

DA 159

**INDIAN AND NORTHERN AFFAIRS CANADA
ABANDONED CLINTON CREEK
ASBESTOS MINE
1998 SITE RECONNAISSANCE**

APRIL, 1999

**PREPARED BY
UMA ENGINEERING LTD.
ENGINEERS AND PLANNERS
1479 BUFFALO PLACE
WINNIPEG, MANITOBA
R3T 1L7**

UMA JOB NO. 41 01 4440 038 00 02

©UMA ENGINEERING LTD. ALL RIGHTS RESERVED.

This report has been prepared by UMA Engineering Ltd. ("UMA") for the benefit of the client to whom it is addressed. The information and data contained herein represent UMA's best professional judgement in light of the knowledge and information available to UMA at the time of preparation. Except as required by law, this report and the information and data contained herein are to be treated as confidential and may be used and relied upon only by the client, its officers and employees. UMA denies any liability whatsoever to other parties who may obtain access to this report for any injury, loss or damage suffered by such parties arising from their use of, or reliance upon, this report or any of its contents without the express written consent of UMA and the client.



UMA Engineering Ltd.
Engineers and Planners

1479 Buffalo Place, Winnipeg, Manitoba, Canada R3T 1L7
Telephone: (204) 284-0580 Fax: (204) 475-3646

Our File 4440 038 00 02

April 6, 1999

Indian and Northern Affairs Canada
345, 300 Main Street
Whitehorse, Yukon
Y1A 2B5

Attention: Brett Hartshorne

Dear Sir:

Reference: Abandoned Clinton Creek Asbestos Mine – 1998 Site Reconnaissance


Enclosed is our report summarizing site reconnaissance trips completed by UMA Engineering at the abandoned Clinton Creek Asbestos Mine in August and September, 1998. Site photographs are included in a separate binder referenced as Appendix A.

Based on our reconnaissance and a review of historical information, we are of the opinion that conditions are continuing to deteriorate at the waste rock dumps and tailings piles. Of particular concern is the potential for either Hudgeon Lake or the pond upstream of the Wolverine Creek tailings piles to drain suddenly, causing destructive flooding and debris flows downstream of these areas. The potential also exists for a sudden release of water upstream of the Porcupine Creek waste rock blockage, however, the watershed boundary is relatively small and the consequences of a failure are less significant by comparison.

Thank you for the opportunity to work on this most interesting assignment at this site. We would be pleased to discuss appropriate follow-up activities based on the observations and assessments developed from the 1998 site inspections. Please contact Mr. Ken Skafffeld or Mr. Tom Wingrove if you have any questions or require additional information.

Respectfully Submitted,

UMA ENGINEERING LTD.


J. A. Terris, P.Eng.
Vice President & Manager
Manitoba & Northwestern Ontario
KS/dh



T. Wingrove, P.Eng.
Director
Earth & Environmental Division

TABLE OF CONTENTS

| | <u>PAGE</u> |
|---|-------------|
| SUMMARY..... | i |
| 1.0 INTRODUCTION | 1 |
| 2.0 CLINTON CREEK WASTE ROCK DUMP | 2 |
| 3.0 CLINTON CREEK CHANNEL | 5 |
| 4.0 PORCUPINE PIT | 19 |
| 5.0 PORCUPINE CREEK WASTE ROCK DUMP | 20 |
| 6.0 TAILINGS PILES | 25 |
| 6.1 South Lobe | 25 |
| 6.2 North Lobe | 29 |
| 7.0 WOLVERINE CREEK CHANNEL | 35 |
| 8.0 CLOSURE | 38 |

DRAWING 01 LOCATION PLAN

DRAWING 02 CLINTON CREEK WASTE ROCK DUMP AND CREEK CHANNEL

DRAWING 03 PORCUPINE CREEK WASTE ROCK DUMP AND CREEK CHANNEL

DRAWING 04 WOLVERINE CREEK TAILINGS PILES AND CREEK CHANNEL

APPENDIX A SITE RECONNAISSANCE PHOTOS: COMPILED SEPARATELY IN BINDER

APPENDIX B SITE RECONNAISSANCE FIELD NOTES

Summary

Based on our 1998 reconnaissance of the abandoned Clinton Creek Asbestos Mine, we are of the opinion that conditions are continuing to deteriorate at the waste rock dumps and tailings piles. Of particular concern is the potential for either Hudgeon Lake or the pond upstream of the Wolverine Creek tailings piles to drain suddenly, causing destructive flooding and debris flows downstream of existing or potential channel blockages. The potential also exists for a sudden release of water upstream of the Porcupine Creek waste rock blockage, however, the upstream watershed boundary is relatively small and the consequences of a failure are less significant by comparison.

Significant erosion, undercutting, and downcutting of the Clinton Creek channel continues. The risk of a major breach increases with time as the channel deepens downstream of the lake outlet. Although the section of channel immediately downstream of the lake outlet has remained relatively intact, channel incising is likely to gradually advance upstream increasing the potential for a complete or partial breach at the lake outlet. The destructive nature of large creek flows is evident well downstream of the waste rock dump where flow debris can be seen over a large area. A breach of the plug at the lake outlet could result in flooding and debris flows more destructive than have been seen historically. Erosion and localized failures of the access road are also occurring, a process which will eventually result in the road becoming impassable.

The Clinton Creek Waste Rock Dump has historically advanced towards the valley and into Hudgeon Lake, as evidenced by ground surface movement monitoring during mine operation. Since the dump is considered at best to be marginally stable, continued movements (spreading) of the waste rock are likely as the channel is down-cut. An understanding of the performance of the rock dump since mine closure, in particular the amount of surficial movements, is essential to fully assess the impact of creek channel erosion, the risk of a catastrophic breach and the feasibility of remedial measures.

Significant instabilities of the southern section of the Porcupine Creek Waste Rock Dump are evident, although ground movement monitoring has never been undertaken to measure the magnitude of movements. Impounded water upstream of the waste rock dump continues

to flow either below or through the waste rock or along the east valley slope in subterranean channels. Both flow channels are at risk of blockage due to subsidence of either the waste rock or the overburden soils. Should this occur, it is possible that water levels upstream of the waste rock dump would increase and eventually overtop the toe of the waste rock along the east valley slope.

The north and south tailings lobes continue to advance toward the east valley slope. Tension cracks and slumping at and behind the crest indicate that the instabilities are retrogressive in nature i.e. as the toe advances and is eroded, the mid and upper sections of the tailings are destabilized resulting in increased rates of movement. Erosion and subsequent transport of tailings from the south and north lobe continues along Wolverine Creek. Given the remaining volume and height of tailings on the west valley slope, the potential for a significant channel blockage is real. Based on the events of 1974, this would likely result in a sudden breach and downstream flooding and debris (tailings) flows. An understanding of the current magnitude and movement rates would be valuable in assessing the present situation, the risk of a sudden breach and the feasibility of remedial measures.

Although the consequences of a sudden breach of the Clinton Creek and Wolverine Creek blockages would be most severe immediately downstream of the mine site, the potential exists for property damage as far downstream as the Forty Mile River. Of particular concern is the potential for loss of life from a sudden outburst flood and debris flow. The mine site is accessible to the public and was well travelled during our site reconnaissance. Camping downstream of the washed out bridge is not uncommon and placer mining was underway along Wolverine and Clinton Creeks in September, 1998 (claim stakes have recently been placed along the creeks).

1.0 INTRODUCTION

UMA Engineering Ltd. (UMA) is pleased to submit this summary report of our 1998 site reconnaissance of the abandoned Clinton Creek Asbestos Mine. The purpose of the two site visits was to: locate, map and inventory all pertinent site conditions relative to the extent of existing slope movements of the waste rock dumps and tailings piles; and assess any visual indicators of potential continued movement. We have also summarized site development activities and previous site inspections conducted since 1974, in particular photographic and observational records of the site over a 24-year period.

An initial one day fly-in visit was made to the site in August, 1998 by Ken Skafffeld, P.Eng. of UMA, Brett Hartshorne of DIAND and Matt Dodd of Royal Roads University (RRU). A more detailed three-day reconnaissance trip was carried out in September, 1998 by Ken Skafffeld, P.Eng. and Jeff Tutkaluk, P.Eng. of UMA in conjunction with an environmental sampling program by RRU. Based on these site reconnaissance trips, we have prepared this report which includes updated mine site drawings, a narrated videotape, and a detailed photographic record of areas of concern.

Similar to previous reports, separate discussions are presented for the Clinton Creek Waste Rock Dump, the Porcupine Creek Waste Rock Dump, the Tailings Piles (north and south lobes), and the Clinton Creek and Wolverine Creek channels including selected historical photographs. Selected photographs are included in the body of this report. A complete UMA photo record is separately bound as Appendix A. Reference numbers for photographs from previous inspections are as they appear in historical reports and as a result, are in no particular order.

The general mine layout is shown on Drawing 01 which is based on an air photo taken in August, 1988. Field notes from our 1998 site reconnaissance, previous reports, aerial photographs, and other relevant information have been used to generate drawings of the Clinton Creek Waste Rock Dump and creek channel (Drawing 02), the Porcupine Creek Waste Rock Dump and creek channel (Drawing 03) and the Wolverine Creek Tailings Pile and creek channel (Drawing 04). Photo numbers and locations are included on Drawings 02, 03 and 04. Copies of field notes are included in Appendix B.

2.0 CLINTON CREEK WASTE ROCK DUMP

The waste rock from Porcupine Pit was initially placed along the south valley slope west of the mine as shown on Photo CC-01, probably taken around 1970 (Geo-Engineering, December, 1986). It is apparent that the waste rock was unstable at this early stage as evidenced by visible slumping of the east section of waste rock. This early photograph, looking upstream, also illustrates Clinton Creek along its original alignment in the center of the valley (now Hudgeon Lake).



Photo CC-01: Clinton Creek Waste Rock Dump (Circa 1970)

Between 1970 and 1975, a considerable volume of waste rock was dumped across the valley as shown on Photo CC-03 taken in May, 1975. The resulting valley blockage impounded water from the Clinton Creek watershed creating Hudgeon Lake.



Photo CC-03: West end of Waste Rock Dump (May, 1975)

Significant lateral spreading of the rock fill, in particular at the west end of the dump towards Hudgeon Lake, occurred as a consequence of the continued placement of waste rock. Photo 1, taken in about May 1976 (Golder Associates, April 1977), shows tension cracks along the crest of waste rock adjacent to Hudgeon Lake. By 1985, the west end of the waste rock dump had slumped considerably towards, and into, Hudgeon Lake (Photo 2, Klohn Leonoff, September, 1986).



Photo 1: Tension Cracks at West End of Waste Rock Dump (1976)



Photo 2: View South at Waste Rock Dump (1985)

Based on observational records, active movement of the waste rock dump has continued since mine closure in 1978, although the magnitude of this movement has not been quantified since that time. Prior to mine closure, surveys of movement monitoring targets were conducted to assess the rate and magnitude (vertical and horizontal) of waste rock movement. With the exception of several targets along the south bank of the creek channel, most of the monitoring points are intact. Targets located during our reconnaissance are indicated on Drawing 02. Visible movements of the waste rock pile were reported in Geo-Engineering's July, 1998 report (Photo 17). Examination of the area near the center of Photo 17 (sparsely covered with young poplar trees) in September revealed that many of the tension cracks associated with slump blocks had been infilled, possibly suggesting reduced slope movement at this end of the dump (UMA Photo 9-3). More recent multiple tension cracks which further confirm on-going lateral movements of the waste rock were observed farther east along the access road during our September, 1998 site reconnaissance (UMA Photo 2-18, Appendix A).

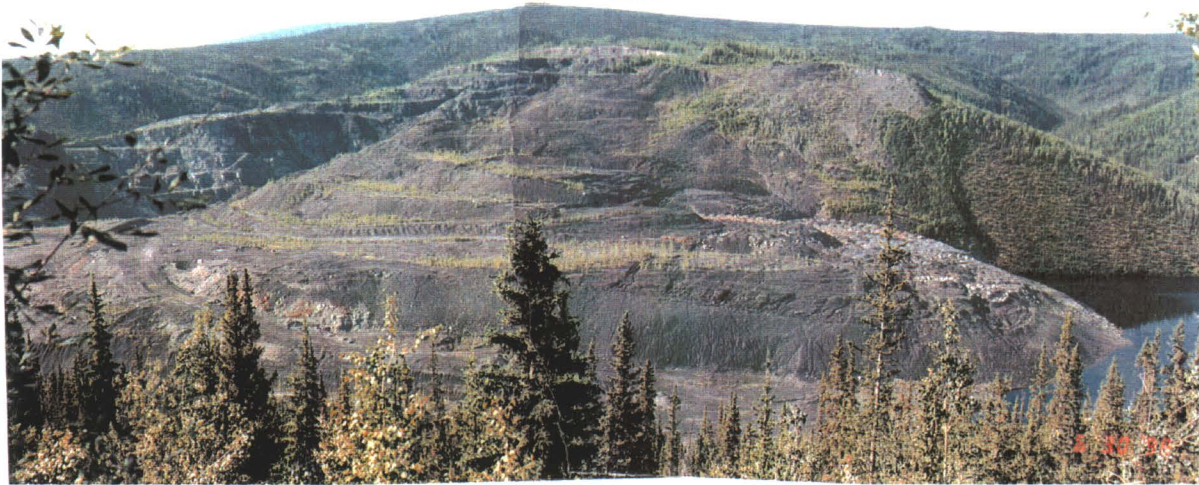


Photo 17: Tension Cracks in Waste Rock Along Sparsely Treed Area (1998)

3.0 CLINTON CREEK CHANNEL

No photographic or written records are available from when the mine first opened until the waste rock dump forced the alignment of Clinton Creek against the north valley slope and ultimately impounded Hudgeon Lake. Photo CC-02 is the earliest available photograph of Hudgeon Lake, looking east at the waste rock dump, lake outlet, and the creek channel. Initially (1974), the creek channel flowed between the waste rock dump and the mill access road located on the north valley slope (Photo CC-03). However, as the water level in Hudgeon Lake increased, the unprotected channel eroded (down-cut) and migrated laterally to the north, eventually washing out the road (Photo CC-09).



Photo CC-02: Access Road and Hudgeon Lake Outlet at Clinton Creek (1974)



Photo CC-03: Access Road Along North Side of Clinton Creek (about 1974)



Photo CC-09: Erosion of Access Road on North Side of Creek (1975)

A new access road with a wide shoulder was subsequently constructed through the rock fill along the south side of the creek channel. However, the waste rock was undercut and began slumping soon after it was constructed as shown on Photo 5, (Golder Associates, April 1977). Slumping on the north side of the channel also began to undercut the natural valley slope can also be seen in Photo 5.

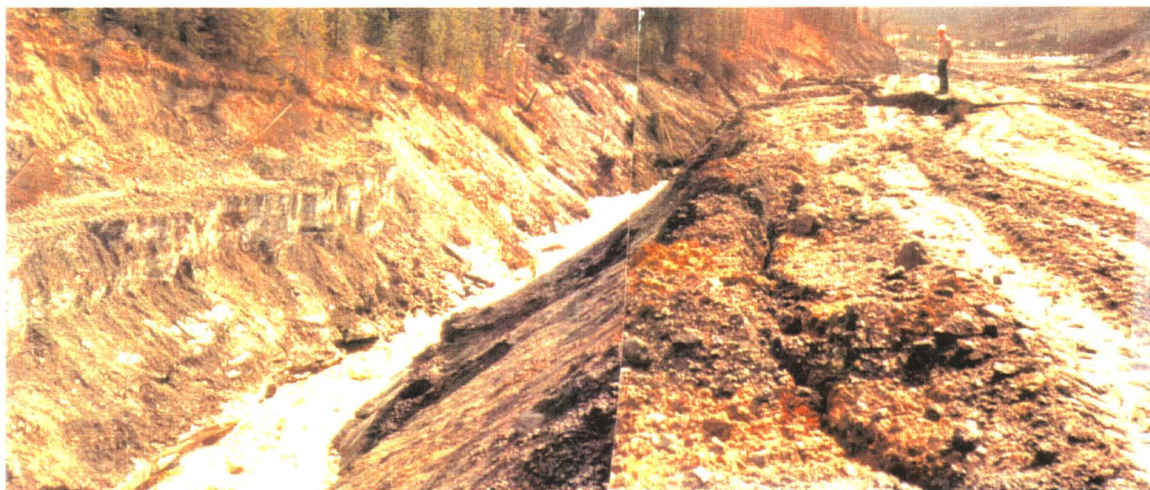


Photo 5: Erosion and Slumping of New Access Road on South Side of Creek (1976)

During the summer of 1979, an attempt was made to reduce channel erosion and undercutting by constructing rock weirs and armouring the banks of the channel immediately downstream of the lake outlet. Over the next few years, however, the creek flow bypassed the rock weirs on the north side causing significant erosion (Photo 3 Hardy Associates Ltd, July 1982). By 1983, channel flow had completely bypassed the weirs substantially increasing valley slope erosion as seen in Photo 3 (Klohn Leonoff, August 1983).



Photo 3: Creek Bypassing Weirs (1982)



Photo 3: Valley Erosion (1983)

Significant channel erosion and down-cutting is also evident downstream of the weir (Photo 4 Klohn Leonoff, August 1983).



