PROPOSED NORTHWEST GAS PIPELINE SALCHA RIVER ALTERNATE ROUTE STUDY

1. INTRODUCTION

Several governmental agencies expressed concern about Alyeska Pipeline Service Company's (APSC) Salcha River crossing. This pipeline river crossing was built as proposed except that the material sites and access roads adjacent to the Salcha River were deleted.

There are a number of environmental and technical reasons why the route chosen by APSC is not necessarily the optimum alignment for a gas pipeline. The most important environmental reason is that construction along this route results in silting one-third of the chinook salmon spawning grounds of the Salcha River. The Salcha River is among the most important clear water chinook salmon spawning streams in the Alaskan Yukon Basin. There are several technical reasons why alternate routes for the Northwest (Northwest Alaskan Pipeline) gas pipeline should be studied. The key technical reasons for considering an alternate gas pipeline route are a lack of suitable materials and adequate access between the Salcha River and Shaw Creek on the APSC route.

2. SUGGESTED REROUTE

Attached are four USGS quadrangle sheets showing a gas pipeline reroute, Northwest Milepost 476.6 (Eielson Air Force Base) to Northwest Milepost 517.5 (Shaw Creek) a distance of 48.5 miles, which includes a different crossing location for the Salcha River and also alleviates several of the problems associated with the APSC route as constructed.

The reroute further considers two alternative subroutes:

a. Mosquito Creek area: This subroute is shorter than its alternative by approximately 0.6 miles, however, it does descend into a valley and crosses Mosquito Creek before ascending back up to the ridge tops.

b. Harding Lake area: This subroute is longer than its alternative by approximately 0.1 miles. It does have an advantage of avoiding potential conflicts with private land owners along Harding Lake.

The longest alternate reroute is about 7.2 miles longer than the present APSC alignment. At this time it is not known what effect the reroute would have on any of the compressor stations or their locations.

3. GEOLOGY

a. Materials along reroute.

Figure No. 1, attached, is a diagrammatical section of the geologic and soils conditions of a typical ridge in the Tanana-Livengood area. This section is inferred from data taken from numerous holes logged by APSC which show loess (windblown silts), colluvium silts and rock fragments thinning at the top of ridges and thickening on the flanks of a ridge. This configuration of less silt soils at the top of the ridges is also evidenced by the borrow areas along the Livengood-Yukon road.

With minor exception, the borrow sources are situated on the top of ridges where more rock was exposed and less silt overburden had to be stripped. On the APSC alignment buried construction was possible only where high ridge points were crossed. From these considerations, it is concluded that the best place to build a gas pipeline is along the ridge tops where the overburden is shallow.

The section of reroute between Shaw Creek and Harding Lake follows the ridge tops where shallow soils over bedrock are judged to exist, and hence, is amenable to the buried construction mode of the gas pipeline. The exceptions to this are the headwaters of Redmond Creek and the lower end of Banner Creek. Both of these creeks lie in valleys and to cross them the gas pipeline will have to traverse an area of fine grained soils. Along the ridge tops there will be long reaches where the overburden is less than five feet thick.

The section between Harding Lake and Aurora Lodge is on a gravel terrace and is considered acceptable for buried construction. Presence of a gravel terrace is inferred from the numerous gravel pits existing in the area; also, from data contained in the Master's Thesis by Mr. Michael Blackwell (Surficial Geology and Geomorphology of Harding Lake Area, Big Delta Quadrangle, Alaska, 1965).

The last portion of the reroute, north from Aurora Lodge to Eielson AFB, is judged to be fine grained silts by extrapolation from geologic maps of the APSC alignment and Blackwell's data. The soils in this area will consist almost completely of silt, ten feet thick or more. Approximately 90% of this portion of the reroute will be in permafrost. There could be exceptions to these predicted foundation conditions, for example, it is possible that the reroute between Aurora Lodge and the boundary of the Eielson AFB military reservation lies, in part, on a gravel terrace.

b. Rock Along Reroute.

Rock along the reroute in the area of the Salcha Bluffs is chiefly Birch Creek schist. Birch Creek schist comprises a multiplicity of rock types and includes quartzites and schists ranging from chlorite to quartzmica, and finally gneissic portions. Progressing south along the reroute, the metamorphism becomes greater and the rock becomes more gneissic. The increase in metamorphism is probably due, in part, to a granitic intrusion in the vicinity of Birch Lake (Blackwell, 1965). Owing to these changes in degree of metamorphism, rock of better size and durability is expected to be found in the southern portions of the reroute.

4. MATERIAL SITE

Except for Material Site 49-2N (Shaw Creek), the remainder of the material sources on the existing APSC route are not amenable to gas pipeline construction, assuming the following criteria:

a. The 48" pipeline will be constructed in the summer months.

b. The gas pipeline will operate at temperatures below 32 degrees Fahrenheit over most of the route implying the use of nonfrost susceptible bedding and padding material for the pipe. Shown on the attached route maps are the locations of the APSC material sites.

