BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

DELOITTE & TOUCHE INC.

2005 ANNUAL REPORT

FRESH WATER SUPPLY DAM BREACH PROJECT
FARO MINE, YUKON

FINAL

PROJECT NO.: 0257-033-01
DATE: FEBUARY 16, 2006

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Project No. 0257-033-01
February 16, 2006

Mr. Doug Sedgwick
Deloitte & Touche Inc., as Interim Receiver for Anvil Range Mining Corporation
Suite 1900, TD Centre
79 Wellington Street West
Toronto, ON
M5K 1B9

RE: 2005 ANNUAL REPORT
FRESH WATER SUPPLY DAM BREACH PROJECT, FARO MINE, YUKON

Dear Mr. Sedgwick:

Please find attached our Annual Report for the Fresh Water Supply Dam Breach Project (FWSB) at Faro Mine. This report has been prepared to comply with the terms of Water Licence QZ03-058. This report contains an assessment of the physical performance of the breach, a report on the success of the re-vegetation activities and a report on the aquatic environment. Copies of this report have been issued in accordance with the distribution list noted on the cover.

If there are any questions regarding this report, or if you require any other services, please contact the undersigned at your convenience.

Yours truly,
BGC Engineering Inc.
per:

Gerry Ferris, M.Sc., P.Eng.
Geotechnical Engineer

encl.: Final report
GWF/sf

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LIMITATIONS OF REPORT

This report was prepared by BGC Engineering Inc. (BGC) for the account of Deloitte & Touche Inc. The material in it reflects the judgement of BGC staff in light of the information available to BGC at the time of report preparation. Any use which a Third Party makes of this report or any reliance on decisions to be based on it are the responsibility of such Third Parties. BGC Engineering Inc. accepts no responsibility for damages, if any, suffered by any Third Party as a result of decisions made or actions based on this report.

As a mutual protection to our client, the public, and ourselves, all reports and drawings are submitted for the confidential information of our client for a specific project and authorization for use and/or publication of data, statements, conclusions or abstracts from or regarding our reports and drawings is reserved pending written approval by BGC.

1.0 INTRODUCTION

1.1 Background

The Fresh Water Supply Dam Breach (FWSB) Project was undertaken in November/December 2003, in accordance with the terms and conditions provide in Yukon Water Licence QZ03-058 (the Licence). The Licence is in effect until December 31, 2008 and provides details on reporting, effluent quality standards, monitoring and surveillance required for this project.

The 2005 Annual Report provided herein has been prepared in accordance with the provisions of Part A, Sections 13 and 14 of that Licence. This report provides a summary of the performance of the breached FWS Dam at the Faro Mine site. In addition to commentary related to the physical performance of the engineered breach section, this report provides details regarding the re-vegetation of the reservoir and the aquatic life in the South Fork Rose Creek channel, tributaries within the former reservoir and channel downstream. Deloitte & Touche Inc. (Deloitte) is the Interim Receiver for Anvil Range Mining Corporation (ARMC) and currently manages the site activities. This report was prepared by BGC Engineering Inc. (BGC) based on information collected by BGC staff, ARMC site staff, White Mountain Consulting (WM) and Laberge Environmental Services (Laberge).

This report presents water quality monitoring results as required by Part C, Section 25 and Part D, Section 33 of the Licence. The field monitoring information presented in this report was gathered by ARMC staff. The physical monitoring program required in Part C, Section 33 of the Licence was performed by BGC.

The annual inspection and assessment of the re-vegetation work undertaken in the former reservoir and the breach, required in Part C, Section 34, was performed by Laberge and is attached to this report.

An assessment of the riparian conditions, availability of spawning and rearing habitat and fish sampling performed by WM is attached. The need for assessment was outlined in the original design report (SRK et al. 2003) and the Environmental Management Plan (EMP) prepared as part of the Water Licence application.

1.2 Scope of Services

BGC provided a proposal (No. 05-006) for the preparation of this Annual Report. The scope of work described in the proposal was:

1. Provide input, review and interpretation of monitoring data collected by site staff at the FWSB project site. Prepare and submit monthly reports on the monitoring activities to the Water Board (as per Part A, Section 15 of the Licence).

2. Perform a May site visit to examine site conditions at the FWSB and K8 Creek project sites following the spring freshet, as recommended in the 2004 Annual report.
3. Perform a September site visit to examine conditions near the end of the open water season.
4. Prepare and submit the Annual Report for the FWSB project.

Authorization to proceed with the work was provided by Mr. Doug Sedgwick of Deloitte via a letter dated June 21, 2005.

2.0 FACILITY OVERVIEW

Faro Mine is located in the central Yukon, approximately 200 km north-northeast of Whitehorse. The mine site is situated approximately 22 km north of the town of Faro, as shown in Figure 1. The former FWS Dam and reservoir are located south of the main access road to the Faro Mine, approximately 5 km from the mine guard house.

The FWS Dam was constructed in 1968 on the south fork of Rose Creek. The FWS Dam was a zoned earth fill dam used to store fresh water for mine-processing operations during the operational life of the mine. The FWS Dam was approximately 410 m long, 20.5 m high at its highest point and 6 to 7 m wide at the crest. The slope of the downstream face of the dam was approximately 2H:1V and the slope of the upstream face of the dam was approximately 2.6H:1V. A 30 m wide, 3.2 m deep concrete spillway is located at the north abutment of the breached dam. The crest of the FWS Dam is at a nominal elevation of 1099.3 m above mean sea level (amsl), based on the geodetic survey conducted in 2002.

The FWS Dam was breached in a controlled manner in November/December 2003, in accordance with a design and regulatory requirements prepared for that project. Design for the breach of the dam was presented in a Final Design Report (SRK et al. 2003). Information related to the construction activities during the breach was presented in an As-Built Construction Report (SRK & BGC 2004).

The main elements of the dam breach design included (SRK et al. 2003):

- An engineered breach through the body of the dam along the approximate alignment of the original creek channel.
- Re-establishment of the pre-construction creek through the reservoir.

The design approach for the breach included the concept of adaptive management for the former reservoir and in the channel downstream of the construction area. Adaptive management in this case meant that the re-forming channel in the former reservoir and the remaining portion of Fresh Water channel would not be engineered per se as part of the breach work, but evaluated and remediated on an as-needed basis.

The breach and channel construction completed in 2003 consisted of a 315 m long section through the former footprint of the dam, as shown in Figures 2. The main components of the breach works are; the floodplain (20 m wide), the channel (8 m wide), the erosion protection along the edge of the floodplain, the inlet structure and the five riffles within the channel.

3.0 MONITORING RESULTS

Monitoring of the flow quantity and total suspended solids (TSS) in the South Fork Rose Creek is required as part of the Licence. Two sampling points are specified in the licence: FWSB#1 is located at the gun club bridge approximately 1.5 km upstream of the limit of the reservoir and FWSB#5 is located downstream of the limits of the 2003 construction area, as shown on Figure 1. These sample points were monitored twice per month during the period April through August. Yearly water quality monitoring is required at FWSB#6, which is located adjacent to the potential acid generating (PAG) spoil pile, Figure 1. The results of this monitoring were submitted in a series of monthly reports to the Yukon Water Board; a copy of the monthly reports is included in Appendix A.

A summary of the monitoring results obtained for FWSB#1 is contained in Table 1. Flow measurements were not collected in April 2005 due to ice cover. This data is also plotted in Figure 3, showing a higher TSS value during the higher flow periods and no or minimal TSS during low flow periods. The results for FWSB#5 are contained in Table 2 and are plotted in Figure 4. Similar to the results for FWSB#1, the higher TSS values correspond to the higher flow period. Due to safety concerns for site staff performing the flow monitoring (typically flow is measured using a current meter while wading), the flow was estimated using the floating object method in May at FWSB#5. This method is less accurate than using a current meter.

A comparison of the TSS measurements from 2004 and 2005 at the two stations is contained in Figure 5. This shows that TSS is generally higher downstream of the former reservoir (2005 maximum TSS of 8 mg/L) and breach works than upstream (2005 maximum TSS of 3 mg/L). Figure 5 also shows that TSS values are lower in 2005 than in 2004 for both stations.

A comparison of the measured flows from 2004 and 2005 at the two stations is provided in Figure 6. This data indicates that the flow in July and August of 2005 was between 50% and 100% larger than in 2004. In 2005, the flow measured at FWSB#5 was always greater than FWSB#1, likely due to the inputs from the two main tributaries. In 2004, the flow at FWSB#5 was equal or slightly less than FWSB#1 despite the additional flow from the two main tributaries. The condition in 2004 was likely caused by losses to groundwater flow in the dryer conditions.

As noted in the 2004 annual report, the peak TSS levels were in the range predicted in the design report. The peak TSS measured in 2005 was approximately one order of magnitude lower than in 2004. This likely indicates that the majority of the loose sediment deposited during the life of the reservoir has been removed by the flowing water in 2004. Confirmation of this preliminary conclusion will have to be confirmed by monitoring in the subsequent years. Of note the background TSS measurements at FWSB#1 was significantly lower, (3 versus 26), in 2005 than 2004 which indicates that there was generally less suspended sediment in 2005 than 2004. The ratio of peak TSS (FWSB#5 divided by FWSB#1) was 3.7 in 2004 and only 2.7 in 2005, indicating a decrease in the proportional sediment picked up in the reservoir base has occurred.

The chemical testing results for water collected at FWSB#6, the run-off from the potentially acid generating (PAG) spoil area (Figure 1), are shown in Table 3. Included on this table are the maximum discharge criteria provided in the Licence. Based on the grab sample tested, the water did not exceed any of the License criteria.

4.0 GEOTECHNICAL INSPECTION

BGC staff members were on-site twice during 2005 to undertake visual inspections of the completed construction works at the FWS Dam breach and K8 locations. Mr. G. Ferris, P.Eng. visited the Faro Mine site during the period May 26 to 28, 2005. The purpose of this May visit was to inspect the performance of the constructed works, the creek and tributaries following the spring freshet period. Mr. J. Cassie, P.Eng. visited the Faro Mine during the period September 12 to 14, 2005. This inspection corresponded with the annual inspection visit for other facilities at Faro Mine and documented the conditions at the end of the open water season, during low flow.

On both occasions, the facilities were inspected during a walking tour. A camera and dictaphone were used to record conditions and observations. The photographs, along with recorded observations, are compiled into a Field Record Summary that is kept in BGC's files. The observations made during the May and September site visits are summarized within this section of the report. The observations of the more recent September visit took precedent over observations made in May. In addition to these two main inspection visits, BGC personnel were onsite for other projects and made brief inspections of the area.

The purpose of the site inspections was to examine the facilities in detail for evidence of deficient performance, to provide a basis for possible adjustment to the frequency of monitoring and to review points of immediate concern which require maintenance with site representatives. Upon return to the office, an inspection memo was prepared that outlined the status of the various structures inspected, highlighted items of concern and items requiring immediate attention. A copy of the inspection memos are attached in Appendix B.

Two different views of the FWSB project area are shown in Figure 7. Included on the aerial view from 2004 are the locations of the inlet structure, tension crack, and erosion gullies. The locations of these features, except the erosion gullies, are also shown in the top photo of Figure 7 as viewed from the crest of the dam.

In general, the channel section through the breach has worked as designed. The majority of the creek flow is concentrated in the channel section, even during the highest flow period of 2005, as shown in Figure 8. During lower flow conditions, all the flow is within the channel (Figure 8). During the high flow period, erosion of some of the soil at the downstream limit of construction occurred which has created another riffle zone. The erosion has created some sloughing of the banks (Figure 8).

Channel movement has occurred within the former reservoir and sand and gravel bars have been created in the channel through the reservoir. This has resulted in changes to both the cover available for fish and to the river morphology as discussed in the aquatic report. These types of changes were expected given the "adaptive management" approach selected for the channel within the former reservoir (SRK et al. 2003). No blockage of the channel has occurred.

The constructed breach section is performing as designed (Figure 9) with some movement of the riprap at the crest of the riffles is occurring but nothing that requires remedial work.

Some cracks and slumping were evident above the upper limit of the erosion protection. This slumping appeared to be related to the steep nature of the excavations made to install the erosion protection. One larger-scale tension crack was encountered on the south bank of the excavation section between Riffle 1 and Riffle 2, as shown on Figure 10.

A significant slough previously developed on the south valley wall, just upstream from the south abutment of the breached dam. A view of the development of this slough is shown in Figure 11. The slough appears to be driven by seepage from the valley wall. The slough appears to be partially stabilizing itself and this process should be monitored. Visual monitoring should be undertaken to ensure that seepage water does not carry any sediment into the nearby creek.

Small erosion gullys have formed on the right bank of the breach, between the inlet structure and riffle 1 (Figure 10). These gullys have formed due to overland flow on the surface of the upstream seepage blanket of the dam. Some of the gullys appear to have formed self armouring as they have eroded and others have not yet formed this armouring. Due to the gully formation a small amount of sediment has been deposited on the surface of the erosion protection and onto the floodplain surface. This amount of deposition is not significant for the performance of the erosion protection or the floodplain, however placement of a small berm could arrest the development of the gullys.

Some tension cracks have formed above the erosion protection (Figure 10). This is due to the over steeped slope created for the installation of the erosion protection.

During the May 2005 inspection, the berm placed around the PAG stockpile was full of water. This water was sampled (FWSB 6) and tested and the results were reported in Section 2 and summarized on Table 3.

In 2004, riprap was placed within the K8 Creek tributary in a location where significant erosion was occurring (BGC 2004). In 2005, some movement of the riprap occurred and it was recommended that some minor repairs be carried out. The minor repairs (placement of additional riprap) were completed by site personnel (Figure 11). The riprap appears to have arrested the erosion (Figure 11) although there are still some changes occurring downstream from the protected area, within the borrow pit. A distinct channel is beginning to form downstream from the borrow pit, although this process is not yet complete.

5.0 RE-VEGETATION

Observations of the re-vegetation efforts in the reservoir area were made by BGC in both May and September. Photos of the re-vegetated area are shown in Figure 12, and additional photos are contained in Appendix C.

The re-vegetation monitoring program described in Part E of the license was performed in 2005 by Laberge; their full report is included as Appendix C. The Laberge report covers two aspects:

1. An assessment of the re-vegetation undertaken by Arctic Alpine Seed Ltd. in 2003 and 2004, as well as natural re-vegetation, and
2. A description of any evidence of erosion.

The evaluation of the re-vegetation success was undertaken for the five different phases of planting.

- Phase I planting occurred between Elevations 1096 and 1090 m amsl in June 2003. In July 2005, this area had an overall vegetative cover of greater than 90%. Very little natural re-vegetation is occurring in this zone due to the success of the planted vegetation.
- Phase II planting occurred between Elevations 1090 and 1086 m amsl in September 2003. In July 2005, this area had an overall vegetative cover of approximately 70%. The majority of the non-vegetated area was thought to be due inconsistencies in the rate of seed application, variations in soil nutrients, birds feeding on disturbed seeds, or the movement of seeds by wind or water before germination. Some areas with less dense cover from the seeding are showing signs of natural colonization by pioneering plant species.

- Phase III planting occurred in September 2003 and consisted of planting of willows in the riparian zone as a trial to show the success of the proposed planting methodology. The survival rate in the zone was noted to be poor.
- Phase IV and V planting occurred on the newly exposed bottom of the former freshwater reservoir in June and July 2004. In July 2005, this area had an overall vegetative cover varying from 30 to 60%. The seeded grasses were growing mostly in depressions, probably the result of seeds having been carried there by wind or water before germination. Some of the lowest areas were totally bare as these areas were likely still under water at the time of seeding. The lower success rate in the Phase IV area as compared to Phase I and II areas is thought to be in part due to the storage of seeds over the inter winter of 2004 in an unheated area.

The floodplains adjacent to the dam breach had a vegetative cover ranging from 10 to 30%. This low cover was likely due to the flooding experienced during the 2004 and 2005 freshets.

The upper part of the dam had a vegetative cover between 40 to 50%. The lower part of the dam had an approximate 60% vegetative cover. The slide slopes of the breach had a 10% vegetative cover. The cover on the breach consists of both the seeded species as well as natural re-vegetation.

The spoil areas had a very sparse vegetative cover, estimated to be 10%.

In addition to the above mentioned seeding, in 2004, the riparian area was planted except for a small portion of the northeast tributary where the final channel location was not yet established. Evaluation of these sites in July 2005 indicated the staked willows on the floodplains upstream and downstream of the dam breach had a survival rate of 80% to 95%. A much lower survival rate of 10% to 30% was observed for the willows staked along the upper tributaries.

The assessment of the re-vegetation performed in 2005 indicated that the site is performing very well and only two areas should be treated with further efforts in the future: the slough near the left abutment and that portion of the North Tributary that has not yet formed a distinct channel.

6.0 AQUATIC ENVIRONMENT

An evaluation of the aquatic environment, as described in SRK et al. 2003 and the EMP for the project, was completed by WM. Their full report is attached in Appendix D.

WM presented information related to fish species and habitat conditions within the five reaches covering the former reservoir, the breach section and a reach downstream from the breach construction area. This study also covered a short reach of Rose Creek downstream from the lower limit of the Rose Creek Diversion Canal to Station X14. A full description of the reaches, including justification for the reach breaks, is contained in the WM report.

The study made the following conclusions concerning habitat and fish utilization in the study areas:

- Reach 1 has excellent fast water cover for small fish in the form of deep spacing between boulders and turbulent flows. 47 Arctic grayling, three Burbot and 22 Slimy Sculpins were encountered during electro-fishing (total from two passes).
- Reach 2 has very limited cover. Five Arctic grayling, no Burbot and 69 Slimy Sculpins were encountered during electro-fishing (total from two passes).
- Reach 3 has limited amounts of cover occur in the upper parts of the reach, but the cover increases from undercut banks and increased depth in the portion of this reach. Several areas of the reach may provide possible Arctic grayling spawning areas. One Arctic grayling, three Burbot and 77 Slimy Sculpins were encountered during electro-fishing (total from two passes).
- In Reach 4, the newly created channel provides good fish habitats. Fish cover amongst the cobbles and boulders is enhanced by the depth and the adjacent riffles. Four Arctic grayling, One Burbot and 10 Slimy Sculpin were encountered during electro-fishing (total from two passes).
- In Reach 5, boulders and cobbles are clear of fines and provide good interstitial spacing. Well established riparian vegetation exists through the reach. 30 Arctic grayling, one Burbot, 11 Slimy Sculpins and one Chinook Salmon were encountered during electro-fishing (single pass).
- Electro-fishing was not conducted at location X-14 (Rose Creek downstream of the Rose Creek Diversion Canal) in 2005; however, the nine minnow traps captured six juvenile Chinook salmon.

A summary comparison (2004 and 2005) of the electro-fishing results is included as Table 4.

The conclusions of the fish utilization study were:

- Slimy sculpin adults were well dispersed throughout the study area, sculpin fry (0+ years) were common in Reach #3, uncommon in Reach #2 than in 2004. Slimy Sculpin fry were common in Reach #4 and absent in 2004.
- Arctic grayling juveniles were common in Reach #1 and #5 and occasional in Reach #2 and #4. Numerous adult grayling were recorded in Reach #5. The only other adult taken in the Reservoir Basin was in Reach #3. Juvenile Arctic grayling were much more common in Reach #5 during 2005 than in 2004. A visual inspection of the Reservoir Basin concluded that the number of adult Arctic grayling has decreased to 6 observations in 2005 from 48 in 2004.
- Minnow traps set at X-14 captured occasional juvenile Chinook Salmon. Juvenile chinook salmon numbers have significantly decreased from 2004.
- After the completion of the block net survey at Reach #2, 2 adult grayling were observed upstream of the block net (1 with a yellow tag, not captured) and a single adult round whitefish was observed. This was the only whitefish observed during the 2005 investigation. Whitefish were not observed in 2004 within the former reservoir.

The aquatic assessment indicated that changes to the habitat are continuing, mostly related to the loss of overhanging banks and the creation or change to banks within the channel section. Further monitoring of the habitat and fish utilization is required before any conclusions regarding the effects on fish populations can be made. All reaches of the breach and de-watered reservoir are utilized by fish.

7.0 RECOMMENDATIONS

The following section provides summary recommendations with respect to routine inspections, monitoring, maintenance and annual inspections for 2006.

7.1 Routine Inspections and Monitoring

The following routine inspection and monitoring should be performed by site staff, as part of good practice and in order to comply with the Licence:

- Monitor the flow quantity and TSS at FWSB#1 and FWSB#5 twice per month between April and August (inclusive).
- Monitor and sample the run-off from FWSB#6 for acidity and metals, once per year.
- Perform bi-monthly visual inspections of the performance of the sideslopes and constructed creek elements. The three areas of concentration should be the slough near the south abutment of the dam, the erosion gullies near the inlet on the north side of the breach, the tension crack between Riffle 2 and 3 on the south side of the breach channel and the tension cracks forming upslope from the top of the erosion protection.
- Perform bi-monthly visual inspection of the portion of the fresh water channel that was not modified as part of the breach construction (part of the adaptive management).
- Perform monthly visual inspection of South Fork of Rose Creek and tributaries through the former reservoir area, checking for channel blockage.

This data should be collected and reviewed as part of the annual review of the performance of the breach and to validate the adaptive management approach taken.

Any change in condition that is noted as a consequence of this program of routine inspection must be brought immediately to the attention of the inspector's superiors. BGC should also be notified so that the condition can be evaluated and to provide any necessary geotechnical advice related to the concern at hand. Photos of any changed condition should be taken.

7.2 Annual Reviews

The purpose of annual reviews is to provide a record of the performance of the facilities. The annual inspection of the physical performance of the breach and K8 creek area should be performed in May and September of 2006. The annual inspection of the re-vegetation and aquatic life/habitat should be performed in July / August 2006.

7.3 Recommendations for Remedial Actions

The following recommendations for remedial actions are made:

- The slough area located near the south abutment should reviewed in the spring and be re-vegetated in the summer now that the majority of movement appears to have stopped. The vegetation should limit sediment generation from this area.
- The area of the breach affected by sheet and gully erosion should be re-vegetated and an earthen berm should be placed on the former erosion blanket to limit the formation of erosion gullys and stop sediment from this area from entering the breach.
- Review the portion of K8 creek (North tributary) that has not, to date, established its final position. When the final position is established, complete the riparian re-vegetation efforts in this area.

8.0 CLOSURE

This report summarizes the physical conditions as observed by BGC, Laberge and WM and the water testing results as collected by site staff. Thank you for the opportunity to be of service to Deloitte & Touche and Faro Mine. Should you have any questions on this report, please contact BGC at your convenience.

Respectfully submitted,
BGC Engineering Inc.
per:

PROFESSIONAL ENGINEER
YUKON TERRITORY
J. W. CASSIE

Gerry Ferris, M.Sc., P.Eng. (AB)
Geotechnical Engineer

James W. Cassie, M.Sc., P.Eng.
Specialist Geotechnical Engineer

PERMIT TO PRACTICE
Signature
Date 16-FEB-06.
PERMIT NUMBER: PP092
Association of Professional Engineers of Yukon

REFERENCES

BGC Engineering Inc. 2004 K8 Creek Construction, As-built Report. Report prepared for Deloitte & Touche Inc., June 2004.

SRK Consulting Inc., BGC Engineering Inc. and Gartner Lee Ltd. 2003. Final Breach Design, Fresh Water Supply Dan, Faro Mine. Report prepared for Deloitte and Touche Inc., April 2003.

