Hardy BBT Limited
CONSULTING ENGINEERING & ENVIRONMENTAL SERVICES

610 Richard Road
Prince George, B.C.
V2K 4L3
Bus: (604) 564-3243
Fax: (604) 562-7045

KX01002

July 31, 1991

B.C. Ministry of Environment
1011 - 4th Avenue
Prince George, B.C.
V2L 3H9

DISTRIBUTION	DATE	INITIALS
DM		
BM	910802	

Attention: Mr. Dave McQuillan

Dear Sir:

Re: Creosote Cleanup
Lovell Cove
Takla Lake, British Columbia

This letter is a follow up letter to our visit to the Fletcher Challenge Lovell Cove site with representatives of Fletcher Challenge, on July 30, 1991.

Soil contaminated with creosote from past activities at the site was uncovered last year. The two test pits excavated at the site were viewed during the site visit and show about 1.2 metres of uncontaminated fill overlying creosote contaminated soil. Samples of this soil have been collected in the past by Ministry of Environment personnel and consultants for laboratory testing. Water with a slight sheen and some creosote floating on the surface was observed in the base of the excavation. Water samples were collected by Hardy BBT Limited and Fletcher Challenge for chemical analyses.

The area of creosote contaminated soil is estimated to be about 30 metres by 45 metres. This is a very approximate estimate and the actual area of contamination will be determined during excavation.

The following outlines the proposed action plan for remediation of the soil contaminated with creosote.

1. Grade an area adjacent to the creosote contaminated soil for storage and remediation of soil. The area will be graded down to native clays and a berm will be constructed around the perimeter of the treatment area.

2. Remove the fill material overlying the creosote. This fill material appears to be uncontaminated and will be stockpiled at a convenient location on site.

3. Excavate creosote contaminated soil and spread in the treatment facility in a layer approximately 0.3 metres thick. All contaminated soil, based on visual and olfactory observation, will be removed and placed in the treatment facility.

4. Four samples of the soil placed in the treatment facility will be collected to characterize this material.

5. Four soil samples will be collected from the base and sides of the finished excavation to confirm that all contaminated soil has been removed.

6. Depending on the results of chemical analyses of the groundwater samples, and observations at the site, water that collects in the excavation will be sprayed over the treatment facility.

7. The treatment facility will be regularly tilled and bacteria and nutrients will probably be applied to expedite remediation of the soils. The type, quantity and method of application of bacteria and nutrients will depend on the results of characterization sampling.

This is a preliminary action plan that may be revised as the excavation and remediation proceeds. Soil and groundwater samples submitted for chemical analyses will be analyzed for polycyclic aromatic hydrocarbon (PAH's) and chlorophenols. The Ministry of Environment will be advised of any changes to the above plan before they are implemented.

As the site is remote, and a contractor is currently on site, your comments concerning this action plan would be appreciated as soon as possible. Thank you.

Yours truly,

Hardy BBT Limited

Per:

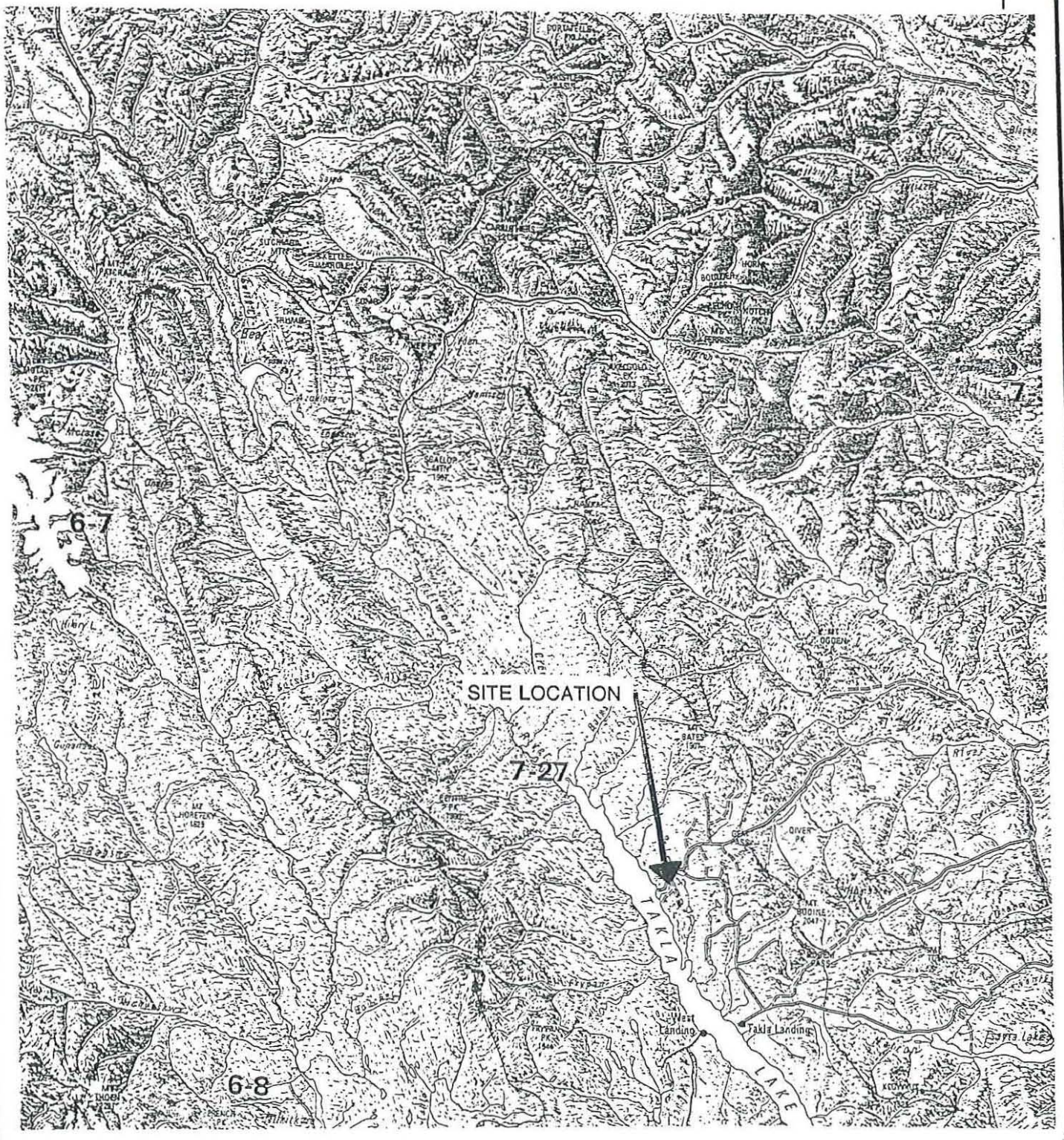
Ian J.D. Mitchell, P.Eng.
Project Engineer

Reviewed by:

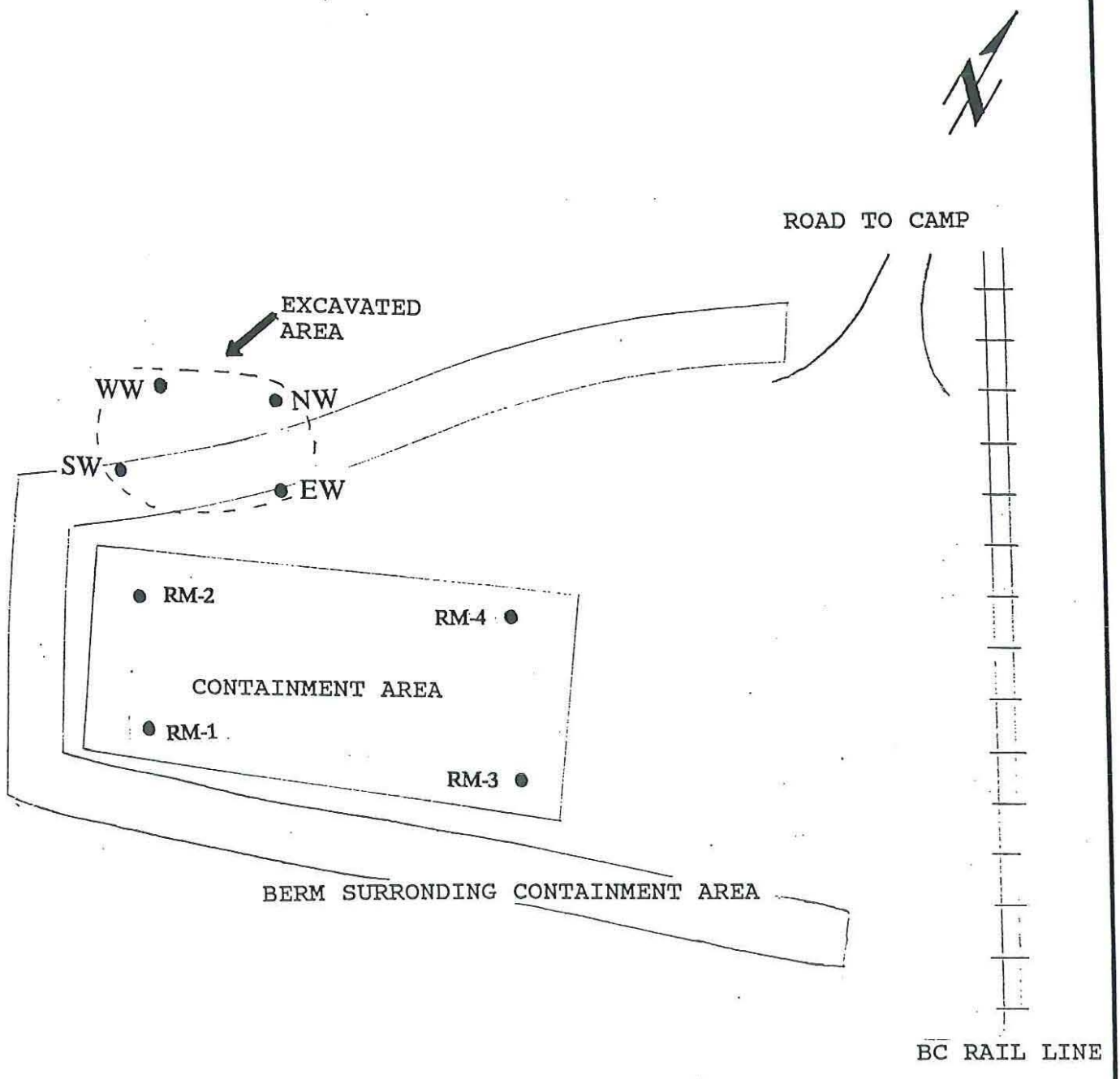
Jerry A. Schmidt, P.Eng.
Senior Geotechnical Engineer

IJDM/crs

cc: Mr. Bill Shore - Fletcher Challenge Williams Lake
Mr. Laurin R. Haines - Fletcher Challenge Vancouver
Mr. W.G. Conolly - Fletcher Challenge Vancouver



Hardy BBT Limited CONSULTING ENGINEERING & PROFESSIONAL SERVICES	KX01002 - SITE LOCATION PLAN FLETCHER CHALLENGE CANADA CREOSOTE CLEANUP LOVELL COVE, B.C.			
	Scale NTS	Date SEPT/91	Drawn By MO	FIGURE 1



Hardy BBT Limited
CONSULTING ENGINEERING & PROFESSIONAL SERVICES

KX01002 - SITE PLAN
FLETCHER CHALLENGE CANADA
CREOSOTE CLEANUP
LOVELL COVE, B.C.

Scale	Date	Drawn By	
NTS	SEPT/91	MO	FIGURE 2

HBLT 11-87/05

BRITISH COLUMBIA
The Best Place on Earth

File:PS-12706

Date: June 21, 2007

REGISTERED MAIL

Tolko Industries Ltd.
180 Hodgson Road
Williams Lake, British Columbia V2G 3P6

Dear Permittee:

Re: Amendment of Permit 12706

In response to your letter dated December 13, 2005, and pursuant to Section 16 of the *Environmental Management Act*, Permit 12706 is hereby amended to reflect the company name change from RIVERSIDE FOREST PRODUCTS (SODA CREEK) LTD. to TOLKO INDUSTRIES LTD. A copy of the permit is enclosed for your records. Please note that although a revised permit has not been produced at this time, a copy of this letter is being placed on the permit file, as an addendum to the permit, to reflect the change in the name of the permit holder. TOLKO INDUSTRIES LTD. is now the permittee with all inherent rights and responsibilities. Your attention is respectfully directed to the conditions of the permit. An annual fee for the permit will be determined in accordance with the Permit Fees Regulation.

This permit does not authorize entry upon, crossing over, or use for any purpose of private or crown lands or works, unless and except as authorized by the owner of such lands or works. The responsibility for obtaining such authority rests with the permittee. It is also the responsibility of the permittee to ensure that all activities conducted under this permit are carried out with due regard to the rights of third parties, and comply with other applicable legislation that may be in force.

This decision may be appealed to the Environmental Appeal Board in accordance with Part 8 of the *Environmental Management Act*. An appeal must be delivered within 30 days from the date that notice of this decision is given. For further information, please contact the Environmental Appeal Board at (250) 387-3464.

Ministry of Environment
Regional Operations
Omineca and Peace Regions
Mailing/Location Address
325 - 1011 Fourth Ave.
Prince George, V2L 3H9
Telephone: (250) 565-6135
Facsimile: (250) 565-6629
http://www.gov.bc.ca/
http://www.gov.bc.ca/env

Administration of this permit will be carried out by staff from the Omineca and Peace Regions. Plans, data and reports pertinent to the permit are to be submitted to the Regional Manager, Environmental Protection, at Ministry of Environment, Regional Operations, Omineca and Peace Regions, 325 - 1011 Fourth Ave., Prince George, V2L 3H9.

Yours truly,

R. W. Girard
for Director, *Environmental Management Act*
Omineca and Peace Regions

Enclosure

cc: Environment Canada

Province of
British Columbia

MINISTRY OF
ENVIRONMENT,
LANDS AND PARKS

BC Environment

Environmental Protection
1011 Fourth Avenue
Prince George, British Columbia
V2L 3H9
Telephone: (604) 565-6155
Fax: (604) 565-6629

REGISTERED MAIL

AUG 10 1994

File: PS12706

Pinette and Therrien Mills Limited
9th Floor, 700 West Georgia Street
Vancouver, B.C.
V7Y 1J7

NOTICE OF CORRECTION

Dear Permittee:

Notice of Correction to Permit #PR12706
presently in the name of Pinette and Therrien Mills Limited

This is to advise you that the following correction has been made to the subject permit:

The Permit Number has been changed from PR12706 to PS12706.

Please destroy the original copy of Permit PR12706 found in the original permit package and replace it with the revised version enclosed.

Please ensure that all future correspondence references the revised permit number, PS12706.

Yours truly,

R.A. Fairservice, P.Eng.
Assistant Regional Waste Manager
Northern Interior Region

Encl.

cc Bill Connolly, Connolly Associates, 8755 Crest Drive, Burnaby, B.C. V3N 4A1

Province of
British Columbia

MINISTRY OF
ENVIRONMENT,
LANDS AND PARKS

BC Environment

Environmental Protection
1011 4th Avenue
Prince George, British Columbia
V2L 3H9
Telephone: (604) 565-6155
Fax: (604) 565-6629

REGISTERED MAIL

Date: MAR 3 1 1994

File:PS12706

Pinette and Therrien Mills Limited
9th floor, 700 West Georgia Street
Vancouver, B.C.
V7Y 1J7

Attention: Mr. Lauren Haines, P.Eng.

Dear Permittee:

Enclosed is a copy of Permit No. PS12706 issued under the provisions of the Waste Management Act. Your attention is respectfully directed to the terms and conditions outlined in the Permit.

This Permit does not authorize entry upon, crossing over, or use for any purpose of private or Crown lands or works, unless and except as authorized by the owner of such lands or works. The responsibility for obtaining such authority shall rest with the Permittee.

The Permittee shall ensure that any discharge under this Permit meets the requirements of other regulatory agencies including, but not restricted to, Environment Canada and the Department of Fisheries and Oceans (Canada).

An annual permit fee will be determined according to the Waste Management Permit Fees Regulation.

The administration of this Permit will be carried out by staff from our Regional Office located in Prince George, (telephone 565-6155). Plans, data and reports pertinent to the Permit are to be submitted to the Environmental Protection office, 3rd Floor, 1011 Fourth Avenue, Prince George, British Columbia, V2L 3H9.

This decision may be appealed in accordance with Section 27 of the Waste Management Act by giving written notice to me within 21 days of this notification.

Yours truly,

R.A.Fairservice P.Eng.
Assistant Regional Waste Manager
Northern Interior Region

enclosure

cc. Mr. Bill Connolly, Connolly Associates, 8755 Crest Drive, Burnaby, B.C. V3N 4A1

PROVINCE OF
BRITISH COLUMBIA

Environmental Protection
1011 Fourth Avenue
Prince George
British Columbia, V2L 3H9
Telephone: (604) 565-6155

MINISTRY OF ENVIRONMENT,
LANDS AND PARKS

PERMIT
PS12706

Under the Provisions of the Waste Management Act

Pinette and Therrien Mills Limited

9th floor, 700 West Georgia Street,

Vancouver, B.C.

V7Y 1J7

is authorized to treat soil contaminated with polyaromatic hydrocarbons and chlorophenols which qualifies as a special waste in a land treatment facility located near Lovell Cove, Takla Lake, British Columbia, subject to the conditions listed below. Contravention of any of these conditions is a violation of the Waste Management Act and may result in prosecution.

1. AUTHORIZED DISCHARGES

1.1 The discharge of soil contaminated with polyaromatic hydrocarbons and chlorinated phenols which qualifies as a special waste to which this Sub-Section is applicable is from the former Pinette and Therrien wood treatment operation at Lovell Cove B.C., as shown on the attached Site Plan. The reference number (S.E.A.M. site number) for this discharge is E219983.

1.1.1 The approximate volume of Special Waste to be treated is 5000 m^3.

1.1.2 The characteristics of Special Waste authorized for land treatment are soils contaminated with polyaromatic hydrocarbons and chlorinated phenols from a former wood treating plant.

1.1.3 The works authorized is a land treatment facility approximately located as shown on the attached Site Plan.

1.1.4 The location of the facilities from which the discharge originates is Special Use Permit 14490, which is within F.L. # A18167, Blk 1 and partly within Res. 0261794, Fort St. James F.D., 800 metres south west of Indian Reserve # 11, Lot 4705.

MAR 3 1 1994

MAR 3 1 1994

Date Issued:
Amendment Date:
(most recent)

R.A. Fairservice, P.Eng.
Assistant Regional Waste Manager

2. GENERAL REQUIREMENTS

2.1 The land treatment facility shall be constructed according to the details provided in a letter, dated July 31, 1991, from the consulting firm of Hardy BBT Limited.

2.2 A clay berm will be constructed around the perimeter of the basin. The berm shall be sufficiently high so as to contain all surface runoff resulting from precipitation.

2.3 Surface water diversion works shall be constructed and maintained to prevent surface water from entering or leaving the land treatment area. Discharge of effluent from the land treatment area is prohibited without the prior written consent of the Regional Waste Manager.

2.4 Provision of fencing, site access, vehicle safety barriers and site restoration as required, shall be carried out to the satisfaction of the Regional Waste Manager.

2.5 The contaminated soil shall be placed in the facility at a thickness no greater than 400 mm.

2.6 The soil will be tilled and nutrients and bacteria added as necessary.

3. MONITORING AND REPORTING REQUIREMENTS

3.1 Monitoring

3.1.1 Monitoring of the facility shall be carried out, at a minimum three times a year.

3.1.2 Representative samples of the contaminated soil shall be taken and analyzed for polyaromatic hydrocarbons and chlorinated phenols.

3.1.3 The facility shall be inspected regularly to detect any irregularities such as deterioration or leaks that could lead to an escape of special waste from the facility.

3.1.4 The final inspection and monitoring of the site shall be conducted with BC Environment personnel present.

R.A. Fairservice, P.Eng.
Assistant Regional Waste Manager

3.1.5 In the event of an emergency or any detected irregularities, the Regional Waste Manager shall be immediately notified and appropriate remedial action shall be taken.

3.2 Ground Water Monitoring Program

A ground water monitoring program shall be submitted for approval by the Regional Waste Manager within 60 days of the issuance of the permit. The plan shall include the number and location of monitoring wells, sampling protocol, parameters to be analyzed for and frequency of sampling.

3.3 Operational Record

Maintain a record of management activities at the site including: date and volume of soil applied; dates of cultivation; dates and quantities of amendments added; and dates, volumes and disposition of effluent removed from the site.

