	110	
900S	2500W	10030	516	204	52	173	3.35	0.61	121	
1050S	0100W	12850	810	360	222	231	1.04	0.76	56	
1050S	0200W	21506	1304	670	534	361	0.68	1.31	-39	
1050S	0300W	22902	1448	678	532	370	0.70	0.90	-28	
1050S	0400W	17570	1124	490	402	257	0.64	0.71	-47	
1050S	0500W	15906	1028	406	368	193	0.53	0.52	-87	
1050S	0600W	24096	1342	714	524	411	0.78	1.47	17	
1050S	0700W	15186	970	388	262	236	0.90	0.58	32	
1050S	0800W	13696	1032	282	268	127	0.47	0.22	-81	
1050S	0900W	12080	836	238	236	101	0.43	0.23	-83	
1050S	1000W	15592	890	368	320	183	0.57	0.60	-63	
1050S	1100W	20192	1046	598	496	311	0.63	2.75	-61	
1050S	1200W	17204	1096	472	336	277	0.83	0.69	20	
1050S	1250W	18224	972	628	338	432	1.28	3.32	173	
1050S	1300W	18530	1012	640	252	494	1.96	2.21	297	
1050S	1400W	9860	464	272	102	213	2.09	1.60	124	
1050S	1500W	13600	996	384	176	282	1.60	0.56	140	
1050S	1600W	13600	832	332	164	237	1.45	0.60	103	
1050S	1700W	12376	672	368	146	283	1.94	1.30	163	
1050S	1800W	12376	788	352	118	283	2.41	0.77	183	
1050S	1900W	13872	744	376	150	289	1.93	1.04	165	
1050S	2000W	15266	1020	468	150	381	2.54	0.81	257	
1050S	2100W	12512	696	344	124	272	2.20	0.97	167	
1050S	2200W	10914	664	264	100	206	2.06	0.60	118	
1050S	2300W	12240	744	256	118	187	1.59	0.45	87	
1050S	2400W	10438	740	184	80	137	1.72	0.27	64	
1200S	0W	12376	664	336	138	256	1.86	1.04	141	
1200S	100W	15096	768	476	198	361	1.83	2.08	203	
1200S	200W	13158	700	344	136	265	1.95	0.96	152	
1200S	300W	15776	732	480	206	360	1.75	2.82	197	
1200S	400W	18496	1004	700	274	541	1.98	3.78	328	
1200S	500W	17544	900	576	220	448	2.04	2.29	275	
1200S	600W	16082	920	484	224	354	1.58	1.19	177	
1200S	700W	14280	812	348	178	245	1.38	0.70	101	
1200S	800W	12920	692	364	124	292	2.36	1.13	187	
1200S	900W	12546	752	372	166	276	1.66	0.99	141	

CO-ORDS	TOTAL CNT	POT CHN	URN CHN	THR CHN	STR URN	U/TH	U/K	RESID URAN	NOTES
***********	-----*****	-----	*****	-----	*****	------	******		
1200S 1000W	15300	752	536	186	428	2.30	3.87	279	
1200S 1100W	21624	1160	776	328	585	1.79	3.13	334	
1200S 1150W	17238	876	588	230	455	1.98	2.97	274	
1200S 1200W	14382	704	408	192	297	1.55	1.67	143	
1200S 1250W	15334	808	512	190	402	2.12	2.16	249	
1200S 1300W	15232	788	456	156	365	2.35	1.50	238	
1200S 1400W	11458	644	328	112	263	2.35	1.04	167	
1200S 1500W	13702	764	444	164	349	2.13	1.55	215	
1200S 1600W	15674	768	504	196	390	1.99	2.62	234	
1200S 1700W	19482	1052	692	244	550	2.26	2.49	359	
1200S 1800W	13328	748	352	146	267	1.83	0.87	147	
1200S 1900W	14688	828	448	162	354	2.19	1.23	222	
1200S 2000W	22746	1160	980	372	664	1.79	11.65	381	
1200S 2050W	23562	1396	860	376	642	1.71	2.08	356	
1200S 2100W	16014	884	452	184	345	1.88	1.07	197	
1200S 2200W	12988	700	380	132	303	2.30	1.24	193	
1200S 2300W	14314	764	432	176	330	1.88	1.45	188	
1200S 2400W	48416	2416	2356	1022	1765	1.73	3.17	1012	
1200S 2425W	30056	1656	1412	588	1072	1.82	10.02	632	
1200S 2450W	20298	1160	820	318	636	2.00	4.14	391	
1200S 2500W	12444	696	308	162	214	1.32	0.75	82	
1350S 0100W	12536	896	332	226	201	0.89	0.48	23	
1350S 0200W	15542	1208	420	320	235	0.73	0.41	-11	
1350S 0300W	10540	708	214	252	68	0.27	0.21	-128	
1350S 0400W	12122	696	332	294	162	0.55	0.99	-65	
1350S 0500W	12896	982	336	276	176	0.64	0.38	-37	
1350S 0600W	15910	1164	422	300	248	0.83	0.46	17	OUT CROP
1350S 0700W	13112	902	312	246	169	0.69	0.40	-22	VALLEY
1350S 0800W	11268	812	300	174	199	1.15	0.50	58	
1350S 0900W	11844	860	312	224	182	0.81	0.46	5	
1350S 1000W	15960	970	448	320	263	0.82	0.85	17	
1350S 1100W	20338	1256	678	424	432	1.02	1.43	111	OUT CROP
1350S 1150W	14378	910	412	330	221	0.67	0.80	-32	
1350S 1200W	18646	1260	472	366	260	0.71	0.48	-18	
1350S 1250W	21454	1120	828	292	659	2.26	5.23	433	
1350S 1300W	19584	948	836	266	682	2.56	20.09	475	
1350S 1400W	20156	1096	752	236	615	2.61	2.86	430	
1350S 1500W	17544	1040	556	198	441	2.23	1.19	283	
1350S 1600W	10472	544	272	80	225	2.82	0.98	152	
1350S 1700W	13770	840	444	130	368	2.84	1.13	259	
1350S 1800W	17068	888	608	250	463	1.85	3.53	268	
1350S 1900W	21420	1084	828	296	656	2.22	7.56	428	
1350S 2000W	15776	796	660	180	555	3.09	12.82	410	
1350S 2100W	23936	1304	1016	408	780	1.91	16.66	470	
1350S 2150W	13362	668	360	152	272	1.79	1.25	147	
1350S 2200W	12308	568	432	146	347	2.38	6.42	227	
1350S 2300W	13294	716	424	174	323	1.86	1.72	182	
1350S 2400W	10914	516	228	112	163	1.46	0.75	67	
1350S 2450W	10098	508	264	100	206	2.06	1.11	118	
1500S 0100W	13366	938	350	244	208	0.86	0.49	17	
1500S 0200W	36904	2210	1196	934	656	0.70	1.69	-33	OUT CROP
1500S 0250W	16374	1144	426	360	217	0.61	0.46	-57	
1500S 0300W	17240	1092	404	386	180	0.47	0.43	-112	
1500S 0350W	11766	680	300	276	140	0.51	0.73	-73	