Photo 4: Channel Erosion Downstream of Weirs (1983)

Remedial work was again undertaken in the fall of 1983 to reduce channel erosion. Flow was diverted along the south side of the rock weirs while the north side of the channel and the culvert outlets were armoured with rip rap as seen in Photos 7 and 10, respectively (Klohn Leonoff, November 1983). Woven geotextile was placed beneath the rip rap on the north side of the channel (Photo 6 Klohn Leonoff, November 1983).



Photo 7: Armouring of North Side of Channel (1983)



Photo 10: Channel Lining at Culvert Outlets (1983)



Photo 6: Channel Repairs (1983)

In June 1984, the channel was beginning to by-pass the last downstream rock weir (Photo 2 - Klohn Leonoff, August 1984). Photos 3 and 4, taken in June, 1985 illustrate the minor modifications made to the north side of the channel.



Photo 2: Channel Bypassing Rock Weirs (1984)



Photos 3 and 4: Channel repairs (1985)

Spring run-off in 1997 destroyed the rock weirs. Since that time, significant channel erosion and incising has occurred downstream of the washed out culverts, apparently down-cutting the channel by up to about 2m (UMA Photo 7-24). Down-cutting of the channel is also apparent farther downstream when Photo 4 (Page 9) is compared with UMA Photo 7-17. At present, numerous slumps and localized slope failures are occurring on either side of the channel as material is eroded (UMA Photos 7-6 and 7-18 and 7-25 in Appendix A). Once material has failed or slumped into the channel, flow is often forced to meander around the debris initiating erosion of the opposite bank.



UMA Photo 7-24: Channel Down-Cutting (1998)

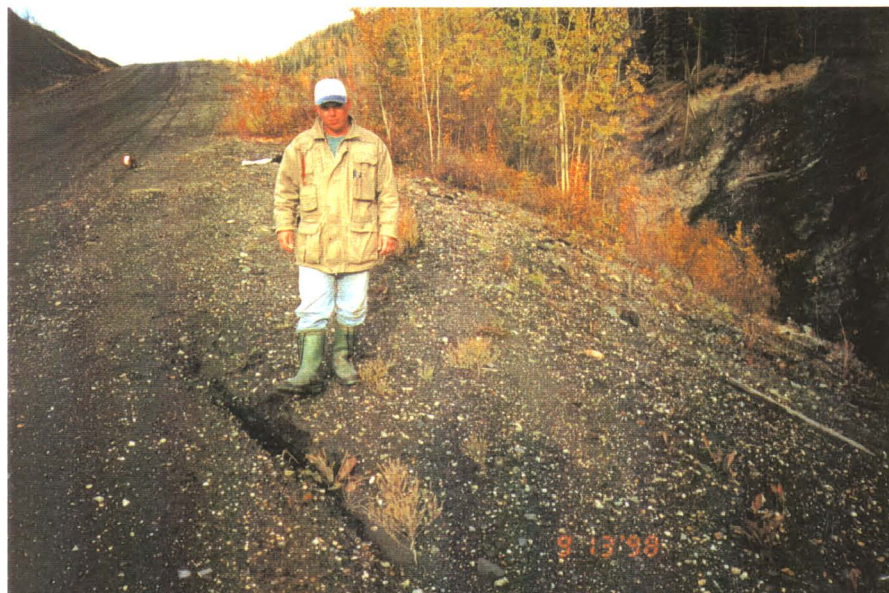


UMA Photo 7-17: Channel Erosion (1998)



UMA Photo 7-6: Sloughed Till in Channel From Localized Bank Failure (1998)

This process has begun to impact the integrity of the access road along the waste rock dump as evidenced by tension cracks along the north shoulder of the access road (UMA Photo 7-14). Slumping has resulted in considerable narrowing of one section of the access road (UMA Photos 2-8 and 7-5 in Appendix A) and it is likely that the access road will become impassible in the near future as this process continues (Drawing 02).



UMA Photo 7-14: Tension Crack Along Access Road (1998)

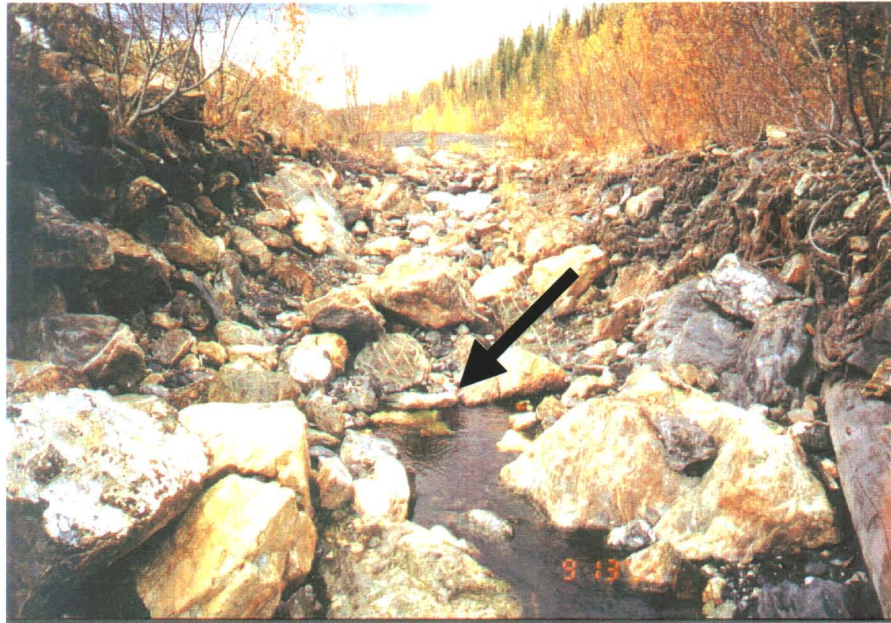


UMA Photo 2-8: Failure Along Access Road Shoulder (1998)

Another contributing factor to erosion and slumping of the south bank is the presence of exposed bedrock along parts of the channel bottom and north valley toe. A substantial length of channel (approximately the downstream half) has been cut into the weathered Argillite bedrock as shown on Drawing 02. The bedrock generally consists of a weathered weaker bedrock unit overlying a stronger more competent bedrock unit with horizontal to slightly dipping bedding planes. The bedrock is less erodable than the waste rock that comprises the south bank and, as a result, the south bank appears to undergo preferential erosion and undercutting. In the upper reaches of the creek (downstream of the lake outlet), the channel is cut into highly erodable waste rock and till material on the north bank. Although portions of the channel contain large diameter boulders, the creek channel, in many cases, is beginning to meander around these more protected sections. Downcutting is evident just downstream of the lake outlet where the new creek bed is suspected to be at least 2 metres below its elevation following repair work in 1984 (Section A-A, Drawing 02).

The road crossing at the lake outlet is now washed out and only 2 of the original 4 CMP culverts remain (Drawing 02). Flow occurs through the culverts and between the second culvert and the north bank. The inlet for the first culvert is not visible and is blocked with debris, limiting flow. Water depths in the open channel are in the order of 0.5 metres (September, 1998) with velocities estimated to be 0.75 metres per second. The CMP section visible in the channel some distance downstream is believed to be either the end section of the second culvert or one of the missing culverts. The channel profile is estimated to drop about 3 metres between the outlet and Points A, B, and C, as shown on Drawing 02.

Two springs were observed exiting from the waste rock just downstream of the lake outlet. The first spring exits from what is believed to be the old creek bed, between the island and south bank (Drawing 02 and UMA Photo 8-16). The second spring exits about 2 metres above the creek water level on the south bank (UMA Photo 8-19 and Drawing 02). The water from both springs was clear with no evidence of fines. Brown slime was growing over the rocks at the downstream spring and the water had a noticeable hydrogen sulphide odour. A water sample was collected from the spring by RRU.



UMA Photo 8-16: Spring in Creek channel Remnant (1998)



UMA Photo 8-19: Spring on South Bank

Downstream of the washed out bridge at the east end of the waste rock dump, a single creek channel now meanders through a considerable area of flow debris consisting of gravel to 200mm diameter rock (UMA Photos 13-17 and 13-18, Drawing 02). There appears to be considerably more flow debris downstream of the bridge now (UMA Photo 2-7) as compared with Photo 7 taken in 1986 (Geo-Engineering, November 1986). Several channel remnants and evidence of significantly wider historic channel flow are visible. High water marks in trees in the area are about 600mm above the ground surface, or about 1.5 to 2 metres above the existing creek water elevation. At locations as far as 200 metres downstream of the bridge, trees and brush have trapped flow debris (UMA Photo 11-22 note leaning trees). Beaver dams several hundred metres downstream of the bridge have flooded a large area near the junction of Wolverine and Clinton Creek.



UMA Photo 13-17 and 13-18: Clinton Creek at washed out bridge



Photo 7: Clinton Creek Bridge Crossing (1986)



UMA Photo 11-22: Flow Debris in Treed Area

4.0 PORCUPINE PIT

Instabilities of the open pit (Porcupine Pit) sides-slopes have been on-going since closure of the open pit mine. Recent tension cracks were observed during our site reconnaissance, in particular at the crest along the entrance to the mine as shown on UMA Photos 9-10 to 9-12 and along the west edge of the crest where a significant slump block has developed (Drawing 03). Continued sloughing of the over-steepened pit walls is clearly evident and is expected to continue for an indefinite time period (UMA Photo 11-1). Debris could occasionally be heard falling into the water while completing our reconnaissance in the area.



UMA Photo 11-1: View Northeast at Porcupine Pit (1998)

5.0 PORCUPINE CREEK WASTE ROCK DUMP

Waste rock was placed across the Porcupine Creek valley slope as shown on Drawing 04 and in Photo 12, one of the earliest aerial photographs of the area taken in 1976 or 1977 (Hardy, 1977). The most northerly section of the dump was placed at least partially up the east valley wall. This area has remained relatively stable. Sections near the centre of the dump which were placed farther away from the east valley toe, however, have experienced slumping creating blockages at two locations, as indicated on Drawing 03.

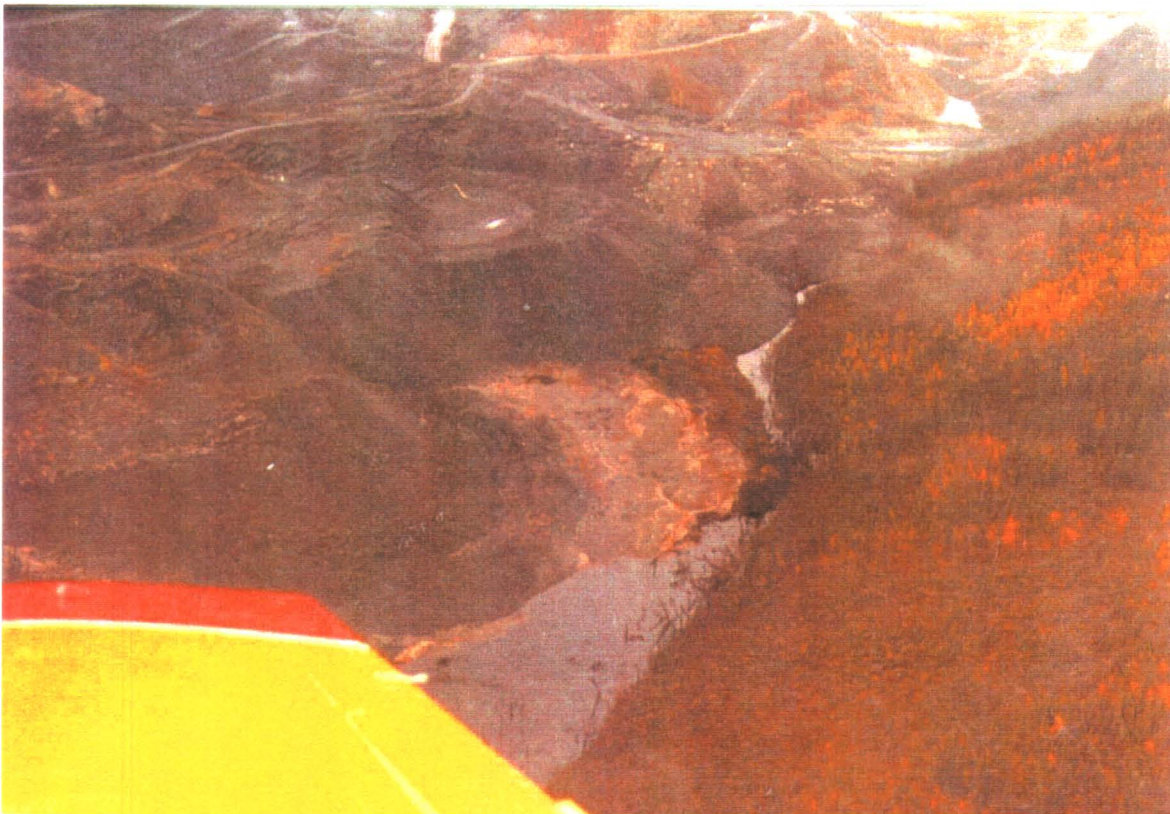


Photo 12: East Edge of Porcupine Creek Waste Rock Dump (1977)

The first blockage (blockage 1) was photographed in 1987 by Geo-Engineering (Photo 8). Subsequent inspections and photos of this blockage and our 1998 site reconnaissance indicate there has been no significant change in the geometry of this blockage (UMA Photos 10-3 & 10-6 in Appendix A).



Photo 8: View Downstream at Blockage 1 (1987)

Blockage 2, located upstream of blockage 1, is illustrated in Photo PC-01 taken in 1975. Since 1975, subsequent inspections suggest very little additional movement is occurring (UMA Photo 10-2 in Appendix A). Both blockages probably behave as permeable dams with some water seeping through the waste rock. During high water events however, it is possible the blockages might be overtopped.



Photo PC-01: View Downstream at Blockage 2 (1975)

The southern section of the waste rock dump has undergone extensive movement at the toe and crest due to both the volume of waste rock and the method of placement. Dumping probably would have begun at or near the crest of the original valley slope but was only advanced across a portion of the valley. Instabilities of the waste rock pile have heaved the valley floor several metres as shown in Photo PC-03 (May 1975). The heaving (up-thrusting) of the valley floor is the primary reason for the impoundment of water from Porcupine Creek.



Photo PC-03: Till Up-Thrust at Toe of Failed Waste Rock (1975)

Near the crest of the waste rock dump, movement has resulted in numerous tension cracks and backscarps as shown in Photo 11 (Geo-Engineering, November 1988) and UMA Photos 10-24 to 11-0 in Appendix A. At present, considerable downslope movements are continuing in the upper slope of this section of the waste rock dump as evidenced by recent tension cracks and backscarps. It is anticipated this movement will continue until the waste rock has become geometrically stabilized, a process that could greatly increase the size of the upstream impoundment.



Photo 11: Crest of Unstable Waste Rock (1988)

Drainage of the Porcupine Creek watershed through the waste rock dump occurs in two ways. The majority of the water drains through the waste rock pile, entering at a point along the southern limit of the stable waste rock pile (Drawing 03). Water drains from the pond to the waste rock via a drainage channel incised through the slide debris from the unstable southern portion of the waste rock. Evidence of this channel was observed by Geo-Engineering during their July 1987 inspection, although at that time, the channel was dry (Photo 9). During our site reconnaissance, water was entering the waste rock pile through an opening that was estimated to be about 0.3m^2 located at the toe of the waste rock (UMA Photo 10-9 in Appendix A).



Photo 9: Dry Inlet Channel From Pond to Waste Rock Pile (1987)



Photo 11: Crest of Unstable Waste Rock (1988)

Drainage of the Porcupine Creek watershed through the waste rock dump occurs in two ways. The majority of the water drains through the waste rock pile, entering at a point along the southern limit of the stable waste rock pile (Drawing 03). Water drains from the pond to the waste rock via a drainage channel incised through the slide debris from the unstable southern portion of the waste rock. Evidence of this channel was observed by Geo-Engineering during their July 1987 inspection, although at that time, the channel was dry (Photo 9). During our site reconnaissance, water was entering the waste rock pile through an opening that was estimated to be about 0.3m^2 located at the toe of the waste rock (UMA Photo 10-9 in Appendix A).



Photo 9: Dry Inlet Channel From Pond to Waste Rock Pile (1987)

The discharge point is believed to be through the toe of the northern slope of the waste rock dump, or about 550 metres to the north of the inlet (Spring A). At the time of our reconnaissance, discharge at the outlet was estimated to be in the order of 6 to 9 l/s (100 - 150 gpm) approximately 5 m above ground surface. A second outlet point, about 2m above the ground surface, discharges about 1 to 2 l/s (15-20 gpm). Localized slumping is evident where water discharges the core rock slope as seen in Photo 13 (Geo-Engineering, November 1988) and UMA Photo 11-3 (Appendix A). Water is conveyed via a drainage course that has been incised along the south edge of the road (Photo 13).



Photo 13: Outlet and Drainage Ditch on North Waste Rock Slope (1988)

Discharge is also occurring via subterranean flow along the toe of the waste rock and east valley slope (Drawing 03). Flowing water could be heard below the organic mat at two locations and was exposed at one location (UMA Photo 9-24 in Appendix A). Flows at this location were estimated to be 3 to 5 gpm. Discharge from the subterranean flow system occurs as a spring (Spring B) near the northeast corner of the waste rock dump (UMA Photo 9-23 in Appendix A). Fine grained material deposited at the discharge point indicates some transport (erosion) of material is occurring.