3.4 Closure Plan

A written closure plan shall be submitted to the Regional Waste Manager within 90 days of the date of issuance of this Permit and his approval obtained in writing. The closure plan shall include, but not be limited to the following: sampling plan of the treatment area; method by which treatment will be assessed; plans for disposition of the treated soil; and plans for surface restoration and revegetation, if applicable.

3.5 Analyses

Analyses are to be carried out in accordance with procedures described in the second edition of "A Laboratory Manual for the Chemical Analysis of Waters, Wastewaters, Sediments and Biological Materials, (1976 edition including updates)", April 1989, 615 pp., or by suitable alternative procedures as authorized by the Regional Waste Manager.

Copies of the above manual are available from the Environmental Protection Division, Ministry of Environment, Lands and Parks, 777 Broughton Street, Victoria, British Columbia, V8V 1X5, at a cost of $70.00, or if Part 1 only, 1976 edition, 389 pp., $40.00 and Part 2 only, supplement, 226 pp., $40.00, and are also available for inspection at all Environmental Protection Program Offices.

Date Issued: MAR 3 1 1994
Amendment Date:
(most recent)

R.A. Fairservice, P.Eng.
Assistant Regional Waste Manager

3.6 Reporting

Reports of inspections, and suitably tabulated monitoring results shall be submitted to the Regional Waste Manager within three months of the issuance of this Permit, and within six weeks of each monitoring period thereafter. The Regional Waste Manager shall be immediately notified of any conditions which may affect the ability of the facilities to contain and/or treat the special waste, or which may affect the environment.

MAR 3 1 1994

Date Issued:
Amendment Date:
(most recent)
Page: 4 of 4

R.A. Fairservice, P.Eng.
Assistant Regional Waste Manager

PERMIT NO. : PS12706

Province of
British Columbia

MINISTRY OF
ENVIRONMENT,
LANDS AND PARKS

BC Environment

Environmental Protection
1011 4th Avenue
Prince George, British Columbia
V2L 3H9
Telephone: (604) 565-6155
Fax: (604) 565-6629

DISTRIBUTION	DATE	INITIALS

REGISTERED MAIL

Date: MAR 3 1 1994

File: PR-12706

Original Permit Dated Mar 31/94 is missing

Pinette and Therrien Mills Limited
9th floor, 700 West Georgia Street,
Vancouver, B.C.
V7Y 1J7

Attention: Mr. Lauren Haines, P.Eng.

Dear Permittee:

Enclosed is a copy of Permit No. PR-12706 issued under the provisions of the Waste Management Act. Your attention is respectfully directed to the terms and conditions outlined in the Permit.

This Permit does not authorize entry upon, crossing over, or use for any purpose of private or Crown lands or works, unless and except as authorized by the owner of such lands or works. The responsibility for obtaining such authority shall rest with the Permittee.

The Permittee shall ensure that any discharge under this Permit meets the requirements of other regulatory agencies including, but not restricted to, Environment Canada and the Department of Fisheries and Oceans (Canada).

An annual permit fee will be determined according to the Waste Management Permit Fees Regulation.

The administration of this Permit will be carried out by staff from our Regional Office located in Prince George, (telephone 565-6155). Plans, data and reports pertinent to the Permit are to be submitted to the Environmental Protection office, 3rd Floor, 1011 Fourth Avenue, Prince George, British Columbia, V2L 3H9.

This decision may be appealed in accordance with Section 27 of the Waste Management Act by giving written notice to me within 21 days of this notification.

Yours truly,

R.W.Girard R.P.Bio.
Regional Waste Manager
Northern Interior Region

Word Processor: DEC....., AES....., Other.....
Disk Name: L:\ENVP_ARC.....
Index No. or Text Name (AES): Resume PR12706.TR, Permit PR12706.PMT

enclosure

cc: Mr. Bill Connolly, Conolly Associates, 8755 Crest Drive, Burnaby, B.C., V3N 4A1

PROVINCE OF
BRITISH COLUMBIA

Environmental Protection
1011 Fourth Avenue
Prince George
British Columbia, V2L 3H9
Telephone:(604)565-6155

MINISTRY OF ENVIRONMENT,
LANDS AND PARKS

PERMIT
PR12706

Under the Provisions of the Waste Management Act

Pinette and Therrien Mills Limited

9th floor, 700 West Georgia Street,

Vancouver, B.C.

V7Y 1J7

is authorized to treat soil contaminated with polyaromatic hydrocarbons and chlorophenols which qualifies as a special waste in a land treatment facility located near Lovell Cove, Takla Lake, British Columbia, subject to the conditions listed below. Contravention of any of these conditions is a violation of the Waste Management Act and may result in prosecution.

1. AUTHORIZED DISCHARGES

1.1 The discharge of soil contaminated with polyaromatic hydrocarbons and chlorinated phenols which qualifies as a special waste to which this Sub-Section is applicable is from the former Pinette and Therrien wood treatment operation at Lovell Cove B.C., as shown on the attached Site Plan. The reference number (S.E.A.M. site number) for this discharge is E219983.

1.1.1 The approximate volume of Special Waste to be treated is 5000 m^3.

1.1.2 The characteristics of Special Waste authorized for land treatment are soils contaminated with polyaromatic hydrocarbons and chlorinated phenols from a former wood treating plant.

1.1.3 The works authorized is a land treatment facility approximately located as shown on the attached Site Plan.

1.1.4 The location of the facilities from which the discharge originates is Special Use Permit 14490, which is within F.L. # A18167, Blk 1 and partly within Res. 0261794, Fort St. James F.D., 800 metres south west of Indian Reserve # 11, Lot 4705.

R.W. Girard, R.P.Bio.
Regional Waste Manager

Date Issued: MAR 3 1 1994
Amendment Date:
(most recent)
Page: 1 of 4

PERMIT NO. : PR12706

3.1.5 In the event of an emergency or any detected irregularities, the Regional Waste Manager shall be immediately notified and appropriate remedial action shall be taken.

3.2 Ground Water Monitoring Program

A ground water monitoring program shall be submitted for approval by the Regional Waste Manager within 60 days of the issuance of the permit. The plan shall include the number and location of monitoring wells, sampling protocol, parameters to be analyzed for and frequency of sampling.

3.3 Operational Record

Maintain a record of management activities at the site including: date and volume of soil applied; dates of cultivation; dates and quantities of amendments added; and dates, volumes and disposition of effluent removed from the site.

3.4 Closure Plan

A written closure plan shall be submitted to the Regional Waste Manager within 90 days of the date of issuance of this Permit and his approval obtained in writing. The closure plan shall include, but not be limited to the following: sampling plan of the treatment area; method by which treatment will be assessed; plans for disposition of the treated soil; and plans for surface restoration and revegetation, if applicable.

3.5 Analyses

Analyses are to be carried out in accordance with procedures described in the second edition of "A Laboratory Manual for the Chemical Analysis of Waters, Wastewaters, Sediments and Biological Materials, (1976 edition including updates)", April 1989, 615 pp., or by suitable alternative procedures as authorized by the Regional Waste Manager.

Copies of the above manual are available from the Environmental Protection Division, Ministry of Environment, Lands and Parks, 777 Broughton Street, Victoria, British Columbia, V8V 1X5, at a cost of $70.00, or if Part 1 only, 1976 edition, 389 pp., $40.00 and Part 2 only, supplement, 226 pp., $40.00, and are also available for inspection at all Environmental Protection Program Offices.

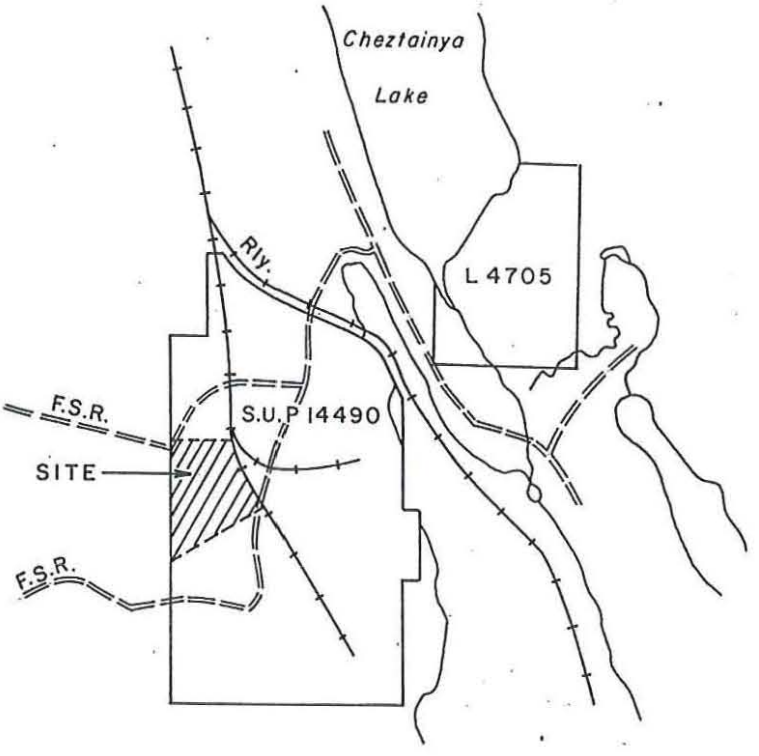
R.W. Girard, R.P.Bio.
Regional Waste Manager

Date Issued: MAR 3 1 1994
Amendment Date:
(most recent)
Page: 3 of 4

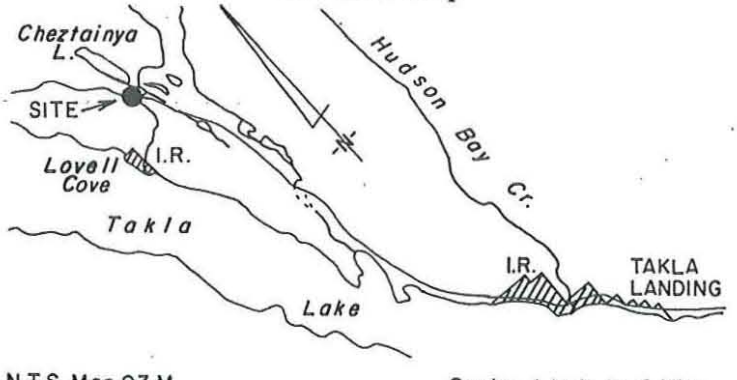
PERMIT NO. : PR12706

SITE PLAN A

N



Location Map



N.T.S. Map 93 M

Scale: 1 Inch to 4 Mile

Scale: N.T.S.

Permit No.: PR-12706

Date: MAR 3 1 1994

R.W. Girard, R.P.Bio.
Regional Waste Manager

Province of
British Columbia

MINISTRY OF
ENVIRONMENT,
LANDS AND PARKS

BC Environment

Environmental Protection
1011 Fourth Avenue
Prince George, British Columbia
V2L 3H9
Telephone: (604) 565-6155
Fax: (604) 565-6629

NOV 02 1992

FILE: AR-10996

REGISTERED MAIL

Fletcher Challenge Canada Limited
P&T - Williams Lake Division
R.R. # 3 North Mackenzie Avenue
Williams Lake, B.C.
V2G 1M3

Attention: Mr. Bill Shore

Dear Sir:

Enclosed is a copy of Approval No. AR-10996 issued under the provisions of the Waste Management Act. Your attention is respectfully directed to the terms and conditions outlined in the Approval.

The administration of this Approval will be carried out by staff from our Regional Office located at 3rd Floor, Plaza 400, 1011 4th Avenue, Prince George, British Columbia V2L 3H9. Plans, data and reports pertinent to the Approval are to be submitted to the Regional Waste Manager at this address.

Yours truly,

Blake Medlar
Assistant Regional Waste Manager
Northern Interior Region

encl.

cc: Mr. Bruce Breitkreutz, HBT AGRA Limited, 610 Richard Road, Prince George, B.C., V2K 4L3

PROVINCE OF
BRITISH COLUMBIA

Environmental Protection
1011 4th Avenue
Prince George
British Columbia, V2L 3H9
Telephone: (604) 565-6155

MINISTRY OF ENVIRONMENT,
LANDS AND PARKS

LETTER OF APPROVAL

Under the Provisions of the Waste Management Act

Fletcher Challenge Canada Limited
P & T - Williams Lake Division

R.R. # 3 North Mackenzie Avenue

Williams Lake, B.C.

V2G 1M3

is authorized to treat soil contaminated with polyaromatic hydrocarbon and chlorophenols which qualifies as special waste subject to the terms and conditions below. Contravention of any of the terms and conditions is a violation of the Waste Management Act and may result in prosecution. The treatment is authorized for fifteen months commencing on the date of issuance of this Approval.

The Approval holder shall comply with all applicable provisions of the Special Waste Regulation of the Waste Management Act. In the event of a conflict between this Approval and the Special Waste Regulation, the Regulation shall override and the conflicting provisions of this Approval shall have no effect.

1. The soil contaminated with polyaromatic hydrocarbons and chlorinated phenols which qualifies as a special waste, shall be that originating from the former P and T wood treatment operation at Lovell Cove, B.C. The approximate volume of Special Waste to be treated is 2,200 m^3.

2. The special waste soil shall be treated on land described as Cutting Permit B of Timber Sale Licence A06264, 2500 feet west south west of Indian Reserve No, 11, Lot 4705, which is located on the historical special waste contaminated site.

3. The works authorized is a land treatment facility.

4. The land treatment facility shall be constructed according to the details provided in a letter, dated July 31, 1991, from the consulting firm of Hardy BBT Limited.

Date issued: NOV 02 1992

Blake Medlar
Assistant Regional Waste Manager

APPROVAL NO. AR-10996

5. A clay berm will be constructed around the perimeter of the basin. The berm shall be sufficiently high so as to contain all surface runoff resulting from precipitation.

6. Adequate security for the facility shall be provided, and access shall be restricted to authorized personnel.

7. The contaminated soil shall be placed in the facility at a thickness no greater than 400 mm.

8. The soil will be tilled and nutrients and bacteria added as necessary.

9. Monitoring of the facility shall be carried out, at a minimum three times a year. Representative samples of the contaminated soil shall be taken and analyzed for polyaromatic hydrocarbons and chlorinated phenols.

10. The facility shall be inspected regularly to detect any irregularities such as deterioration or leaks that could lead to an escape of special waste from the facility.

11. In the event of an emergency or any detected irregularities, the Regional Waste Manager shall be immediately notified and appropriate remedial action shall be taken.

12. Reports of inspections, and suitably tabulated monitoring results shall be submitted to the Regional Waste Manager within three months of the issuance of this Approval, and every four months thereafter. The Regional Waste Manager shall be immediately notified of any conditions which may affect the ability of the facilities to contain and/or treat the special waste, or which may affect the environment.

13. Final inspection and monitoring of the site shall be conducted with BC Environment personnel present.

14. When the polyaromatic hydrocarbons and chlorinated phenols contamination has been reduced to levels where the soil meets the level "B" criteria contained in Developing Criteria and Objectives for Managing Contaminated Sites in British Columbia, dated November 21, 1989 and subject to the prior authorization of the Regional Waste Manager, the treatment area shall be returned to its original state.

Compliance with the terms and conditions of the Approval will be determined through periodic inspections by staff from our Regional Office located at 1011 4th Avenue Prince George, British Columbia, V2N 3H9 (telephone 565-6456). Based on these inspections and any other information obtained by the Regional Waste Manager, additional conditions or restrictions may be introduced.

Issuance of this Approval is without prejudice to any future applications.

Date issued: NOV 02 1992

Blake Medlar
Assistant Regional Waste Manager

Province of
British Columbia

Ministry of
Environment

Pollution Control Branch
1106 Cook Street
Victoria
British Columbia
V8V 1X4
Phone: 387-5321

YOUR FILE

OUR FILE 0262100-PA-1605

MAY 7 1979

POLLUTION CONTROL BRANCH RECEIVED 1

DOUBLE REGISTERED

Silvacan Resources Ltd.
#5 - 123 Borland Street
Williams Lake, British Columbia
V2G 1R1

Gentlemen:

LETTER OF TRANSMITTAL

Enclosed is a copy of amended Pollution Control Permit No. PA-1605 in the name of Silvacan Resources Ltd. The terms and conditions of this amended Permit supersede those of Permit No. PA-1605 as last amended on August 17, 1976.

Your attention is respectfully directed to the terms and conditions now outlined in this amended Permit. The amendments involve a change in Section (c) of Appendix 01 and the deletion of non-metric units from the Permit.

In addition, this Letter of Transmittal supersedes the Letter of Transmittal dated August 17, 1976.

In conjunction with this amended Permit you are now directed to comply with the following requirements:

A. BURNER ASH DISPOSAL

The Permittee shall dispose of burner ash and residue in a manner acceptable to the Regional Manager.

B. SAMPLING AND MONITORING

The attached Sampling and Monitoring Program dated April 25, 1979 shall be undertaken by the Permittee and the results thereof submitted to the Director. The need for increased or decreased monitoring will be based on the results submitted as well as any other data obtained by the Pollution Control Branch in connection with these discharges.

...2

C. PROCESS MODIFICATIONS

The Permittee shall notify the Director prior to implementing any changes to the process that may affect the quality and/or quantity of the discharges.

D. MAINTENANCE AND EMERGENCY PROCEDURES

Inspect regularly the pollution control works and maintain them in good working order.

In the event of any emergency, or condition beyond the control of the Permittee which prevents continuous operation of the approved method of pollution control, the Permittee shall:

1. either take immediate remedial action or cease discharging until normal operations can be resumed;

2. immediately notify the Director;

3. provide the Director access to the facilities and all pertinent information as to the cause of such emergency or conditions; and

4. submit other information as the Director may require from time to time thereafter.

E. PLANS

Within 90 days from the date of issuance of this amended Permit, plans and specifications of the existing works authorized in Appendix 01 shall be submitted to the Director in duplicate, for approval.

You will note that values have been expressed in the International System of Units (SI). These units are to be used in submitting monitoring results and any other information in connection with this Permit.

The administration of this Permit will be carried out by staff from our Regional Office located at 3691 - 15th Avenue, Prince George. British Columbia, V2N 1A3 (telephone 562-8131, local 238, 239 or 344). Plans, data and reports pertinent to the Permit are to be submitted to the Director through the Regional Manager at this address.

...3

0262100-PA-1605

Silvacan Resources Ltd.

MAY 7 1979

This Permit does not authorize entry upon, crossing over, or use for any purpose, of private or Crown lands or works, unless and except as authorized by the owner of such lands or works. The responsibility for obtaining such authority shall rest with the Permittee.

This Letter of Transmittal is an Order under the Pollution Control Act.

For your reference, enclosed is a copy of the Metric Practice Guide and a copy of the Pollution Control Objectives for the Forest Products Industry of British Columbia as they pertain to wood-waste burners.

Yours very truly,

H. P. Klassen, P. Eng,
Assistant Director
Pollution Control Branch

Encl.

0262100-PA-1605

April 25, 1979

SAMPLING AND MONITORING PROGRAM

Silvacan Resources Ltd.
Lovell Cove, Takla Lake, British Columbia

The following sampling and monitoring program shall be undertaken by the Permittee:

1. Discharge (Wood-waste Burner)

In order to determine the opacity at the exit of the burner authorized by Appendix 01, record an adequate number of opacity readings, taken at least at hourly intervals, and their respective discharge temperatures during normal operation of the burner so as to establish a correlation chart between these two parameters.

Once an appropriate correlation has been established to the satisfaction of the Regional Manager, records of the discharge temperature readings may be considered as measurement of opacity at the exit of the burner. The method or technique used to measure opacity is to be approved by the Director.

2. Total Mill Particulate

At locations designated by the Regional Manager and on a frequency specified by him, the Permittee shall measure the average combustible material, as dustfall, over two weeks and record the results as milligrams per square decimetre per day.

Analyses are to be carried out in accordance with procedures described in the second edition (February 1976) of "A Laboratory Manual for the Chemical Analysis of Ambient Air, Emissions, Soil and Vegetation", or by suitable alternative procedures as approved by the Director.

Copies of the above mentioned manual are available from the Environmental Laboratory, 3650 Wesbrook Crescent, Vancouver, British Columbia, V6S 2L2, at a cost of $10.00, and are also available for inspection at all Pollution Control Branch offices.

3. Report

(a) Continue to submit once per month the monitoring results from 1. above, including the daily temperature recorder charts for the burner.

...2

(b) Submit the results from 2. above, as required by the Regional Manager.

4. Discharge (Railcar Chip Loader)

Visual monitoring of the railcar chip loader discharge may be undertaken by the Pollution Control Branch as part of an ambient monitoring program for the entire mill operation.

