# INSPECTIONS OF CLINTON MINE OPERATIONS

JUNE 10-11, 1974

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DAWSON CITY

# I N D E X

PAGE

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# I INTRODUCTION

This inspection of operations at the Clinton Creek Mine was precipitated by reports of an oil slick forming on the Forty Mile River. The oil slick was reported by Yukon Lands And Forest Service patrol aircraft.

In the process of investigating the oil slick, the writer noticed problems which have occured during the past few months with the mine and mill tailing dumps. Due to the visible impact of these dumps on the local environment it was decided that they also should be documented and brought to the attention of concerned government departments.

During this inspection trip considerable time was spent in some very enlightening conversations with local residents and representatives of the mining company.

## II OIL SPILLS AT TOWNSITE POWERPLANT LOCATION

Investigation of the power plant location revealed that an oil slick was present on the Forty Mile River. The slick originated in the vicinity of the power plant. Although the slick was constant, it was quite small and thin. The slick reached a maximum width of ± 40'(figure 2) before dissipating in the river water several hundred feet downstream.

There appeared to be three possible sources for the slick. I suspect the slick is caused by a combination of at least two of these possible sources. (See Figure 2)

1. Discharge Pipes: This is a group of three large pipes (about 6") which discharge into the river directly opposite the power plant. Two of the pipes discharge cooling water from the generators. It is highly unlikely that these two pipes would contain any oil. The third pipe discharges from the only water separator system and may be the cause of periodic discharges of pure oil into the river.

Oily Water Separation: Dirty oil from the power plant is flushed to an underground storage tank (Figure 1, Photo 1). When this tank is full, the oil and water mixture is run through the oily water separator which removes the water and discharges it into the river. Problems arise when the separator encounters pure oil which

