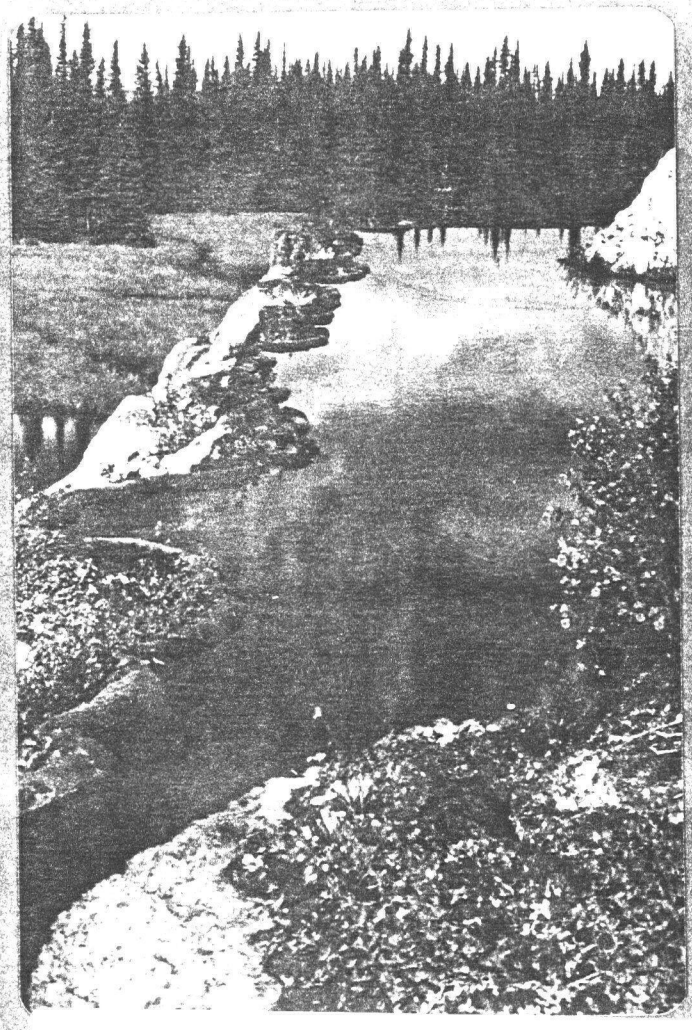
A Reconnaissance of the Coal River Springs
Yukon Territory, July 27/75

for IBP-CT Panel 10



A reconnaissance of the Coal River spring, Yukon Territory, July 27/75 ; for IBP-CT Panel 10 / Malcolm Dennington.

Malcolm Dennington

Introduction:

In May 1975, Mr. Cristel Foster, Coordinator of Ecological Reserves for the province of British Columbia, forwarded a letter from Mr. J. McDougall of Falconbridge Nickel Mines Ltd., in which Mr. McDougall briefly described a somewhat unique and picturesque cold spring area near the Coal River in south-eastern Yukon Territory. On Dr. V. Geist's suggestion, and after further correspondence with Mr. McDougall to clarify the precise location, I visited the springs and subsequently forwarded a letter to Miss D. Seckel suggesting inclusion of the site as an ecological reserve under the IBP-CT. This brief report is a record of my observations at the springs on July 27, 1975. Some correspondence relating to the springs is appended.

Location and Access:

The springs are found approximately one-quarter mile east of the Coal River at 60° 09' 08" N, 127° 25' 02" W (letter from Mr. McDougall, July 7/75), the site being about 40 air miles east of Watson Lake. A winter trail which departs from the Alaska Highway near mile 590 and extends northeast for approximately 35 miles to Otter Creek, crosses the Coal River some 12 miles above the springs (see Fig. 1). The trail crosses several tributaries of the Coal River and some muskeg areas, probably making it impassible for wheeled vehicles during most summer months. The Alaska Highway crosses the Coal River near its junction with the Liard, some 60 miles downstream from the springs; but I would expect navigation on the Coal River to be quite difficult except during peak runoff periods.

The channel of the Coal River immediately adjacent to the springs will accommodate small float-equipped aircraft; but abrupt banks, boulders and leaning

Fig. 1

...mpiled, drawn and printed by
...urvey Est., R.C.E. 1948-50.
...ography by R.C.A.F., 1948
...950.

