This is the 1st affidavit of Jonn Braman
Made in this matter
Sworn, April 20th, 2012

No. S120712
Vancouver Registry

IN THE SUPREME COURT OF BRITISH COLUMBIA

IN THE MATTER OF THE *COMPANIES' CREDITORS ARRANGEMENT ACT*, R.S.C. 1985, c. C-36, AS AMENDED

AND

IN THE MATTER OF THE *CANADA BUSINESS CORPORATIONS ACT*, R.S.C. 1985, c. C-44

AND

IN THE MATTER OF THE *BUSINESS CORPORATIONS ACT*, S.B.C. 2002, c. 57

AND

IN THE MATTER OF CATALYST PAPER CORPORATION AND THE PETITIONERS LISTED IN SCHEDULE "A"

AFFIDAVIT of JONN BRAMAN

I, Jonn Braman, of 10470 – 152nd Street, Surrey, British Columbia, SWEAR THAT:

1. I am Regional Director, South Coast Region of Environmental Protection Division, Ministry of Environment ("MOE"). Since March 2, 2009 I have been a statutory decision maker under the *Environmental Management Act*, S.B.C. 2003, c.53 in respect of the pulp mill operations at Powell River. As such, I have personal knowledge of the matters hereinafter disposed to, save and except where stated to be based upon information and belief, and where so stated, I verily believe the same to be true.

2. In preparation of this Affidavit, I have reviewed MOE's files. The documents and records contained in the file were made and kept in the usual and ordinary course of MOE's business. It was in the usual and ordinary course of MOE's business to record the statement of fact in the documents or records at the time the fact occurred or within a reasonable time thereafter.

The Mill

3. The Powell River Pulp Mill (the "Mill"), with a civic address located at 5775 Ash Avenue, Powell River, British Columbia is located on property owned by Catalyst Paper Corporation. Attached as Exhibit "A" to this my Affidavit is a copy of the BC Assessment Roll Report for 5775 Ash Avenue, Powell River, BC and I believe the facts contained in the Exhibit are true.

4. The Mill is 100 years old, having celebrated its 100th anniversary on or about April 12, 2012.

5. On April 18, 2012 I undertook a Google Earth Map Search in respect of the Mill. I then added "pinpoint' identifying the location of the Mill's Process Treatment Plant and Wildwood Landfill. The Process Treatment Plaint and Wildwood Landfill are located on Mill property. Attached hereto and marked as Exhibit "B" to this my Affidavit is the Google Earth Map of the Powell River Pulp Mill with the pinpoints referred to.

Ownership History

6. According to the file's permitting history, which I have reviewed:

    (a) MOE, or its predecessor, issued permits to MacMillan Bloedel Limited, Powell River Division regulating discharges from the Mill. A permit for effluent was issued in 1966, a permit for refuse was issued

in 1976 and a permit for air emissions was issued in 1977. These permits were held by MacMillan Bloedel Limited until about 1997.

(b) During the period from 1997 to 2000 MOE received requests to transfer permits to MB Paper Limited and subsequently to Pacifica Papers Incorporated. These requests were processed in the usual and ordinary course of MOE's business.

(c) The permits were transferred to Norske Skog Canada Limited and Norske Skog Pulp Operations Limited dba NorskeCanada General Partnership on or after August 27, 2001.

(d) The company name on the permits was changed to Catalyst Paper Corporation and subsequently to Catalyst Paper Corporation and Catalyst Pulp Operations Limited dba Catalyst Paper, General Partnership ("Catalyst") after October 1, 2005.

7. On April 27, 1998, MacMillan Bloedel Limited was continued out into federal jurisdiction. Attached as Exhibit "C" to this my Affidavit is copy of BC Company Summary for MacMillan Bloedel Limited and I believe the facts contained in the Exhibit are true.

8. On November 1, 1999, MacMillan Bloedel Limited amalgamated with Weyerhauser Company Limited/Compagnie Weyerhauser Limitee. Attached as Exhibit "D" to this my Affidavit are copies of Federal Corporation Information summaries by Industry Canada and I believe the facts contained in the Exhibit are true.

9. On March 24, 1998, MB Paper Limited was continued out into to federal jurisdiction. Attached as Exhibit "E" to this my Affidavit is copy of BC Company Summary for MacMillan Bloedel Limited and I believe the facts contained in the Exhibit are true.

10. On or about June 15, 1998, MB Paper Limited changed its name to Pacifica Papers Inc. Attached as Exhibit "F" to this my Affidavit is a copy of a Federal Corporation Information summary by Industry Canada and I believe the facts contained in the Exhibit are true.

11. On or about August 27, 2001 Pacifica Papers Inc. was discontinued. Attached as Exhibit "G" to this my Affidavit are copies of Federal Corporation Information summaries by Industry Canada and I believe the facts contained in the Exhibit are true.

12. On or about August 28, 2001 Pacifica Papers Inc. was continued out of British Columbia into federal jurisdiction. Attached as Attached as Exhibit "H" to this my Affidavit is a copy of a Federal Corporation Information summary by Industry Canada and I believe the facts contained in the Exhibit are true.

13. On or about September 1, 2001, Pacifica Papers Inc. amalgamated with Norske Skog Canada Limited into Norske Skog Canada Limited. On October 3, 2005, Norske Skog Canada Limited changed its name to Catalyst Paper Corporation. Attached as Attached as Exhibit "I" to this my Affidavit are copies of Federal Corporation Information summaries by Industry Canada and I believe the facts contained in the Exhibit are true.

Current Permits

14. Permit 4565 authorizes Catalyst to discharge industrial refuse from the Mill to the Wildwood Landfill which is contiguous to and within the Mill property. A copy of Permit 4565 and covering letter is attached as Exhibit "J" to this my Affidavit.

15. Industrial refuse is identified in Permit 4565 as flyash, waste asbestos, and miscellaneous mill waste restricted to: dirt contaminated wood chips / hog fuel, road sweepings, asphalt and concrete rubble, elemental sulphur, spent activated carbon,

lime materials, effluent treatment solids, boiler feedwater treatment, fibreglass and spent bed sand.

16. Permit 4565 requires monitoring of leachate, dustfall and groundwater at various locations for parameters including: pH (acidity), specific conductivity, biochemical oxygen demand, dioxins & furans, total suspended solids, total dissolved solids, alkalinity, sulphate, sulphide, total organic carbon, chlorinated / non-chlorinated phenols, total metals, dissolved oxygen, temperature, redox and flow.

17. Older portions of the landfill were responsible for contaminating groundwater down gradient of the landfill. The collection and treatment of the contaminated groundwater in the mill effluent treatment system has resulted in significant improvement to groundwater quality.

18. Permit 4565 stipulates annual review of the design and operating plan (section 2. 15) of the Wildwood Landfill. Catalyst is also required (section 2.19) to record a financial obligation on its books to reflect future closure and other regulatory requirements related to the landfill. This information is to be reported as part of the annual plan review required by the permit.

19. The 2010 annual plan review records changes to the design and operating plan and states, at page 5: "The accrued obligation on Catalyst's books was not updated in 2010 and remained at $1,078,000. This is based on a closure date of 2012." Attached as Exhibit "K" to this my Affidavit is the text portion of the 2010 Annual Report, Wildwood Landfill, BC, dated May 2, 2011. The 2011 annual plan review is due April 30, 2012.