SRK Consulting Inc. and BGC Engineering Inc. 2004. As-built Construction Report, Fresh Water Supply Dam Breach, Faro Mine. Report submitted to Deloitte and Touche Inc., February 2004 .

TABLES

Table 1 - Monitoring Results for FWSB#1

Date	TSS	Flow (m^3/s)	Comments
April 5, 2005	<1	-	refer to note 1
April 19, 2005	<1	-	refer to note 1
May 11, 2005	3	2.01	Flow measured on May 12, 2005
May 24, 2005	<1	2.14	
June 8, 2005	<1	1.75	
June 28, 2005	<1	0.77	
July 12, 2005	1	0.63	
July 27, 2005	<1	0.73	
August 11, 2005	1	0.53	
August 31, 2005	1	0.55	

Note1: The creek was ice covered and collection of reliable flow data was not possible.

Table 3 - Laboratory Test Results for Run-off from PAG Spoil Area (FWSB#6)

Parameter	May 24, 2005 Results (mg/L unless noted)	May 26, 2004 Results (mg/L unless noted)	Laboratory Detection Limit (mg/L)	Maximum Allowable Concentration (mg/L)[2]
Temperature	12.7°C	9.4°C		
pH[1]	8.6	8.1		
Total Suspended Solids	7	10		
Total Dissolved Solids	253	180		
Sulphate	145	68.7		
Conductivity	355 µS/cm	252 µS/cm		
Total Alkalinity	45.1	75.8		
Total Hardness	190	127		
Total Antimony (Sb)	<0.001	<0.001	0.001	0.1
Total Arsenic (As)	<0.001	0.002	0.001	0.05
Total Barium (Ba)	0.045	0.091	0.023	1
Total Cadmium (Cd)	<0.0002	<0.0002	0.0002	0.02
Total Copper (Cu)	0.003	0.007	0.001	0.2
Total Lead (Pb)	<0.001	0.003	0.001	0.2
Total Mercury (Hg)	<0.02 µg/L	<0.02 µg/L	0.02 µg/L	0.005
Total Molybdenum (Mo)	0.0009	0.0016	0.0005	0.5
Total Nickel (Ni)	0.003	0.005	0.001	0.5
Total Selenium (Se)	<0.001	<0.001	0.001	0.05
Total Silver (Ag)	<0.00025	<0.00025	0.00025	0.1
Total Zinc (Zn)	0.006	0.012	0.005	0.5
[1] pH does not have units of mg/L.				
[2]Maximum Allowable Concentrations from Water Licence QZ03-058				

Table 4 - Electro-fishing Results

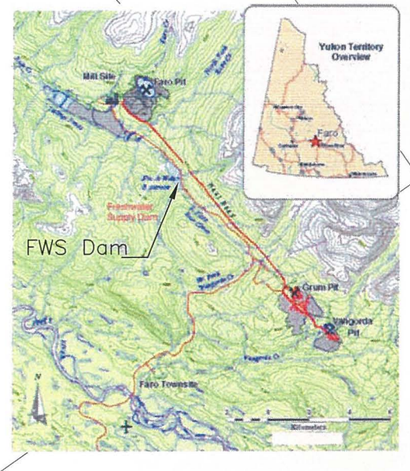
Reach	Fish Type	Total Catch*	
		2004	2005
1	Arctic Grayling	31	47
	Burbot	11	3
	Slimy Sculpins	21	22
2	Arctic Grayling	7	5
	Burbot	0	0
	Slimy Sculpins	132	69
3	Arctic Grayling	5	1
	Burbot	11	3
	Slimy Sculpins	38	77
4	Arctic Grayling	38	4
	Burbot	11	1
	Slimy Sculpins	19	10
5†	Arctic Grayling	26	30
	Burbot	5	1
	Slimy Sculpins	5	11
	Chinook Salmon	0	1

* Based on 2 pass block net, electro-fishing technique.

† Based on 1 pass electro-fishing technique.

FIGURES

FWS DAM BREACH PROJECT



LEGEND

- CREEK OUTLINE FROM 1999 SURVEY
- ESTIMATED CREEK OUTLINE (PRE-BREACH)
- EXISTING ACCESS ROAD
- WATER SAMPLING LOCATION

ELEVATIONS (m amsl)
CONTOUR INTERVAL = 1m
SELECT AREAS INCLUDE
0.5m CONTOUR INTERVALS

NAD 27 DATUM, ZONE 8

AS BUILT TOPOGRAPHIC SURVEY BY YES (2003)

150m 0 150m 300m 450m

Scale 1:7500

REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

SCALE	AS SHOWN
DATE	JAN 2006
DRAWN	CJT
DESIGNED	GWF
CHECKED	GWF
APPROVED	JWC

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY
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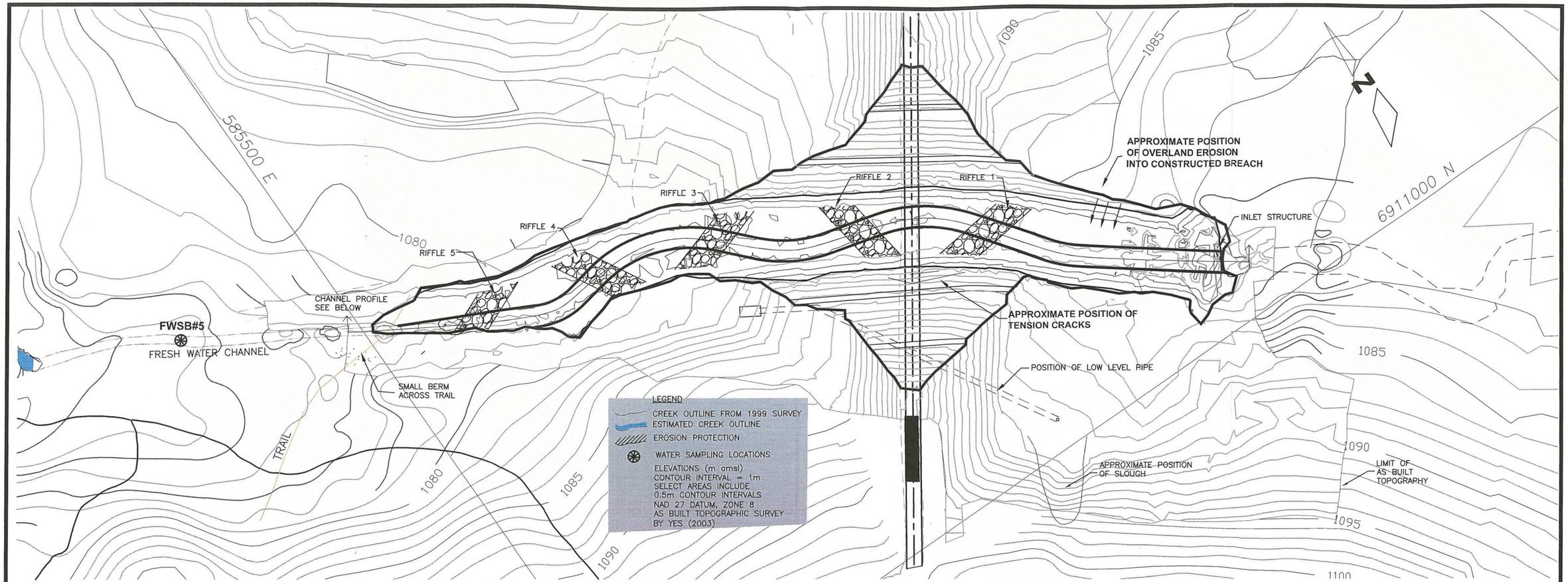
CLIENT
Deloitte & Touche

PROJECT
2005 ANNUAL REPORT, FWSB

TITLE
LOCATION PLAN

PROJECT No.	FIG No.	REV.
0257-033-01	1	A

0257-033-01 FIGURE_1.dwg



REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

SCALE	AS SHOWN
DATE	JAN 2006
DRAWN	CJT
DESIGNED	GWF
CHECKED	GWF
APPROVED	JWC

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY
Calgary, AB Phone: (403) 250 5185

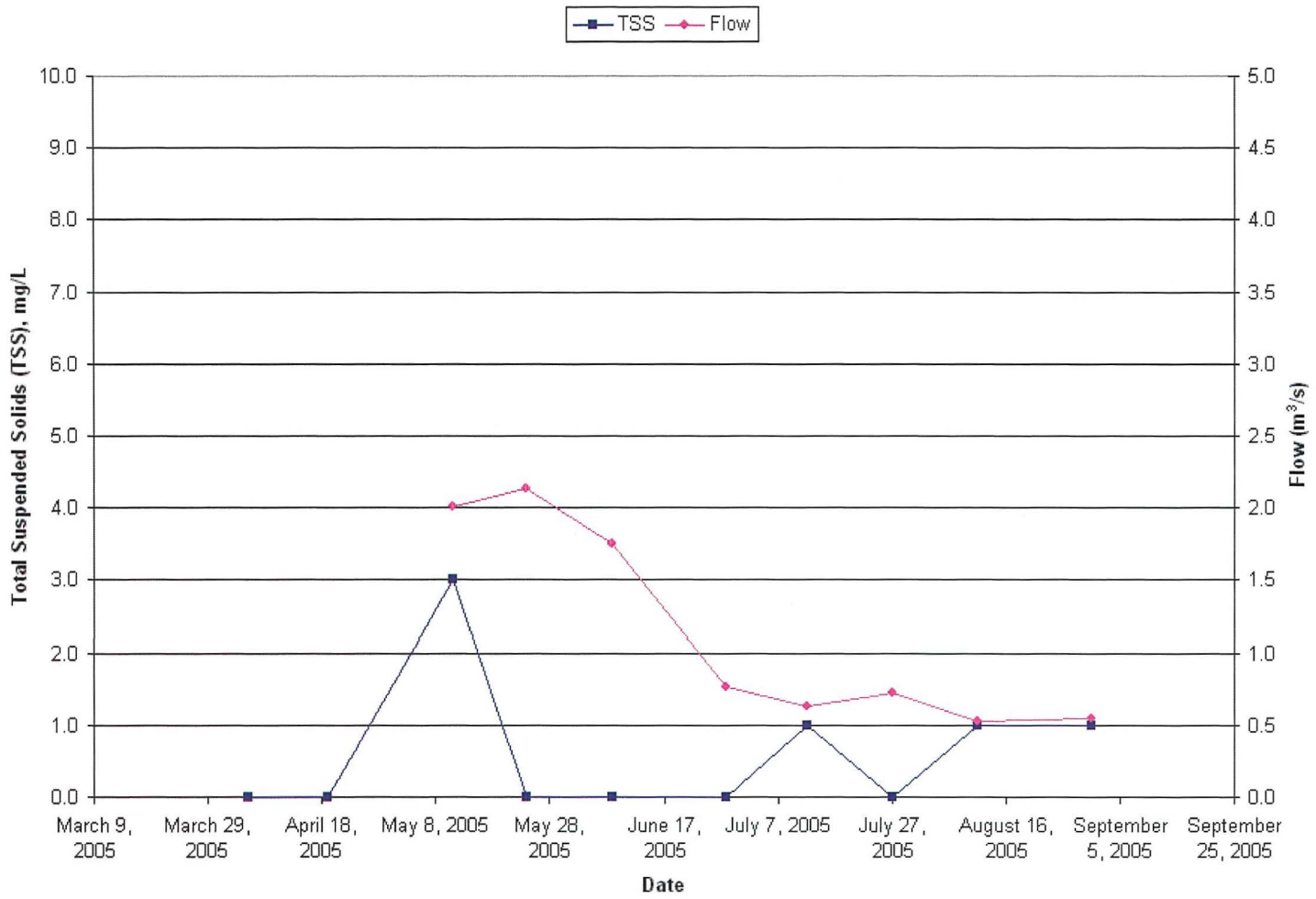
CLIENT
Deloitte & Touche

PROJECT
2005 ANNUAL REPORT, FWSB

TITLE
AS-BUILT FWSB PLAN AND PROFILE

PROJECT No.	FIG.	REV.
0257-033-01	2	A

0257-033-01 FIGURE_2.dwg



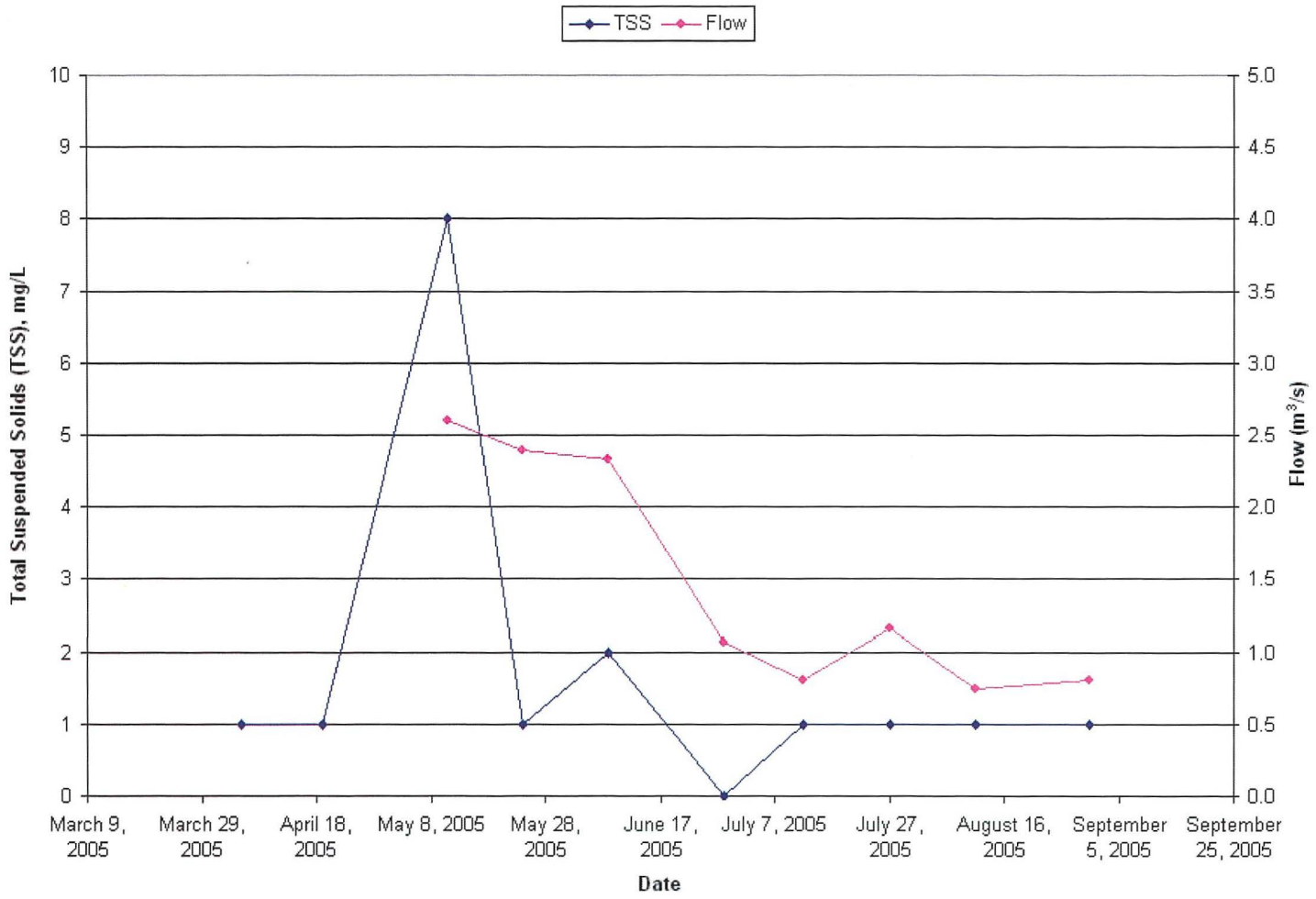
BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY
Calgary, Alberta
Phone: (403) 250-5185

Client: Deloitte & Touche

Project: 2005 ANNUAL REPORT, FWSB

Title: MONITORING RESULTS FOR FWSB #1

Project #:	Date:	Scale:	Drawn:	Approved:	Figure:
0257-033-01	JAN 2006	NA	JMS	GWF	3



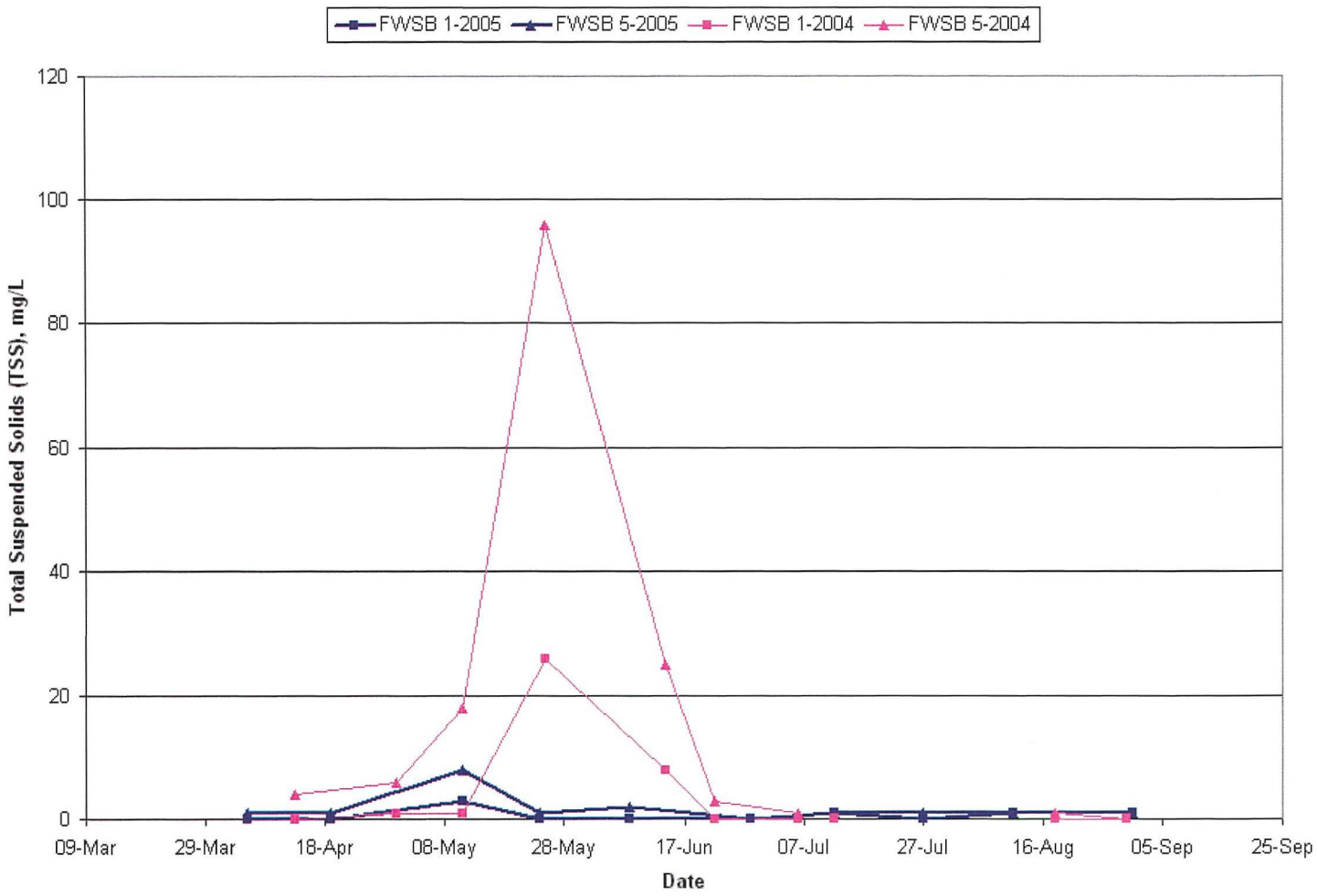
BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY
Calgary, Alberta
Phone: (403) 250-5185

Client: Deloitte & Touche

Project: 2005 ANNUAL REPORT, FWSB

Title: MONITORING RESULTS FOR FWSB #5

Project #:	Date:	Scale:	Drawn:	Approved:	Figure:
0257-033-01	JAN 2006	NA	JMS	GWF	4



BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY
Calgary, Alberta
Phone: (403) 250-5185

Client: Deloitte & Touche

Project: 2005 ANNUAL REPORT, FWSB

Title: COMPARISON OF TSS RESULTS, FWSB #1 AND FWSB #5

Project #:	Date:	Scale:	Drawn:	Approved:	Figure:
0257-033-01	JAN 2006	NA	JMS	GWF	5

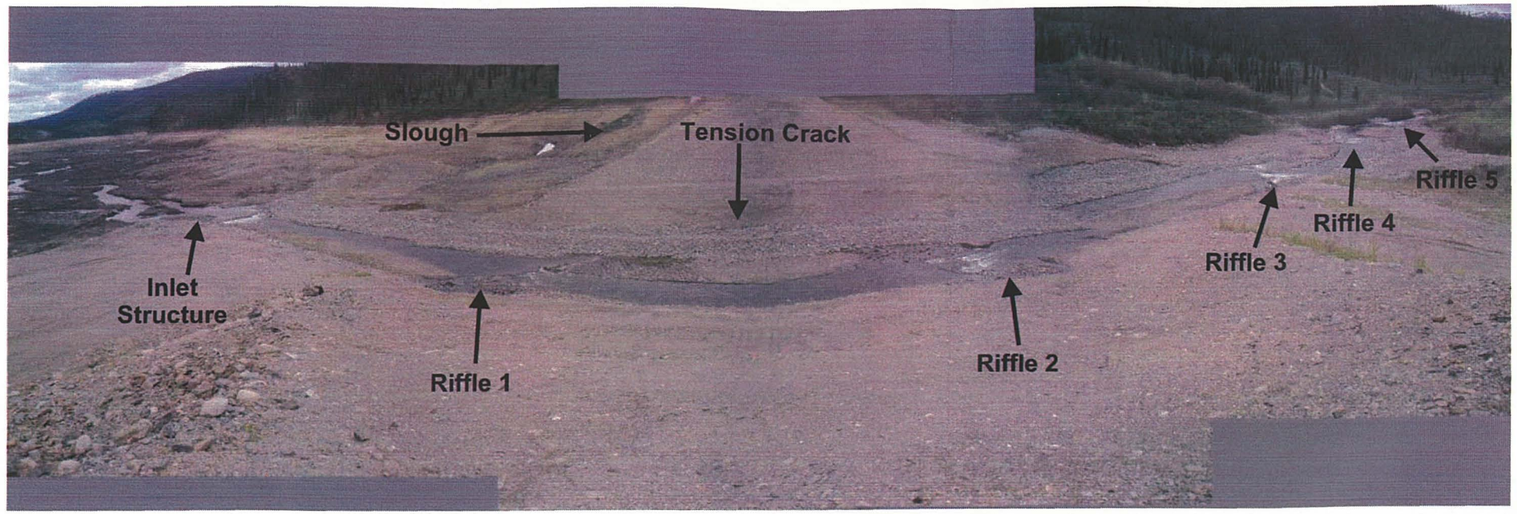
BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY
Calgary, Alberta
Phone: (403) 250-5185

Client: Deloitte & Touche

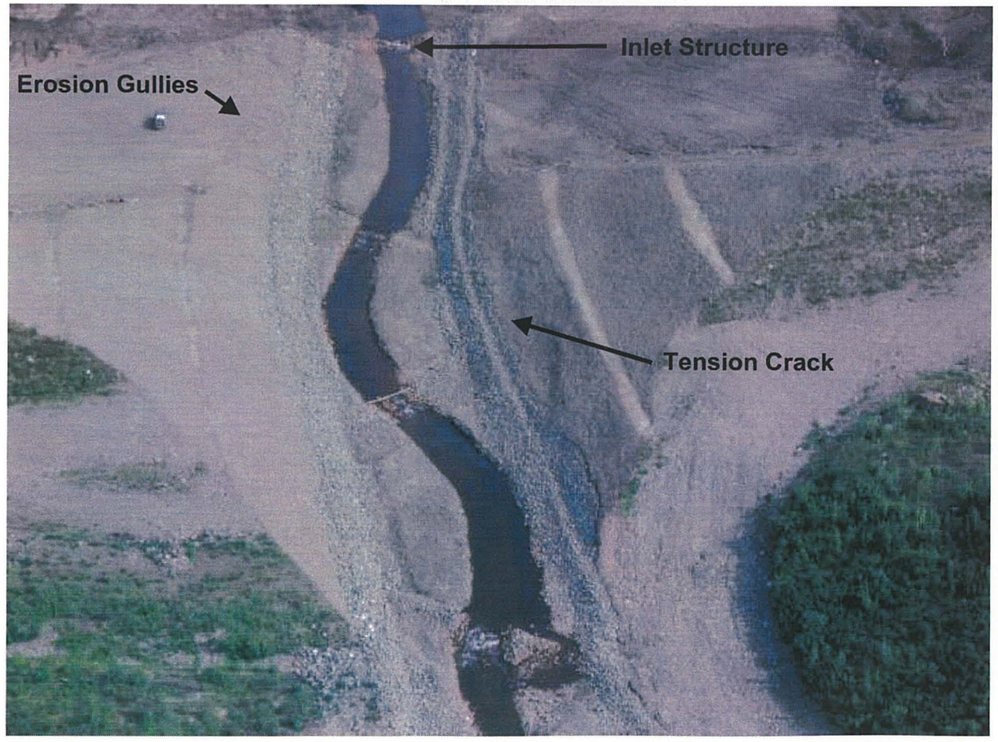
Project: 2005 ANNUAL REPORT, FWSB

Title: COMPARISON OF FLOW RESULTS, FWSB #1 AND FWSB #5

Project #:	Date:	Scale:	Drawn:	Approved:	Figure:
0257-033-01	JAN 2006	NA	JMS	GWF	6



May: The breach channel through the dam. As shown at the far left, some stream braiding has occurred upstream of the inlet structure. This photo also shows the slough, the location of tension cracks in the core of the dam and the 5 riffles..