CO-ORDS	TOTAL CNT	POT CHN	URN CHN	THR CHN	STR URN	U/TH	U/K	RESID URAN	NOTES
***********	------	*****	------	*****	------	******	------	******	
1500S 0400W	12430	830	312	244	170	0.70	0.48	-20	OLD BOGGY CREEK
1500S 0500W	28250	1758	782	682	387	0.57	0.76	-119	CLIFFS
1500S 0550W	15064	922	414	328	224	0.68	0.78	-27	
1500S 0600W	12792	972	356	292	193	0.68	0.45	-25	BOGGY CREEK 6+25
1500S 0700W	10350	784	212	160	119	0.75	0.26	-11	
1500S 0800W	16486	1034	394	362	184	0.51	0.47	-91	
1500S 0900W	12650	1030	300	252	154	0.61	0.28	-42	
1500S 1000W	23412	1444	726	498	438	0.88	1.12	63	OUTCROP
1500S 1050W	21360	1348	622	432	372	0.86	0.84	45	OUTCROP
1500S 1100W	12942	884	354	268	199	0.74	0.57	-9	
1500S 1200W	18726	1198	550	374	333	0.89	0.83	48	OUTCROP
1500S 1250W	19756	1324	574	398	343	0.86	0.71	41	
1500S 1300W	21284	1184	832	324	644	1.99	3.98	395	S
1500S 1400W	19482	1136	760	242	620	2.56	2.55	430	
1500S 1500W	17782	924	772	268	617	2.30	******	408	
1500S 1600W	26112	1432	992	442	736	1.67	4.29	402	
1500S 1700W	15062	744	456	158	364	2.31	1.84	235	S
1500S 1800W	19482	928	780	246	637	2.59	47.38	445	
1500S 1900W	19924	1156	828	268	673	2.51	3.74	464	
1500S 1950W	19516	1052	712	352	508	1.44	4.20	239	
1500S 2000W	32504	1528	1404	678	1012	1.49	3.43	507	
1500S 2100W	18326	808	676	274	517	1.89	17.04	304	
1500S 2200W	13124	740	308	118	239	2.03	0.66	139	
1500S 2300W	10098	560	192	44	166	3.79	0.48	119	
1500S 2400W	10030	476	188	80	141	1.77	0.59	68	
1500S 2500W	10234	500	216	72	174	2.42	0.72	107	
1650S 0000W	11740	874	266	216	141	0.65	0.31	-29	
1650S 0100W	10718	806	260	218	133	0.61	0.34	-38	
1650S 0200W	12960	1060	316	262	164	0.63	0.29	-39	
1650S 0300W	9280	690	226	154	136	0.89	0.38	10	
1650S 0400W	13036	872	370	216	245	1.13	0.67	74	
1650S 0500W	14676	1018	410	312	229	0.74	0.57	-10	
1650S 0600W	15102	1028	396	300	222	0.74	0.52	-9	
1650S 0700W	13116	920	332	268	177	0.66	0.43	-31	
1650S 0800W	13272	898	344	250	199	0.80	0.51	4	
1650S 0900W	14926	934	338	282	175	0.62	0.43	-43	
1650S 1000W	19270	1232	568	358	361	1.01	0.84	87	
1650S 1100W	23344	1266	666	280	504	1.80	1.17	287	
1650S 1200W	15764	886	458	218	331	1.52	1.13	159	
1650S 1235W	18678	988	556	19190	*****	-0.55	0.75	-24406	
1650S 1300W	20400	1068	800	302	625	2.07	6.75	392	
1650S 1400W	29274	1656	1300	452	1038	2.30	10.37	697	
1650S 1450W	22508	1356	980	334	686	2.06	2.44	430	
1650S 1500W	25160	1436	1068	340	371	2.56	4.80	611	
1650S 1600W	23426	1296	916	386	692	1.80	4.65	399	
1650S 1700W	14722	900	360	112	295	2.64	0.62	199	
1650S 1800W	38182	2088	1644	738	1217	1.65	250.37	669	S
1650S 1850W	24990	1412	1100	416	859	2.07	12.24	544	S
1650S 1950W	27506	1536	1096	450	835	1.86	4.85	496	
1650S 2000W	28084	1596	1164	500	875	1.75	6.67	499	
1650S 2060W	10744	456	320	88	269	3.06	2.97	190	
1650S 2100W	12376	676	356	110	292	2.66	1.12	197	
1650S 2200W	10064	460	256	82	208	2.54	1.31	134	S
1650S 2300W	11526	648	296	66	257	3.91	0.80	195	S

CO-ORDS		TOTAL CNT	POT CHN	URN CHN	THR CHN	STR URN	U/TH	U/K	RESID URAN	NOTES
1650S	2400W	10098	604	224	72	182	2.53	0.54	115	
1650S	2500W	9588	480	204	42	179	4.28	0.70	134	
1800S	0000	12606	712	272	192	161	0.84	0.51	7	
1800S	0100W	10592	634	240	124	168	1.36	0.53	63	
1800S	0200W	8824	640	150	74	107	1.45	0.24	38	
1800S	0300W	12054	674	260	94	205	2.19	0.57	122	
1800S	0400W	10454	676	186	138	106	0.77	0.27	-8	
1800S	0500W	11018	606	258	124	186	1.50	0.69	81	
1800S	0600W	10212	548	284	102	225	2.21	1.09	136	
1800S	0700W	9442	542	210	38	188	4.95	0.59	145	
1800S	0800W	13910	830	354	112	289	2.58	0.70	193	
1800S	0900W	11416	518	222	72	180	2.51	0.70	113	
1800S	1000W	14646	688	366	100	308	3.08	1.14	220	
1800S	1100W	13876	742	286	98	229	2.34	0.57	143	
1800S	1200W	12998	576	320	88	269	3.06	1.28	190	
1800S	1225W	12648	568	256	56	223	3.99	0.78	168	
1950S	0000	12590	710	326	126	253	2.01	0.82	147	
1950S	0100W	11792	534	236	80	189	2.37	0.75	116	
1950S	0200W	12140	836	250	198	135	0.68	0.30	-22	
1950S	0300W	12818	960	296	210	174	0.83	0.33	8	
1950S	0400W	9818	578	188	54	156	2.90	0.43	102	
1950S	0500W	9920	464	220	30	202	6.76	0.86	166	
1950S	0600W	14194	910	376	150	289	1.93	0.65	165	
1950S	0700W	12962	822	330	136	251	1.85	0.61	138	
1950S	0800W	10146	568	268	110	204	1.86	0.87	109	
1950S	0900W	12230	684	274	108	211	1.96	0.61	118	
1950S	1000W	14830	860	404	128	330	2.58	0.86	222	
1950S	1100W	12244	638	270	92	216	2.36	0.69	135	
1950S	1200W	12062	678	278	112	213	1.90	0.64	117	
1950S	1250W	16048	924	520	178	417	2.34	1.37	273	
1950S	1300W	16490	1012	640	200	524	2.62	1.99	365	
1950S	1400W	18088	1144	588	222	459	2.07	1.08	284	
1950S	1500W	15912	892	600	200	484	2.42	2.69	325	
1950S	1600W	15572	896	448	188	339	1.80	1.01	188	
1950S	1700W	20366	1260	704	256	556	2.17	1.36	356	
1950S	1800W	21556	1304	884	386	660	1.71	3.54	367	
1950S	1850W	26554	1724	1124	418	882	2.11	2.46	565	
1950S	1900W	28152	1740	1128	486	847	1.74	2.65	481	S
1950S	2000W	19482	1040	708	264	555	2.10	3.10	349	
1950S	2100W	14246	900	428	168	330	1.97	0.89	194	
1950S	2200W	13532	924	332	118	263	2.24	0.50	163	
1950S	2300W	11254	616	256	104	195	1.88	0.66	105	S
1950S	2400W	11764	764	220	90	167	1.87	0.34	87	
1950S	2500W	8568	448	172	40	148	3.72	0.58	105	
2100S	0000	11450	832	262	190	152	0.80	0.34	0	
2100S	0100W	11796	964	298	200	182	0.91	0.34	23	
2100S	0200W	11864	932	282	248	138	0.56	0.29	-55	
2100S	0300W	12590	912	328	248	184	0.74	0.44	-9	
2100S	0400W	14030	1028	394	268	239	0.89	0.52	30	
2100S	0500W	10132	662	302	246	159	0.65	0.82	-32	
2100S	0600W	15354	1150	450	322	263	0.82	0.54	16	
2100S	0700W	13222	956	334	248	190	0.77	0.42	-3	
2100S	0800W	13406	878	308	260	157	0.61	0.40	-45	
2100S	0900W	9810	470	310	206	190	0.93	7.63	27	