MINISTRY OF THE ENVIRONMENT

POLLUTION CONTROL BRANCH

PERMIT

Under the Provisions of the Pollution Control Act, ~~1967~~

Silvacan Resources Ltd.

#5 - 123 Borland Street, Williams Lake, British Columbia, V2G 1R1

is hereby authorized to discharge contaminants

from a sawmill

located at Lovell Cove, Takla Lake, British Columbia

to the air

This permit has been issued under the terms and conditions prescribed in the attached appendices

01, 02 and A

Assistant Director of Pollution Control

Date issued September 28, 1972

Amendments dated October 26, 1973

August 17, 1976

MAY 7 1979, 19

Permit No. PA-1605

FCB 11— o

MINISTRY OF ENVIRONMENT

POLLUTION CONTROL BRANCH

APPENDIX No. 01

to Pollution Control Permit No. PA-1605

(a) The discharge or emission of contaminants into the air applicable to this appendix is from a (Source or operation) modified wood-waste burner identified as (1) as shown on attached Appendix A.

(b) The rate of discharge or emission (dry basis) authorized is:

Maximum 1 770 mol/s Duration 24 hours per day Frequency 7 days per week

Average daily (based on the operating period) 1 770 mol/s - the normal operating period is 24 hours per day, 7 days per week.

(c) The characteristics of the contaminants shall be equivalent to or better than

Contaminant	Average daily concentration based on the daily operating period	Maximum Concentration	Duration	Frequency
Opacity	Discharge smoke opacity shall not exceed 40% for periods longer than 3 minutes in any ½ hour interval, and shall not exceed 80% at any time.			
	During fuel feed shutdowns of more than ½ hour, a variance from the above requirement to a maximum opacity of 80% is permitted. The maximum duration of this variance is 1 hour for shutdowns of more than 4 hours and ½ hour for all other shutdowns.			

(d) The works authorized are a modified wood-waste burner and related appurtenances approximately located as shown on the attached Appendix A.

(e) The land from which the discharge originates and to which this appendix is appurtenant is approximately 550 m S.SW of the SW corner of Indian Reserve No. 11, Lot 4705.

(f) Those works authorized and proposed must be completed and in operation on or before July 1, 1974.

Date issued September 28, 19 72

Date amended October 26, 19 73

August 17, 19 76

MAY 7 1979

Assistant Director of Pollution Control

PCB 15— 0

MINISTRY OF ENVIRONMENT

POLLUTION CONTROL BRANCH

APPENDIX No. 02

to Pollution Control Permit No. PA-1605

(a) The discharge or emission of contaminants into the air applicable to this appendix is from a railcar chip loader identified as (2) as shown on attached Appendix A.
(Source or operation)

(b) The rate of discharge or emission (dry basis) authorized is:

Maximum 134 mol/s Duration 12 hours per day. Frequency 20 days per month

Average daily (based on the operating period) 134 mol/s - the normal operating period is 12 hours per day, 20 days per month.

(c) The characteristics of the contaminants ~~shall not exceed the following~~

Contaminant	Average daily concentration based on the daily operating period	Maximum Concentration	Duration	Frequency
are of the nature originating from a railcar chip loader.				

(d) The works authorized are a railcar chip loader, pneumatic conveyer system and related appurtenances approximately located as shown on the attached Appendix A.

(e) The land from which the discharge originates and to which this appendix is appurtenant is approximately 680 m S.SW of the SW corner of Indian Reserve No. 11, Lot 4705.

(f) Those works authorized and proposed must be completed and in operation on and from the date of this Appendix.

Date issued August 17, 1976

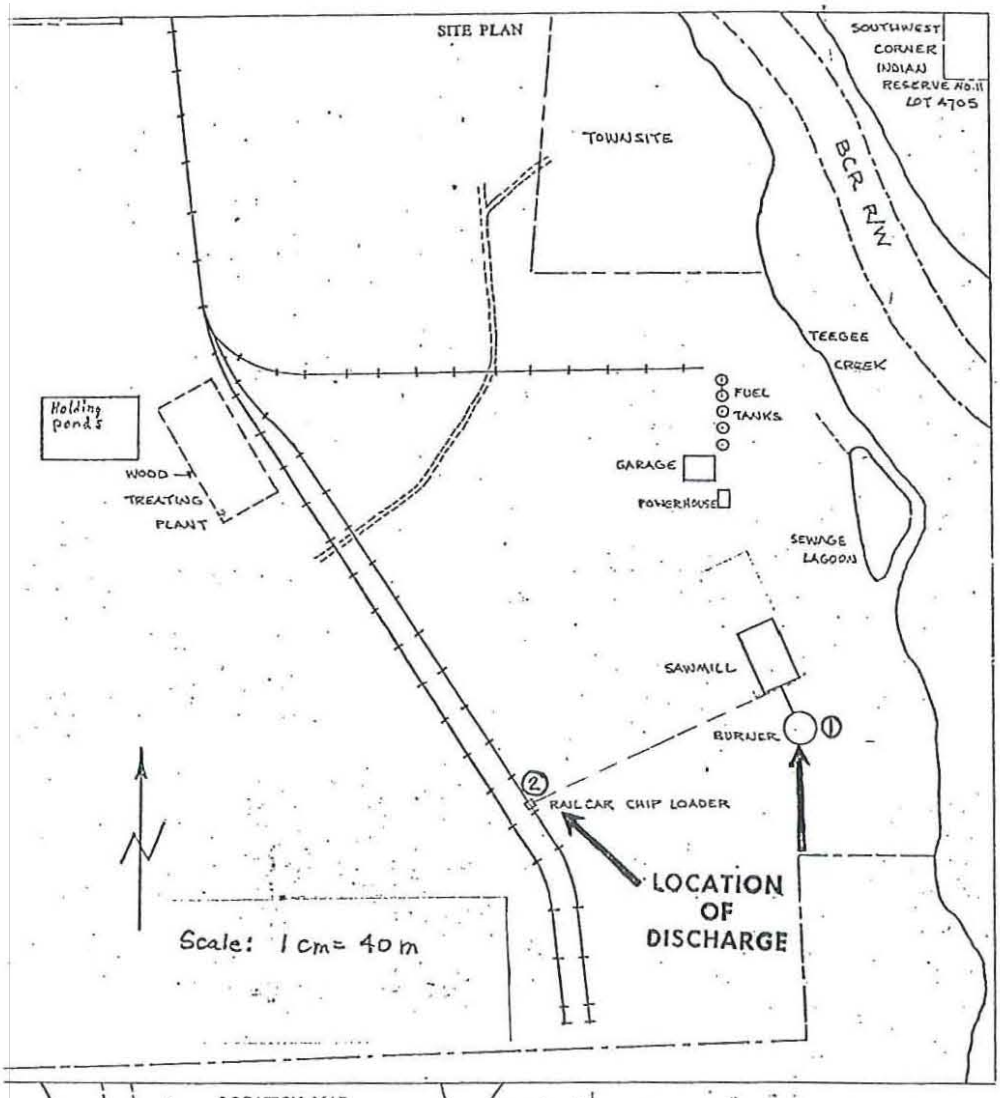
Date amended MAY 7 1979, 19

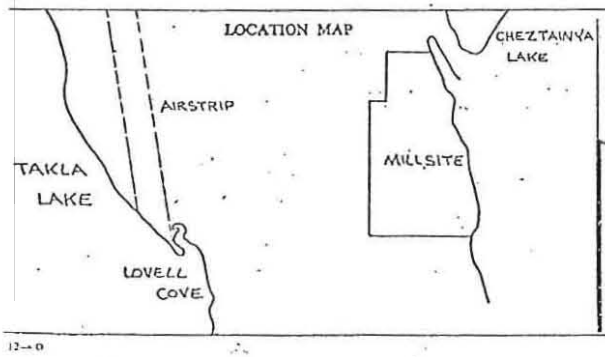
, 19

Assistant Director of Pollution Control

PCB 15— 0

DEPARTMENT OF LANDS, FORESTS, AND WATER RESOURCES
WATER RESOURCES SERVICE
POLLUTION CONTROL BRANCH





SILVACAN RESOURCES LTD.
(Name of applicant(s))

24 June/75
(Date)

(Signature of applicant(s) or agent)

(FOR OFFICE USE ONLY)

Aug. 17, 1976 MAY 7 1979

Amended Dates

Sept. 28, 1972
(Date issued) Assistant (Director of Pollution Control)

Appendix A to Permit No. PA-1605

12-0

INVESTIGATION OF POSSIBLE CONTAMINATION OF GROUNDWATER FROM A FORMER CREOSOTE TREATMENT SITE AT LOVELL COVE LOGGING CAMP AT TAKLA LAKE, B.C.

Prepared for

TIMBERWEST FOREST LTD.
Suite 690 - 700 West Georgia Street
VANCOUVER, B.C. V7Y 1J7

Prepared by

SRK-ROBINSON INC.
115 - 2550 Boundary Road
BURNABY, B.C. V5M 3Z3

MARCH 31, 1994

SRK-ROBINSON INC. Consulting Engineers
Suite 115, 2550 Boundary Road, Burnaby, B.C. Canada V5M 3Z3
Phone: (604) 451-3397 Fax: (604) 451-3403

Project F 220103

March 31, 1994

TimberWest Forest Ltd.
Suite 690 - 700 West Georgia Street
VANCOUVER, B.C. V7Y 1J7

Attention: Mr. Laurin R. Haines, P. Eng.
Manager of Environmental Services

Subject: **Investigation of Possible Contamination of Groundwater from a Former Creosote Treatment Site at Lovell Cove Logging Camp at Takla Lake, B.C.**

Dear Sirs:

We herewith submit our Report covering our investigation of possible contamination of groundwater due to a former creosote treatment site at Lovell Cove Logging Camp at Takla Lake, B.C.

We trust that the Report meets with your approval. We would be pleased to further discuss any aspect of the contents of the Report or to provide further clarification as may be required.

Yours truly,
SRK-ROBINSON INC.

Ed Livingston

Ed Livingston, P. Eng.
Associate Consultant/PHCL

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
E. LIVINGSTON

Ann Badry

PROFESSIONAL GEOSCIENTIST
PROVINCE OF BRITISH COLUMBIA
A. M. BADRY
03/31/94

Ann Badry, P. Geo.
Hydrogeologist and Manager/PHCL

CE BC MEMBER

INVESTIGATION OF POSSIBLE CONTAMINATION OF GROUNDWATER FROM A FORMER CREOSOTE TREATMENT SITE AT LOVELL COVE LOGGING CAMP AT TAKLA LAKE, B.C.

TABLE OF CONTENTS

APPENDICES

TABLE OF CONTENTS (cont'd)

FIGURES

TABLES

EXECUTIVE SUMMARY

An investigation of possible contamination of groundwater from a former creosote treatment site at Lovell Cove Logging Camp at Takla Lake, B.C. was carried out by SRK-Robinson Inc. (SRKR) in December 1993. The investigation consisted of a review of background documents, hydrogeologic reconnaissance, the digging of eight test pits, the installation of six monitoring wells and sampling of groundwater and surface water quality downstream of the site.

Several previous investigations had been concerned with site contamination and remediation in the creosote treatment area. The present investigation was concerned with evaluating the groundwater regime and, from this, assessing whether groundwater containing contaminants from the creosote treatment area could reach Cheztainya Lake I.R. No. 11.

As expected, SRKR's investigation of hydrogeologic conditions, along with the results of water and soil sampling, has confirmed that there is virtually no chance that contaminants could/would have been mobilized and transported by groundwater from the creosote treatment area toward Cheztainya Lake I.R. No. 11.

An initial analysis of soil from TP-8, which was dug very close to the known zone of most intense contamination and directly in the path of groundwater flow, did not detect any contaminants, confirming conclusions in published literature that the creosote and wood preservative used at the site are compounds that are not easily mobilized and which, even after entering the groundwater flow regime, are not usually detected very far downgradient from the source. Detection of small amounts of several polyaromatic hydrocarbons in soil samples from TP-4 and TP-5 located near the northeast corner of Cheztainya Lake I.R. No. 11 does not indicate that groundwater is contaminated. All evidence is that the low-level soil contamination at TP-4 and TP-5 is from some local source and is not due to migration of polyaromatic hydrocarbons in groundwater from the contaminated area at the former plant site.

1.0 INTRODUCTION

1.1 Purpose and Scope

The purposes of the investigation carried out by SRK-Robinson Inc. at the site of a former creosote treatment facility at Lovell Cove were to evaluate:

- Whether groundwater has been contaminated by the creosote operation.
- The extent of any contamination.
- Whether contamination might occur in future from residual creosote in the soil.

The investigation covered by this Report consisted of:

- A review of relevant published and unpublished documents concerning geology, soils and groundwater in the area and onsite - in particular, a review of previous analyses of soil and water samples.
- A field investigation including test pit digging and monitoring well installation by Ed Livingston, P. Eng., Associate Consultant to Pacific Hydrology Consultants Ltd. (PHCL), an affiliate company of SRK-Robinson Inc. (SRKR), both totally owned by Steffen Robertson and Kirsten (North America) Inc. During the field investigation, Ed Livingston was assisted by Mr. Jeff Clark, (a junior geological engineer employed by R.E. Graham Engineering Ltd.) with whom PHCL has a long history of cooperation.

Figure 1 in Appendix A is an area location map; Figure 2 is a contoured map of the study area showing approximate (unsurveyed) test pit and monitoring well locations.

1.2 Authority and Project Initiation

The work covered by this Report was arranged in discussions between Dr. Harm Gross of SRKR and Mr. Laurin Haines, P. Eng., Manager of Environmental Services for TimberWest Forest Ltd. (formerly Fletcher Challenge Canada Limited). On November 25, 1993 Dr. Gross of SRKR contacted Ed Livingston to arrange for the investigation covered by this Report. Thurber Environmental Services (TES), who had initially been engaged to carry out the work at Lovell Cove could not proceed because of possible conflict of interest. Mr. Bruce Ingimudson of TES sent to PHCL reports, maps and air photos which he had assembled for the investigation. Prior to SRKR's involvement, TES had made an arrangement with Mobile Augers of Edmonton to move an auger rig, which was at Fort Fraser, to Lovell Cove on November 28 or 29, 1993; however, from Ed Livingston's knowledge of site conditions from former work on the water supply at Lovell Cove Camp, he believed that the auger was not the most appropriate equipment to carry out the investigation.

Mr. Livingston contacted Mobile Augers and cancelled the order for auger services in favour of using an excavator which was available from Lovelle Logging Ltd. and was already onsite. Parties concerned with the situation at Lovell Cove and who were consulted about the course of action to be followed in the investigation included the following:

1. Takla Lake Indian Band represented by Chief Michael Teegee at Takla Landing.

2. The legal firm Nixon & Nixon of Kamloops, representing Takla Lake Indian Band, with Mr. Craig Nixon acting as legal counsel to the Band.

3. Indian and Northern Affairs Canada, represented by Mr. Don Giannace of the Prince George Office.

4. Health Canada, represented by Mr. Paul Broda, Environmental Health Officer, of the Prince George Office.

5. B.C. Environment, represented by Mr. Ian J.D. Mitchell, P. Eng., Environmental Protection Officer at the Prince George Office.

SRKR engaged R.E. Graham Engineering Ltd. (REGEL) of Prince George to provide a junior field assistant and appropriate transportation from Prince George to Lovell Cove and return. REGEL assigned Mr. Jeff Clark, B.ASc. (Geological Engineering). Ed Livingston and Ann Badry, P. Geo., (PHCL Manager) met with Mr. John Park, Chemist, of Analytical Services Laboratories Ltd. (ASL) in Vancouver to discuss sampling and analytical requirements to best detect the known creosote products in the contaminated area. Based on analyses in previous reports, Mr. Park recommended a suite of constituents, sample sizes, etc., and provided the necessary glass bottles and jars for collection of the water and soil samples.

Supplies of pipe, slotted pipe, pipe fittings, granular bentonite, sand and permanent steel protective tops for observation wells were ordered from Hydrophilic Industries Ltd. of Langley and shipped to Prince George in advance of the scheduled field investigation.

During a conference telephone call on December 2, 1993, between Messrs. Haines, Nixon, Chief Teegee, Giannace, Broda and Livingston, it was agreed that Livingston would stop at Takla Landing on the way to Lovell Camp on December 6, to meet with Chief Teegee and discuss plans for the Lovell Cove investigation - in particular, to discuss procedures which might be required to detect the presence of contaminants that may have reached Cheztainya I.R. 2 which is adjacent to the Lovell Cove log loading and shipping operation. As agreed, Livingston and Clark went to the Takla Landing Band Office on the afternoon of December 6; however, Chief Teegee was not at Takla Landing and was reported to be in Prince George. Livingston discussed the situation with Mitza of the Band, who stated that she would inform the Chief of our visit. Livingston and Clark again visited Takla Landing in the afternoon of December 8, 1993 to report on the investigation that had been carried out. The Chief was not at Takla Landing, and neither was Mitza available, but two copies of the field map showing the test pit locations were left at the Band Office.

The staff and other individuals at Lovell Cove Camp were most hospitable and cooperative; in particular, the assistance of the following is acknowledged: Mr. Wayne Tait, Camp Manager for Rustad Brothers & Company Ltd.; Mr Gary Johnson, Superintendent for Lovelle Logging Ltd.; and Mr. Kevin Passeral, operator of the excavator owned by Lovelle Logging and used in the investigation.

1.3 Background Documents

In addition to the maps and aerial photographs provided by TimberWest Forest Ltd. and TES, the following published documents have been used in the preparation of this Report:

1. N.T.S. Map 92M/9, **Bulkley House,** of scale 1:50,000, and contour interval 100 ft.

2. Geological Survey of Canada Memoir 252, **Fort St. James Map-Area, Cassiar and Coast Districts, British Columbia**; by J.E. Armstrong, 1949.

3. Geological Survey of Canada Map 1505A, **Tectonic Assemblage Map of the Canadian Cordillera and Adjacent Parts of the United States of America**; co-ordinators H.W. Tipper, G.J. Woodsworth and H. Gabrielse, 1981, of scale 1:2,000,000.

4. British Columbia Department of Mines and Petroleum Resources Bulletin No. 48, **Landforms of British Columbia - A Physiographic Outline**, by Stuart S. Holland, 1964, 138 pp.

Various consultant reports and letter-reports concerning the site being investigated include the following:

1. A letter-report prepared by PHCL for Rustad Brothers & Company Ltd., dated May 21, 1991 on the subject "Evaluation of the Feasibility of Obtaining a Supply of Groundwater for the Lovell Cove Logging Camp on Takla Lake".

2. A report prepared by HBT Agra Ltd. dated November 30, 1992 on the subject "Sampling of Stored Creosote Contaminated Material Factual Report Lovell Cover, British Columbia".

3. A report prepared by Thurber Environmental Consultants Ltd., dated September 1991 on the subject "Lovell Cove Preliminary Sampling and Analysis" .

4. A report dated September 7, 1993, prepared by Conolly Associates Consulting Ltd., titled "Silvercan Site Remediation Progress Report, Lovell Cove, Takla Lake, B.C.".

5. A letter-report, dated October 21, 1993, by Conolly Associates Consulting Ltd., dated October 22, 1993, on the subject "Site Remediation Progress Report Silvercan Site Inspection and Sampling September 15, 1993".

2.0 FIELD INVESTIGATION

2.1 General Procedure

SRKR's field investigation at Lovell Cove consisted of:

- Field reconnaissance to consider possible movement of groundwater from the area of creosote contamination.
- Digging of eight test pits and construction of monitoring wells at six of the sites. Except at the sites of TP-4 and TP-5, monitoring wells were only completed if groundwater was present, or if there was evidence of intermittent groundwater flow.
- Collection of samples of groundwater or, where no groundwater flow was present, samples of damp or wet soil at the bottom of the weathered zone.

In initial reconnaissance of the contaminated area on foot, the ponds in the impoundment area were crossed. Near the middle of the larger pond, more or less south of the pile of scrap metal, there was a hole, about 10 cm in diameter, in the ice; the hole, which was surrounded by a layer of slush under the dry snow, was being maintained by a very distinct disturbance in the water. There seemed to be an upward jet of water in the centre of the hole. This phenomenon was discussed with Mr. Wayne Tait, Camp Manager for Rustad Brothers, and Mr. Gary Johnson, Manager for Lovelle Logging, both of whom have been at the camp for many years, who stated that there are no pipes of the present or previous water or sewerage systems near the pond and they were not aware of the condition which we described. In SRKR's opinion, because of its location, almost at the height of land between the Lake and Cheztainya Creek and at the recharge end of the groundwater flow regime, the observed phenomenon is not caused by normal groundwater or surface water flow but, rather, is most likely due to some kind of structure or activity in the area. Any natural flow under the existing geologic conditions would be quite diffuse, in contrast to the concentrated flow which was observed.