August 2004: An aerial view of the breach section. This overview of the project shows the location of the breach and channel. Also shown is the slough on the former reservoir wall, the erosion gullies, the tension crack located between Riffle 1 and 2. The water flowing around the left side of Riffle 3 shown in this photo was repaired in September 2004.

CLIENT:

Deloitte & Touche

REV.	DATE	REVISION NOTES	DRAWN	CHECKED	APPROVED
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-	-	-	-	-	-
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SCALE:	N/A
DATE:	JANUARY 2006
DRAWN:	SLF
DESIGNED:	JMS
CHECKED:	GWF
APPROVED:	JWC

PROJECT
2005 ANNUAL REPORT, FWSB

TITLE
OVERVIEW OF FWS DAM BREACH

PROJECT No.	Figure No.	REV.
0257-033-01	7	A

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary Alberta Phone: (403) 250-5185

May: Flow in the channel and flood plain during the peak freshet flow of 2005.

May: Erosion on left bank immediately downstream of the limit of the 2003 construction.

May: Overview of the channel flow within the breach from near Riffle 4 looking upstream.

CLIENT:

Deloitte & Touche

REV.	DATE	REVISION NOTES	DRAWN	CHECKED	APPROVED

SCALE:	N/A
DATE:	JANUARY 2006
DRAWN:	SLF
DESIGNED:	JMS
CHECKED:	GWF
APPROVED:	JWC

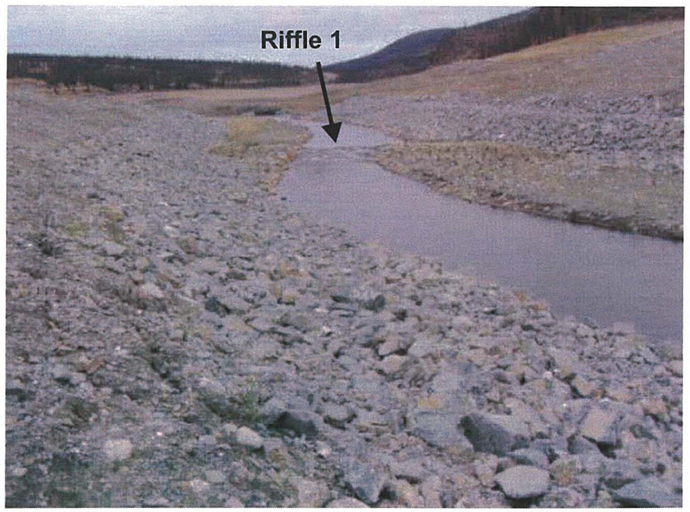
PROJECT: 2005 ANNUAL REPORT, FWSB

TITLE: CHANNEL FLOW

PROJECT No.	Figure No.	REV.
0257-033-01	8	A

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary Alberta Phone: (403) 250-5185

May: View of the inlet structure and the channel immediately upstream of the breach. The channel has formed into a braided stream upstream of the inlet structure.



September: Aview of the normal Fall water flow within the channel.

September: Shows the condition of Riffle 3. As can be seen, some of the boulders at the crest of the riffle have been pushed downstream and some of the water is escaping around the left side of the riffle.

CLIENT:

Deloitte & Touche

REV.	DATE	REVISION NOTES	DRAWN	CHECKED	APPROVED
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-	-	-	-	-	-
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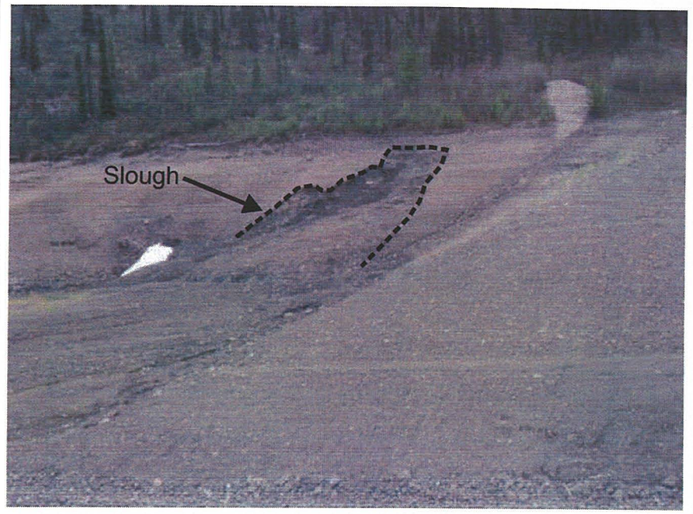
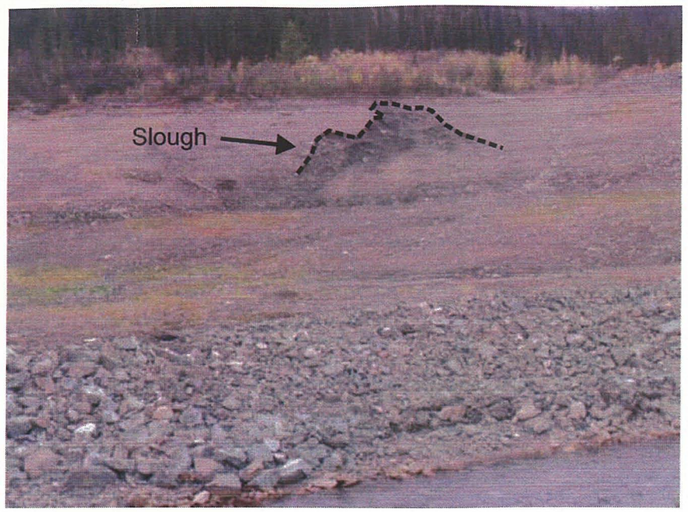
SCALE:	N/A
DATE:	JANUARY 2006
DRAWN:	SLF
DESIGNED:	JMS
CHECKED:	GWF
APPROVED:	JWC

PROJECT		
2005 ANNUAL REPORT, FWSB		
TITLE		
FLOW IN CHANNEL		
PROJECT No.	Figure No.	REV.
0257-033-01	9	A

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary Alberta Phone: (403) 250-5185

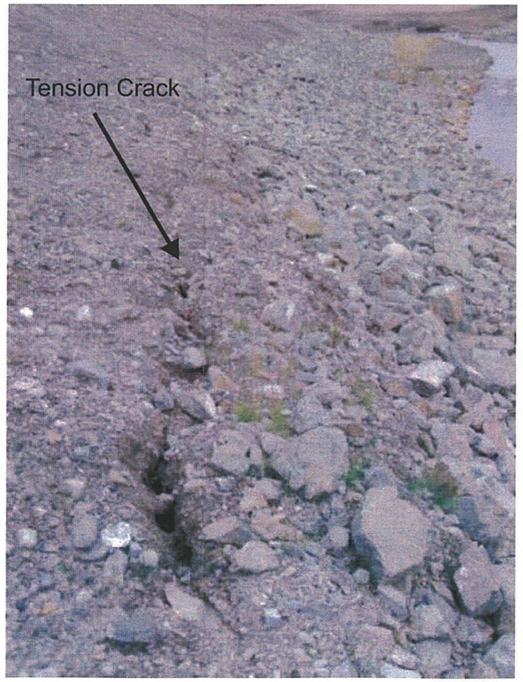


May: Shows a view of the slump located over towards the south abutment. The slump appears to be growing in size from last year.



September: Shows a view of the slough at south abutment, which appears to be slightly larger than in 2004 but appears to be self buttressing.

September: The erosional gullies which have formed un the right side of the breach. These gullies are the result of sheet flow across the upstream seepage blanket. The flow then coalesces into small channels and flows into the breach section. Some of these erosion gullies are self armouring.



September: Shows longitudinal tension cracks located behind the riprap.

CLIENT:

Deloitte & Touche

REV.	DATE	REVISION NOTES	DRAWN	CHECKED	APPROVED
-	-	-	-	-	-
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SCALE:	N/A
DATE:	JANUARY 2006
DRAWN:	SLF
DESIGNED:	JMS
CHECKED:	GWF
APPROVED:	JWC

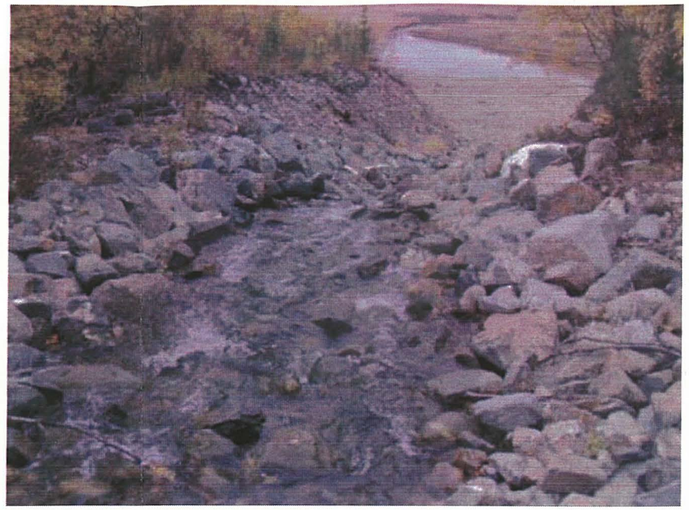
PROJECT: 2005 ANNUAL REPORT, FWSB

TITLE: VARIOUS FEATURES

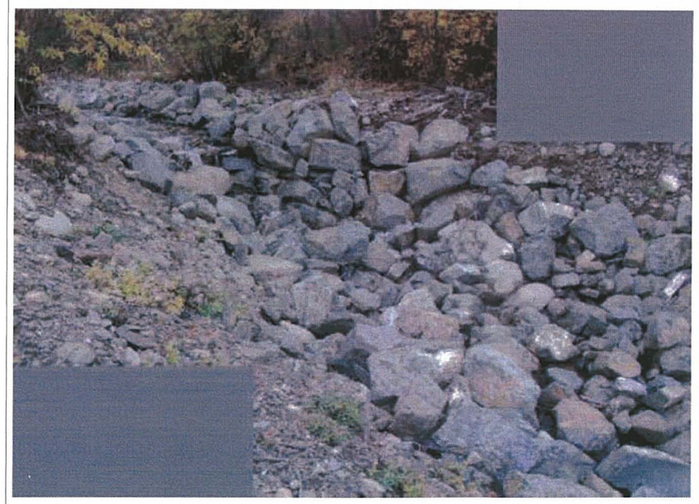
PROJECT No.	Figure No.	REV.
0257-033-01	10	A

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary Alberta Phone: (403) 250-5185

May: Shows a view looking in the upstream direction.



September: View looking in the downstream direction.



September: Shows the condition of the riprap within the upslope area.

May: a view of the K8 Creek entering the reservoir area from the borrow pit. In this area, the water flow has not yet formed into a distinct channel.

CLIENT:

Deloitte & Touche

REV.	DATE	REVISION NOTES	DRAWN	CHECKED	APPROVED
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-	-	-	-	-	-
-	-	-	-	-	-

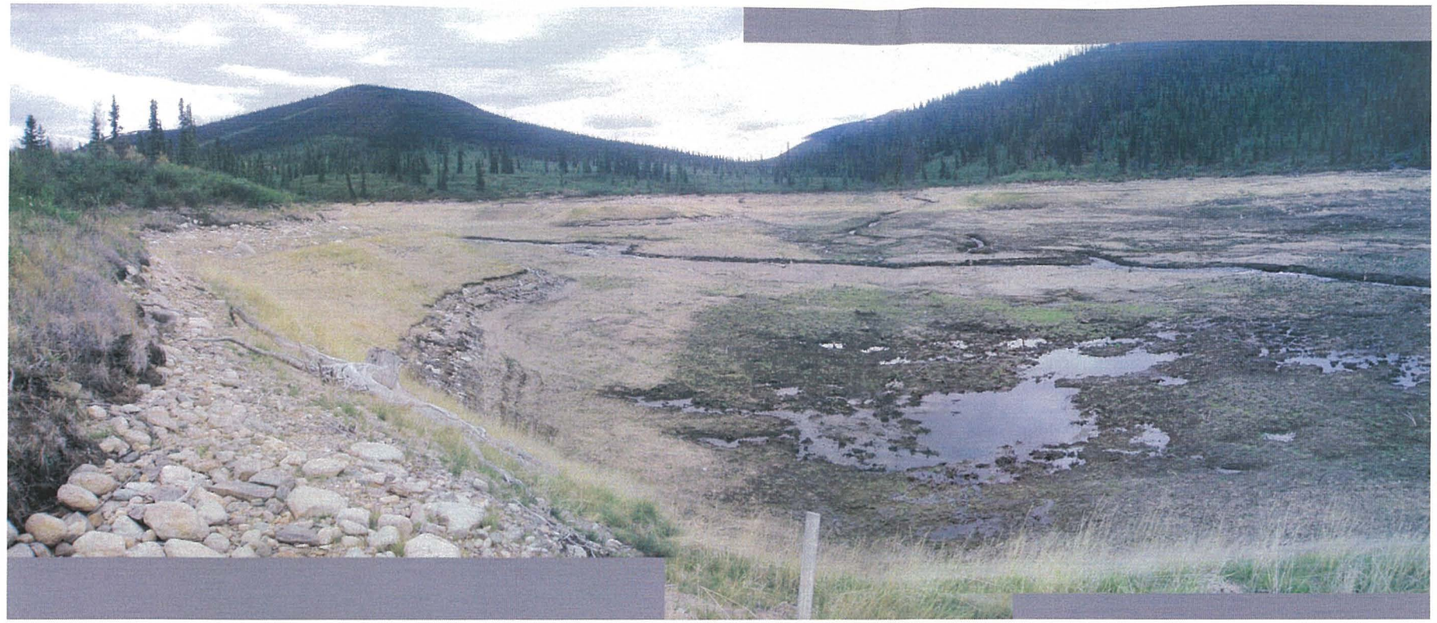
SCALE:	N/A
DATE:	JANUARY 2006
DRAWN:	SLF
DESIGNED:	JMS
CHECKED:	GWF
APPROVED:	JWC

PROJECT: 2005 ANNUAL REPORT, FWSB

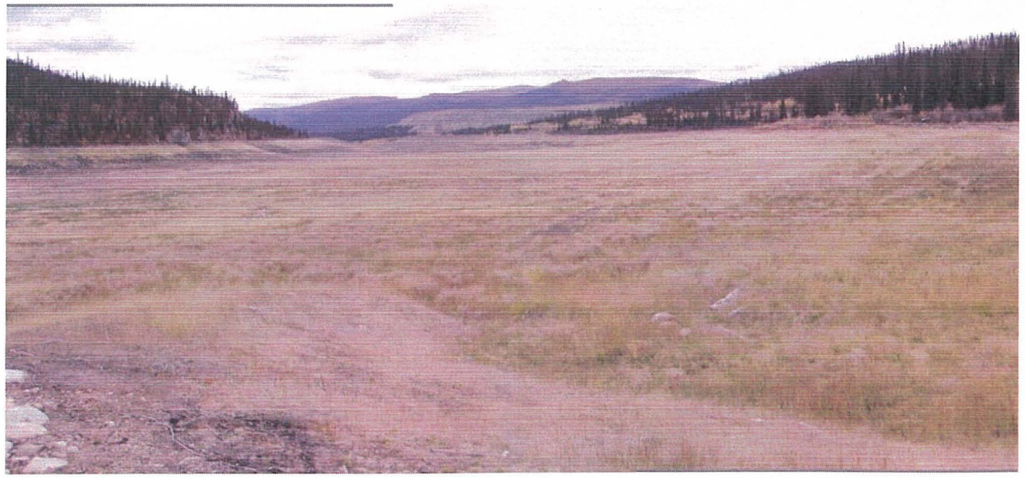
TITLE: K8 CREEK OBSERVATIONS

PROJECT No.	Figure No.	REV.
0257-033-01	11	A

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary Alberta Phone: (403) 250-5185



May: Shows a panoramic showing the condition of the vegetation and the two tributaries at the upstream end of the reservoir. The early phases of re-vegetation performed in the upper part of the former reservoir appears to be performing better than the later (lower) re-vegetation efforts.



September: Shows an overall view of the vegetation in the former reservoir bottom. From this perspective there is good vegetative coverage. Vegetation is sparser on the south side of the channel.

September: A general view of the former reservoir bottom and the upstream side of the Fresh Water Supply Dam breach.

CLIENT:

Deloitte & Touche

REV.	DATE	REVISION NOTES	DRAWN	CHECKED	APPROVED
-	-	-	-	-	-
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-	-	-	-	-	-

SCALE:	N/A
DATE:	JANUARY 2006
DRAWN:	SLF
DESIGNED:	JMS
CHECKED:	GWF
APPROVED:	JWC

PROJECT: 2005 ANNUAL REPORT, FWSB

TITLE: RE-VEGETATION OBSERVATIONS

PROJECT No.	Figure No.	REV.
0257-033-01	12	A

BGC Engineering Inc.
AN APPLIED EARTH SCIENCES COMPANY
Calgary Alberta Phone: (403) 250-5185

APPENDIX A – MONTHLY REPORTS

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY
1605, 840 - 7 Avenue SW
Calgary, Alberta T2P 3G2
Tel.: (403) 250-5185
Fax: (403) 250-5330

0257-033-01
May 26, 2005

Yukon Territory Water Board
Suite 106 - 419 Range Road
Whitehorse, Yukon
Y1A 3V1
Fax (867) 456-3890

Re: April Monthly Sampling Results for QZ03-058, Faro Mine, Yukon

Dear Board:

This letter report fulfills the monthly reporting requirement (item 15) for Water License QZ03-058 for the month of April 2005. I trust that this information is self-explanatory. However, if you have any questions please do not hesitate to contact us.

Table 1 Summary of Monthly Sampling Results, April 2005

Date	Sample	TSS (mg/L)	Flow (m^3/s)	Comments
April 5	FWSD-1	<1	note 1	Creek was ice covered
April 5	FWSD-5	1	note 1	Creek was ice covered
April 19	FWSD-1	<1	note 1	Creek was ice covered
April 19	FWSD-5	1	note 1	Creek was ice covered

Note: 1: The creek was ice covered and collection of reliable flow data was not possible. Flow measurements will commence once it is safe to do so.

Yours truly,
BGC Engineering Inc.
Per:

Gerry Ferris, M.Sc., P.Eng.
Geotechnical Engineer

GWF/sf

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY
1605, 840 - 7 Avenue SW
Calgary, Alberta T2P 3G2
Tel.: (403) 250-5185
Fax: (403) 250-5330

0257-033-01
June 30, 2005

Yukon Territory Water Board
Suite 106 - 419 Range Road
Whitehorse, Yukon
Y1A 3V1
Fax (867) 456-3890

Re: May Monthly Sampling Results for QZ03-058, Faro Mine, Yukon

Dear Board:

This letter report fulfills the monthly reporting requirement (item 15) for Water License QZ03-058 for the month of May 2005. I trust that this information is self-explanatory. However, if you have any questions please do not hesitate to contact us.

Table 1 Summary of Monthly Sampling Results, May 2005

Date	Sample	TSS (mg/L)	Flow (m^3/s)	Comments
May 11	FWSD-1	3	2.01	Flow measured on May 12, 2005 using current meter.
May 11	FWSD-5	8	2.6	Flow measured by floating object method.
May 24	FWSD-1	<1	2.14	Flow measured using current meter.
May 24	FWSD-5	1	2.4	Flow measured by floating object method.

Flow measurements calculated using the floating object method are rough approximations and should be considered accurate within ±50%.

The results of the annual sampling at FWSD#6, the run-off water from the PAG storage area, are attached in Table 2. This table includes a column listing the maximum allowable concentration (from Water Licence QZ03-058) for each of the metals. As indicated in the table the measured concentrations for all parameters were below the allowable concentration.

Table 2 Summary of Annual Sampling for PAG stockpile (FWSB #6), May 2005

Parameter	Maximum Allowable Concentration (mg/L)	May 24, 2005 Results (mg/L unless noted)	Laboratory Detection Limit (mg/L)
Temperature		12.7°C	
pH		8.6	
Total Suspended Solids		7	
Total Dissolved Solids		253	
Sulphate		145	
Conductivity		355 µS/cm	
Total Alkalinity		45.1	
Total Hardness		190	
Total Antimony (Sb)	0.10	<0.001	0.001
Total Arsenic (As)	0.05	<0.001	0.001
Total Barium (Ba)	1.00	0.045	0.023
Total Cadmium (Cd)	0.02	<0.0002	0.0002
Total Copper (Cu)	0.20	0.003	0.001
Total Lead (Pb)	0.20	<0.001	0.001
Total Mercury (Hg)	0.005	<0.02 ug/L	0.02 ug/L
Total Molybdenum (Mo)	0.50	0.0009	0.0005
Total Nickel (Ni)	0.50	0.003	0.001
Total Selenium (Se)	0.05	<0.001	0.001
Total Silver (Ag)	0.10	<0.00025	0.00025
Total Zinc (Zn)	0.50	0.006	0.005

Yours truly,
BGC Engineering Inc.
Per:

Gerry Ferris, M.Sc., P.Eng.
Geotechnical Engineer

GWF/sf

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY
1605, 840 - 7 Avenue SW
Calgary, Alberta T2P 3G2
Tel.: (403) 250-5185
Fax: (403) 250-5330

257-033-01
July 30, 2005

Yukon Territory Water Board
Suite 106 - 419 Range Road
Whitehorse, Yukon
Y1A 3V1
Fax (867) 456-3890

Re: June Monthly Sampling Results for QZ03-058, Faro Mine, Yukon

Dear Board:

This letter report fulfills the monthly reporting requirement (item 15) for Water License QZ03-058 for the month of June 2005. I trust that this information is self-explanatory. However, if you have any questions please do not hesitate to contact us.