6.0 TAILINGS PILES

Since the failure of the asbestos tailings pile, the tailings piles have historically been referred to as the south and north lobes (UMA Photo 3-5 and Drawing 04). Each tailings lobe is discussed separately as follows:



UMA Photo 3-5: View North at South and North Tailings Lobes (1998)

6.1 South Lobe

The southerly portion of the tailings pile (south lobe) failed suddenly in early 1974. The tailings moved down the west valley slope and completely blocked the existing creek channel. The blockage was subsequently breached releasing a significant amount of water borne tailings which were deposited downstream of the blockage as shown in Photo 7 (W.B. Bowie, June 1974). Remedial works, including removal of tailings from the channel, were implemented soon after the breach occurred (Photo WC-01, July 1974).

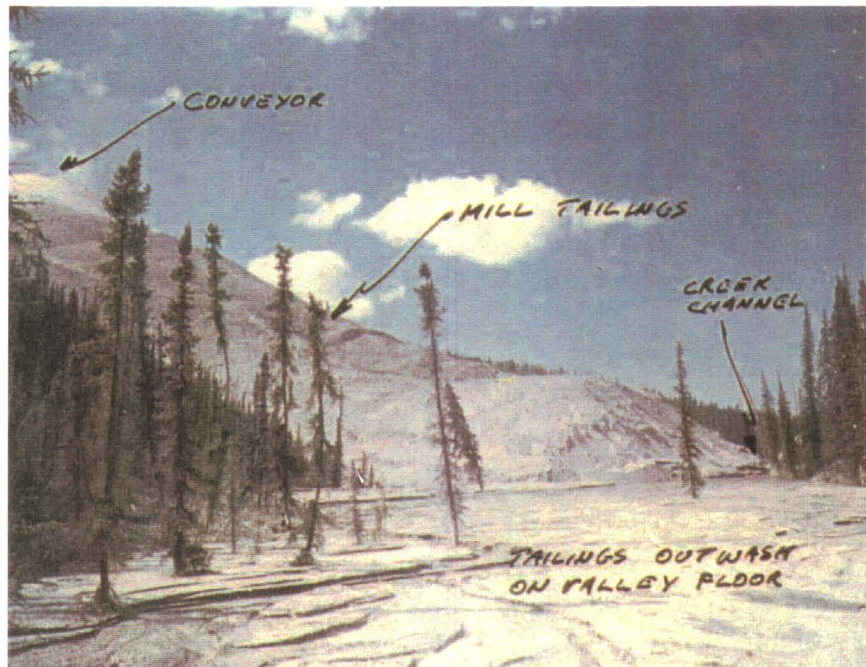


Photo 7: Tailings Deposition After Breach (1974)



Photo WC-01: Creek Channel Downstream of Breach (1974)

Following the 1974 failure, downslope movement of tailings continued resulting in occasional channel blockage as shown in Photos WC-06 (June 1976).



Photo WC-06: Channel Blockage (1976)

In 1978 a mid-slope portion of the south lobe was regraded (terraced) in an attempt to off-load this area and slow the advancement of the lobe (Drawing 04). The regraded area has since failed and evidence of the terraced slope is visible as inclined benches at the toe (Photo 18 Geo-Engineering, May 1993) and UMA Photos 3-6 and 5-11 in Appendix A.

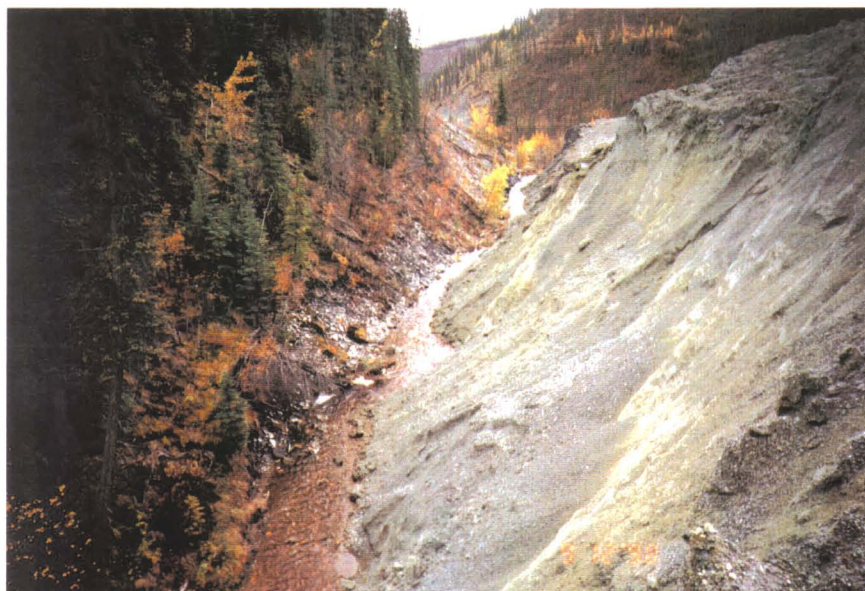


Photo 18: Impoundment Upstream of South Lobe (1992)

As the tailings continue to move down-slope, they are eroded and transported downstream. A comparison of the position of the leading edge of the tailings in Photo 12 taken in June, 1988 by Geo-Engineering with UMA Photo 5-20 indicates the gradual advancement of tailings into the creek channel.



Photo 12: Toe of South Lobe in June (1998)



UMA Photo 5-20: Toe of South Lobe in September (1998)

It is clearly evident that the south lobe remains active as evidenced by numerous tension cracks and slump blocks between the crest and toe (UMA Photo 3-13). Although the magnitude of this movement has not been confirmed since mine closure, it is anticipated that sufficient up-slope material exists to continue the advancement of tailings for an indefinite period of time.



UMA Photo 3-13: Tension cracking of Upper Slope (1998)

6.2 North Lobe

Following the failure of the south tailings lobe, tailings were placed farther to the north. However, similar downslope movements occurred almost immediately forming the north lobe. Tailings were then placed farther to the northwest on flatter ground until mine closure.

One of first aerial photographs of the unstable north lobe was taken in 1977 (Photo 1, R.M. Hardy and Assoc.). Downslope movement of the north lobe was not as sudden as that which occurred on the south lobe. However, the tailings gradually moved down-slope and within 10 years reached the pond created by the south lobe blockage (Photo 7, Klohn Leonoff, 1984).



Photo 1: Aerial View of Advancing Toe of North Lobe (1977)



Photo 7: North Lobe at Edge of Pond (1984)

By July, 1986, the north lobe had nearly reached the east valley slope as shown on Photo 8 (Klohn Leonoff, September 1986). The lighter tailings areas in the upper portion of the tailings pile were relatively undisturbed in the photo. The darker areas in the mid and lower portion of the slope are indicative of heavily disturbed material as the north lobe advanced. These observations were verified with monitoring data in Hardy Associates (1978) Ltd.'s 1984 report that indicated upper-monitoring locations moved significantly less than mid and toe monitoring locations.



Photo 8: Failed North Lobe Near Valley Slope (1986)

Significant heaving (up-thrusting) of the valley floor also occurred along the north side of the lobe resulting in a narrowing of the upstream section of the channel and the formation of an upstream pond (Photo 8, Geo-Engineering, November 1986). Continued advancement of the north lobe heaved the valley floor directly in the path of the lobe resulting in additional channel constriction as seen in Photo 19 (Geo-Engineering, November 1988) and UMA Photos 1-3, 5-9 in Appendix A.



Photo 8: Toe of North Lobe Approaching Valley Slope (1986)



Photo 19: Erosion of Toe of North Lobe and Heaved Valley Floor (1988)

Recent photographs suggest the tailings are advancing faster than they are being eroded as evidenced by mounding near the toe. This can be seen in a comparison of Photo 17 (Geo-Engineering, 1988) with Photo 22 (Geo-Engineering, 1998) and UMA Photo 5-17 (Appendix A), taken 10 years later.

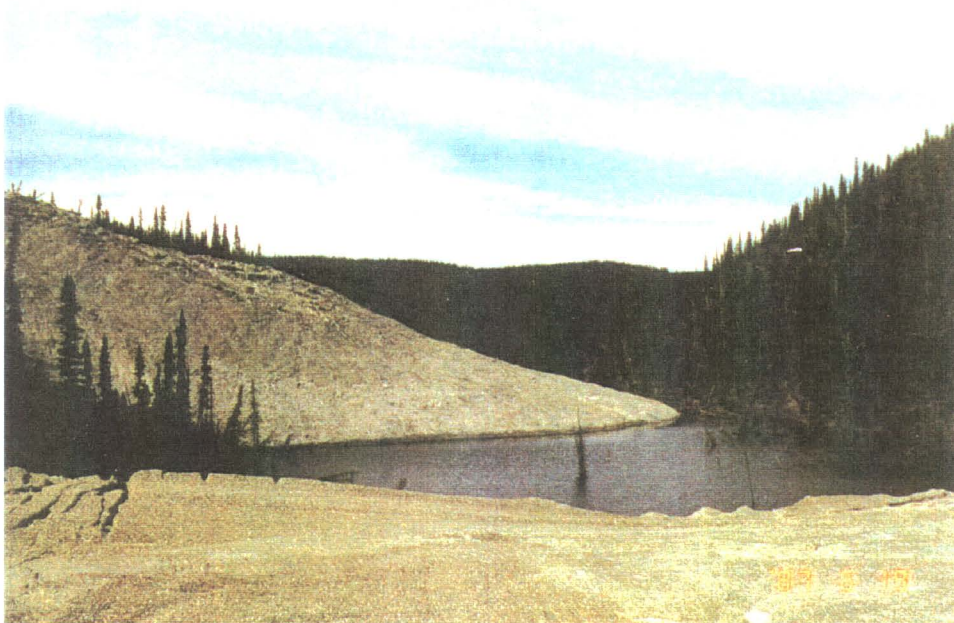


Photo 17: Toe of North Lobe (1988)

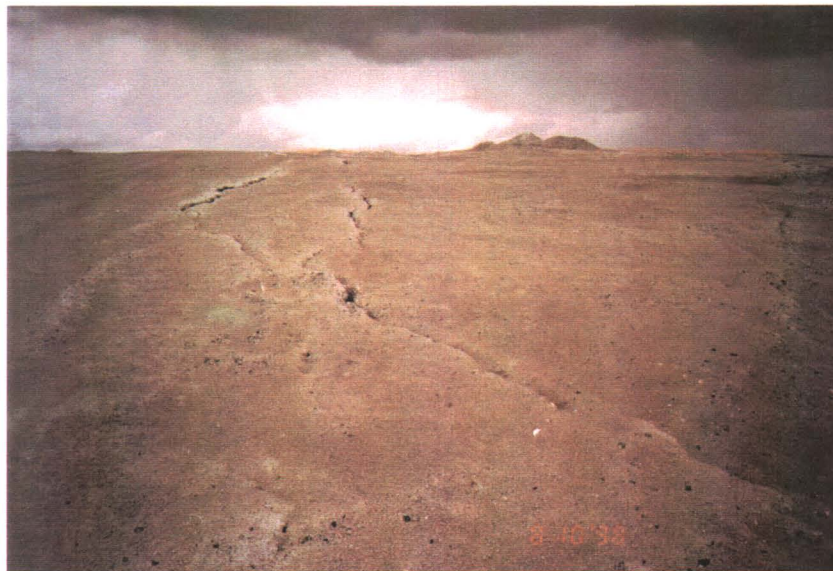


Photo 22: Toe of North Lobe (1998)

Continued erosion at the toe will undoubtedly trigger retrogressive failures and continued downslope movement. Recent tension cracks were observed in the mid and upper portions of the north lobe in 1998 confirming on-going movement (UMA Photos 1-6 and 1-5, 1-12 and 4-2 in Appendix A). Tension cracks and slumping are evident at and beyond the crest of the slope supporting the observations of continued movements (UMA Photo 1-15).



UMA Photo 1-6: Back Scarps at Crest of North Lobe (1998)



UMA Photo 1-15: Tension Cracks Upslope of North Lobe Crest

7.0 WOLVERINE CREEK CHANNEL

Between 1978 and 1981, channel improvements downstream of the south lobe were undertaken including a series of rock weirs as shown on Drawing 04 and Photos 22 (Geo-Engineering, November 1986) and 12 (Geo-Engineering, November 1988). These channel improvements have remained relatively intact since construction. The secondary channel between the downstream channel improvement and the east valley slope noted in Geo-Engineering's 1986 report was visible, but dry during our September 1998 reconnaissance.



Photo 22: Armouring of Wolverine Creek Channel Downstream of the South Lobe



Photo 12: Weirs Downstream of South Lobe (1988)

At the time of UMA's site reconnaissance, four beaver dams were present between the upstream side north lobe and the downstream end of the south lobe as shown on Drawing 04. Beaver dam 1 is located at the north end of the north lobe where the valley floor has been raised. This first beaver dam has raised the water level in the upstream pond about 1 metre higher than would occur from the overburden blockage at this location. High water marks on trees in the upstream pond suggest water levels have been about 0.5 metres higher than were observed in September, 1998. Surficial slumping of the east valley slope is also occurring opposite from beaver dam 1. Test Holes 1 and 2, drilled with a hand auger within and just above the slumped area, indicate that the surficial overburden soils consist of 0.3 metres of mossy organic cover overlying 1 metre of soft, wet silty clay containing bedrock fragments (holes were terminated at 1.3 metres). No ice or frozen soil was encountered in either hole.

The second beaver dam, located between the upstream end of a small channel island and the toe of the north tailings lobe does not impound a significant amount of water. The third beaver dam is located at the upstream end of the south lobe as shown in UMA Photo 5-18

and is responsible for raising the water in the pond between the two tailings lobes by at least a metre.



UMA Photo 5-18: Beaver Dam 3 (1998)

The four beaver dams have significantly reduced channel velocities and erosion of the channel where the tailings piles meet the valley slope. Downstream of beaver dam No. 4 however, velocities increase significantly as the channel narrows and the channel slope steepens. Between the beaver dam and the rock weirs, the channel has down-cut into the underlying weathered argillite bedrock resulting in surficial slumping of the overburden soils (UMA Photos 5-23 and 5-21, 6-1 and 6-2 in Appendix A). Downstream of the south lobe, flow appears to be contained within the original modified channel with no significant erosion or down-cutting observed.



UMA Photo 5-23:

View Upstream of South Lobe Toe and East Valley Slope

8.0 CLOSURE

Our site reconnaissance trips in 1998 have confirmed the observations made in several previous inspection reports since mine closure with respect to the overall condition of the waste rock dumps, creek channels and tailings piles. We trust this summary reconnaissance report will provide DIAND with additional information to more fully assess changes in site conditions. This report also completes an important initial step should a more comprehensive risk assessment program or remedial stabilization measures be considered.

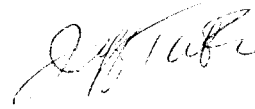
Thank you for the opportunity to work with you on this most interesting project. Please contact either of the undersigned should you have any questions or require any additional information.

Yours Truly,

UMA ENGINEERING LTD.



Ken Skaffeld, P. Eng.
Senior Project Engineer
(Yukon Territory License Pending)



Jeff Tutkaluk
Geotechnical Engineer

DRAWINGS



APR 08, 1988
 Plot Scale: 1"=2000
 ManPic01.dwg

Date of Photography: Aug. 17, 1988

| REV. | DESCRIPTION | DWN. | APP. | DATE |
|------|-------------|------|------|------|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

SEAL

SEAL

Uma UMA Engineering Ltd.
Engineers and Planners
 1479 Buffalo Place, Winnipeg, Manitoba, Canada R3T 1L7
 MARCH, 1988

APPROVED BY: _____ DATE: _____
 DRAWN BY: JV DESIGNED BY: _____
 CHECKED BY: JMT/KMS CHECKED BY: _____
 SCALE: APPROX. 1:36,000 JOB No. 4440-038-0

INDIAN AND NORTHERN AFFAIRS CANADA

ABANDONED CLINTON CREEK ASBESTOS MINE
 SITE RECONNAISSANCE

LOCATION PLAN

01 -
 DWG. No. REV.

**APPENDIX A
SITE RECONNAISSANCE PHOTOS
COMPILED SEPARATELY IN BINDER**

APPENDIX B
SITE RECONNAISSANCE FIELD NOTES

pp 1-9 AUG 10/98 SITE RECONN.
 10-13 PLAN FOR SEPT. RECONN
 TAILINGS.
 14-20 NORTH ^ LOBE
 21-22 WOLVERINE CREEK
 23 S. LOBE
 24-26 WOLVERINE CR. @ TOE
 OF S. LOBE
 27-30 WOLVERINE CR. O/S OF TAILS.
 31-32 WOLV. CREEK & ACCESS
 ROAD TO MINE.
 33-49 CLINTON CREEK &
 MON #68 ON WASTE
 ROCK (PP 49).
 50-60 CLINTON CREEK.
 61-62 WASTE ROCK DUMP.
 63-71 PORCUPINE CREEK.
 72-78 CLINTON CREEK O/S
 OF WASHED OUT BRIDGE.