CO-ORDS		TOTAL CNT	POT CHN	URN CHN	THR CHN	STR URN	U/TH	U/K	RESID URAN	NOTES
2100S	1000W	14000	840	418	274	259	0.95	1.07	46	
2100S	1100W	13776	894	368	298	195	0.66	0.60	-34	
2100S	1200W	16014	824	456	180	351	1.96	1.34	206	
2100S	1300W	14722	740	488	194	375	1.94	2.73	220	
2100S	1400W	15606	932	440	162	346	2.14	0.87	214	
2100S	1500W	17340	972	596	232	461	1.99	1.92	279	
2100S	1600W	20264	1156	736	296	564	1.91	2.31	336	
2100S	1700W	16422	1008	516	216	391	1.81	1.08	220	
2100S	1800W	25772	1480	968	428	720	1.68	2.85	396	
2100S	1900W	21114	1516	752	300	578	1.93	0.99	347	
2100S	1950W	14178	752	492	166	396	2.39	2.37	261	
2100S	2000W	12954	720	352	86	302	3.52	0.93	225	
2100S	2100W	12852	892	344	116	276	2.39	0.57	178	
2100S	2200W	12070	836	384	102	325	3.19	0.81	236	S
2100S	2300W	11866	684	268	70	227	3.25	0.60	162	
2100S	2400W	13838	916	312	118	243	2.07	0.46	143	
2100S	2500W	12716	752	340	118	271	2.30	0.79	171	
2250S	0000	13148	904	408	268	253	0.94	0.79	44	
2250S	0100W	12144	972	284	210	162	0.77	0.30	-4	
2250S	0200W	11832	940	320	204	202	0.99	0.41	39	
2250S	0300W	12564	894	332	264	179	0.68	0.47	-26	
2250S	0400W	10190	752	248	160	155	0.97	0.39	24	
2250S	0500W	11122	768	308	224	178	0.80	0.57	1	
2250S	0600W	9240	576	246	200	130	0.65	0.67	-29	
2250S	0700W	15528	1194	422	298	249	0.84	0.43	19	
2250S	0800W	16804	1168	452	350	249	0.71	0.52	-18	
2250S	0900W	15510	954	438	330	247	0.75	0.84	-6	
2250S	1000W	13398	784	398	308	219	0.71	1.22	-17	
2250S	1100W	12956	898	288	246	145	0.59	0.33	-46	
2250S	1200W	13770	1118	410	258	260	1.01	0.48	59	
2250S	1250W	14756	1072	432	160	339	2.12	0.62	208	
2250S	1300W	14620	1056	456	170	357	2.10	0.71	219	
2250S	1400W	14518	1000	460	184	353	1.92	0.82	205	S
2250S	1500W	14892	992	540	214	416	1.95	1.28	246	
2250S	1600W	16762	1068	684	262	532	2.03	2.30	328	
2250S	1700W	15742	980	496	186	388	2.09	1.03	239	
2250S	1800W	16082	984	508	252	362	1.44	1.13	165	
2250S	1900W	17612	1328	616	244	474	1.95	0.84	283	
2250S	2000W	12206	704	296	106	234	2.21	0.68	143	
2250S	2100W	11900	700	252	114	186	1.63	0.49	88	
2250S	2200W	12818	920	260	90	207	2.31	0.34	127	
2250S	2300W	12308	780	224	114	158	1.39	0.33	60	
2250S	2400W	13702	1044	332	118	263	2.24	0.41	163	
2250S	2500W	12478	716	324	108	261	2.42	0.79	168	
2250S	2580W	7752	376	136	58	102	1.77	0.50	45	
2400S	0000	9790	632	216	128	142	1.11	0.43	34	
2400S	0100W	9548	604	220	114	154	1.35	0.38	56	
2400S	0200W	11714	756	280	154	190	1.24	0.50	64	
2400S	0300W	8298	472	160	94	105	1.12	0.42	22	
2400S	0400W	9812	552	252	112	187	1.67	0.81	91	
2400S	0500W	12454	780	282	164	187	1.14	0.48	53	
2400S	0600W	10110	696	200	108	137	1.27	0.32	44	
2400S	0700W	11746	672	290	102	231	2.27	0.71	142	
2400S	0800W	13408	846	316	254	169	0.67	0.47	-29	

CO-ORDS	TOTAL CNT	POT CHN	URN CHN	THR CHN	STR URN	U/TH	U/K	RESID URAN	NOTES
2400S 0900W	19694	1072	542	280	380	1.36	1.07	163	
2400S 1000W	8792	550	166	84	117	1.40	0.35	41	
2400S 1100W	14604	848	366	160	273	1.71	0.71	142	
2400S 1160W	8394	526	158	92	104	1.14	0.34	23	
2400S 1200W	15300	936	468	200	352	1.76	1.01	193	
2400S 1250W	13872	876	352	182	246	1.36	0.60	100	
2400S 1300W	12172	812	356	150	269	1.80	0.74	145	
2400S 1400W	17272	1144	564	250	419	1.68	0.98	224	
2400S 1500W	14246	1008	416	146	331	2.27	0.65	211	
2400S 1600W	15708	920	456	202	339	1.68	0.99	178	
2400S 1700W	15810	928	504	194	391	2.02	1.26	236	
2400S 1800W	14790	924	484	168	386	2.30	1.12	250	
2400S 1900W	15130	1020	516	182	410	2.26	1.03	264	
2400S 2000W	12376	772	360	150	273	1.82	0.85	149	
2400S 2100W	12478	736	352	120	282	2.36	0.89	180	
2400S 2200W	12886	888	328	116	260	2.25	0.53	162	
2400S 2300W	12614	844	288	118	219	1.86	0.45	119	
2400S 2400W	11084	780	244	112	179	1.60	0.38	83	
2400S 2500W	10948	756	216	72	174	2.42	0.35	107	

```
***ERROR***  END OF FILE ENCOUNTERED ON UNIT    7 (IBM CODE IHC217)

       PROGRAM WAS EXECUTING LINE    21 IN ROUTINE M/PROG WHEN TERMINATION

CORE USAGE       OBJECT CODE=    2112 BYTES,ARRAY AREA=    408 BYTES,TOTAL

DIAGNOSTICS        NUMBER OF ERRORS=        1, NUMBER OF WARNINGS=        0,

COMPILE TIME=     0.04 SEC,EXECUTION TIME=     1.90 SEC,  WATFIV - JUL 1973


       $STOP
EXECUTION TERMINATED


$SIG
```

tion. This has some drawbacks, including the statistical ones inherent in ratios and the ease with which uranium is leached from soil in comparison to thorium. On AGUR-ASH property, however, there is a further complication as follows:

iv) Magmatic co-variance

Except for especially high thorium in some of the "felted" rocks, the ratio of uranium to thorium in the radioactive suite on this property does not change much with the overall radioactivity of the rock. A Th/U geochemical ratio of eight is common throughout. This is presumably a reflection of magmatic partitioning.

The resulting overall correlation between readings in the uranium and thorium channels (summer data) is given in Figure 2. In looking for places where uranium may have been specifically concentrated by hydrothermal mobilization (to which thorium is less susceptible), one method is to remove the effect of all forms of thorium co-variance by simple regression. This is like saying how much more (or less) uranium radiation is found at each point than is expected from thorium radioactivity there - given all of the relationships existing between these two. Another approach is to take the ratio of stripped uranium counts to stripped potassium counts, thus using potassium as a background indicator instead of thorium. The computer has produced and plotted these two ratios, but the problems of slipping windows are apparent, and the two different surveys are not comparable. That information (Table I) is hence being held for detailed work as mapping progresses, and only the stripped uranium data and its ratio to thorium are presented (Figure 3).

In summary, it should be recalled that this was an almost reconnaissance scale radiometric survey, with 100 meter stations on lines 150 meters apart. It fulfilled most of the objectives of such a survey, in that it will assist in mapping radioactive lithologies in areas of poor outcrop, and gives some indication of where these lithologies are overlain by thick till. The limitations of such a survey are clearly demonstrated in that it entirely missed the aforementioned radioactive zone of felted rock crossing Riddle Creek's north fork, as well as some other radioactive localities known on the western rim of the lavas. There are some unexpectedly high readings or ratios in the data which will require examination next year, and more detailed mapping may well demonstrate that it responded to the areas of alteration in the rectangular porphyry. Experience, however, has now shown that the most useful radiometric method on this property is careful and systematic prospecting with hand held scintillometers, searching for relatively small zones where radioactivity is high with respect to its surroundings.