Table 1 Summary of Monthly Sampling Results, June 2005

Date	Sample	TSS (mg/L)	Flow (m^3/s)	Comments
June 8	FWSD-1	<1	1.75	
June 8	FWSD-5	2	2.33	
June 28	FWSD-1	<1	0.77	
June 28	FWSD-5	<1	1.07	

Yours truly,
BGC Engineering Inc.
Per:

Gerry Ferris, M.Sc., P.Eng.
Geotechnical Engineer

GWF/sf

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY
1605, 840 - 7 Avenue SW
Calgary, Alberta T2P 3G2
Tel.: (403) 250-5185
Fax: (403) 250-5330

0257-033-01
September 9, 2005

Yukon Territory Water Board
Suite 106 - 419 Range Road
Whitehorse, Yukon
Y1A 3V1
Fax (867) 456-3890

Re: August Monthly Sampling Results for QZ03-058, Faro Mine, Yukon

Dear Board:

This letter report fulfills the monthly reporting requirement (item 15) for Water License QZ03-058 for the month of August 2005. I trust that this information is self-explanatory. However, if you have any questions please do not hesitate to contact us.

Table 1 Summary of Monthly Sampling Results, August 2005

Date	Sample	TSS (mg/L)	Flow (m^3/s)	Comments
August 11	FWSD-1	1	0.53	
August 11	FWSD-5	1	0.75	
August 31	FWSD-1	1	0.55	
August 31	FWSD-5	1	0.81	

Yours truly,
BGC Engineering Inc.
Per:

Gerry Ferris, M.Sc., P.Eng.
Geotechnical Engineer

GWF/sf

APPENDIX B – SITE INSPECTION MEMOS

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY
1605, 840 – 7 Avenue S.W., Calgary, Alberta, Canada. T2P 3G2
Phone (403) 250-5185 Fax (403) 250-5330

PROJECT MEMORANDUM

To:	**Anvil Range Mining Corp.**	**Fax No.:**	**by email**
Attention:	**Dana Haggar**	**CC:**	**Doug Sedgwick**
From:	**Jim Cassie /Gerry Ferris**	**Date:**	**June 9, 2005**
Subject:	**Summary of Site Observations and Maintenance Needs Selected Facilities, Faro Mine, YT**		
No. of Pages (including this page): 3		**Project No:**	**0257-032-03**

Messrs. Gerry Ferris, P.Eng. and Jim Cassie, P.Eng., from BGC Engineering Inc. (BGC) undertook a site visit of selected Faro structures from May 26 to 28, 2005. The following memorandum outlines some of the conditions noted and any recommended follow-up work:

FWS Dam Breach

- Breach channel appears to be performing in a satisfactory manner.
- Some minor water flow (est. 1 to 5% of total) was occurring where the riffles met the erosion protection, with the majority of flow concentrated in the center of the channel. No concerns expressed.
- Erosion and downcutting of the channel base was occurring downstream of the breach construction. Some tension cracks have developed in this area. No concerns.
- Portions of the floodplain and upstream of the inlet structure have eroded, but no concerns.
- Slough continues to occur at the south abutment. The soil within the slough will need to be excavated and replaced with rockfill to both buttress the slope and allow water drainage.
- K8 Creek appears fine but one minor area of rip rap should be repaired by the placement of additional material.
- A distinct incised channel has not yet formed in the K8 Creek discharge downstream from the old borrow area.
- Main channel in the reservoir area appears to be performing fine.
- The vegetation in the Phase I and Phase II re-vegetation area appears to the growing well. The lower elevations of the former reservoir have not yet "greened up", likely due to the flooding of the area that occurred this spring.

Intermediate Dam

- Pond water is located approximately 4 m below the physical crest.
- Minor crest cracking was noted near the north abutment. Minor crest cracking near upstream crest rip rap in the center of the dam. These cracks should be monitored for deteriorating conditions.
- Two small sinkholes, previously noted and painted, may be settling slightly. They should be backfilled and graded over.
- No toe seepage noted at the south abutment.
- Erosion on the downstream face is slightly more extensive as compared to the last inspection. The eroded material is located on the road surface at the interface with the downstream shell. This material which is likely covering the gravel drain should be removed.
- Some small scarps were noted on the rip rapped toe of the road surface within the polishing pond. This is the location where ice plucking was noted by BGC in early May. These scarps should be graded. It is understood that in the future the water level in the pond will be maintained at about the current water elevation, which is about 2 m below the area affected by the ice action.

Cross Valley Dam

- Water level is located approximately 2 m below the emergency spillway inlet elevation.
- Cracking noted in the centre of the crest along a majority of its length. Some minor crest cracking located near upstream side rip rap. These cracks should be monitored for deteriorating conditions.
- No maintenance items noted.

Rose Creek Diversion Canal

- Three minor slough areas with cracking were noted on the backslope. These should be monitored and assessed for deteriorating conditions.

Faro Creek Diversion Canal

- Channel appears to be working well under current flows. Slightly higher water mark was noted, approximately 0.3 to 0.4 m above the current water level. Some slight movement of pilot channel rip rap has occurred.

North Fork Rose Creek Rock Drain

- Head pond level was relatively high (equal to 2004 highest pond level) but the drain appears to be passing the flows in a satisfactory manner.
- Minor channelized erosion and related sloughing noted on the upstream side of the rock drain. The placement of some coarse armour rock may retain some of the fine material which is sloughing/eroding.
- New datalogger installed in the creek flow at Station X2.
- Recommendations for monitoring at the rock drain were provided to site environmental staff.

In general, the site appears in good condition, even though various site water flows are higher than values seen between late June and September. No major concerns were noted and these findings were reviewed verbally with Messrs. Haggar and Sedgwick before BGC personnel left site.

Please contact either of the undersigned should you have any questions.

Respectfully submitted,
BGC Engineering Inc.
per:

Gerry Ferris, P.Eng.
Geotechnical Engineer

James W. Cassie, P.Eng.
Specialist Geotechnical Engineer

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY
1605, 840 – 7 Avenue S.W. , Calgary, Alberta, Canada. T2P 3G2
Phone (403) 250-5185 Fax (403) 250-5330

PROJECT MEMORANDUM

To:	**Anvil Range Mining / Deloitte &Touche**	**Fax No.:**	**(867) 994-3459**
Attention:	**Dana Haggar / Doug Sedgwick**	**CC:**	**(416) 601-5902**
From:	**Jim Cassie, P.Eng.**	**Date:**	**Sept. 21, 2005**
Subject:	**September Site Inspection Conditions Selected Facilities, Faro Mine, YT**		
No. of Pages (including this page): 3 Pages		**Project No:**	**0257-032-03**

Mr. Jim Cassie, P.Eng., from BGC Engineering Inc.(BGC), undertook an inspection of selected facilities at Faro Mine on September 12 to 14, 2005 and the following memo summarizes the conditions observed, along with any required maintenance or monitoring:

FWSD Breach

- No additional cracking occurring in the backslope behind the rip rap on both sides.
- Slough at the south abutment appears to be flattening itself and partially stabilizing the associated scarp. Continue to monitor any retrogression as seepage occurs.
- Otherwise appears in satisfactory condition.

K8 Creek Rehab.

- Appears in satisfactory condition.

Cross Valley Dam

- Large quantity pump test at toe appears to have reduced surface quantity in the seepage collection trench.
- Appears in satisfactory condition.

Intermediate Dam

- No crest cracking or toe seepage noted.
- Downstream face has been recently graded and minor erosional gullies have formed.
- Appears in satisfactory condition.

Secondary Impoundment Dam

- Upstream crest berm needs to be re-established at the north abutment to prevent crest overtopping and downstream face erosion (Dana and Jim specifically visited this site to discuss problem and repair method).
- No other visual concerns were noted.

Rose Creek Diversion Channel

- Previously noted sloughs in the backslope do not appear currently active.
- No signs of cracking or settlement noted on the canal dike crest.
- Increased seepage quantity and sloughing occurring at the toe of the spoil piles, located between the Cross Valley and Intermediate Dams. Seepage and related sloughing caused by very low polishing pond level. Monitor sloughing and retrogression for the short term and undertake rehabilitation if the retrogression becomes worse.

North Fork Rose Creek Rock Drain

- Rock drain appears to be discharging water with no signs of significant instability.

North Valley Wall Interceptor Ditch

- Selected sections of the channel were inspected and found to be flowing properly.
- Some minor work on the inlet side of the Outfall Section culvert was undertaken in an attempt to prevent icing problems.
- Ditch appears in satisfactory condition.

Faro Creek Diversion Channel

- New berm constructed on the downhill side of the canal dike access road. Purpose of berm is to prevent overland surface run-off and related ravelling of proximal overburden at Faro pit edge.
- Channel appears to be performing in a satisfactory manner.

Selected Northeast Rock Dumps (overlooking North Fork Rose Creek)

- Selected portions of the toe area and crest edges were inspected. No signs of new crest cracking, toe bulging or significant slope instability were noted.

In general, the inspected facilities appear in satisfactory condition and only some minor maintenance and monitoring is required. Please contact the undersigned should you have any questions or comments.

Respectfully submitted,
BGC Engineering Inc.
per:

James W. Cassie, P.Eng.
Specialist Geotechnical Engineer

APPENDIX C – RE-VEGETATION REPORT

REPORT PREPARED BY
LABERGE ENVIRONMENTAL SERVICES

2005 Revegetation Assessment

Dewatered Freshwater Reservoir

South Fork of Rose Creek, Yukon

Assessment Report Prepared for:

Deloitte & Touche Inc.

Laberge
ENVIRONMENTAL SERVICES

November 2005

Contents

1.0 Background

The dewatered reservoir on the south fork of Rose Creek was seeded with northern native grass species in several phases during 2003 and 2004. No legumes were seeded and no fertilizer was applied. The stem cuttings of woody species (primarily willows) were staked along the Rose Creek riparian zone, along the upper tributaries, and on the floodplains adjacent to the breached dam. All work was carried out by Arctic Alpine Seed Ltd.

Under Part E, Section 35 of Water Licence QZ03-058, an annual inspection and assessment of the success of the revegetation activities is to be undertaken. Laberge Environmental Services evaluated the success of the revegetation program during a survey in July 2005. The results are summarized in this report.

2.0 Grass Seeding Program

2.1 Phase I Zone

2.1.1 Seeding Program

The Phase I zone includes 17.2 ha of newly exposed shoreline between elevations of 1090 m and 1096 m seeded by Arctic Alpine Seed Ltd. in June 2003 (Figure 1).

The seed mix (Lacroix 2005) included:

Sheep Fescue	(*Festuca brachyphylla*)	25.0 lb/ha	(11.34 kg/ha)
Slender Wheatgrass	(*Agropyron trachycaulus*)	25.0 lb/ha	(11.34 kg/ha)
Violet Wheatgrass	(*Agropyron violaceum*)	13.0 lb/ha	(5.89 kg/ha)
Ticklegrass	(*Agrostis scabra*)	1.0 lb/ha	(0.45 kg/ha)
Alpine Bluegrass	(*Poa alpina*)	0.5 lb/ha	(0.23 kg/ha)
Tufted Hairgrass	(*Deschampsia caespitosa*)	0.5 lb/ha	(0.23 kg/ha)
Total		65.0 lb/ha	(29.48 kg/ha)

Arctic Alpine Seed Ltd. reported an overall germination rate of 90% for this area in September 2003 and an overall vegetative cover of 95% in September 2004 (Arctic Alpine Seed 2005).

2.1.2 July 2005 Assessment

The July 2005 assessment of the Phase I seeding showed a >90% vegetative cover for most of the area seeded, with occasional patches of sparser growth. The Phase I zone is dominated by a dense growth of Sheep Fescue with lesser amounts of Ticklegrass, Alpine Bluegrass and Tufted Hairgrass. Both species of Wheatgrass are scarce in most of the Phase I zone, but are more prevalent in those patches with lighter vegetative cover. It is apparent that Wheatgrass cannot compete well in the areas with a dense growth of Sheep Fescue (such as occurs in most of the Phase I zone). All the seeded grass species observed in the Phase I zone in July 2005 were in seed.

The dense cover of seeded grasses, along with a thick layer of grass litter (primarily the previous year's growth of Sheep Fescue), has inhibited the growth of naturally occurring pioneering plant species in the Phase I zone. Some Yellow Cress (*Rorippa palustris*) and Tansy Mustard (*Descurainia incana*) have colonized areas that have a less dense vegetative cover.

It should be noted that many of the pioneering species observed in the Phase II and Phase IV zones were also seen in the Phase I zone prior to the seeding program (Lacroix 2005). These post-disturbance primary successional species "kickstart" biological processes in the soil and allow for colonization by the seeded grasses. These pioneering species were slowly "thinned out" as the seeded grasses successfully colonized this zone.

2.2 Phase II Zone

2.2.1 Seeding Program

The Phase II zone includes 17.5 ha of newly exposed shoreline between elevations of 1086 m and 1090 m seeded by Arctic Alpine Seed Ltd. in September 2003 (Figure 1).

The seed mix (Lacroix 2005) included:

Sheep Fescue	(*Festuca brachyphylla*)	25.0 lb/ha	(11.34 kg/ha)
Slender Wheatgrass	(*Agropyron trachycaulus*)	25.0 lb/ha	(11.34 kg/ha)
Violet Wheatgrass	(*Agropyron violaceum*)	13.0 lb/ha	(5.89 kg/ha)
Ticklegrass	(*Agrostis scabra*)	1.0 lb/ha	(0.45 kg/ha)
Alpine Bluegrass	(*Poa alpina*)	0.5 lb/ha	(0.23 kg/ha)
Tufted Hairgrass	(*Deschampsia caespitosa*)	0.5 lb/ha	(0.23 kg/ha)
Total		65.0 lb/ha	(29.48 kg/ha)

Arctic Alpine Seed Ltd. reported an overall germination rate of 80% for this area in September 2004 (Arctic Alpine Seed 2005).

2.2.2 July 2005 Assessment

Although the rate of seed application was the same for both Phase I and Phase II (29.48 kg/ha), the July 2005 assessment showed only an estimated 70% vegetative cover for much of the area seeded in the Phase II zone. There were also patches of ground with less cover including a few higher knolls that were nearly bare. This possibly results from inconsistencies in the rate of seed application, variations in soil nutrients, or the movement of seeds by wind or water before germination. It was also noted that large numbers of birds flocked to the site during the fall seeding (Lacroix 2005). It was believed they were feeding on the disbursed seeds.

On the southeast side of the former reservoir, the Phase II seeding zone is dominated by Sheep Fescue and Ticklegrass, with lesser amounts of Wheatgrass and Tufted Hairgrass. There is little evidence of Alpine Bluegrass in this area. Very dense stands of Ticklegrass are found in some depressions, probably from the very small seeds of Ticklegrass being washed into these lower areas.

The Phase II seeding zone on the northwest side of the former reservoir generally has a more evenly distributed growth of grass species (Sheep Fescue, Wheatgrass, Alpine Bluegrass and Ticklegrass) with a more patchy distribution of Tufted Hairgrass. Dense stands of Tufted Hairgrass occur in this area (the seeds of tufted Hairgrass are also very small and therefore easily windblown). One small area is dominated by a dense stand of Wheatgrass.

All grass species seeded in the Phase II zone were in seed at the time of the July 2005 survey.

The less dense vegetative cover in the Phase II seeding zone has allowed for the natural colonization of the area by pioneering plant species, including Balsam Poplar (*Populus balsamifera*), willows (*Salix* spp.), chickweed (*Stellaria* sp.), Yellow Cress (*Rorippa palustris*), Tansy Mustard (*Descurainia incana*), Fireweed (*Epilobium angustifolium*), Willowherb (*Epilobium ciliatum*), Alpine Milk-vetch (*Astragalus alpinus*), Annual Hawk's-beard (*Crepis tectorum*), Mastadon Flower (*Senecio congestus*), Scorpion-weed (*Phacelia franklinii*), Smooth Brome (*Bromus inermis*), Blue-joint (*Calamagrostis canadensis*), Foxtail Barley (*Hordeum jubatum*), sedges (*Carex* spp.) and rushes (*Juncus* spp.).

2.3 Phase IV and Phase V Zones

2.3.1 Seeding Program

The Phase IV zone includes approximately 17 ha of the newly exposed bottom of the former freshwater reservoir and was seeded in June and early July 2004 by Arctic Alpine Seed Ltd. Phase V includes the dam area, the disturbed site downstream of the dam, and the floodplains adjacent to the dam breach and this zone was seeded in September and October 2004 (Figure 1).

The seed mix (Lacroix 2005) used for these areas, excluding the floodplains, included:

Sheep Fescue	(*Festuca brachyphylla*)	25.0 lb/ha	(11.34 kg/ha)
Slender Wheatgrass	(*Agropyron trachycaulus*)	25.0 lb/ha	(11.34 kg/ha)
Violet Wheatgrass	(*Agropyron violaceum*)	13.0 lb/ha	(5.89 kg/ha)
Ticklegrass	(*Agrostis scabra*)	1.0 lb/ha	(0.45 kg/ha)
Alpine Bluegrass	(*Poa alpina*)	0.5 lb/ha	(0.23 kg/ha)
Tufted Hairgrass	(*Deschampsia caespitosa*)	0.5 lb/ha	(0.23 kg/ha)
	Total	65.0 lb/ha	(29.48 kg/ha)

The seed mix (Lacroix 2005) used for the floodplains included:

Sheep Fescue	(*Festuca brachyphylla*)	4.00 kg/ha
Violet Wheatgrass	(*Agropyron violaceum*)	4.00 kg/ha
Ticklegrass	(*Agrostis scabra*)	1.00 kg/ha
Tufted Hairgrass	(*Deschampsia caespitosa*)	1.00 kg/ha
Total		10.00 kg/ha

2.3.2 July 2005 Assessment

The July 2005 assessment of the valley bottom showed that the vegetative cover varied from 30% to 60%. The seeded grasses were growing mostly in depressions, probably the result of seeds having been carried there by wind or water before germination. Some of the lowest areas were totally bare. These areas were likely still under water at the time of seeding.

The dominant grasses found in the valley bottom were Wheatgrass, Alpine Bluegrass and Ticklegrass. Sheep Fescue and Tufted Hairgrass were not so common in this area. The grasses observed on the valley bottom were not as well developed as those on the higher valley sides (Phase I and Phase II zones). The Wheatgrass and Ticklegrass plants were just beginning to form seed. Alpine Bluegrass plants were stunted in growth and with very few plants in seed.

Yellow Cress (*Rorippa palustris*) and Mastadon Flower (*Senecio congestus*) are the dominant colonizing plant species of the valley bottom. Other plants colonizing this zone include willows (*Salix* spp.), Shepherd's-purse (*Capsella bursa-pastoris*), Grass-of-Parnassus (*Parnassia palustris*), Foxtail Barley (*Hordeum jubatum*), Alpine Knotweed (*Polygonum viviparum*), Golden Saxifrage (*Chrysoplenium tetandrum*), Blue-joint (*Calamagrostis canadensis*), Common Timothy (*Phleum pratense*), Alkali Grass (*Puccinellia* sp.), Trisetum (*Trisetum spicatum*) and rushes (*Juncus* spp.).

The July 2005 assessment of the floodplains adjacent to the dam breach showed that the vegetative cover ranged from 10% to 30%. The vegetation includes Sheep Fescue, Tufted Hairgrass and Ticklegrass, with lesser amounts of Wheatgrass. The growth form of these grass species was low, with only a few plants of each species in seed at the time of the assessment. Some natural regeneration of willows (*Salix* spp.) is occurring.

These floodplains were flooded during the 2004 spring seeding program and it appears they were again under water during the 2005 spring freshet. Loss of seeds during the 2004 flood undoubtedly accounts for the lower vegetative cover in these areas.

The 2005 assessment of the dam showed a cover of 40% to 50% cover on the upper part of the dam. Seeded species included Sheep Fescue, Alpine Bluegrass, Ticklegrass and Wheatgrass. There was no evidence of Tufted Hairgrass. Natural revegetation included Yellow Cress (*Rorippa palustris*), Fireweed (*Epilobium angustifolium*), Foxtail Barley (*Hordeum jubatum*), Tansy Mustard (*Descurainia incana*) and willows (*Salix* spp.).

The lower part of the dam had an approximately 60% vegetative cover, including primarily Sheep Fescue and Wheatgrass, with lesser amounts of Alpine Bluegrass, Ticklegrass and Tufted Hairgrass. Yellow Cress (*Rorippa palustris*), Hawk's-beard (*Crepis elegans*), willows (*Salix* spp.) and a few sedges (*Carex* spp.) are naturally colonizing this part of the dam.

The sides of the dam breach had sparse (about 10%) vegetative cover. Seeded species included Sheep Fescue, Ticklegrass and Wheatgrass.

The areas seeded downstream of the dam also had a very sparse (< 10%) vegetative cover at the time of the 2005 assessment. Seeded species included Tufted Hairgrass, Ticklegrass and Wheatgrass. Plant species naturally colonizing this area included Felt-leaf Willow (*Salix alaxensis*), Balsam Poplar (*Populus balsamifera*), Jacob's Ladder (*Polemonium pulcherrimum*), Alpine Milk-vetch (*Astragalus alpinus*), River Beauty (*Epilobium latifolium*), Fireweed (*Epilobium angustifolium*), Bear Root (*Hedysarum alpinum*), Common Yarrow (*Achillea millefolium*), Common dandelion (*Taraxacum officionale*) and Foxtail Barley (*Hordeum jubatum*).

It should be noted that the grass seeds used during the 2004 seeding had been stored at the mine since the fall of 2003. It is possible that the cold temperatures in the unheated warehouse could have compromised the seeds viability, and thus may have also contributed to the lower vegetative cover on those sites seeded in 2004 (Denis Lacroix, 2005).

2.4 Vitality of Seeded Grass Species

The seeded grass species all appeared to have normal growth forms at the time of the 2005 assessment. All species showed greatest vigor on the upper valley sides (Phase I and Phase II zones – two growth seasons), where the average plant heights were:

Sheep Fescue	85 cm
Tufted Hairgrass	80 cm
Wheatgrass	75 cm
Ticklegrass	40 cm
Alpine Bluegrass	35 cm

On the valley bottom, the riparian areas, the dam sides and the dam breach, all seeded species had a lower growth form (one growth season).

All seeded grass species were in seed in the Phase I and Phase II zones at the time of the assessment. The growth of all species on the valley bottom appeared seasonally retarded and few plants were yet in seed.

The average rooting depths of the seeded grass species on the valley bottom were:

Sheep Fescue	68 mm
Tufted Hairgrass	98 mm
Wheatgrass	65 mm
Ticklegrass	67 mm
Alpine Bluegrass	63 mm

3.0 Shrub Establishment Program

3.1 Shrub Harvest and Establishment

Stem cuttings from locally occurring species of shrubs (primarily willows) were harvested from a site downstream of the breached dam and staked at a number of sites in the dewatered reservoir (Figure 1). These included a willow transplant test site at the south-east end of the reservoir (Phase III program, September 2003), willow stem cutting transplants along the riparian zone on the main channel of Rose Creek (part of the Phase IV program, May 2004) and willow stem cutting transplants along the two main tributaries as well as on the floodplains adjacent to the dam breach (Phase V program, September and October 2004).