The test pits were dug with a fairly large excavator (Caterpillar Model 235) which is based at the camp. Each pit was dug to the practical maximum depth for the excavator or, in several pits, to bedrock. The excavator was equipped with a 1½ metre wide bucket with teeth. Digging was easy and rapid in the weathered zone, but the dark fresh till was difficult and slow to dig because of numerous stones and because of the compaction and strength of the silty sandy matrix. A few large boulders were encountered; most of the stones are rounded cobbles and pebbles. At some locations, the brown weathered zone had a blocky structure but no fissures or joints were observed in the semi-plastic fresh till. Lithologs of sediments encountered in the digging of the test pits, along with other test pit and monitoring well details, are summarized in Table 1 in Appendix B.

2.2 Test Pit Digging and General Field Observations

Under the uncomplicated geologic conditions described by the recent and previous test pits, flow from the contaminated area, as defined by the impoundment structures, is down the topographic slope toward Takla Lake. However, because of topographic irregularities and such processes as diffusion, groundwater flowing from the contaminated area is expected to spread laterally to a broader zone as it moves down the slope.

Several factors were considered in the planning of the test pit sites:

1. A "line" of test pits (see Figure 2, Page A - 2) was sited on the downslope side of the contaminated area and relatively close to the contaminated area since, if samples of groundwater and/or soil water from these pits did not show any contaminants, there would be no need for additional pits or wells further down the slope.

2. Two sites (TP-4 and TP-5) were selected close to, and on the upslope side of, Cheztainya Lake I.R. 11, since, if no evidence of contamination was present in samples from these pits, then no contaminated groundwater is reaching the Reserve. Even though, because of their location relative to the slope of the land, TP-4 and TP-5 are not located in the zone of predicted groundwater flow away from the known contaminated zone, permanent monitoring wells were installed in these pits to permit future groundwater sampling.

3. As requested by Mr. Broda, Environmental Health Officer of Health Canada, a pit (TP-3) and monitoring well were constructed near Takla Lake. The shore of the Lake in that area is the front of a low "beach ridge". The airstrip is located on this ridge; a swampy area containing some standing water is located behind (east of) the ridge. The airstrip access road is on a fill across the swamp. TP-3 was sited at the foot of the slope on the inland side of the swamp where it would intercept any groundwater moving toward the Lake.

4. A test pit (TP-7) was sited north and upgradient of the zone where groundwater from the known contaminated area would have flowed.

5. After the surface water flow had been observed and sampled, a test pit (TP-5) was dug near the shallow gulley to determine whether there was significant groundwater flow. When TP-5 showed that a saturated zone was present at the bottom of the loose soil, a shallow sampling well was constructed in a shallow pit located close to a deep pit which had been dug into the underlying till.

6. A test pit (TP-8) was sited on the east side of the road and close to the known contaminated zone. It is outside of the impoundment area in undisturbed second growth bush. The main purpose of this pit was to determine whether geologic conditions are the same under the known contaminated area as had been observed in all of the other test pits. The digging of this test pit was considered to be necessary because stratified sand and silt had been reported in a previous report. The other purpose of this pit was to observe possible contamination and to obtain a water sample close to the contaminated area. TP-8 was dug last to avoid the possibility of cross-contamination from the excavator bucket in the event that contaminated ground was encountered.

3.0 SITE CHARACTERIZATION

3.1 Geology

As pointed out in PHCL's Report of May 21, 1991 concerning an evaluation of groundwater source feasibility for the Lovell Cove Logging Camp, the surficial geology of the entire subject area is quite straightforward and is remarkably uniform. All of the test pits dug during the present program are consistent with those dug in 1991 except, of course, the pit dug in 1991 in the swamp south of Cheztainya Lake. The test pits all show that there is a very compact dark silty sandy stony till with a few large boulders overlying bedrock which, in this area, is coarse pebbly blue-green sandstone that dips gently eastward.

Since the geology of the Lovell Cove area, as described in PHCL's previous report on water supply, has been confirmed by the present investigation, the discussion of geology contained in the previous report is quoted here.

> As shown on Figure 1 attached, the subject area is located within the transition zone of the Nechako Plateau and the Omineca Mountains to the north. The geologic map (Geological Survey of Canada Map 1505A) shows the area of the Lovell Cove Camp to be underlain by Cretaceous age rocks which are probably part of the Skeena Formation. They are described as "sandstone, conglomerate, argillite, marine and non-marine". The marine fossils, which are plentiful in the quarry northeast of the Camp, show that the argillite is marine. The sandstone and pebble conglomerate which underlie the camp area look more like non-marine sediments; although no fossils were seen, it is uncertain whether the sediments are marine or non-marine. The sandstone, which dips gently to the northeast, outcrops in the form of northwest-southeast trending ridges that were probably formed by glacial erosion of hard and soft rocks, with the more resistant beds forming the ridges.
>
> The bedrock is overlain by an intermittent cover of glacial and recent sediments. Most of the glacial material is a dark grey, very compact stony, sandy, silty-clay till which rests directly on bedrock in most places. In the valley between two rock ridges, at the southeast end of Cheztainya Lake, there is at least 9 m (30 ft) of silt, sand and gravel which is probably fine-grained glacial outwash. These sediments are overlain by less than one metre of organic swamp deposits. Other than the minor deposits of sand and gravel between rock ridges, there seems to be very little sand and gravel in the area. This is supported by the fact that one of the sandstone ridges near the Camp was stripped down to rock to obtain the small amount of sand and gravel at surface; the origin of this sand and gravel is likely weathering of the sandstone. Along Takla Lake, near the airstrip, there is a low beach terrace composed of sand and fine gravel. The thickness of the granular sediments is unknown but, all things considered, they are likely to be rather thin.

The top part of the till is brown and, in most places, there is a thin but distinct sandy zone at a depth of 1 to 1½ m. At some locations, the thin sandy zone marks the bottom of the brown zone; in other places the brown zone extends as deep as three metres. The brown colour is most probably the zone of weathering of the till. It seems to be thinner in low, less well-drained sites and is deep in dry well drained areas. Perhaps downward movement of oxygen-bearing water from surface is responsible for the deeper weathering in well drained areas.

The origin of the sandy zone is not clear. One possibility is that the shallow till, in which the sandy zone is present, is ablation till, sediment left on ground surface when the last regional ice sheet wasted away by melting about 12,000 years ago. If so, it is probably not correctly called till but, rather, should be called glacial drift. The sediment is essentially the same as the compact till plastered on the bedrock by the thick ice sheet but it has not been compacted by the ice. The thickness of the "ablation" till - if that what it is, is remarkably uniform - between about 1 and 1½ metres. In any case, the origin or explanation for the sandy zone is not important for the problem at hand. The fact that it exists is important in the hydrogeology of the area, and it may also be important in determining the type and health of forest vegetation.

3.2 Surface Water and Groundwater Hydrology

In the subject area, the soil is important in storing water from precipitation until it has time to move down into the till and ultimately into the rock. If the hydraulic conductivity of the soil is about 10^{-3} cm/sec, and if the hydraulic conductivity of the underlying till is about 10^{-5} cm/sec, water in the soil can move down into the till at a rate of about 0.9 cm per day, or 27 cm/month. Such an infiltration rate is probably greater than the average yearly groundwater recharge; if so, there is not a thick saturated zone in the soil and groundwater flow downslope is probably insignificant. Obviously, there are other factors to be considered: for instance, local topography is important and shallow gulleys, which obviously carry no surface water flow, tend to concentrate groundwater flow in the upper soil layer.

One of the test pits (TP-1) is located in such a shallow gulley. A small steady trickle of water from the top layer into the test pit, mostly from the upslope side of the pit was observed during digging, and an estimated 0.2 m^3 of water accumulated in 24 hours. The accumulated water did not flow from a specific source but, rather, is water collected from the sloping sides of the gulley along its length. None of the test pits constructed at well-drained sites encountered any water. A slightly larger and better defined gulley which passes close to TP-5 carried a very small surface flow as shown by the presence of slush under the dry snow in the gulley and some ice in the bottom of the gulley. Except for water in the ponds at the contaminated site, the small flow in the gulley near TP-5 was the only surface water flow observed in the study area.

In a simple groundwater flow system in homogeneous isotropic sediments, recharge takes place on the upper two thirds of the slope with the groundwater discharge zone occupying the lower third of the slope. In the subject situation, the groundwater flow system of concern is a system moving through a rock ridge with fracture permeability and covered with three metres or more of till, and which in turn is covered with a loose permeable soil about 1 to 1½ metres thick. The permeability of the rock is estimated to be similar to that of the unweathered till so the framework for considering groundwater flow can be described as consisting of a layer of loose soil that has an estimated hydraulic conductivity about two orders of magnitude higher than the underlying till-bedrock combination.

Recharge to the groundwater regime is from precipitation, assuming that no other water is being added by human activity in the log yard-loading area. In the undisturbed condition, much of the precipitation is returned to the atmosphere by evapotranspiration during the growing season, with most groundwater recharge occurring during spring before the growing season gets started. Where vegetation has been removed, recharge increases unless soil compaction or other activities reduce it sufficiently to cause increased runoff. It seems likely that there is some runoff from the log yard area but this was difficult to estimate during the present field investigation because of snow on the ground.

The broad ridge, at elevation about 76 m (250 ft) above Takla Lake, on which the log yard, the camp, the loading area and the contaminated area are located, is the recharge end of a small local groundwater flow system bounded on the east by Cheztainya Creek and on the west by Takla Lake; the surface water divide, and also the groundwater divide created by the topography, is shown on the site location map (Figure 2, Appendix A). Because of the relative elevations of the Creek and Lake, most groundwater flow is toward the Lake. As illustrated by the location of the surface water/groundwater divide (see Figure 2), the contaminated zone is clearly on the Takla Lake side of the ridge; therefore, groundwater flow from the contaminated zone is clearly westward. There is also a large regional groundwater flow system involving deep flow through bedrock westward from the mountains on the east and which discharges into Takla Lake below water level. The hydrogeologic cross-section of Figure 3, which is included in Appendix A, illustrates the groundwater flow regime in the study area. In considering the contaminated area, only the smaller shallower groundwater flow system is of concern.

4.0 ANALYTICAL RESULTS FROM SAMPLING OF SOILS AND WATERS

The purpose of the investigation carried out by SRKR at Lovell Cove Logging Camp is to determine whether the known contamination is entering the groundwater regime and moving to Takla Lake and/or Cheztainya Lake I.R. No. 11 at the mouth of Cheztainya Creek. Where the test pits did not encounter any groundwater, samples of soil were taken at the level where soil moisture was observed and where shallow groundwater is likely to flow at the time of maximum groundwater conditions. When present, the contaminants are in the spaces between mineral grains and on mineral grain surfaces. The chemical analysis is carried out by using extractions with solvents to remove the contaminants from the soil. The extract is then analyzed by very sensitive equipment to detect the presence of the contaminant. The presence of contaminant in the soil extract does not show that the contaminant will be present in groundwater where it occurs, as the groundwater is much less effective than the special solvents in putting the contaminants in solution. It is important to note that levels of contaminants in the soil, as shown by the analyses, are not the levels that would occur in groundwater.

To focus the analytical program, an analysis of soil from TP-8 was carried out first because TP-8 was dug very close to the known zone of most intense contamination and directly in the path of groundwater flow. Thus, it was reasoned that, if any significant movement of contaminant in groundwater had occurred, the contaminants would certainly be detected in TP-8 and the result would give direction to a decision about what analyses should be carried out on samples further from the contaminated zone. However, as shown

by the ASL analysis of soil from TP-8 (ASL File D6153, February 2, 1994), a soil sample from the permeable sandy layer at the top of the fresh till in TP-8 showed potential contaminants to be less than the level of detection.

From discussions with Mr. John Park, Chemist and Principal at Analytical Service Laboratories (ASL), and who was familiar with previous analyses from the old Creosote Plant Site, the two compounds in use on the site - creosote (polyaromatic hydrocarbons) and a wood preservative (chlorinated phenols) - could be characterized as follows:

- *Creosote*, which does not have a specific formulation, but is a variable mixture of organic compounds. Previous chemical analyses from the contaminated zone show that this particular formulation consists primarily of polyaromatic hydrocarbons.

- *Wood preservative,* also consisting of a mixture of organic compounds classed as chlorinated phenols. This preservative is commonly known in the industry as PCP.

Of the two compounds, the creosote is much less soluble in water and therefore has a greater tendency to remain in the area of use than does the chlorinated phenols. This fact, as recommended by ASL, was taken into account in the sampling strategy, by analyzing for phenols based on the fact that, if they are not present, it is very unlikely that the polyaromatic hydrocarbons would be present. Even so, in the case of the Pits (4 and 5) near Cheztainya Lake I.R. No. 11, the samples were analyzed for both compounds. It has long been recognized that the creosote and wood preservatives under consideration in the present investigation do not mobilize readily; for example, Godsy, Goerlitz & Grbic-Galic (1992, Page 241; see References listed on Page 11) state the following : "Results indicate that a disproportionate decrease of selected organic compounds observed during downgradient movement in the aquifer may be attributed to microbial degradation of selected compounds." Thus, even if groundwater conditions were favourable, there is virtually no possibility that creosote or wood preservatives could be transported by natural processes from the Creosote Plant Site to Cheztainya Lake I.R. No. 11.

Details of laboratory procedures are given in the reports from ASL contained in Appendix C. ASL's analyses showed less than detectable amounts of both compounds in all of the samples except the water sample from TP-4 and the soil sample from TP-5, the two pits located near the northeast corner of Cheztainya Lake I.R. No. 11. As no groundwater was encountered at TP-5, only soil could be sampled; however, a water sample was collected from an adjacent stream.

As summarized in Table 2 in Appendix C, the water sample from TP-4 showed detectable amounts of ten of the components of the polyaromatic hydrocarbons that make up creosote, with six of these marginally exceeding the CMCS (Criteria for Managing Contaminated Sites) standard. Only a single compound (phenanthrene) was detected in the soil sample from TP-5. None of the compounds of the chlorinated phenol group were detected inspite of the fact that they are more mobile than are polyaromatic hydrocarbons.

The results of the analysis of water from TP-4 suggest that the detection of polyaromatic carbon occurrence at that site is local in extent and is not part of a "plume" of contamination extending from the old contaminated area. Evidence for this conclusion is the following:

1. The sample from TP-8, which is located much closer to, and more directly in the path of groundwater flow, showed no contaminants.
2. TP-4 and TP-5 are located a substantial distance from the nearest known contaminated areas and they are certainly not in the direct path of groundwater or surface water flow.

The result from the soil sample of TP-5 is particularly puzzling as only one constituent (phenanthrene) of the polyaromatic hydrocarbon mixture was detected, and even then it is below the CMCS standard; since none of the other fourteen constituents was detected, a sampling error or some other unique factor limited to the specific location is the best explanation.

5.0 CONCLUSIONS AND RECOMMENDATIONS

The investigation near the site of a former creosote treating plant at Lovell Cove, has shown:

1. The creosote and PCP contamination is confined to the impoundment area and has not been spread downslope by groundwater flow.
2. The surficial geology of the area is quite straightforward:
   - a "blanket" of slowly permeable compact till, three metres or more in thickness, overlies sandstone bedrock;
   - the more permeable soil zone, developed by weathering of the till, is usually about one metre thick.
3. Groundwater has not been contaminated during the long period since the creosote plant was active, and there is virtually no chance that it will be contaminated in future, particularly when an active program of remediation of the contaminated area is in operation.
4. There is virtually no risk of contamination of groundwater on Cheztainya Lake I.R. No. 11 by creosote or PCP from the known contaminated area.

For the reasons outlined following, no further groundwater investigation is recommended:

1. The amount of contaminant in the soil at the sites of TP-4 and TP-5 is very small and will be reduced in future by natural processes.

2. The site is not in an area of habitation nor is it an area which is ever likely to be inhabited.

3. An active program of bioreclamation is under way at the old contaminated site so the contamination will soon be removed.

It is recommended, however, that the active water flow observed in the pond in the contaminated area should be investigated and shut off if possible. It is probably easier to mark the exact location of the flow from the ice cover on the pond than during open water conditions.

6.0 SELECTED REFERENCES

Godsy, E.Michael, Donald F. Goerlitz and Dunja Grbic-Galic (1992): "Methanogenic Biodegradation of Creosote Contaminants in Natural and Simulated Ground Water Ecosystems"; in **Ground Water**, Vol. 90, No. 2, pp. 232-242.

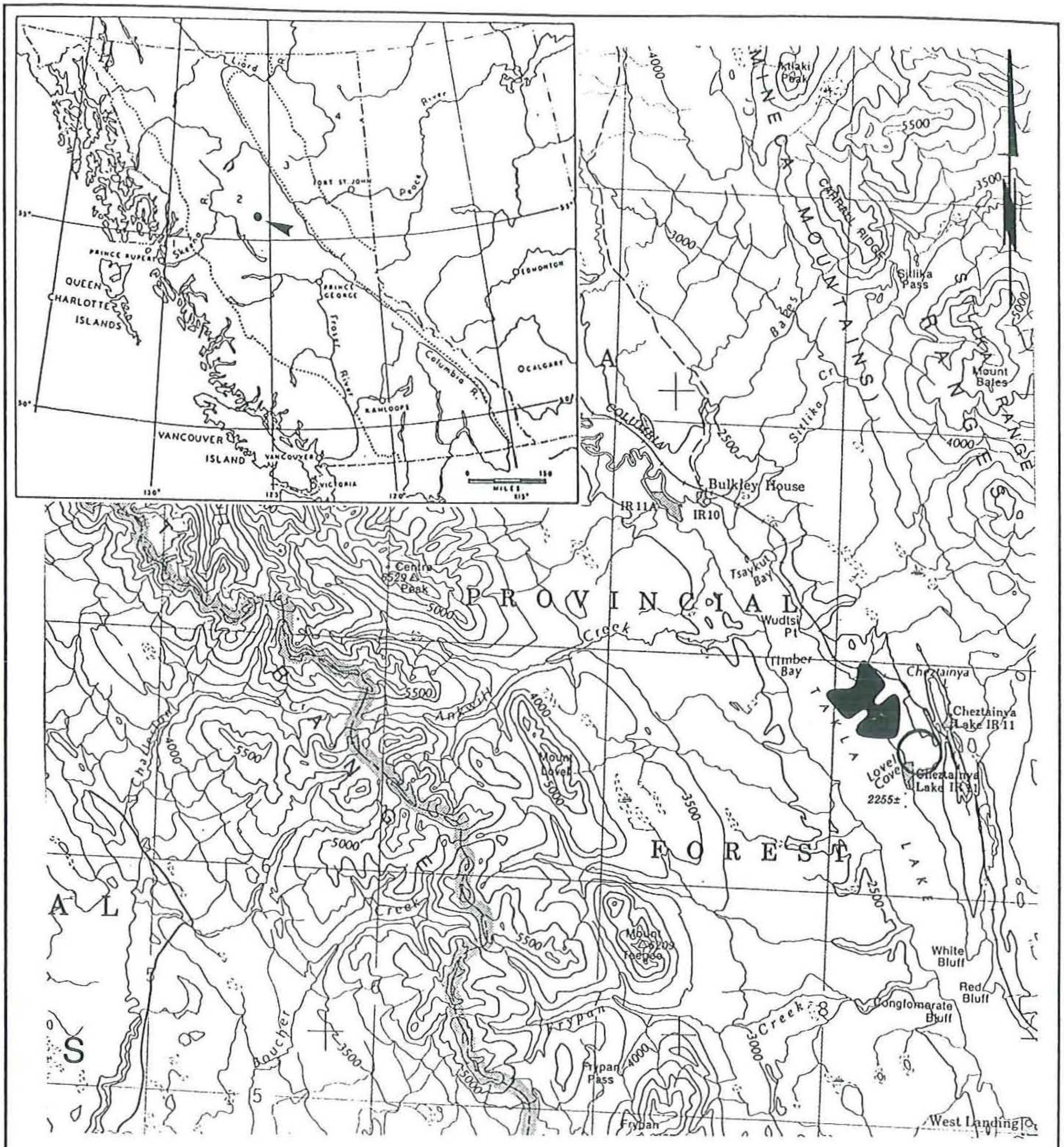
U.S. Environmental Protection Agency (1992): **Approaches for Remediation of Uncontrolled Wood Preserving Sites**; Centre for Environmental Research Information, Office of Research and Development, EPA/625/7-901011, 21 pp.