GEOCHEMISTRY

a) Rock Geochemistry

There is a strong possibility that the Riddle Creek volcanics set some sort of record for radioactivity in extrusive rocks. According to a recent compilation by Kishimari et al, the most uraniferous flows on record are from Italy, where a unique trachyphonolite suite averages 45 ppm uranium and 210 ppm thorium. (Bostonite dykes in eastern Egypt and Colorado have been reported as containing as much as 100 ppm uranium.) The exact uranium and thorium content of the Riddle Creek complex is not yet well known. Wet-chemical analyses with nitric-perchloric acid digestion has given results as high as 90 ppm for uranium and 500 ppm for thorium. Eleven samples of the radioactive volcanics which have been run by both wet-chemical and neutron-activation analysis, however, averaged 2½ times more uranium on the neutron techniques. Likely this is a result of uranium (and presumably thorium) being locked into refractory minerals, abundant apatite being the principal suspect. There is also some possibility, however, of thorium interfering with neutron-activation analysis for uranium.

Based on the results from low energy gamma spectrometry, the average from 14 samples of rectangular porphyry flows (those not hydrothermally leached) was 50 ppm uranium and 224 ppm. The felted trachytes (8 samples) averaged 131 ppm uranium and 307 ppm thorium.

b) Soil Geochemistry

To determine the usefulness of grid-wise soil sampling in this area, two lines across the property were sampled at 50 m. intervals, and a line of soil samples was also taken from a fairly steep bank across the radioactive zone on the north fork of Riddle Creek. The former set was analyzed by neutron activation. Results have been disappointing. Uranium values have responded only very locally to the radioactive zones, and weakly in comparison to the transported anomalies of wet, organic areas. These zones are better seen by soil thorium, but it is doubtful that this would add much information to results obtained by prospecting with hand scintillometers. It is true that the uranium-thorium radioactive zones may not be the most interesting targets, but in view of the glacial overburden covering most of this property and the known accumulation anomalies, general grid soil sampling is not recommended.

c) Creek and Gully Geochemistry

Although abundant calcite is available from amydules on this property, uranium water anomalies have not been encountered. If carbonate waters are indeed involved, they do not appear to be leaching major amounts of uranium. Laboratory tests indicate that these rocks are not very susceptible to leaching by carbonate solutions in any case. It is of interest, however, that one spring of radioactive water (radon) was encountered, together with a 100 ppm uranium silt anomaly to south of the volcanic cover.

Silt and gully soil anomalies have been found in several parts of this property, those associated with the radioactive zone on western rim of the flows giving results as high as 600 ppm (confirmed by neutron activation). The highest values are in boggy, organic areas, and are hence likely transported accumulations. At one site here, however, a small set of soil samples taken across the wet lineament had the highest uranium values in a dry side-flank sample. This is one area where detailed soil sampling is recommended, along with gully soil or sediment collection on all parts of the property. Certain localities have also been noted where there is strong radioactivity over soil in which neither uranium nor thorium is sufficiently rich to explain the observation. Hand-trenching is planned in these locations, followed by radon gas measurements if a radiation source is not uncovered.

A composite of silt samples from the southwest part of the volcanic margin was found to contain, in addition to 355 ppm uranium, anomalies of 90 ppm Mo, 590 ppm Cu, 505 ppm Ni, 122 ppm Co and 1850 ppm Mu. This multi-element anomaly suggests that uranium may be present as multi-metal vein or stockwork systems, as none of them are particularly concentrated in the flows.

The outcrop of felted rock on north fork of Riddle Creek is actually cut by that creek. There is little opportunity for "bog" accumulations here, however, and two samples taken below this have very little uranium in analyses by the usual wet chemical method.

BREAKDOWN OF COSTS - for assessment purposes
(approximate only)

D.G. Leighton & Associates Ltd.		
Geological, geochemical and compilation		
Wages and salaries	$4,311	
Benefits	517	$ 4,828
Meals and accommodations		712
Transport		365
Assay costs		1,000
Miscellaneous; includes petrographic study, compilation, etc.		500
Nielson Geophysics Ltd.		
Contract charge for linecutting and radiometric measurements		9,075
Total		$16,480

CERTIFICATION

I, R.R. Culbert, do hereby certify that:

1. I am a practicing Professional Geological Engineer with offices at 3152 West 10th Ave., Vancouver, B.C.

2. I am a graduate of the University of British Columbia, BASc. (1964), PhD. (1971).

3. I have practiced mining exploration for fifteen years, most of which were based in British Columbia.

4. I am a member in good standing of the Association of Professional Engineers of the Province of British Columbia.

5. I have personally visited the AGUR-ASH property and supervised exploration work carried out there.

Respectfully submitted,

R.R. Culbert, PhD., P.Eng.

31 May, 1978

Appendix "A"

TELEPHONE: (604) 731-7367

D. G. LEIGHTON & ASSOCIATES LTD.
GEOLOGICAL CONSULTANTS

3152 WEST 10TH AVENUE
VANCOUVER, B.C.
V6K 2K9

REPORT (103) 78-2

REPORT ON RADIOACTIVE VOLCANICS FROM RIDDLE CREEK, FARLEIGH CREEK AND SKAHA CREEK AREAS LOCATED WEST OF PENTICTON, B.C.

Petrological and Chemical Study

By

R.R. Culbert, PhD., P.Eng.

CERTIFICATION

I, R.R. Culbert, do hereby certify that:

1. I am a practicing Professional Geological Engineer with offices at 3152 West 10th Ave., Vancouver, B.C.

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R.R. Culbert, PhD., P.Eng.

31 May, 1978

CONTENTS

GENERAL

Radioactive flows, tuffs and related volcanic sediments have been discovered in three areas of Tertiary igneous activity northwest of Penticton. From the northwest, these are the Riddle Creek area (Agur-Ash property), the Clark property at Farleigh Creek and part of the Indian Reserve between Skaha and Shingle Creek immediately west of Penticton. The three localities form an axis which includes the Corynell Tertiary syenite body at Allendale Lake, if projected to the southeast.

The Riddle Creek assemblage involves a large, radioactive trachyte flow with apparently co-magmatic syenite, derived tuffs and clastic volcanic sediments. At the other two locations, intense radioactivity is mainly associated with a pink-coloured deposit of volcanic grit, conglomerates and sandstones, together with coarse tuffs. The unit is likely a channel deposit lying beneath or within the earliest phases of the Yellow Lake phonolite eruptives.

In a regional sense, the Yellow Lake phonolites are the basal member of a major series of alkaline Eocene extrusives known as the Marron Formation. Most flows of this phonolite exhibit large rhombohedral phenocrysts of anorthoclase, and are referred to as "rhomb porphyries". This lithology is mildly radioactive, primarily due to thorium. Its petrology and chemistry has been described in detail by Dr. Neil Church of the B.C. Ministry of Mines (Geology of the White Lake Basin, Bull. No. 61, B.C. Dept. of Mines and Petroleum Resources, 1973) and will not be discussed here.

Over much of its range, the Marron Volcanics are underlain by a coarse, cemented basal conglomerate called the Springbrook Formation. In the areas of the radioactive channel deposit, however, there is a major accumulation of light-coloured pyroclastic deposits, explosion breccias, ashflows and tuffs which lie between the Marron and the Springbrook. These appear to be of rhyolitic composition, and it is at or near this abrupt rhyolite-phonolite transition that radioactive units occur.

Radioactive extrusive rocks are very rare. The purpose of this study has been to examine closely the chemistry and petrology of those in the Penticton area to determine if they have other unusual characteristics which might assist in determining the source of the radioactive elements or evaluating the economic importance of occurrences. Information was also compiled to assist in the mapping and prospecting of the properties in 1978.