...ransverse Mercator Projection.

...eclination 33° 39′ East at centre of sheet, 1950.
... of the compass needle is decreasing 5 minutes annually.

COA...

YUKON TERRITORY

REFERENCE

Road, Hard Surface, Heavy Duty	3 or more Lanes	Partially completed
,, Hard Surface, Heavy Duty	2 Lanes	Route No. (12)
,, Hard Surface, Medium Duty	3 or more Lanes	2 Lanes
,, Loose Surface, Graded and Drained	3 or more Lanes	Not less than 14 ft. wide
Other Roads		Poor condition
Trail		
Railway, Double Track		
,, Single Track	Station	Stop
Boundary, International		
,, Provincial		
,, County		
,, Reservation, Military, etc.		
Electric Power Line	on Steel Towers	on Wood Poles

Miles 5 0 5

Kilometres 5 0 5

trees along the shoreline make docking somewhat hazardous. Mr. S. Driscoll of Watson Lake Flying Service attempted to put me ashore from a Cessna 185 on July 26, but after touching down we were unable to beach the aircraft. A Piper Super Cub was utilized the following day, and beaching was achieved with relatively few problems. (I would stress, for the safety of persons wishing to reach the springs with fixed-wing aircraft, the pilot's familiarity with the area can be invaluable.)

Description of Site:

The Coal River valley, in the vicinity of the springs, is confined on the east by mountains rising to approximately 4700 ft. To the west the landscape shows somewhat less relief and is dominated by low irregular hills and numerous small lake basins. Forest cover consists primarily of spruce or lodgepole pine; but aspen, balsam poplar, birch, and alder can all be found along stream courses. (White spruce of up to 24" D.B.H. was found on the inactive floodplain of the Coal River, and although its occurrence was noted on the 1973 Land Use Information Series, the Yukon Forest Service does not consider volumes sufficient to warrant commercial harvesting.) Understory species found along the river valley include willow, red osier, rose, high-bush cranberry, black currant, and gooseberry. Some of the more common flowering plants found near the springs are discussed on page 5.

There are several seeps originating from a mile-long linear rock escarpment which forms the easterly limit of the inactive floodplain (Fig. 2). All drain to the south via a series of wet sedge-willow meadows and interconnecting channels, and empty into the Coal River. It is the most southerly of the springs on this drainage system that has formed a series of terraces on the rock outcrop immediately above the sedge meadows and currently affords a most spectacular view. (See Figs. 3 and 4.)