20. Catalyst also holds air emission Permit 3149 which authorizes the discharge of air contaminants to the ambient air via stacks, vents, fans and ducts. Attached as Exhibit "L" to this my Affidavit is a copy of Permit 3149.

21. The source of the authorized discharges under Permit 3149 are the No. 19 Wood Residue Boiler, the No. 18 Standby Power Boiler, a Sulphur Burner, miscellaneous wood residue cyclones, exhaust stacks of mechanical pulp mills, five thermo-mechanical pulping lines, three mechanical pulp brightening lines, three paper machines and miscellaneous vents and stacks.

22. Permit 3149 sets emission quantity limits and quality limits for particulate matter, nitrogen oxides, opacity, and sulphur dioxide. Emission discharge monitoring is required for particulate matter, opacity, nitrogen oxides, sulphur dioxide, dioxins and furans. Ambient air monitoring is required for particulate matter (PM10 and PM2.5), total reduced sulphur (TRS), and nitrogen oxides (NOx) in specified locations within and outside the mill property.

23. Catalyst also holds an effluent Permit 153 which authorizes the discharge of effluent to the marine environment of Malaspina Strait and Powell River near or adjacent to DL450, Plan 8096, New Westminster District, which is within the Powell River Pulp Mill properties. Attached as Exhibit "M" to this my Affidavit is a copy of Permit 153 and covering letter.

24. The effluent discharges under Permit 153 are from process effluent secondary treatment, cooling water, non-contact cooling water, and stormwater.

25. Permit 153 sets effluent quantity limits and quality limits for pH (acidity), total suspended solids, biochemical oxygen demand, dissolved oxygen, temperature, and toxicity (bioassay). Discharge monitoring required for pH, temperature, conductivity, dissolved oxygen, toxicity, total suspended solids, biological oxygen demand, oil and grease, residual chlorine, ammonia nitrogen and resin acids.

Regulatory Proceedings

26. On July 20, 1990, the Assistant Regional Waste Manager, of the Ministry of Environment issued a Pollution Abatement Order to MacMillan Bloedel Limited in relation to ground contamination. My review of the permit file indications that the

contamination was the result of a significant spill of bunker C oil in 1977 and a spill of bunker C oil and diesel oil in 1989. Attached as Exhibit "N" to this my Affidavit is a copy of Order 14398.

27. The Pollution Abatement Order required the development and implementation of a a remediation plan. A remediation plan was implemented. Part of that remediation plan involves the collection and treatment of contaminated groundwater prior to discharge to Malaspina Strait. Monitoring over many years indicates that the treatment has been successful in protecting the marine environment; however the soil and groundwater within the property remains contaminated and will require treatment for the foreseeable future.

SWORN (OR AFFIRMED) BEFORE)
ME at Vancouver British Columbia)
on April 20 , 2012.)
)
)
)
A commissioner for taking) John Braman
affidavits for British Columbia)

E. J. Roubotham
Barrister & Solicitor
604-660-3029

Assessment Roll Report

Disclaimer

This information is obtained from various sources and is determined as of the specific dates set out in the Assessment Act. As a result, BC Assessment cannot warrant that it is current or accurate, and provides it for your convenience only. Use of this information without verification from original sources is at your own risk.

Report Date:	Apr 17, 2012	**Report Time:**	10:11:04 AM
Folio:	2012-0044189	**For:**	SC58617
Roll Year:	2012	**Roll Number:**	0003-000
Area:	06	**Jurisdiction:**	330
School District:	47		
Neighbourhood:	002 - TOWNSITE		
Property Address:	5775 ASH AVE POWELL RIVER BC V8A 4R3 & 6270 YEW ST POWELL RIVER BC V8A 4K1		
Owner Name:	CATALYST PAPER CORP	**# of Owners:**	1
Owner Address:	C/O BUSINESS BUILDING 200-3600 LYSANDER LANE RICHMOND BC V7B 1C3		
Document No:	CA264046		
PID:	002-554-682		
Legal Description:	Block 43, Plan 8096, District Lot 450, Group 1, New Westminster Land District, Except Plan 12273 14778 5457 7624 BCP7701 BCP23888 BCP23889		

This is Exhibit "A" referred to in the affidavit of S. Braman sworn before me at Vancouver in the Province of British Columbia this 20th day of April, 2012

A Commissioner for taking Affidavits within the Province of British Columbia

2012 Value

Property Class	Land	Improvement
Light Industry	$256000	$154000
Major Industry	$5456000	$116576000
Business And Other	N/A	$157000

Total Actual Value: $122599000

2011 Value

Property Class	Improvement	Land
Light Industry	$155000	$250000
Business And Other	$161000	N/A
Major Industry	$118398000	$5416000

Total Actual Value: $124380000

2010 Value

Property Class	Improvement	Land
Major Industry	$123119000	$5416000
Light Industry	$156000	$250000
Business And Other	$165000	N/A

Total Actual Value: $129106000

Manual Class: 8000 - Non-Manualized Structures
Actual Use: 424 - Pulp & Paper Mills (Incl Fine Paper, Tissue & Asphalt Roof)
Tenure: 01 - Crown-Granted
ALR:
Land Dimension: 380.017 **Land Dimension Type:** Acres

Sales:	Number	Description
	#1	A SINGLE PROPERTY, IMPROVED SALE occurred on 02 Aug 2006. This was a CASH sale and the price was 210,000. The document # was CA264046.
	#2	A NON-SALE occurred on 19 Jul 2006. The document # was BA179178.
	#3	A NON-SALE occurred on 11 Jan 2006. The document # was BA152487.
	#4	A NON-SALE occurred on 09 Jan 2006. The document # was BA151509.
	#5	A NON-SALE occurred on 09 Jan 2006. The document # was BA151507.
	#6	A NON-SALE occurred on 09 Jan 2006. The document # was BA151506.

Additional Owners:

No Additional Owners

Associated PIDs:

004-781-821
004-781-856
010-264-469
010-267-727
010-267-760
015-875-121
015-890-309
015-890-317
015-890-325
015-890-333
025-961-357
025-961-373

This is Exhibit "B" referred to in the
affidavit of J. Braman
sworn before me at Vancouver
in the Province of British Columbia this
20 day of April, 2012

A Commissioner for taking Affidavits
within the Province of British Columbia


Wildwood
Wildwood Landfill
Process Treatment Plant
Powell River
Powell River Pulp Mill
© 2012 Cnes/Spot Image
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
© 2012 Google
Image DAS Ltd.
2006
49°52'22.77" N 124°32'59.80" W elev 61 m

5

BRITISH COLUMBIA
The Best Place on Earth

BC Registry Services

Mailing Address:
PO BOX 9431 Stn Prov Govt.
Victoria BC V8W 9V3
www.corporateonline.gov.bc.ca

Location:
2nd Floor - 940 Blanshard St.
Victoria BC
250 356-8626

BC Company Summary

For

MACMILLAN BLOEDEL LIMITED

Date and Time of Search: April 17, 2012 10:15 AM Pacific Time

Currency Date: February 20, 2012

HISTORICAL - Continuation Out on May 14, 1998

Incorporation Number: BC0247324

Name of Company: MACMILLAN BLOEDEL LIMITED

Recognition Date: December 31, 1981 as a result of an Amalgamation

In Liquidation: No

Last Annual Report Filed: December 31, 1997

Receiver: No

AMALGAMATING CORPORATION(S) INFORMATION

Name of Amalgamating Corporation	Incorporation Number in BC
MACMILLAN BLOEDEL INDUSTRIES LIMITED	C0239957
MACMILLAN BLOEDEL LIMITED	BC0202283