The thin-section studies for this report were carried out largely by Dr. K. Lu and Prof. H. Shimazaki.

RIDDLE CREEK AREA (Agur and Ash Claims)

This large complex of radioactive volcanic rocks suffers from extensive overburden and is as yet poorly explored. From what mapping has been done, however, it appears to be the richest of the occurrences in both uranium and thorium, and the major rock types are as follows:

(a) Syenites

The lavas rest on basal tuffs or on granodiorite and quartz monzonite country rocks, except along their western boundary they are in contact with what appears to be co-magmatic syenites. This contact is one of the most radioactive zones, and the area of highest uranium geochemistry. Three different types of syenite have been observed, and these will be referred to as the "granular", "porphyritic" and "boxwork" varieties. The first is an ordinary coarse white syenite with low mafic content. It weathers easily to a granular texture. The porphyritic style appears to have transitional phases to the "rectangular porphyry" trachyte flows. It exhibits large apatite rods in hand specimens, as well as anorthoclase phenocrysts which may take on a directive or "herring-swarm" texture. The boxwork syenites are striking rocks, and the most radioactive. They are mainly comprised of tabular anorthoclase crystals twined into a 3-directional lattice with many tetragonal voids. Transitional phases between this and the "felted trachytes" are readily observed.

In thin section, the porphyritic syenite shows zircons and small sphene crystals as well as apatite. Up to 10% of both biotite and titanaugite may be present. The phenocrysts are anorthoclase, but typically have albite rims. Etching and staining of several specimens have shown that in some cases the replacement of phenocrysts by albite is almost complete. It also indicated that the apatite content is extremely variable, and may comprise as much as 5% of the rock. A separation of this mineral was made by the Dept. of Mines, and it was found to not represent the source of radioactivity. Some quartz is visible in thin section, but less than 2%. Multi-element analysis of one specimen showed that its composition correlated more closely with the rectangular porphyry flows (and with the ignimbrite deposit) than with the other syenites. There is also a strong visible resemblance to the Allendale syenite body located southeast of Penticton.

The boxwork syenites were studied in some detail, in part because of their striking appearance, and in part because of their radioactivity and apparent relation to the felted trachytes.

The large laths which give this rock its graphic or boxwork texture are anorthoclase, and again there is a variable degree of albitization. Argite crystals have been converted to chlorite-quartz intergrowths in most cases. Sphene, fluorite and opaques are the main accessory minerals, with opaques running as high as 5%. Biotite (5 - 10%) is the major mafic mineral, and remains fresh despite strong argillic alteration in some samples.

Gradational variation between the boxwork syenite and certain felted texture rocks may be seen, at least in the south-western contact region, where both rocks occur together and where the felted trachytes prove to be holocrystalline in thin section. Felted rocks from elsewhere on the property prove to be comprised largely of microlites, however, and their relationship to the syenites is less clear. Samples of all of these rocks share certain chemical similarities, of which the most important is their high thorium and uranium contents. Enrichment in lead, zinc and fluorite is also clear.

The uranium content of the felted series is quite variable. In comparison to the other radioactive lithologies, they generally have higher portions of acid exchangeable uranium and a greater tendency toward disequilibrium between uranium and its daughter products. These observations suggest that the radioactive elements are present in a less refactory mode in this lithology, and thin section work has shown that the most radioactive specimens have, in fact, been subject to the late-stage hydrothermal alteration. Alteration products are variable, but include greed horn-blende, fluorite, quartz, opaques and zoisite. In one case this takes the form of veining. There may be allanite associated with the zoisite, but the radioactive component is likely dominantly with the opaque minerals.

It appears that the boxwork syenite was originally cooled as silica saturated argite syenite, and in the murky nomenclature of alkaline rocks might be termed a "larvikite". Late stage biotite formation and widespread alteration of the titan augites has changed the nature of most of the lithology.

(b) Rectangular Porphyry Trachytes

The term "rectangular porphyry" was adopted by Dr. Neil Church in 1977 to differentiate these flows from the less radioactive rhombic porphyry phonolites which occur to the south. A series of flows appears to be involved, some highly vessicular and all of a light grey colour.

The rectangular porphyry has a silica content in the 55 - 60%, while the felted rocks and boxwork syenites lie in the 60 - 65% range, and those rhombic porphyry phonolites analysed had less than 55%. On these grounds the rectangular porphyries and felted series are referred to as trachytes.

Thin sections and potassium staining indicate that the large feldspar phenocrysts are anorthoclase in various stages of albitization. As with the Yellow Lake phonolites, the fresher rocks tend to have well-formed augite crystals, but in most areas these have been altered to some combination of biotite, chlorite, zoisite, and quartz. Fresh biotite is common, although patchy, and minor carbonate alteration also occurs in some areas. Apatite and opaques are the main accessories, although sphene and small xenotine are also observed. Nephaline phenocrysts occur in some specimens.

The texture of these flows varies considerably, some showing no orientation in the microlites (unusual for flows) and others being extremely vuggy or amydoidal. Vesicule fillings include quartz, carbonate and naturolite.

The rectangular porphyry appears to have an average uranium content in the 30 - 35 ppm range, and a thorium average somewhat less than 200 ppm. This is much lower than the radioactive elements in the "felted" rock series, but the uranium content is an order of magnitude greater than encountered in the typical Yellow Lake "rhomb porphyry" phonolites. There were no other really striking chemical peculiarities observed in the rectangular porphyry series.

(c) Trachyte Alterations

The typical altered trachyte is mottled reddish-brown and yellow in hand specimen, with amber-coloured secondary biotite. This type is quite widespread, especially in the southern part of the volcanic area. Also observed are chalky rocks which have been thoroughly kaolinized, and vuggy breccias comprised of little more than the silica skeletons in which virtually all other elements appear to have been leached or replaced. Apparent brecciation is common in the altered rocks, which have not been observed yet in outcrop - presumably due to their low resistance to weathering.

In thin section, these rocks show varying degrees of silicification, argillic alteration and biotitization. Hematite and some pyrite are also observed. It appears likely that the style of alteration will vary from site to site, as will the extent to which the radioactive elements have been affected. Some of the alteration zones have patchy areas of unusually high radioactivity, the cause of which has not been determined.

One sample of the brown and yellow biotitized rock was included in multi-element analysis, and found to contain an interesting assemblage of trace elements. This included high levels of Mo, Cr, Mg, Ti and V. The vanadium was given at 1000 ppm, which is almost two orders of magnitude above background, and this may be of direct importance in view of that element's ability to precipitate uranium from solution under a wide variety of conditions. Uranium occurs in conjunction with vanadium in most of the sandstone deposits, and apparently also at the new Blizzard subvolcanic showing. The fact that both elements are involved in late-stage hydrothermal alterations provides another possibility for the localization of uranium.

Most of the tuff or volcanic grit deposits have been altered to some extent, but those (poorly) exposed below the rectangular porphyry trachyte on lower Riddle Creek are so intensely altered that they fit better into this classification. A sample studied in thin section had originally been a lapilli tuff, but most fragments are almost entirely replaced by limonite and clay minerals. Surprisingly, a few crystals of biotite, potassium feldspar and even augite survived in fresh condition, and some of the biotite may well be a secondary hydrothermal phase. Staining of samples indicates that the rocks are potassic in a patchy fashion, again pointing to hydrothermal alteration. A very peculiar blue-green rock was found in this area, and proved to be a pumice altered by an assortment of unidentified zeolites and an unusual blue-green stain. Similar rocks were observed on the Clark property, which may be of lapidary interest.

(d) Tuffs, Grits, Conglomerates and Ignimbrites

This varied and unusual unit appears in part at least to underlie stratigraphically the rectangular porphyry flows, but the best exposures lie beside the lavas and they may represent more than one horizon. They vary from classic ignimbrites and chaotic "vent facies" breccias (with obsidian clasts) to obviously water-laid grits and conglomerates. The distinctive pink crystal grits which form the radioactive channels farther south are also encountered in this sequence. In the few places where bedding is visible, it is flat lying.