Fig. 2

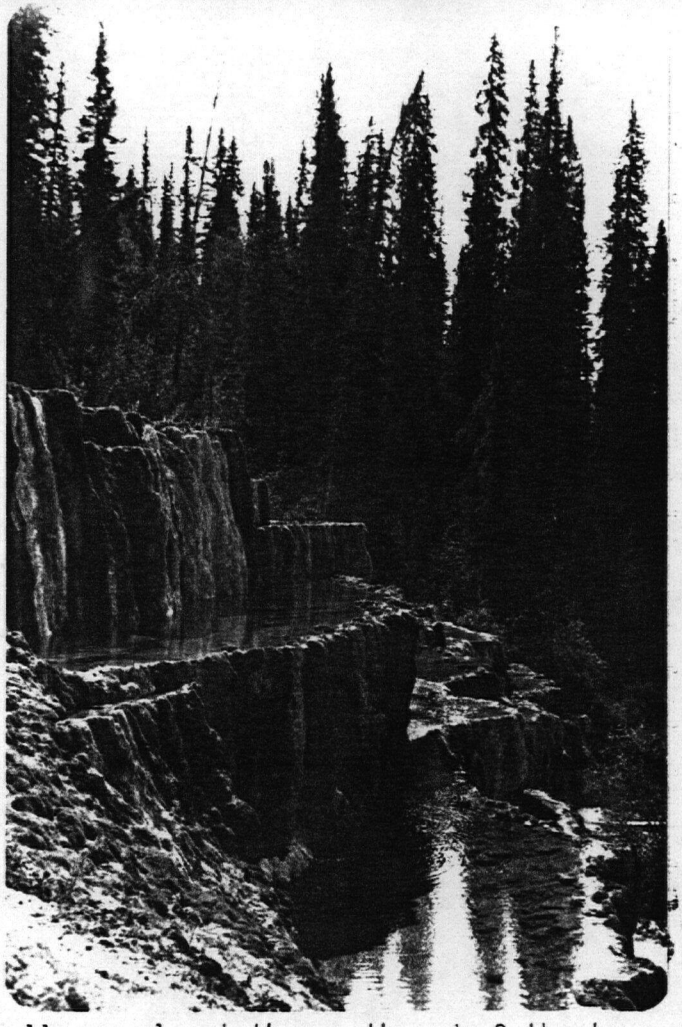


Fig.3 Shallow pools at the south end of the terraced escarpment.

Fig.4 Mosses and organic stain on granular surfaces provide a multi-colored effect.

A small creek carrying water to the terraced pools was followed upslope (to the east) for approximately 100-150 yds to its source pool (Fig. 5). This pool occupied approximately one-tenth of an acre and was completely covered by a floating mat of mosses. Gas bubbles could be seen rising through a couple of small openings in the mat, but no sulphurous odor was detected, nor was the water unpleasant to taste.

Returning downstream, the first series of pools were found on the crest of the escarpment 40 to 50 feet above the sedge meadows. These pools were in an opening in the timber, occupying approximately one-half acre, and the largest pool was some 20-30 ft in diameter. Water depth varied from a few feet to an apparent maximum of about 15 ft, but in all cases the water was extremely clear and the pool floors were visible. Precipitation patterns have given the pool walls a concave profile so that frequently, in examining a rim, the observer finds himself well out over the underlying water (Fig. 6). These concave walls are most apparent on the downslope (west) side of the individual pools and would appear to be the end result of the same precipitation process that forms the lower, more vertical, terraces. The profile could be diagrammatically illustrated in cross-section as follows:

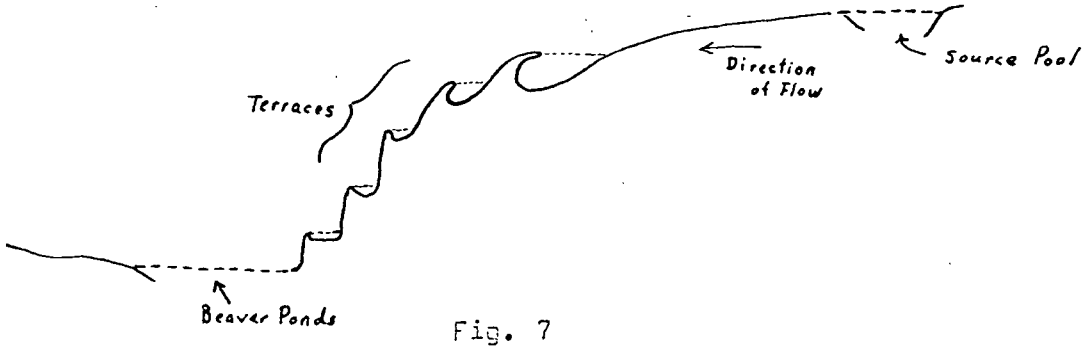


Fig. 7

A number of drained shells with the same overhanging downslope walls were found along the slope immediately above the escarpment. Dense carpets of moss covered the floors of all the drained pools.

Fig.5 A source pool. Note bubble openings in the dense moss cover, center foreground.

