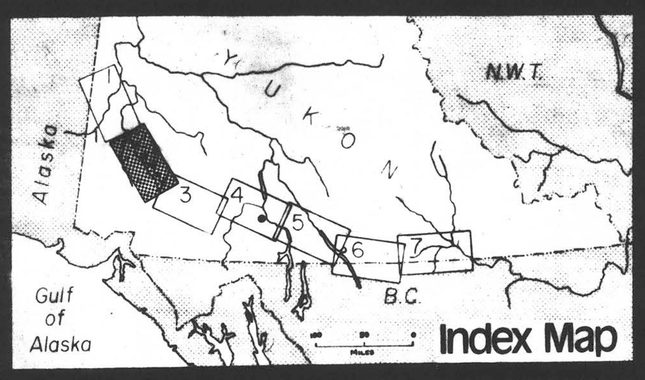
MAP 2
TERRAIN OVERVIEW
ALCAN PIPELINE
YUKON TERRITORY



Index Map

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PHYSIOGRAPHIC UNITS	SHAKWAK VALLEY: KLUANE PLATEAU TO NORTH	SHAKWAK VALLEY (DONJEK RIVER VALLEY)	SHAKWAK VALLEY	SHAKWAK VALLEY	SHAKWAK VALLEY (DUKE RIVER SYSTEM)	SHAKWAK VALLEY	SHAKWAK VALLEY/KLUANE RANGES
PHYSICAL ENVIRONMENT — TERRAIN TYPES	Complex of alluvial fans, sand dunes, drumlinized moraine, and ground moraine. Organic deposits in depression and on flatter areas. Alluvial fans consist of gravel; moraine is stoney till.	Floodplain, terraces and valley walls of Donjek River. Terrain units consist mainly of gravel; terraces may be capped by sand and silt. Valley wall mainly of stoney till.	Rolling and drumlinized moraine with scattered rock outcrops and organic deposits in depressions. Moraine consists of stoney till.	Alluvial fans and drumlinized moraine. Alluvial fans consist of gravel; moraine is stoney till.	Alluvial fan and active floodplain of Duke River, composed of gravel.	Mainly alluvial fans, but some ground moraine, hummocky outwash, and landslide. Alluvial fans consist of gravel, ground moraine of stoney till, outwash of sand and gravel and landslide of bouldery debris.	Valley slopes covered with varying thickness of stoney till, colluvium, and landslide debris. Some landslide debris is very bouldery. Shallow bedrock.
LOCAL RELIEF AND DRAINAGE	Gentle to moderate slopes, some moderately steep slopes along valley edge. Drainage on slopes moderately good, but fair to poor on flat areas and in swales and depressions.	Floodplain and low terraces are flat with minor scarps separating surface. Steep valley walls. High water table on floodplain.	Gentle slopes and predominate valley bottom. Well drained except for poorly drained swales and depressions.	Flat to gently sloping except for minor scarp at edges of alluvial fans. Moderately well drained except for swales between drumlins. Surface seepage across inactive alluvial fans.	Flat to gently sloping except for minor scarps. Area is well-drained except for high water table on active floodplain.	Flat to gently sloping with a few small steep-sided channels incised in the ground moraine and hillsides in hummocky outwash. Well drained.	Moderate to steep slopes along valley wall. Very well drained by numerous small creeks flowing into Kluane Lake.
PERMAFROST AND GROUND ICE	Continuous permafrost with some ground ice in fine-grained and organic deposits in poorly drained areas.	Sporadic permafrost probable under vegetated floodplain, terraces and valley walls. Except for possible ice wedges on valley walls, negligible ground ice present.	Permafrost probably continuous although taliks may be present on south-facing well-drained slopes. Ground ice in peat and fine-grained sediments in depressions and low-flat areas.	Continuous permafrost with taliks unlikely. Sporadic ground ice may be present in poorly drained areas.	Discontinuous permafrost with thick active layers where permafrost is present. Ground ice generally absent.	Discontinuous permafrost with deep active layers and probable common taliks.	No ground ice at lower elevations, but sporadic permafrost, especially on north-facing slopes.
BEDROCK LITHOLOGY	South-primarily propylite, basic lava, banded cherty tuff, volcanic breccia, chlorite schist. North mainly granitic and granodiorite of Mesozoic age and Yukon complex of schist, quartzite, slate. (14)	Primarily Permian propylite basic lava, banded cherty tuff, volcanic breccia, chlorite schist. (14)	Triassic age basalt and andesite; Permian age propylitic basic lava, banded cherty tuff, volcanic breccia, chlorite schist. (14)	Primarily Permian basic rocks and Cache Creek group and Triassic basalt and andesite. (14)	Triassic basalt and andesite, Permian Cache Creek group, peridotite and gabbro.	Mainly Triassic age andesite and basalt and Cretaceous/Jurassic age Dezadeash group. Some limestone and volcanic rocks. (14)	Mainly Triassic basalt and andesite. Some argillite sandstone, grit, conglomerate, limestone, chert of Permian age. (14)