The clastic rocks are mainly located east and north of the main volcanic sequence, and are poorly exposed. One sample of classic ignimbrite was observed in thin section. This was directly associated with the pink crystal tuffs or grits, which suggests that the radioactive rocks of ignimbritic appearance with a similar association on the Skaha Indian Reserve may indeed be ashflows. (This could not be demonstrated in thin sections from that area.) Chemically, the Riddle Creek ignimbrite is similar to the trachytes, although it lacksvisible augite. It also has a fairly strong chemical correlation coefficient with the apparent ignimbrite at the reservation.

Most of the clastic rocks in the Riddle Creek area are lapilli or crystal tuffs which were at least in part waterlaid. Clasts of trachyte, syenite, devitrified glass, granite, diorite and even previous tuff units are observed in thin section. Some are fairly porous, and others completely sealed with a crystalline matrix of apparent hydrothermal origin. Analcite pockets were observed in one specimen. In view of the unit's relatively high radioactivity and of the appearance of trachytes as clasts, it seems likely that it, in part at least, represents pyroclastics accompanying eruption of the trachytes. The striking pink crystals which distinguish the radioactive grits at all three areas remain somewhat of an enigma. In composition they are K-feldspars in various stages of alteration to albite or carbonates. The colouring is likely due to the same hydrothermal alteration which caused uranium and thorium enrichment, as the only pink phenocrysts seen in lavas have been in a highly altered series on the reservation.

An especially coarse and permeable piece of conglomerate float was found by Dr. Neil Church in the northern claim area. In addition to the wide variety of lithologies mentioned previously, this specimen contains clasts of a leucite-bearing lava.

Leucite was also observed in a clastic rock encountered on the extreme southeast of the volcanic area. This is a very angular multilithic breccia, cemented in part by lapilli of volcanic glass. It appears to be a cone complex or vent facies.

SKAHA RESERVATION

The relationships between units in this area are only poorly known. Most of the reservation is underlain by an apparently normal series of the Marron Volcanics, dipping to the south. On the north these are underlain by a major series of white rhyolites and rhyolite tuffs, which appear to be co-magmatic with the Shingle Creek intrusive - an unusual granite with very large K-feldspar crystals which outcrops in adjacent Shingle Creek Valley. The tuffs locally form a boulder conglomerate which is mapped as part of the Springbrook Formation. Only one small radioactive zone has been observed in these tuffs, and that was at their base.

The major radioactive unit in this area is largely of pink or pink and green colouration, and is comprised of tuffs, grits and volcanic sandstones. Textures vary from eutaxitic to clearly water-laid bedding, and from coarse clastics to fine ash. It appears to lie stratigraphically between the rhyolite tuffs and the lowest member of the Marron Volcanics, which is the Yellow Lake phonolite. The relationships are not as yet clear, however, and have been complicated by dacite dikes and by large bodies of intensely altered pink volcanic rocks.

(a) The Rhyolites

These are nondescript white quartz porphyry tuffs, although they locally contain K-feldspar phenocryst fragments similar to those of the Shingle Creek Intrusive. The tuffs appear to have filled in an irregular terrain (in part as matrix to a boulder conglomerate) and do not seem to be involved in the steep but local northward dip of the later rocks.

Thin sections suggest that the lower members of these tuffs are less siliceous and comprised of clasts of dacite or rhyodacite lavas. There is a wider variety of clasts here, and also some calcite and muscovite alterations. Minor amounts of radioactivity have been observed in this basal unit.

A sample of rhyolite tuff submitted for multi-element analysis had a high silica content (over 70%) and surprisingly little potassium, but otherwise there were no chemical peculiarities.

(b) Pink Tuff and Clastic Unit

The strong radioactivity of these rocks is apparent in the average of 65 ppm uranium and in excess of 300 ppm thorium from samples analysed by both delayed neutron activitation and gamma spectrometry. Thin section and staining have indicated a wide range in composition as well as texture, despite the apparent thin nature of the unit. Rhyolite or quartzose fragments are absent in some sections, yet form a major portion of others. Some appear to be lapilli tuffs of a single composition, while others are multilithic breccias which include syenite and granitic clasts. Some are water-laid, while others appear to be air-fall tuffs or even ashflows.

The pink crystals are K-feldspars and albite, as noted in the Riddle Creek area, but almost all of the clastic rocks in the reservation occurrence have undergone moderate to strong lateration. The most common clasts are of microlite lavas with feldspar, augite and biotite phenocrysts. The alteration is dominated by muscovite (sericite), quartz, carbonate and epidote, with some indication that the aerial tuffs tend toward sericitization while quartz-carbonate alteration marks the water-laid grits. The most radioactive rocks have undergone what appears in thin section to be an addition of epidote or zoisite, accompanied by lesser amounts of quartz, carbonate, fluorite and opaque minerals. This is quite similar to alteration affecting the most radioactive felted trachytes at Riddle Creek, and again there is the possibility that some of the zoisite is in face secondary allanite. One expecially instructive specimen showed clasts or lapilli of different rocks with different alterations (sericite, argillite, quartz-carbonate), but they had all undergone a zoisite-fluorite alteration during a presumably later, post-depositional, hydrothermal stage.

Two samples from this unit were submitted for multi-element analysis. The first was a multilithic water-laid grit with zoisite-fluorite alteration. Chemically this correlated quite closely with the felted and porphyritic syenites and ignimbrite of Riddle Creek, and it was also similar to radioactive pink grit of the Clark property. It was not, however, particularly close to the composition of the other specimen from its own unit, which was an airfall tuff or ashflow with muscovite, carbonate, quartz, zoisite and fluorite alteration products. In hand specimen the epidote alteration takes on a cellular pattern. Its most striking feature in thin sections, however, was crystals with the optical properties of clear, red corundum - i.e. ruby.

Chemically, this sample did not particularly closely resemble anything else, its most striking feature being a 6.2% fluorine content, coupled with high lead and zinc values. Its closest relatives chemically are again the ignimbrites and trachytes at Riddle Creek.

(c) Altered Flows

To the north of the major radioactive showing on the Skaha Reservation there is a similar series of tuffs and grits which are moderately radioactive and which are associated with moderately radioactive pink, altered volcanics, rather than the rhyolites. In this area there is also a major zone of orange to pink highly altered volcanics which appear to be an alteration belt of some sort. In view of the possible connection between these volcanic rocks and the radioactive pink tuffs, a sample of both alterations was examined in thin section and through multi-element analysis.

The lava directly associated with the tuffs and grits was almost entirely destroyed by carbonate alteration, with little more than some of the albite crystals remaining. There was also considerable hematite, suggesting that the altering solutions were oxidizing, and unusual amounts of apatite were observed. The sample from the main alteration belt was quite similar, with almost complete carbonate alteration (no quartz) and high apatite content. More sericite was involved in this case and augite was still recognizable. There was also texture suggesting a late stage cataclasis or stress. Chemically, both rocks had similar compositions, being of roughly 46% silica and having unusually high levels of such elements as Fe, Cr, Ni, Co, Ag, Ba, Sr and P. This assemblage makes them correlate closely with the Yellow Lake (rhombic porphyry) phonolites rather than with the trachytes or radioactive tuffs. The altered lavas probably underlie the radioactive sediments, and may be equivalent to the phonolites which appear to underlie the radioactive grits on Clark property as well. More work is required in both areas to determine the volcanic sequence.

CLARK PROPERTY

In this area a major sequence of classic rhombic porphyry phonolites of the Yellow Lake member overlie a complex of non-radioactive rhyolite tuffs and breccias. This complex appears to include a variety of lithologies, including ignimbrite, and it in turn overlies a variable thickness of the Springbrook conglomerate. The basement rock in this area is normal granitic country rock in some places, but under much of the extrusive sequence there is an unusual body of pink aplite or a coarser grained pink alaskite.