The following table presents the pertinent information for the APSC material sites relative to gas pipeline construction:

SITE NO.	DESCRIPTION	% PASSING NO. 200 SIEVE	REMARKS
MS49-2N	Sandy gravel	10%	Good pad mtrl., Process for bedding
MS50-1	Fine sand	10%	Poor pad mtrl., Process for bedding
MS51-1	Sandy silt	Ave. 20%	Poor pad mtrl., Possible beddi
MS51-2R	Sandy silt	20%	Poor pad mtrl., Possible beddi
MS52-1	Silt, w/rock fragments	40%	Poor pad and bedding material
MS53-2	" "	20%	" " "
MS54-1	Silt	29%	" " "
MS54-4N	Silt w/rock fragments	20%	" " "
MS56-1	" "	20%	" " "

These material sites were located by a careful geologic reconnaissance which included utilizing aerial photographs, geologic terrain maps, and shallow subsurface techniques to identify the most likely material sites along the route. These selected sites were drilled and sampled to confirm the reconnaissance phase. Based on the known characteristics of the Yukon-Tanana Upland Province and the terrain unit map of the surficial soil deposits along the APSC Pipeline, it is not likely that significantly better material sites will be located within an economic haul distance on that section of NAPLINE route running from Shaw Creek to Eielson AFB.

Along the proposed reroute for the gas pipeline, suitable gravels should be readily obtainable from gravel pits along the highway west of Harding Lake, and from highway pits in rock sources between Shaw Creek and Harding Lake. The availability of borrow materials from these sources substantially decreases the further land disturbances along the APSC route that would occur if the old restored material sites and corresponding access roads were reopened. It is not known if the APSC material sites contain sufficient amounts of material to even warrant reopening. The material sites along the proposed reroute contain less frost susceptible material than those sites used by Alyeska.

5. GEOTECHNICAL CONSIDERATIONS

The construction of the oil pipeline along the route from Eielson AFB to Shaw Creek resulted in aboveground construction for approximately 80% of the length. The mode changes between VSM's, thermal VSM's, and belowground construction are very frequent along this route indicating a large amount of variation in the subsurface conditions.

The reroute line is located along the ridge tops for approximately 30 miles out of the total of 48.5 miles. The ridge top environment could possibly be an ideal burial site for a gas pipeline because of the shallow overburden and the well drained conditions. The frost heave problems could be minimized by burial in the bedrock. That portion of the reroute from Aurora Lodge to Eielson AFB will require special measures to mitigate the frost heave potential.

6. CONSTRUCTION

The construction scheme for the 48" gas pipeline is to utilize the existing APSC work pad whenever possible. The reasons for this are to lower construction cost, reduce environmental damage, and reduction in required natural resources such as energy, gravel, land, etc. If the gas pipeline is built along the APSC alignment from Eielson AFB to Shaw Creek as proposed, the following information describes the construction pad:

Use existing APSC construction pad	4.2 Miles
Extend APSC pad 15 feet	14.8 Miles
Double pad (new 55-foot pad in addition to APSC pad)	17.3 Miles
New work pad	5.1 Miles

Therefore, at least 50% of the distance will require essentially a new work pad negetating the advantage of using the existing construction pad. At this time, summer construction is proposed for the gas pipeline. The reroute line would be amenable to this type of construction because a substantial amount of it is on the ridge tops. The overburden on the ridge tops is better drained and not as thick as in the flatter terrain. The APSC alignment is not favorable to summer construction because of the fine grained material used in the work pad. This material has low trafficability in the summer and very poor ability to support construction equipment when wet. APSC designed their work pad for winter construction so that they could reduce the thickness of the construction pads, therefore, the pad is not usable for summer construction without substantial improvements. These improvements would include increased thickness and a gravel overtopping on the silt. A portion of the proposed reroute is underlain by frozen fine grained material (Aurora Lodge to Milepost 476.7 on Eielson AFB), however, this alignment is not more than two miles away from the Richardson Highway. There are at least two known gravel pits along the Richardson Highway in this location.

Access on the APSC line in the area from Eielson AFB to Shaw Creek was a problem during construction of the oil pipeline. The State of Alaska did not allow the requested winter access roads up the Salcha River and by Birch Lake from the Richardson Highway to the APSC line. Consequently, there is only one access to the pipeline between Shaw Creek to Eielson AFB and that is at Pump Station No. 8. It is 24 miles from Pump Station No. 8 to Shaw Creek and 6 miles from Pump Station No. 8 to the Richardson Highway. There is no bridge at the Salcha River and, therefore, any competent gravel required in summer construction south of the Salcha River must come from Shaw Creek, which is 17.8 miles away. Construction equipment is not allowed to cross the Salcha during the summer months.

Access to the proposed reroute is very good. It is 7 miles up the reroute line from Shaw Creek to the first existing road at Banner Creek. Between Banner Creek and Harding Lake the reroute line is within 3 miles of the Richardson Highway. It is 4 miles between Harding Lake and Aurora Lodge, which is the next access point on the reroute line. As previously mentioned, the rest of the reroute line going north towards Eielson is within 2 miles of the Richardson Highway.

7. LAND OWNERSHIP

The attached four maps reflect land ownership along the reroute. The reroute is on Federal land for approximately 23 miles out of its total length of 48.5 miles. The APSC route is predominantly on State of Alaska land with the Federal land constituting only six miles out of a total distance of 41.4 miles.

8. RECREATION

Recreation in the Salcha River-Harding Lake area has many facets and possibly the two routes balance each other out with regard to recreation potential and adversity. The Salcha River Property Owners Association used to control the access to their member's cabins which extended up to 100 river miles upstream. Any further activity upstream from the launching area near the highway would certainly work against their interests. On the other hand, those who enjoy trips to such an area in snow machines, all terrain vehicles, etc., would find their area of access increased by such activity and additional work pads. Also, one additional "road" into the area would be added to what is already there, as the increases in pad size would render ATV control more difficult by restricting authorities.