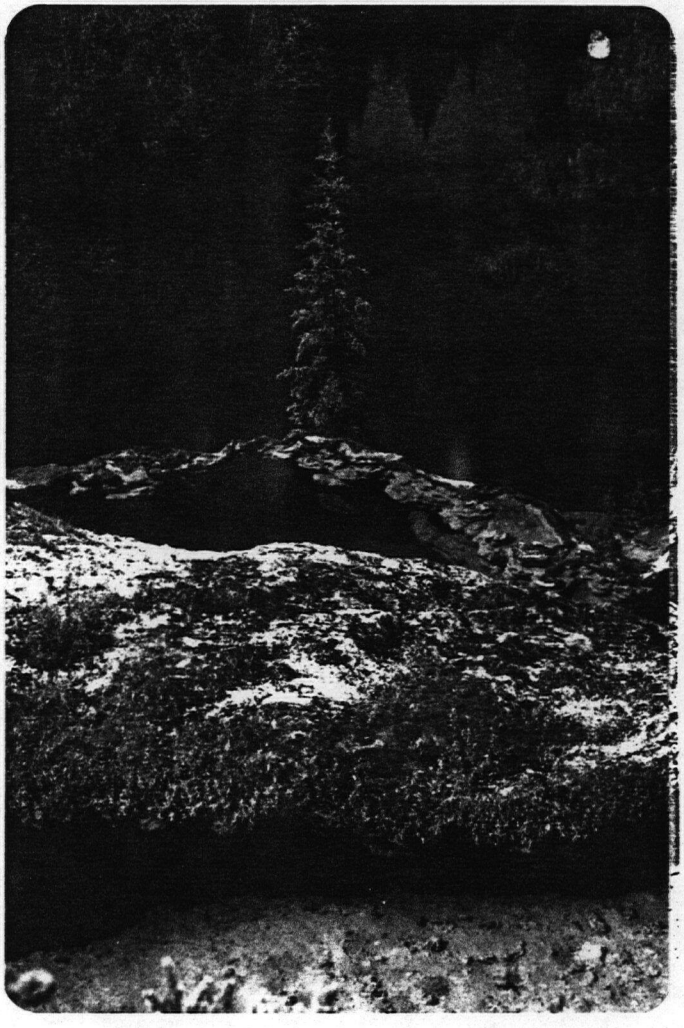


Fig.6 Thin, over-hanging walls typical of upper pools. Small fish were seen rising from beside the submerged log in the beaver pond, center background.

The structure of pool walls is significant because it is this feature, together with a shallow wet soil profile, that lends an element of extreme fragility to the pool area (Fig. 8 & 9). Although the underlying rock structure seemed quite substantial, the granular surface material which supports a variety of plant life can be readily crushed and displaced by careless footsteps.

Red squirrels were the only mammals observed near the springs, although there was abundant evidence of the presence of some species and an apparent potential for a diversified fauna. Moose tracks and droppings were found within the opening occupied by the pools, and most red osier showed evidence of having been browsed. Several bear scats were observed, and the cave-like appearance of drained pools leads to speculation as to their potential for bear den sites. Bubble-tubes and crevices in the same structures also supply potential denning sites for small mammals. Beaver have colonized the wet sedge meadows below the pools, as indicated by a series of dams and numerous shoreline cuttings, but the current lodge site was not located.

A brood of ruffed grouse (hen and two chicks) was seen at the source pool, and a brood of spruce grouse (hen and three chicks) was flushed from an alder thicket near the beaver ponds. Other birds observed were the varied thrush, lesser yellowlegs, gray jay, least sandpiper and slate-colored junco. Unfortunately, in transferring equipment to the smaller aircraft for a second attempt to reach the springs, my binoculars were left behind and several small song birds could not be positively identified.

A large toad (probably Bufo boreas) was observed in one of the older drained shells above the pool. No fish were seen in the pools contained by terraces, but several small fish (6-8 inches) were observed rising from beside a submerged log in the beaver pond. It is quite probable that these were grayling, but specimens could not be obtained on this trip.