①

CLINTON CREEK AUG 10/98

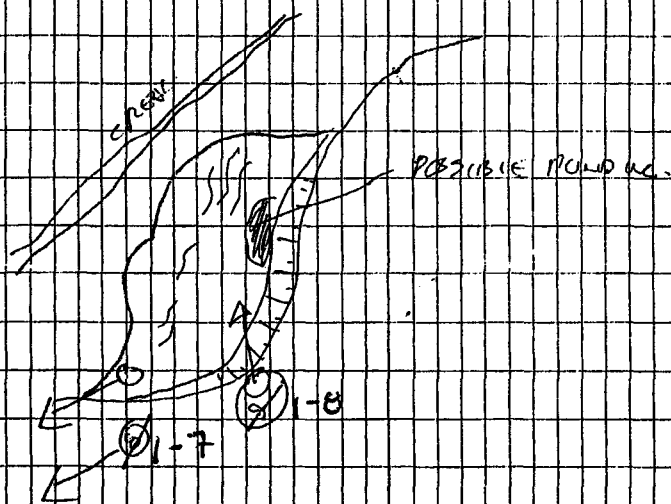
PHOTOS 1-1 TO 1-5

NORTH LOBE.

SIGNIFICANT O/S MOVEMENT.

1-6

Photo ⑧ - MARK BY TENSION CRACK
 ± SW W OF SCARP.



1-9
 ⑩

TC'S NEAR WEST EDGE
 OF N LOBE.

FIELD

③

CLINTON CR. - AUG 10 1928

WEST SIDE OF N. LOBE
APPEARS REMARKABLY STABLE

≈ 45°

1-10

(PHOTO) VIEW N.

NUMEROUS (MULTIPLE) TRENCHES

CRACKS THROUGH WEST N. LOBE

AS FEAR BACK AS WEST

LEDGE. CRACKS RUN N-S

≈ 4-6" WIDE

1-11

(VS)

VIEW N. OF TC IN

MIDDLE OF RANGE

ALONG TOP OF N. LOBE

1-12

(VS)

MULTIPLE T.C.'S ON

WEST SIDE OF RANGE

TOP OF N. LOBE.

- MOUNTAIN TO WEST

BEGINNING TO OCCUR.

FIELD

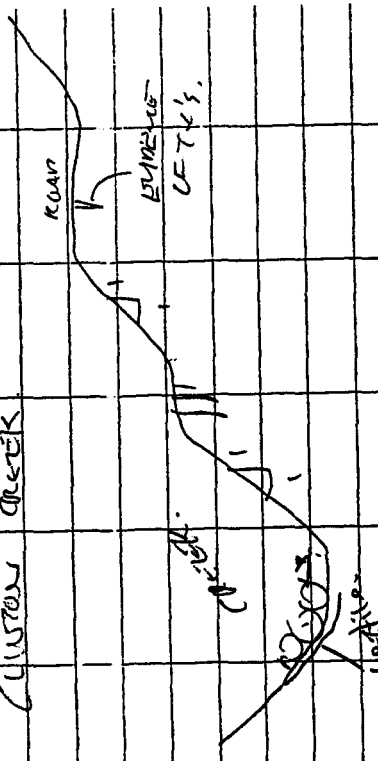
②

6

HODGKINSON?
 ? SHALE
 2-10 HODGKINSON LAKE OUTLET
 ROCK WATER E OUTLET FORM
 HODGKINSON LAKE IN FAIRLY
 GOOD CONDITION ± 10-20m DROP
 OVER 1-1 SH-φ POWDER.

2-11 (14) - VIEW NE 1/2 NEAR
 STATION ON CURVE.

ROAD ON S SIDE OF
 CUSTON CREEK



2-12 (15) - VIEW E

2-13 (16) VIEW NE @ gate site.

2-14 (15) VIEW W

7

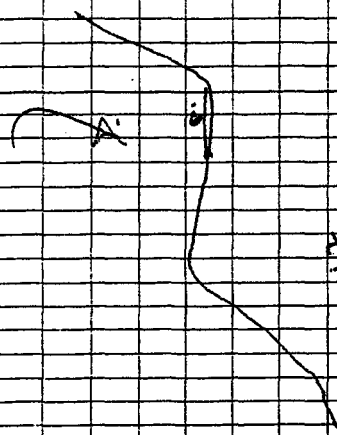
CUSTON CR. AUG 10/28

WASTES ROAD SCORPED USUALLY
 VULNERABLE ON S SIDE OF
 TRUCK WALKWAY D/S (17) 2-10
 UP TO 25m HIGH.

NUMEROUS INSTALMENTS

NOT COMPLETE AS WASTE
 ROCK SCUMPS. (17) 2-16

WASTES ACCO DESTROYED
 WITH STONE SLABS OF
 IRONING.



2-17
 (18) - VIEW NE @ BRIDGE.

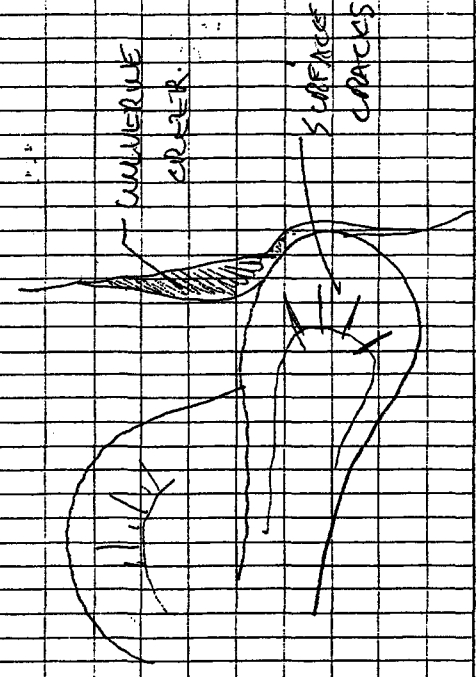
FIELD

10

| | |
|---------------|--------------------------------|
| SEPT 12/98 | CUNTON CREEK |
| TRAVELED FROM | WHITE ROSE TO |
| CUNTON CREEK | TOWNSHIP WITH |
| JEFF TUTKALUK | MET UP WITH |
| MATT & BILL | @ CUNTON CREEK |
| - SET | UP CAMP @ TOWNSHIP |
| 3-15 | ABANDONED SET. OF NEW CR. |
| 3-16 | VIEWS ALONG CUNTON CR. |
| 3-17 | " " |
| 3-18 | WORKED OUT BRIDGE @ MINE |
| 3-19 | " " @ TOWNSHIP |
| 3-20 | CUNTON CR. TOWNSHIP |
| 3-21 | 40 MILE R. BRIDGE |
| 3-22 | RD FROM HWY |
| 3-23 | 40 MILE R. DISCH. INTO YEAR R. |
| 3-24 | YAKOW R. |
| 3-25 | DAWSON CITY. |

11

| | |
|--------------------------|------------------------|
| SEPT 12/98 | CUNTON CREEK |
| - PLANNED TO | TRAVEL TO TOWNERS AREA |
| TODAY. | |
| GENERAL NOTES: | |
| COLDER V. 36000 | |
| MAY, 1976 | - LU MOVEMENT |
| ADRIAN'S INSTALLED ON | |
| TOWNERS PLOTS | |
| - SOUTH ADBE | PAUL (1974) |
| - ADRIAN CRACKS IN SOUTH | |
| WEBE | |
| - NORTH ADBE | O.K. |



FIELD

(12)

SEPT 12/98 CUNYON CR.

HARDY CG 10075 APRIL 84

- AREA'S SOUTH LINES MONITORED SINCE 1978.

* 14 MONITORING POINTS WITHIN NORTH LOBE

• 7 MONITORING POINTS WITHIN SOUTH LOBE

- BEST PORN WITH MONITORING POINTS IS D-1004A FROM KLOHN'S 1984 REPORT. (AT WHICH TIME TOP OF N LOBE ANCHOR REACHED CREEK)

- THERMISTOR STRIPS T5, T6, T7 INSTALLED BY HARDY IN TAILINGS AREA.

(13)

SEPT 12/98 CUNYON CREEK

REVIEW OF TAILINGS DRAWINGS (CANTON CO. 10075)

KLOHN 1984 - TAILING LOBE TOE HADN'T REACHED CREEK

GEDO - JUNE 1987 - TOE OF NORTH LOBE @ CREEK

KLOHN D-4009 - TOE @ CREEK (CONFORMS GEDO 1987 SECTION)

GEDO - JUNE '88 - SAME SKETCHES '91 - TAILING REACHED '93 - EAST VALLEY

N. SLOPE - BE GERMERLE CREEK BEGAN EPIDURAL VALLEY.

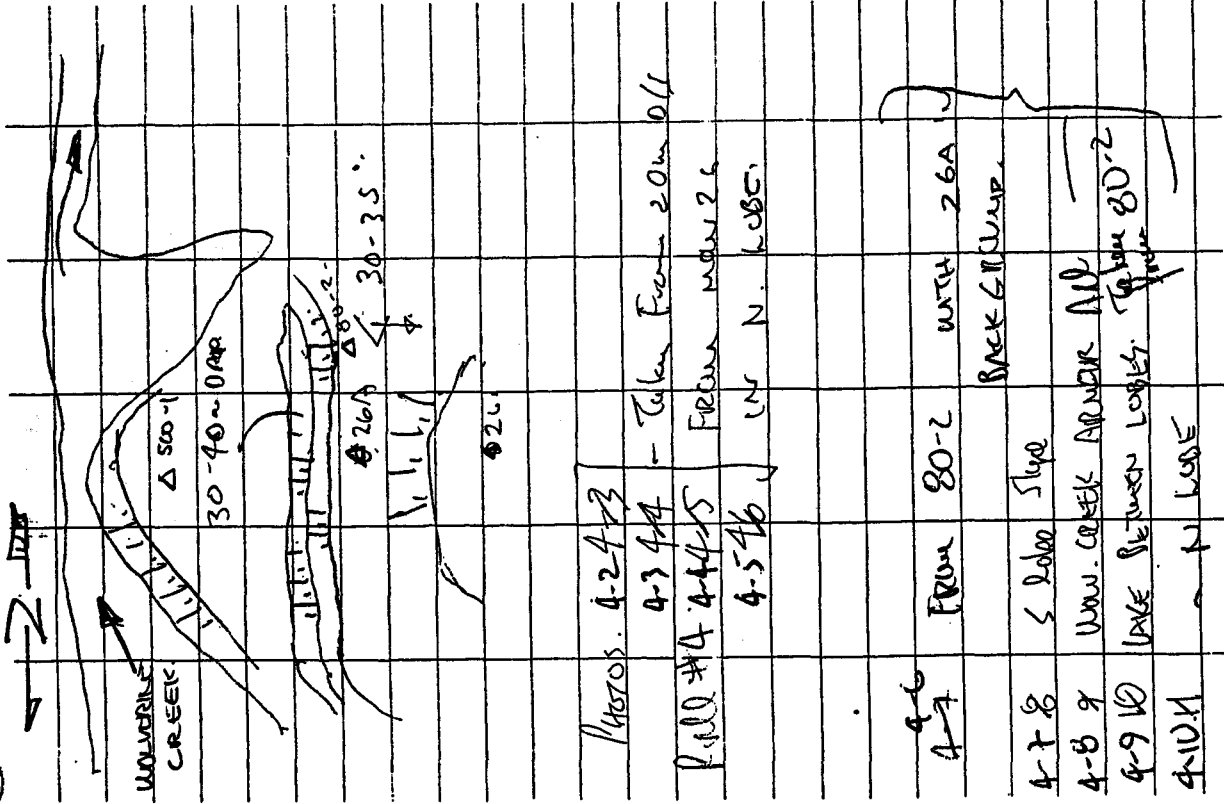
STREET INTERSECTION OF TAILINGS AREA AT 9:30 - TAILING PYS UP WITH MATE & FILL.

- CANTON 10-152

FIELD

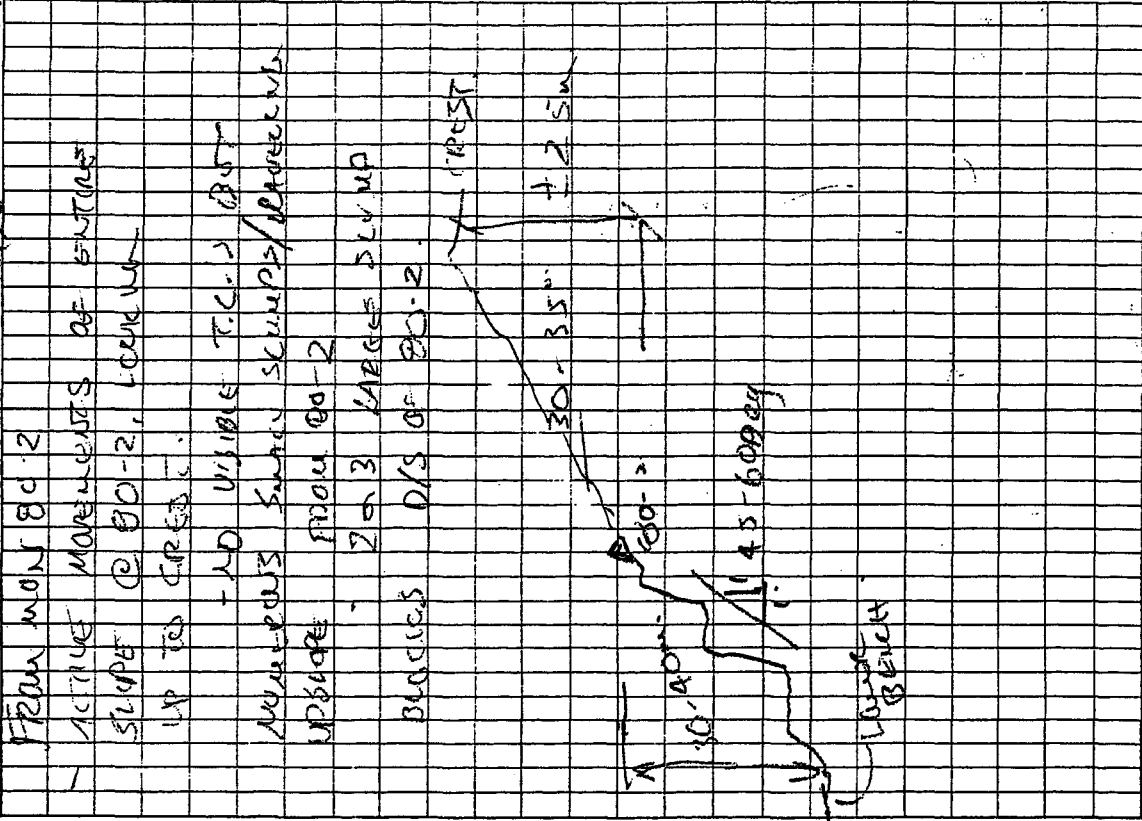
(19)

SEPT 12, 98 CLAYTON CR.



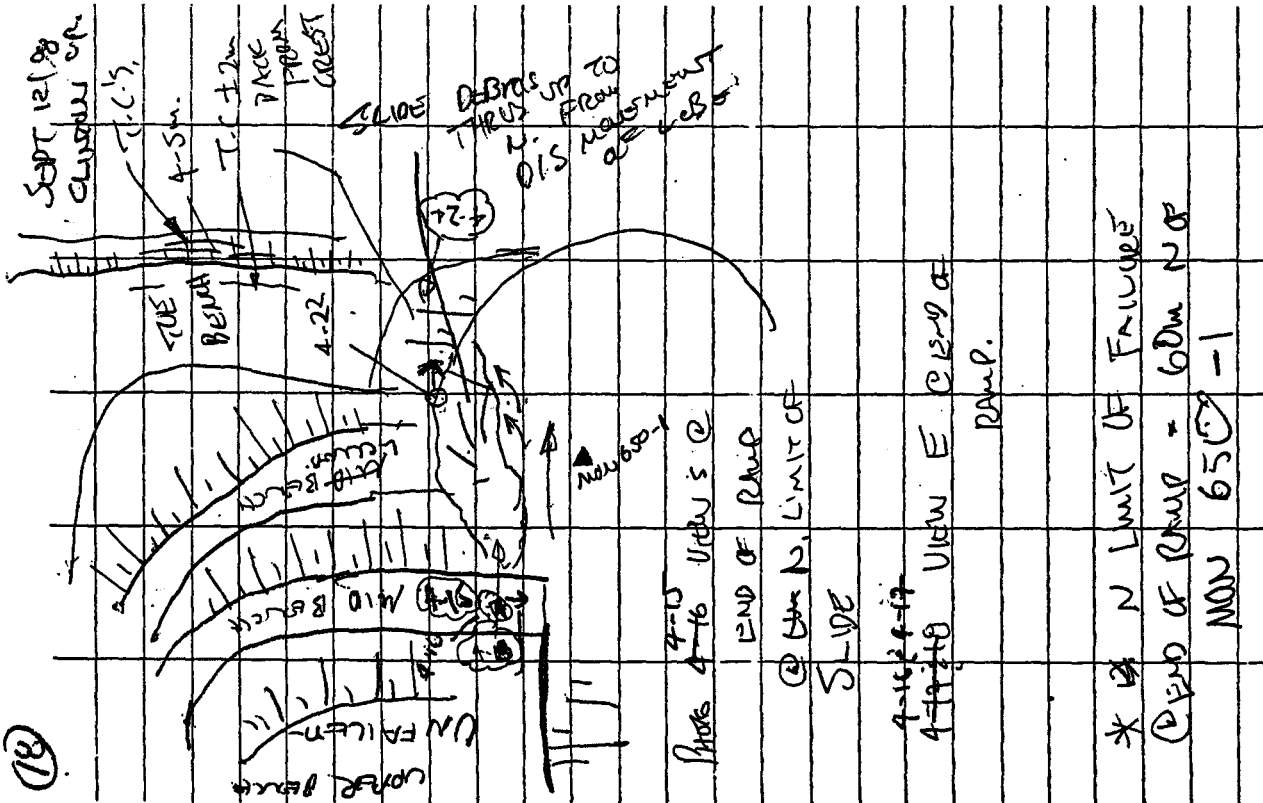
(15)

SEPT 12, 98 CLAYTON CR.