APSC argued in the 1971-1973 papers that the reroute would spoil the view from popular Harding Lake. The alignment on the ridge considers visibility and is located to avoid this problem.

9. FISHERIES CONSIDERATIONS

Several geotechnical features led to the still recurring problem of pad stability. There was practically no suitable material available between Shaw Creek and Eielson. The material used had a high percentage of fines, was easily eroded, and drained poorly. Sheet flow was a major means of water transport on the sides of the valley through which the work pad passed. As a result, the pad sank into the surrounding terrain, water flowed over it, it rutted easily, and APSC found it difficult to maintain effective transverse levees to keep water from running down the ruts and scouring out materials. Briefly, it was a muddy mess. Aufeis in winter and late spring forced water out of main channels and onto impromptu crossings. Heavy ice-rich ground under the forest floor was difficult for APSC to restore after it had started to melt.

The point of introduction of silt into the Salcha was upstream from one-third of the chinook salmon spawning area. McCoy Creek had been known as a prime nursery area for small chinook salmon and other fish, well above the beaver dams.

Aside from reported shifts in location of chinook salmon spawning activity in the Salcha, we will have to wait till 1980 for the first reliable indication of how the construction years affected fish production.

In that season the progeny of the 1975 spawning will commence to return. Since the ages of the Salcha chinook salmon are five to seven years, it will not be until 1982 and later that the full impact will be evident, as some of next year's returns will be from progeny of 1972 and 1973 (before any construction in the area). If the continued introduction of fine sediments into the lower river persists, then we can expect to see a continued diminution of the runs and other changes in biota.

The potential hazard of an oil spill in the Minton Creek area was not considered at the time of the earlier reroute proposal and should be considered now.

The important thing to remember about the fish resources is that:

(1) Salcha River is among the most important chinook salmon streams of the Yukon River system in Interior Alaska.

(2) One-third of the chinook salmon spawn downstream from the mouth of McCoy Creek, where silt from pipeline construction enters the Salcha.

(3) McCoy Creek has been bringing fines to Salcha spawning areas since APSC construction began. With effort, this condition may be restored but should not be further postponed by additional construction through the area.

(4) More chum salmon use Salcha than chinook salmon and these fish are important to downriver (Lower Yukon) subsistence fishery.

(5) The Salcha River is also a very popular area for Grayling fishing.

(6) Dangers resulting from a construction-caused oil spill in this area are particularly high because of inaccessability of block points at the mouths of Minton and McCoy Creeks. At this time, no provision has been made for reaching these hypothetical block points, either as right-of-ways, plans, or preparations. Construction-caused leaks in the oil pipeline will have a greater likelihood of occurring if the gas people use the APSC route.

(7) The annual value of the salmon runs to the Salcha have been placed at $76,000 a year in 1971 dollars. This is based on commercial values rather than on sports fisheries values (which are higher) and does not include the value of other Salcha River fisheries.

(8) The alternate route crosses the river below the point where real damage could occur, and crosses other streams which are of lesser value and fewer in number, and do not contain salmon spawning areas.

(9) Every fisheries agency contacted strenuously advocated the alternate route.

(10) Brice, 1971 ("Measurement of lateral erosion of proposed river crossing sites of the Alaska pipeline," U.S. Geological Survey, Water Resources Division, Alaska District) states "The Salcha River crossing site is at the apex of a large meander bend where the concave bank migrated laterally about 225 feet during the period 1950-1969. Adjacent bends are moving at similar rates, and these rates can be expected to continue for the next few decades."

(11) On September 11, 1979, a former APO hydrologist reported verbally he had seen the crossing this year and that the bank apppeared to be eroding faster and the river bottom over the pipe had been scoured deeper than he had anticipated. The prospect of reinstalling or readjusting the present crossing is an environmentally unpleasant thought by itself. It would be worse if there were two crossings to consider at this site.

10. SUMMARY

The reroute of the gas pipeline appears feasible, within limitations of study capability, based on the following:

a. Construction impact on salmon spawning habitat and the fishery resources would be almost negligible along the reroute compared to what would be highly likely along the existing APSC alignment.

b. The availability of suitable material sites for gas pipeline construction is much more likely on the reroute alignment than on the APSC alignment.

c. Access to the reroute line is much better than the existing APSC line. This is an important factor in considering haul distances to upgrade any existing APSC work pad for gas pipeline construction.

d. The reroute line offers the possibility of fewer changes in the mode of gas pipeline construction because it is confined to longer reaches in areas with similar thermal and geological characteristics. This is opposed to the APSC alignment, which cuts through several different thermal and geological areas as it moves from flat terrain across ridge tops and back down again. This particular factor can not be adequately assessed without a more definitive set of gas pipeline design criteria and further geotechnical explorations along the reroute alignment.