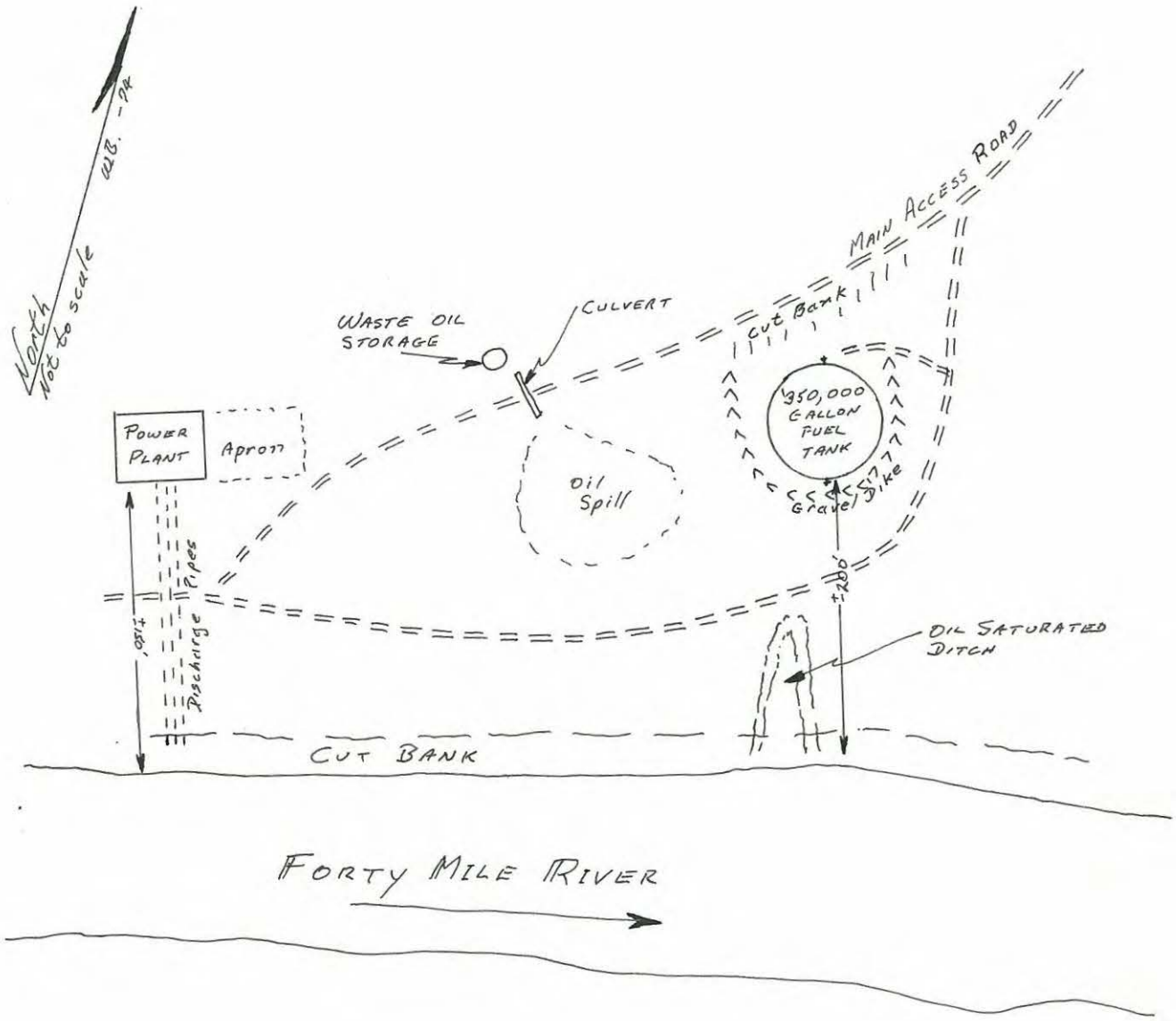



FIGURE 1

SKETCH OF POWER PLANT SITE

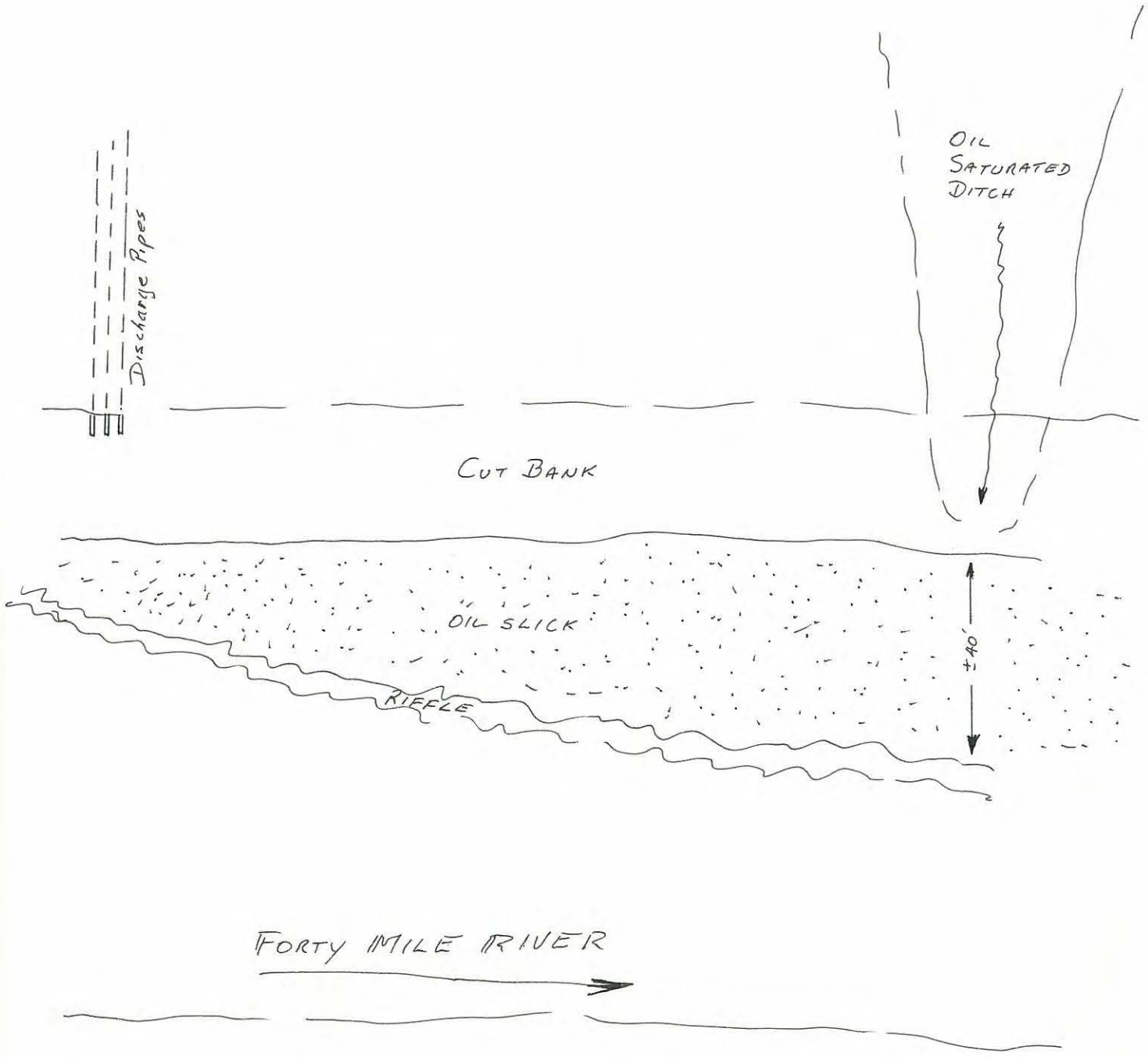



FIGURE II

SKETCH OF OIL SLICK


PHOTOGRAPH 1

MANHOLE TO WASTE OIL STORAGE TANK

Note indications of spilled oil on surface and proximity to culvert which would permit free passage of the oil with runoff water.

it cannot distinguish from water. This oil is discharged into the river through the water discharge system unless the operator of the system is in constant attendance and switches the flow when pure oil is processed. This particular operation could be responsible for periodic oil slicks on the river but should not be the cause of a continuous slick. However, the present slick does seem to originate in the vicinity of the discharge from the separator.

2. Ground Saturation With Oil: There are several indications at the power plant site of oil spills and discharges onto the ground. It is quite possible that over the years the ground has become saturated with oil and that this oil is now seeping into the river. When observing the present oil slick on the river, oil globules seemed to be rising from below the surface and spreading to cause or contribute to the slick. There appears to be two principal sources of this ground contamination with oil. (a) Overflow from the oily water separator storage tank (photos 1&2) and (b) oil spills from the 350,000 gal diesel fuel tank (photos 2 & 3).

(a) The dirty oil tank contains about 500 gallons when full. The system is not sealed hence when the tank is overfull the fluid fills the manhole to the tank (photo-1) and seeps into the surrounding ground. Photos 1 & 2 show evidence of considerable overflow from this tank. The culvert shown (photo 1 & 2) allows free passage for this overflow to run on the surface towards the river.


PHOTOGRAPH 2

OIL ON SURFACE NEAR POWER PLANT

Culvert at centre left of photo is the same culvert shown in Photo 1. Note the large amounts of oil which appear to have washed out from this culvert. The diesel storage tank and dike are visible to the extreme right.