CONTINUED OUT INFORMATION

Jurisdiction: FEDERAL

Name Company Continued Out As:

Continuation Out Date: April 27, 1998

This is Exhibit "C" referred to in the affidavit of J. Braman sworn before me at Vancouver in the Province of British Columbia this 20 day of April 2012

A Commissioner for taking Affidavits within the Province of British Columbia

REGISTERED OFFICE INFORMATION

Mailing Address:
22ND FLOOR
925 WEST GEORGIA STREET
VANCOUVER BC V6C 3L2
CANADA

Delivery Address:
22ND FLOOR
925 WEST GEORGIA STREET
VANCOUVER BC V6C 3L2
CANADA

RECORDS OFFICE INFORMATION

Mailing Address:
22ND FLOOR
925 WEST GEORGIA STREET
VANCOUVER BC V6C 3L2
CANADA

Delivery Address:
22ND FLOOR
925 WEST GEORGIA STREET
VANCOUVER BC V6C 3L2
CANADA

DIRECTOR INFORMATION

Last Name, First Name, Middle Name:
ARNOLD, JOHN T.

Mailing Address:
3795 SOUTHRIDGE AVENUE
WEST VANCOUVER, BC
FULL NAME: JOHN TIMOTHY ARNOLD V7V3H9

Delivery Address:
3795 SOUTHRIDGE AVENUE
WEST VANCOUVER, BC
FULL NAME: JOHN TIMOTHY ARNOLD V7V3H9

Last Name, First Name, Middle Name:
DAVENPORT, DAVID CHARLES

Mailing Address:
4650 WOODGREEN DRIVE
W VANCOUVER BC V7S2V2

Delivery Address:
4650 WOODGREEN DRIVE
W VANCOUVER BC V7S2V2

Last Name, First Name, Middle Name:
DELANEY, IAN W.

Mailing Address:
57 CLARENDON AVENUE
TORONTO ONTARIO M4V1J2

Delivery Address:
57 CLARENDON AVENUE
TORONTO ONTARIO M4V1J2

Last Name, First Name, Middle Name:
HASKAYNE, RICHARD F.

Mailing Address:
422 CRESCENT RD NW
CALGARY ALBERTA T2M4A4

Delivery Address:
422 CRESCENT RD NW
CALGARY ALBERTA T2M4A4

Last Name, First Name, Middle Name:
MARSHALL, DAVID L.

Mailing Address:
32 VALLEY CLUB CIRCLE
NAPA CALIFORNIA
U.S.A. 94558

Delivery Address:
32 VALLEY CLUB CIRCLE
NAPA CALIFORNIA
U.S.A. 94558

Last Name, First Name, Middle Name:
MINNICK, WALTER C.

Mailing Address:
1094 HEARTHSTONE DRIVE
BOISE IDAHO
USA 83702

Delivery Address:
1094 HEARTHSTONE DRIVE
BOISE IDAHO
USA 83702

Last Name, First Name, Middle Name:
RITCHIE, CEDRIC E.

Mailing Address:
5 SILVERDALE CRES
DON MILLS ON M3V3G9

Delivery Address:
5 SILVERDALE CRES
DON MILLS ON M3V3G9

Last Name, First Name, Middle Name:
ROSS, JOHN ST. CLAIR

Mailing Address:
5436 WESTHAVEN PLACE
WEST VANCOUVER BC V7W3G1

Delivery Address:
5436 WESTHAVEN PLACE
WEST VANCOUVER BC V7W3G1

Last Name, First Name, Middle Name:
STEPHENS, WILLIAM THOMAS

Mailing Address:
D1 988 BEACH AVENUE
VANCOUVER BC V6Z2N9

Delivery Address:
D1 988 BEACH AVENUE
VANCOUVER BC V6Z2N9

Last Name, First Name, Middle Name:
STRANGWAY, DAVID WILLIAM

Mailing Address:
3483 WEST 18TH AVENUE
VANCOUVER, B.C. V6S1A8

Delivery Address:
3483 WEST 18TH AVENUE
VANCOUVER, B.C. V6S1A8

Last Name, First Name, Middle Name:
TAYLOR, THOMAS M.

Mailing Address:
71 WESTOVER TERRACE
FORT WORTH TX
USA 76107

Delivery Address:
71 WESTOVER TERRACE
FORT WORTH TX
USA 76107

Last Name, First Name, Middle Name:
WALTON, JOHN SHEPPARD

Mailing Address:
2623 QUEENSWOOD DRIVE
VICTORIA, BC V8N1X6

Delivery Address:
2623 QUEENSWOOD DRIVE
VICTORIA, BC V8N1X6

OFFICER INFORMATION AS AT December 31, 1997

Last Name, First Name, Middle Name:
BARBER, T. LARRY

Office(s) Held: (Other Office(s))

Mailing Address:
804 WYNWOOD DRIVE
PRATTVILLE ALABAMA
USA 36067 V7S2W1

Delivery Address:
804 WYNWOOD DRIVE
PRATTVILLE ALABAMA
USA 36067 V7S2W1

Last Name, First Name, Middle Name:
BENDER, GRAHAM J.

Office(s) Held: (Other Office(s))

Mailing Address:
8065 PASCO ROAD
N VANCOUVER BC V7W2J5

Delivery Address:
8065 PASCO ROAD
N VANCOUVER BC V7W2J5

Last Name, First Name, Middle Name:
CAFFERATA, WILLIAM N.
Office(s) Held: (Other Office(s))

Mailing Address:
1460 LAWSON STREET
WEST VANCOUVER BC V7T2E8

Delivery Address:
1460 LAWSON STREET
WEST VANCOUVER BC V7T2E8

Last Name, First Name, Middle Name:
COADY, Y. LINDA
Office(s) Held: (Other Office(s))

Mailing Address:
3073 WEST 6TH AVENUE
VANCOUVER BC V6K1X4

Delivery Address:
3073 WEST 6TH AVENUE
VANCOUVER BC V6K1X4

Last Name, First Name, Middle Name:
CONNOR, JAMES F.
Office(s) Held: (Other Office(s))

Mailing Address:
5190 FULLINGER CRESCENT
NANAIMO BC V9V1H0

Delivery Address:
5190 FULLINGER CRESCENT
NANAIMO BC V9V1H0

Last Name, First Name, Middle Name:
EMERSON, JAMES W.
Office(s) Held: (Vice President)

Mailing Address:
3 RIVERVIEW ESTATES
CAMDEN ALABAMA
USA 36726

Delivery Address:
3 RIVERVIEW ESTATES
CAMDEN ALABAMA
USA 36726

Last Name, First Name, Middle Name:
ERNST, FREDERICK V.
Office(s) Held: (Other Office(s))

Mailing Address:
3046 BANKHEAD AVENUE
MONTGOMERY ALABAMA
USA 36016

Delivery Address:
3046 BANKHEAD AVENUE
MONTGOMERY ALABAMA
USA 36016

Last Name, First Name, Middle Name:
FERGUSON, GLENN MILES
Office(s) Held: (Other Office(s))