Enclosures-5
1 - Figure No. 1
2 - Map No. 1
3 - Map No. 2
4 - Map No. 3
5 - Map No. 4

APPENDIX I

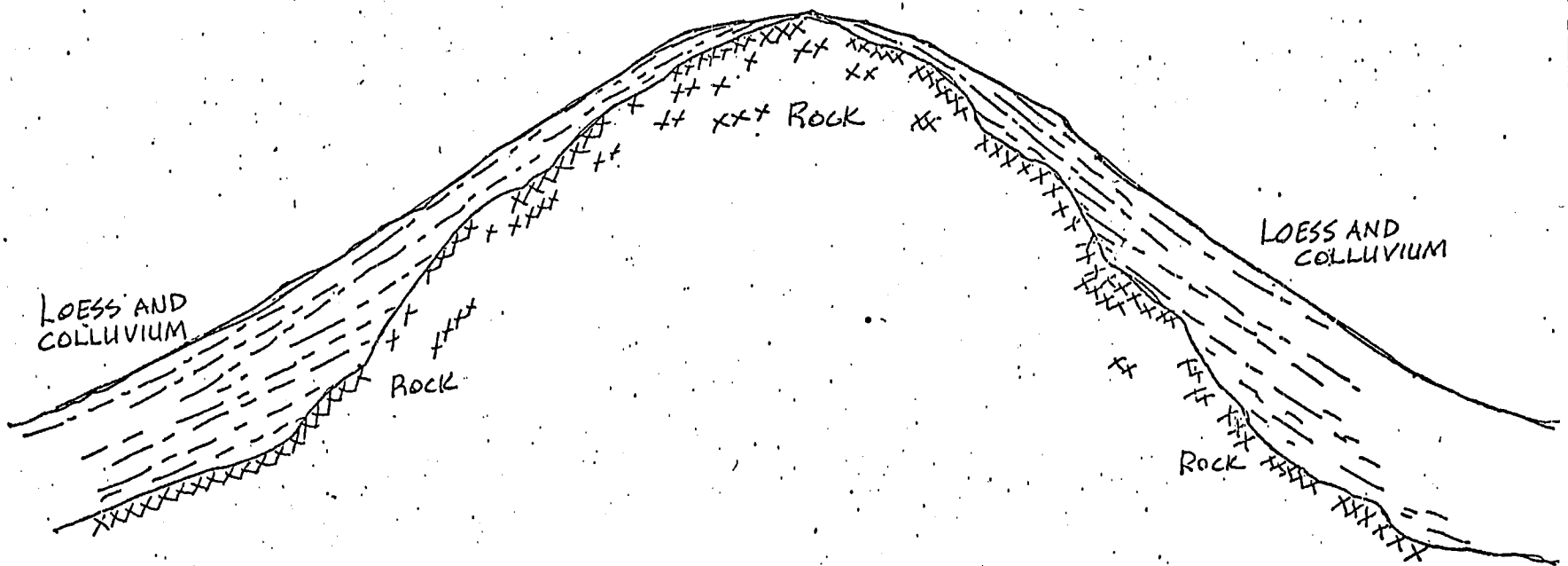
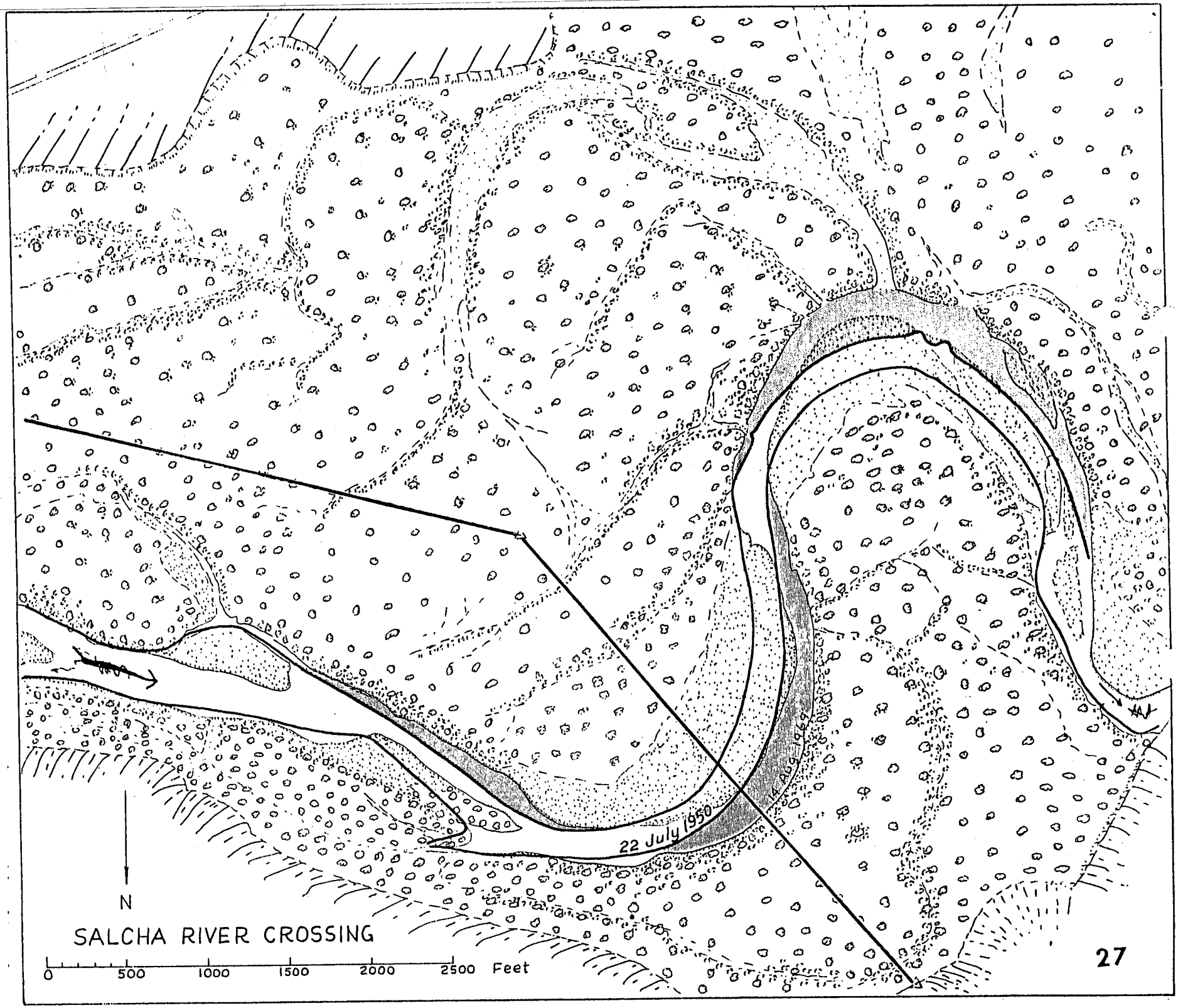