PHOTOGRAPH 3

350,000 GALLON FUEL TANK AND SURROUNDING DIKE

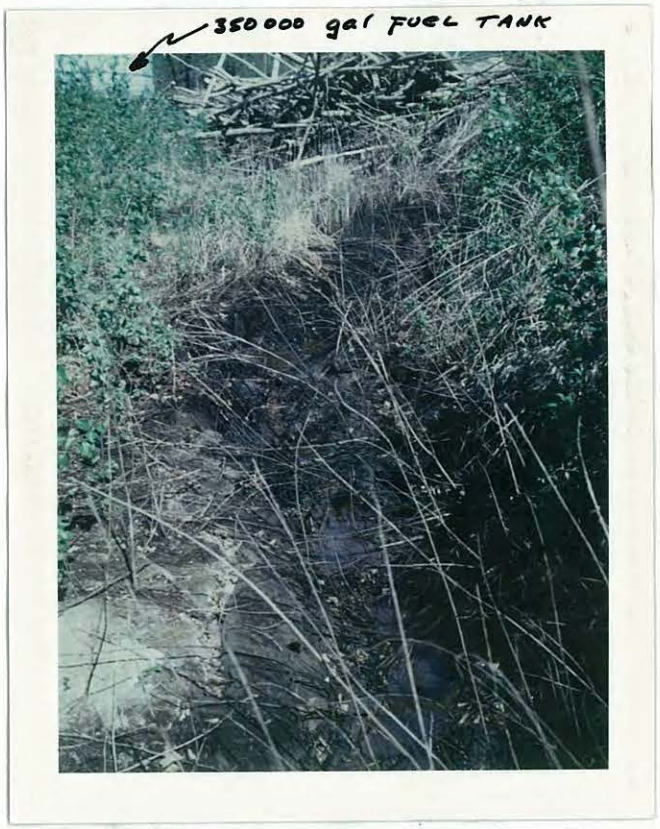
Note indications of large amounts of fuel spilled within the dike. The valve shown on the tank cracked in May 1974 causing a spill estimated at 400 gallons.

(b) The 350,000 gal fuel tank is enclosed by a gravel dike. However, there is no membrane in the dike or under the tank to prevent seepage of spilled oil. There is an opening in the dyke at the rear of the tank to allow truck access to the fuel valve. There are indications within the dike of substantial fuel spills (photo 3).

A few years ago fuel leakage from this tank resulted in contamination of the community water well several hundred feet on the upstream side of the fuel tank. This made the well unuseable for domestic purposes and a new well had to be installed further unstream.

In May 1974 a spill occured at this tank. Mine officials estimate 400 gallons were spilled within the dike. Of this amount, 200 gallons were recovered and pumped back into the tank. A crack in the valve shown in photo 3 was responsible for this spill.

3. Drainage Ditch: A ditch located between the access road to the oil tank and the Forty Mile River (figure 1 & Photo 4) is completely saturated with oil. A very minor amount of water was running in the ditch at time of inspection but would likely increase during run-off from a rain shower. The oil present in the ditch may be from ground saturation or from dumping of waste.




PHOTOGRAPH 4

OIL SATURATED DITCH

The dark area through the centre of the photo is completely saturated with oil. Oily puddles are visible in the bottom of the ditch. This oil will flush into the river with runoff water. The 350,000 gallon oil tank is visible at the upper left corner of the photo.

## III MINE WASTE TAILING PILE

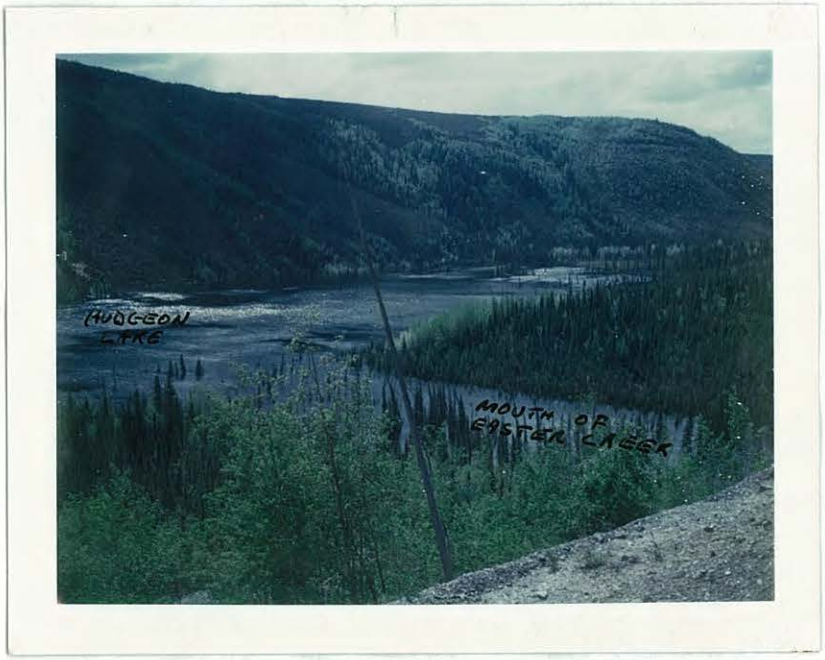
Overburden and waste material from the open pit mine has been dumped into the Clinton Creek valley. Over the past few years this pile of material has slumped and completely blocked the normal flow of the creek. This has caused the formation of a lake (see Photos 5 & 6) over one mile long and ½ mile in width. Locally this body of water is referred to as Hudgeon Lake. The maximum depth of this lake at the present time is estimated at 70 feet.

Overflow from the lake now runs over top of the mine waste. However, further slumping could block this flow and cause additional flooding. Last winter some cutting was done in the flood area to remove standing timber. This cut material has drifted to the outlet of the lake. A large amount of flooded standing timber remains along the lake shore and bottom. This will soon become a sea of snags.


PHOTOGRAPH 5

EAST END OF HUDGEON LAKE

The mine waste pile is visible in the background. Water flows over the waste at the toe of the pile.




PHOTOGRAPH 6

WEST END HUDGEON LAKE

Note the areas of timber flooded by the lake. Partially covered trees are easily visible.

## IV MILL TAILINGS

Tailings from the mill have slumped into Wolverine Creek blocking the normal flow. (See fig. 3 & photo 7). This spring about a 30' head of water backed up behind these tailings and washed out causing a flash flood down Wolverine Creek to the mouth of Clinton Creek. Tailings were washed down Wolverine Creek to Clinton Creek and deposited across the valley floor (Photo 7). Asbestos dust was carried down to the Forty Mile River and deposited across the Clinton Creek valley floor where it flooded. (Photo 8 & 9). A considerable amount of this dust is still evident in the water at the mouth of Wolverine Creek. (Photo 9)

Due to the unstable condition of this tailings pils this flooding is likely to be an annual occurance unless alternate passage is provided for the creek flow. Continued flooding will result in flood killed timber behind the tailings, possible washout of the access road and powerline to the mine, depositing of tailings over several acres of valley bottom, and washing of asbestos dust into the Forty Mile River.