Mailing Address:
3924 SHARON PLACE
W VANCOUVER BC V7V4T6

Delivery Address:
3924 SHARON PLACE
W VANCOUVER BC V7V4T6

Last Name, First Name, Middle Name:
FORD, ROBERT G.
Office(s) Held: (Other Office(s))

Mailing Address:
5169 SARITA PLACE
NORTH VANCOUVER BC V7R3N3

Delivery Address:
5169 SARITA PLACE
NORTH VANCOUVER BC V7R3N3

Last Name, First Name, Middle Name:
JOHNCOX, GARY H.
Office(s) Held: (Other Office(s))

Mailing Address:
2 8868 16TH AVENUE
BURNABY BC V3N5A6

Delivery Address:
2 8868 16TH AVENUE
BURNABY BC V3N5A6

Last Name, First Name, Middle Name:
KENNEDY, C. GRAHAM
Office(s) Held: (Other Office(s))

Mailing Address:
3936 BRAEMAR PLACE
NORTH VANCOUVER BC V7N4M8

Delivery Address:
3936 BRAEMAR PLACE
NORTH VANCOUVER BC V7N4M8

Last Name, First Name, Middle Name:
KULLA, BRUCE
Office(s) Held: (Other Office(s))

Mailing Address:
2201 717 JERVIS STREET
VANCOUVER BC V6E4L5

Delivery Address:
2201 717 JERVIS STREET
VANCOUVER BC V6E4L5

Last Name, First Name, Middle Name:
LABERGE, ALICE D.
Office(s) Held: (Treasurer, Vice President)

Mailing Address:
2606 W 37TH AVENUE
VANCOUVER BC V7N2T4

Delivery Address:
2606 W 37TH AVENUE
VANCOUVER BC V7N2T4

Last Name, First Name, Middle Name:
MYNETT, GEOFFREY E.
Office(s) Held: (Other Office(s))

Mailing Address:
3505 WEST 31ST AVENUE
VANCOUVER BC V6S1X8

Delivery Address:
3505 WEST 31ST AVENUE
VANCOUVER BC V6S1X8

Last Name, First Name, Middle Name:
NEESER, CRAIG D.
Office(s) Held: (Other Office(s))

Mailing Address:
1748 EMERSON COURT
N VANCOUVER BC

Delivery Address:
1748 EMERSON COURT
N VANCOUVER BC

Last Name, First Name, Middle Name:
PELMAN DR, ALAN
Office(s) Held: (Other Office(s))

Mailing Address:
9655 WOODWARDS PLACE
RICHMOND BC V7E1H5

Delivery Address:
9655 WOODWARDS PLACE
RICHMOND BC V7E1H5

Last Name, First Name, Middle Name:
QUINTIN, CLARK
Office(s) Held: (Other Office(s))

Mailing Address:
5333 WESTHAVEN WYND
WEST VANCOUVER, BC V7W3E8

Delivery Address:
5333 WESTHAVEN WYND
WEST VANCOUVER, BC V7W3E8

Last Name, First Name, Middle Name:
SMALL, ALAN
Office(s) Held: (Other Office(s))

Mailing Address:
1985 DUNSTONE PL
NORTH VANCOUVER BC V7H2M3

Delivery Address:
1985 DUNSTONE PL
NORTH VANCOUVER BC V7H2M3

Last Name, First Name, Middle Name:
STEPHENS, WILLIAM THOMAS
Office(s) Held: (CEO, President)

Mailing Address:
D1 988 BEACH AVENUE
VANCOUVER BC V6Z2N9

Delivery Address:
D1 988 BEACH AVENUE
VANCOUVER BC V6Z2N9

Last Name, First Name, Middle Name:
STUBBS, ALAN C.
Office(s) Held: (Other Office(s))

Mailing Address:
302 27TH ALEXANDER STREET
VANCOUVER BC V6A1B2

Delivery Address:
302 27TH ALEXANDER STREET
VANCOUVER BC V6A1B2

Last Name, First Name, Middle Name:
TUCKEY, R. DALE
Office(s) Held: (Other Office(s))

Mailing Address:
4460 WOODCREST ROAD
WEST VANCOUVER, BC V7S2W1

Delivery Address:
4460 WOODCREST ROAD
WEST VANCOUVER, BC V7S2W1

Last Name, First Name, Middle Name:
YOUNG, KENNETH R.
Office(s) Held: (Other Office(s))

Mailing Address:
334 ROSLYN BLVD.
NORTH VANCOUVER BC V7G1N9

Delivery Address:
334 ROSLYN BLVD.
NORTH VANCOUVER BC V7G1N9

11

Industry Canada Industrie Canada

Canada

Industry Canada

Corporations Canada

Federal Corporation Information - 3487504

Glossary of Terms used on this page

Return to Search Results
Start New Search

Corporation Number
3487504

Business Number (BN)
Not Available

Governing Legislation
Canada Business Corporations Act - 1998-04-27

Corporate Name
MacMillan Bloedel Limited
MacMillan Bloedel Limitee

Status
Inactive - Amalgamated into WEYERHAEUSER COMPANY LIMITED / COMPAGNIE WEYERHAEUSER LIMITEE
on 1999-11-01

Registered Office Address
925 WEST GEORGIA STREET
2ND FLOOR
VANCOUVER BC V6C 3L2
Canada

Active CBCA corporations are required to update this information within 15 days of any change.

Directors

Minimum	Maximum
3	20

Directors
ALEX A SHORTEN
STEVEN R ROGEL
WILLIAM C GAYNOR

To obtain addresses of directors, contact Corporations Canada by email or fax.

Active CBCA corporations are required to update this information within 15 days of any change.

Annual Filings

Anniversary Date (MM-DD)
04-27

Date of Last Annual Meeting
1998-04-23

Annual Filing Period (MM-DD)
04-27 to 06-26

Type of Corporation
Distributing corporation

Status of Annual Filings
1999 - Filed

Corporate History

Corporate Name History
1998-04-27 to Present

This is Exhibit "D" referred to in the affidavit of J. Braman
sworn before me at Vancouver
in the Province of British Columbia this
24 day of April, 2012

A Commissioner for taking Affidavits within the Province of British Columbia

12

MacMillan Bloedel Limited

1998-04-27 to Present

MacMillan Bloedel Limitee

Certificates Issued and Filings

Certificate of Continuance
1998-04-27 Previous jurisdiction: British Columbia

Certificate of Arrangement
1999-11-01

Date Modified: 2012-03-30

13

Industry Canada Industrie Canada

Canada

Industry Canada

Corporations Canada

Federal Corporation Information - 3675611

Glossary of Terms used on this page

Return to Search Results
Start New Search

Corporation Number
3675611

Business Number (BN)
866035033RC0001

Governing Legislation
Canada Business Corporations Act - 1999-11-01

Corporate Name
WEYERHAEUSER COMPANY LIMITED
COMPAGNIE WEYERHAEUSER LIMITEE

Status
Inactive - Amalgamated into WEYERHAEUSER COMPANY LIMITED / COMPAGNIE WEYERHAEUSER LIMITEE
on 2000-05-01

Registered Office Address
925 WEST GEORGIA ST
2ND FLOOR
VANCOUVER BC V6C 3L2
Canada

Active CBCA corporations are required to update this information within 15 days of any change.