FIELD

(18)



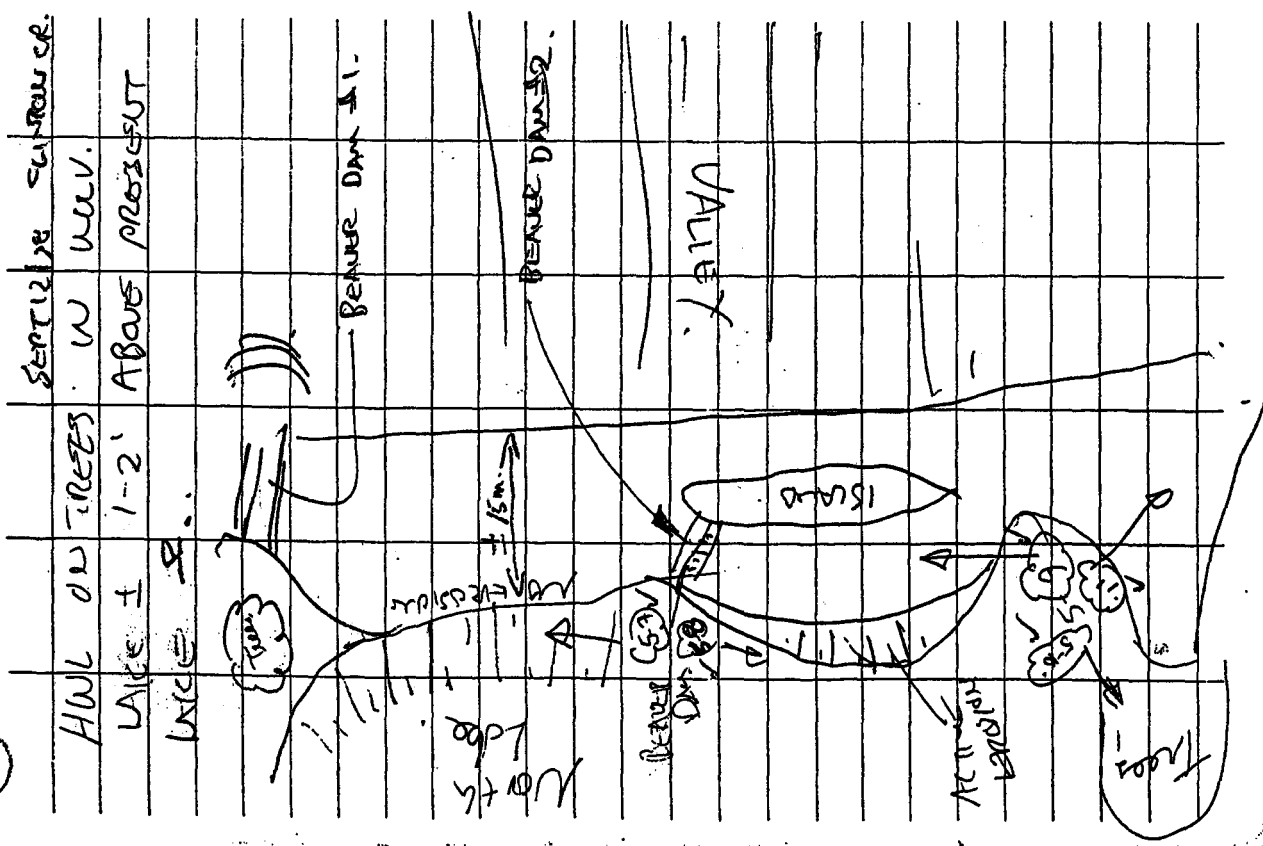
(19)

SEPT 12/88 CLAYTON CR.

| | |
|----------------|--------------------------------------|
| 4-14 (4-19) | VIEW NW FROM 650-1 |
| 4-19 (4-20) | VIEW SEE. ACROSS TAILWATER |
| 4-20 (4-21) | VIEW N @ END OF MID-BENCH |
| 4-21 (4-22) | VIEW EAST ACROSS LIMIT OF SLIDE |
| 4-22 (4-23) | VIEW 13 MARK IN LEFT AND TREE TRUNKS |
| 4-23 (4-24) | VIEW WEST FROM TOE BENCH |

FIELD

(22)



SEPT 12/28 CLINTON CR.

HWL ON TREES
 LAKE ± 1-2' ABOVE PROSPECT
 LAKE S...

BEAVER DAM #1

BEAVER DAM #2

VALLEY

ISLAND

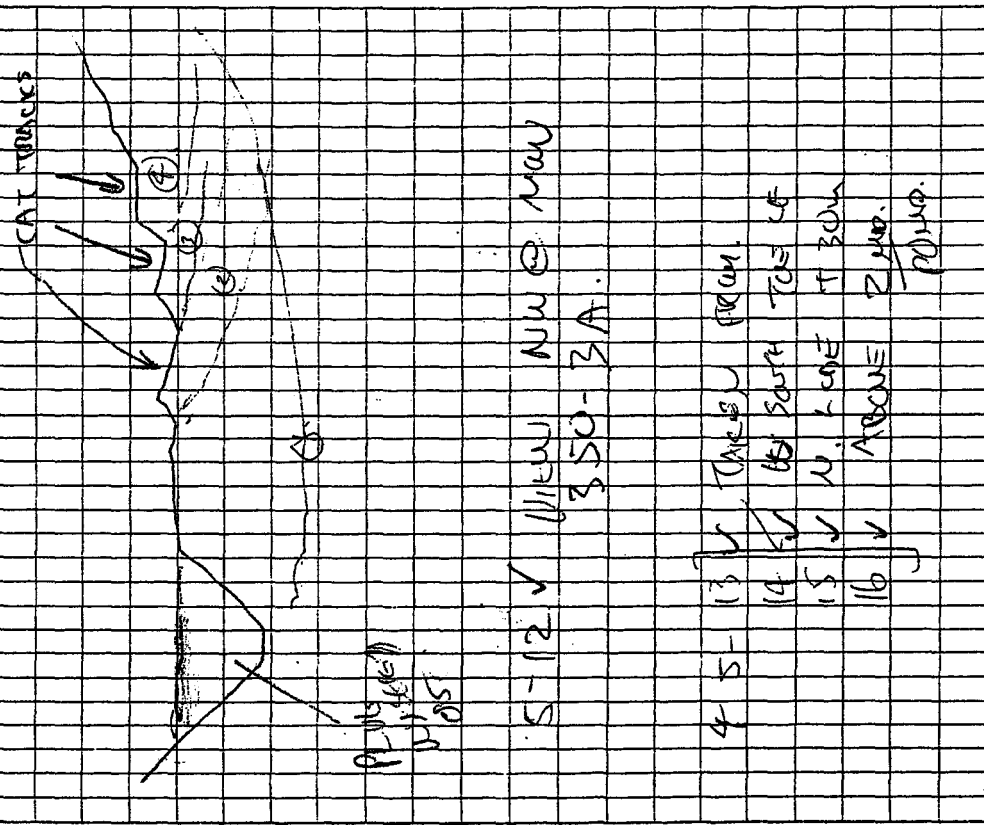
TRAILS

ACTING PARADISE

(23)

SEPT 12/28 CLINTON CR.

VIEW S
 D 2K 98



5-12 ✓ VIEW NW @ NEW
 350-3A

4-5-13 ✓ TAKE SW FROM

14 ✓ TO SOUTH TOE OF

15 ✓ W. LINE AT 30M

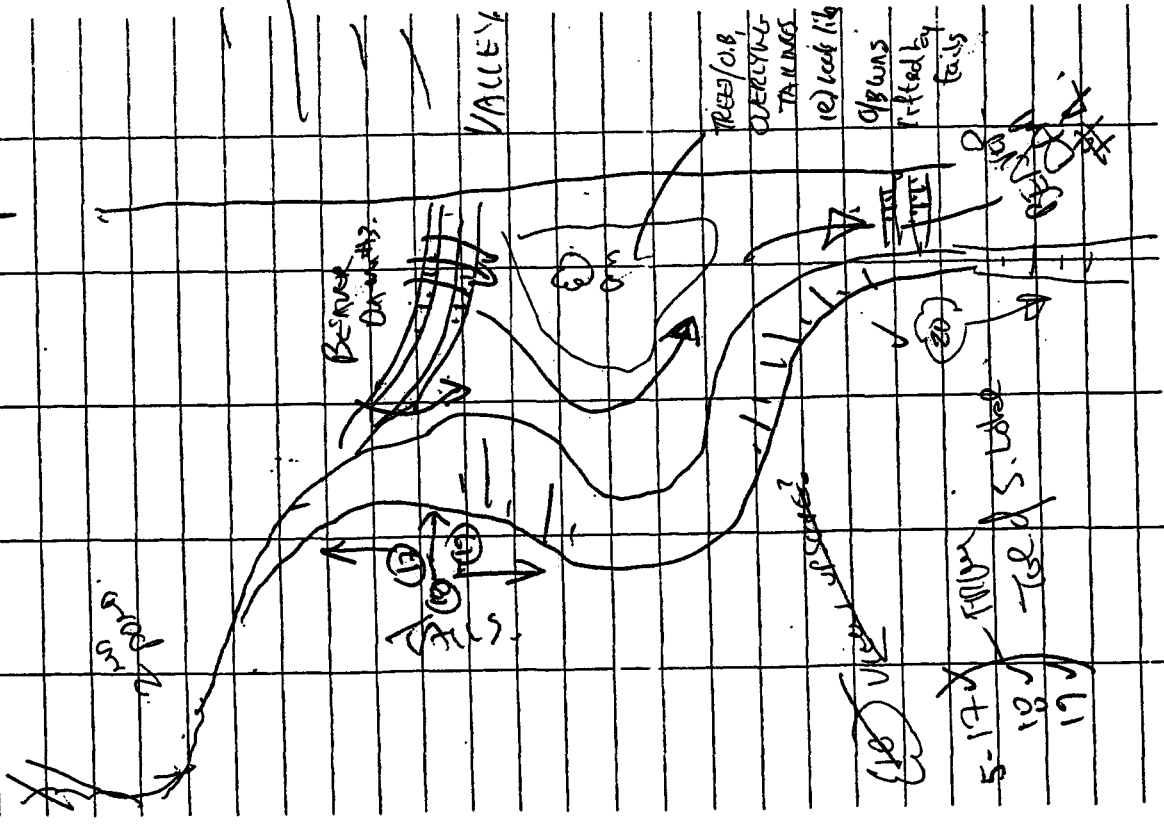
16 ✓ ABOVE 2 M.P.

POHOP.

FIELD

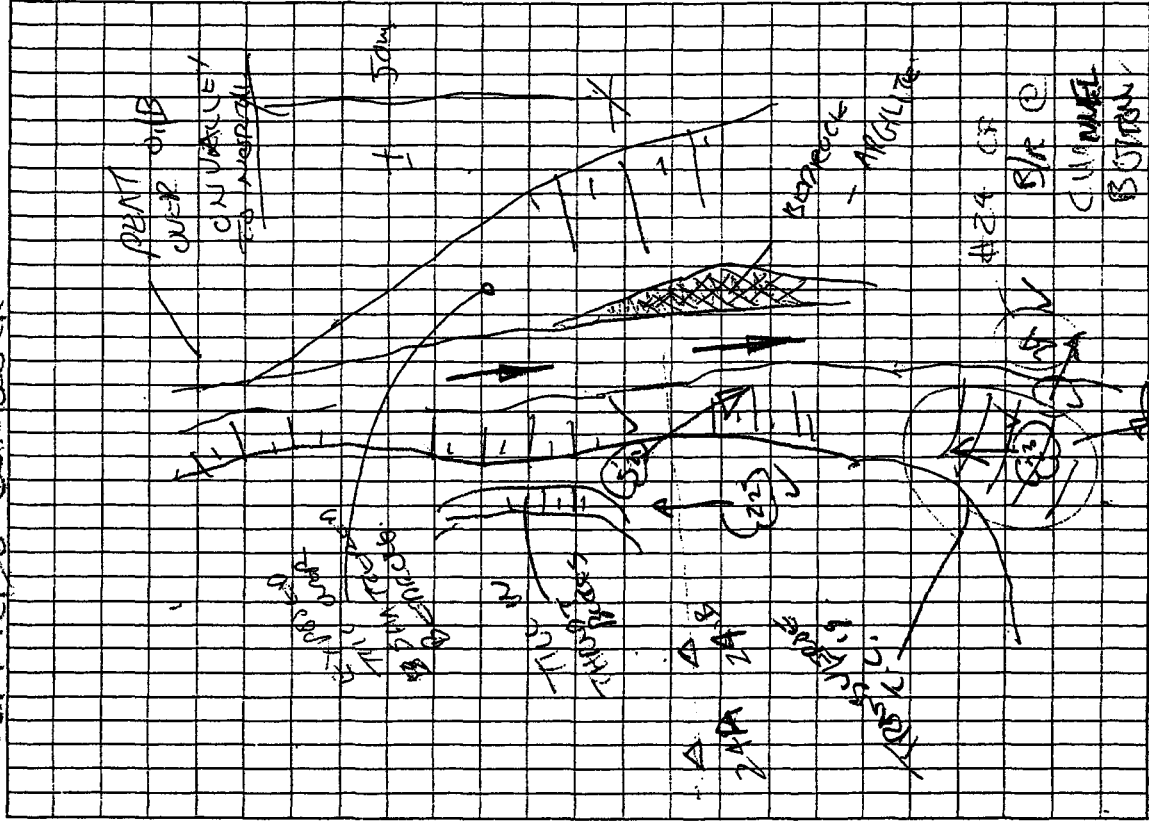
(24)

SEPT 12/88 CLINTON SF



(23)

SEPT 12/88 CLINTON SF



FIELD

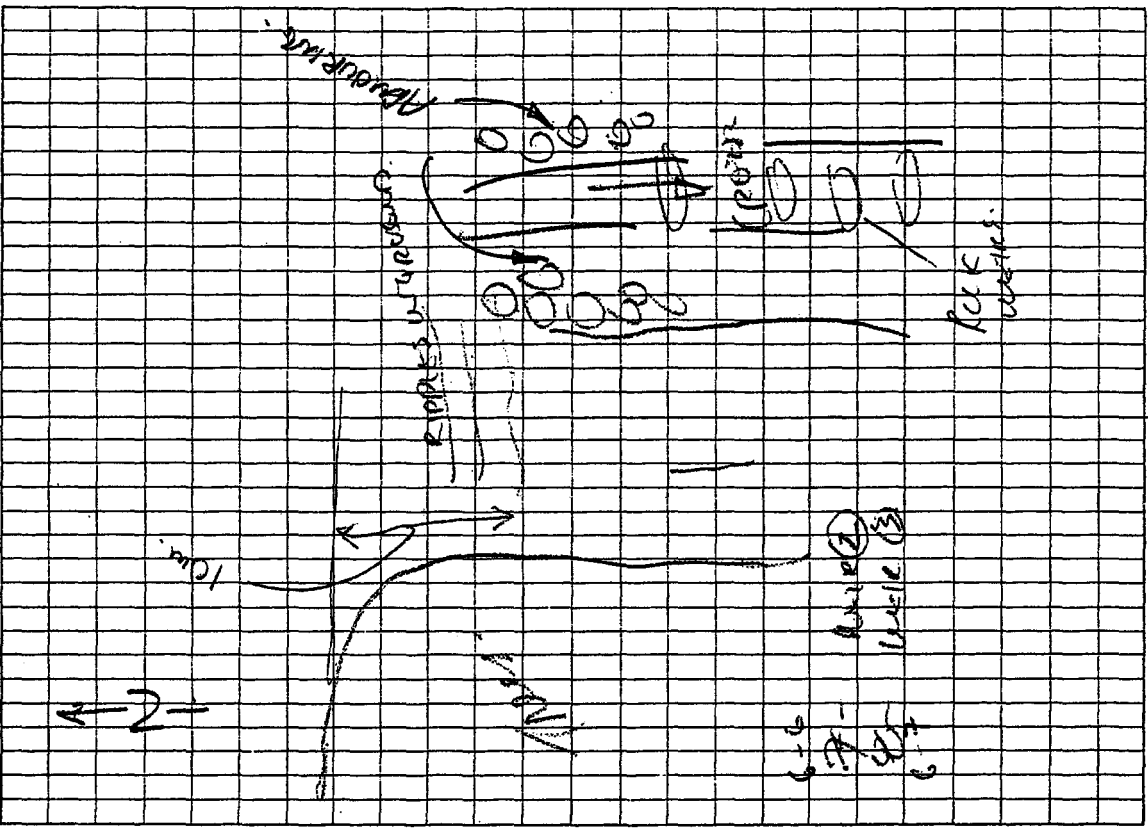
26

SEPT 12/98 CLINTON CK

| | | |
|---------|-----------|----------------------|
| Rock #5 | - strat.? | may |
| 10020 | cont | fluvial |
| Rock 6 | | |
| 6-0 | Relict | S-23 |
| 6-21 | | S-24 |
| 6-23 | | S-25 |
| 6-34 | Ureca | YSE TRAIL |
| | | T.C. 31 |
| 6-48 | - VIEW | N FROM 60m |
| | | S OF 80-9 |
| 6-56 | - VIEW | S DOWN RD |
| | | FROM 80-9 |
| | SETH | LIMIT OF MEASUREMENT |
| | CAUSE | RIPPLING ON GRUNTS |
| | SURFACE | ENDS HERE |

27

SEPT 12/98 CLINTON CK



FIELD

(20)

SEPT 12/96 CANTON CR

* SECONDARY FLOOD CHANNEL NOTED IN 1993 (600 END) - THIS BRAN NOT EVIDENT (NO FLOW VISIBLE)

→ PRESENTLY BRANDED TAILWAS?? *

6-80 - US FROM ± SONS OF START OF ARCHITECTURE

6-90 (10) US "

6-90 (11) VIEW D/S ALONG FILL IN SECONDARY BRAN CHANNEL. WEIRS.