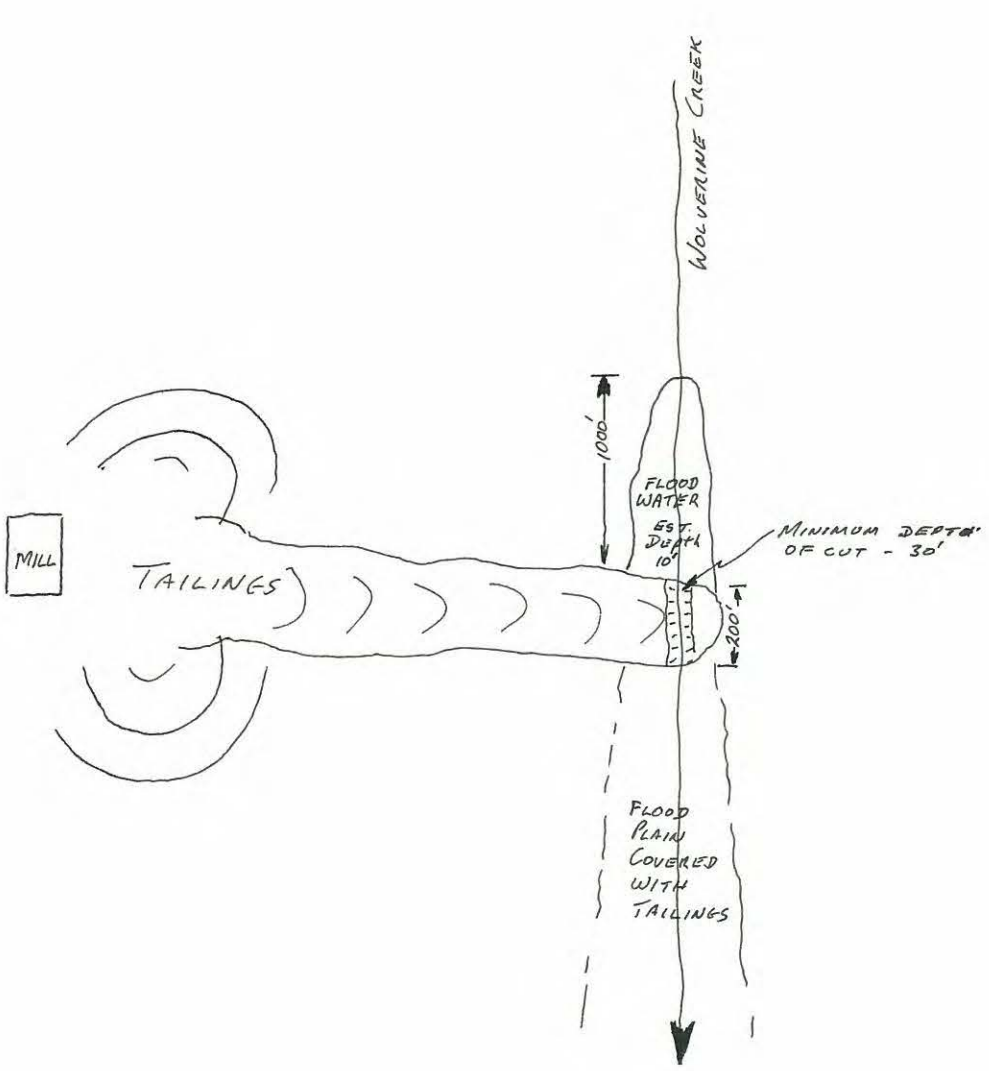
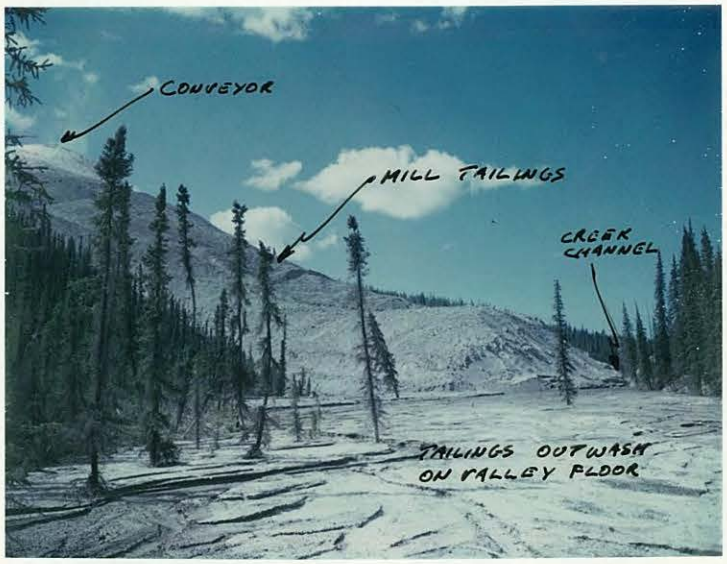



FIGURE III

SKETCH OF MILL TAILINGS - WOLVERINE CREEK




PHOTOGRAPH 7

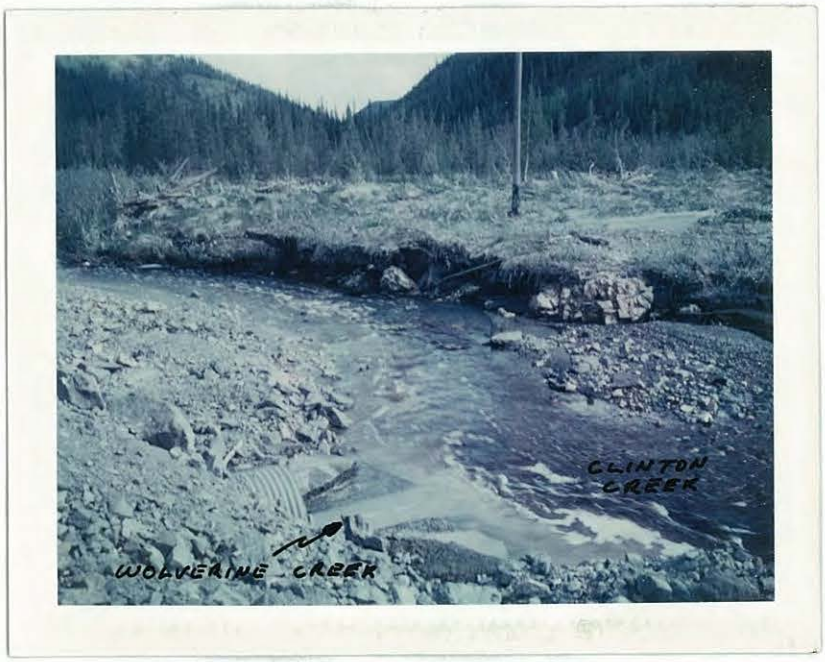
MILL TAILINGS IN WOLVERINE CREEK

Tailings in the foreground were washed across the valley floor by the flash flood. The cut washed through the toilings exceeds 30 feet in depth. Uprooted trees are present for seveeral hundred feet down the valley.