Directors
Minimum 3
Maximum 15

Directors
STEVEN R ROGEL
ALEX A SHORTEN
C. GRAHAM KENNEDY
WILLIAM C GAYNOR

To obtain addresses of directors, contact Corporations Canada by email or fax.

Active CBCA corporations are required to update this information within 15 days of any change.

Annual Filings
Anniversary Date (MM-DD)
11-01

Date of Last Annual Meeting
Not Available

Annual Filing Period (MM-DD)
11-01 to 12-31

Type of Corporation
Distributing corporation

Status of Annual Filings
1999 - Filed

Corporate History
Corporate Name History

14

1999-11-01 to 2000-01-14
WEYERHAEUSER COMPANY LIMITED

2000-01-14 to Present
WEYERHAEUSER COMPANY LIMITED
2000-01-14 to Present COMPAGNIE WEYERHAEUSER LIMITEE

Certificates Issued and Filings

Certificate of Amalgamation
1999-11-01 Corporations amalgamated:
- 3487504 MacMillan Bloedel Limited / MacMillan Bloedel Limitee
- 3675602 WEYERHAEUSER COMPANY LIMITED

Certificate of Amendment *
2000-01-14 Amendment details: Corporate name

Certificate of Amendment *
2000-01-27 Amendment details: Other

* Amendment details are only available for amendments effected after 2010-03-20. Some certificates issued prior to 2000 may not be listed. For more information, contact Corporations Canada.

Date Modified: 2012-03-30

15

Industry Canada Industrie Canada

Canada

Industry Canada

Corporations Canada

Federal Corporation Information - 3755215

Glossary of Terms used on this page

Return to Search Results
Start New Search

Corporation Number
3755215

Business Number (BN)
103440624RC0003

Governing Legislation
Canada Business Corporations Act - 2000-05-01

Corporate Name
WEYERHAEUSER COMPANY LIMITED
COMPAGNIE WEYERHAEUSER LIMITEE

Status
Active

Registered Office Address
925 WEST GEORGIA STREET
5TH FLOOR
VANCOUVER BC V6C 3L2
Canada

Active CBCA corporations are required to update this information within 15 days of any change.

Directors
Minimum 3
Maximum 15

Directors
PATRICK LANE
DANIEL S. FULTON
ANNE E. GIARDINI

To obtain addresses of directors, contact Corporations Canada by email or fax.

Active CBCA corporations are required to update this information within 15 days of any change.

Annual Filings
Anniversary Date (MM-DD)
05-01

Date of Last Annual Meeting
2010-06-21

Annual Filing Period (MM-DD)
05-01 to 06-30

Type of Corporation
Non-distributing corporation with 50 or fewer shareholders

Status of Annual Filings
2012 - Not due
2011 - Filed
2010 - Filed

Corporate History
Corporate Name History
2000-05-01 to Present

16

	WEYERHAEUSER COMPANY LIMITED
2000-05-01 to Present	COMPAGNIE WEYERHAEUSER LIMITEE

Certificates Issued and Filings

Certificate of Amalgamation

2000-05-01 Corporations amalgamated:

- 3751619 WEYERHAEUSER CANADA LTD. / WEYERHAEUSER CANADA LTEE.
- 3675611 WEYERHAEUSER COMPANY LIMITED / COMPAGNIE WEYERHAEUSER LIMITEE
- 3751538 GREEN FOREST LUMBER LIMITED

Date Modified: 2012-03-30

BRITISH COLUMBIA
The Best Place on Earth

BC Registry Services

Mailing Address:
PO BOX 9431 Stn Prov Govt.
Victoria BC V8W 9V3
www.corporateonline.gov.bc.ca

Location:
2nd Floor - 940 Blanshard St.
Victoria BC
250 356-8626

This is Exhibit "E" referred to in the affidavit of J. Braman sworn before me at Vancouver in the Province of British Columbia this 20 day of April 2012

A Commissioner for taking Affidavits within the Province of British Columbia

BC Company Summary

For

MB PAPER LIMITED

Date and Time of Search: April 20, 2012 11:20 AM Pacific Time

Currency Date: February 20, 2012

HISTORICAL - Continuation Out on April 06, 1998

Incorporation Number: BC0520255

Name of Company: MB PAPER LIMITED

Recognition Date: Incorporated on May 21, 1996

Last Annual Report Filed: May 21, 1997

In Liquidation: No

Receiver: No

COMPANY NAME INFORMATION

Previous Company Name	Date of Company Name Change
NO. 138 SEABRIGHT HOLDINGS LTD.	December 12, 1996

CONTINUED OUT INFORMATION

Jurisdiction: FEDERAL

Name Company Continued Out As:

Continuation Out Date: March 24, 1998

REGISTERED OFFICE INFORMATION

Mailing Address:
22ND FLOOR 925 WEST GEORGIA ST
VANCOUVER BC V6C 3L2
CANADA

Delivery Address:
22ND FLOOR 925 WEST GEORGIA ST
VANCOUVER BC V6C 3L2
CANADA

RECORDS OFFICE INFORMATION

Mailing Address:
22ND FLOOR 925 WEST GEORGIA ST
VANCOUVER BC V6C 3L2
CANADA

Delivery Address:
22ND FLOOR 925 WEST GEORGIA ST
VANCOUVER BC V6C 3L2
CANADA

DIRECTOR INFORMATION

Last Name, First Name, Middle Name:
BENDER, GRAHAM I

Mailing Address:
8005 PASCO RD
WEST VANCOUVER BC V7W2J5

Delivery Address:
8005 PASCO RD
WEST VANCOUVER BC V7W2J5

Last Name, First Name, Middle Name:
FERGUSON, GLENN M

Mailing Address:
3924 SHARON PL
WEST VANCOUVER V7V4T6

Delivery Address:
3924 SHARON PL
WEST VANCOUVER V7V4T6

OFFICER INFORMATION AS AT May 21, 1997

Last Name, First Name, Middle Name:
BENDER, GRAHAM I

Office(s) Held: (President)

Mailing Address:
8005 PASCO RD
WEST VANCOUVER BC V7W2J5

Delivery Address:
8005 PASCO RD
WEST VANCOUVER BC V7W2J5

Last Name, First Name, Middle Name:
MYNETT, GEOFFREY E.

Office(s) Held: (Secretary)

Mailing Address:
3505 WEST 31 AVENUE
VANCOUVER BC V6S1X8

Delivery Address:
3505 WEST 31 AVENUE
VANCOUVER BC V6S1X8

Last Name, First Name, Middle Name:
SWIATLOWSKI, DONALD

Office(s) Held: (Treasurer)

Mailing Address:
1505 1188 RICHARDS STREET
VANCOUVER BC V6B3E6

Delivery Address:
1505 1188 RICHARDS STREET
VANCOUVER BC V6B3E6

19

Industry Canada Industrie Canada

Canada

Industry Canada

Corporations Canada

Federal Corporation Information - 3476120

Glossary of Terms used on this page

Return to Search Results
Start New Search

Corporation Number	Business Number (BN)	Governing Legislation
3476120	883445629RC0001	*Canada Business Corporations Act* - 1998-03-24

Corporate Name
Pacifica Papers Inc.