The shrub species selected were:

Diamond-leaf Willow	(*Salix pulchra*)
Felt-leaf Willow	(*Salix alaxensis*)
Scouler's Willow	(*Salix scouleriana*)
Barclay's Willow	(*Salix barclayi*)
Trembling Aspen	(*Populus tremuloides*)
Balsam Poplar	(*Populus balsamifera*)
Soapberry	(*Shepherdia canadensis*)
White Spruce	(*Picea glauca*)

3.2 July 2005 Assessment

The staked willows on the floodplains upstream and downstream of the dam breach had a survival rate of 80% to 95% at the time of the 2005 assessment. The most successful species were Diamond-leaf Willow, Felt-leaf Willow and Balsam Poplar. These are commonly used reclamation species.

The staked willows (mostly Diamond-leaf Willows and Felt-leaf Willows) in the 10 m wide Rose Creek riparian zone also had a high rate of survival (80% to 90 %).

A much lower rate of survival (10% to 30%) was noted for the willows staked along the upper tributaries. These willows appeared to be Gray-leaf Willows (*Salix glauca*) collected from the nearby shrub zone along upper Rose Creek. The stem cuttings of Gray-leaf Willows are not recommended as reclamation species (Collet, 2002).

4.0 Natural Revegetation

A considerable number of plant species are naturally colonizing the dewatered reservoir as discussed in previous sections. This colonization of plant species is least common in the Phase I seeding zone where the seeded grass species have the densest vegetative cover, and is most common in the valley bottom where the seeded grasses have a sparse cover.

The plant species colonizing the dewatered reservoir are pioneering species normally found on disturbed sites in this region. The most common species are those from the Mustard Family, including Yellow Cress (*Rorippa palustris*) and Tansy Mustard (*Descurainia incana*), along with Mastadon Flower (*Senecio congestus*) and willows (*Salix* spp.).

Colonization of the site by undesirable invasive species does not appear to be a problem. The small amounts of Foxtail Barley (*Hordeum jubatum*), Annual Hawk's-beard (*Crepis tectorum*) and Common Dandelion (*Taraxacum officionale*) found on the site are to be expected in any disturbed site in this region. The non-native grass species, Common Timothy (*Phleum pretense*) and Smooth Brome *(Bromus inermis*) are common in the area and have probably been transported through the importing of hay for horses.

5.0 Evidence of Erosion

The only significant soil erosion was noted on the south side of the reservoir just upstream from the breached dam at northing 6911165 and easting 585552. At this point, a gully has occurred on the steepest part of the slope, in the Phase I seeding zone (see Photos 5 and 6). The deepest part of the cut is about 2 m. Groundwater seepage, at an estimated 2 litres/sec, enters the cut approximately half way down and fans out through mud on the lower slope, in the Phase II seeding zone.

Elsewhere throughout the dewatered reservoir, only minor occurrences of soil erosion were observed during the 2005 assessment.

6.0 Summary

- All seeded grass species are growing well, with the densest and most robust growth occurring in the Phase I seeding zone. All grass species are producing seed in most areas.

- The dense growth of grass in the Phase I zone, although inhibiting the colonization by naturally occurring plant species, is significantly preventing soil erosion on the upper steep slopes.

- The only site with significant soil erosion is the gully described in Section 5.0.

- The non-uniformity in the growth of seeded grasses throughout some areas of the dewatered reservoir is probably the result of seed disbursement by wind or water before germination, or by inconsistencies in seeding methods. This non-uniformity in growth patterns is not currently causing problems in the prevention of soil erosion.

- Much of the dewatered reservoir is being colonized by pioneering plant species. This is most obvious on the valley bottom where the growth of seeded grasses is not so dense.

- The invasion of the area by unwanted invasive plant species is so far not a significant problem.

- The stem cuttings of woody species, particularly willows, are surviving well on the floodplains adjacent to the dam breach and in the Rose Creek riparian zone. The survival rate of the cuttings staked on the upper tributaries and in the test sites (Phase III) is poor.

7.0 Recommendations

Overall the site is doing very well and the only additional work recommended is the treatment of the gully that has formed on the south side of the reservoir as described in Section 5.0. This erosion cut could possibly be restored through the use of common bioengineering techniques. The optimal time for the construction of bioengineered structures is late summer / early fall.

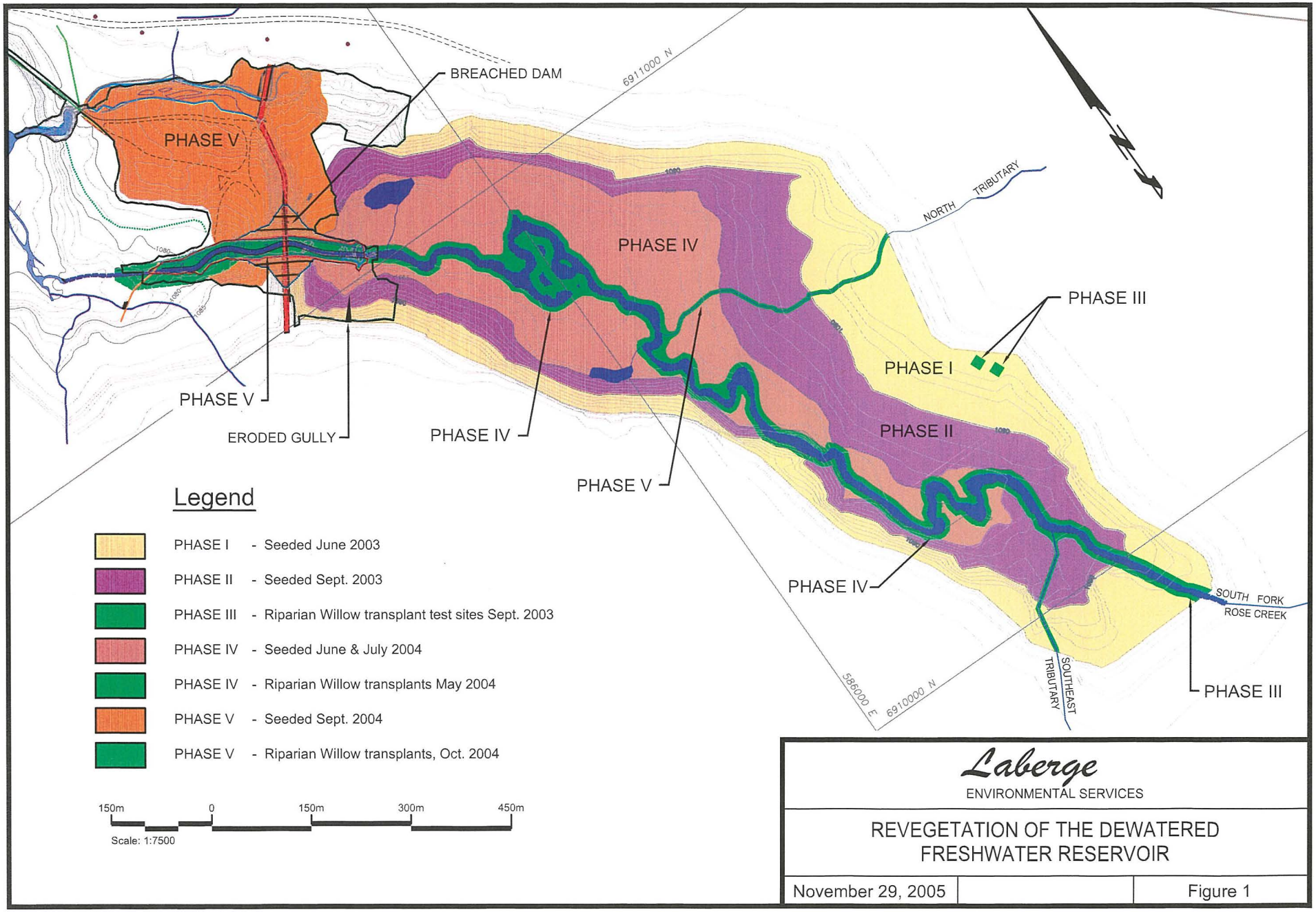
Although growth is sparse on the breached walls, additional seeding is likely unnecessary. This area has only had several months to become established (it was seeded in the fall of 2004) and growth is likely to increase over time. Annual monitoring of this area will indicate whether the seeding was successful.

8.0 References

Arctic Alpine Seed Ltd. 2005. Anvil Range Mining Complex, Faro, Yukon. Former Fresh Water Supply Reservoir. Reservoir Site Revegetation and Rose Creek Riparian Zone Rehabilitation. Project Report 2003-2004. Prepared for Deloitte & Touche Inc.

Collet, Dominique. 2002. Willows of Southcentral Alaska. Prepared for the Kenai Watershed Forum and funded by U.S. Fish and Wildlife Service.

Lacroix, Denis. 2005. Personal comments, emails and notes. (Mr. Lacroix was Arctic Alpine Seed's site manager for the freshwater reservoir revegetation project during the 2003 and 2004 field seasons).



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ENVIRONMENTAL SERVICES

REVEGETATION OF THE DEWATERED FRESHWATER RESERVOIR

November 29, 2005		Figure 1

APPENDIX A

SITE PHOTOGRAPHS, JULY 21, 2005

Photo #1 : Facing north from the valley bottom, Phase I in background

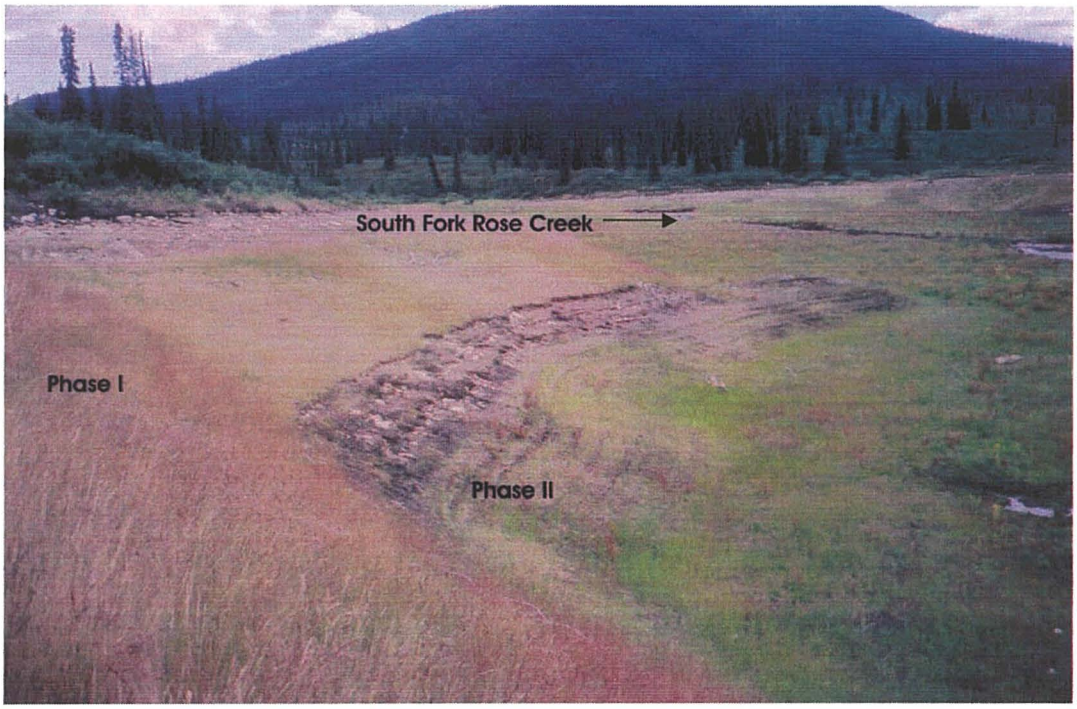

Photo #2 : North east end of reservoir showing Phases.

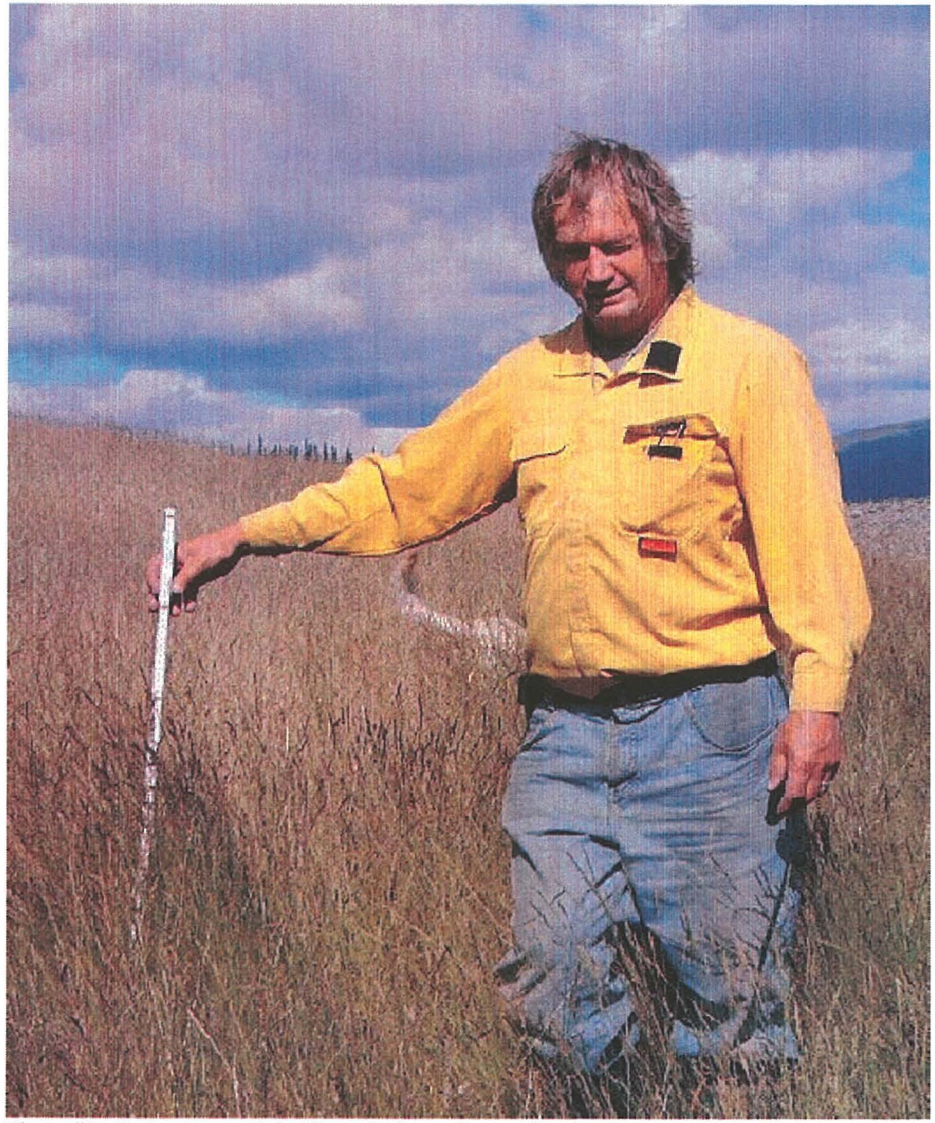

Photo #3 : Robust growth in Phase I, sheep fescue dominating.

Photo #4 : Facing west towards breached dam through Phase II, Phase I in upper right.

Photo #5: Eroded gully formed on south west side of reservoir.

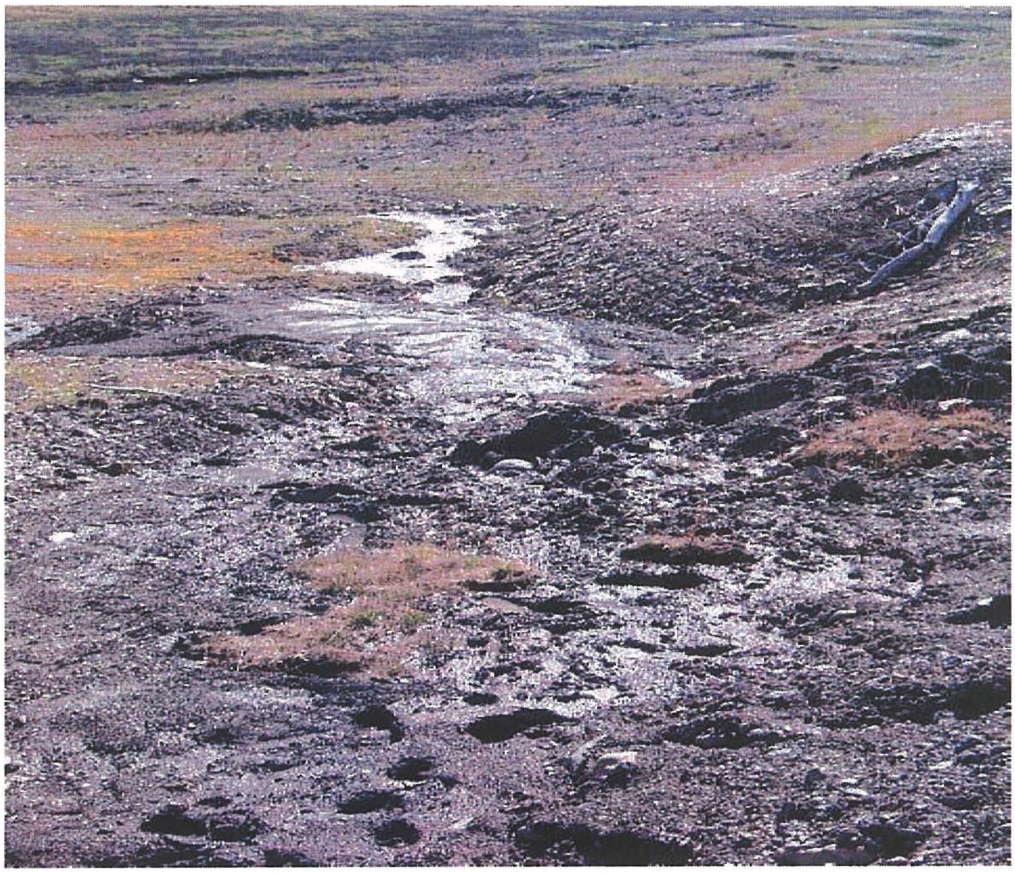

Photo #6 : Erosion in gully below groundwater seepage point, looking to valley floor.

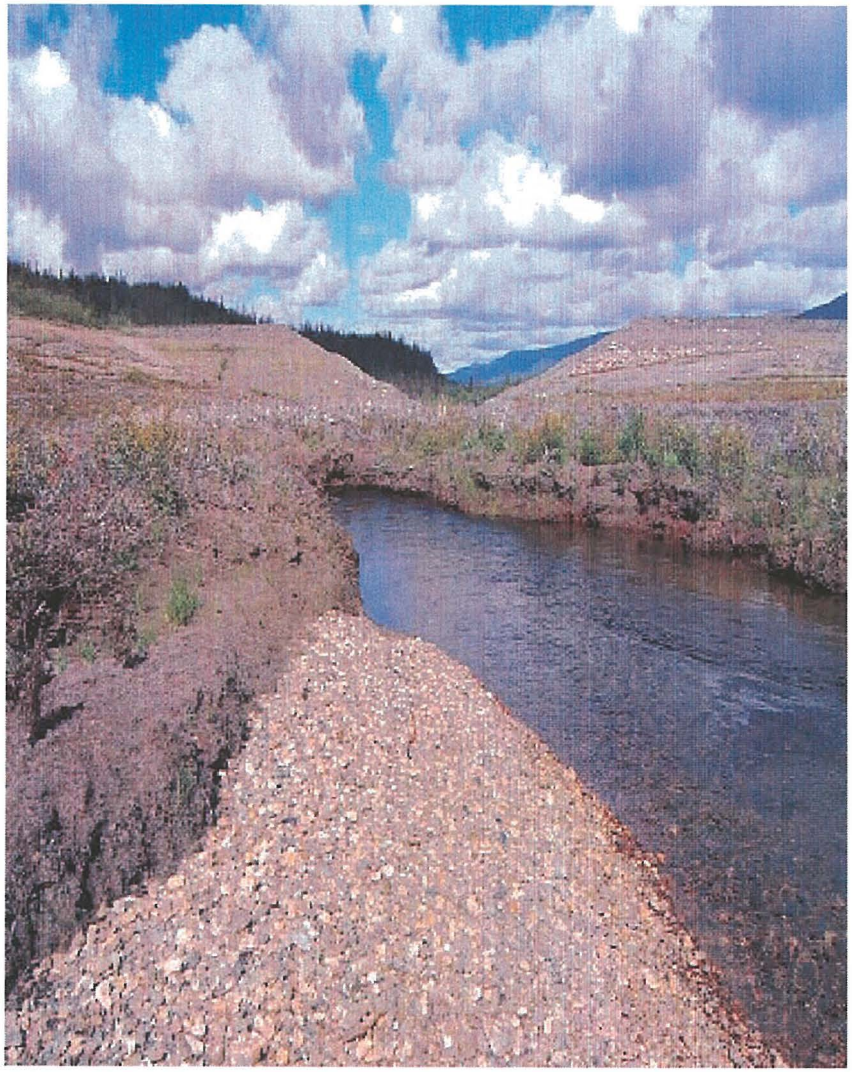

Photo #7 : Rose Creek riparian zone along the valley floor looking towards the breached dam.

Photo #8 : Natural colonization of willows in the original riparian zone west of the north tributary area.

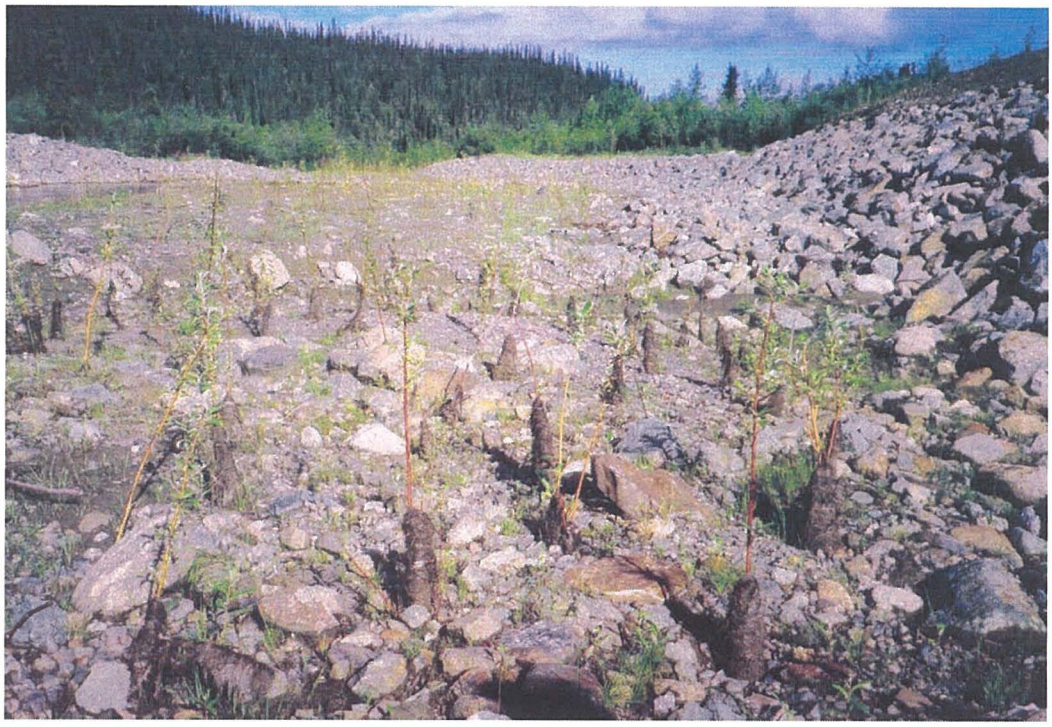

Photo #9 : Successful willow transplants in the flood plain of the breached area. Note the entrapment of debris at the bases of the willows resulting from high water events.