PHOTOGRAPH 8

FLOODED AREA ON CLINTON CREEK

This photo was taken about 2 miles downstream from the mouth of Wolverine Creek. The flood-line is visible in the trees and the ground is covered by dust washed down from the tailings. Rate of flow shown in the creek is about normal.




PHOTOGRAPH 9

MOUTH OF WOLVERINE CREEK

Note the difference in water color. The milky water in Wolverine Creek has run through the mill tailings. The flat in the centre of the photo is covered with dust and sludge washed down from the mill tailings.

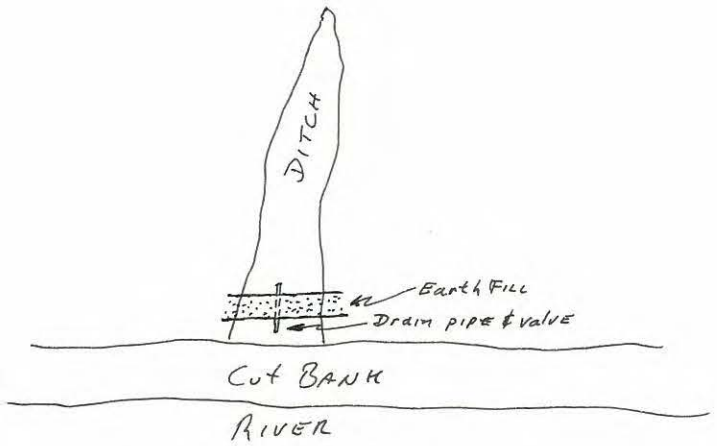
## V CONCLUSIONS & RECOMMENDATIONS

It appears that the problems discussed previously in this report are mainly the result of poor planning, carelessness and lack of supervision. Reports and photos of the tailing piles have been submitted to Whitehorse by this office in the past years. Apparently these reports were ignored as we are now faced with the very problems which they predicted.

1. Oil Spill: It is obvious that immediate steps must be taken to eliminate the oil being discharged into the Forty Mile River. Adequate supervision and less carelessness in the handling of oil will eliminate much of the problem.

It may be necessary to redesign the oily water separator system to eliminate the possibility of accidental discharge of oil into the Forty Mile River. Also, there is the possibility of leakage from the storage tank for this system. It may be necessary to excavate the tank and connecting pipe to check for leakage. Allowing this tank to overfill may be the cause of much of the ground saturation with oil. At the time of inspection the tank was overfull and the fluid was up almost to the top of the manhole culvert.

Steps must be taken to prevent further saturation of the ground with oil as this oil ultimately ends up in the river. Adequate care and supervision would prevent the dumping of waste oil on the surface and overflow from the oily water separator tank. Installation of an



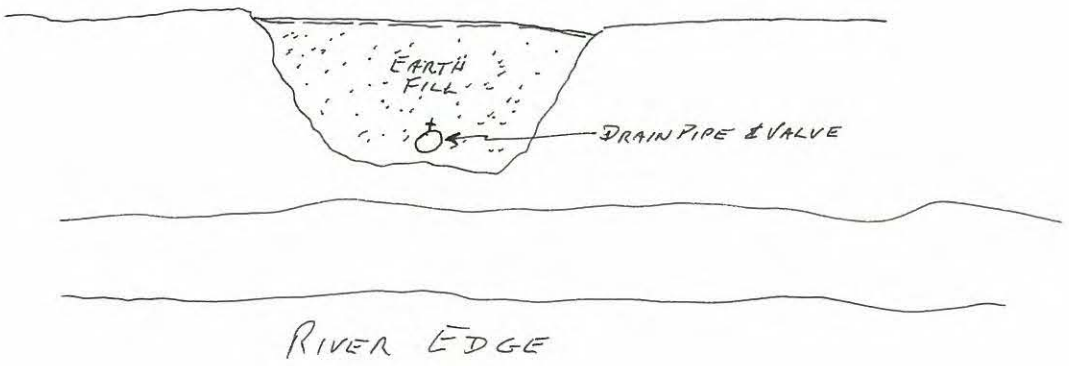




FIGURE IV

PROPOSED DIKE ACROSS OIL FILLED DITCH

impervious membrane in the dike and ground adjacent to the 350,000 gallon tank would aid considerably in containing future spills.

At the time of inspection it was recommended that a dike be placed accross the lower end of the ditch shown in photo 7 (see figure 4). A pipe and valve at the bottom of the dike would allow water to drain and the oil could be skimmed or burned off the surface. It was also recommended that a series of test holes be dug parallel to the river bank to determine if oil seepage through the ground could be contained by a ditch parallel to the river bank.

Officials of the Clinton Creek Mine advised they were attempting to obtain a chemical suitable to add to the oil present in the river. This would hopefully aid in dispersal and emulsifying the oil slick.

2. Mine Waste Tailing Pile: Considering the large mass of material blocking Clinton Creek it would be impractical to consider removing a channel to return the Creek to its normal level. Steps should be taken to ensure that the present creek bed over the tailings is stable so it will not wash a channel and create a flash flood. The timber being flooded by Hudgeon Lake should be cut and removed to avoid creating an unsightly mess when it dies. In the future overburden and waste should not be dumped where it will slump and cause increased flooding.