Reitman, V., T. Stone, M. Trudell, L. Andriaskek and D. Thomson (1992): "A study of the Upward Movement of Creosote into the Bow River"; in **Modern Trends in Hydrogeology**, Proceedings of 1992 Conference of the Canadian National Chapter, International Association of Hydrogeologists, Hamilton Ontario, May 11 to 13, 1993, Co-sponsored by Waterloo Center for Groundwater Research and Environment Canada, pp 234-249.

Franks, Bernard J., Editor (1987): "Chapter A. - Movement and Fate of Creosote Waste in Ground Water Near an Abandoned Wood-Preserving Plant near Pensacola, Florida"; in U.S. Geological Survey Open-File Report 87-1109, **U.S. Geological Survey Program on Toxic Waste - Ground Water Contamination: Proceedings of the Third Technical Meeting, Pensacola, Florida, March 23-27, 1987**, pp. A-1 to A-19.

APPENDIX A

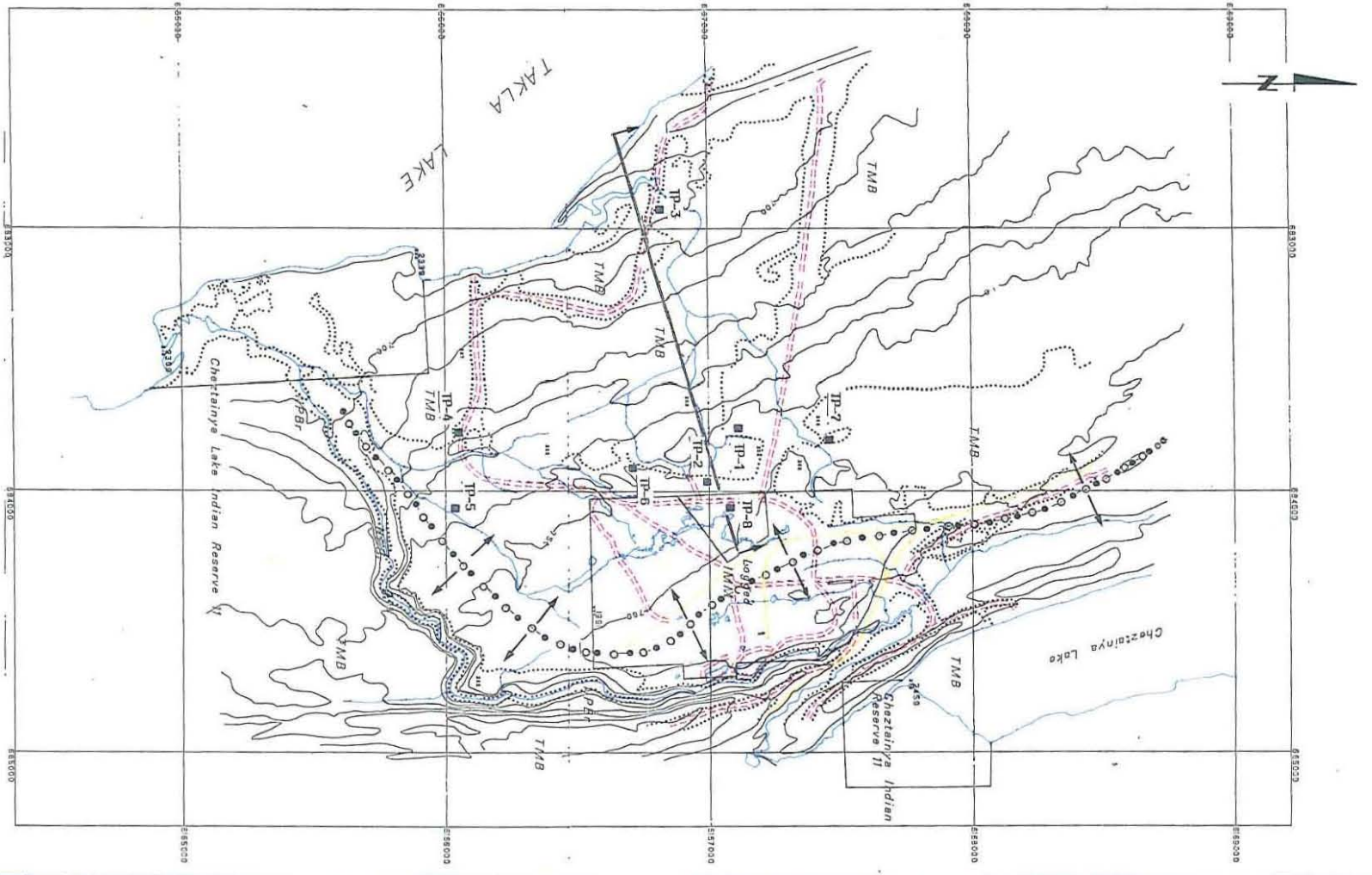
AREA AND SITE LOCATION MAPS
AND
HYDROGEOLOGIC CROSS-SECTION



Notes:

1. The base map is topographic map N.T.S. 93M, **Hazelton**, of scale 1:250,000; contour interval is 500 ft.
2. O◀ outlines area of investigation; for detail, see Figure 2.

PROJECT No: F220103	SRK-ROBINSON INC. CONSULTING GEOTECHNICAL ENGINEERS
PROJECT: TIMBERWEST FOREST LTD.'S FORMER LOVELL COVE CREOSOTE TREATMENT SITE	AREA LOCATION MAP
LOCATION: TAKLA LAKE, B.C.	DATE: 03/03/94 · DRAWN BY: ab · FIGURE: 1



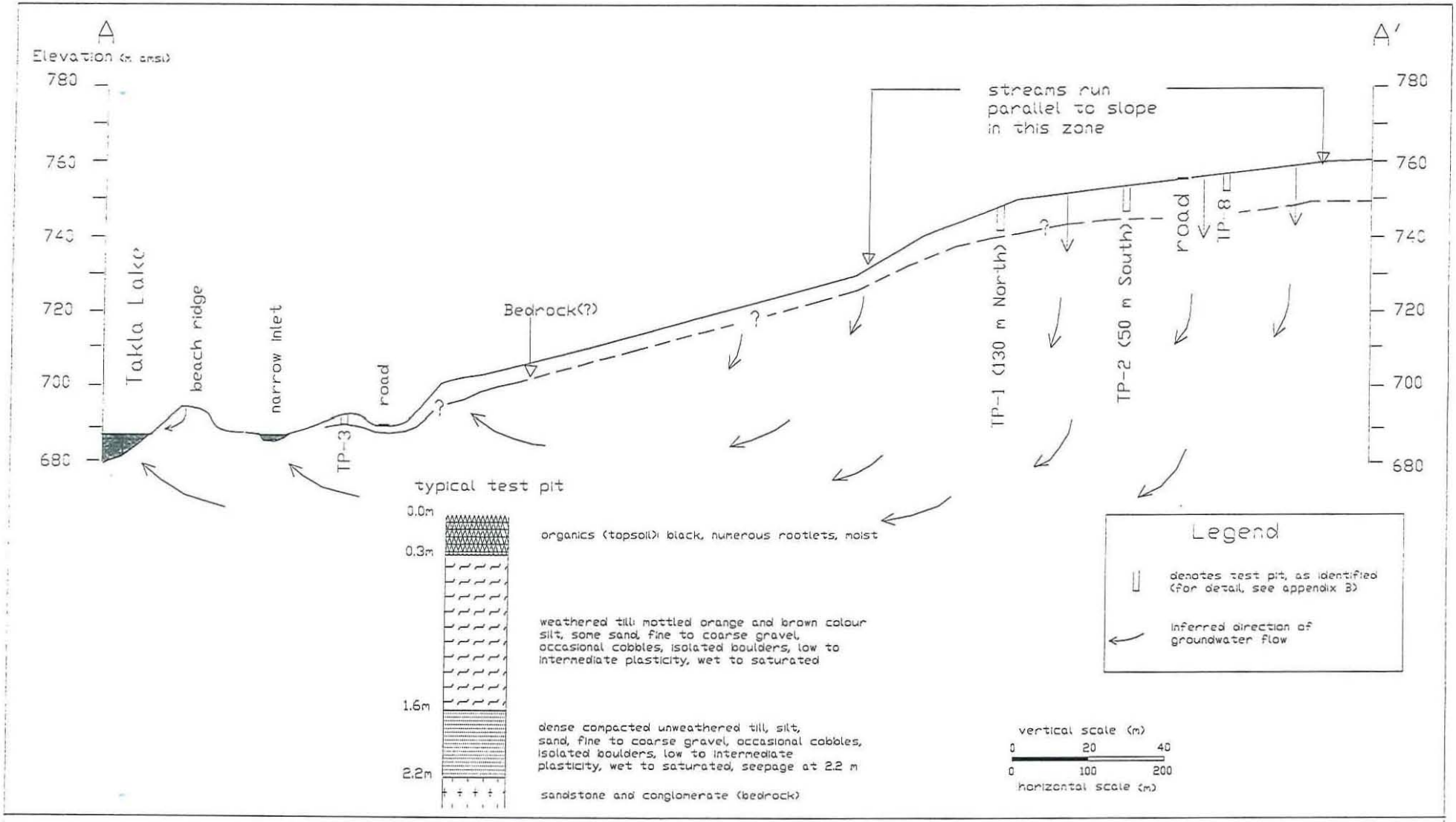
Notes:
1. The base map is by B.C. Ministry of Forests (identified as "Map of S.U.P. 14490), reduced to an approximate scale of 1:6,300 from 1:10,000; contour interval is 10 metres.
2. ■ denotes approximate (unsurveyed) location of a test pit (for details, see Table 1 in Appendix B).
3. ↑——↑ defines line of hydrogeologic cross-section (see Figure 3).
4. ——→ indicates interpreted direction of groundwater flow. 5. ●●●○○○ surface/groundwater divide.

PROJECT No: F220103
PROJECT: TIMBERWEST FOREST LTD.'S FORMER LOVELL COVE CREOSOTE TREATMENT SITE
LOCATION: TAKLA LAKE, B.C.

SRK–ROBINSON INC.
CONSULTING GEOTECHNICAL ENGINEERS

TEST PIT LOCATION PLAN

DATE:	DRAWN BY:	FIGURE:
03/03/94	gb	2



A - 3

SRK - Robinson Inc. Consulting Geotechnical Engineers

Project:	Project No:	Location:
Timber West Forest Ltd.	F220103	East End of Takla Lake

Title:	Date:	Drawn By:	Figure:
Hydrogeological Cross Section A - A'	Feb. 7, 1994	BDM	3

APPENDIX B

TEST PIT LITHOLOGS

Table 1. Details of 1993 Test Pits Dug for Timber West Forest Ltd.'s Lovell Cove Groundwater Investigation

TEST PIT	TOTAL DEPTH	LITHOLOGY		COMPLETION	REMARKS
1	5.30 m	0.00 - 0.25 m 0.25 - 1.10 m 1.10 - 5.30 m	organics (topsoil), black, numerous roots and rootlets; moist oxidized orange colour till (weathered) *seepage at 1.1 m from NE direction* till: silt, trace of clay, slightly sandy with fine to coarse gravel, frequent cobbles, isolated boulders, very dense, low to medium plasticity; damp.	monitoring well 1.2 m to bottom 0.75 m slotted PVC stickup = 0.8 m bottom 0.3 m back-filled with sand	soil sample taken at 1.1 m water sample taken at 3.8 m unweathered till is very compacted water ponded in the hole overnight from seepage at 1.1 m
2	5.40 m	0.00 - 0.25 m 0.25 - 1.00 m 1.00 - 1.40 m 1.40 - 5.40 m	organics (topsoil): black, numerous roots and rootlets, moist till: silt, some sand, fine to coarse gravel, frequent cobbles, isolated boulders; damp saturated sand and gravel seam: *seepage between 1.0 and 1.4 m* same as 0.25 to 1.00 m but with traces of clay.	monitoring well in adjacent excavation bottom at 1.4 m 0.75 m slotted PVC stickup = 1 m bottom 0.3 m back-filled with sand	soil sample taken at 1.3 m water sample taken at 1.4 m unweathered till is very compacted water ponded in the hole overnight from seepage at 1.4 m
3	2.20 m	0.00 - 0.30 m 0.30 - 1.60 m 1.60 - 2.20 m at 2.20	organics (topsoil): black, numerous roots and rootlets; wet weathered till: mottled orange and brown colour, silt, some sand, fine to coarse gravel, occasional cobbles, isolated boulders, low to intermediate plasticity, dense; wet to saturated dense compacted unweathered till: silt, sand, fine to coarse gravel, occasional cobbles, isolated boulders, low to intermediate plasticity, very dense; wet to saturated *slight seepage at 2.20 m* sandstone and conglomerate (bedrock).	monitoring well to 2.2 m 0.42 m slotted PVC stickup = 1 m bottom 0.3 m back-filled with sand	water sample taken at 2.2 m test pit walls sloughing with time

(For test pit locations, see Figure 2 in Appendix A)

Table 1. Details of 1993 Test Pits Dug for Timber West Forest Ltd.'s Lovell Cove Groundwater Investigation (cont'd)

TEST PIT	TOTAL DEPTH	LITHOLOGY		COMPLETION	REMARKS
4	4.80 m	0.00 - 0.30 m 0.30 - 3.00 m 3.00 - 4.80 m at 4.80 m	organics (topsoil): black, numerous roots and rootlets; wet weathered till: brown silt with trace to little clay, some sand, some fine to coarse gravel, occasional cobbles, isolated boulders, low to intermediate plasticity, dense; wet to saturated unweathered till: same as weathered zone but grey-brown colour *prominent seepage zone between 3.5 and 4.2 m* grey-green fragmented sandstone and shale (bedrock).	monitoring well to 4.8 m stickup = 1.3 m 1.0 m slotted PVC crushed rock backfill	water sample taken at 4.8 m sloughing zone from 3.5 to 4.2 m
5	4.00 m	0.00 - 0.30 m 0.30 - 2.30 m 2.30 - 4.00 m at 4.00 m	organics (topsoil): black, numerous roots and rootlets; moist weathered till: brown silt, traces of clay, some sand, fine to coarse gravel, frequent cobbles, isolated boulders, dense, damp *seepage zone between 0.8 and 1.6 m* from saturated sand and gravel seams unweathered till: grey, silt, traces of clay, some sand, fine to coarse gravel, frequent cobbles, isolated boulders, very dense and compacted; damp bedrock(?).	monitoring well to 1.6 m in adjacent excavation stickup = 1.25 m 0.75 m slotted PVC bottom 0.3 m back-filled with sand	soil sample taken at 1.6 m water sample collected from nearby stream
6	4.70 m	0.00 - 0.30 m 0.30 - 4.70 m	organics (topsoil): black, numerous roots and rootlets; moist till: brown silt, traces of clay, some sand, fine to coarse gravel, occasional cobbles, isolated boulders, low to medium plasticity, dense; damp *no seepage.*		
7	4.60 m	0.00 - 0.30 m 0.30 - 1.10 m 1.10 - 4.60 m	organics (topsoil): black, numerous roots and rootlets; moist oxidized orange colour till (weathered): silt, trace of clay, slightly sandy with fine to coarse gravel, frequent cobbles, isolated boulders, very dense, low to medium plasticity, damp unweathered till: grey with same character as weathered zone. color is grey.	monitoring well to 1.3 m 0.75 m slotted pipe no sand backfill	soil sample taken at 0.75 m substantial seepage from sand seam Test Pit walls remained vertical

(For test pit locations, see Figure 2 in Appendix A)

Table 1. Details of 1993 Test Pits Dug for Timber West Forest Ltd.'s Lovell Cove Groundwater Investigation (cont'd)

TEST PIT	TOTAL DEPTH	LITHOLOGY		COMPLETION	REMARKS
8	4.30 m	0.00 - 0.30 m 0.30 - 2.80 m 2.80 - 4.30 m	organics (topsoil): black, numerous roots and rootlets; moist weathered till: brown silt, trace to little clay, little sand, little fine to coarse gravel, occasional cobbles, isolated boulders, dense; roots to 1.1 m; damp *no seepage* same character as 0.30 to 2.80 m but grey-brown colour.		soil sample taken at 1.0 m Test Pit walls stayed vertical

(For test pit locations, see Figure 2 in Appendix A)

APPENDIX C

ANALYTICAL RESULTS OF SOIL AND WATER SAMPLES

Table 2. Selected Chemical Parameters in Soil/Water from Lovell Cove 1993 Test Pits

Parameter[1]	TP 4[2] Water	TP 5[3]		CMCS Standard[4]	
		Soil	Surface Water	Water	Soil
Polyaromatic Hydrocarbons	<0.0005	<0.020	<0.0005	0.0005	0.1
Acenaphthene	<0.0005	<0.020	<0.0005	0.0005	0.1
Acenaphthylene	<0.0002	<0.020	<0.0002	0.0002	0.1
Anthracene	**0.00005**	<0.020	<0.00001	0.00001	0.1
Benz(a)anthracene	**0.00005**	<0.020	<0.00001	0.00001	0.1
Benzo(a)pyrene					0.1
Benzo(b)fluoranthene	**0.00013**	<0.020	<0.00001	0.00001	0.1
Benzo(ghi)perylene	0.0001	<0.020	<0.0001	0.0001	0.1
Benzo(k)fluoranthene	**0.00003**	<0.020	<0.00001	0.00001	0.1
Chrysene	0.0001	<0.020	<0.0001	0.0001	0.1
Dibenz(a,h)anthracene	**0.00004**	<0.020	<0.00001	0.00001	
7,12-Dimethyl-1, 2-benzanthracene	<0.0001	<0.020	<0.0001	0.0001	0.1
Fluoranthene	0.0001	<0.020	<0.0001	0.0001	0.1
Fluorene	<0.0001	<0.020	<0.0001	0.0001	0.1
Indeno(1,2, 3-cd)pyrene	**0.00009**	<0.020	<0.00001	0.0001	-
3-Methylcholanthrene	<0.0001	-	<0.0001	0.0002	
Naphthalene	<0.0002	<0.020	<0.0002	0.0002	0.1
Phenanthrene	0.0002	0.046	<0.0002	0.0002	0.1
Pyrene	<0.0002	<0.020	<0.0002	0.0002	0.1
Chlorinated Phenols					
Total Chlorinated Phenols	<0.001	<0.02	<0.001	0.001	0.1

Notes:

1. The analytical results are contained in Analytical Service Laboratories Report D6610; February 2, 1994; those shown in bold exceed the CMCS standard, shown in the last two columns of the table.
2. As shown in Table 1 in Appendix B, the sediments in TP-4 between 0.30 and 4.8 m were wet to saturated, with a prominent seepage zone between 3.5 and 4.2 m; the water sample was collected at the base of the overburden at 4.8 m.
3. No water was encountered in TP-5, so a sample of soil was collected at 1.6 m, along with a water sample from the nearby surface stream.
4. **Criteria for Managing Contaminated Sites in B.C.**; Draft 6, Effective November 21, 1989; B.C. Ministry of Environment.

1988 Triumph Street, Vancouver, B.C., Canada V5L 1K5

analytical
service
laboratories
ltd.

FAX: (604) 253-6700 TEL: (604) 253-4188

CHEMICAL ANALYSIS REPORT

Date: February 2, 1994

ASL File No. D6610

Report On: Water and Soil Analysis (Takla)

Report To: **SRK-Robinson Inc.**
115 - 2550 Boundary Road
Burnaby, BC
V5M 3Z3

Attention: **Mr. Ed Livingston**

Received: January 10, 1994

ASL ANALYTICAL SERVICE LABORATORIES LTD.
per:

Brent A. Makelki, B.Sc.
Project Chemist

Frederick Chen, B.Sc.
Project Chemist

RESULTS OF ANALYSIS - Water[1]

File No. D6610

	TP 3	TP 4	TP 5
Polyaromatic Hydrocarbons			
Acenaphthene	-	<0.0005	<0.0005
Acenaphthylene	-	<0.0005	<0.0005
Anthracene	-	<0.0002	<0.0002
Benz(a)anthracene	-	0.00005	<0.00001
Benzo(a)pyrene	-	0.00005	<0.00001
Benzo(b)fluoranthene	-	0.00013	<0.00001
Benzo(ghi)perylene	-	0.0001	<0.0001
Benzo(k)fluoranthene	-	0.00003	<0.00001
Chrysene	-	0.0001	<0.0001
Dibenz(a,h)anthracene	-	0.00004	<0.00001
7,12-Dimethyl-1,2-benzanthracene	-	<0.0001	<0.0001
Fluoranthene	-	0.0001	<0.0001
Fluorene	-	<0.0001	<0.0001
Indeno(1,2,3-cd)pyrene	-	0.00009	<0.00001
3-Methylcholanthrene	-	<0.0001	<0.0001
Naphthalene	-	<0.0002	<0.0002
Phenanthrene	-	0.0002	<0.0002
Pyrene	-	<0.0002	<0.0002
Acid Extractables			
m-Cresol	<0.001	<0.001	<0.001
o-Cresol	<0.001	<0.001	<0.001
p-Cresol	<0.001	<0.001	<0.001
2,4-Dimethylphenol	<0.001	<0.001	<0.001
4,6-Dinitro-o-cresol	<0.001	<0.001	<0.001
2,4-Dinitrophenol	<0.001	<0.001	<0.001
2-Nitrophenol	<0.001	<0.001	<0.001
4-Nitrophenol	<0.001	<0.001	<0.001
Phenol	<0.001	<0.001	<0.001

< = Less than the detection limit indicated.
[1]Results are expressed as milligrams per litre.