HYDROLOGY	Several unnamed creeks.	Donjek River, mean annual flow 3000 cfs. Diurnal and annual flow governed by glacier melt at headwaters (51)	Several unnamed creeks. Swede-Johnson Creek.	Quill Creek; Burwash Creek, several unnamed creeks.	Duke River; Kluane Lake - 156 sq. mi. max. lake level in August - 6 ft. fluctuations in level.	Several unnamed creeks, Cogdor Creek, Mines Creek, Bocks Creek, Lewis Creek, Halfbreed Creek.	Several unnamed creeks.
PROCESSES AND STABILITY	Minor deposition on small alluvial fans. Potential thermokarst development in depressions containing ice-rich sediments. Slopes and sand dunes stable.	Erosion and deposition on braided active floodplain. Some lateral erosion along low terrace edge and west bank of valley.	Stable landscape except for minor potential thermokarst development in areas of ice-rich sediment.	Some sediment moved across alluvial fans by Quill and Burwash Creeks. Lateral shifting of Burwash Creek channel.	Erosion and deposition on braided active floodplain. Some lateral erosion at edge of active floodplain.	Sediment moved across alluvial fans by numerous small creeks with lateral shifting of channels.	Large landslides periodically affect area. Small creeks carry minor amount of sediment down slope.
CONSTRUCTION MATERIALS AND ENGINEERING IMPLICATIONS	Potential thermokarst in ice-rich deposits. Fuings on slopes. Erosion protection necessary for the unstable soils along river.	Scour depth of channels. Potential erosion of west bank at crossing.	Potential thermokarst in ice-rich deposits. Gravel only locally present, but coarse till provides fair quality granular material.	Scour by creeks. Minor thermokarst potential of sediments in poorly drained swales. Granular material abundant.	Scour depth and lateral shifting of Duke River. Abundance of granular material..	Scour by creeks. Potential flow of eroded materials or contaminants directly downslope to Kluane Lake. Granular materials abundant.	Potential erosion and burial by landslides. Potential flow of eroded materials or contaminants directly downslope to Kluane Lake. Abundant granular materials.
LIVING ENVIRONMENT — VEGETATION	Complex of white spruce and black spruce forest in well drained areas. Black spruce muskeg and tussock muskeg in poorly drained areas.	Active floodplain with grassland, poplar/aspen stands and spruce forest on terraces.	Large areas of shrubbery resulting from a recent burn; other wise white/spruce/aspen forest. Depauperate black spruce forest and sedge meadows on poorly drained areas.	Mainly white spruce and white/spruce aspen on well drained areas; deciduous shrubs dominates recently burnt areas.	Duke flats to NE of Route on south shore of Brooks arm of Kluane Lake is the site of IBP-CT reserve. Unique grassland meadows and aspen parkland grows on sandy alluvial fan.	White spruce and white spruce/aspen forests dominate; some areas of recent burn; isolated meadows; minor commercial stands of timber.	Complex of spruce/aspen birch forest on north-facing slopes. Aspen and grassy meadows on south-facing xeric slopes. Sheep Mountain south slope is actually prairie grassland.
FISHERIES		Donjek River: Chinook and chum salmon upstream migration; Swede Johnson Creek: probable chinook and chum salmon spawning area. (36)(68)		Grayling probably inhabit Burwash Creek. (68)	Kluane River; chinook and chum salmon spawn downstream of the Kluane Lake Outlet. (47)	The shores of Kluane Lake are probably important nursery areas for salmon, lake trout, whitefish and other species. Likely whitefish spawning September to October; chum salmon and lake trout spawning late September along the shores. (36)	