3. Mill Tailings: Alternate means for the free passage of Wolverine Creek must be provided. If this is not done future floods

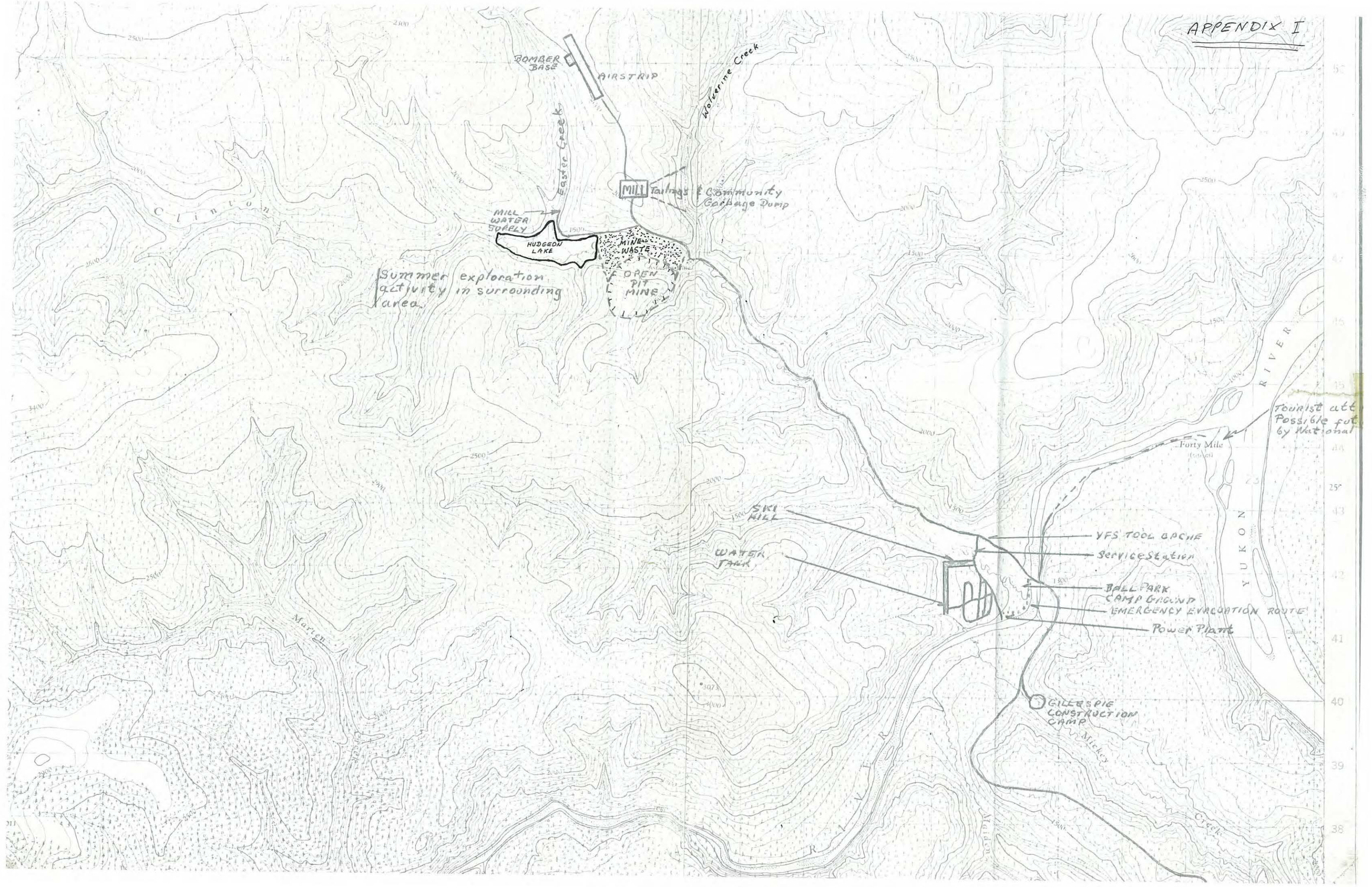
may occur with far more disasterous results than the flood which occurred this year. The tailings from the mill are not stable and will undoubtedly continue to slump and block the valley. Free passage for the water could be provided by a ditch up the east side of the valley above the tailings or by a large culvert through the tailings. A culvert would, however, likely be impractical due to freezing. Routing of the water around the tailings would also have a beneficial effect on water quality.

According to local sources grayling were present in Clinton Creek prior to the mining operations. Undoubtedly these fish have been affected by foreign material and interrupted water flow from the two tailing piles.

In conclusion, I recommend a further inspection of the aforementioned problem areas by persons with greater expertise in water quality and engineering. Following this a definite program should be laid out to remove these problems and prevent future occurrences.

## A C K N O W L E D G E M E N T S

IN PREPARING THIS REPORT A GREAT DEAL OF HELP WAS OBTAINED IN DISCUSSIONS WITH MR. GEORGE KINGSTON, ENGINEER, CLINTON MINE; MR. PAUL WATTERS, MASTER MECHANIC, CLINTON MINE; MR. JOHN OWEN, POWER PLANT SUPERINTENDANT, CLINTON MINE AND MR. JACK TAYLOR, PRESIDENT, C.M.W.U. MR. TAYLOR ALSO MADE AVAILABLE COPIES OF CORRESPONDENCE SENT BY A MR. BIERMAN TO E.P.S. IN MAY OF THIS YEAR. COPIES OF THIS CORRESPONDENCE MAY BE FOUND IN APPENDICE 2 OF THIS REPORT.


APPENDIX I
BOMBER BASE
AIRSTRIP
Wolverine Creek
Eagle Creek
MILL
Tailings & Community Garbage Dump
MILL WATER SUPPLY
HUDGEON LAKE
MINE WASTE
OPEN PIT MINE
Summer exploration activity in surrounding area.
Clinton
Marion
SKI HILL
WATER TANK
YFS TOOL OPCHE
Service Station
BALL PARK
CAMP GROUND
EMERGENCY EVACUATION ROUTE
Power Plant
GILLESPIE CONSTRUCTION CAMP
Mickey
Matson Creek
YUKON RIVER
Forty Mile
Tourist att
Possible fut
by National

APPENDIX IV

May 23, 1974

Mr. Ken Weagle
Senior Biologist
Environmental Protection Service
Room 102 - 212 Main Street
Whitehorse, Y.T.