Status
Inactive - Amalgamated into Pacifica Papers Inc.
on 1998-06-30

Registered Office Address
925 WEST GEORGIA STREET
22ND FLOOR
VANCOUVER BC V6C 3L2
Canada

Active CBCA corporations are required to update this information within 15 days of any change.

Directors

Minimum	Maximum
1	10

Directors
G. E. MYNETT
G. M. FERGUSON
W. T. STEPHENS
G. I. BENDER

To obtain addresses of directors, contact Corporations Canada by email or fax.

Active CBCA corporations are required to update this information within 15 days of any change.

Annual Filings

Anniversary Date (MM-DD)	Date of Last Annual Meeting
03-24	Not Available
Annual Filing Period (MM-DD)	**Type of Corporation**
03-24 to 05-23	Not Available

Status of Annual Filings

Corporate History
Corporate Name History
1998-03-24 to 1998-06-15
MB Paper Limited

This is Exhibit "F" referred to in the affidavit of J. Braman sworn before me at Vancouver in the Province of British Columbia this 20 day of April, 2012

A Commissioner for taking Affidavits within the Province of British Columbia

20

1998-06-15 to Present

Pacifica Papers Inc.

Certificates Issued and Filings

Certificate of Continuance

1998-03-24 Previous jurisdiction: British Columbia

Date Modified: 2012-03-30

21

Industry Canada Industrie Canada

Canada

Industry Canada

Corporations Canada

Federal Corporation Information - 3596010

Glossary of Terms used on this page

Return to Search Results
Start New Search

Corporation Number
3596010

Business Number (BN)
893904730RC0003

Governing Legislation
Canada Business Corporations Act - 1999-03-12

Corporate Name
Pacifica Papers Inc.

Status
Inactive - Discontinued on 2001-08-27

Registered Office Address
925 WEST GEORGIA STREET
SUITE 1000
VANCOUVER BC V6C 3L2
Canada

Active CBCA corporations are required to update this information within 15 days of any change.

Directors

Minimum	Maximum
1	20

Directors
KENNETH P. KILGOUR
WAYNE NYSTROM
NORMAN E. WALE
KEITH R. PURCHASE
JOYCE JOHNSON-MILLER
TREVOR JOHNSTONE

To obtain addresses of directors, contact Corporations Canada by email or fax.

Active CBCA corporations are required to update this information within 15 days of any change.

Annual Filings

Anniversary Date (MM-DD)
03-12

Date of Last Annual Meeting
2000-03-12

Annual Filing Period (MM-DD)
03-12 to 05-11

Type of Corporation
Distributing corporation

Status of Annual Filings
2002 - Overdue
2001 - Overdue
2000 - Not filed

Corporate History

This is Exhibit "6" referred to in the affidavit of J. Braman sworn before me at Vancouver in the Province of British Columbia this 20 day of April, 2012

A Commissioner for taking Affidavits within the Province of British Columbia

22

Corporate Name History

1999-03-12 to Present

Pacifica Papers Inc.

Certificates Issued and Filings

Certificate of Amalgamation

1999-03-12 Corporations amalgamated:

- 3595994 3595994 Canada Ltd.
- 3596001 3596001 Canada Ltd.
- 3507254 Pacifica Papers Inc.
- 3536734 Pacifica Industries Ltd.

Proxy Circular

Received on 1999-05-28

Proxy Circular

Received on 2000-07-13

Proxy Circular

Received on 2001-06-07

Proxy Circular

Received on 2001-06-13

Certificate of Arrangement

2001-08-27

Certificate of Discontinuance

2001-08-27 Importing jurisdiction: British Columbia

Date Modified: 2012-03-30

23

Industry Canada Industrie Canada

Canada

Industry Canada

Corporations Canada

Federal Corporation Information - 3507254

Glossary of Terms used on this page

Return to Search Results
Start New Search

Corporation Number
3507254

Business Number (BN)
894368521RC0001

Governing Legislation
Canada Business Corporations Act - 1998-06-30

Corporate Name
Pacifica Papers Inc.

Status
Inactive - Amalgamated into Pacifica Papers Inc. on 1999-03-12

Registered Office Address
700 WEST GEORGIA ST
SUITE 1900 BOX 10354
VANCOUVER BC V7Y 1G5
Canada

Active CBCA corporations are required to update this information within 15 days of any change.

Directors

Minimum	Maximum
1	20

Directors
P KENNETH KILGOUR
SVEN-ERIK HENRIKSSON
JOYCE JOHNSON-MILLER
WAYNE NYSTROM
NORMAN E WALE
KENNETH A SHIELDS
TREVOR JOHNSTONE

To obtain addresses of directors, contact Corporations Canada by email or fax.

Active CBCA corporations are required to update this information within 15 days of any change.

Annual Filings

Anniversary Date (MM-DD)
06-30

Date of Last Annual Meeting
Not Available

Annual Filing Period (MM-DD)
06-30 to 08-29

Type of Corporation
Not Available

Status of Annual Filings

Corporate History

Corporate Name History

24

1998-06-30 to Present

Pacifica Papers Inc.

Certificates Issued and Filings

Certificate of Amalgamation

1998-06-30 Corporations amalgamated:

- 3476120 Pacifica Papers Inc.
- 3496821 Pacifica Paper Acquisition Company Ltd.

Date Modified: 2012-03-30

Industry Canada Industrie Canada

Canada

Industry Canada

Corporations Canada

Federal Corporation Information - 3937607

Glossary of Terms used on this page

Return to Search Results
Start New Search

Corporation Number
3937607

Business Number (BN)
Not Available

Governing Legislation
Canada Business Corporations Act - 2001-08-28

Corporate Name
PACIFICA PAPERS INC.

Status
Inactive - Amalgamated into Catalyst Paper Corporation on 2001-09-01

Registered Office Address
700 WEST GEORGIA STREET
VANCOUVER BC V7Y 1J7
Canada

Active CBCA corporations are required to update this information within 15 days of any change.

Directors
Minimum 1
Maximum 10

Directors
RUSSELL JAMES HORNER
RALPH LEVERTON
PETER STAIGER

To obtain addresses of directors, contact Corporations Canada by email or fax.

Active CBCA corporations are required to update this information within 15 days of any change.

Annual Filings

Anniversary Date (MM-DD)
08-28

Date of Last Annual Meeting
Not Available

Annual Filing Period (MM-DD)
08-28 to 10-27

Type of Corporation
Not Available

Status of Annual Filings

Corporate History

Corporate Name History

2001-08-28 to Present
PACIFICA PAPERS INC.

Certificates Issued and Filings

Certificate of Continuance
2001-08-28 Previous jurisdiction: British Columbia

Date Modified: 2012-03-30

This is Exhibit "H" referred to in the affidavit of J. Braman
sworn before me at Vancouver in the Province of British Columbia this
20 day of April, 2012

A Commissioner for taking Affidavits within the Province of British Columbia

Industry Canada Industrie Canada

Canada

Industry Canada

Corporations Canada

Federal Corporation Information - 3937615

Glossary of Terms used on this page

Return to Search Results
Start New Search

Corporation Number
3937615

Business Number (BN)
101821171RC0002

Governing Legislation
Canada Business Corporations Act - 2001-09-01

Corporate Name
Catalyst Paper Corporation

Status
Active

Registered Office Address
2nd Floor, 3600 Lysander Lane
Richmond BC V7B 1C3
Canada

Active CBCA corporations are required to update this information within 15 days of any change.