RESULTS OF ANALYSIS - Water[1] File No. D6610

	TP 3	TP 4	TP 5
Chlorinated Phenols			
2-Chlorophenol	<0.001	<0.001	<0.001
3-Chlorophenol	<0.001	<0.001	<0.001
4-Chlorophenol	<0.001	<0.001	<0.001
2,3-Dichlorophenol	<0.001	<0.001	<0.001
2,4-Dichlorophenol	<0.001	<0.001	<0.001
2,5-Dichlorophenol	<0.001	<0.001	<0.001
2,6-Dichlorophenol	<0.001	<0.001	<0.001
3,4-Dichlorophenol	<0.001	<0.001	<0.001
3,5-Dichlorophenol	<0.001	<0.001	<0.001
2,3,4-Trichlorophenol	<0.001	<0.001	<0.001
2,3,5-Trichlorophenol	<0.001	<0.001	<0.001
2,3,6-Trichlorophenol	<0.001	<0.001	<0.001
2,4,5-Trichlorophenol	<0.001	<0.001	<0.001
2,4,6-Trichlorophenol	<0.001	<0.001	<0.001
3,4,5-Trichlorophenol	<0.001	<0.001	<0.001
2,3,4,5-Tetrachlorophenol	<0.001	<0.001	<0.001
2,3,4,6-Tetrachlorophenol	<0.001	<0.001	<0.001
2,3,5,6-Tetrachlorophenol	<0.001	<0.001	<0.001
Pentachlorophenol	<0.001	<0.001	<0.001
Total Chlorinated Phenols	<0.001	<0.001	<0.001

< = Less than the detection limit indicated.
[1]Results are expressed as milligrams per litre.

RESULTS OF ANALYSIS - Sediment/Soil[1] File No. D6610

	TP 5	TP5[2] LRep.
Polyaromatic Hydrocarbons		
Acenaphthene	<0.020	-
Acenaphthylene	<0.020	-
Anthracene	<0.020	-
Benz(a)anthracene	<0.020	-
Benzo(a)pyrene	<0.020	-
Benzo(b)fluoranthene	<0.020	-
Benzo(ghi)perylene	<0.020	-
Benzo(k)fluoranthene	<0.020	-
Chrysene	<0.020	-
Dibenz(a,h)anthracene	<0.020	-
Fluoranthene	<0.020	-
Fluorene	<0.020	-
Indeno(1,2,3-cd)pyrene	<0.020	-
Naphthalene	<0.020	-
Phenanthrene	0.046	-
Pyrene	<0.020	-
Acid Extractables		
m-Cresol	<0.05	<0.05
o-Cresol	<0.05	<0.05
p-Cresol	<0.05	<0.05
2,4-Dimethylphenol	<0.05	<0.05
4,6-Dinitro-o-cresol	<0.05	<0.05
2,4-Dinitrophenol	<0.05	<0.05
2-Nitrophenol	<0.05	<0.05
4-Nitrophenol	<0.05	<0.05
Phenol	<0.05	<0.05

< = Less than the detection limit indicated.
[1]Results are expressed as milligrams per kilogram.
[2]LRep = Laboratory Replicate.

RESULTS OF ANALYSIS - Sediment/Soil[1] File No. D6610

	TP 5	TP5[2] LRep.
Chlorinated Phenols		
2-Chlorophenol	<0.02	<0.02
3-Chlorophenol	<0.02	<0.02
4-Chlorophenol	<0.02	<0.02
2,3-Dichlorophenol	<0.02	<0.02
2,4-Dichlorophenol	<0.02	<0.02
2,5-Dichlorophenol	<0.02	<0.02
2,6-Dichlorophenol	<0.02	<0.02
3,4-Dichlorophenol	<0.02	<0.02
3,5-Dichlorophenol	<0.02	<0.02
2,3,4-Trichlorophenol	<0.02	<0.02
2,3,5-Trichlorophenol	<0.02	<0.02
2,3,6-Trichlorophenol	<0.02	<0.02
2,4,5-Trichlorophenol	<0.02	<0.02
2,4,6-Trichlorophenol	<0.02	<0.02
3,4,5-Trichlorophenol	<0.02	<0.02
2,3,4,5-Tetrachlorophenol	<0.02	<0.02
2,3,4,6-Tetrachlorophenol	<0.02	<0.02
2,3,5,6-Tetrachlorophenol	<0.02	<0.02
Pentachlorophenol	<0.02	<0.02
Total Chlorinated Phenols	<0.02	<0.02

< = Less than the detection limit indicated.
[1]Results are expressed as milligrams per kilogram.
[2]LRep = Laboratory Replicate.

CMCS - Soil - Level A

CMCS = Criteria for Managing Contaminated Sites in B.C.
Effective November 21, 1989 (Draft 6)
Limits expressed as milligrams per kilogram, dry weight basis.

	Upper Limit	
Polyaromatic Hydrocarbons		
Acenaphthene	0.1	mg/kg
Acenaphthylene	0.1	mg/kg
Anthracene	0.1	mg/kg
Benz(a)anthracene	0.1	mg/kg
Benzo(a)pyrene	0.1	mg/kg
Benzo(b)fluoranthene	0.1	mg/kg
Benzo(ghi)perylene	0.1	mg/kg
Benzo(k)fluoranthene	0.1	mg/kg
Chrysene	0.1	mg/kg
Dibenz(a,h)anthracene	0.1	mg/kg
Fluoranthene	0.1	mg/kg
Fluorene	0.1	mg/kg
Indeno(1,2,3-cd)pyrene	0.1	mg/kg
Naphthalene	0.1	mg/kg
Phenanthrene	0.1	mg/kg
Pyrene	0.1	mg/kg
Chlorinated Phenols		
Total Chlorinated Phenols	0.1	mg/kg

CMCS - Water - Level A

CMCS = Criteria for Managing Contaminated Sites in B.C.
Effective November 21, 1989 (Draft 6)
Limits expressed as milligrams per litre.

	Upper Limit	
Polyaromatic Hydrocarbons		
Acenaphthene	0.0005	mg/L
Acenaphthylene	0.0005	mg/L
Anthracene	0.0002	mg/L
Benz(a)anthracene	0.00001	mg/L
Benzo(a)pyrene	0.00001	mg/L
Benzo(b)fluoranthene	0.00001	mg/L
Benzo(ghi)perylene	0.0001	mg/L
Benzo(k)fluoranthene	0.00001	mg/L
Chrysene	0.0001	mg/L
Dibenz(a,h)anthracene	0.00001	mg/L
Fluoranthene	0.0001	mg/L
Fluorene	0.0001	mg/L
Indeno(1,2,3-cd)pyrene	0.0001	mg/L
3-Methylcholanthrene	0.0001	mg/L
Naphthalene	0.0002	mg/L
Phenanthrene	0.0002	mg/L
Pyrene	0.0002	mg/L
Chlorinated Phenols		
Total Chlorinated Phenols	0.001	mg/L

Health and Welfare Canada

Guidelines for Canadian Drinking Water Quality, Fifth Ed., 1993.
All limits are Maximum Acceptable Concentration (MAC) unless otherwise indicated.
Limits expressed as milligrams per litre except pH, Turbidity, Colour, and Coliform.

	Upper Limit	
Polyaromatic Hydrocarbons		
Benzo(a)pyrene	0.00001	mg/L
Chlorinated Phenols		
2,4-Dichlorophenol	0.9	mg/L
2,4,6-Trichlorophenol	0.005	mg/L
2,3,4,6-Tetrachlorophenol	0.1	mg/L
Pentachlorophenol	0.06	mg/L

Samples were analyzed by methods acceptable to the appropriate regulatory agency. Outlines of the methodologies utilized are as follows:

Polynuclear Aromatic Hydrocarbons in Water

This analysis is carried out in accordance with U.S. EPA Method 3510/8270. (publ. #SW-846, 3rd Ed., Washington, DC 20460). This method involves the extraction of the sample with methylene chloride followed by silica column chromatography cleanup. The resulting extract was analysed by capillary column gas chromatography with mass spectrometric detection.

Chlorinated and Non-Chlorinated Phenols in Water

This analysis is carried out in accordance with U.S. EPA Methods 3510/8270 and 8140. The sample is extracted with acidified methylene chloride. The final extract is derivatized and analysed by capillary column gas chromatography with mass spectrometric detection and thermionic detection.

Polynuclear Aromatic Hydrocarbons in Sediment/Soil

This analysis is carried out using a procedure adapted by ASL from U.S. EPA Methods 3540, 3630, and 8270 (Publ. # SW-846 3rd ed., Washington, DC 20460). The procedure involves a triple solvent extraction with dichloromethane and clean-up using silica gel column chromatography. This clean-up procedure has been found to effectively remove aliphatic and heterocyclic hydrocarbons which could potentially interfere with the analysis. The final extract is analysed by capillary column gas chromatography with mass spectrometric detection.

Semi-Volatile Organic Priority Pollutants in Sediment/Soil

This analysis is carried out in accordance with U.S. EPA Methods 3540/8270 (Publ. # SW-846, 3rd ed., Washington, DC 20460). The procedure involves a soxhlet extraction followed by analysis using capillary column gas chromatography with mass spectrometric detection.

End of Report

1988 Triumph Street, Vancouver, B.C., Canada V5L 1K5

analytical
service
laboratories
ltd.

FAX: (604) 253-6700 TEL: (604) 253-4188

CHEMICAL ANALYSIS REPORT

Date: February 2, 1994

ASL File No. D6153

Report On: Soil Analysis (Takla)

Report To: **SRK-Robinson Inc.**
115 - 2550 Boundary Road
Burnaby, BC
V5M 3Z3

Attention: **Mr. Ed Livingston**

Received: December 10, 1993

ASL ANALYTICAL SERVICE LABORATORIES LTD.
per:

Brent A. Makelki, B.Sc.
Project Chemist

Frederick Chen, B.Sc.
Project Chemist

RESULTS OF ANALYSIS

File No. D6153

	TP-8	TP-8 Dup.
Polyaromatic Hydrocarbons		
Acenaphthene	<0.020	-
Acenaphthylene	<0.020	-
Anthracene	<0.020	-
Benz(a)anthracene	<0.020	-
Benzo(a)pyrene	<0.020	-
Benzo(b)fluoranthene	<0.020	-
Benzo(ghi)perylene	<0.020	-
Benzo(k)fluoranthene	<0.020	-
Chrysene	<0.020	-
Dibenz(a,h)anthracene	<0.020	-
Fluoranthene	<0.020	-
Fluorene	<0.020	-
Indeno(1,2,3-cd)pyrene	<0.020	-
Naphthalene	<0.020	-
Phenanthrene	<0.020	-
Pyrene	<0.020	-
Acid Extractables		
m-Cresol	<0.05	<0.05
o-Cresol	<0.05	<0.05
p-Cresol	<0.05	<0.05
2,4-Dimethylphenol	<0.05	<0.05
4,6-Dinitro-o-cresol	<0.05	<0.05
2,4-Dinitrophenol	<0.05	<0.05
2-Nitrophenol	<0.05	<0.05
4-Nitrophenol	<0.05	<0.05
Phenol	<0.05	<0.05

Results are expressed as milligrams per dry kilogram.
< = Less than the detection limit indicated.
Dup. = Duplicate

RESULTS OF ANALYSIS

File No. D6153

	TP-8	TP-8 Dup.
Chlorinated Phenols		
2-Chlorophenol	<0.02	<0.02
3-Chlorophenol	<0.02	<0.02
4-Chlorophenol	<0.02	<0.02
2,3-Dichlorophenol	<0.02	<0.02
2,4-Dichlorophenol	<0.02	<0.02
2,5-Dichlorophenol	<0.02	<0.02
2,6-Dichlorophenol	<0.02	<0.02
3,4-Dichlorophenol	<0.02	<0.02
3,5-Dichlorophenol	<0.02	<0.02
2,3,4-Trichlorophenol	<0.02	<0.02
2,3,5-Trichlorophenol	<0.02	<0.02
2,3,6-Trichlorophenol	<0.02	<0.02
2,4,5-Trichlorophenol	<0.02	<0.02
2,4,6-Trichlorophenol	<0.02	<0.02
3,4,5-Trichlorophenol	<0.02	<0.02
2,3,4,5-Tetrachlorophenol	<0.02	<0.02
2,3,4,6-Tetrachlorophenol	<0.02	<0.02
2,3,5,6-Tetrachlorophenol	<0.02	<0.02
Pentachlorophenol	<0.02	<0.02

Results are expressed as milligrams per dry kilogram.
< = Less than the detection limit indicated.
Dup. = Duplicate

METHODOLOGY File No. D6153

Samples were analyzed by methods acceptable to the appropriate regulatory agency. Outlines of the methodologies utilized are as follows:

Polynuclear Aromatic Hydrocarbons in Sediment/Soil

This analysis is carried out using a procedure adapted by ASL from U.S. EPA Methods 3540, 3630, and 8270 (Publ. # SW-846 3rd ed., Washington, DC 20460). The procedure involves a triple solvent extraction with dichloromethane and clean-up using silica gel column chromatography. This clean-up procedure has been found to effectively remove aliphatic and heterocyclic hydrocarbons which could potentially interfere with the analysis. The final extract is analysed by capillary column gas chromatography with mass spectrometric detection.

Semi-Volatile Organic Priority Pollutants in Sediment/Soil

This analysis is carried out in accordance with U.S. EPA Methods 3540/8270 (Publ. # SW-846, 3rd ed., Washington, DC 20460). The procedure involves a soxhlet extraction followed by analysis using capillary column gas chromatography with mass spectrometric detection.

End of Report

HBT AGRA Limited
Engineering & Environmental Services

913 Laval Crescent
Kamloops, B.C.
V2C 5P4
Bus: (604) 374-1347
Fax: (604) 374-2944

November 30, 1992

Project No.: KX10808

PRIVILEGED AND CONFIDENTIAL INFORMATION

Fletcher Challenge Canada
Northern Interior Wood Products
R.R.#3, Glendale Drive
Williams Lake, BC
V2G 1M3

Attention: Mr. Hugh Jones, General Manager

Dear Sir,

Re: Sampling of Stored Creosote Contaminated Material
Factual Report
Lovell Cove, British Columbia

1.0 INTRODUCTION

HBT AGRA Limited (HBT) was retained by Fletcher Challenge Canada to obtain soil samples of creosote and PCP contaminated material from the decommissioned railway tie treatment facility at Lovell Cove, British Columbia. Authorization was given by Mr. Bill Shore, of Fletcher Challenge Canada, and sampling of the soils on the site was completed on July 7, 1992. This report summarizes field observations and provides results of the laboratory testing conducted by HBT in July 1992.

For details regarding initial background information, and earlier soil monitoring results, the reader is referred to our report entitled "Fletcher Challenge Canada, Remediation of Creosote Contaminated Material, Lovell Cove, British Columbia", dated September 9, 1991 (project no. KX01002). Future monitoring reports will contain tabular and graphical comparisons of all monitoring data for the purpose of determining remediation trends.

1.1 Background Information

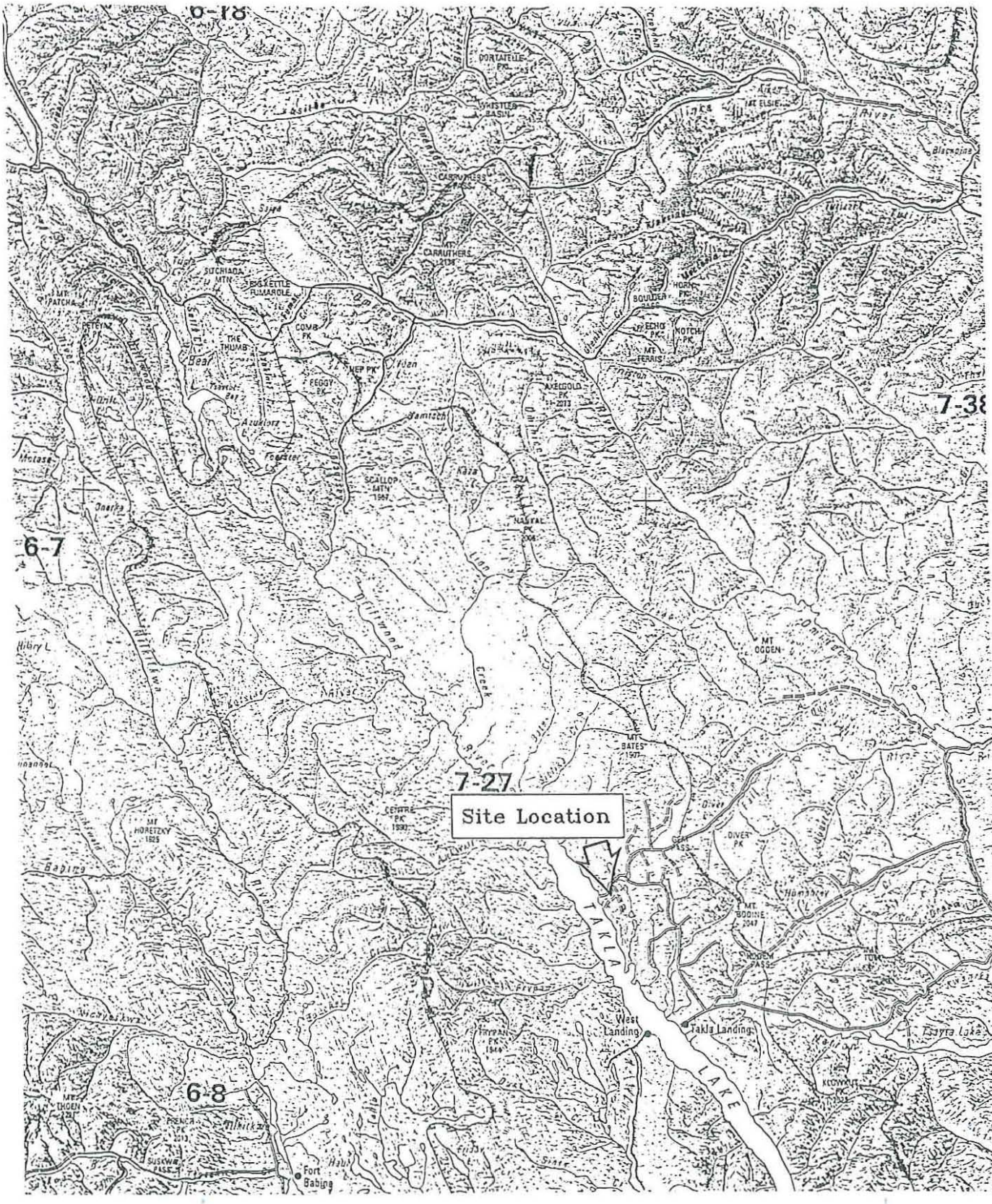
In August of 1991, HBT was on-site to supervise the removal of soil excavated from a soil capped containment area. The soil contained elevated concentrations of creosote and chlorophenols originating from the now abandoned nearby wood treatment facility operated by Fletcher Challenge. Soils were placed into a bermed storage facility as approved by the BC Ministry of Environment. The soil is currently stored in a containment facility and it is expected that limited remediation by natural degradation of the contaminants is occurring. To enhance this natural degradation by aeration the soil has, on two or more separate occasions, been turned over and mixed since its placement. The soil was also seeded with clovers and grasses.

In July, 1992, HBT collected soil and water samples from the above noted storage facility and surrounding area for the purpose of monitoring soil and surface water quality.