FIG. 1 - DIAGRAMATIC SECTION OF TYPICAL TANANA - LIVENGOOD HILL

Salcha River Crossing

The Salcha River crossing site is at the apex of a large meander bend where the concave bank migrated laterally about 225 feet during the period 1950-69. The next bend upstream, which is somewhat narrow, migrated about 300 feet during this same period. In the next few decades, the bend at the crossing can be expected to continue its lateral migration at a rate similar to that of the past. The surface crossed by the pipeline on the convex side of the bend is subject to flooding but not to significant scour because cutoff of the main channel across this surface seems unlikely.


22 July 1950
14 Aug 1969
N
SALCHA RIVER CROSSING
0
500
1000
1500
2000
2500 Feet

Brice, J., 1971

Table II LIST OF STREAMS ALONG PIPELINE

IDENTIFICATION 1/			PHYSICAL DESCRIPTION 1/				BIOLOGICAL DESCRIPTIONS 1/					REFERENCES
Station Number	Stream Name	T., R., sec., & mer. 2/	Photo	Drainage Area	Slope	Remarks	Fish	Timing of Migration	Other Remarks	Prod.	Sur. Stat.	
EPL19+00 (Supersedes DPL15783 +20) (53A)	Salcha River (334-40-000) (N1, N2, N3, N4) (BG)(Block Point)	T.5 S., R. 4 E., sec. 21 of FM (03-399-2012300-0305130)	B8 TAPS 10-47/ 48, PLP 26-12/ 14, and TAPS 70 5-14/ 16.	2,118 sq mi		Water clear; pH 7.2 to 7.8 3-4 ft d; 200 ft w; bottom: rubble, gravel, some sand & silt. Rapid runoff-type habitat. Bank at proposed crossing has migrated laterally about 225 ft from '50-'69. Rate expected to continue for next few decades. Turbid in Jun. Gravel porous; mediam particle size: 1-1/4 in. Ice to 48 in thick on 15Mar76 3/. Peak discharge 11,500 cfs 19May77-moderate 8/. PDF = 102,000 cfs.	AL BB CN DS GR KS LS NP RW SB SS	4/ 5/ Jul-Aug Apr-Sep 9/ 9/ Aug-Nov Jan-Dec	bd, cd, fd, nd 6/, 1d. 1 BB/hr electrofished 10Jul 71 9/. 8,040 peak count DS. DS from mouth to Caribou Cr. 0.58 to 1.04 GR per angler hr in '68. GR condition factor 0.76 for males, 0.72 for females 23May60 7/. Hourly electro capture rate GR:44 10Jul71 9/. 11 LS/hr electrofished 10Jul71 9/. 2,900 peak count KS early Aug. on 3Aug72 1,193 KS observed: 1,050 above PL crossing; 143 (11%) below. Heavily used in recreation. Main spawning of KS is from mouth up to North Fork. 18 RW/hr electrofished 10Jul71 9/. SS use of river historic rather than present; last reported in the early '60's 4/. Some algae in river. Between 13Jul73 and 4Aug73, 275 anglers caught 24 KS, 64 DS, 1,294 GR in 2,052 fishermen hours between mouth and Redmond Cr. Benthic fauna: Isoperla sp, Ephemerella sp, Baetis sp, Centroptilum sp, Iron sp, Brachycentrus sp, Glossosoma, sp, Micrasema sp, Ptilostomus sp, Simulidae, (cont.)	III	H A A G E A B A A A B B E A A A	APSC 1971 Bergstrand, J.L. 1970a Bergstrand,J.L. & T.Nagata 1968a Brice,J.1971 Dickason,O. E. 1970 Heckart,L. 1964,1965a Means,R.S. 1972a Nagata,T. & J.L. Bergstrand 1969 Reed,R.J. 1964 Regnart,R. 1969a,1970 1971a,1972b Rockwell,J. 1971a Rockwell,J. & T.J. Charlton 1971 Roguski,E.A. & P.C. Winslow 1969 Spetz,C.E. 1969 Van Wyhe,G.L. 1969 Wienhold, R.J. 1970b (cont.)