Directors
Minimum 3
Maximum 15

Directors
WILLIAM DICKSON
Alan B. Miller
Douglas P. Hayhurst
Kevin J. Clarke
Geoff Plant
JEFFREY G. MARSHALL
THOMAS S. CHAMBERS
Dallas H. Ross

To obtain addresses of directors, contact Corporations Canada by email or fax.

Active CBCA corporations are required to update this information within 15 days of any change.

Annual Filings
Anniversary Date (MM-DD)
09-01

Date of Last Annual Meeting
2011-04-28

Annual Filing Period (MM-DD)
09-01 to 10-31

Type of Corporation
Distributing corporation

Status of Annual Filings
2012 - Not due
2011 - Filed
2010 - Filed

This is Exhibit "F" referred to in the affidavit of J. Braman
sworn before me at Vancouver
in the Province of British Columbia this
20 day of April, 2012

A Commissioner for taking Affidavits
within the Province of British Columbia

Corporate History

Corporate Name History

2001-09-01 to 2005-10-03

Norske Skog Canada Limited

2005-10-03 to Present

Catalyst Paper Corporation

Certificates Issued and Filings

Certificate of Amalgamation

2001-09-01 Corporations amalgamated:

- 3937607 PACIFICA PAPERS INC.
- 3937577 Norske Skog Canada Limited

Proxy Circular

Received on 2004-04-07

Certificate of Amendment *

2005-10-03 Amendment details: Corporate name

* Amendment details are only available for amendments effected after 2010-03-20. Some certificates issued prior to 2000 may not be listed. For more information, contact Corporations Canada.

Date Modified: 2012-03-30

Industry Canada Industrie Canada

Canada

Industry Canada

Corporations Canada

Federal Corporation Information - 3937577

Glossary of Terms used on this page

Return to Search Results
Start New Search

Corporation Number
3937577

Business Number (BN)
Not Available

Governing Legislation
Canada Business Corporations Act -
2001-08-27

Corporate Name
Norske Skog Canada Limited

Status
Inactive - Amalgamated into Catalyst Paper Corporation on 2001-09-01

Registered Office Address
700 WEST GEORGIA STREET
9TH FLOOR
VANCOUVER BC V7Y 1J7
Canada

Active CBCA corporations are required to update this information within 15 days of any change.

Directors
Minimum 3
Maximum 15

Directors
WILLIAM PETER ROSENFIELD
HAROLD NORMAN KVISLE
JAN KILDAL
JAN REINAS
RUSSELL JAMES HORNER
J. TREVOR JOHNSTONE
W. THOMAS STEPHENS
MITCHELL HAROLD GROPPER
R. KEITH PURCHASE

To obtain addresses of directors, contact Corporations Canada by email or fax.

Active CBCA corporations are required to update this information within 15 days of any change.

Annual Filings

Anniversary Date (MM-DD)
08-27

Date of Last Annual Meeting
Not Available

Annual Filing Period (MM-DD)
08-27 to 10-26

Type of Corporation
Not Available

Status of Annual Filings

Corporate History

Corporate Name History

2001-08-27 to Present

Norske Skog Canada Limited

Certificates Issued and Filings

Certificate of Continuance

2001-08-27 Previous jurisdiction: British Columbia

Date Modified: 2012-03-30

BRITISH COLUMBIA
The Best Place on Earth

May 3, 2011

Tracking Number: 173121

Authorization Number: 4565

REGISTERED MAIL

Catalyst Paper Corporation and Catalyst Pulp Operations Limited
doing business as Catalyst Paper, General Partnership
2nd Floor
3600 Lysander Lane
Richmond BC V7B 1C3

Dear permittee:

Enclosed is Amended Permit 4565 issued under the provisions of the *Environmental Management Act*. Your attention is respectfully directed to the terms and conditions outlined in the permit. An annual fee will be determined according to 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. This permit is issued pursuant to the provisions of the *Environmental Management Act* to ensure compliance with Section 120(3) of that statute, which makes it an offence to discharge waste, from a prescribed industry or activity, without proper authorization. It is also the responsibility of the permittee to ensure that all activities conducted under this authorization are carried out with 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.

This is Exhibit "J" referred to in the affidavit of J. Braman sworn before me at Vancouver in the Province of British Columbia this 20 day of April, 2012

A Commissioner for taking Affidavits within the Province of British Columbia

Ministry of Environment
Environmental Protection Division
2nd Floor, 10470 - 152 Street
Surrey, BC V3R 0Y3
Lower Mainland Region
Telephone: (604) 582-5200
Facsimile: (604) 584-9751

Administration of this permit will be carried out by staff from the Lower Mainland Region. Plans, data and reports pertinent to the permit are to be submitted to the Regional Manager, Environmental Protection, at Ministry of Environment, Regional Operations, Lower Mainland Region, 2nd Floor, 10470 - 152 Street, Surrey, BC V3R 0Y3.

Yours truly,

Cassandra Caunce
for Director, *Environmental Management Act*
Lower Mainland Region

Enclosure

cc: Environment Canada

Sarah Barkowski, Catalyst Paper, General Partnership
5775 Ash Avenue, Powell River, BC V3A 4R3

BRITISH COLUMBIA
The Best Place on Earth

MINISTRY OF ENVIRONMENT

PERMIT 4565

Under the Provisions of the Environmental Management Act

Catalyst Paper Corporation and Catalyst Pulp Operations Limited doing business as Catalyst Paper, General Partnership

2nd Floor, 3600 Lysander Lane
Richmond BC V7B 1C3

is authorized to discharge refuse to the ground from a pulp and paper mill located at 5775 Ash Avenue, Powell River, British Columbia, subject to the terms and conditions listed below. Contravention of any of these conditions is a violation of the *Environmental Management Act* and may lead to prosecution.

This Permit supersedes and amends all previous versions of Permit 4565 issued under Part 2, Section 14 of the *Environmental Management Act*.

1. AUTHORIZED DISCHARGES

1.1 This section applies to the discharge of **REFUSE FROM A PULP AND PAPER MILL**. The site reference number for this discharge is E208453.

1.1.1 The maximum authorized rate of discharge is 25,000 m^3/year (uncompacted volume). The total volume of refuse discharged to the landfill must not exceed 620,000 m^3 (uncompacted volume).

1.1.2 The components of the refuse which may be discharged are restricted to:

Flyash
Waste asbestos
Miscellaneous mill waste, subject to Section 2.9, to a maximum of 3000 m^3/year (uncompacted volume)

Date issued: December 7, 1976
Date amended: May 3, 2011
(most recent)

Cassandra Caunce
for Director, *Environmental Management Act*
Lower Mainland Region

1.1.3 The authorized works are a landfill operation including a 6.1 ha landfill with a 1.5 mm high density polyethylene liner, a leachate management system consisting of a leak detection system, leachate collection system, leachate pond, pumping and conveyance system, surface water diversion ditches, surface water infiltration pit, truck wash facility, and related appurtenances approximately located as shown on Site Plan A.

1.1.4 The authorized works for the landfill expansion, in the area outside of the existing mini-landfill, must be complete and operational prior to the discharge of refuse.

During construction of the authorized works for the expanded landfill, discharge is authorized to the mini-landfill area. The permittee must continue to ensure that all leachate and runoff from the mini-landfill area is collected for treatment.