Dear Mr. Weagle:

Please find enclosed 9 soil and ~~x~~ 2 vegetation and 6 water samples plus an explanation where each sample was taken. Somme photographs were taken with a Polaroid camera but only a few showed the purpose of the picture, therefore the picuters are not all of good quality.

Photograph # 1 was taken near sample site # 4. The sample site is approximately 10 feet to the right of the picture.

Photograph # 2 shows Wolverine Creek running from right to left at the bottom of the picture. The logs at the bottom left of the picture guide the water into the culvert under the road as seen in photograph # 3 where it flows into Clinton Creek, which flows from right to left. Wolverine Creek runs along the base of the hill seen on the left of the picture # 3. Sample site # 5 and 6 are shown on photograph # 2 where I am being shown taking a sample.

Photograph # 4 shows where the mine wastes have dammed up Clinton Creek. The narrow channel through which the creek must flow is at centre and just beyond that you can see the log boom and the accumulation of logs on the water. The trees shown on the left did not grow there but did probably about 100 feet to the left until the mine wastes pushed them out of the way.

Photograph # 5 was taken approximately 125 feet below p photograph # 4 showing serpentine and asbestos deposits through which the Clinton Creek must flow. Clinton Creek's original channel is about 125 feet to the left. At the bottom left of the picture part of the old main road can be seen. This road used to be approximately 20 - ~~25~~ 25 feet above Clinton Creek. Soils sample # A was taken at the top of the waterflow shown

Presently I have not taken any soil or water samples of the site where the tailings were broken through by the water. of the Wolverine Creek. No pictures have been taken yet either because the area is somewhat isolated. Therefore a seperate report will deal with this area.

The breakthrough of the Wolverine Creek occured on May 13, 1974 at approximately 9:00 pm. Now water was flowing yet through Clinton Creek above the mouth of the Wolverine Creek.

The soil samples were taken at a random area, with the only qualification being that the immediate area of the sample site be comparitively flat. The only exception to the above rule is sample # 1 which was selected as being of average polluted.

Some terms that I have used in the sample report may be somewhat confusing. Wherever I used the word creek shore I meant the point where the water and the dry ground meet. Floodline is the high water mark during the flood.

In addition it should be mentioned that flooding of the area in question is a common occurence but not to the x extent to which it happened this year.

We have taken some photographs with a 35mm camera and are waiting for the film to be developed.

If any additional information is required please contact me by phone at 7393 after 7:00 pm any night or leave a message for me at 7238 or contact me by mail at Box 5436, Clinton Creek.

Gerry Bierman.

May 25, 1974

Mr. Ken Weagle
Senior Biologist
Environmental Protection Service
Room 102 212 Main Street
Whitehorse, Y.T.

Dear Mr. Weagle:

As with all other samples the numbers, letters and Roman numerals on the samples refer to the respective sign with explanation in the reports. All water samples were taken May 23, 1974.

No tailings samples were taken because of a shortage of time and improper footwear to reach the area concerned. Perhaps when you come up here yourself you may be able to take the samples.

Photograph # 7 shows where all the trouble started as you can see Wolverine Creek running through the tailings pile from the top to the bottom of the picture. The tailings on the left side of the creek (right side on the picture) are approximately 90 feet high.

While walking down to the creek through the area shown, our clothes were covered with dust from the vegetation. This dust undoubtedly drifts down from the tailings pile.

Photograph # 6 was taken from the north shore of "Hudgeon Lake", overlooking part of the lake. Some of the debris is shown in this picture. Presently as the water level starts to drop in the lake more and more trees are being uncovered.
Sample site # II is about 25 feet to the left.

Enclosed also is a report on the water samples.

Yours truly,

Gerry Bierman.

1. Sample taken from surface of sâal. Only minimal coverage of the Pollutant on soil surface.
Unlide other sample areas along Clinton Creek this particular area has comparatively steep banks (approximately 4-5' high at appr.60° angle). This perhaps explains the very small amount of pollutant present since ot would be comtinually washed away becausethere was no place for pollutant to settle.
Pollutant coverage of sample area approximately 60%. A teaspoon was used to scoop up soil at a depth of a level teaspoon. Sample contains two teaspoons. Clinton creek is approximately 20 feet wide at sample area and approximately 40 feet from the Forty Mile River.

2. This sample taken of deposits on left shore of Clinton Creek on up-stream side of Clinton Creek bridge and approximately 25 feet from creed band. Depth of deposits at sample area ~~approximately~~ deposits extend about 60 - 80 feet away from creed shore at a slight slope of 6 feet up in about 90 - 100 feet.

3. This sample taken fromright side of Clinton Creek directly across fromsample #2 site. In this area there is a fair amount of water sittled after the flood. Depth of pollutant at sample site is 8 inches. This area is nearly flat and about 1-2 feet above creek shore and almost at the limit of the flook line.

4. This sample taken approximately 40 feet above on left bank of Clinton Creek at avout 15 feet from creek shore. Depth of deposits 7/16 of an inch. Area is somewhat confined and sample site avout 2-3 feet above present water level. Clinton Creek at this site is about 12 - 15 feet wide but flooded area is about 60 feet wide.

5. This sample taken near mouth of Wolverine Creek. at the sample site Wolverine Creek enters a culvert which in turn discharges into the Clinton Creek. The Culvert passes under a road. Sample taden 12 feet from road and about 30 feet from Wolverine Creek shore line on right hand side. The area flooded is about 60 feet in width

Depth of deposit is about 18 inches and therefor two samples were taken.,Sample #5 was taken 14#inches from surface of deposit. Presintly Wolverine Creed is 12 - 15 feet wide. Only one culvert allows water to discharge into theClinton Creek. Road surface is about 2-3 feet higher than surrounding area. causing water discharge to be delayed until it has risen enough to flow over the road. Perhaps the heavy solids remaine therefore on the upstream side of road and culvert.

6. This sample was taken at exactly the same site but is a surface sample. (the same site as # 5).

Due to a time shortage no report on the water samples has been mad yet. This, however will be done today (May 24 1974) and will be mailed to you today.

In the report on sample # 4 you will find that the name of a particular creek has not been filled in. So far I have not been able to find out the name.