FILL. ↑ T.L. 6-90

SECONDARY CHANNEL DRY.

(29)

SEPT 12/96 CANTON CR

6-11 (2) VIEW W/ ALONG FILL D/S SIDE OF CHANNEL (T.C.)

6-12 (10) JUNCTION OF BRAN CHANNEL VIEW W/ (S.T. KING)

6-12 (11) END OF ARCHITECTURE (S.T. KING)

6-12 (12) ARCHITECTURE CHANNEL DRY

6-12 (13) VIEW D/S ALONG FILL IN SECONDARY BRAN CHANNEL. WEIRS.

6-12 (14) T.L. 6-90

6-12 (15) T.L. 6-90

6-12 (16) T.L. 6-90

6-12 (17) T.L. 6-90

6-12 (18) T.L. 6-90

6-12 (19) T.L. 6-90

6-12 (20) T.L. 6-90

6-12 (21) T.L. 6-90

6-12 (22) T.L. 6-90

6-12 (23) T.L. 6-90

6-12 (24) T.L. 6-90

6-12 (25) T.L. 6-90

6-12 (26) T.L. 6-90

6-12 (27) T.L. 6-90

6-12 (28) T.L. 6-90

6-12 (29) T.L. 6-90

6-12 (30) T.L. 6-90

FIELD

32

SEPT 15/98 +10° PTRY SUNNY
RAIN @ 7:00PM.

CLINTON CREEK & WASTE ROCK
DUMP.

CREEK LIST:

→ SEEPING THROUGH WASTE ROCK
± 60M D/S FROM DUMPER

→ EVIDENCE OF ANNEALING
(POULDER ABOVE CREEK)

33

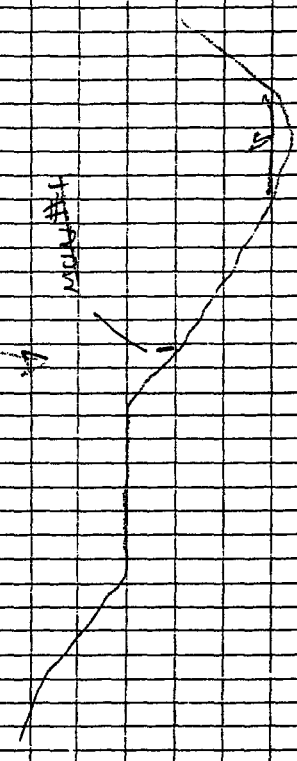
SEPT 13/98

WALKED UP FROM BRIDGE TO
WATER INDICATED LATER CIRCLED.

Ground Water

- PS MIDDLE NO
- INDICATED W/ DISCUSS MISSING
- BUT MONITORING (2) + CAME VISIBLE
- OLD WASTE ROCK SUMP

SECTION 153-
MOUNTAIN



FIELD

SEPT 13/98 CLINTON CREEK

- DEBRIS SLIDE DRAIN BANK + SW WEST OF PE PAT

- Partially dewatered channel, water according to Smith

- Spheres 1-2m x BEHAVIORS GRAPESITES P? (See plots # 7-9)

7-16 DIS FROM MATH PA

7-67 N "

7-78 U/S "

7-89 - Boulders in channel

- Bank on W SIDE ACCE 20cm HIGHT

- OVER STEEPENED (1") BUT RELATIVELY STABLE - BOUNDARY ALONG S TRENCH OF CREEK

ASK: RE MINING UNDERSTAND

FIELD

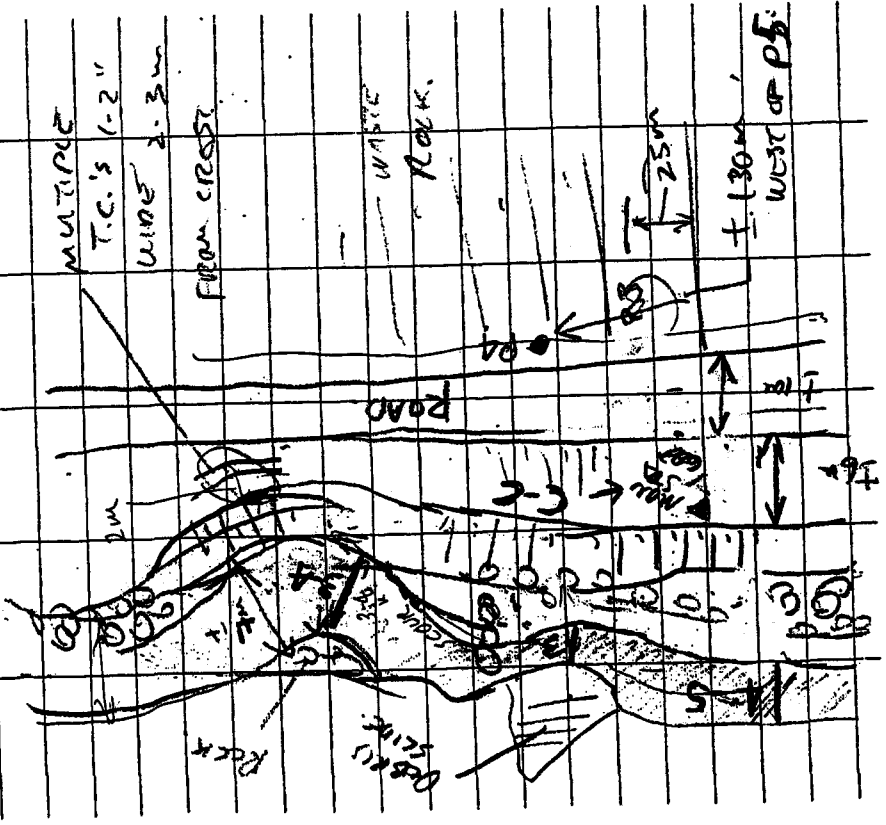
SEPT 13/98 CLINTON CREEK

MARKING FOR X-SEC C-C

MON 50A #469

- SOUTH BANK 8-10m HIGHT

X-SEC D-D GORE (SIN SURE ROAD)



CLINTON CREEK

SEPT 11/98

7-12 U/S
7-13 D/S
7-14 NORTH

T.C. REMNANT 6' WIDE
= 7m wide (FILLED)
(OLD) (7-15 7-14)

7-15
7-16 WITH FINGER
ON NEW MESS PIN.

PHOTO 7-17 + VIEWS FROM
CAMP ± 190m Wd PA

THE W.R. ROCK RICE OVER 5' DEEP
AND BENE UNO-CUT
BANK ± 15' HIGH.
- BP DRAIN TO SOUTH < 45°

(12) WAS DIPNOK TO MS (R)
UNUS. MORE, RAILS DRAIN TO SOUTH

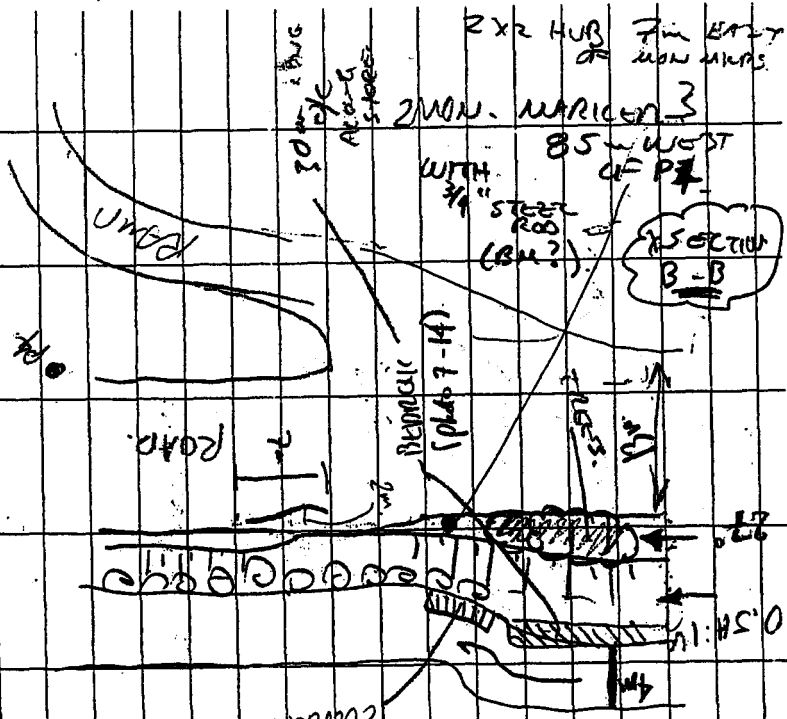
FIELD

CLINTON CREEK

SEPT 13/98

7-18 U/S @ 5:00 IN RICE FILL ± 30m W
FROM PA
7-19 U/S @ 5:00 @ 5:00 ON W. BANK "

PA - DRY - BENE ± 3.1m
TOP OFFICE 1-3m ABOVE GP.



(10)

SEPT 13/28 CLINTON CREEK

U/UNKN. MONUMENT MARKER
15 m E of P3

7-18 19 DIS }
7-19 20 DIS }
7-20 21 N. }
1/2 X 2 STAKE
(BE LIEVED TO BE X-502 AA)

OPPOSITE FROM P3: (7-22 VIEW DIS)

SIGNIFICANT QUARTZITE
SLIVERS OF WASTES ROCK
SEVERAL m. BACK FROM CREST

LARGE TREE (ABOUT 1000' HIGH)
STUMP BEING U/S.
(Photo 7-23)
7-22

BEDROCK CONTACT NO
FOLLOWER UNABLE ON
NORTH BANK JUST U/S FROM
HERE (± 25m?).

(11)

SEPT 13/28 CLINTON CREEK

P3
- R @ 5.6 km
- FORTAC STAMP @ 3.55
- BOTTOM @ 5.17
SC = 1.35 m.

- EXPOSED TILL ON
N. BANK U/S FROM
P3

- MONUMENT 4 m N
OF N. EDGE OF RD. OPPOSITE
FROM P3. (A large cl.)
(DISTRIBUTION MON 69)



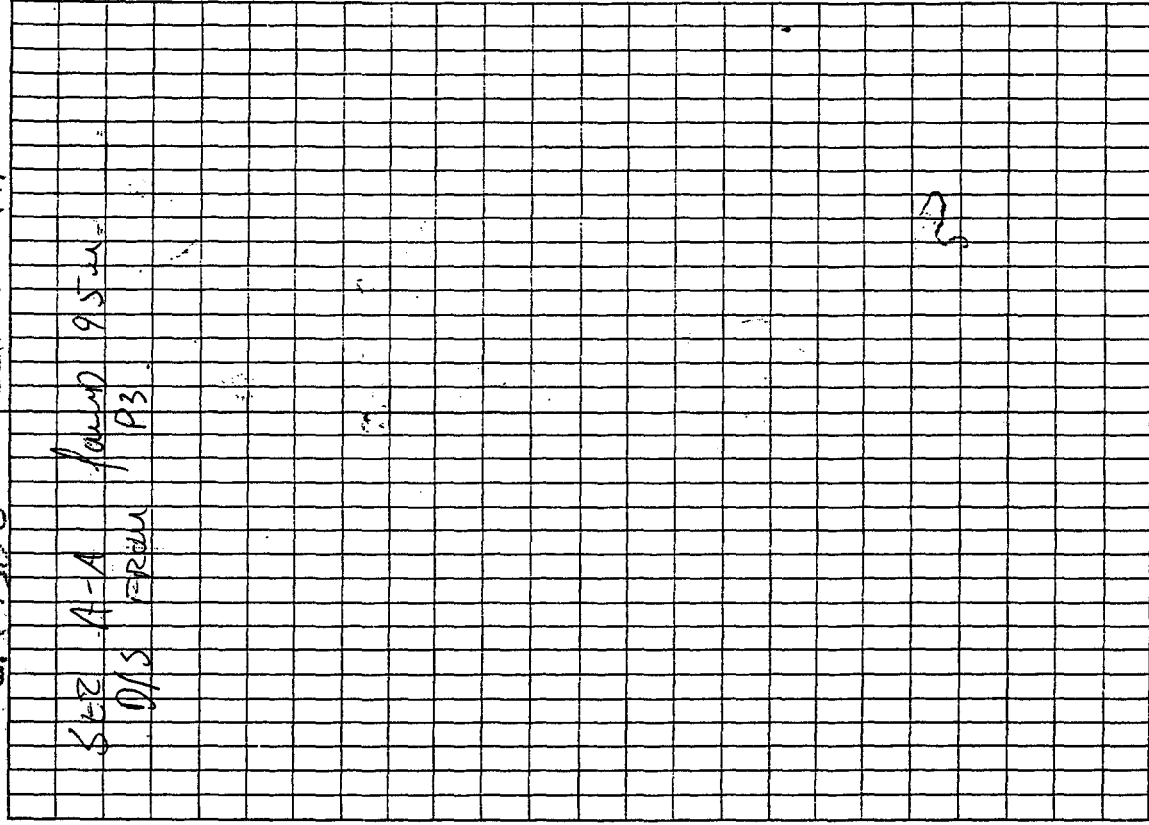
FIELD

(45)

CLINTON CR.

SEPT 13/98

SEP A-A FOUND 9.5m
D/S FROM P3



FIELD

(44)

SEPT 13/98 CLINTON CR.

P 8-13
 * 8-84 - PAVEMENT 1111m
 8-65 FROM ± 30m W/S
 8-76 FROM EXPOSED
 GASTROSTOME.

P2 → 9.30
 12m to Bottom of pipe
 (sediment in bottom)
 SU = 1.65

P1
 I 07.97
 13.5m.
 SU = 1.95

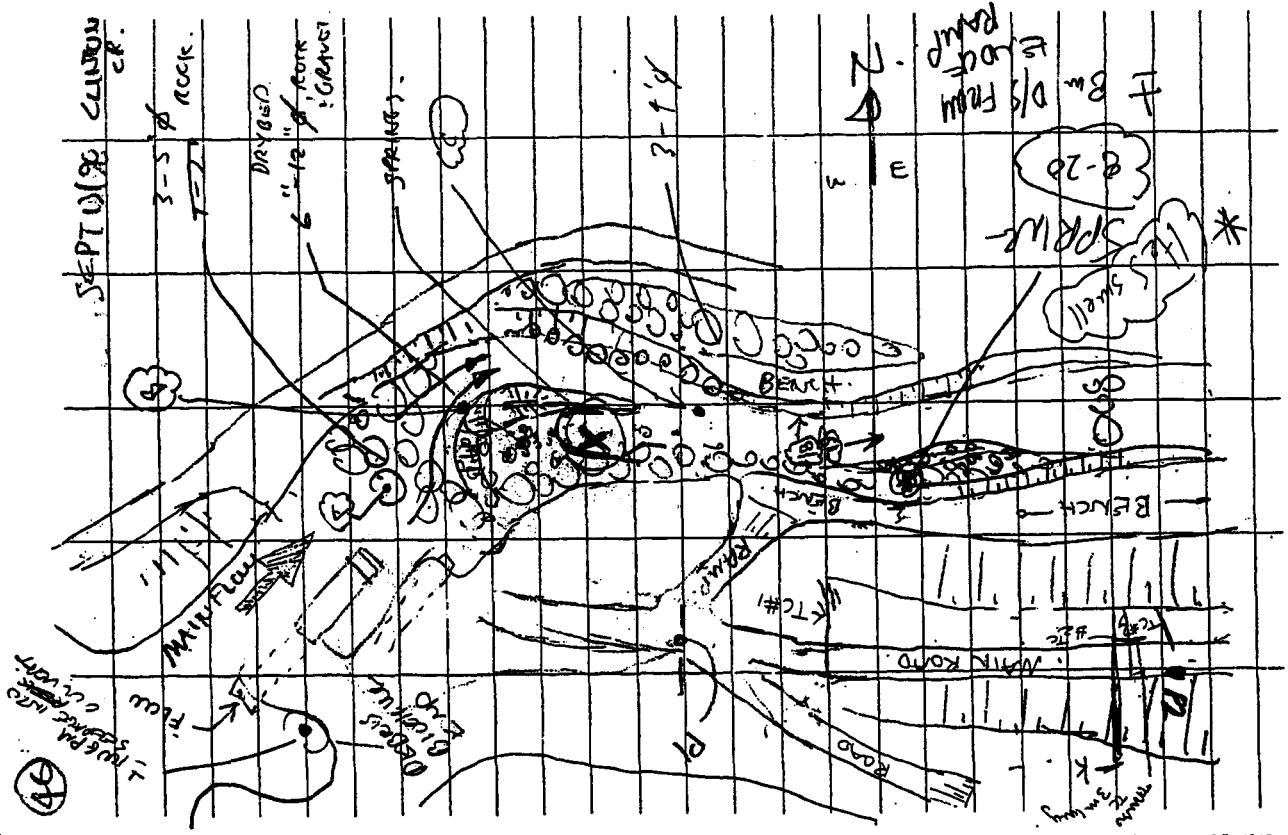
(47)