1/ See appended list for coding and abbreviations.
2/ USGS Quadrangle: Big Delta (B-6)
3/ A.L. Townsend,Memo of 15Apr76.
4/ Francisco,K.,1976
5/ Bendock,T.,1974
6/ USGS,1977.
7/ Reed,R.J. and J.A.McCann,1971
8/ Loeffler,R.M. and J.M.Childers,1977
9/ Tack,S.L.1979

2262-77

Table II LIST OF STREAMS ALONG PIPELINE

IDENTIFICATION 1/			PHYSICAL DESCRIPTION 1/				BIOLOGICAL DESCRIPTIONS 1/					REFERENCES
Station Number	Stream Name	T., R., sec., & mer. 2/	Photo	Drainage Area	Slope	Remarks	Fish	Timing of Migration	Other Remarks	Prod.	Sur. Stat.	
EPL19+00 (cont.)	Salcha River (cont.)								Tendipedidae: 20 psf on 26Aug69; Isogenus sp, Paraperla sp, Alloperla sp, Rithogenia sp, Arthroplea sp, Tubificidae; 40 psf on 17Sep69. Also Cinygma sp, Cinygmula sp, Isocapnia sp, Brachyptera sp, Isoperla, sp, Apatania sp, Chimarra sp, Prosimulium sp, Procladius sp, Thienemannemyia sp, Pseudodiamesa sp, Heterotrissocladius sp, Eukiefferiella sp, Psectrocladius sp, Brillia sp, Corynoneura sp, Lauterbornia sp, Paracladopelma sp, and Stictochiromonous sp found in stomachs of KS and DS juveniles between 17May and 8Jun73 3/. Spruce, birch, cottonwood, and willow on banks. Stream in prime recreational area including many cabins. Boat fishing goes 120 mi upstream.		A	Yoshihara, H.T.1971

1/ See appended list for coding and abbreviations.
2/ USGS Quadrangle: Big Delta (B-6, C-6)

3/ Loftus,W.F. + H.L.Lenon,1977.

2262-77

STREAM LIST
LIST OF REFERENCES

Alyeska Pipeline Service Company
1971. Unpublished data: Particle and gravel size in various rivers along the pipeline route. 3 pp of tables.

Bendock, Terry
1974. First interim report of the sport fish technical evaluation study, Fisheries investigations of the Salcha and Tanana River drainages. Joint State/Federal Fish and Wildlife Advisory Team. Special Report No. 6, 38 pp.

Bergstrand, Jay L.
1970a. Investigations of Alaska's Public fishing access requirements. State of Alaska. Department of Fish and Game. Federal Aid in Fish Restoration 11:331-342

Bergstrand, Jay L., and Thomas H. Nagata
1968. Investigations of Alaska public fishing access requirements. Ibid. 9:323:337.

Brice, James
1972. Measurement of lateral erosion at proposed river crossing sites of Alaska pipeline. U.S. Department of the Interior. Geological Survey. Water Resources Division. Alaska District, 42 pp.

Dickason, O. E.
1970a. Water quality data, trans-Alaska pipeline route. U.S. Department of the Interior. Federal Water Pollution Control Administration. Northwest Region. Alaska Operations Office, 82 pp.

Francisco, Kim
1976. First interim report of the commercial fish technical evaluation study. Joint State/Federal Fish and Wildlife Advisory Team. Special Report No. 4, 85 pp

Heckart, Larry
1964. Inventory and cataloging of the sport fish and sport fish waters in the interior of Alaska. State of Alaska. Department of Fish and Game. Federal Aid in Fish Restoration 5:339-352.

1965. Inventory and cataloging of the sport fish and sport fish waters in the interior of Alaska. Ibid. 6:291-305.

Loeffler, Robert M. and Joseph M. Childers
1977. Channel erosion surveys along the TAPS route, Alaska, 1977. U.S. Department of the Interior. Geological Survey. Open-file Report 78-611, 90 vi pp.

Loftus, William F., and Herbert L. Lenon
1977. Food habits of the salmon smolts, Oncorhynchus tshawytscha and O. keta, from the Salcha River, Alaska. American Fisheries Society. Transactions. 106(3):235-240.

Means, R. Sam
1972a. Photographs of streams along the proposed Trans-Alaska Pipeline route, 1969 through 1971. U.S. Department of the Interior. Bureau of Land Management. Alaska State Office. Pipeline Division, 98 pp.

Nagata, Thomas and Jay Bergstrand
1969. Investigation of public fishing access requirements. State of Alaska.

Department of Fish and Game. Federal Aid in Fish Restoration 10:369-382.

Reed, Roger J.
1964. Life history and migration patterns of Arctic grayling, Thymallus arcticus, (Pallas) in the Tanana River drainage of Alaska. State of Alaska. Department Fish and Game. Research Report No. 2, 30 pp.

Regnart, Ronald
1969a. Seasonal concentration of anadromous fish along proposed pipeline route in the AYK area. State of Alaska. Department of Fish and Game. Division of Commercial Fisheries, Anchorage Alaska. Memorandum to Ed Hulzer (BCF), dated December 12, 1969, 1 p.

1970. Yukon River salmon resources and fishery with recommendations to minimize effects of proposed oil development activities. State of Alaska. Department of Fish and Game. Division of Commercial Fisheries. Arctic-Yukon-Kuskokwim Area, Anchorage, Alaska, 5 pp.

1971a. Letter report on August 1971 surveys and September 1971 surveys. Ibid., 5 pp.

1972a. Yukon subsistence fishery - important resource. State of Alaska. Depart- of Fish and Game. Alaska Fish Tales and Game Trails 29:2-4.

1972b. Salmon surveys - 1972. State of Alaska. Department of Fish and Game. Commercial Fish Division, Anchorage, Alaska, 4 pp.

Rockwell, Julius, Jr.
1971a. Summary Trip Report - Valdez to Prudhoe Bay, June 7-11, 1971. U.S. Department of the Interior. Bureau of Land Management. Pipeline Division, 6 pp.

Rockwell, Julius, Jr., and Thomas J. Charlton
1971. Photographs taken along the proposed trans-Alaska pipeline route, June 7-11, 1971. U.S. Department of the Interior. Bureau of Land Management. Alaska State Office. Pipeline Division, 74 pp.