Hopefully, I will be able to include with the water samples report a rough map of the area pointing out the different sites.

Samples A,B,C, and 1-6 inclusive taken May22, 1974.

A.This sample was taken above the junction of the Clinton Creek, and Wolverine Creek on the Clinton Creek. At this point the mine wastes h have blocked off the Clintn Creek and , in addition, a new road was bu built during the past winter across the Clinton Creek, necessitating a culvert to be installed below the "dam" under the new road. A completely new channel was built for Clinton Creek with the new stream bed and banks consisting out of the same material as in sample A.
This type (serpentine/asbestos) and other mine wastes (argylite and quarts carbonate) are presently being dumped into what is locally rdferred to as "Hudgeon Lake". This is a man made lake created by the blocking off of the natural water course of the Clinton Creek. The lake is reported to be 30 feet deep in some places. A number of trees that were protruding through the ice during the winter were cut at the ice level, but no attempts were made to clean up the cut down trees. The cutting was done by representatives (according to mu information) of the local "Alpine Club" so that the lake may be used for recreational purposes. No attempts have been mede by anybody fsomabbatmatfloating tree trunks from the water, however, a "log-boom" has been installed to prevent the trees from blocking the narrow channel throughwhich the Clinton Creek must flow. This sample is not of a deposit but material through which the Clinton Creek had to flow through its new channes.

B.This sample of typical vegetation along Clinton Creek was taken on the upstream side of the Clinton Creek bridge approximately 8 feet north of the bridge on left side of the creek.
The particular plant from which sample B was taken is about 8 feet tall and sample B was at approximately 5 feet 6 inches .

C.This sample is taken from a plant at the site of sample #4 at a height of approximately 5 feet this height being also the height of the plant.

WATER SAMPLES

I( This sample was taken at approximately 7:00 pm 200 feet down-stream of the tailings pile on the Wolverine Creek. Probably due to the creek bed having risen by the deposits the water flows through a number of shallow channels. This particular sample was taken from the right channel near the shore.
The polluted area is about 80 feet wide at the point shown in the picture. It is difficult to say where the original channel used to be, but some trees which might have lined the creek on both sides are about 35 feet apart.

Although the creek bed does look as if no trees ever existed in it (in photo) some do grow (at least until the flood) where there are no other trees around. There are however numerous logs or trees approximately ½ mile down stream of the tailings pile laying along the creek shore. It is not known whether these were cut down or up-rooted by the water. If the last statement does seem somewhat ex-aggerated it should be kept in mind that the freak of the flood lasted for not more than 1 - 1½ hours before settling down to nor-mal levels.

II Sample was taken approximately 25 feet east of a trail leading down to"Hudgeon Lake". It was taken from along the lake shore at about 8:00 pm. The lake, as explained earlier, is upstream of the mouth of the Wolverine Creek on the Clinton Creek.

III Taken at about 8:30pm from Clinton Creek approximately 10 feet above Wolverine Creek. Care was taken to avoid any influence from the waters of Wolverine Creek. Sample site is on extreme right of photo # 3. This site is down stream of the area shown in photo # 5.

IV Taken from the mouth of Wolverine Creek as it comes out of the culvert shown in photo # 3 at about 8:30 pm. Because of the strong current I was not able to fill the sample bottle by simply holding it in the water, therefore, I used one hand as a shield for the

bottle. Both hands were covered with asbestos when taken out of the water. Care was taken to assure that this sample contains Wolverine Creek "water" only and no contamination from Clinton Creek water took place.

V Taken about 50 feet below the mouth of the creek that I have been unable to name (but indicated on the map) from Clinton Creek at about 8:45 pm.

VI Taken approximately 70 feet above the mouth of Clinton Creek from the Clinton Creek at about 9:00 pm.

Field notes C.E. Williams / CLINTON CR.

JUNE 26/74

1. SEWAGE TREATMENT PLANT CHLORINATOR TANK DRY. PLANT STILL PRETTY DIRTY.
COMPANY PLANS TO USE HOPPER AS SECOND SETTLING TANK IN PARALLEL
NORM KELLY SAYS THEY HAVE SCREENS IN SYSTEM BEFORE COMMUTATOR TO CATCH FOREIGN MATERIAL

2. OIL CYCLONE STORAGE TANK WAS REMOVED. SATURATED COVER MATERIAL. AREA IS WAS LEAKING. IS BEING REPLACED. SOIL WAS REMOVED FOR ROAD BEING FILLED IN BY GRAVEL-SAND

3. THERE IS A DISCHARGE PIPE WITH SALTY WATER. SUPPOSE TO BE FROM POWER PLANT.

4. COMPANY IS TESTING WATER LINES TO TRY & ISOLATE HEAVY USERS OR LOCATE LEAKS, THEY ARE PLANNING A RECIRCULATION SYSTEM TO THE MAIN STORAGE TANK

5. THE WASEE ROCK PILE IS NOW BLOCKING OFF THE CREEK AT THE 'RESERVOR'. THEY PLAN TO BRING IN A DRAG LINE TO DIG IT OUT HOWEVER THE DITCH WILL PROBABLY CONTINUE TO BE ENCROACHED. THEY SHOULD CUT IT BACK TO A FLATTER SLOPE

CLINTON CR.
JUN 24

6. THERE MILL TAILINGS PILE SLUMPED INTO WOLVERINE CR. LAST FALL, IN THE SPRING IT BROKE OUT AND FLOODED DOWN CLINTON CR. CARRYING MATERIAL WITH IT. FROM AIR PHOTOS THE SLUMP APPARENTLY WENT DOWN A NATURAL RAVINE. THERE ARE STILL TWO PILES AND THE PLAN TO MOVE THE DUMPING FROM THIS SIDE. THEY PLAN TO CLEAN THE CR. AREA WITH BUGGIES ETC. TO MOVE MATERIAL TO SIDES. HOWEVER THE SLIDE MIGHT CONTINUE TO SLIDE INTO CR. IT IS POSSIBLE THAT A DIVERSION IS NECESSARY TO PREVENT FURTHER OCCURANCES. TOPOGRAPHICALLY IT CAN BE DONE.