



**INTRODUCTION**

A program of regional mapping and property examination in the East Okanagan area was carried out during the summers of 1976 and 1977 to help define the geological setting of known uranium deposits (Christopher and Karpis, 1977) and to provide an improved geological base for rock, stream, and lake geochemical studies. In 1977 about 200 rock samples were collected for a lithological and geochemical study of uranium in basement rocks by T.C. Bell at the University of Calgary. A geochemical survey in the Deer Creek-Lake Lake area is contained in a report by S.E. Sallenger (1976) and regional stream sediment and water geochemical data is available on open file maps 608 (1977).

**LOCATION AND ACCESS**

The East Okanagan uranium area extends from Vernon in the Okanagan Valley to Beaverdell in the Okanagan Highlands. The area includes parts of the Okanagan Highlands through the east-south-east of the Okanagan Valley and covers parts of 1:75 map sheets 82E/10, 82E/11, 82E/14, and 82E/16; Highway 33, the McCallish road, the B.C. Water Transfer road, and the Okanagan Park logging road provide the main access and many secondary mining and logging roads provide access to other areas.

**GENERAL GEOLOGY**

Rocks considered to be "basement" for Tertiary unconsolidated fluvial and lacustrine deposits that underlie "olive-plume basalt" are divided into nine units, in ascending order of age, as follows: Unit 10 (1982, 1981) terrigenous in the Kettle River area; Metamorphic rocks generally can be classified as Monashee Group (Unit 1), Anaschist Group (Unit 2), or Cache Creek Group (Unit 3). With the exception of minor hydrothermal rocks, the intrusive rocks are classified as Nelson (Unit 4), Valhalla (Unit 5), or Corvill (Unit 6) plutonic rocks. Tertiary volcanic rocks are subdivided into Kettle River Formation (Unit 6), Kamloops Group (Unit 7), and plateau basalt (Unit 10) with underlying sedimentary (Unit 10A).

**METAMORPHIC ROCKS (UNITS 1, 2, 3)**

Metamorphic rocks generally have low radioactive background and unless associated with quartzite or volcanic rocks represent poor sources of uranium. The metamorphic terrain is mainly layered gneiss. The Anaschist Group (Unit 2) - Wallace Formation (Beaverdell area), Kamloops Group (Unit 3) - Cache Creek Group (Unit 3), and the Cache Creek Group (Unit 3) are generally composed of metamorphic equivalents of mesoproterozoic sedimentary and volcanic rocks in younger plutonic rocks. The Cache Creek Group (Unit 3) is mainly gneiss and has been mapped in one area along the McCallish road.

**NELSON PLUTONIC ROCKS (UNIT 4)**

Nelson plutonic rocks are of hypidiomorphic granular texture and are biotite-hornblende quartz diorites or gneisses with a strong to moderate foliation. Younger Valhalla and Corvill plutonic rocks can generally be distinguished from Nelson rocks by more acidic and shaly character, lack of biotite, porphyritic texture, and higher background radiation. Like the metamorphic rocks, the Nelson plutonic rocks are not considered to be favourable uranium rocks unless associated with Valhalla or Corvill plutonic rocks (for example, Carmi hydrothermal property, Karpis and Marston, 1978).

**VALHALLA PLUTONIC ROCKS (UNIT 5)**

Valhalla plutonic rocks are generally porphyritic quartz monzonites and related pegmatitic and hypabyssal phases. Large pink feldspar phenocrysts, abundant perthite, quartz, a calcic texture, and purple fluorite veins and fracture coatings are common features of these plutonic rocks and are considered to be indicative of high background uranium rocks. Biotite K/Ar age from the Beaverdell area indicates an Eocene age for some phases of this unit.

**KETTLE RIVER FORMATION (UNIT 6) AND KAMLOOPS GROUP (UNIT 7)**

The Kettle River Formation may be an extrusive equivalent of Valhalla plutonic rocks, with abundant pyritic sulfide and flows. Strong geochemical response is obtained from fault-controlled stream valleys that cut through the Kettle River Formation and Kamloops Group rocks. Strong geochemical response is obtained from high elevation outcrops.

The main exposure of Kamloops Group rocks is east of Deer Creek and near Deer Creek. Along Deer Creek south of the Beaverdell Creek road, the rocks are of granitic character and may be correlative of the Marston Formation (Church, 1973). Although phases of the Corvill plutonic rocks cut this unit, it appears to be an extrusive equivalent of Corvill rocks.

**CORVILL PLUTONIC ROCKS (UNIT 6)**

Corvill plutonic rocks are represented generally by syenitic or monzonitic phases except in the area of Deer Creek and along the western margin of Kamloops Group rocks where porphyritic or amphibole-bearing coarse grained monzonitic rocks occur. Syenitic Corvill plutonic rocks can generally be distinguished by redish weathering and high to very high background radiation. A swarm of north 20 degree west trending Corvill dykes cut pegmatitic Valhalla rocks in the area of the Beaverdell-Kamloops contact near Lake Lake.