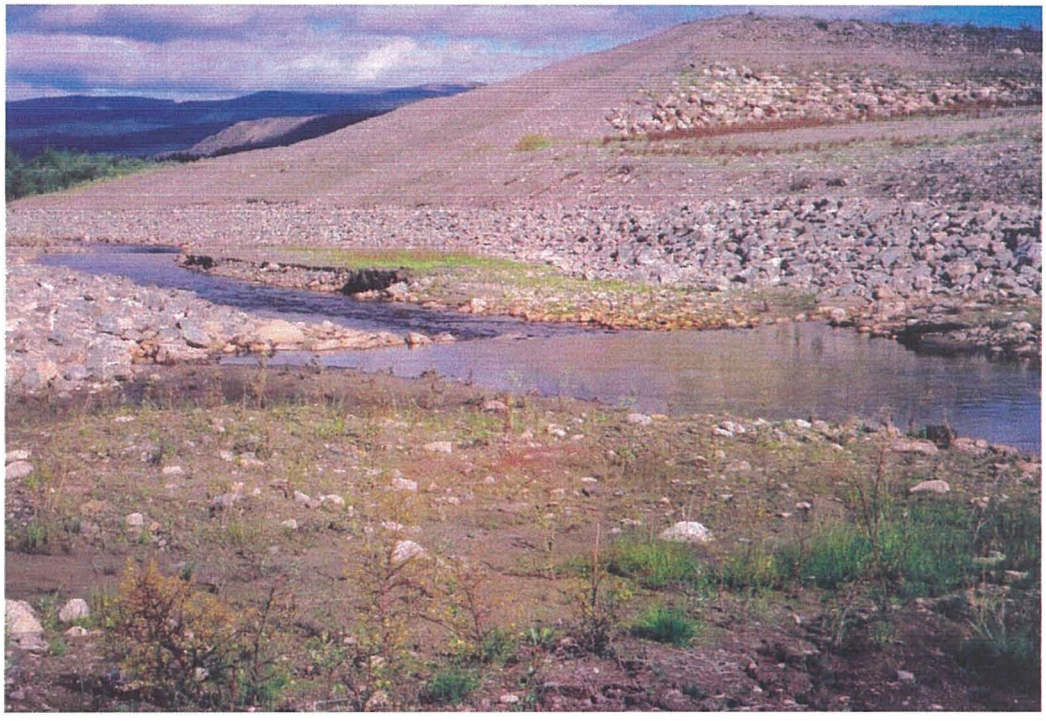

Photo #10 : High survival rate of transplanted willows was also observed in the riparian zone. This photo was taken just upstream of the breach.

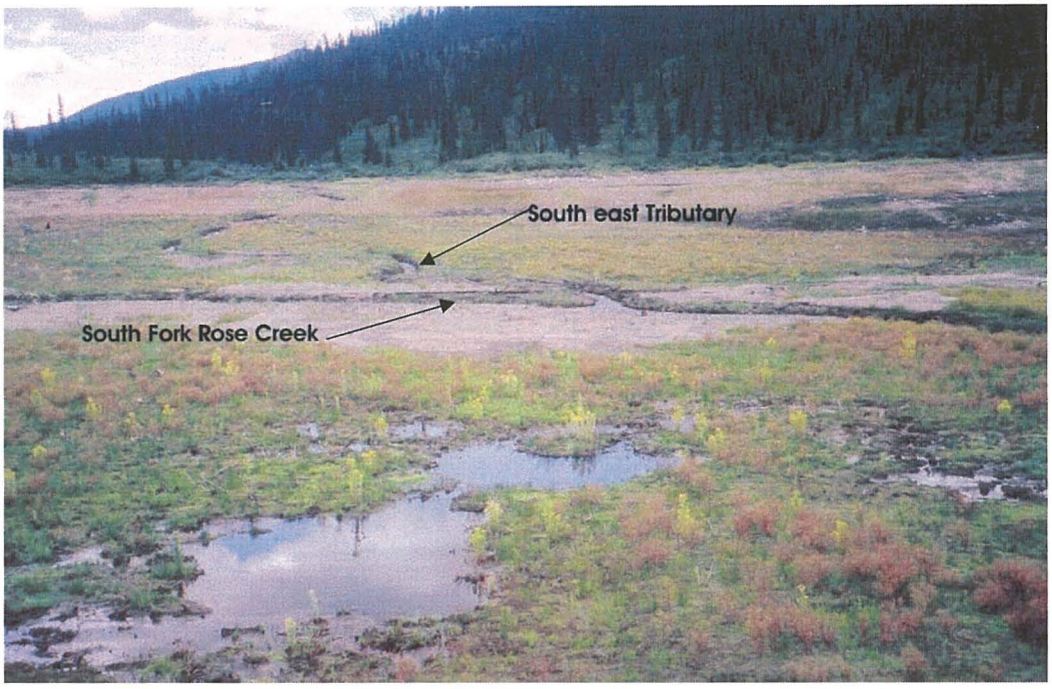

Photo #11 : Confluence of the South Fork and the South east tributary at the east end of the reservoir.

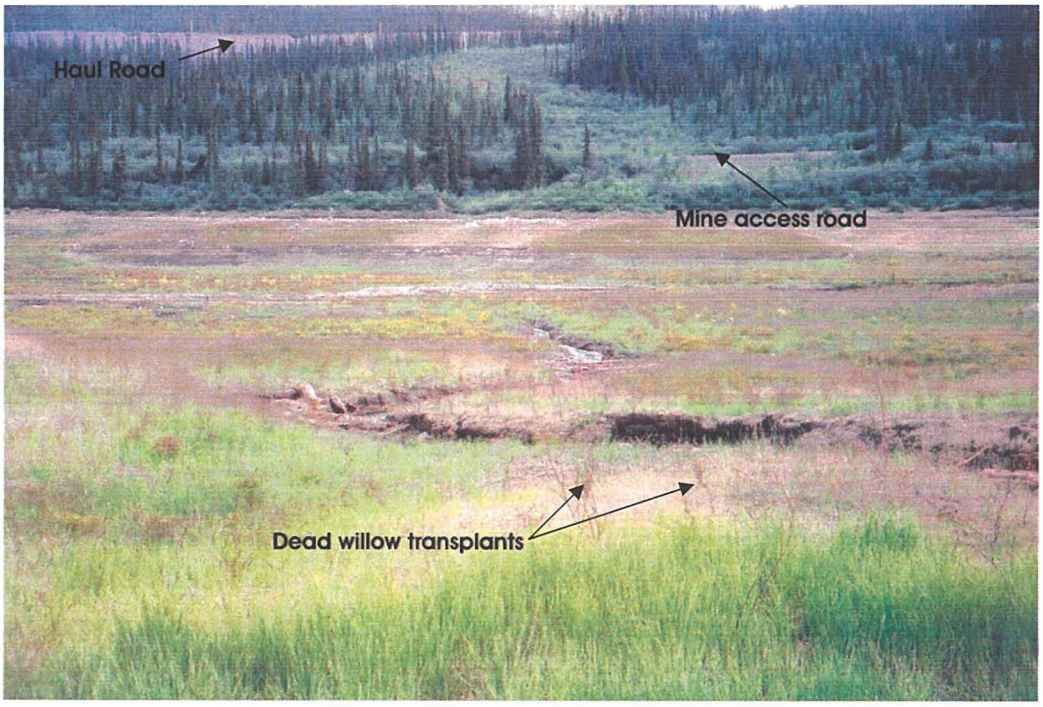

Photo #12 : Looking down S.E. tributary. Most of the willow transplants did not survive in this area.

Photo # 13: Freshwater Reservoir prior to breaching. Draw down has occurred to at least the Phase I level. Summer 2003.

Photo # 14: The dam has been breached and dewatering has occurred. Summer 2004.

Photo # 15: The dewatered reservoir just upstream of the breached dam. Summer 2004.

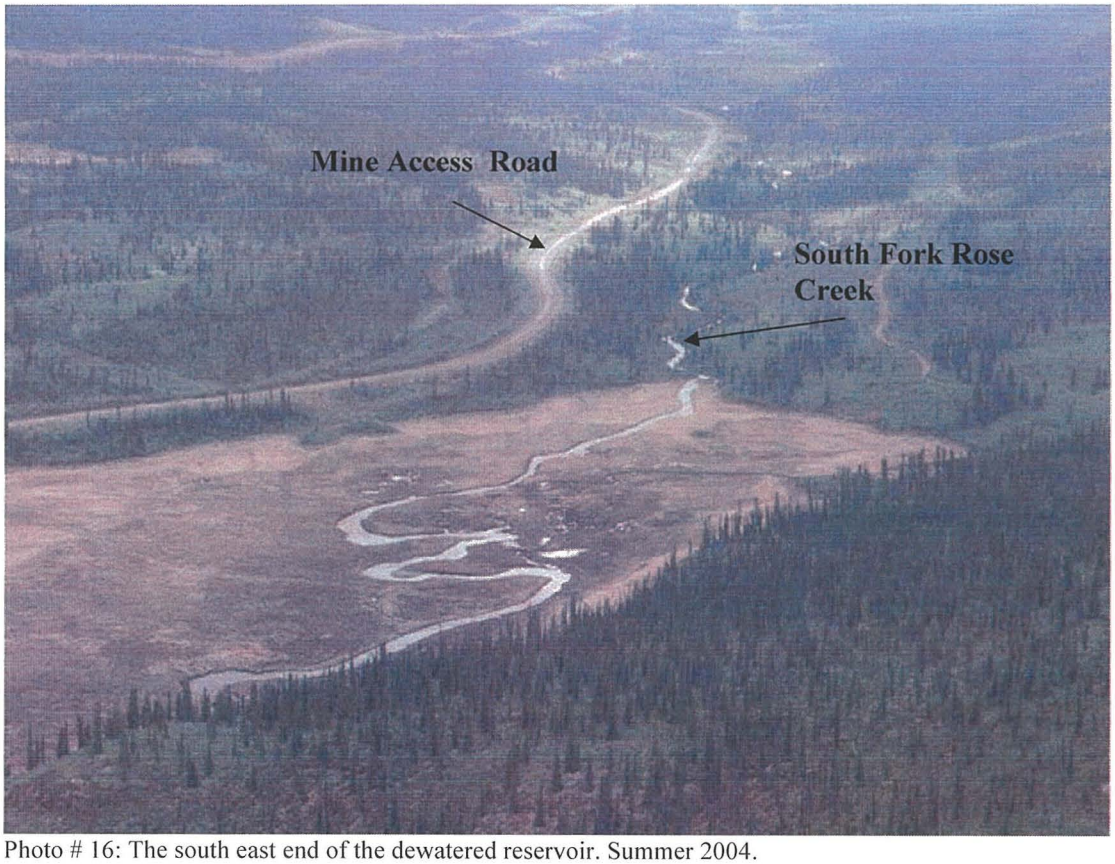

Photo # 16: The south east end of the dewatered reservoir. Summer 2004.

APPENDIX D – AQUATIC REPORT

REPORT PREPARED BY
WHITE MOUNTAIN CONSULTING

2005

FISH HABITAT AND FISH UTILIZATION ASSESSMENTS WITHIN THE DE-WATERED FRESHWATER SUPPLY RESERVOIR

ANVIL RANGE MINE SITE
FARO, YUKON
June/August 2005

Prepared For: Deloitte and Touche Inc.
December, 2005

WHITE MOUNTAIN ENVIRONMENTAL CONSULTING

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1.0 INTRODUCTION

The Freshwater Reservoir at the Faro Mine Site was permanently de-watered during fall and early winter of 2003 with the construction of a new channel through the old dam site. The following report details the 2005 evaluation of fish habitat in the one year old reformed channels and fish utilization and distribution in the vicinity of the de-watered reservoir. This assessment was committed to in the *Environmental Management Plan for the Breaching of the Fresh Water Supply Dam at the Faro Mine*. Evaluations of fish habitat and fish distribution in Rose Creek through the reservoir basin were conducted during early June and mid August, 2005.

2.0 STUDY AREA

The Freshwater Reservoir Basin was created over a reach of the South Fork of Rose Creek. Within the reservoir basin two small tributaries join the South Fork of Rose Creek. The 2003 breach of the freshwater dam has re-exposed the original channel and the creek once again flows in this channel. The fish habitat and fish utilization assessments of Rose Creek occurred within the newly exposed channel, the small tributaries, the newly created channel through the breach, in the lower section of the South Fork of Rose Creek immediately downstream of the breach, and Rose Creek in the vicinity of water sample site X14. These monitoring locations met the objectives set out by the EMP. The Pump House Pond area, considered as critical fish habitat for the area, was also investigated in conjunction with the 2005 investigation.

3.0 METHODS

Methods used in 2005 to assess fish habitat and fish utilization were as similar as possible to those used during the 2004 investigation. The exception to this was investigations in the Pump House Pond area which were not evaluated during 2004. The 2005 assessments were conducted during spring, between May 31 and June 2 and summer, between August 15 and 18. The June investigation served as a post freshet assessment to identify areas of channel instability, to identify potential barriers to fish movements and to identify any critical habitats such as Arctic grayling spawning areas. Evaluation of fish habitats and assessments of fish utilization within the study area were conducted during August.

Prior to initiating field activities a license to collect fisheries information was obtained through DFO. The investigations were conducted under the authority of License to Collect Fish No. 05-18.

Rose Creek, within the reservoir basin was divided into three separate reaches in 2004 based on channel slope and corresponding channel morphology. The area of construction activities and the previously modified channel downstream of the old reservoir were also described as separate reaches. The reaches are shown in Figure 1.

Field maps generated in 2004 were used to ensure the 2005 investigations re-sampled the same fishing locations and features as in 2004. A hand held GPS was used to document observation locations and elevations. A laser range finder was used to measure distances within each reach. Habitat evaluations throughout the study area

included assessments of creek width (wet and dry), water depth, velocity (floating object technique), bank stability, bottom substrates, available cover and riparian vegetation.

Both ground and air photographs representative of each reach and unique features of the channel were taken during both field sessions to provide a record for long term monitoring of habitat stability.

Fish utilization and distribution was assessed with a variety of techniques to ensure capture of all species present. Crew members wore polarized sunglasses at all times to assist in fish viewing. All visual observations were recorded.

Minnow trapping was conducted with "Gee type" minnow traps (¼" mesh). Traps were baited with salmon roe (Yukon River origin) suspended in the trap in a perforated plastic bag. Traps were set in all habitat types for an overnight period with the total time of set ranging from 17.5 to 25.6 hours. A simple site description was recorded for each trap set and velocities at each location were visually estimated. This style of minnow trapping has previously been shown to be highly effective for the capture of juvenile chinook salmon (jcs). This technique is also effective for the capture of slimy sculpin and burbot juveniles, however, is not viewed as a reliable tool for documenting Arctic grayling. Many of the traps set in 2005 were set in such a way as to create a "fyke" trap, designed to assist in the capture juvenile Arctic grayling migrating up or down stream along the shoreline.

Electro-fishing was conducted with a Smith-Route POW type 12A back pack, battery powered electro-fisher. The operator was accompanied by two crew members with dip nets. Fish densities within the newly created channel and the newly exposed channel sections were assessed using a 2 pass block net, electro-fishing technique. Block nets (1/8" rochel weave) were installed in the creek 100 meters apart at the same locations used in 2004. Electro-fishing of the entire blocked reach was conducted twice, moving in an upstream direction each time. Effort, measured in seconds of shocking time, varied between the reaches due to complexity of habitats and the number of fish encountered.

Electro-fishing below the breach and at Site X-14 was, as in 2004, conducted as a single pass over a 100 meter reach with no block nets. Electro-fishing was not conducted in the Pump House Pond area.

Angling was conducted with light spin casting gear and a variety of small lures. Effort was recorded as minutes fished.

Visual observation surveys of extensive reaches in the glide areas were repeated and total counts of Arctic grayling observed were recorded.

Gillnetting and snorkel surveys were conducted in the Pump House Pond area during the June sampling period. The gillnetting was conducted with a mixed net of 2" and 2.5" mesh monofilament nets to record abundance and spawning condition of Arctic grayling. Gillnet sets were of short duration lasting 30 minutes or less. The snorkel surveys were conducted to denote spawning habitats.

All fish captured were identified as to species and recorded; a sub-sample of fish captured were live measured for fork length (+/- 1 mm) and weighed (+/- 1.0 gm). All fish captured were handled delicately to allow for live release. A small mortality of Arctic

Snorkel surveys of the Pump House Pond found that the inlet area to the pond as an active and extensive Arctic grayling spawning area. The spawning area is located in the central channel were flows are laminar, with velocities less than 0.5 meters per second in 0.7 meters of water. The substrates consist of well sorted pea gravel that extends as a long band with the current for 60 meters by as much as 15 meters across the channel width. At the time of investigation male Arctic grayling guards were observed actively guarding redds. Disturbances to a light sediment layer on the pea gravel were observed in almost all of the area. Arctic grayling were also observed actively spawning against the beaver lodge in the pond. Gillnetting within the pond on June 1 with a set time of 30 minutes captured 10 female and 9 male Arctic grayling adults. Many were actively exuding spawn. A gross examination of the gonads of incidental mortalities indicated that spawning was almost complete at the time of investigations.

Table 1: Results of electro-fishing surveys conducted in Rose Creek in the de-watered reservoir basin, through the breach of the old dam and at site X-14 during August, 2005.

			Catch		
Site	Pass #	Shock time (seconds)	Arctic Grayling	Slimy Sculpin	Burbot
Reach #1	1	1,360	2 ad 29 juv. 2 sub.ad	9 adult	0.
	2	1,200	1 ad 12 juv. 1 sub. ad.	13 adult	3 sub.ad
Reach #2	1	1200	4 juv.	33 adult 4 fry	0
	2	890	1 juv.	23 adult 9 fry	0
Reach #3	1	825	0	5 adult 25 fry	1 sub.ad.
	2	575	1 juv.	47 fry	2 sub.ad
Reach #4	1	710	1 juv.	1 fry	1 sub.ad
	2	711	3 juv.	1 adult 9 fry	1 sub.ad
Reach #5	1	585	1 sub-ad 29 juv.	9 adult 2 fry	0 1 jcs

Juv. =juvenile, sub.ad = sub adult,

Table 2: Catch per unit of effort for electro-fishing block net surveys of Rose Creek Dewatered Reservoir channel comparing 2004 and 2005 total catches. Results have been presented as # of fish captured per 100 seconds of shock time for 2 passes combined

Reach	**Year**	**Ag ad**	**Ag sub-ad**	**Ag Juv.**	**SS ad**	**SS fry**	**BB**	**jcs**
#1	2004	0	0.16	0.84	0.68	0	0.36	0
	2005	0.12	0.12	1.60	0.86	0	0.12	0
#2	2004	0	0	0.23	1.49	2.79	0	0
	2005	0	0	0.24	2.68	0.62	0	0
#3	2004	0.05	0.05	0.16	1.44	0.58	0.58	0
	2005	0	0	0.07	0.36	5.14	0.21	0
#4	2004	0	0.07	1.21	0.64	0	0.37	0
	2005	0	0	0.28	0.07	0.07	0.14	0
#5	2004	1.14	1.14	0.68	0.56	0	0.23	0
	2005	0	0.17	4.96	1.50	0.34	0	0.17

3 High water during June caused extensive erosion and movement of the channel by approximately 16 meters on the left bank in 2004, the channel has stabilized in the newly cut areas and built gravel point bars at the site of the old channel.

4 Side to side erosion occurred during June of 2004 exposing boulders of the right bank. In 2005 the left bank became an exposed area of washed boulders.

5 Well defined banks protected by old root mats continue to confine the channel into a stepped boulder rapid with small pools interspersed.

6 Eroded banks on either side have stabilized creating dry gravel/cobble side areas.

Reach #2

7 Erosion of outside corners has created a large corner pool. The small sand island within the original channel observed in 2004 has been cleaned out leaving a shallow corner pool.

8 Erosion of side banks and creation of sand and gravel point bars continues through area of tight meanders.

9 The outside corner of the meander that moved 8-10 meters during spring of 2004 has stabilized.

10 Shallow pool on outside corner, with extensive erosion during 2004 has become a point of deposition with thalwag eroding the point inside the curve by several meters.

11 Long (175 meters) straight stretch partially confined by the hillside on the left bank. Right bank is low (0.4 meters) with exposed boulder edges. Small cobble and gravel substrates typical of reach 2 were clean of all fines during 2005 investigations.

12 A deep pool formed on the right bank by a 3-4 meter eroding bank consisting of aggregate materials has been scoured out leaving a cobble bottomed pool.

13 Small amounts of ground flow from the North Tributary, comes to surface 20 meters from right bank and flows into Rose Creek in the original channel of the North Tributary.

14 Large sand and gravel deposit opposite deeply eroded outside corners continue to build. The sand depositions are now above the ordinary high water mark and creek substrates consist of gravel and cobble.

Reach #3

15 First mid channel gravel bar has extended during 2005.

16 The North Tributary is forming a channel that enters Rose Creek at this point. This is approximately 150 meters downstream of the location the tributary historically entered Rose Creek.

17 Series of undercut and collapsing banks on both banks with associated deep side pools >1 meter depth observed in 2004 have washed out. The banks are steep, unstable and clear of instream bank remnants.

18 Gravel bar formations with much bank movement in the area continue to develop.

19 Channel actively shifting, banks are low and not confining in a flat flood plain area, gravel bar formations have grown since 2004.

20 Bank erosion has stabilized leaving large deposition areas, the channel consists of 40% gravel bar and has begun to braid.

21 Old meander scroll channel remains wet and exists as a small slough.

22 Small side slough connected to the Downstream end of the North Tributary.

23 Perched areas behind levees on the left bank have been filled with fines.

24 Channel braids and forms two small islands of local materials consisting of very fragile, unconsolidated mud. The channel on the left bank has opened from 1.5 meters to as wide as 4 meters and the depth of this area has been reduced from >1 meter to < 0.5 meters.

Reach #4

25 Inlet structure constructed at the upstream margin of the newly created channel. Steep rip rap rock, rapid, 1.2 meters in height with a slope of almost 50%.