2.0 SITE DESCRIPTION

The site is located approximately 400 km northwest of Prince George, BC, and is approximately 2 km inland from Takla Lake. The site itself is approximately 1.7 hectares in plan area and slopes slightly towards the southwest. The containment area is covered with fill (up to 0.35 m thick) which overlies the native silts and clays. A site location plan is included in the Appendix as Figure 1.

The native soil profile generally consisted of interbedded sequences of silts and clays, with occasional cobbles, based on data collected from test pits excavated to a depth of 5 m. A perched groundwater table was encountered at a depth of between 0.3 and 2.5 m. Based on the topography, the groundwater flow direction is expected to be west/southwest. This has not been verified since groundwater monitoring wells are beyond the scope of the project. The site is at an approximate elevation of 750 m ASL.



HBT AGRA Limited	Fletcher Challenge Canada, Lovell Cove SITE LOCATION PLAN Environmental Investigation	Scale: 1:60k Date: December 8 /92 Drawn By: M. Rowlands Job #: KX10808 | Figure 1

3.0 FIELD OBSERVATIONS

During the sampling, HBT observed soil that had been placed within the storage facility was surficially stained in approximately 6 locations. The largest area of staining was approximately 10 m^2 in area.

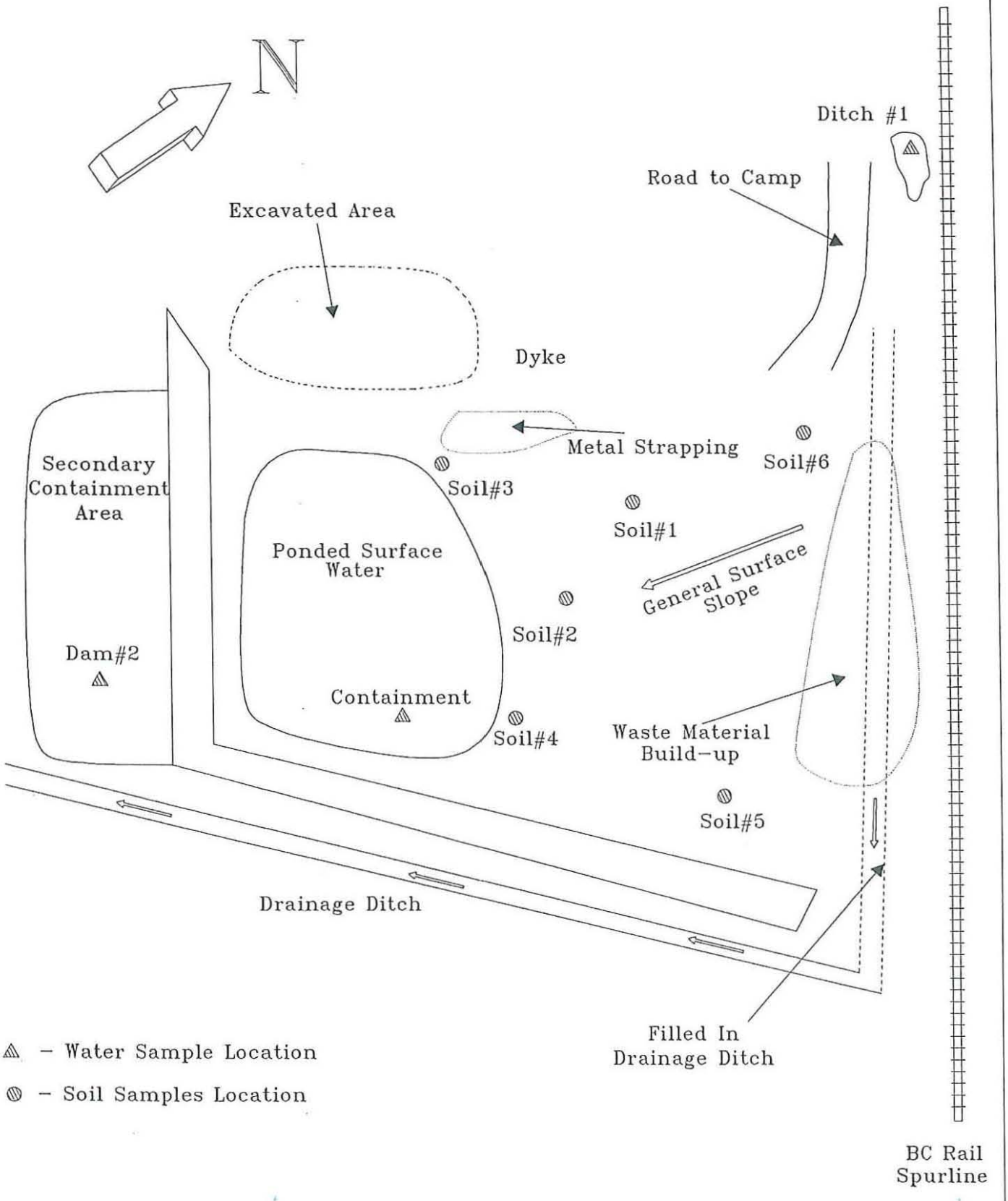
Metal strapping waste from the bundling of treated logs was found in the excavated waste material. The majority of this metal strapping has been placed in a single pile within the bermed area. This was done during the tilling of the soils within the storage facility.

Northwood Pulp and Timber Limited, which currently occupies the adjacent property to the north and east, uses a BC Rail spur line for its current operations. Snow and wood waste material that had blocked railcar access during winter railcar loading was cleared. During this clearing the east drainage ditch surrounding the soil treatment facility was filled in. The effect of these clearing operations is as follows:

1. There has been a build up of wood waste material on the east side of the containment facility.

2. Due to the lack of drainage around the storage facility, water has ponded to the north and east of the wood waste material adjacent to the BC Rail spur line.

During the visit, a total of six surface scratches were excavated to obtain soil samples.. A total of six soil samples were collected from the site of the stored soil. The six samples are representative of soil that was contained within the treatment facility as of July 07, 1992. All soil samples were taken at depths between 0.1 and 0.35 m, after a shallow excavation was completed with a skidder that was on-site. Soil sample 3 is representative of soil from one of the surficially stained areas of the site, all other samples represent the general condition of soils found on site. All water samples were taken from the areas of surface ponding as indicated on the site plan (Figure 2).



HBT AGRA Limited	Fletcher Challenge Canada, Lovell Cove SITE PLAN Environmental Investigation	Scale: 1:60k Date: December 8 /92 Drawn By: M. Rowlands Job #: KX10808 — Figure 2

4.0 SOILS ANALYSIS

All soil samples were tested for chlorinated phenols and polyaromatic hydrocarbons (PAHs) by Analytical Service Laboratories Limited of Vancouver, BC. The complete soil chemistry results are contained within the Appendix.

Phenanthrene with concentrations of 54.7 and 121 parts per million (ppm), respectively in samples 1 and 3 exceeded provincial industrial criteria[1] (<50 ppm). Soil Sample 3 exceeded provincial industrial criteria with respect to Benzo(a)anthracene (<10 ppm) and Chrysene (<10 ppm), with concentrations of 11.5 and 10.5 ppm, respectively. Samples 1 and 3 both exceeded provincial industrial criteria (<200 ppm) for total PAHs, with concentrations of 209.8 ppm and 398.5 ppm, respectively.

A PAH total equivalency quotient of 14.2 ppm was calculated on sample 3 which contained the highest total PAH concentration. This concentration does not exceed the special waste concentration of 100 ppm outlined in provincial regulations[2]. The total equivalency quotient was calculated by summing the products of each individual PAH concentration and corresponding toxicity equivalency factors specified in Schedule 1.1 of the regulations.

Samples 1, 2, 3, and 4 exceeded provincial industrial criteria for pentachlorophenol and samples 1, 2, and 3, exceeded provincial criteria for total chlorophenols.

The remaining soil samples were all below provincial industrial criteria for PAHs and chlorinated phenol concentrations.

---

[1] British Columbia Ministry of Environment, "Developing Criteria and Objectives for Managing Contaminated Sites in British Columbia", November, 1989.
- A - Natural Background Levels
- B - Remediation Criteria for Residential, Recreational, or Agricultural Land use.
- C - Remediation Criteria for Commercial or Industrial Land use.

[2] Waste Management Act, Special Waste Regulation, B.C. Reg. 63/ 88, April 16, 1992

The following Table 1 summarizes highlights of contaminant concentrations encountered in samples collected on specified dates. For individual parameter concentrations the reader is referred to the Appendix where a complete listing of each chemical concentration is specified. The purpose of Table 1 is to provide a method of monitoring the progress of the remediation of these soils.

Table 1: CONCENTRATIONS OF POLYNUCLEAR AROMATIC HYDROCARBONS AND CHLOROPHENOLS IN SOILS LOCATED AT THE TREATMENT FACILITY AT LOVELL COVE, BC

	Average of Samples			Lowest Detected Concentrations in Individual Samples			Highest Detected Concentrations in Individual Samples		
	PAHs	Chlorophenols		PAHs	Chlorophenols		PAHs	Chlorophenols	
	(total)	(total)	(each)***	(total)	(total)	(each)	(total)	(total)	(each)
Provincial Criteria*	200	10	5	200	10	5	200	10	5
Date Sampled									
Aug.15/91 **	6,347.1	313.3	259.8	4,585.4	247.6	45.6	8,226.6	377.6	324
July 7/92	120.1	8.6	7.3	0.273	1.09	0.071	398.5	15.9	13.1

Comments

* - "Developing Criteria and Objectives for Managing Contaminated Sites in British Columbia", British Columbia Ministry of Environment, Lands and Parks, November, 1989

** - Original soil shortly after removal and placement in the treatment facility

*** - Average of overall highest individual parameter

Note1 - All parameters are expressed as parts per million or milligrams/dry kilogram

Note2 - < means less than the detection limit indicated

A leachate generation analysis was performed on samples 1 and 3 to determine if the soils can be classified as special waste. Concentrations of pentachlorophenol and 2,3,4,6-tetrachlorophenol were analyzed in the soils' leachate. Pentachlorophenol and 2,3,4,6-tetrachlorophenol concentrations of 0.109 mg/l and 0.017 mg/l in sample 1 and 0.45 mg/l and 0.075 mg/l in sample 3 did not exceed the provincial regulation criteria (<3, <0.1 ppm, respectively).

5.0 SURFACE WATER ANALYSIS

Three samples were collected from surface water that had ponded around the site. The water sample labelled as "Ditch #1" is from the ponded water north (up-slope) of the wood waste material placed by Northwood and adjacent to the spur line. The water samples labelled as "Containment" and "Dam #2" were collected from the water contained within the berm and from the secondary bermed area, down gradient of the main treatment facility, respectively.

Sample "Ditch #1" contained 0.033 mg/l of total trichlorophenols exceeding federal[3] drinking water (<0.005 mg/l) and aquatic life (<0.018 mg/l) guidelines. Samples "Ditch #1" and "Containment" contained 0.007 mg/l and 0.003 mg/l of total tetrachlorophenols exceeding federal aquatic life guidelines (<0.001 mg/l) but not exceeding federal drinking water guidelines (<0.1 mg/l). Also, Samples "Ditch #1" and "Containment" contained 0.02 mg/l and 0.009 mg/l of pentachlorophenol exceeding federal aquatic life guidelines (<0.0005 mg/l) but not exceeding federal drinking water guidelines (<0.06 mg/l).

Sample "Containment" contained 0.002 mg/l of pyrene which is equivalent to the provincial drinking water criteria (<0.002 mg/l). Samples "Ditch #1" and "Containment" contained 0.06 mg/l and 0.014 mg/l of total chlorophenols, respectively, exceeding provincial drinking water criteria (<0.005 mg/l).

---

[3] "Interim Canadian Environmental Quality Criteria for Contaminated Sites", Report CCME EPC-CS34, Canadian Council of Ministers of the Environment, September, 1991

6.0 CLOSURE

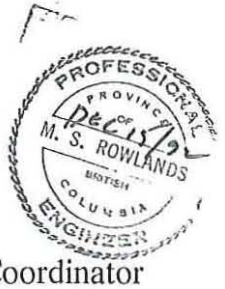
HBT AGRA findings are based on a site visit in July of 1992. The evaluations and conclusions do not preclude the existence of chemical substances other than that identified herein, or the possibility that conditions may vary between the sample locations. Hence, this report should be used for informational purposes only and should not be regarded as a certification of the actual chemical character of the site.

If there are any questions or concerns, please contact the undersigned at your convenience.

Yours truly,

HBT AGRA LIMITED

per:



Mark Rowlands, P.Eng.
Environmental Engineering Coordinator

Reviewed by:

Shawn Severn, PhD.
Associate Environmental Scientist

c.c.
Mr. W.G. Conolly, Fletcher Challenge, Vancouver, BC
Mr. Laurin Haines, Manager, Environmental Services, Fletcher Challenge, Vancouver, BC

APPENDIX

1988 Triumph Street, Vancouver, B.C., Canada V5L 1K5

analytical service laboratories ltd.

FAX: (604) 253-6700 TEL: (604) 253-4188

CHEMICAL ANALYSIS REPORT

Date: Jul. 22, 1992

ASL File No. 4555C

Report On: Water and Soil (KX10808)

Report To: HBT AGRA Limited
913 Laval Crescent
Kamloops, BC
V2C 5P4

Attention: Mr. Mark Oikawa

Date Received: Jul. 13, 1992

METHODOLOGY

Moisture

This analysis is carried out gravimetrically by drying the sample to constant weight at 103 C.

Polynuclear Aromatic Hydrocarbons in water

This analysis is carried out in accordance with U.S. EPA Method 3510/8270. (publ. #SW-846, 3rd Ed., Washington, DC 20460). This method involves the extraction of the sample with methylene chloride followed by silica column chromatography cleanup. The resulting extract was analysed by capillary column gas chromatography with mass spectrometric detection.

Polynuclear Aromatic Hydrocarbons in soil

This analysis is carried out using a procedure adapted by ASL from various literature and U.S. EPA Methods 610/625 (40 CFR Part 136, Federal Register 49:209). The procedure involves a triple solvent extraction with acetonitrile. The initial extract is cleaned-up using solid phase extraction columns containing octadecylsilane followed by a further clean-up using silica gel solid phase extraction columns. These clean-up procedures have been found to effectively remove aliphatic and heterocyclic hydrocarbons which could potentially interfere with the analysis. The final extract is analysed by capillary column gas chromatography

Chlorinated Phenols in water

This analysis is carried out in accordance with U.S. EPA Methods 604 (EPA 1984 - 40 CFR Part 136, 49:209) and 3510/8040. The sample is extracted with acidified methylene chloride followed by a ion-exchange cleanup. The final extract is derivatized and analysed by capillary column gas chromatography with flame ionization detection and electron capture detection.

Chlorinated Phenols in soil

This analysis is carried out using a modification of U.S. EPA Methods 3540/8040 (Publ. # SW-846, 3rd ed., Washington, DC 20460). The procedure involves an extraction with acidified acetone followed by solvent partitioning to hexane. The crude extract is derivatized and analysed by capillary column gas chromatography with electron capture detection.

ASL ANALYTICAL SERVICE LABORATORIES LTD.
per:

Dawn Gilbert
Chemist

Scott Hannam
Supervisor, Trace Organics Lab

RESULTS OF ANALYSIS - Sediment/Soil

Parameter	#1 Jul07/92	#2 Jul07/92	#3 Jul07/92	#4 Jul07/92	#5 Jul07/92
Physical Tests					
Moisture %	6.95	13.7	13.2	8.52	6.45
Polyaromatic Hydrocarbons					
Acenaphthene	28.6	12.7	53.9	<0.020	1.67
Acenaphthylene	0.770	0.500	1.36	<0.020	0.310
Anthracene	8.02	3.84	16.5	<0.020	1.03
Benzo(a)anthracene	6.90	3.46	11.5	<0.020	0.720
Benzo(a)pyrene	3.20	2.46	5.02	<0.020	1.26
Benzo(b)fluoranthene	3.84	2.97	6.24	<0.020	1.37
Benzo(ghi)perylene	1.22	0.950	1.58	<0.020	1.10
Benzo(k)fluoranthene	1.53	1.02	2.27	<0.020	0.460
Chrysene	7.75	3.25	10.5	<0.020	0.740
Dibenzo(a,h)anthracene	0.950	0.530	1.05	<0.020	0.630
Fluoranthene	36.4	17.0	62.9	<0.020	2.51
Fluorene	21.8	8.47	16.0	<0.020	0.950
Indeno(1,2,3-cd)pyrene	1.27	0.990	1.66	<0.020	1.03
Naphthalene	5.20	1.01	40.1	<0.020	0.044
Phenanthrene	54.7	21.1	121	0.028	2.22
Pyrene	27.6	13.4	46.9	<0.020	2.02
Chlorinated Phenols					
2,3,4-Trichlorophenol	<0.020	<0.020	<0.020	<0.020	<0.020
2,3,5-Trichlorophenol	<0.020	0.022	<0.020	<0.020	<0.020
2,4,5-Trichlorophenol	<0.020	0.140	0.026	0.071	<0.020
2,4,6-Trichlorophenol	<0.020	<0.020	<0.020	<0.020	<0.020
2,3,4,5-Tetrachlorophenol	0.091	0.340	0.200	0.072	0.038
2,3,4,6-Tetrachlorophenol	1.52	1.65	3.10	0.670	0.120
2,3,5,6-Tetrachlorophenol	0.082	0.136	0.238	0.086	<0.020
Pentachlorophenol	13.1	8.51	12.6	7.29	1.54

< = Less than the detection limit indicated.
Results expressed as milligrams per litre.
Sediment results expressed as milligrams per dry kilogram.

RESULTS OF ANALYSIS - Sediment/Soil

Parameter	#5 Dup. Jul07/92	#6 Jul07/92	#6 Dup. Jul07/92
Physical Tests			
Moisture %	-	6.46	-
Polyaromatic Hydrocarbons			
Acenaphthene	1.44	0.024	-
Acenaphthylene	0.320	<0.020	-
Anthracene	0.980	<0.020	-
Benzo(a)anthracene	0.670	0.022	-
Benzo(a)pyrene	1.44	<0.020	-
Benzo(b)fluoranthene	1.51	<0.020	-
Benzo(ghi)perylene	1.35	<0.020	-
Benzo(k)fluoranthene	0.440	<0.020	-
Chrysene	0.720	0.026	-
Dibenzo(a,h)anthracene	0.570	<0.020	-
Fluoranthene	2.32	0.054	-
Fluorene	0.730	0.020	-
Indeno(1,2,3-cd)pyrene	1.27	<0.020	-
Naphthalene	0.063	<0.020	-
Phenanthrene	1.58	0.069	-
Pyrene	2.02	0.058	-
Chlorinated Phenols			
2,3,4-Trichlorophenol	-	<0.020	<0.020
2,3,5-Trichlorophenol	-	<0.020	<0.020
2,4,5-Trichlorophenol	-	0.071	0.072
2,4,6-Trichlorophenol	-	<0.020	<0.020
2,3,4,5-Tetrachlorophenol	-	0.088	0.083
2,3,4,6-Tetrachlorophenol	-	0.127	0.094
2,3,5,6-Tetrachlorophenol	-	<0.020	<0.020
Pentachlorophenol	-	0.960	0.710

< = Less than the detection limit indicated.
Results expressed as milligrams per litre.
Sediment results expressed as milligrams per dry kilogram.

Parameter	Ditch #1 Jul07/92	Contain. Jul07/92	Dam #2 Jul07/92
Polyaromatic Hydrocarbons			
Acenaphthene	0.008	0.003	<0.001
Acenaphthylene	<0.001	<0.001	<0.001
Anthracene	<0.001	0.001	<0.001
Benzo(a)anthracene	<0.001	<0.001	<0.001
Benzo(a)pyrene	<0.001	<0.001	<0.001
Benzo(b)fluoranthene	<0.001	<0.001	<0.001
Benzo(ghi)perylene	<0.001	<0.001	<0.001
Benzo(k)fluoranthene	<0.001	<0.001	<0.001
Chrysene	<0.001	<0.001	<0.001
Dibenzo(a,h)anthracene	<0.001	<0.001	<0.001
Fluoranthene	<0.001	<0.001	<0.001
Fluorene	<0.001	0.004	<0.001
Indeno(1,2,3-cd)pyrene	<0.001	<0.001	<0.001
Naphthalene	<0.001	<0.001	<0.001
Phenanthrene	<0.001	<0.001	<0.001
Pyrene	<0.001	0.002	<0.001
Chlorinated Phenols			
2,3,4-Trichlorophenol	<0.001	<0.001	<0.001
2,3,5-Trichlorophenol	<0.001	<0.001	<0.001
2,4,5-Trichlorophenol	0.033	0.002	<0.001
2,4,6-Trichlorophenol	<0.001	<0.001	<0.001
2,3,4,5-Tetrachlorophenol	0.005	0.002	<0.001
2,3,4,6-Tetrachlorophenol	0.002	0.001	<0.001
2,3,5,6-Tetrachlorophenol	<0.001	<0.001	<0.001
Pentachlorophenol	0.020	0.009	<0.001

< = Less than the detection limit indicated.
Water results expressed as milligrams per litre.
Results expressed as milligrams per dry kilogram.
Dup. = Duplicate.