FIELD

SEPT 13/98 CLINTON CR

| | | |
|-------------------|-------|-----------------------|
| FROM POINT A | 8-8 | 7 D/S |
| | 8-9 | 8 SOUTH |
| | 8-10 | 9 U/S |
| | 8-11 | 10 NORTH |
| OUTLET TO POINT A | A - | 0.5m |
| | A - B | 2.0m |
| PHOTO | 8-12 | 8-13 |
| | | SPRING - U/S |
| | | B - D/S |
| | B - C | 1.1m |
| FROM | 8-14 | 13 U/S |
| | 8-15 | 14 NW |
| | 8-16 | 15 D/S |
| | 8-17 | view U/S @ spring |
| * SPRING | ± | 0.5m |
| | | 11cm |
| | | TRAIL IN MAIN CHANNEL |
| | | (50 6 PM - SPRING) |

SEPT 10/98 CLINTON CR



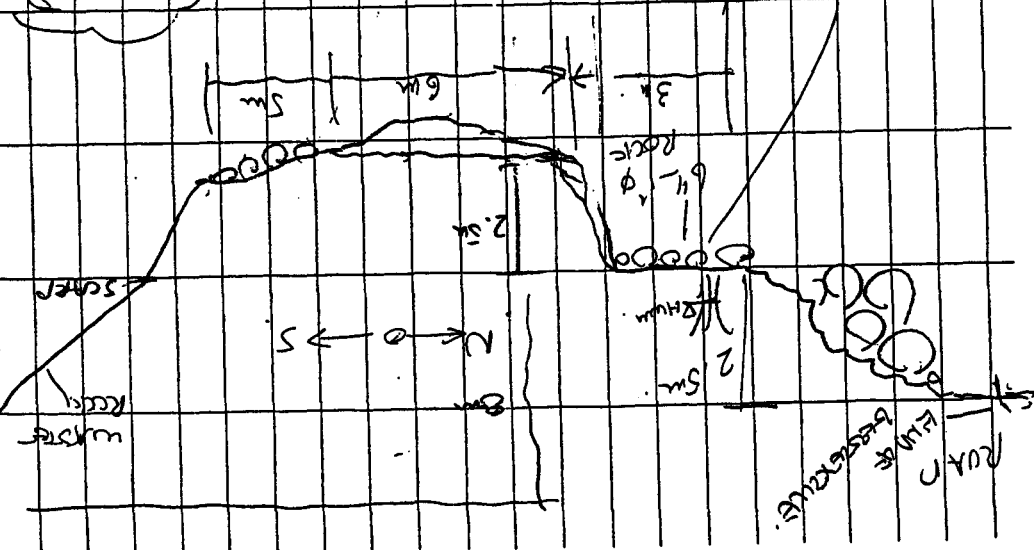
(48)

SEPT 13/98 CLINTON CR.

X-SECTION OPPOSITE FROM
D/S SPRING

8-23
PHOTO 8-24
57
cutting geotextile

8-24
8-25
VIEW US
FROM
EXP. BEST.



OLD
ROAD
CROSSING

ROAD
FIELD
DISTANCE

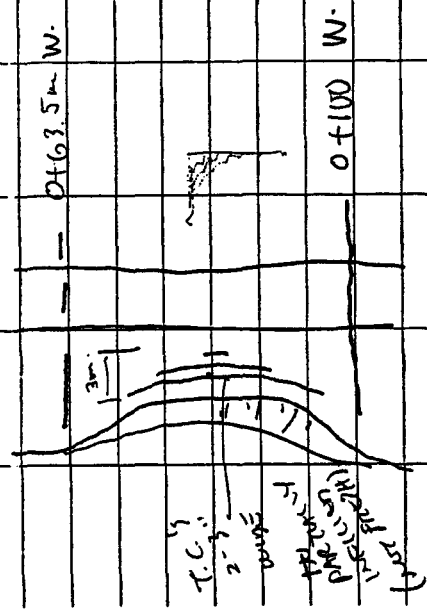
SEPT 13/98 CLINTON CR.

7-0 VIEW US @ X SECTION
CREEK
- RIVER HAS DEPOSITED
SOME F. SAND ON BANKS.
1-2' ABOVE BANK
ADJUST R/P P.M.

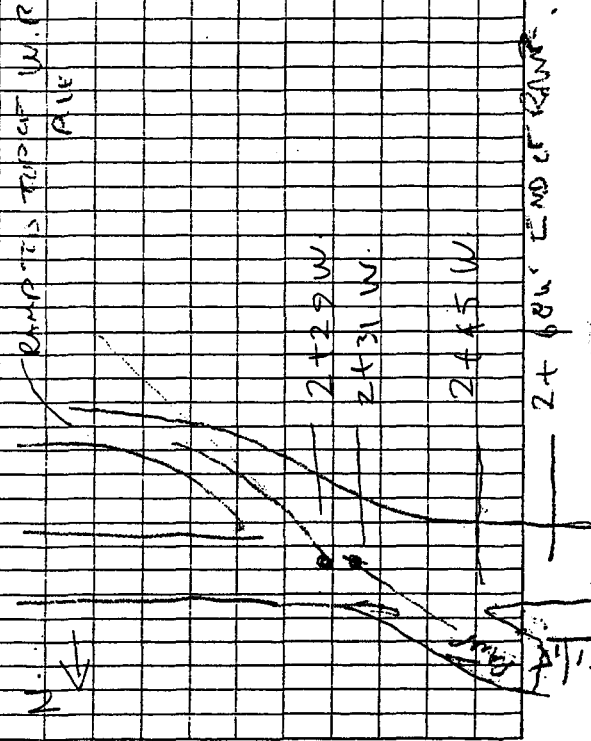
9-1
9-2 - RETAKE 8-25.

9-2
JEFF COLLINS MANSURGER
HELPER NANA GOOD!

| | |
|------------------------------|------------------------------|
| SEPT 14/28 | CLINTON CREEK |
| CHANGE ALONG CLINTON CR. RD. | |
| PS STA 0+10 | |
| CURB MARKER | POST NO 1 EVA 99 ✓ |
| | 150' E 150' S |
| | ACROSS 26/28 B. SANDER |
| | → NEXT POST 150' W / 150' R. |
| | → STA 20+00 W. |
| X-SEC ELS | STA 42+00 W. |
| | 0+100 W. |



| | |
|--------------------|---------------------|
| SEPT 14/28 | CLINTON CREEK |
| PD | 1+25.7 W. |
| X-SEC C-C | 1+50 SW. |
| T.C. 4' WIDE | 4' in long |
| | FRONT 14 26 TO 27 |
| | 6m NORTH OF RD. |
| 2' X 2' LUGS | 2+00 S |
| X-SEC BB - PP LUGS | 2+18.5 |
| | DAMP TO TOP OF W.P. |
| | PAVE |
| | 2+29 W. |
| | 2+31 W. |
| | 2+45 W. |
| | 2+60' END OF RANGE |



54

SPT 14/98 CLINTON CREEK

3/4" STEEL BAR IN S. SIDE OF
 P.D. (UNUSUAL) BUT FRAGGED
 @ 3+02 W.

CONSTANT GRADE FROM PS
 TO SECTION A-A (SHOULD BE
 ABLE TO CORRECT FOR TRUE
 HORIZ. DISTANCE)

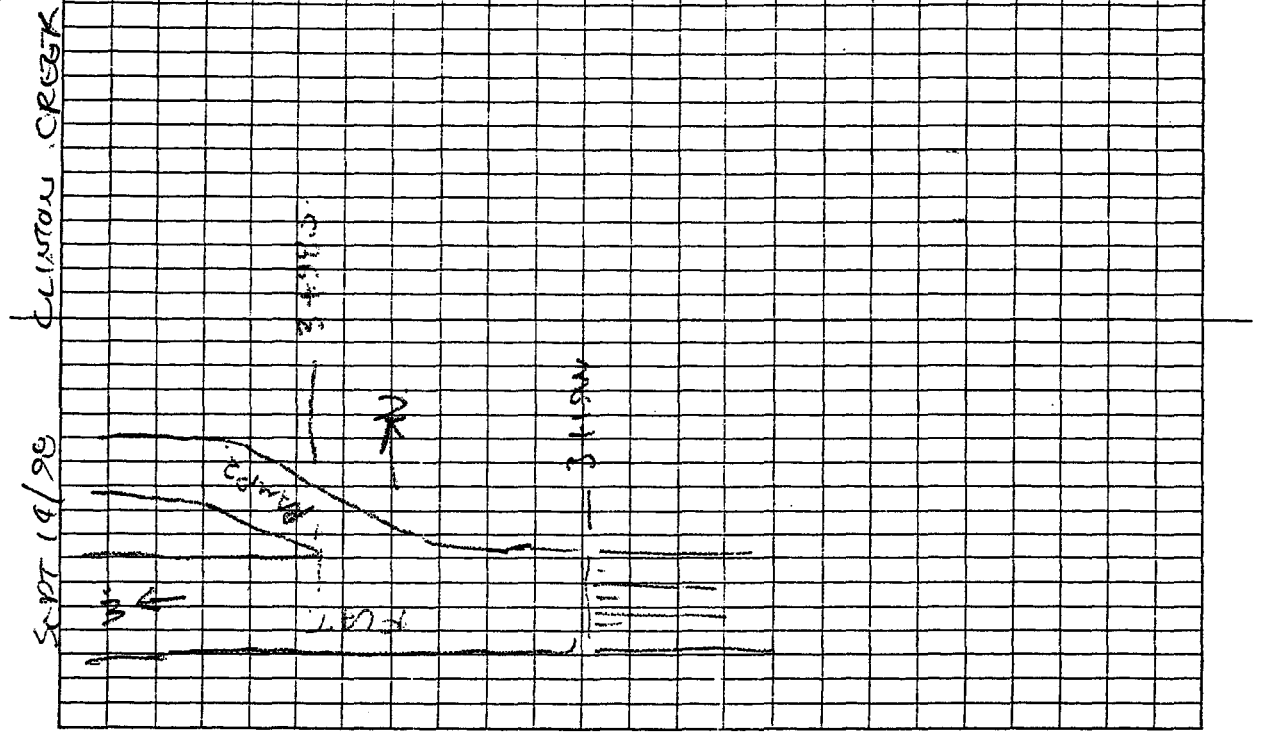
X-SEC A-A. 3+08 W.

TOP OF ROAD @ 3+19 W.

P3 3+52 W.

MON STA 69 3+55.5

55



FIELD

50

SEPT 14/98

CLINTON CREEK

X-SEC C.G.

3/4" PIN ± 1 ft
above gr. N side
of road, 7m N of &

4+88.5
6500 STAKE

5000

4+71.5

4+58.5

3+96.5

51

SEPT 14/98

CLINTON CREEK

TRANSU. T.C. @ 4+84.5
ACROSS RD.

P2 4+96.2

--- POLYMER PIPE RAPIDS @ 4+94

--- LOW ACULC. RD FOR 15m

--- PIN @ P2 ± 0.5m

--- CANTON ALLEY

--- X2" STAKES SEC K-K

--- 1/4" RE-BAR

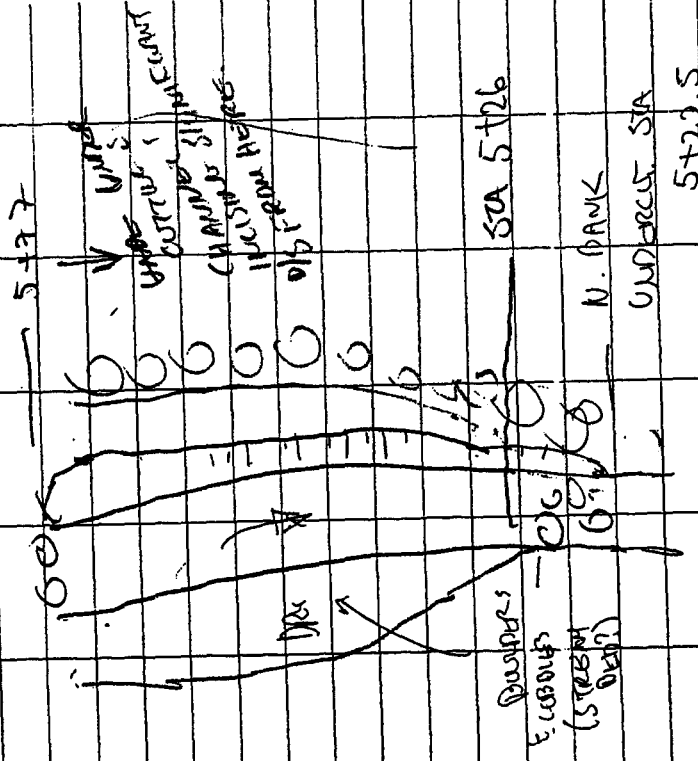
--- 5m N of & 50 5+22.4

FIELD

52

Sept 14/98

CUNYON CREEK



5+37.7

SOA 5+26

N. BANK

UNDERCUTS

5+22.5

FROM ~~37~~ 5+37 TO

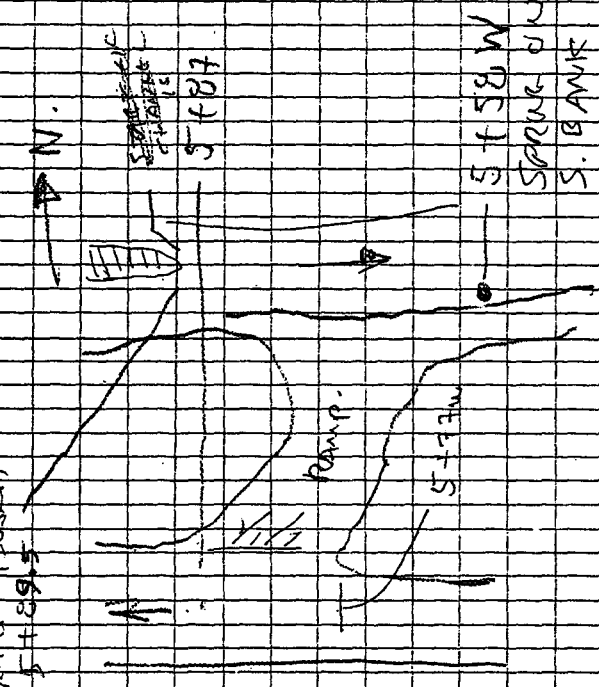
T.C.S. 5+42.5

4

Sept 14/98

CUNYON CREEK

START OF PUMP



N.

5+87

5+74

5+58 W

SPRING ON S. BANK

PI 5+85.0 W

5+91.5 - SPRAWL CHANNEL

UPR BANK OF 13 WIND @ 6+6.5

FIELD

60

SEPT 19/78 CLETON CREEK

1 YZ 1/4" REBAR
X-SEC I-S
6+27.2

EDGE OF CURB

CONCRETE 6+50

6+56.8

6+58



6+52

6+60.5

± 6+65.5

STICK OVER 10m.

51-04 = 13 seconds
RECURT.

27-A1 14 sec.

61

SEPT 19/82 CLETON CREEK

WALKED UP WASTES REAR CAMP

LOCATED MON 20-A

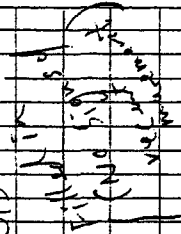
21-2

21-A

22-A

21-1 (ACID SPILL)

HUGHES 1K



0.22A

0.21A

TK 98

SCAPPOLOGY

(see Klok '87)

MON 9-3
9-4 VIEW N 2 way between

9-8 22-A

9-5 VIEW

(21A IN BACKGROUND FIELD)

(62)

SEPT 14/88 CLINTON CREEK

9-5 VIEW S FROM ± 60m
VIEW OF MON ST-1

SUMMIT OF W DIRT
TOWARDS LAKE.

ST-1

9-6 (D) - PAN

9-7 9

9-8 9

9-9 (U)

30m E of o/a CRATER
± 60m S of ST-1.

9-10 (U) T.C.'s across ROAD
RD WFO OPEN PIT.

9-11 (9-12) ± open pit.

9-12 #3

9-13 (9-14) FROM MINE BLGGS
LOOKING E DIRT OF
ROAD. ± CLINTON CR.

(63)

SEPT 14 CLINTON CR.

9-14 9-15 VIEW OF PERCYMINE CR

9-15 16 - FLOW ROOM W OF

9-16 17 MILLS.

9-17 VIEW OF HEAVY SPARK

± POSSIBLE CHANNEL
REMNANT.

WALKED DOWN ROAD AND FOUND

MILL ± UNIDENTIFIED.

HEAVY SPECKS (AL) (See Gen
Sketch).

SPARK LIVES W/ SCRAP
OF WASTED ROCK ± SUN

ABOVE ROAD

SEARCH ESY C ± 100' (30gpm).