Roguski, Eugene A., and Peter C. Winslow
1969. Investigations of the Tanana River and Tangle Lakes grayling fisheries: migratory and population study. State of Alaska. Department of Fish and Game. Federal Aid in Fish Restoration 10:333-351.

Spetz, Carl E.
1969. Inventory and cataloging of the sport fish and sport fish waters in the interior of Alaska. State of Alaska. Department of Fish and Game. Federal Aid in Fish Restoration 10:301-317.

U.S. Geological Survey
1977. Water-resources investigations in Alaska, 1977. U.S. Department of the Interior. Geological Survey. 6 pp.

Van Wyhe, George L.
1969. Pipeline impact on sport fish resources. State of Alaska. Department of Fish and Game. Sport Fish Division, Fairbanks, Alaska, 21 pp.

Weinhold, Robert L.
1970b. Stream survey summaries of 71 streams along pipeline route. State of Alaska. Department of Fish and Game. 71 pp.

RECREATION

Recreation in the Salcha River-Harding Lake area has many facets and possibly the two routes balance each other out with regard to recreation potential and adversity. The Salcha River Property Owners Association used to control the access to their member's cabins which extended up to 100 river miles upstream. Any further activity upstream from the launching area near the highway would certainly work against their interests. On the other hand, those who enjoy trips to such an area in snow machines, all terrain vehicles, etc., would find their area of access increased by such activity and additional work pads. Also, one additional "road" into the area would be added to what is already there, as the increases in pad size would render ATV control more difficult by restricting authorities.

APSC's argument in the 1971-3 papers that the reroute would spoil the view from popular Harding Lake was a fabrication. The alignment on the ridge of visibility was not quite where they said it was so they "moved" their version of the alignment to where it would be visible and then criticized its visibility.

FISHERIES CONSIDERATIONS

Several geotechnical features led to the still recurring problem of pad stability. There was practically no adequate material available between Shaw Creek and the Salcha River. The material used had a high percentage of fines, was easily eroded, and drained poorly. Sheet flow was a major means of water transport on the sides of the valley through which the

workpad passed. As a result, the pad sank into the surrounding terrain, water flowed over it, it rutted easily, and APSC found it difficult to maintain effective transverse levees to keep water from running down the ruts and scouring out materials. Briefly, it was a muddy mess. Aufeis in winter and late spring forced water out of main channels and onto inpromptu crossings. Heavy ice-rich ground under the forest floor was difficult for APSC to restore after it had started to melt.

The reader is urged to examine the documents from the file on the effort on the part of certain government employees to get APSC to adopt this alternate route (Appendix). Although this attempt failed, all groups involved except APSC supported the alternate route at that time; APSC may support it today.

Damage to fish habitats was far worse than anticipated because of massive pad washouts and thermal erosion along the North and South forks of Minton Creek. So much sediment got into those streams that McCoy Creek into which Minton Creek empties was completely silted and at times long plumes of muddy water could be seen issuing from McCoy Creek into the clean water of the Salcha River. This point of introduction of silt into the Salcha was upstream from 1/3 of the chinook salmon spawning area. McCoy Creek had been known as a prime nursery area for small chinook salmon and other fish, well above the beaver dams.

Aside from reported shifts in location of chinook salmon spawning activity in the Salcha, we will have to wait till 1980 for the first reliable indication of how the construction years affected fish production.

In that season the progeny of the 1975 spawning will commence to return. Since the ages of the Salcha chinook salmon are five to seven years, it will not be till 1982 and later that the full impact will be evident, as some of next years returns will be from progeny of 1972 and 1973 (before any construction in the area). If the continued introduction of fine sediments into the lower river persists, then we can expect to see a continued diminution of the runs and other changes in biota.

The potential hazard of an oil spill in the Minton Creek area was not considered at the time of the earlier reroute proposal. The demonstrated lack of APSC's capability to stop oil once it enters a stream strenuously implies that once oil enters either Fork of Minton Creek, it will run all the way to the Tanana River.

The important thing to remember about the fish resources is that:

(1) Salcha River is among the most important chinook salmon streams of the Yukon River system in Interior Alaska.

(2) One third of the chinook salmon spawn downstream from the mouth of McCoy Creek, where silt from pipeline construction enters the Salcha.

(3) McCoy Creek has been bringing fines to Salcha spawning areas since APSC construction began. With effort this condition may be restored but should not be further postponed by additional degradations.

(4) More chum salmon use Salcha than chinook salmon and these fish are important to downriver (Lower Yukon) subsistence fishery.

(5) The Salcha River is also a very popular area for Grayling fishing.

(6) Dangers resulting from a construction-caused oil spill in this area are particularly high because of inaccessability of block points at the mouths of Minton and McCoy Creeks. At this time, no provision has been made for reaching these hypothetical block points, either as right-of-ways, plans, or preparations. Construction-caused leaks in the oil pipeline will have a greater likelihood of occuring if the gas people use the APSC route.

(7) The annual value of the salmon runs to the Salcha have been placed at $76,000 a year in 1971 dollars. This is based on commercial values rather than on sports fisheries values (which are higher) and does not include the value of other Salcha River fisheries.

(8) The alternate route crosses the river below the point where real damage could occur, and crosses other streams which are of lesser value only and fewer of them, and do not contain salmon spawning areas above the crossings.

(9) Every fisheries agency contacted strenuously advocated the alternate route.

