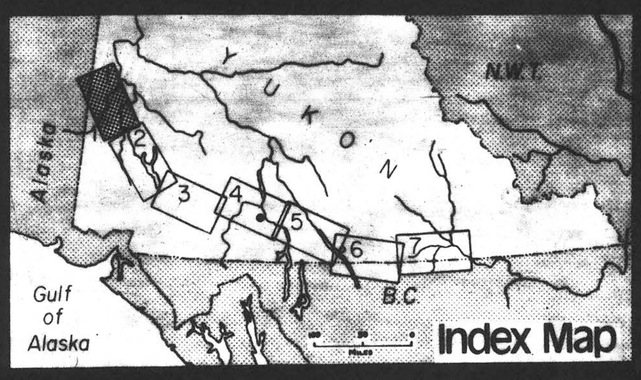
MAP 1
TERRAIN OVERVIEW
ALCAN PIPELINE
YUKON TERRITORY



Refer to Geologic Legend on Front Page

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PHYSIOGRAPHIC UNITS	KLONDIKE PLATEAU	WELLESLEY BASIN	WELLESLEY BASIN	WELLESLEY BASIN	WELLESLEY BASIN/ SHAKWAK VALLEY	SHAKWAK VALLEY (WHITE RIVER VALLEY)	SHAKWAK VALLEY: KOIDERN VALLEY
PHYSICAL ENVIRONMENT							
TERRAIN TYPES	Colluvium covers bedrock slopes; alluvial fans and alluvial valley fill. Colluvium is a mixture of platy rubble, silt, and organic layers. Alluvium is interbedded sand, silt, and peat.	Organic deposits overlying glaciofluvial gravels; Snag Creek floodplain, sand and silt-capped gravel.	Outwash fans, low stream terraces and floodplain consisting mainly of gravel.	Organic deposits overlying glaciofluvial gravels. Narrow colluvium-covered bedrock ridge.	Complex of hummocky moraine, very coarse-textured and contains interbedded outwash.	Floodplain and alluvial fan of the White River. Escarpment along west bank of White River. Fluvial units are gravel. Alluvial fan capped by thin sand and silt.	Complex of floodplain, organic terrain, and valley slopes covered by stoney colluvium and till. Floodplain is gravel and sand with some surfaces capped by sand and silt.
LOCAL RELIEF AND DRAINAGE	Slopes are flat to gentle in the broad valley bottom, and gentle to moderately steep on the bedrock hills. Hill tops are well drained; valley bottoms poorly drained with seepage through peat.	Flat terrain except for small scarps formed along Snag Creek. Poorly drained with many ponds and pools of standing water north of Snag Creek.	Flat to very gently sloping, small scarps associated with terraces and scarps at Beaver Creek. Well drained except for low terraces having thin peat cover.	Flat except for gentle to moderate slopes in colluvial areas and low steep scarps cut in outwash.	Gentle to moderate except for steep slopes along canyon. Good drainage on hill slopes, but poor in depressions and on flat areas.	Flat except for minor scarps at edge of active floodplain and high escarpment at edge of White River. Well drained except for eastern edge of alluvial fan. High water tables under floodplain.	Slopes vary from flat in valley bottom to moderate along the valley edge. Slopes moderately well drained by numerous small rills and creeks. Valley bottoms, poorly drained except near floodplain scarps.
GROUND ICE AND PERMAFROST	Permafrost is ubiquitous except possibly on some well-drained south-facing slopes: Thermokarst lakes developed in valley fill indicate presence of ground ice.	Organic deposits have very high ice content.	Permafrost not detected in gravels, but probably present on low terraces.	Continuous permafrost; high ice content in organic deposits.	Continuous permafrost. Ground ice in fine-textured sediments and peats in depressions. Ice wedges in most sediment types.	Permafrost underlies terraces. Some ground ice present in thin silts and organic deposits capping eastern edge of alluvial fan.	Continuous permafrost. Ground ice in fine-textured sediments and peats in depressions.
ENVIRONMENT							
BEDROCK LITHOLOGY	Mainly Yukon Group Schist, quartzite, gneiss, limestone and amphibole. (18)	Cretaceous granite granodiorite. Carboniferous shale, sandstone conglomerate and limestone. (18)	Cretaceous granite, granodiorite, Carboniferous shale, sandstone, conglomerate and limestone. (18)	Mainly andesite, diabase, basalt, Cretaceous. Some granite and granodiorite. (18)	Cretaceous granite and granodiorite, andesite, diabase, and basalt. Some Carboniferous shale, sandstone conglomerate and limestone in west. (14, 18)	Cretaceous granite and granodiorite, andesite, diabase, and basalt. Some Carboniferous shale, sandstone conglomerate and limestone in west. (14, 18)	Mainly Cretaceous granite and granodiorite. Some andesite, diabase, basalt and schists. (14, 18)
HYDROLOGY	White River Drainage Basin. Mirror Creek; poor drainage - swamps. General flow is perpendicular to route. Several unnamed creeks. Many tributaries are glacier fed with steep gradients often up to 5%.	Snag Creek	Beaver Creek - mean annual precipitation 14.16 inches at Snag.	Enger Creek	Dry Creek, Sanpet Creek	White River glacial origin; mean annual runoff 1.4 cfsm; peak runoff 13.6 cfsm. (48)	Koidern River south meandering, crosses pipeline route 3 times. Pickhandle Lake, Long's Creek, Wolf Creek; poor drainage in thermokarst terrain.
PROCESSES AND STABILITY	Landscape is stable, except for slowly expanding thermokarst lakes; flash floods in summer.	Slow continuing accumulation of organic deposits. Infrequent flooding of Snag Creek. Floodplain with sediment erosion and separation.	Outwash surface extremely stable. Some channel shifting and periodic flooding along Beaver Creek.	Stable except for potential thermokarst development in disturbed areas.	Some expension and contraction of thermokarst lakes in large melt water channel. Slow accumulation of organic deposits in marshy areas. Channel shifting of creeks crossing alluvial fans.	Erosion and deposition on braided active floodplain. Some lateral erosion along edges of active floodplain.	Some sediment moved downslope by small creeks. Flooding and lateral shifting of meandering channel of Koidern River. Expansion of thermokarst lakes in organic terrain. Icings along hillslopes.