**MARMAHA(?) FORMATION (UNIT 8)**

Volcanic rocks of intermediate composition occur along Williams Creek. Generally northward trending feeder dykes (Unit 8A) occur in the southern part. The rocks are considered to be younger than Corvill or Marston Formation rocks. They are correlated on the basis of age and composition with the Marma Formation (Church, 1973).

**PLATEAU BASALT FORMATION (UNIT 10)**

Fluoro basalt, generally olive bearing and flat lying, represents the main basaltic rocks for unconsolidated fluvial and lacustrine sediments (Unit 10A) that underlie uranium deposits. Basalt show well-developed columnar jointing which is particularly well exhibited along the Kamloops Group rocks. The basalt is generally considered to be a sequence overlain by unconsolidated sediments. A mineralized exposure of greenstone occurs between Deer Creek and Deer Creek (Deer Creek Road). Mineralized sediments capped by platy basaltic or clay rich sediments are near Deer Creek and north of Deer Creek. The Kamloops Group rocks are of Hydrothermal Lake, and at the junction of Highway 33 and the McCallish road (see map in grid 82E/10). Unconsolidated sediments and volcanic flows plateau basalt between the forks of Kettle Creek and north of the area between Wood and Williams Lakes and near Kettle.

**MINERALIZATION**

Uranium mineralization occurs in unconsolidated fluvial or lacustrine sedimentary rocks that are capped by an impermeable horizon, either Plateau or Miocene plateau basalt (6.5 Ma and 8.0 Ma K/Ar ages) or by sediments of low permeability. A rhyolite or trachyte of groundwater solution is necessary to provide a reducing environment from normally oxidizing or leaching groundwater solutions. Uranium-bearing sediments unconformably overlie most of the map units but high radioactive background Corvill or Valhalla plutonic rocks and extrusive equivalents are key basement rocks. Strong feeding that occurs in the area of mineral deposits controls the distribution of plateau basaltic and trachyte. When leaching solutions encounter reducing groundwater, uranium mineralization occurs as films on pebbles and in the matrix of unconsolidated or poorly consolidated carbonaceous conglomerates and fine sediments that were deposited in paleochannels. Uranium mineralization is associated with minor barrenite near Carmi. Molybdenum and copper mineralization also occurs in host granites on the McCallish between Deer and Beaverdell Creeks. Tungsten is reported to occur with molybdenum near Antelope Lake (Karpis, 1978). Pyrite fluorite occurs with uranium and molybdenum mineralization at Carmi and has also been seen as fracture coatings in other areas underlain by Valhalla plutonic rocks.

**ACKNOWLEDGMENTS**

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Province of British Columbia  
Ministry of Mines and Petroleum Resources

**PRELIMINARY MAP NO. 29**

**EAST OKANAGAN URANIUM AREA (KELOWNA TO BEAVERDELL)**  
**SOUTH-CENTRAL BRITISH COLUMBIA**  
(82E/10, 11, 14, 15)

By P.A. Christopher, July 1978

**LEGEND**

**MIOCENE AND PLEISTOCENE**

10 BASALT; OLIVINE BASALT (PLATEAU BASALT); 10A - UNCONSOLIDATED SEDIMENTS

**Eocene**

9 DACITE (MARMAHA FORMATION ?); 8A - FEEDER

8 CORVILL, MAINLY SYENITE AND MONZONITE

7 KAMLOOPS GROUP TUFFS AND FLOWS AND RELATED VOLCANIClastic SEDIMENTARY ROCKS

6 KETTLE RIVER FORMATION

**EARLY CENOZOIC (?) AND MESOZOIC**

5 VALHALLA PLUTONIC ROCKS

4 NELSON PLUTONIC ROCKS; 4A - ALTERED NELSON

**PALEOZOIC**

3 CACHE CREEK GROUP; GREENSTONE

2 ANASCHIST GROUP OR WALLACE FORMATION (METASEDIMENTARY ROCKS)

1 MONASHEE GROUP LAYERED GNEISS; 1A - ALTERED MONASHEE

**SYMBOLS**

DRILL HOLE; GRID OR CLOSELY SPACED DRILLING

K/Ar AGE DATE SAMPLE (BASALT WHOLE ROCK)

DYKE

OUTCROP AREA

EDGE OF MAPPING

CONTACT: KNOWN, ASSUMED

FAULT OR STRONG LINEAR FROM AIR PHOTO

SYNCLINE AXIS

MINE

HIGHWAY (LOOSE SURFACE)

GRAVEL ROAD; LOGGING ROAD

TRAIL

SCALE

CONTOUR INTERVAL - 500 FEET