(10) Brice, 1971, ("Measurement of lateral erosion of proposed river crossing sites of the Alaska pipeline," U.S. Geological Survey, Water Resources Division, Alaska District) states "The Salcha River crossing site is at the apex of a large meander bend where the concave bank migrated laterally about 225 feet during the period 1950-1969. Adjacent bends are moving at similar rates, and these rates can be expected to continue for the next few decades," according to Brice. ~~If this is true, then the meander bends at and just downstream from the crossing should reach disposal site 53-2 and material site 53-1 between 60 and 80 years hence, other things being equal.~~

(11) On September 11, 1979, former hydrologist reported verbally he had seen the crossing this year and that the bank appeared to be eroding faster and the river bottom over the pipe had been scoured deeper than he had anticipated. The prospect of reinstalling or readjusting the present crossing is an environmentally unpleasant thought by itself. It would be worse if there were two crossings to consider at this site.

CHRONOLOGICAL LOG OF DOCUMENTS ON THE SALCHA RIVER REROUTE DISCUSSIONS

(1) February 16, 1971. Oral Testimony of W.H. Noerenberg, Commissioner, Department of Fish and Game, State of Alaska. (Department of the Interior, Trans-Alaska Pipeline Hearings, Washington, D.C., Volume 1)

(2) April 13, 1971. BLM Letter 2881 (980) to APSC regarding seven alignment problems.

(3) April 27, 1971. ADF&G Letter to BLM regarding concern over two alignment areas.

(4) July 24, 1971. APSC Letter to BLM regarding alignment problems, regarding 2881 (980) of April 13, 1971.

(5) August 9, 1971. Alaska Department of Highways Letter to BLM regarding Letter 00-2516.

(6) March 16, 1972. Minutes of Meetings, (Page 5)

(7) July 24, 1972. Salcha River Proposed Reroute, BLM memorandum to files.

(8) November 3, 1972 Proposed Trans-Alaska Pipeline Salcha Reroute memorandum from BLM, SD Alaska to BLM Director.

(9) November 14, 1972. Salcha Reroute. BLM, Washington, D.C. to SD, status of November 3, 1972 report.

(10) December 1, 1972. Proposed Realignment for Crossing Salcha River, APSC Report 72-8R3, File 2.2.9.1

(11) January 5, 1973. Telephone log regarding report of November 3, 1972.

(12) January 5, 1973. Transmittal of report of November 3, 1972, to State of Alaska.

(13) February 21, 1973. Salcha River Reroute Study, ADF&G memorandum Regional Supervisor to Habitat Section, File 36.7.1.

(14) May 4, 1973. Informal Meeting with Alyeska on Salcha Reroute, P001.1704 (980).

(15) May 14, 1973. Meeting Announcement, DEC to BLM.

(16) May 17, 1973. Salcha River Crossing Siting Evaluation Analysis. Present Alyeska Route vs. Proposed Reroute., by APSC.

(17) May 17, 1973. Confidential Guidance for BLM participants attending the Salcha Reroute Meeting, May 24.

(18) May 21, 1973. APSC Letter transmitting May 17, 1973 report.

(19) May 22, 1973. Property Owners Mr. & Mrs. Alan R. Smith to Governor Egan, protesting route.

(20) May 24, 1973. Salcha River Meeting by Henry Noldan.

(21) May 24, 1973. APSC Agenda for Salcha River Crossing Siting Evaluation Analysis, May 24, 1973.

(22) May 24, 1973. Attendance List-Salcha Reroute meeting.

(23) May 29, 1973. DEC Letter of Appreciation to BLM.

(24) May 31, 1973. BLM Memorandum to Staff.

(25) June 1, 1973. Minutes of Salcha River Routing Meeting, May 14, 1973. Frank M. Therrell's memorandum to File (APSC).

(26) June 12, 1973. Pipeline Reroute Still Under Study, clipping from Fairbanks Daily News-Miner, A-3.

(27) June 14, 1973. Senator Gravel's Inquiry on Behalf of Mr. & Mrs. Alan R. Smith Regarding the Pipeline Route in the Salcha River Area.

(28) June 14, 1973. BLM, WDC, to Alaska State Director, Comments on Salcha River Inquiry by BLM, Pipeline Division.

(29) June 26, 1973. Telephone Log (not clear).

(30) June 29, 1973. BLM Washington, D.C.'s reply to Senator Gravel.

(31) July 25, 1973. Salcha Reroute Meeting, May 24, 1973. APO Staff Geologist to Staff.

(32) September 27, 1973. Reroute/Lower Crossing of Alaska Pipeline Across Salcha River, Letter from Salcha River Property Owners Association to BLM.

(33) September 27, 1973. Letter from Salcha River Property Owners Association to Secretary Morton.

(34) October 2, 1973. Reply of BLM to above letter of September 27, 1973.

(35) April 15, 1974. Further Comments Regarding Alyeska Pipeline Construction Activities and Recommendation to Minimize Impact on Salmon Resources. ADF&G Memorandum from AK Region to Habitat Section.

(36) April 24, 1974. Some ADF&G Fishery Concerns on the Pipeline, Memorandum ADF&G to State Pipeline Coordinator.

(37) April 30, 1974. Review of Special Report - Salcha River Crossing Restoration and Control of Public Access. APO Staff Fishery Biologist's Review of Report.

(38) May 20, 1974. Salcha River APO Staff Engineer's comparison of APSC's May 17, 1973, report with APSC's April 25, 1974, Salcha River Pipeline Route Report.