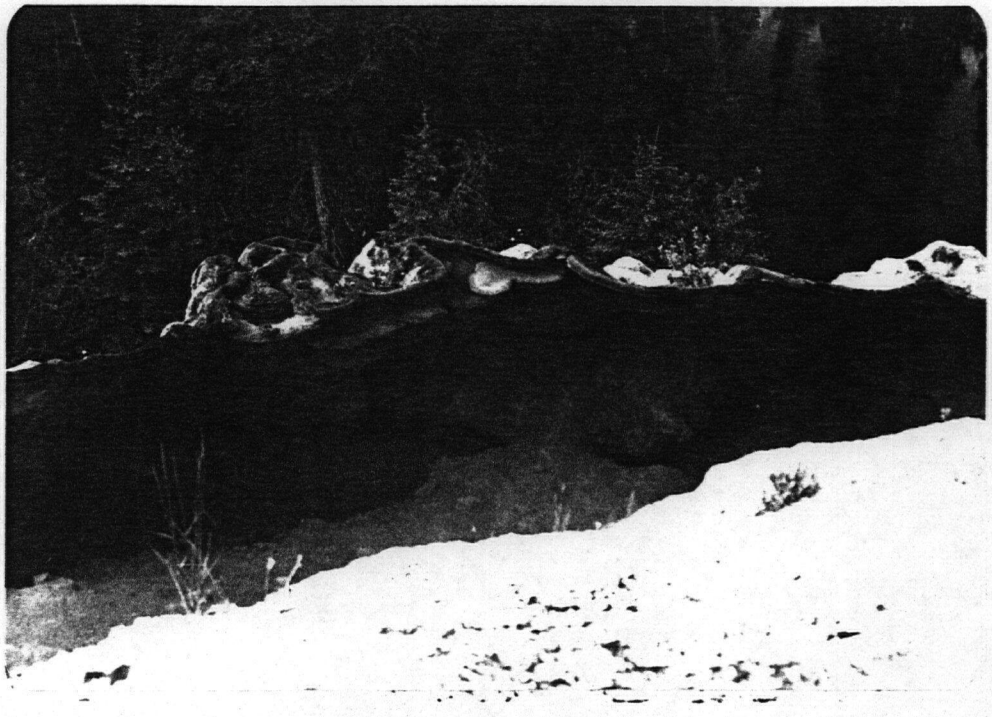


Fig. 8 Thin overhanging walls and extremely clear water characteristic of the upper pools.

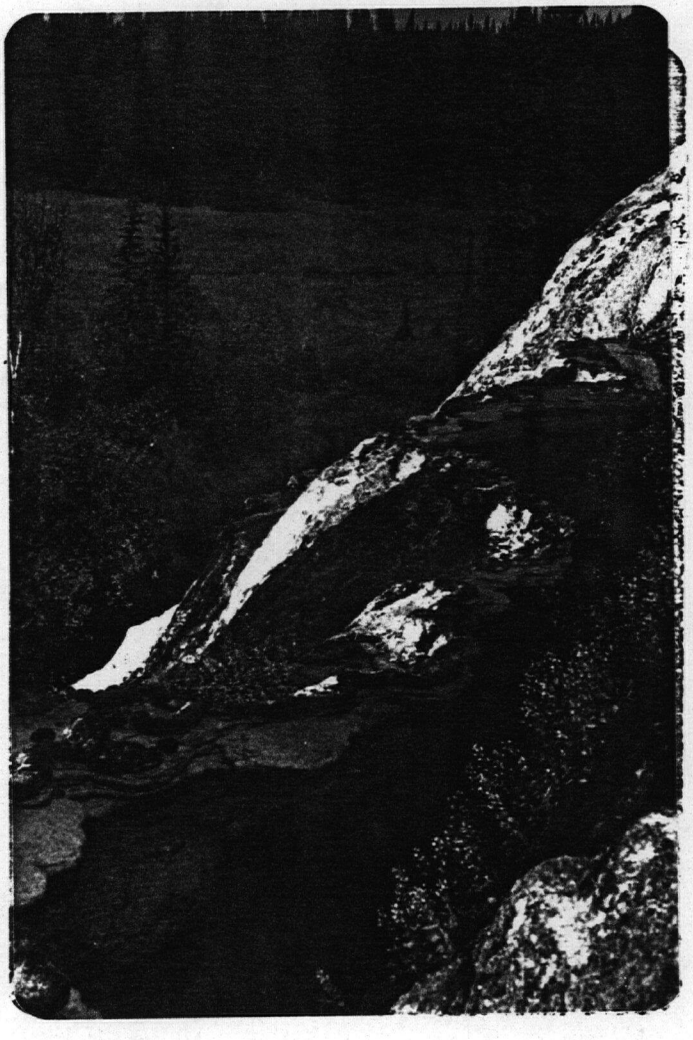


Fig. 9 Another view of the pool walls-- a most vulnerable component of the surface features.

A number of plants were collected in the vicinity of the springs; and most were later identified, through much-appreciated assistance from Dr. V. Geist and Manfred Hoefs. Hulten's "Flora of Alaska" served as a reference in identification of species, although in a few cases the stage of development of flowers or fruits made positive identification impossible.