ENGINEERING IMPLICATIONS AND CONSTRUCTION MATERIALS	Bedrock excavation required on hills. Ice-rich alluvium susceptible to thermokarst when disturbed. Crushed rock available for granular material.	Design will be required to prevent thermokarst development in fine grained sediments. No granular material available in section. Potential thermokarst in ice-rich organic deposits. Granular material available to south.	Minor crossing of Beaver Creek. Abundant granular material.	Potential thermokarst in ice rich organic deposits. Gravel locally available in subsurface.	Potential thermokarst in ice-rich fine-grained deposits, and minor gulleying in frozen deposits on north-facing scarp at Dry Creek. Scour and lateral shifting of creeks on alluvial fans. Gravel and till abundant.	Broad braided floodplain and steep west bank of White River. Ample construction material available.	Potential thermokarst in ice-rich organic deposits. Minor crossing of Koidern River. Icings on slopes.
LIVING ENVIRONMENT							
VEGETATION	Complex of white spruce/ paper birch/aspen forest on upland; black spruce muskeg and tussock muskeg in valleys.	Mainly sedge meadow tussock muskeg; some black spruce muskeg.	White spruce/ aspen and white spruce forests. Some commercial stands.	Mainly black spruce muskeg and tussock muskeg; scattered black spruce forest.	Well-drained areas covered by complex of black spruce/ white spruce/aspen forest; poorly drained areas by depauperate black spruce forest. Some commercial stands at Sanpete Creek.	Active floodplain is bare of vegetation; alluvial fan covered by white spruce/aspen forest; black spruce on poorly drained areas.	Complex of white and black spruce forest on north scarp. Depauperate black spruce forest and muskeg in poorly drained areas.
FISHERIES					Migration route, overwintering area; spawning locations of chinook and chum salmon in White River. Spawning and migration in Koidern River, chinook and chum salmon spawn in river below the Pickhandle Lakes - it also contains likely sites for fish overwintering. (47)	Migration route, overwintering area; spawning location for chinook and chum salmon in White River. Spawning and migration area. Koidern River: chinook and chum salmon spawn in river below Pickhandle Lakes where fish overwinter. (47)	Koidern River; chinook and chum salmon spawn in river below the Pickhandle Lakes where fish overwinter. (47)
MAMMALS AND BIRDS	Extreme Southern limit of present Winter range of the Steese - forty mile Caribou herd to north of alignment. (41)				Spring and summer presence grizzly bear, dall sheep year round grazing, beaver, muskrat and moose habitat; waterfowl nesting areas. Enger Lakes and James Trail and Alaska Highway intersection area - waterfowl nesting. (46)	Spring and summer's presence of grizzly bear, dall sheep year round grazing, beaver, muskrat and moose habitat; waterfowl nesting area along river and floodplain.	Pickhandle Lakes beaver and muskrat habitat; moose concentrations spring and fall and excellent year round habitat. Waterfowl nesting and staging in spring and fall. South of MP 1150 of Alaska Highway - upland game bird range. Signs of concentration of wolf in Koidern valley. (36,47)
RESEARCH PRIORITIES	Ice content and distribution in alluvium. Location of taliks. Survey of Steese - forty mile herd to define proximity to route and possible conflicts.	Fisheries survey of small creeks crossed by route.	Depth of scour and lateral channel shifting along Beaver Creek. Fisheries survey of Beaver creek with particular reference to timing of Grayling and any salmon migrations.	Ice content and distribution in organic deposits. Depth of gravel.	Ice contents and thermokarst potential of fine-grained deposits. Possible thermal erosion, stream siltation.	Scour depth of White River channels. Fisheries survey of White River with particular reference to timing of fish migrations. Locations of spawning, nursery and overwintering sites.	Ice contents and distribution of organic deposits. Location of taliks. Location of fish spawning nursery and overwintering sites downstream of route.
	Very little is known about the fisheries significance of the various tributaries of the White, Donjek and Kluane Rivers. Many of them undoubtedly sustain grayling populations and act as spawning and nursery areas of chinook and chum salmon. An extensive fisheries survey is required to assess the significance of these rivers along the proposed route.						
NOTES	Ice-rich shallow permafrost locally continuous in continuous permafrost between the Alaska border and White River. Thaw lakes are common in several localities, suggesting that thaw settlements might be significant problem. The route crosses gentle to moderate slopes between the Alaska border and White River, and slope problems such as flowage of saturated soils and erosion by permafrost meltwaters might also be anticipated.				*Ice wedges known to occur in coarse-textured hummocky moraine. *Deep canyon with bottom containing ice-rich fine-grained deposits and thermokarst lakes.	*West bank of White River consists of interbedded outwash and till with rare organic layers. Peats, which occasionally cap sequence, contain broad ice wedges.	*Permafrost between 6 and 34 feet in borehole at Long's Creek. (50) *Thick volcanic ash near surface along the part of right-of-way.

(x) cfsm - cubic feet per square mile of drainage bassin