MAMMALS AND BIRDS	East of Donjek River staging zone for snow geese, ducks, swans; golden eagle, gyrfalcons nesting in the area; peregrine falcons observed, potential nesting. (46)	To south of route along Donjek Valley and Wolverine Creek, prime dall sheep habitat.	Small unnamed lakes between Donjek River and Swede Johnson Creek. Nesting area for ducks, geese, swans, golden eagle, osprey, peregrine falcon.	Burwash uplands one small herd of caribou spend much of their time in this area. This is a unique herd of a large race of caribou. The Osborn Mountain caribou. (43-45)	Duke flats provides unique habitat for many species. A dense Arctic ground squirrel colony inhabits the flats. Foxes and probably coyotes den on its edge. Grassland birds such as the upland plover nest here as does the sharp tailed grouse. Along shores of Kluane Lake gyrfalcon and peregrine falcon nesting occurs.	Raptors: golden eagle, gyrfalcon, peregrine falcon breeding area; upland game bird range to northeast of lake. Waterfowl staging around shores of Kluane Lake.	Sheep Mountain, Mount Wallace area adjacent to the highway is recognized as winter and spring range of a few hundred Dall sheep. When present these dall sheep are easily visible from the highway. Their presence here is important to the objectives of the Kluane National Park. (36)
RESEARCH PRIORITIES	Distribution of ice-rich sediments and determination of their ice content and thermokarst potential. Timing of the use of staging areas by wildfowl to east of Donjek River.	Scour depths of channels. Stability of west bank. Dall sheep in the Donjek valley.	Distribution of ice-rich sediments. Hydrological processes in Donjek River adjacent to crossing with special reference to likelihood of channel shifting.	Scour depth of major creeks. Nature of sediments in poorly-drained swales. Fisheries survey of Burwash Creek to define critical areas and timing of greyling migrations. Use of Burwash uplands by Osborn and/or other caribou.	Scour depth of Duke River. Conflicts between fish migrations and Kluane river crossing. Possible impact of erosion and stream siltation on nursery and spawning areas. Possible conflicts between construction and use of Duke Flats by wildlife.	Scour depth of major creeks. Effects of earlier construction on small creeks and sedimentation in Kluane Lake.	Effects of earlier construction on small creeks and sedimentation in Kluane Lake. Timing of movements of Dall sheep to and away from Sheep Mountain.
	Definition of critical areas for fish in the Donjek river system and timing of fish migrations.				Survey of critical areas for fish in Kluane Lake especially of SW shore adjacent to route and of the fisheries significanbe of tributary streams along the SW shore.		
NOTES	*Fourteen inches of volcanic ash near surface at west end Donjek River Bridge.	*Sedimentology of Donjek River studied in detail by Williams and Rust, 1969.(29)	*Interbedded till and gravel in developed gravel pits. *Local thick, accumulation of volcanic ash in this area.		*No permafrost along highway but reported from deep wells. (50)	*Discontinuous permafrost reported at depth of 18 inches under moss. (50)	

*In the Shakwak valley three major rivers (White, Donjek and Slims-Kluane) and many lesser streams flow northwards across the proposed route. Most have beds and banks of coarse gravel providing favourable foundations for structures.

*Environmental hazards could be most severe where route crosses the glacier-fed White, Donjek and Slims-Kluane rivers. These streams are subject to great fluctuations in discharge. Sudden and large channel shifts and probable aufeis formation each winter.

*Kluane National Park covering 8,500 sq. miles was set aside in 1972 to provide for recreational and nature interpretive opportunities. The pipeline route skirts the NE boundary of the park between Kluane Lake and Haines Junction. There are potential conflicts between tourist traffic and construction activities along the Alaska highway, and between construction activities and the animal populations adjacent to the highway such as the Sheep Mountain Dall sheep and the Osborn caribou herd on the Burwash Uplands.