Within the mature spruce forest above the pools, and under a relatively closed canopy, horsetail (Equisetum spp.), wild sarsaparilla (Aralia nudicaulis), and bunchberry (Cornus canadensis) were found in abundance. Skunk currant (Ribes glandulosum), wintergreen (Pyrola secunda), and twinflower (Linnaea borealis) were common but less readily apparent in the same areas. Under a more open canopy within the spruce forest, comandra (Geocaulon lividum), alpine blueberry (Vaccinium uliginosum), lingonberry (Vaccinium vitis-idaea), bearberry (Arctostaphylos rubra), and dewberry (Rubus arcticus) occupied areas of shallow moss cover; while crowberry (Empetrum nigrum) and several species of lichens (Cladonia, Peltigra, etc.) prevailed on deeper moss cover. In the opening along the creek from the source pool, aster(Aster modestus), lungwort (Mertensia paniculata), false solomons seal (Smilacina stellata), fleabane (Erigeron elatus), ragwort (Senecio cymbalaroides), and goldenrod (Solidago multiradiata) were most conspicuous. The yellow monkey flower (Mimulus guttatus) was an abundant and most picturesque element of the plant community in the immediate vicinity of the pools. The species seemed particularly well adapted to the fractured rock and shallow soil complex surrounding the upper pools. Marsh grass of Parnassus (Parnassia palustris), white camas (Zygadenus elegans), ladies tresses (Spiranthes Romanzoffiana), cinquefoil (Potentilla norvegica), and bedstraw (Galium boreale) were also found throughout the openings between pools. Several species of grass (probably Festuca spp. and Agropyron spp.),

a sedge (*Carex* spp.), and a small mustard (*Arabis*) were present, but not abundant, near the pools. Larkspur (*Delphinium glaucum*), arnica (*Arnica alpina*), and a violet paintbrush (probably *Castilleja Raupii*) were collected along the lower reaches of the stream that drains into the Coal River.

Conclusions:

It is my opinion that the Coal River Springs present an opportune setting for investigations into the adaptation of plant and animal communities to a unique combination of environmental stimuli. Also, the possibility that some components of the biological community may be specific to the springs area must not be overlooked. Therefore, this area could conceivably qualify as both a site for research programs and as a possible genetic bank, under the proposed system of IBP reserves in the Yukon.

Further, I feel that a current proposal to include the area within a territorial park system would not be compatible with the objectives of IBP; and such a move could, in view of the fragile elements discussed earlier, lead to undesirable changes from both an aesthetic and scientific standpoint.

FALCONBRIDGE NICKEL MINES LIMITED
1112 West Pender Street, Vancouver 1, B.C., Canada
Telex 04-53245
Telephone (604) 682-6242

May 15, 1975

Mr. Bristol Foster
Co-Ordinator of Ecological Reserves
Department of Lands
Parliament Bldgs.
Victoria, B.C.

Dear Mr. Foster:

Earlier in the year I had some correspondence with your department including proposals for several ecological reserves within the hopefully discarded Driftwood Valley "Conservancy" proposal. Following 25 years of investigations in the B.C. wilds with unusual travel opportunities, many further proposals come to mind but I would like to restrict this proposal to just one of a certain type.

For many years I have had the opportunity of investigating and locating hot spring occurrences in B.C. Part of this interest evolved during several years of fixed wing and helicopter exploration for uranium during the course of which natural radioactivity associated with certain hot springs led to further investigation. One of these on Deer River about 6 miles downstream from the Liard Hotspring deposit turned out to be the most radioactive occurrence that we tested in B.C. although we investigated all known springs. It consisted of a few seepages and one pool of only weakly sulphurous water and an associated 20 foot high bluff or plateau of travertine and calcareous tuffa. As usual, ferns and other plants requiring more heat than the north has to offer were present. Because of the associated radioactivity I staked and drilled the tuffa deposits but, unfortunately, uranium present (which is itself not radioactive) was very minor relative to the unusual amounts of radium decay product present. At the time we believed radon gas responsible for the radioactivity but in recent years a bismuth isotope has been shown to be responsible for such conditions elsewhere. Evaluations of the travertine showed it to be of economic value but transportation charges were a few dollars more than the material was worth.