End of Report

1988 Triumph Street, Vancouver, B.C., Canada V5L 1K5

analytical service laboratories ltd.

FAX: (604) 253-6700 TEL: (604) 253-4188

CHEMICAL ANALYSIS REPORT

Date: Aug. 14, 1992

ASL File No. 5007C

Report On: Soil Analysis (KX10808)

Report To: HBT AGRA Limited
913 Laval Crescent
Kamloops, BC
V2C 5P4

Attention: Mr. Mark Oikawa

Date Received: Aug. 05, 1992

METHODOLOGY

Chlorinated and Non-Chlorinated Phenols on Leachate

This analysis is carried out in accordance with U.S. EPA Methods 604 (EPA 1984 - 40 CFR Part 136, 49:209) and 3510/8040. The sample is extracted with acidified methylene chloride followed by a ion-exchange cleanup. The final extract is derivatized and analysed by capillary column gas chromatography with flame ionization detection and electron capture detection.

Leachable Components

This analysis is carried out using the extraction procedure outlined by the B.C. Ministry of Environment and Parks (Waste Management Act - Special Waste Regulation, February 18, 1988. B.C. Reg. 63/88 OC 268/88). In summary, 25 grams of solid (dry weight) is mixed with about 400 ml of water and the pH adjusted to 5.0 with acetic acid (0.5N). The pH is maintained at 5.0 for

24 hours after which the volume is adjusted to 500 ml and the liquid separated by filtration. The filtered extract is then analysed by the chlorinated phenols method as described above. Specific details are available upon request.

ASL ANALYTICAL SERVICE LABORATORIES LTD.
per:

Dawn Gilbert
Chemist

Scott Hannam
Supervisor, Trace Organics Lab

RESULTS OF ANALYSIS - Sediment/Soil

Parameter	#1 Jul07/92	#1 Dup. Jul07/92	#3 Jul07/92
Chlorinated Phenols			
2,3,4-Trichlorophenol	<0.001	<0.001	<0.001
2,3,5-Trichlorophenol	<0.001	<0.001	<0.001
2,4,5-Trichlorophenol	<0.001	<0.001	<0.001
2,4,6-Trichlorophenol	<0.001	<0.001	<0.001
2,3,4,5-Tetrachlorophenol	<0.001	<0.001	0.033
2,3,4,6-Tetrachlorophenol	0.017	0.020	0.075
2,3,5,6-Tetrachlorophenol	0.001	0.002	0.007
Pentachlorophenol	0.109	0.110	0.450

< = Less than the detection limit indicated.
Results expressed as milligrams per liter of leachate.

End of Report

Box 100,
Fort St. James, B.C.
V0J 1P0

File: S.U.P. 10099

May 17, 1983

Rustad Bros. & Co. Ltd.,
Box 698,
Prince George, B.C.
V2L 4T3

Attention: Mr. Daniel Alexander

Dear Sir:

Further to your letter dated May 02, 1983, requesting cancellation of Special Use Permit Number 10099.

We wish to advise you that Special Use Permit Number 10099, issued March 01, 1982, for the purpose of a refuse disposal site is herewith cancelled as of May 17, 1983.

Any improvements on the area are now the property of the Crown.

Yours truly,

W.E. Hall,
District Manager

RGF/WEH/cl

cc: Director - Timber Mgmt. - Victoria
R.M. - Timber Mgmt. - Zone II
- copy of R.O. Timber's recommendations attached
F.D. 5 - File - Certified Mail #L3014940
Leo Creek Field Office
Pollution Control Board
Northern Interior Health Unit
B.C. Assessment Authority
Surveyor of Taxes

SEND TO F.D.5

Box 100
Fort St. James, B.C.
V0J 1P0

File: S.U.P. 10099

March 01, 1982

Rustad Bros. & Co. Ltd.
Box 698
Prince George BC
V2L 4T3

Silvacan Resources Ltd.
R.R. #3, Glendale Drive
Williams Lake, B.C.
V2G 1M3

Gentlemen:

Enclosed please find your completed copy of Special Use Permit No. 10099 effective March 1, 1982, for the purpose of a refuse disposal site.

Please read the attached document and be prepared to comply with all conditions set out therein.

Yours truly,

J.R. Cuthbert
Regional Manager

RGF:cl

Enclosure

cc: Director - Timber Admin. - Victoria - Receipt No. 39384
R.M. - Timber Admin. - Zone II
Pollution Control Board
Northern Interior Public Health Unit
B.C. Assessment Authority
Surveyor of Taxes
F.D. 5 - File
Leo Creek Field Office

Post to: ✓ Work Chart
Site History Map
✓ 20 Chain Mylar
☐ Well Operations Map
☑ Post to Active File

RECEIVED
MAR 12 1982
B.C. FOREST SERVICE
FORT ST. JAMES, B.C.

Province of
British Columbia

Ministry of
Forests

FOREST SERVICE

To whom it may concern:

IN THE MATTER OF ~~T.S.L. A08657~~
S.U.P. 10099, ~~S.U.P. 9270~~, S.U.P. 8418, S.U.P. 7786

Pursuant to Section 50 of the Forest Act
the Minister of Forests for the Province of British Columbia HEREBY CONSENTS, in so far as it is within his authority so to do, to the Assignment dated July 26, 1982

BETWEEN: Pinette & Therrien Mills Ltd.
of Williams Lake

in the Province of British Columbia, hereinafter called the Assignor(s),

OF THE ONE PART,

AND Rustad Bros. & Co. Ltd.
of Prince George

in the Province of British Columbia, hereinafter called the Assignee(s),

OF THE OTHER PART.

SUBJECT, HOWEVER, to the express condition that, notwithstanding this Consent, or the said Assignment, or any documents referred to therein, no person on behalf of Her Majesty the Queen in the Right of the Province of British Columbia shall be deemed to have waived compliance with or observance of, on the part of the Assignor(s), or the predecessors, successors, and assigns of the Assignor(s), any of the covenants, provisos, conditions, or reservations contained in the said matter above referred to nor to have waived, impaired, or restricted in any way whatsoever any of the rights or remedies available to Her Majesty or Her Minister of Forests in respect of the said matter above referred to, or of the property or rights thereby demised or privileges granted, nor to have approved of the form or of any of the terms, provisions, or conditions of the said Assignment, or of any document, IT BEING EXPRESSLY DECLARED that the sole object, purport, and effect of this Consent is merely as a permission in writing to validate the making of an assignment, and no action shall be taken or thing done under, by virtue of, or in connection with the said Assignment, or any documents referred to therein, that may prejudice, impair, or affect in any way whatsoever any of the rights of Her Majesty or Her Minister of Forests.

DATED at Victoria, British Columbia this 26th day of July, 1982.

Minister of Forests

F.S. 538—5M-1178-5785 (2)
Revised Nov. 1978

British Columbia and Corporate Affairs

Registrar of Companies
940 Blanshard Street
Victoria
British Columbia
V8W 3E6

July 22, 1982

Vanderburgh & Co.,
Attn: Mr. Ken O'Brien
5 - 123 Borland
Williams Lake, B.C.
V2G 1R1

Dear Sirs:

"RE: "PINETTE & THERRIEN MILLS LIMITED"

I hereby Certify that according to the records of this office "PINETTE & THERRIEN MILLS LIMITED" AND "SILVACAN RESOURCES LTD." were duly amalgamated under the name "PINETTE & THERRIEN MILLS LIMITED" under Certificate number 253,481 on this 22nd day of July, 1982.

Yours very truly,

F.A. Skinner
Assistant Deputy Registrar
of Companies

3-o

SEND TO F.D.S COPY

(address)

1.00 *Grant of Rights*

1.01 Subject to this Special-Use Permit and in consideration of the Permittee's covenants in it, the Regional Manager of the Prince George Forest Region (the "Regional Manager") grants to the Permittee the right, during the term of this Permit, to use or manage the permit area within the Takla Provincial Forest for the following purpose:

Refuse Disposal Site

1.02 The permit area is the land outlined in bold black on the map attached to this Special-Use Permit, except land that is excluded in notations made on the map.

1.03 The term of this Special-Use Permit is one year(s), beginning March 1, 19 82.

2.00 *Financial*

2.01 In addition to other money payable by the Permittee under the *Forest Act* and regulations made under it, the Permittee will pay to the Crown, immediately on receipt of a statement issued on behalf of the Crown, annual rent in the amount of

(a) $100.00 for the first year, and

(b) for each ensuing year, an amount as determined by the Chief Forester of the Ministry of Forests.

3.00 *Improvements*

3.01 Before cutting any timber, erecting any building or other structure or making any other improvement to the licence area the Permittee will submit to the Regional Manager a plan showing the locations of the cutting and the locations and specifications of structures, buildings and other improvements proposed for the permit area.

3.02 The Permittee will not

(a) cut any timber or erect any building or other improvement on the permit area, except as approved under this Special-Use Permit,

(b) remove any building, other structure or other improvement from the permit area, or

(c) sell, lease or otherwise dispose of, except bona fide by way of security, any building or other structure or other improvement on the permit area,

without the prior written consent of the Regional Manager.

4.00 *Miscellaneous*

4.01 The Permittee will indemnify the Crown against and save it harmless from all claims, demands, suits, actions, causes of action, costs and expenses faced by the Crown as a result, directly or indirectly, of the Permittee's occupation or use of the permit area.

4.02 The parties acknowledge that, for fire protection purposes, sections 121 to 123 of the *Forest Act* shall apply to the permit area and to the parties as though the permit area were a parcel of Crown land subject to an interest under the *Land Act*.

4.03 The Permittee will at his own expense

(a) repair all damage, except ordinary wear and tear, to roads, trails, irrigation ditches and other improvements on Crown land that results from his use of the permit area, and

(b) dispose of all slash and other refuse resulting from the use of the permit area under this Special-Use Permit,

in the manner directed by a Forest Officer.

4.04 This Special-Use Permit is subject to the *Forest Act* and regulations made under it.

4.05 The Permittee will perform the covenants and will observe the conditions, if any, set out in the attached Schedule.

Special-Use Permit entered into on
behalf of the Crown, by

"Seal Affixed"
"Conrad Pinette"

Permittee

J.R. Cuthbert, Regional Manager

F.S. 6 (Page 2)—o

BY THE FOREST OFFICER;

(D) NOT PLACE OR CAUSE TO BE PLACED ANY OBSTRUCTION OR FILL WITHIN THE HIGHWATER LEVEL OF ANY STREAM CHANNEL;

(E) REMOVE ANY LOGGING, MILLING, ROAD BUILDING OR OTHER DEBRIS DEPOSITED OR CAUSED TO BE DEPOSITED IN ANY STREAM CHANNEL OR LAKE AS DIRECTED BY THE FOREST OFFICER;

(F) LOCATE LANDINGS NO CLOSER THAN FORTY (40) METRES FROM ANY STREAM CHANNEL AND ONLY WITHIN AREA DESIGNATED FOR CUTTING;

(G) DIRECT THE FALLING AND YARDING OF TREES AWAY FROM STREAMBANKS AND LAKESHORES EXCEPT AS OTHERWISE DESIGNATED ON THE GROUND AND APPROVED BY THE FOREST OFFICER;

(H) NOT BURN SLASH CLOSER TO THE STREAMBANKS OR LAKESHORES THAN THE DISTANCE SPECIFIED BY THE FOREST OFFICER;

(I) PROTECT FROM LOGGING AND BURNING DAMAGE ALL STREAMBANK AND LAKESHORE SHRUBS.

4.062

THE HOLDER OF THIS PERMIT SHALL MAINTAIN ALL BUILDINGS AND IMPROVEMENTS IN AN ADEQUATE STATE OF REPAIR AND TO THE SATISFACTION OF THE FOREST OFFICER.

4.063

THE PERMITTEE SHALL:

(A) NOT ALLOW ANY SUBSTANCE LIKELY TO CAUSE POLLUTION TO BE DEPOSITED AT ANY TIME WITHIN ANY LAKE OR STREAM;

(B) NOT ALLOW ANY DAMAGE TO BE DONE WITHIN THE HIGHWATER LEVEL OF ANY STREAM CHANNEL OR LAKE;

(C) NOT PLACE OR CAUSE TO BE PLACED ANY OBSTRUCTION OR FILL WITHIN THE HIGHWATER LEVEL OF ANY STREAM CHANNEL OR LAKE.

4.064

THERE SHALL BE NO INTERFERENCE WITH FREE PUBLIC

4.064 CONT.
ACCESS THROUGH OR ON THE PERMIT AREA, EXCEPTING THOSE PORTIONS WHICH ARE OCCUPIED BY BUILDINGS OR STRUCTURES.

4.065
THE PERMITTEE SHALL NOT DEPOSIT OR PERMIT TO BE DEPOSITED ANY REFUSE ON THE LANDS DESCRIBED IN THIS PERMIT WITHOUT FIRST OBTAINING A PERMIT FROM THE DIRECTOR OF THE POLLUTION CONTROL BRANCH, ISSUED PURSUANT TO THE PROVISIONS OF THE POLLUTION CONTROL ACT, 1967.

4.066
THE PERMITTEE SHALL CARRY OUT THE CONTROL AND MAINTENANCE OF THE DISPOSAL OF THE REFUSE ON THE LANDS DESCRIBED HEREIN IN ACCORDANCE WITH A PERMIT ISSUED UNDER THE POLLUTION CONTROL ACT AS MENTIONED ABOVE.

4.067
THIS PERMIT IS SUBJECT TO THE PROVISIONS OF THE HEALTH ACT AND ANY REGULATIONS ISSUED THEREUNDER.

4.068
THIS PERMIT IS SUBJECT TO THE PROVISIONS OF THE POLLUTION CONTROL ACT, AND THE LITTER ACT, AND ANY REGULATIONS ISSUED THEREUNDER.

4.069
UPON FINAL CESSATION OF OPERATIONS OR AT ANY OTHER TIME AS INSTRUCTED BY THE REGIONAL MANAGER, THE PERMITTEE SHALL TAKE SUCH MEASURES AS DIRECTED BY THE REGIONAL MANAGER TO PREVENT EROSION AND TO REHABILITATE THE SITE. IN THE EVENT THE PERMITTEE FAILS TO CARRY OUT THE ABOVE MEASURES THE REGIONAL MANAGER MAY ASSESS THE PERMITTEE THE ESTIMATED COSTS TO CARRY OUT SUCH MEASURES, AND THE PERMITTEE SHALL FORTHWITH PAY THE ACCOUNT.

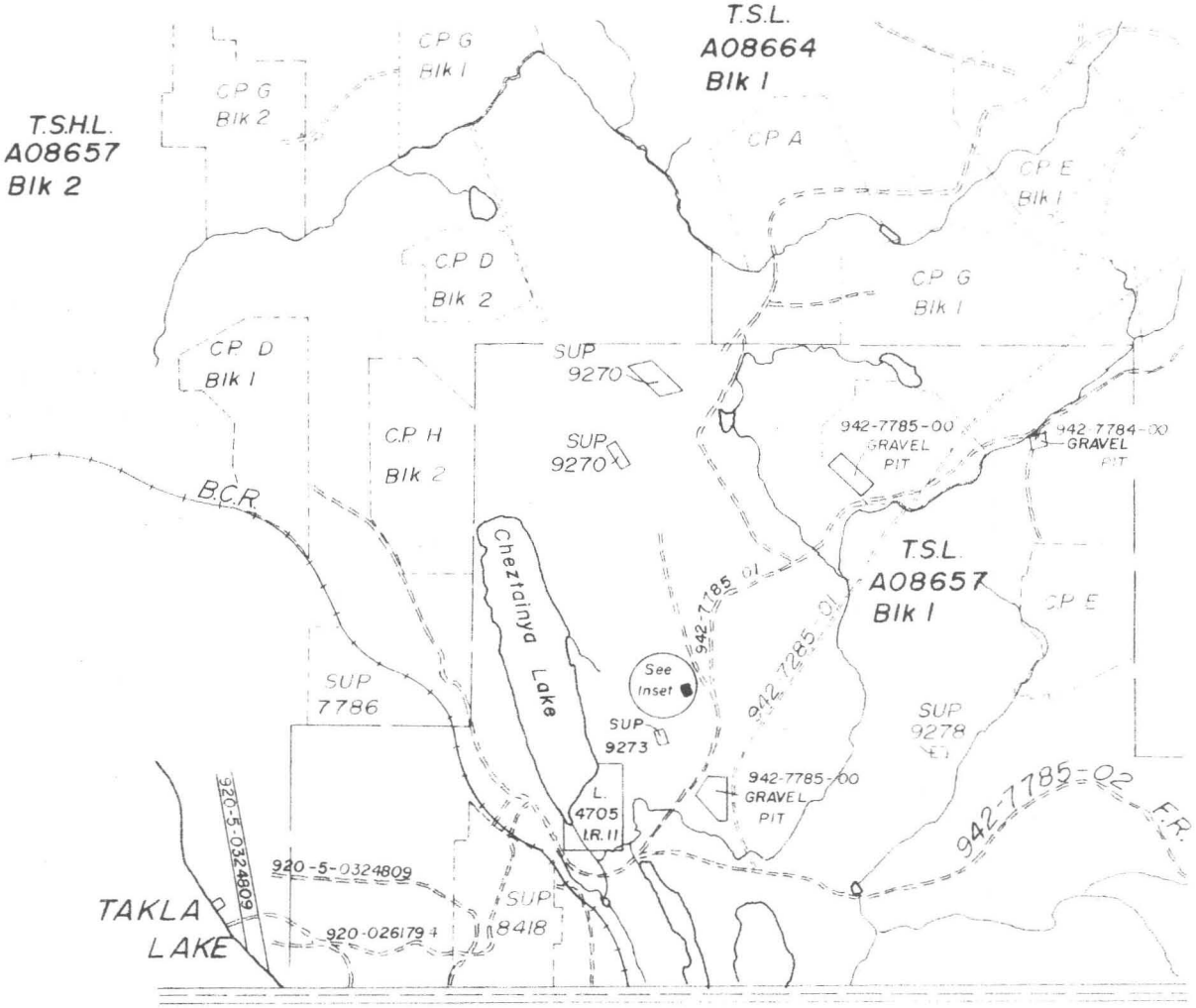
4.070
THE PERMITTEE SHALL USE AND MAINTAIN THE PERMIT AREA IN A MANNER TO CAUSE THE LEAST DAMAGE TO THE ENVIRONMENT ALL TO THE SATISFACTION OF THE REGIONAL MANAGER.

4.071
A WIRE MESH FENCE AT LEAST THREE (3) METRES IN HEIGHT MUST BE CONSTRUCTED AND MAINTAINED AROUND THE ACTUAL DUMP AREA. SPECIFICATIONS OF THE FENCE AND AREA FENCED MUST BE APPROVED BY THE FOREST OFFICER IN CHARGE.

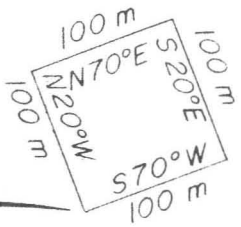
4.072
GARBAGE MUST BE BURNED IN A MANNER AND AS PER A SCHEDULE APPROVED BY A FOREST OFFICER.

Block		Sub-B			West	

SCALE: 1:50,000



INSET: SCALE: 1:5,000



P of C – 440 m E & 460 m N of
the N.E. corner of L.4705

F.S. 357 (Revised June, 1979)–o

Drawn by S S

Box 100
Fort St. James, B.C.
V0J 1P0

File: S.U.P. 10099

February 19, 1982

Silvacan Resources Ltd.
R.R. #3, Glendale Drive
Williams Lake, B.C.
V2G 1M3

Gentlemen:

We are enclosing Special Use Permit No. 10099 in duplicate for signature by an authorized signing official.

Please sign both copies of the permit and return both documents to our Fort St. James office in the enclosed self-addressed envelope.

Yours truly,

R. G. Hall

(for) W.E. Hall
District Manager

RGF:cl

Enclosures

cc: R.M. - Timber Admin. - Zone II
F.D. 5 - File