26 First constructed riffle in the breach.

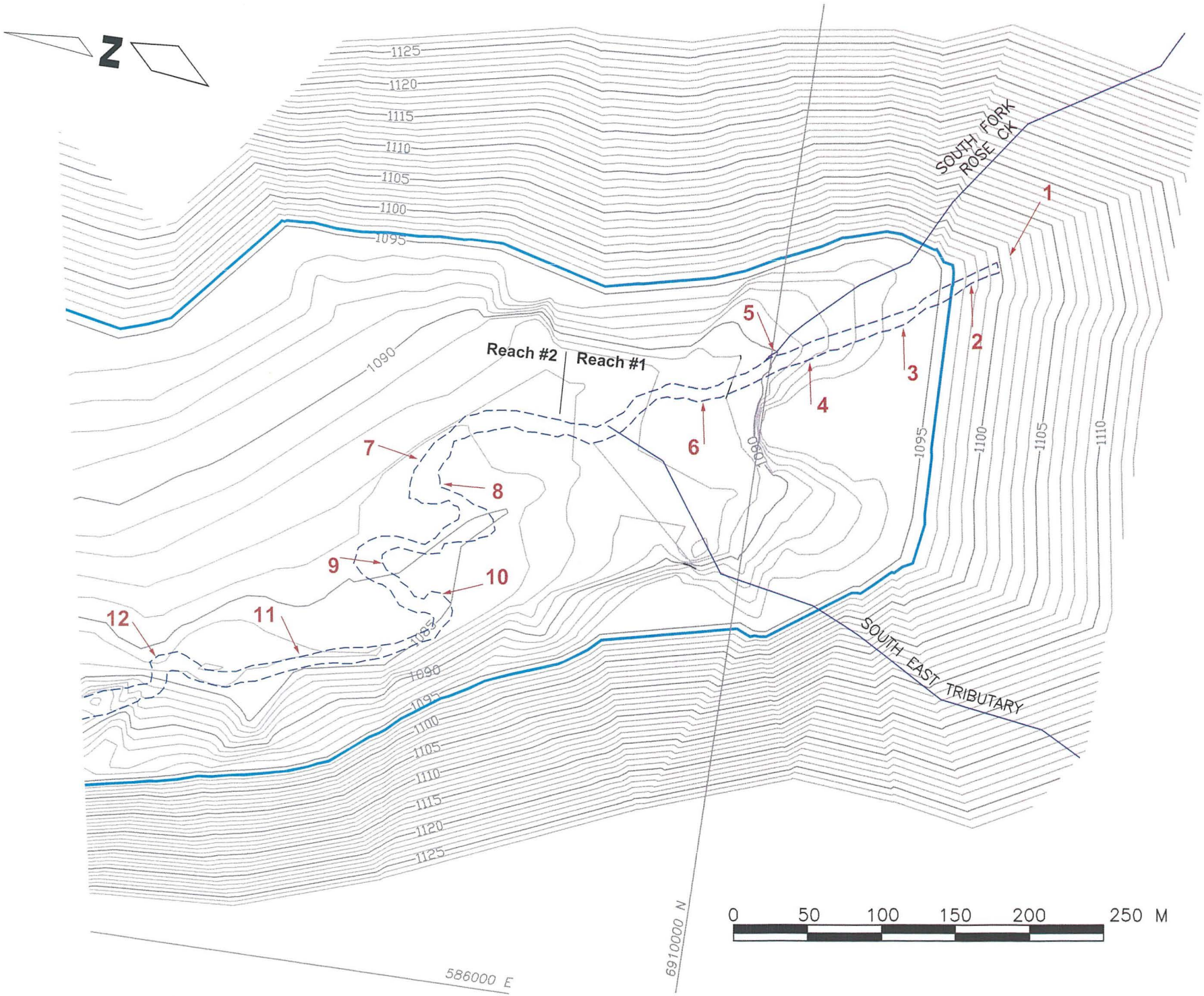
27 Second constructed riffle in the breach.

28 Third constructed riffle in the breach.

29 Boulder armor ends directing flow into channel built at the time of original dam construction.

Reach #5

30 End of channel built at the time of original dam construction.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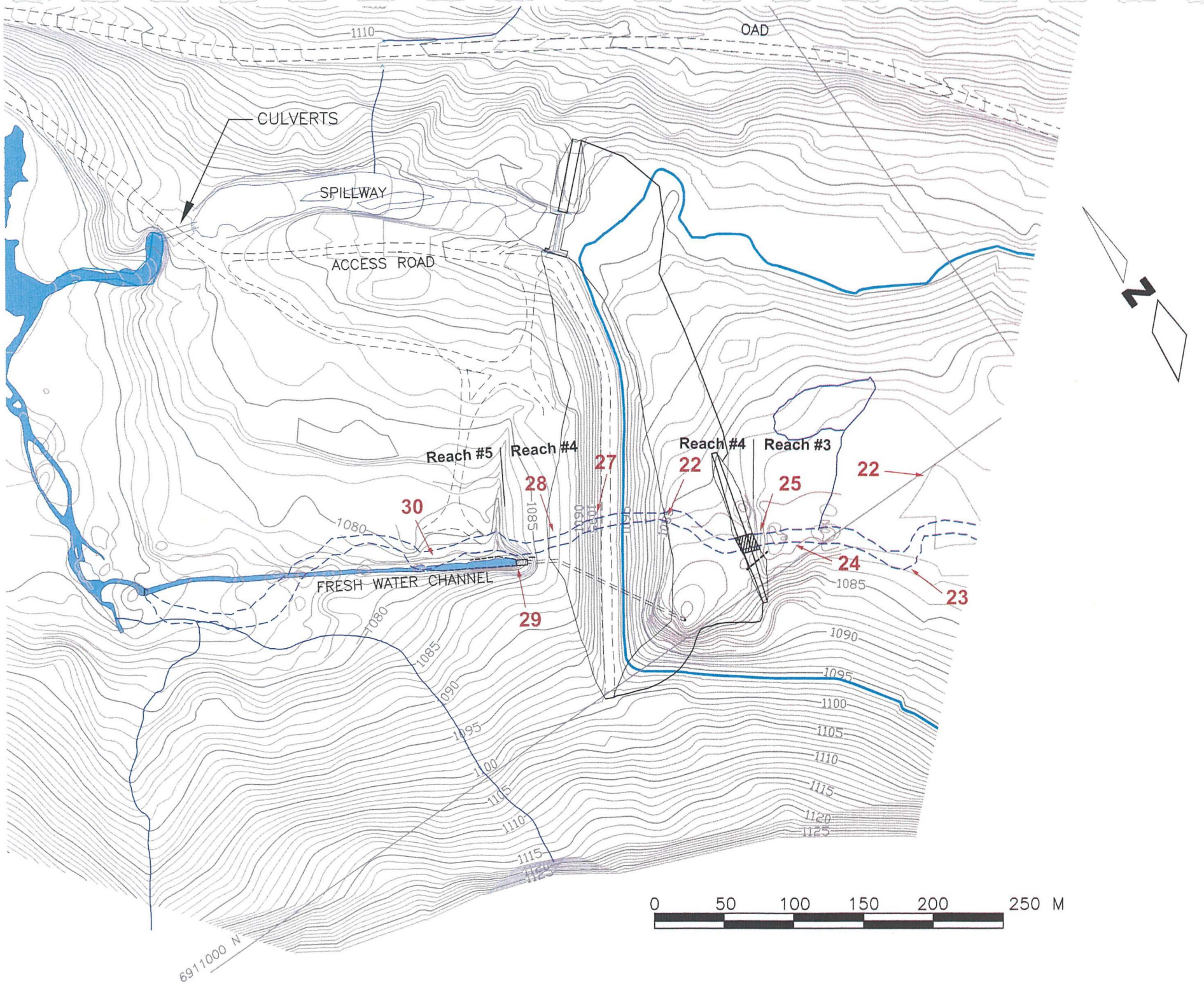
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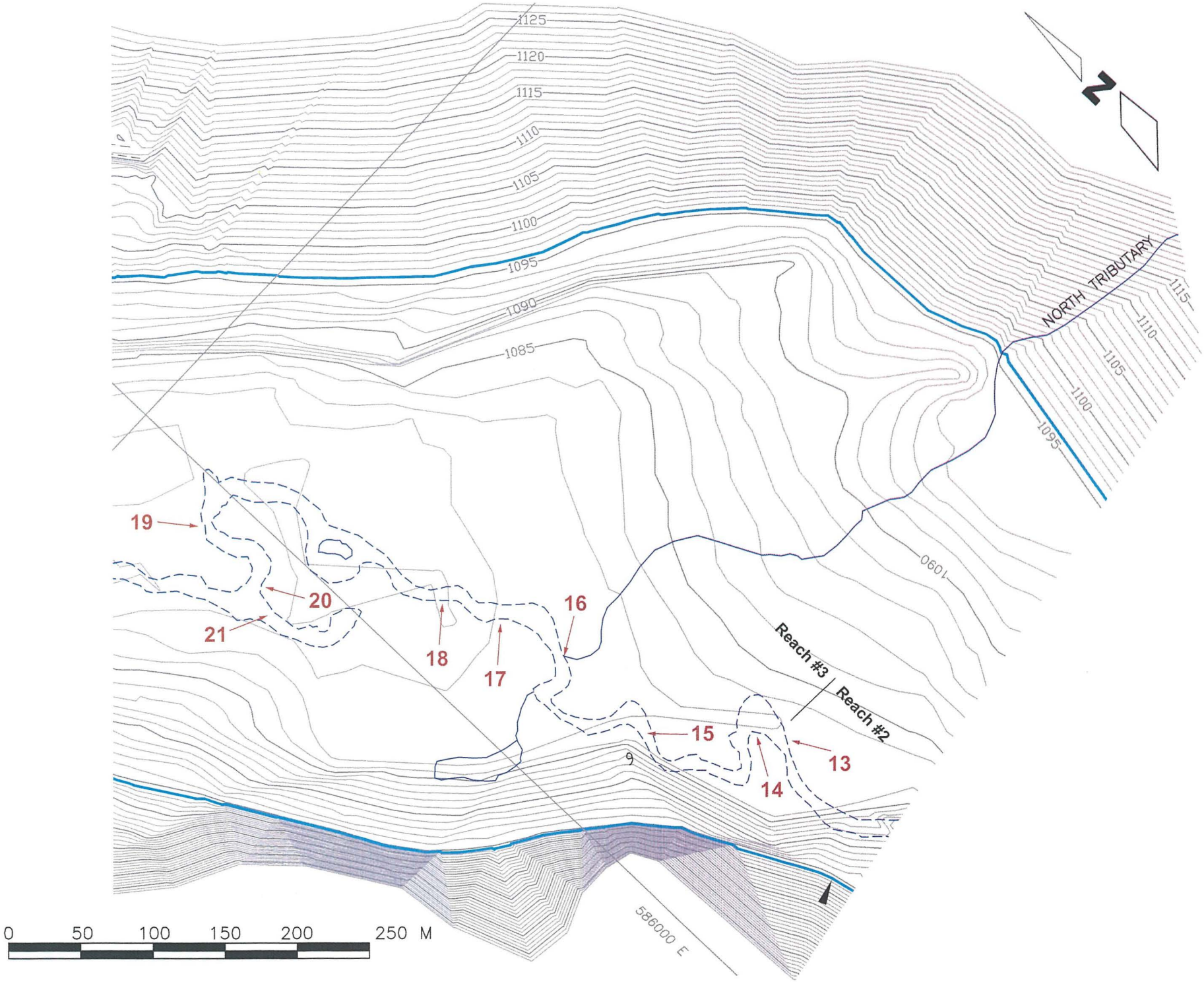
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APPENDIX 1

GENERAL SITE DESCRIPTIONS

LOCATION: Reach #1

UTM upstream end: Zone 8V 5 86 518 E / 69 09 900 N
Elevation: 3,608 feet
Site Location Description: South Fork Rose Creek at the upstream end of de-watered reservoir.
Date Sampled: August 10, 11, and 12, 2004
August 16 and 17, 2005

CHANNEL CHARACTERISTICS:

Reach Length:	370 meters
Average Channel Width:	6.5 meters
Average Wetted Width:	3.5 meters
Slope	4%
Average Depth:	0.3 meters
Average Velocity	>1 meters per second
% Pool, Riffle, Run / Glide:	45 % short runs, 25% stepped rapids over boulders and 30% small pools
Cover	Boulder pools, turbulence and perched boulders and cobbles
Overhead vegetation	Non-existent
Riparian Vegetation	newly planted grasses, willow stems and poplar stems

BED MATERIAL:

Unconsolidated
50% boulder, >35% cobble, <10% gravel, 5% sand (sand only in deposition points along side areas)

BANK CHARACTERISTICS: Banks rise an average of 0.8 meters; evidence of erosion from 2004 occurs on both banks exposing old vegetation mats. Two separate areas of significant erosion occurred within reach #1 during the 2004 freshet, channel movements of 8 to 10 meters were recorded. On top of the banks fine silts to a depth of 15 cm have been newly deposited. Grass plantings from the fall of 2003 and the spring of 2004 have established growth. Some of the willow and black poplar plantings from spring 2004 have taken.

STREAM FLOW CHARACTERISTICS: Flows consist of a stepped rapid consisting of 30% boulder pools mixed with short run areas 2-5 meters in length between boulder steps.

PHOTOS: See photos 1, 2 and 3.

LOCATION: South East Tributary

UTM at confluence with Rose Creek: Zone 8V 5 63 383 E / 69 10 127 N
Elevation: 3,573 feet
Site Location Description: Small tributary within the reservoir basin that feeds into Rose Creek.
Date Sampled: August 10, 11, 2004
August 15, 2005

CHANNEL CHARACTERISTICS:

Reach Length:	<250 meters
Average Channel Width:	2.75 meters
Average Wetted Width:	2.75 meters
Average Depth:	0.15 meters
Average Velocity	<0.5 meters per second
% Pool, Riffle, Run / Glide:	90% riffle/ run, and 10% small pools
Cover	limited; boulders, some organic debri and turbulence
Overhead vegetation	Non-existent
Riparian Vegetation	lower reach has grass planted in 2004, upper reach has well established grass planted in fall of 2003

BED MATERIAL: Substrates become finer moving downstream from the edge of the old reservoir to the confluence with Rose Creek. A decrease in slope occurs 100 meters from the edge of the old reservoir basin.

Upper reach 80% boulder, 20% cobble.
Lower reach 35% boulder, 35% cobble, 20% gravel and 10% sand

BANK CHARACTERISTICS: Upper 100 meters is entrenched with abrupt banks that rise to a maximum of 1.5 meters and are eroding. Lower 150 meters also entrenched with banks consistently rising abruptly to 0.6 meters.

STREAM FLOW CHARACTERISTICS: Upper 100 meters is 100% boulder strewn run with organic deposition area at slope change, lower 250 meters is 90% riffle run with 2 small pools (10%) near Rose Creek

LOCATION: Reach #2

UTM at upstream end: Zone 8V 5 86 379 E / 69 10 178 N
Elevation: 3,567 feet
Site Location Description: Reach starts approximately 340 meters downstream of the edge of the old reservoir basin and extends approximately 690 meters downstream.
Date Sampled: August 9, 2004
August 15,16,17,2005

CHANNEL CHARACTERISTICS:

Reach Length:	690 meters
Average Channel Width:	6.0 meters
Average Wetted Width:	5.5 meters
Average Depth:	0.18 meters
Slope	>1%
Average Velocity	>1 meters per second
% Pool, Riffle, Run / Glide:	20% riffles, 60% glide and 20% pools
Cover	very little cover, some provided by deep corner pools
Overhead vegetation	non-existent
Riparian Vegetation	new grass and willow plantings

BED MATERIAL: Substrates become finer moving down the reach. Cobbles, common in the upper portions of the reach become rare in the lower portion.

Occasional boulder, 30% cobble, 60% gravel, 10% sand

BANK CHARACTERISTICS: Mostly entrenched rising abruptly an average of 0.4 meters. Banks consist of eroding vegetative mat.

STREAM FLOW CHARACTERISTICS: Long glide areas interspersed with occasional gravel riffles. A total of 6 large pools occur.

PHOTOS: See photos 4, 5, and 6

LOCATION: Reach #3

UTM upstream end: Zone 8V 5 86 148 E / 69 10 551 N
Site Location Description: Reach extends from just upstream of the old North Tributary confluence to the site of the old coffer dam.
Date Sampled: August 10, 11, 2004
August 15,16,17, 2005

CHANNEL CHARACTERISTICS:

Reach Length:	Approximately 950 meters
Average Channel Width:	5.0 meters
Average Wetted Width:	4.5 meters
Average Depth:	0.4 meters
Slope	0.5%
Average Velocity	>0.5 meters per second
% Pool, Riffle, Run / Glide:	10% riffles, 80% glide and 10% pools
Cover	Very limited, small riffles and occasional pool
Overhead vegetation	Non-existent
Riparian Vegetation	newly seeded grass

BED MATERIAL: Loosely consolidated gravels and sand, cobbles and boulders firmly consolidated.

10% boulder, 10% cobble, 70% gravel, 10% sand (sand in deposition points only)

BANK CHARACTERISTICS: 70% of banks cut and eroding with rise to flood plain varying from 0.2 meters to 1.0 meters, 30% deposition points

STREAM FLOW CHARACTERISTICS: Channel is predominantly flat and featureless with occasional side pools

PHOTOS: See photos 7,8,9,10 and 11

LOCATION: North Tributary

UTM old channel confluence with Rose:
Site Location Description: Small tributary that enters Rose Creek from the West
Date Sampled: August 10, 2004

BED MATERIAL: Substrates consist primarily of fine gravels and sand with heavy orange colored siltation. Boulders in a steep area upstream of the old gravel pit pond have been placed to protect from head-ward erosion.

BANK and STREAM FLOW CHARACTERISTICS: The channel of this tributary within the reservoir basin is indistinct; during spring flows this tributary entered the reservoir basin cascading down a boulder shoot immediately below the road then formed a pond in an old gravel pit. Flows exited the pond through a well defined channel for 20 meters before charging overland and over the flood plain with no distinct channel. Flows entered Rose Creek as small rivulets. During August investigations the flow went to ground in the boulder shoot upstream of the pond, the pond was partially charged, however no distinct flow came out of the pond and all flow from this creek went to ground. Two small rivulets arising from the ground 20 meters from Rose Creek were the only surface flow observed.

PHOTOS: see photo 7

LOCATION: Reach #4

UTM Upstream end of reach: Zone 8V 5 85 764 E / 69 11 037 N
Site Location Description: Reach extends from the old coffer dam through the breach of the old dam.
Date Sampled: August 10, 2004
August 15,16,17, 2005

CHANNEL CHARACTERISTICS:

Reach Length:	265 meters
Average Channel Width:	6.0 meters
Average Wetted Width:	5.5 meters
Average Depth:	0.3 meters
Average Velocity	<0.5 meters per second
% Pool, Riffle, Run / Glide:	10% riffles/ rapid, 90% glide
Cover	riffle areas and interstitial spaces along shoreline blast rock
Overhead vegetation	non-existent
Riparian Vegetation	none

BED MATERIAL: Substrates are heavily silted in glide areas.

60% angular boulder, 20% cobble, 20% gravel, % sand

BANK CHARACTERISTICS: Confining and stable banks consist of stepped and contoured blast rock constructed during 2003.

STREAM FLOW CHARACTERISTICS: Channel is flat flowing predominantly as a glide, riffle/ rapids are constructed.

PHOTOS: See photos 12,13,14,15,16,17 and 18

LOCATION: Reach #5

UTM upstream end: Zone 8V 05 83 690 E / 69 12 366 N
Site Location Description: downstream of the breach and construction activity
Date Sampled: August 13, 2004
August 16,17, 2005

CHANNEL CHARACTERISTICS:

Reach Length:	260 meters
Average Channel Width:	3.0 meters
Average Wetted Width:	3.0 meters
Average Depth:	0.4 meters
Average Velocity	1.0 meters per second
% Pool, Riffle, Run / Glide:	20% riffles, 50% run and 5% pools (pools along edges and at corners)
Cover	Perched cobbles, steep banks, occasional corner pools and turbulence below riffles
Overhead vegetation	5% coverage from willows and dwarf birch
Riparian Vegetation	willow, poplar, some cinquefoil and sedges

BED MATERIAL: Substrates highly compacted and consolidated.

10% boulder, 80% cobble, 10% gravel with very few fines

BANK CHARACTERISTICS: Banks are well defined and confining, rising 0.6 meters to an open flood plain. This reach was a constructed channel built at the time of the original dam construction

STREAM FLOW CHARACTERISTICS: Creek bottom is flat and the channel flows arrow straight through the constructed channel. Meanders at the downstream end are straightening and flows may shift to original channel in subsequent high water events.

LOCATION: Site X-14

Site Location Description: Rose Creek from the downstream end of the diversion channel to 100 meters downstream of the confluence with the tailings pond channel.
Dates Sampled: August 14 and 15, 2004
August 17, 18, 2005

CHANNEL CHARACTERISTICS:

Reach Length:	360 meters
Average Channel Width:	17.0 meters
Average Wetted Width:	8.0 meters
Average Depth:	0.7 meters
Average Velocity	0.5 meters per second
% Pool, Riffle, Run / Glide:	10% riffles, 80% glide/run and 10% pools
Cover	deep pools, collapsed banks and instream woody debri
Overhead vegetation	15% coverage from willows and occasional spruce sweeper
Riparian Vegetation	willow, sedges and occasional spruce

BED MATERIAL: Substrates loosely compacted and mobile.

Small cobble patches near riffles 15%, 85% gravel

BANK CHARACTERISTICS: Wide gravel aprons opposing actively eroding cut banks

STREAM FLOW CHARACTERISTICS: The channel flows consistently with a deep side opposite of a gravel apron with occasional flat channels near riffle areas.