The area underlain by tuffa is about 1000 x 500 ft. The pool is large enough to swim in (there are a few leeches) but not as hot as are a few of the minor seepages. Flow is moderate with warm shower baths being available as the water flows into Deer River over the 20 ft. tuffa escarpment.

The little known occurrence as described would go unnoticed within Yellowstone Park where such are a dime a hundred but there are few, if any, similar spring occurrences in B.C. with such extensive tuffa-travertine build-ups. We have ample remains of dormant ones however (as the Deer River Spring could even be now following possible earthquake activity in the 10 years since I last saw it, thus my use of past tense.)Access used to be by boat and foot but oil exploration in the mid 60's resulted in a now impassable(?) cat road to the Deer River Valley. The spring is on an old trapline and with the exception of the trapper was unknown to anyone in the vicinity at the time of our investigation.

Should this fit your requirement as mentioned in Kamloops last Monday of "off-road study areas", I can send you more information. Radioactivity in plants would be an interesting biogeochemical study. The most delicate and picturesque of the dormant hot springs referred to above is on the Coal River in the Yukon, a few miles north, unfortunately(?), of the B.C. border. Multicoloured fishbowl terraces (with mini fish in them) are well worth preserving should you be in touch with your Yukon equivalent. The only other springs of interest in northern B.C. are near the Toad River.

Yours very truly,

FALCONBRIDGE NICKEL MINES LIMITED

J. J. McDougall

JJMcD:o
cc: Dr. Nick Carter

Canadian Wildlife Service
Room 102, 4103 - 4th Avenue
Whitehorse, Yukon Y1A 1H6
June 4, 1975

Dr. V. Geist
Co-Chairman, Panel 10
Canadian Committee for the
International Biological Programme
University of Calgary
Faculty of Environmental Design
Calgary, Alberta T2N 1N4

Dear Dr. Geist:

I am in receipt of the copy of Mr. J. J. McDougall's most interesting letter regarding the hot springs in the Liard region. I would be very happy to examine the dormant hot spring on the Coal River that Mr. McDougall refers to in the last paragraph of the letter. However, I would require more detailed information as to the location of this site before commencing a field excursion.

Last spring I had occasion to visit the Coal River area by helicopter. At that time, I searched for the hot spring that is indicated at 60° 23' N, 126° 19' W on the NTS 1:250,000 Coal River sheet. I was unable to locate the spring at that time, and if in fact it does exist, I suggest it is quite insignificant.

A second spring located on the right hand bank of Larson Creekaat 60° 12' N, 124° 30' W was located; and I have several photographs of this site. There is a pool located here that is large enough for bathing, and the RMO at Watson Lake informed me that helicopter tours have stopped here in the past.

I would be interested in knowing if either of these sites represents the area mentioned by Mr. McDougall. Hopefully, you can obtain more specifics on the location.

Yours truly,

Malcolm C. Dennington

Malcolm C. Dennington

kvd

CANADIAN COMMITTEE FOR THE INTERNATIONAL BIOLOGICAL PROGRAMME

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Please reply to:
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Calgary, Alberta, Canada
T2N 1N4
(403) 284-6601

9 July 1975

Mr. Malcolm C. Dennington
Canadian Wildlife Service
4103 - 4 Avenue, room 102
Whitehorse, Yukon
Y1A 1H6

Dear Malcolm:

I have just received from Mr. J. J. McDougall of Falconbridge Nickel Mines Limited a map and description of the 'hot spring'.

Would you please be good enough to inspect it at the earliest possible date, and as a preliminary let Dorothy Beckel know that this should be considered as a new number in our ecological reserve series.

Sincerely,

Val Geist

VG/MJS

FALCONBRIDGE NICKEL MINES LIMITED
1112 West Pender Street, Vancouver 1, B.C., Canada
Telex 04-53245
Telephone (604) 682-6242

XF-70-103

July 7, 1975

Mr. V. Geist,
Canadian Committee for the International Biological Programme,
Faculty of Environmental Design,
University of Calgary,
Calgary, Alta.
T2N 1N4

Dear Mr. Geist,

I am in receipt of your letter of June 11th 1975 re terraced 'Technicolour' hotspring (now cold), in the Southern Yukon. Perhaps you had intended to include a copy of the letter mentioned as being from Mr. Dennington, but such was not enclosed.