Radioactive grits form what appears to be a large channel deposit within an otherwise grey bed of tuffs and sandstones. In places this bed appears to lie between the phonolitic sequence and underlying explosive rhyolite deposits. Elsewhere, however, the tuffs and sandstones occur between volcanic flows. There may be more than one horizon involved. Thin section work has not been as extensive on this property as for the other two occurrences, due to the complexity of the rocks and the lower uranium contents.

(a) Springbrook Formation

This is dominantly a multilithic cobble conglomerate with very low porosity (due to silica cementation), and also of low radioactivity. The cobbles are largely of granites, cherts and greenstones in this area. It is a cliff-forming unit of irregular thickness.

In the northern portion of the Clark claims the Springbrook is typically fine grained, being dominantly a sandstone or grit, and hence more applicable to thin-section study. This showed that the clasts themselves had undergone a wide variety of alterations, including the carbonate, kaolin and sericite varieties. Much of the matrix was argillic, but the rock as a whole had undergone a hydrothermal alteration phase, which caused silicification and kaolinization of the matrix and chloritication of some of the clast rims.

(b) Altered Rhyolites and Breccia Sequence

This highly varied rock group is dominantly of red and white colouration and includes flows, ignimbrite, tuffs and explosive breccias. Some are, in fact, rhyolite grits similar to those of the Indian Reservation, but others were found to contain nephaline instead of quartz. One minor block flow contains leucite. For the most part, however, these rocks have been so thoroughly destroyed by quartz-carbonate alterations that it is difficult to determine the original composition. This area was likely close to the source of explosive volcanism. One classic multilithic breccia appears (in thin section) to have been shattered by two explosive events, the first followed by silicification and the second by carbonate alteration. Fresh biotite occurs in many of the specimens, and potassic alteration may be seen in stained specimens. The red and brown colours of many of these lithologies is due to extensive hematite which accompanies the other alterations.

This sequence lies directly over the basement granite or aplites in some places, and includes these rocks in some of its breccias. The only radioactive zone discovered in this lithology was near such a basal contact and was due almost entirely to thorium.

(c) Radioactive Pink Grit

Only two samples of this rock were examined in thin section, as most of its occurrences on the Clark property were not discovered until this spring. As with the other pink grits, it is comprised of clasts of microlite lava mixed with crystals of K-feldspar and albite. Quartz crystals are rare, although there has been some silicification of the matrix. Fresh biotite is common, and pyrite more common than in other occurrences. Hematite dust is widespread in the unit.

The grits appear to comprise one or more large channel deposits in a moderately radioactive bed of shaley tuffs and volcanic sandstones. This unit is almost flat lying (dip slightly to west) and in some areas at least occurs between phonolite flows rather than under that sequence. More work is required to determine the stratigraphy here. Near the grid base station there is a large area of brown, moderately radioactive alteration of tuffs and flows adjacent to (largely underneath) the channel.

The uranium values from Clark samples have not been encouraging to date, although one case showed substantial enrichment of uranium daughter products. Other small radioactive zones have also been encountered on the property, including one in the aplite, a thorium-rich lamprophyre dike, and two zones adjacent to major dacite dykes.

GENERAL GEOCHEMISTRY

Uranium and thorium analyses for various rocks are given in the accompanying table. Wide differences may be observed between the results from different laboratories and methods. In part this reflects continuing inter-laboratory discrepancies and a general lack of reproducibility for analyses of these elements. It should also be remembered, however, that the Min-En results are based on leaching procedures which do not extract 100% of the elements. Furthermore, in some cases different pieces of the specimen were involved in the different analyses.

The degree of disequilibrium between uranium and its daughter products is extremely variable. It would appear that in general uranium is more easily leached than its daughter products in surface exposures of radioactive lavas and syenites, while the reverse is true for the channel grits. The extreme daughter excess in FM54 involves a seep, and may represent radium accumulation. The generally lower values of Pb^{214} as compared to radium are presumably due to escape of the intermediate radon during pulverization.

The multi-element analysis failed to show any really distinctive assemblage of elements associated with uranium and thorium in these rocks. Most of the strongest correlations with uranium for the 22 volcanic samples analyses for 18 elements were negative correlations and represented elements closely associated with the phonolitic influence (Cr, P, V, Mg, Ti, Al, Ba and Sr). The elements having the closest overall positive correlation with uranium are Zn (.69), Be (.40), K (.46), Pb (.37) and fluorine (.31). Of these, the lead and the fluorine are associated more directly with the acid exchangeable portion of the uranium.

30 May 1978

ADDENDUM - JUNE 1978

Between writing and release of this report, several new pieces of data have been received of interest. These are presented in list form.

1. An electron microprobe scan by The B.C. Ministry of Mines was made on a sample of the radioactive felted trachyte. This showed that uranium occurs in conjunction with manganese, strengthening the belief that uranium is associated with the opaque minerals deposited hydrothermally. More of this is planned.

2. Dr. N. Church of The B.C. Ministry of Mines further reported that a tuff sample taken from below the rectangular porphyry trachytes on the Agur-Ash property had been hydrothermally converted to as high as 40% zeolites. This is especially interesting in view of the role of zeolites in Japan in trapping uranium.

3. In view of the fact that radioactive elements associated with alkaline rocks in some areas (Brazil for example) are located in zircons, zirconium analyses were ordered with the multi-element work. The results did not arrive until after the report was completed, but only one rock (a felted trachyte) had anomalous quantities. Zircon crystals were not commonly met in thin section, either, and pleochroic halos in biotite were not observed.

4. A larger number of rocks have now been examined by low energy gamma spectrometry, largely due to spring mapping. This grids an average of 50 ppm uranium and 224 ppm thorium for the 14 samples of rectangular trachyte flows (those not hydrothermally leached). The eight felted trachyte specimens average 131 ppm uranium and 307 ppm thorium, while five boxwork syenites averaged 55 ppm uranium and 316 ppm thorium. These rocks tended to have fairly large disequilibrium coefficients, presumably due to leaching of uranium daughter products.

5. This spring, a rectangular porphyry trachyte dyke was observed cutting rhomb porphyry phonolite (Yellow Lake Unit) flows on the northeastern Agur-Ash property. As with the radioactive grit channels, the radioactive trachyte now appears to postdate at least the earliest phonolite volcanism.

TABLE I

		AGUR-ASH PROPERTY	P.P.M. URANIUM				URANIUM EQUIVALENT		P.P.M. THORIUM	
			Neutron Activ.	Min-En 1978	Min-En 1977	Gamma Spec.	Pb^{214}	Radium	Min-En	Gamma Spec.
RID	1	Rect. porph. flow		27.0	47	38	33	27	135	191
	1A	Alt. lapilli tuff			19.5	34	18	20	20	111
	2	Rect. porph. flow			27	23	14	21	21	101
	3	Felted trachyte	120		90	174	98	132	375	440
	17	Porph. syenite		12.0	8.5	16	13	19	98	65
	17B	Porph. syenite			7.5	19	22	26	72	100
	21	Felted trachyte	74.2		53	73	41	53	290	360
	23	Alt. zone			5.0	24	15	23		72
	24	Felted trachyte	115		53	130	63	64	285	511
	26	Coarse syenite			5.0	12	10	12	42	60
	58	Rect. porph. trachyte				39	20	24		131
	60	Rect. porph. trachyte		25.8		43	18	25		141
	61	Rect. porph. trachyte			17	42	28	33		157
	64	Rect. porph. trachyte			11.5	47	14	19	105	135
	65	Altered trachyte prophry				50	14	14		121
	70	Rhomb porph.?				23	17	20		143
	79	Rect. porph., carbonatized		21.4		63	18	24		374
	81	Rect. porph., carbonatized				44	27	26		138
	82	Leached zone - silicified			2.5		9	11	27	100