APPENDIX 2

Minnow Trapping Results

(See attached excel files)

Site	location	date set	date lift	time set	time lift	hours set	s. sculpin	A.grayling	burbot	juv.chin.salm.	comments
De-Watered Reservoir Basin											
R1-1	30m u/s old shore	Aug.15	Aug.16	1745	1145	18	0	0	0	0	below rapid, V=<.4 m/sec, willow cover
R1-2	25m u/s old shore	Aug.15	Aug.16	1745	1145	18	0	2 (63,65mm)	0	0	lg. bldrs, V=<.5 m/sec
R1-3	at old shore	Aug.15	Aug.16	1750	1150	18	0	1 (62)	1 (180mm)	0	side eddy below rapid
R1-4	25m d/s old shore	Aug.15	Aug.16	1755	1155	18	0	0	0	0	side flow, cobs and bldrs
R1-5	60m d/s old shore	Aug.15	Aug.16	1755	1155	18	0	0	0	0	bldrs with washed out veg edge
R1-6	75m d/s old shore	Aug.15	Aug.16	1755	1201	18.1	0	0	0	0	side of riffle. Bldr/cob, V=>1 adj.
R1-7	95m d/s old shore	Aug.15	Aug.16	1755	1202	18.1	2 (65,102mm)	0	0	0	side riffle
R1-8	125m d/s of old shore line	Aug.15	Aug.16	1800	1202	18	0	1 (61)	0	0	side riffle
R1-9	160m d/s of edge	Aug.15	Aug.16	1800	1204	18.1	0	4 (55,57,47,49mm)	0	0	side riffel
R1-10	180m d/s edge	Aug.15	Aug.16	1800	1205	18.1	0	2 (71,55mm)	0	0	side riffle
R1-11	260m d/s edge	Aug.15	Aug.16	1800	1205	18.1	0	0	0	0	side riffle
SE Trib	10 m u/s Rose	Aug.15	Aug.16	1800	1215	18.2	0	0	0	0	hole between bldrs
R2-1	top of reach #2	Aug.15	Aug.16	1810	1220	18	0	0	1 (225mm) Ag in mouth	0	cut bank, co/bldr adj, woody debri, V=>.1 m/sec
R2-2	50m d/s R2-1	Aug.15	Aug.16	1815	1223	18.1	0	1 (42mm)	0	0	mid chan, below cob riffle, V=<.3 m/sec
R2-3	85m d/s R2-1	Aug.15	Aug.16	1815	1226	18.2	0	0	0	0	outer corner wash out pool, lg woody debri
R2-4	133m d/sR2-1	Aug.15	Aug.16	1820	1229	18.1	0	0	0	0	outer corner woody debri pile
R2-5	185m d/s/ R2-1	Aug.15	Aug.16	1815	1234	18.3	0	0	0	0	cut bank, below riffle, woody debri
R2-6	235m d/s R2-1	Aug.15	Aug.16	1820	1234	18.3	0	0	0	0	cut bank, edge of glide
R2-7	285m d/s R2-1	Aug.15	Aug.16	1830	1242	18.2	1 (115mm)	0	0	0	cut bank, silted cobs, above riffle
R2-8	330m d/s R2-1	Aug.15	Aug.16	1835	1242	18.1	0	0	1 (215mm)	0	out corner eddy pool, cut bank LOD
R2-9	380m d/s R2-1	Aug.15	Aug.16	1840	1242	18	0	0	0	0	btm of riffle, cut bank.
R3-1	top of Reach #3	Aug.15	Aug.16	1843	1545	21	0	0	0	0	gravel spurr
R3-2	80m d/s R#2	Aug.15	Aug.16	1850	1550	21	0	1 (55mm)	0	0	eroded stump, silted cobs, V= >.3 m/sec
R3-3	120m d/s R#2	Aug.15	Aug.16	1850	1550	21	0	0	1 (210mm)	0	cut bank with eddy, and lg bldr
R3-4	180m d/s R#2	Aug.15	Aug.16	1855	1555	21	0	0	0	0	cut bank, pea grav, V= >.2 m/sec
R3-5	215m d/s R#2	Aug.15	Aug.16	1855	1555	21	0	0	0	0	cut bank, fine subs
R3-6	250m d/s R#2	Aug.15	Aug.16	1900	1600	21	0	0	0	0	cut bank, woody debri, V= <.2 m/sec
R3-7	150 m u/s breach	Aug.15	Aug.16	1930	1900	23.5	0	0	0	0	side flow, cob/ bldr edge vis ob at set of juv fish jcs or ag
R3-8	130 m u/s breach	Aug.15	Aug.16	1935	1900	23.4	0	1 (55mm)	0	0	cut bank, V= .2 m/sec
R3-9	50 m u/s breach	Aug.15	Aug.16	1935	1905	23.5	0	0	0	0	cut bank area, sand, grav V= >.1 m/sec
R3-10	10 m u/s beach	Aug.15	Aug.16	1940	1908	23.5	0	0	0	0	pool, cob and gravel
Within the Breach											
R4-1	u/s end of R#4	Aug.15	Aug.16	1940	1910	23.5	0	1 (51mm)	0	0	side flow area of first groin, angbldrs
R4-2	20m d/s R4-1	Aug.15	Aug.16	1940	1910	23.5	0	0	0	0	run area, silted cob, V= .3 m/sec
R4-3	65m d/s R4-1	Aug.15	Aug.16	1945	1915	23.5	0	0	0	0	bldr cob edge, V=.2 m/sec
R4-4	110m d/s R4-1	Aug.15	Aug.16	1945	1919	23.5	0	0	0	0	blast rock edge,
R4-5	20m d/s groin 3,	Aug.15	Aug.16	1950	1920	23.5	0	0	0	0	blast rock edge
R4-6	10m d/s groin 4	Aug.15	Aug.16	1955	1923	23.5	0	0	0	0	sm side chan below groin
R4-7	side of groin 5	Aug.15	Aug.16	1955	1925	23.5	0	5 (49,50,52,55,55mm)	0	0	side riffles over angular bldr cob
R4-8	20m u/s btm groin	Aug.16	Aug.17	1930	1645	21.3	0	0	0	0	side flow
R4-9	on btm groin	Aug.16	Aug.17	1930	1640	21.2	0	0	2 (240,220mm)	0	narrow shoot on groin
Downstream of the Breach											
R5-1	u/s end of R#5, 20m d/s last groin	Aug.16	Aug.17	1935	1635	20	0	1 (60mm)	0	0	bldr with over head willow
R5-2	50m d/s last groin	Aug.16	Aug.17	1935	1635	20	0	0	0	0	constructed chan, willow over, cob, V= .4 m/sec
R5-3	50m d/s last groin	Aug.16	Aug.17	1940	1625	20.8	0	0	0	0	undercut bank on side of gun barrel chan, willow over, cob, grav, V=>.2 m/sec
R5-4	113m d/s last groin	Aug.16	Aug.17	1940	1625	20.8	0	0	0	0	edge of eddy, sm bldrs, 15m u/s of end of gun barrel chan
R5-5	30m d/s of gun barrel chan in natural chan	Aug.16	Aug.17	1945	1620	20.8	0	0	1 (165mm)	0	abrupt bank, cobs,, V=.5 m/sec, natural chan, vis obs of 15 Ag juv at set
Down Stream end of Diversion Channel											
X-14-1	95m d/s diversion chan	Aug.16	Aug.17	1920	1200	16.7	0	0	0	0	imm. d/s of bldr rapids, ang bldr, eddy
X-14-2	65m d/s diversion chan	Aug.16	Aug.17	1920	1200	16.7	0	0	0	0	mid chan. edge of flow, cob, grav
X-14-3	40m d/s diversion chan	Aug.16	Aug.17	1920	1200	16.7	0	0	0	0	btm of rapid, bldrs, V=.4
X-14-4	btm 1st groin of div. chan LB	Aug.16	Aug.17	1925	1205	16.7	0	1 (76mm)	0	0	pool below rapid, v=.1
X-14-5	3m d/s groin	Aug.16	Aug.17	1925	1210	16.7	0	0	0	0	pool between rapids, bldrs, v=-.2
X-14-6	u/s side groin 1	Aug.16	Aug.17	1925	1210	16.7	0	0	0	3 (63,67,53mm)	pool between rapids, bldrs, v=-.2
X-14-7	just d/s of 2nd groin	Aug.16	Aug.17	1930	1215	16.7	0	0	0	5 (62,54,68,73,59mm)	Mid chan belw 3rd u/s rapid, V= eddy
X-14-8	between groin 2 & 3	Aug.16	Aug.17	1930	1215	16.7	0	0	0	0	u/s end of ang bldr armor

X-14-9	between groin 1 & 2	Aug.16	Aug.17	1930	1215	16.7	0	0	0	0	corner pool, roots over
Pump House Pond Area											
PHP-1	RB100m u/s pond	Aug.18	Aug.19	1730	1710	23.6	0	0	0	0	glide area u/s pond, LOD and log, v=>.1
PHP-2	RB 80m u/s pond	Aug.18	Aug.19	1730	1713	23.6	0	0	0	0	at large pipe, v=>.1
PHP-3	RB 70m u/s pond	Aug.18	Aug.19	1730	1715	23.6	0	0	0	0	open sand shore with ground flow v=>0
PHP-4	RB 50m u/s pond	Aug.18	Aug.19	1735	1718	23.7	0	0	1 (125mm)	0	organic debri, v=>.25
PHP-5	RB 20m u/s pond	Aug.18	Aug.19	1735	1722	23.8	0	0	0	0	grassy margin, v=0
PHP-6	RB at pond edge	Aug.18	Aug.19	1735	1734	24	0	0	0	0	bldrs with grass, v=>.25

APPENDIX 3

Photographs

Photo #1: Reach 1 entering the dewatered Reservoir basin from the right. The South East Tributary enters Rose Creek from the bottom, August, 2005.

Photo #2: The downstream end of reach 1, August 2005, sediment accumulations from the 2004 freshet are still in evidence. Note vegetation development in comparison to photo #3.

Photo #3: The same site in Reach 1 as Photo #2 from August 2004

Photo #4: Reach 2, August, 2005 with showing new channel formation of the North Tributary entering Rose Creek

Photo #5: Reach 2 block net site, August 2005, looking downstream.

Photo #6: The same location in Reach 2 as Photo #5 looking upstream. Note mud bar development in foreground, August 2005.

Photo #7: Reach 3 from the confluence of the North Tributary to just upstream of the breach, August, 2005.

Photo #8: Sand bar development in Reach 3 looking downstream towards the breach, August 2005.

Photo #9: Aerial view for comparison to photo # 8 of mid-section of Reach #3 showing deposition areas and extent of gravel bar formation during 2004.

Photo #10: Rose Creek entering the breach, August, 2005. Note channel development outside of islands in comparison to photo # 11 from 2004.

Photo # 11: Aerial view of the downstream end of Reach #3 in 2004 for comparison of island formation above the old coffer dam site.

Photo #12: The constructed channel within the breach, August, 2005

Photo #13: Aerial view for comparison from 2004 of the constructed channel within the breach,.

Photo #14: The inlet structure at the upstream margin of the breach during June flows, 2005.

Photo #15: Inlet structure at the upstream margin of the newly created channel and start of Reach #4, August 2004.

Photo #16: The third constructed riffle through the breach, August 2005.

Photo #17: Glide area within the breach, 2005.

Photo #18: The breach 2005.

Photo #19: The downstream end of the breach, August 2005.

Photo #20: Snorkel surveys of the Pump House Pond Area during June of 2005.

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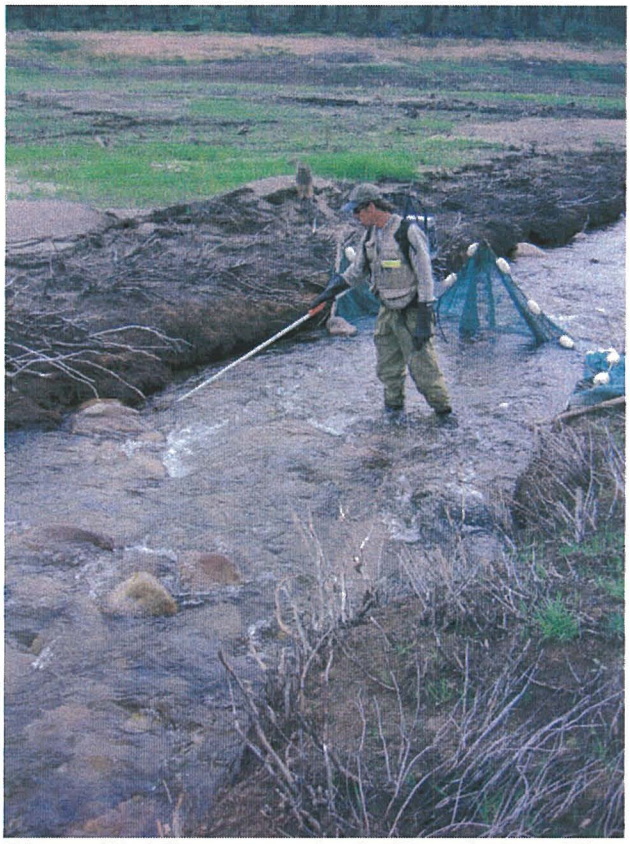

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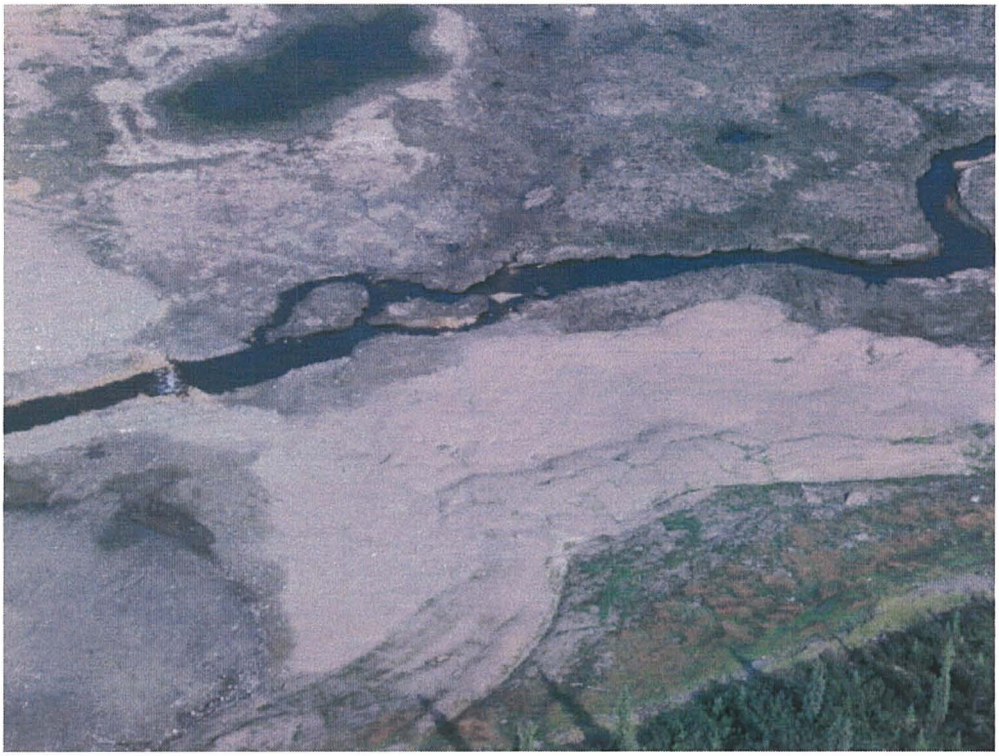

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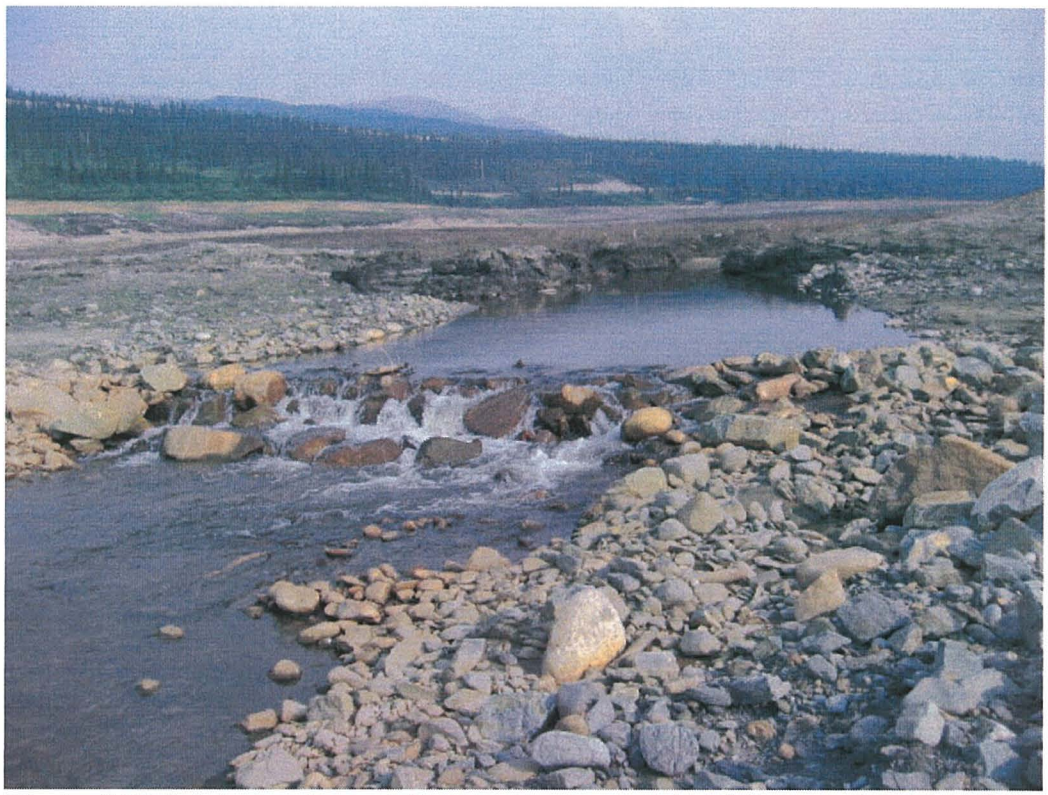


Photo #15: Inlet structure at the upstream margin of the newly created channel and start of Reach #4, August 2004.

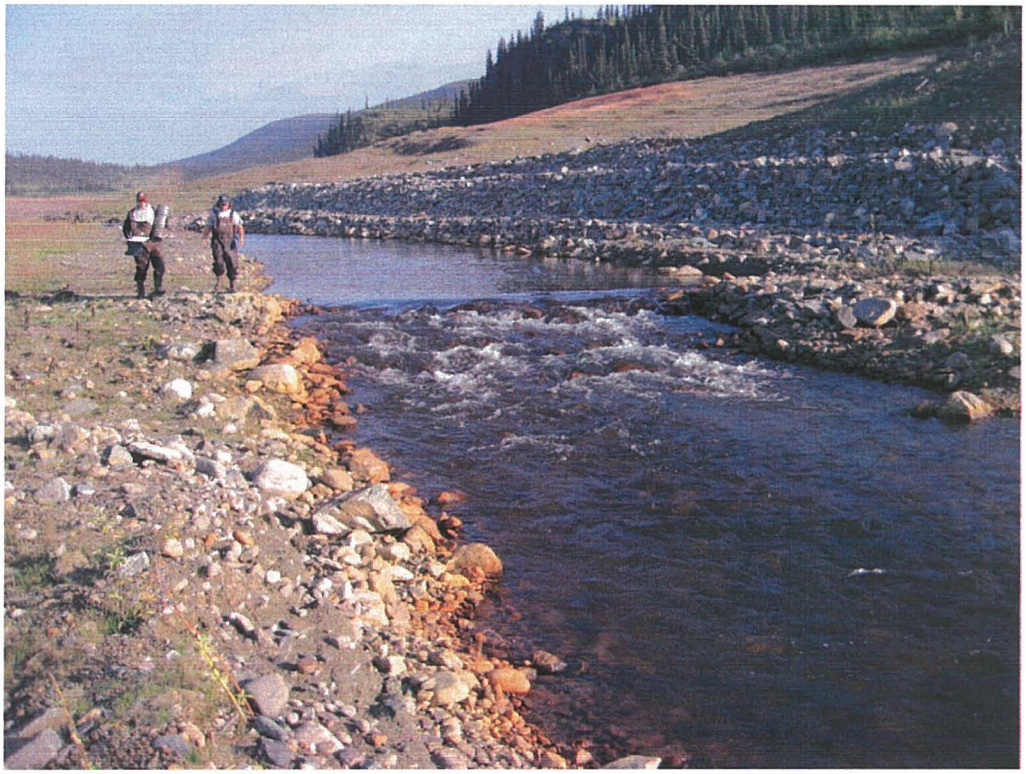


Photo #16: The third constructed riffle through the breach, August 2005.

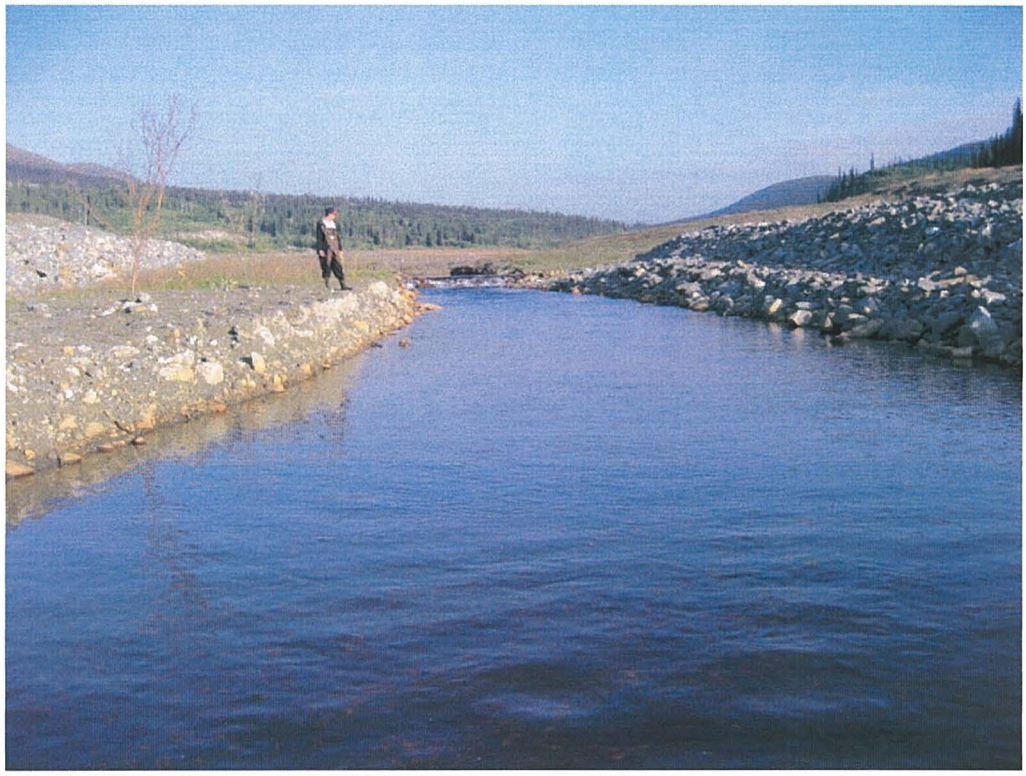
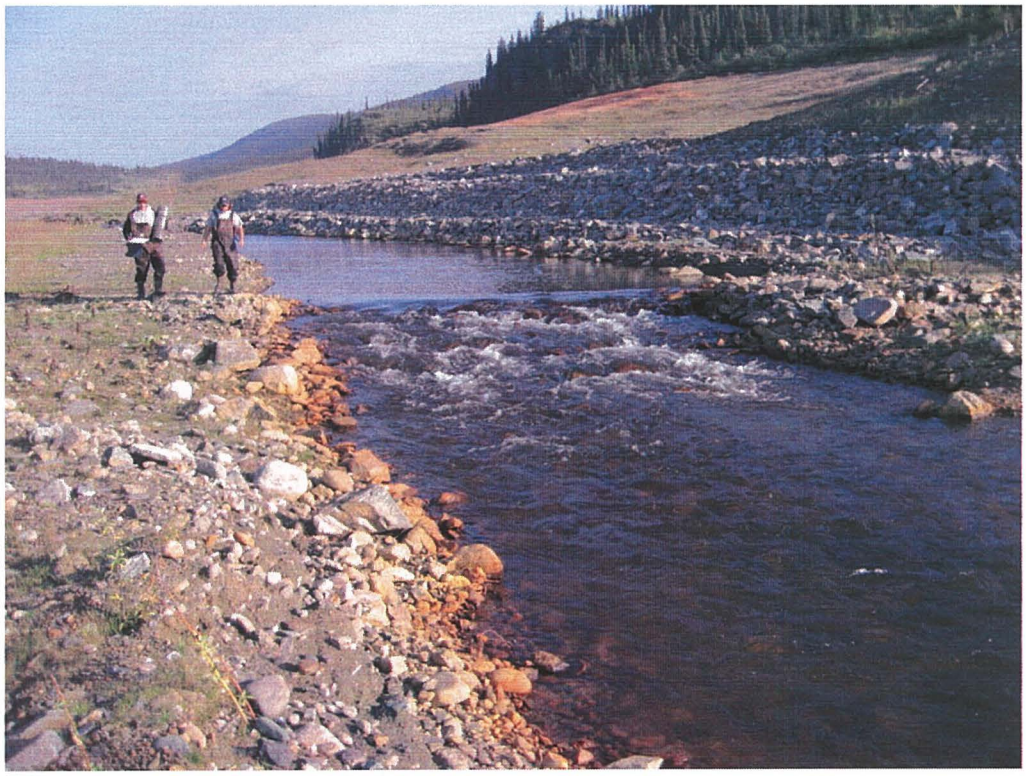


Photo #17: Glide area within the breach, 2005.



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