The springs in question are located as shown on the accompanying 4 mile map. In the early 1950's a trapper, Don Miller of Lower Post told us of the springs which we examined by landing a float plane on the river 1/4 mile away. Stan Bridcut, who operates Watson Lake Flying Service, is familiar with them. I showed the location to the G.S.C. who later examined them with similarly favourable impressions.

I include a somewhat bleached photo, and I think you will agree that bulldozers or rifles should not be allowed near. A friend who specialized in photography took a number of excellent large size photos, the negatives of which he should still have if of further interest. However, as the enclosed in the only enlargement I have at the moment, I would like it returned.

Yours truly,
FALCONBRIDGE NICKEL MINES LTD.,

J.J. McDougall
Exploration Manager,
Western Division.

Encl.

JUL - 8 1975

Canadian Wildlife Service
Room 102, 4103 - 4th Avenue
Whitehorse, Yukon Y1A 1H6
July 31, 1975

Miss Dorothy Beckel, Coordinator
CCIBP-CT Region 10 Panel
1410 - 20 Avenue South
Lethbridge, Alberta T1K 1E9

Dear Miss Beckel:

A few weeks ago, Dr. Geist wrote to me with regard to a mineral spring area near the Coal River in southeastern Yukon that had been brought to his attention as a possible IBP site. The proposal was originated by Mr. J. J. McDougall of Falconbridge Nickle Mines, who had visited the springs a few years ago.

I have now viewed the area, spent one day on the ground at the springs, and have collected a few of the more prominent plants, noted animals or signs of animal presence, and taken a number of color pictures. I will be forwarding a report within a few weeks (if I don't get bogged down with the Berger Inquiry and further attempts to make best use of our short field season!!). Meanwhile, would you kindly incorporate this site as indicated on the enclosed map, as a potential site proposal.

Yours truly,

Malcolm C. Dennington

kvd
encl.

Canadian Wildlife Service
Room 102, 4103 - 4th Avenue
Whitehorse, Yukon Y1A 1H6
July 31, 1975

Mr. J. J. McDougall
Exploration Manager, Western Division,
Falconbridge Nickle Mines Limited
1112 West Pender Street
Vancouver, British Columbia

Dear Mr. McDougall:

A few weeks ago I received a copy of your letter to Val Geist concerning the "Technicolor" springs on the Coal River in southeastern Yukon. Dr. Geist was anxious to include this area within the I.B.P. reserves plan and accordingly asked me to examine the site and prepare a report for the Panel.

With the directions that you kindly provided, I contacted Stan Bridcut and flew in to the springs on Monday. I certainly agree with your appraisal - one hesitates even to collect representative plant specimens from areas that exhibit such fragile elements.

Out of curiosity, and anticipating the report that I will prepare for I.B.P., I wonder if I could impose upon you for additional information as regards your observations on the site. Possibly I could itemize a few questions for clarity.

1. The source of the upper (main) springs is some 100-150 yards upstream of the terraces. Assuming the terraces are formed by precipitation, why is this process not in evidence further upstream? Could there be a reaction between substances in the water and the bedrock in the area of terrace development?

2. Again assuming terraces are formed by precipitation, the waters must be quite highly mineral-charged. Do you have any information on minerals present, quantities? (Could be most interesting in view of the somewhat unique riparian plant associations and also presence of beaver and fish - grayling? - in the slough below the terraces.)

3. Any guesses as to the ultimate source of spring waters? In order to assure maximum protection under any land-use regulation, it would be beneficial to know if we are dealing with a truly subterranean source or if there is nearby recharge. Possibly the hills to the east of the springs should be afforded some measure of protection.

4. Have water temperatures changed as the springs aged? I gather from your letter to Dr. Geist that the springs were hot at one time. I was guilty of going to the field without a thermometer, but would guess that water temperature is somewhere in the neighborhood of 40°-50° F. at this time.

Thank you again for your assistance to date and any comments you may be able to make on these questions. I took a series of color photos of the site that are available at your request.

Yours truly,

M Dennington

Malcolm C. Dennington

kvd