SMALL SPUR TO LEFT (± 300').
± 300' ABOVE GR.

9-18 (9-19) SPARKS (A).

9-19 (9-20) - CRACK FROM SPARKS

ST. IN PICT

FIELD

(64)

CREEK WATER POND ± FROM
D/S WATER SAND CRACK
(LESS PLANT?) CUES 1/2 WAY
THROUGH WATER ROCK
TOWARDS WATERFALL.

9-20 ✓ NEW CHAINES
BELOW CUT.

✓ * CULVERT @ ROAD
CROSSING (NOW APPROX)

9-21 ✓ 2ND SPRING.

HEAVY FLOW AT
NOTED ON GEO DRUG.
+ 200 GRM
TO WATERFALL

- Sample Cues & debris
but highways to north
of main spring.

(65)

SEPT 14 90 CANTON CR.

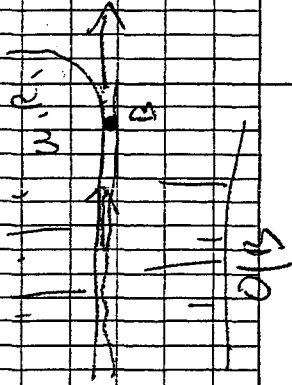
✓ 9-22 - VIEW CANTON
AT IT AT JUNCTION
AND 1/2 MILE CHAINES
FROM SPRING A

SPRING B 15-20 GRM

- FINE SAND/SILT DEPOSITED
D/S OF SPRING
RESISTANT TO PIPING.

✓ 9-23 - SPRING B CHAINES
JEFF S ARM.

- WATER TRUCKING DOWN
CATCH ABOVE SPRING B



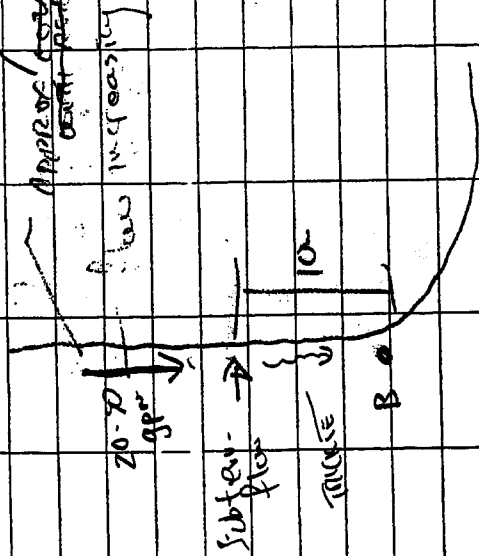
FIELD

(66)

HEAVY USE SUBSTRATE
FROM NOTED LOW RSCOPE
FROM SPRING (ALL IN TRACKS
OF WATER VISIBLE)

- HEAVIER FLOW VISIBLE
THROUGH LOW GRASS

LEVEL WITH
TOP OF MAIN
DEER
ORBITER EMIC.



(67)

SEPT 14 CUSTON CR.

HEAVY SUBSTRATE FLOW
FISH UP STAIRS FROM SPRING
P.

WATER IS PUMPED DOWN
SPRINGWAY NEAR TREES, ADJACENT
TO TOP OF ROCK FLOW
-31

✓ 9-24 RE-TERMINAL FLOW
AS DOWN O/S / MOUNTAIN
SPRINGS P.
- SW ABOVE ROAD
(EMIC. (EMIC.))

FLOW ENDS ± IN ASPECT
GROUND @ MILL
MOUNTAIN.

✓ 9-25 (MILL)

✓ 10-0 Re-terminated 9-25 @
END OF CULMINATION

WATER

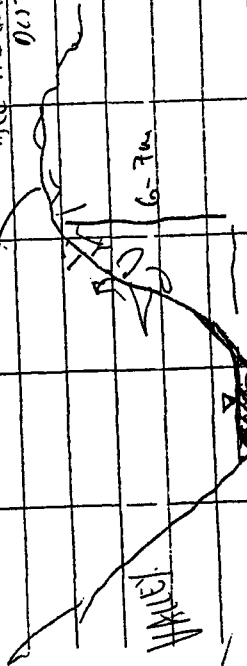
FIELD

70

10-16 ✓ TILL LIFTED UP
+ 100m W OF CREEK
(CASE W. B.G.)

UNCOVER N. A.M.U.G.
TILL RIDGE
TOWARDS WASTE MUCK
NEW ± 6m ABOVE

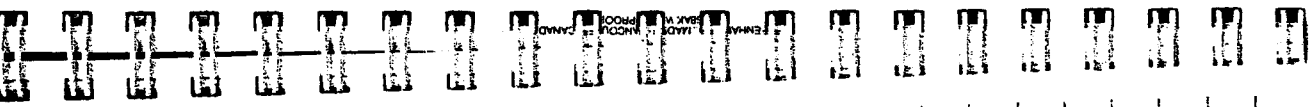
TREES, TILLS BIRMS
ALL HEAVILY
DISTURBED



BECKEN C TILLS PAINT

X-SECTION 100m DLS FROM
O.O. OUTLET.

(*) 17) - Pan from lake shore
18)
19)



71

SEPT 14/98 CUSTON CR.

20) ✓
21) - Pan from higher up
22) ✓ add to work

23) ✓
24) - Pan from Test Bldg
25) ✓

11-0 ✓ T.C. SCENE AREA

11-1 ✓ OPEN PIT

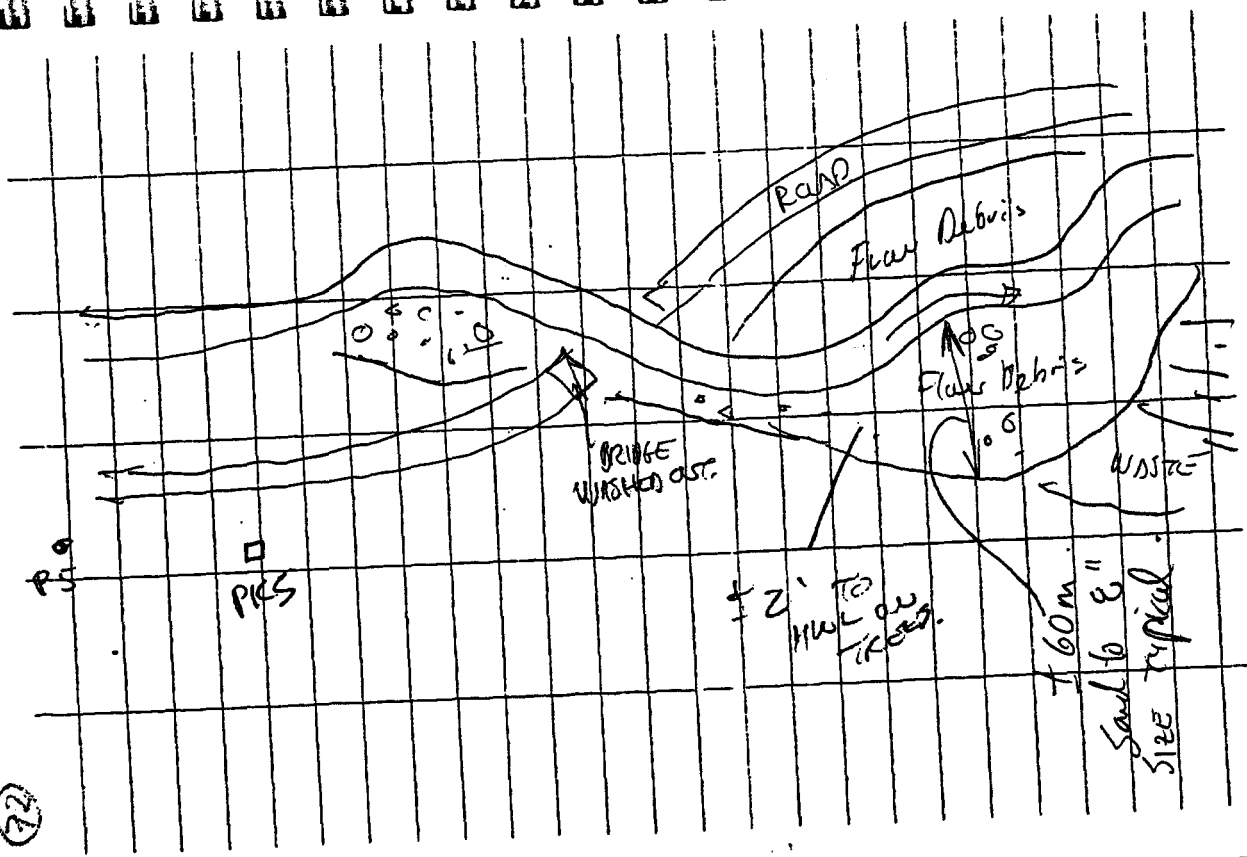
11-2 ✓
11-3 ✓ SPRING A. FROM RD FROM
FERRY DUGS

11-6 ✓ T.C.'s along road to M. 11

11-7 ✓
11-8 ✓ Pan d (11-12) in
11-9 ✓ FROM PAN ± 50m DLS
OF PS

11-10 ✓
11-11 ✓
11-12 ✓
11-13 ✓
11-14 ✓
11-15 ✓
11-16 ✓
11-17 ✓
11-18 ✓
11-19 ✓
11-20 ✓
11-21 ✓
11-22 ✓
11-23 ✓
11-24 ✓
11-25 ✓
11-26 ✓
11-27 ✓
11-28 ✓
11-29 ✓
11-30 ✓

FIELD



- ✓ 11-10) - VIEW U/S BRIDGE
- ✓ 11-11)
- ✓ 11-R) - Same Spot
- ✓ 11-B)
- ✓ 11-A)
- ✓ 11-L) - Fairbank
- ✓ 11-16) - WASHED OUT BRIDGE
- ✓ 11-17) - VIEW DIS OF BRIDGE (ATX KING)
- ✓ 11-18) - 3-4" Ø BRIDGE P.R.
- ✓ 11-19) - ± 150m S/S OF BRIDGE
- ✓ 11-20) - ON N SIDE OF CHANNEL (± 20m)
- ✓ 11-21) - PTO 16" RAKE
- ✓ 11-22) - (Channel 11-20)
- ✓ 11-23) - (11-16) ± 17 (D/S)
- ✓ 11-24) - 11-22
- ✓ 11-25) - TRAIL (Washed)
- ✓ 11-26) - 11-25
- ✓ 11-27) - 11-26
- ✓ 11-28) - 11-27
- ✓ 11-29) - 11-28
- ✓ 11-30) - 11-29
- ✓ 11-31) - 11-30
- ✓ 11-32) - 11-31
- ✓ 11-33) - 11-32
- ✓ 11-34) - 11-33
- ✓ 11-35) - 11-34
- ✓ 11-36) - 11-35
- ✓ 11-37) - 11-36
- ✓ 11-38) - 11-37
- ✓ 11-39) - 11-38
- ✓ 11-40) - 11-39
- ✓ 11-41) - 11-40
- ✓ 11-42) - 11-41
- ✓ 11-43) - 11-42
- ✓ 11-44) - 11-43
- ✓ 11-45) - 11-44
- ✓ 11-46) - 11-45
- ✓ 11-47) - 11-46
- ✓ 11-48) - 11-47
- ✓ 11-49) - 11-48
- ✓ 11-50) - 11-49
- ✓ 11-51) - 11-50
- ✓ 11-52) - 11-51
- ✓ 11-53) - 11-52
- ✓ 11-54) - 11-53
- ✓ 11-55) - 11-54
- ✓ 11-56) - 11-55
- ✓ 11-57) - 11-56
- ✓ 11-58) - 11-57
- ✓ 11-59) - 11-58
- ✓ 11-60) - 11-59
- ✓ 11-61) - 11-60
- ✓ 11-62) - 11-61
- ✓ 11-63) - 11-62
- ✓ 11-64) - 11-63
- ✓ 11-65) - 11-64
- ✓ 11-66) - 11-65
- ✓ 11-67) - 11-66
- ✓ 11-68) - 11-67
- ✓ 11-69) - 11-68
- ✓ 11-70) - 11-69
- ✓ 11-71) - 11-70
- ✓ 11-72) - 11-71
- ✓ 11-73) - 11-72
- ✓ 11-74) - 11-73
- ✓ 11-75) - 11-74
- ✓ 11-76) - 11-75
- ✓ 11-77) - 11-76
- ✓ 11-78) - 11-77
- ✓ 11-79) - 11-78
- ✓ 11-80) - 11-79
- ✓ 11-81) - 11-80
- ✓ 11-82) - 11-81
- ✓ 11-83) - 11-82
- ✓ 11-84) - 11-83
- ✓ 11-85) - 11-84
- ✓ 11-86) - 11-85
- ✓ 11-87) - 11-86
- ✓ 11-88) - 11-87
- ✓ 11-89) - 11-88
- ✓ 11-90) - 11-89
- ✓ 11-91) - 11-90
- ✓ 11-92) - 11-91
- ✓ 11-93) - 11-92
- ✓ 11-94) - 11-93
- ✓ 11-95) - 11-94
- ✓ 11-96) - 11-95
- ✓ 11-97) - 11-96
- ✓ 11-98) - 11-97
- ✓ 11-99) - 11-98
- ✓ 11-100) - 11-99

163
 SEPT 14/98 3 4 - CUSCO OF

30m NORTH
 - SCENE FROM DEBRIS
 USUAL ON MOUNTAIN
 OF DEBRIS (CROSSING)
 23m N - OF 5 MOUNTAIN -
 POSSIBLE BEAR DAM
 DAMIFIED
 A LITTLE DEBRIS VISIBLE ON
 NO DEBRIS FROM 30 FT + SOUTH
 MILLER DEBRIS VISIBLE
 98 - 1163
 DEBRIS VISIBLE BOTH DAMS
 U/S OF 1163 TO 2+14
 (Mention to road 0244A)
 130 TO END OF DEBRIS
 ± 452 TO d creek

FIELD

79

11-23 11:20
 ± 225m U/S of
 2+14 on
 CH-SWIFT
 Flag on ROAD
 Lateral extent of debris
 reduced (→ say 70m wide)
 CHANGE PACK TO
 BRIDGE
 OTED - EXTENSIVE BEAR
 DAM FLOOR - 20
 FROM DEBRIS VISIBLE
 11-23
 23? - END OF PALS.
 - Check NO'S.

78

SEPT 14 76 Cuscuta CR
 - ON DRIVE CUT
 - CORSE SPARK URBIC
 ON MOST OUTSIDE BENDS
 SURFICIAL KILOMETERS DOWN
 STREAM - POSSIBLE TURT TALS
 MATERIAL IS NATURAL
 NOT ASSOCIATED WITH
 OTHER FLOW-

2300
 24



Richard
 Schlaachter
 - Jimm Summers

1975 ~~1977~~ road 98

13-9 Helvetic Avenue
 AUG 10 TRIP
 13-10 5 FURROW RAPIDS (MEASURE)
 13-11
 13-12

CUSTOMY CREEK
 FROM TOP OF
 WINDY BRIDGE
 BLUE U.S. DE
 P.S.

14
 15
 16
 17
 18
 19
 20
 21

FIELD

o DEPART CLINTON CREEK CAMP
SITES 4.15

o ARRIVED WHITEHORSE @ 1:30 AM
TUESDAY

SEPT 15th / 92

ARRIVED W.H. @ 1:30

- MET WITH MERTZ / JAMES / MATT & DAVE

- G. FINISHED OFFICE @ 9:00

- CHANGED CLOTHING

FIELD

REFERENCES

Bowie, W.B. 1974. Inspections of Clinton Creek Mine Operations, ARMO Dawson City, June 10-11, 1974.

Geo-Engineering Ltd., November 1983. Clinton Creek Asbestos Mine – Report on 1988 Site Inspection.

Geo-Engineering Ltd., November 1986. Clinton Creek Asbestos Mine Abandonment Plan – Review Report.

Geo-Engineering Ltd., July 1987. Clinton Creek Asbestos Mine – Report on 1987 Annual Inspection.

Geo-Engineering Ltd., May 1993. Abandoned Clinton Creek Asbestos Mine – Report on Site Inspection.

Geo-Engineering Ltd., July 1998. Abandoned Clinton Creek Asbestos Mine Report on 1997 and 1998 Site Inspections.

Golder Associates, April 1977. Report to Cassiar Asbestos Corporation Ltd. on Stabilization Measures for Mine Closure.

Hardy Associates Ltd., December 1977. Report on Requirements for Development of a Rehabilitation Plan – Clinton Creek Mine, Cassiar Asbestos Corporation.

Hardy Associates Ltd., 1982. Cassiar Asbestos Mine, Waste Dump and Tailings Pile Inspection.

Hardy Associates Ltd., April 1984. Rehabilitation Recommendations for Clinton Creek Asbestos Mine.

Klohn Leonoff Consulting Engineers, August 1983. Report on Mine Waste Dumps.

Klohn Leonoff Consulting Engineers, November 1983. Report on 1983 Remedial Works – Mine Waste Dumps Clinton Creek Asbestos Mines.

Klohn Leonoff Consulting Engineers, August 1984. Clinton Creek Waste Dump and Tailings Piles - 1984 Site Visit.

Klohn Leonoff Consulting Engineers, September 1986. Clinton Creek Asbestos Mine Abandonment Plan.