	AGUR-ASH PROPERTY	P.P.M. URANIUM				URANIUM EQUIVALENT		P.P.M. THORIUM	
		Neutron Activ.	Min-En 1978	Min-En 1977	Gamma Spec.	Pb^{214}	Radium	Min-En	Gamma Spec.
RID 82A	Leached zone - silicified			2.5	8	7	8	25	63
87	Analcite tuff, trach. clasts				71	30	33		280
89	Ignimbrite		12.0		36	20	22		164
94B	Vent facies phonolite tuff			2.5		10	8	10	24
96A	Multilithic breccia		27.0		56	29	36		186
96B	Banded volc. sstne.				58	32	34		223
97	Dacite		7.5		7	7	9		44
107	Vent facies breccia				20	13	15		30
107A	Vent facies breccia				22	26	30		143
110	Rhomb porph. phonolite		4.2		19	13	11		79
111	Altered flows				29	10	10		119
111A	Altered flows			12.5	21	13	11	27	134
111B	Altered trachyte				42	16	24		100
113	Altered trachyte			17.5	33	26	25		138
115	Trachyte-biotite alteration		6.4		30	7	15		61
117	Granular syenite			8.0	13	15	18		75
120	Rect. porphyry trachyte				63	23	18		285
157	Boxwork syenite			4.0	53	40	50	47	219
157A	Fine porphyry syenite			5.0	16	17	27	61	91
158	Boxwork syenite			21	69	31	39	210	374
163	Boxwork syenite			20	17	21	51	300	323
165	Boxwork syenite			25	82	29	40	286	290

	AGUR-ASH PROPERTY	P.P.M. URANIUM				URANIUM EQUIVALENT		P.P.M. THORIUM	
		Neutron Activ.	Min-En 1978	Min-En 1977	Gamma Spec.	Pb^{214}	Radium	Min-En	Gamma Spec.
RID 166	Rect. porphry trachyte			40	53	43	51	300	453
166A	Felted trachyte			30	81	35	47	286	340
167	Pink felted trachyte			50	122	63	77	510	576
173	Altered fine BW syenite		34	20	53	19	23	334	372
THOR	Thor zone trachyte				70	38	44		460
THGL	Thor zone trachyte				123	36	39		353
THX	Thor zone trachyte				109	52	69		363
ZAPQ	Felted trachyte	112	33	55				231	
ZAPL	Felted trachyte			50	155	107	111		499
TH6	Trachyte dyke				52	20	24		162
	CLARK PROPERTY								
BR 5	Volc. sstne.- dam area				76	31	41		163
BR 5B	Volc. sstne.- dam area		4.0	15.5	33	17	20	98	105
56	r/a aplite zone			32.5					
59	Tuff-grit, lake zone			8.0					
59B	Tuff-grit, lake zone			13.0					
59X	Tuff-grit, lake zone			12.5					
FM 11	Qtz.-carb. alt. lapilli tuff		2.2			3			29
14	Nephaline phonolite		3.4			5			54

	CLARK PROPERTY	P.P.M. URANIUM				URANIUM EQUIVALENT		P.P.M. THORIUM	
		Neutron Activ.	Min-En 1978	Min-En 1977	Gamma Spec.	Pb^{214}	Radium	Min-En	Gamma Spec.
FM 21	Phonolite		3.4		5	4	8		30
30	Springbrook grit		1.2		9	3	6		19
50	Tuff-grit, base zone				23	8	11		73
50A	Tuff-grit, base zone				21	4	9		17
51A	Tuff-grit, base zone				65	50	60		104
53	Altered tuff				13	78	92		54
54	Dacite rim r/a zone				16	13	12		61
62	Roadside r/a dyke				24	11	16		127
75	Lake zone tuff				105	48	61		313
75A	Lake zone grit				157	47	52		380

	RESERVATION AREA	Neutron Activ.	Min-En 1978	Min-En 1977	Gamma Spec.	Pb^{214}	Radium	Min-En	Gamma Spec.
IR 2	Rhyolite tuff		4.5		4	4		22	32
9	Pink tuff	63.4	20.5		58	37	39	79	304
11	Volcanic grit	65.5	24.5		50	31	33	165	313
12	Volcanic grit	65.2	26.5		105	37	36	155	337
14	"Cellular" tuff - pink	57.6	23.5		49	36	41	88	304
IRQ	Volcanic grit	89.6	32.5		85	40	39	79	331
IR-IG	Pink tuff		20.0		104	45	49		346

	RESERVATION AREA	P.P.M. URANIUM				URANIUM EQUIVALENT		P.P.M. THORIUM	
		Neutron Activ.	Min-En 1978	Min-En 1977	Gamma Spec.	Pb^{214}	Radium	Min-En	Gamma Spec.
SR 2	Rhyolite tuff		20.0						
11	Carbonatized lava		2.0		12	9	11		59
14A	"Cellular" tuff - pink		31.6		82	44	55		267
15	Altered rhomb porphyry				29	19	21		52
19	Light crystal tuff				70	33	41		324
21	Carbonatized lava		5.0		9	9	10		69
	OTHER AREAS								
ANIG	Summerland ignimbrite				12	5			29
YLK	Yellow Lake phonolite			4.0	3	3	3	22	50
ADA	Allendale sytenite				18	18	24		105
TDI	Carbon-chip grit				96	32	47		297

N.B. Some analyses are from different chips of same specimen and therefore not directly comparable.

HUNDREDS OF METERS WEST
HUNDREDS OF METERS EAST
HUNDREDS OF METERS NORTH
HUNDREDS OF METERS SOUTH
UPPER NUMBER IS CNTS/MIN. URANIUM, AFTER CORRECTION FOR THORIUM
LOWER NUMBER IS RATIO OF THIS TO THORIUM COUNTS (X100)
X DENOTES OUTCROP IN FIELD NOTES
BL
FIGURE 3
SOUTHERN B.C. URANIUM PROJECT
ASH-AGUR PROPERTY
RADIOMETRIC SURVEY
D.G. LEIGHTON AND ASSOCIATES LTD.
SURVEY BY NIELSON GEOPHYSICS LTD
SCALE 1:5000
DATE SEPT 1977
PROJECT NO. 103
CLIENT BRINEX
MINERAL RESOURCES BRANCH ASSESSMENT REPORT
6750
NO.
PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
R. R. CULBERT
N


6750
AGUR-3
AGUR-2
AGUR-4
AGUR-5
ASH-3
ASH-2
BASE LINE
MOLYBDENUM
OLD MILL SITE
OLD FARM
LOGGING SLASH
APLITE
MORAINE
JUNGLE
NO O.C.
SYA
RP
SED
GDio
ABx
FR
SYN
RP DYKE
GDio FLOAT
LEGEND
GEOLOGY
GDio GRANODIORITE & RELATED MESOZOIC INTRUSIVES
APPOX. LIMIT OF TERTIARY
TERTIARY LITHOLOGIES - OUTCROP OR FRESH FLOAT
RP RHOMB PORPHYRY PHONOLITES (YELLOW LAKE MEMBER)
(P) RECTANGULAR PORPHYRY RADIOACTIVE PHONOLITES ?
SED TUFFS, VOLC. SANDSTONES, GRITS & IGNIMBRITES
SYN COARSE SYENITE
SYA PORPHYRITIC SYENITE - FINE MATRIX
ABx ALTERED BRECCIAS
FR FELTED, RADIOACTIVE ROCKS
NO O.C. NO OUTCROP
GEOCHEMISTRY
SAMPLE SITE — X RID53 - SAMPLE NAME
2.5 - SOIL OR SEDIMENT URANIUM p.p.m.
(0.6) - URANIUM IN WATER - ppb
58 - ppm THORIUM
CREEK OR LAKE SEDIMENT
SOIL SAMPLE - GULLY OR SPECIAL SITE
SOIL SAMPLE - LINE OR GRID SITE
MINOR GULLY OR CREEK
cps COUNTS / SECOND ON SCINTILLOMETER
RADIOACTIVE ZONES
CLAIM LINE
GRID LINE
MINERAL RESOURCES BRANCH
ASSESSMENT REPORT
NO. 6750
FIGURE 4
D. G. LEIGHTON & ASSOCIATES LTD.
AGUR - ASH PROPERTY
GENERAL COMPILATION
SCALE IN METRES
200 150 100 50 0 100 200
PROJECT S. B.C. URANIUM
PROJECT No. 103
DATE JAN. 1977
DRAWN Altair