1.1.5 The location of the facilities from which the discharge originates is L3088 (PID 015-890-333), L7212 (PID 004-781-821), L7213 (PID 004-781-856), L6071, Water L 6174, L6237A, L5922, L5923, L5924, L4071, L4072, L3437 (PID 015-875-121), L3090 (PID 015-890-325), L3091(PID 015-890-317), Lot A2, Ref. Plan 490, DL 3091 (PID 015-890-309), Part of Block 43 (PID 002-554-682), Block 44 (PID 010-264-469), and Block 46 (PID 002-560-194) of DL 450, Plan 8096, New Westminster District.

The location of the point of discharge is Part of Block 55, DL 450, Plan 8096 (PID 010-237-321) and Part of Block 48, DL 1901A, Plan 8096 (PID 010-267-361), Group 1, New Westminster District.

2. GENERAL REQUIREMENTS

2.1 Maintenance of Works and Emergency Procedures

The authorized works must be inspected regularly and maintained in good working order. In the event of an emergency or condition beyond the control of the permittee including, but not limited to, unauthorized fires arising from spontaneous combustion or other causes, or detection of leachate on the property, the permittee must take appropriate remedial action and notify the Director immediately. The Director may reduce or suspend operations to protect the environment until the authorized works has been restored, and/or corrective steps taken to prevent unauthorized discharges.

Date issued: December 7, 1976
Date amended: May 3, 2011
(most recent)

Cassandra Caunce
for Director, *Environmental Management Act*
Lower Mainland Region

2.2 **Maintenance of Contiguous Point - Part of Block 55 and Block 48 with Block 43**

The permittee must ensure that Part of Block 55, DL 450 (PID 010-267-361),Plan 8096, Group 1, NWD, and Block 48, DL19O1A, Plan 8096, Group 1, NWD remain contiguous with Block 43, DL 450, Plan 8096, NWD. The permittee must notify the Regional Manager, Environmental Protection in writing at least 90 days prior to any subdivision of Part of Block 55, DL 450 (PID 010-267-361), Plan 8096, Group 1, NWD or Block 48, DL19O1A, Plan 8096, Group 1, NWD or Block 43, DL 450, Plan 8096, NWD.

2.3 **Bypasses**

Any bypass of the authorized works is prohibited unless the approval of the Director is obtained and confirmed in writing.

2.4 **Process Modifications**

The Director must be notified prior to implementing changes to any process that may adversely affect the quality and/or quantity of the discharge. Despite notification under this section, permitted levels must not be exceeded.

2.5 **Site Security**

The permittee must maintain an inner and an outer perimeter fence and secure access to the landfill authorized in Section 1.1 during the active life of the landfill. A sign, acceptable to the Director, including the name and contact information of the owner/operator must be posted at the entrance of the landfill.

2.6 **Buffer Zone**

The permittee must maintain a minimum 50 metre buffer zone between the perimeter of the discharge area and the closest property boundary.

2.7 **Inspections**

Once each month, the permittee must inspect the area between the landfill and the inner perimeter fence, determine the extent of any noted problem, and notify the Regional Manager, Environmental Protection of any evidence of potential environmental impact on adjacent properties. Records of inspections must be kept available on-site.

Date issued: December 7, 1976
Date amended: May 3, 2011
(most recent)

Cassandra Caunce
for Director, *Environmental Management Act*
Lower Mainland Region

2.8 Waste Reduction and Alternate Disposal

The Ministry of Environment has adopted a policy to reduce, recycle and reuse solid wastes. The permittee is encouraged to segregate for recycling and reuse, where possible, materials destined for disposal at this site.

The permittee must, on an ongoing basis, explore options for the use of flyash and spent bed sand as products, in order to reduce or eliminate the need for landfilling of those materials. Details of the efforts made must be included in the Annual Report required in Section 3.7.

2.9 Miscellaneous Mill Waste

The miscellaneous mill waste authorized for discharge in Section 1.1.2 is restricted to dirt contaminated wood chips/hog fuel, road sweepings, asphalt and concrete rubble from minor demolition/construction projects, elemental sulphur, spent activated carbon, lime, lime mud and lime dregs, effluent treatment solids, boiler feedwater treatment resins, fibreglass and spent bed sand. The discharge of any other types of miscellaneous mill wastes must be approved by the Director.

2.10 Refuse Deposition and Prohibitions

All refuse must be placed in a manner determined by a qualified professional registered in British Columbia and as specified in the Design and Operating Plan required in Section 2.15. Refuse must be discharged in lifts not exceeding 3 metres in height. Each lift must cover all of the available disposal area prior to the commencement of the next lift. Miscellaneous mill waste as defined in Section 2.9 must be discharged in layers, compacted to the smallest practical volume (where applicable), and covered with a minimum of 0.3 metres of suitable cover material at least once every thirty days.

The overall profile from the outer edge of the landfill must not exceed a maximum side slope of 1:3 (vertical:horizontal) at any time. The final side slopes of the landfill cover must not exceed a slope of 1:3 (vertical:horizontal). The working face must be confined to the smallest practical area. The permittee must take all necessary actions to minimize dust from the landfill, including but not limited to, more frequent application of cover material.

Waste asbestos authorized for discharge in section 1.1.2 must be managed in accordance with the Hazardous Waste Regulation.

Date issued: December 7, 1976
Date amended: May 3, 2011
(most recent)

Cassandra Caunce
for Director, *Environmental Management Act*
Lower Mainland Region

The discharge of the following waste is prohibited:

- Wood waste contaminated with wood preserving chemicals, or wastes that contain chemicals that penetrate the high density polyethylene liner.
- Hazardous waste, other than waste asbestos, as defined in the Hazardous Waste Regulation.

2.11 Leachate Management

The permittee must, to the satisfaction of the Director, take measures to minimize leachate generation, including but not limited to, providing effective surface water diversion and optimizing the amount of water used in producing the flyash slurry. Measures taken, their effectiveness and any proposed measures must be detailed in the Annual Report required in Section 3.7.

The leachate detection and collection works must be maintained in accordance with an approach designed by a qualified professional registered in British Columbia.

The leachate containment pond must be lined to prevent infiltration of leachate into groundwater. A minimum level of 1.0 metres of freeboard must be maintained in the leachate containment pond to prevent overflow from the pond to the environment. Freeboard is defined as the difference in elevation between the contained liquid level and the top of the berm structure at its lowest point.

2.12 Slope Stability and Settlement

The permittee must retain a qualified professional registered in British Columbia to design a slope stability and settlement monitoring program, to the satisfaction of the Director, for the landfill authorized in Section 1.1. Areas of primary focus must include, but are not limited to:

- Slope stability of the south-east slope of the Phase 1 portion of the landfill.
- Settlement across the base of the Phase 2 portion of the landfill.

The details of the monitoring program must be included in the Design and Operating Plan required in Section 2.15. Monitoring results must form part of the Annual Report required in Section 3.7.

2.13 Fugitive Particulate Emission

The permittee must control fugitive particulate emissions generated from the property. Should the Director have reasonable grounds to believe that fugitive particulate emissions cause pollution outside the property boundary, the permittee must undertake additional measures and/or curtail operations to control the emissions.

2.14 Ambient Air Quality

The permittee must evaluate ambient air quality (PM10 and PM2.5) in the adjacent community of Wildwood with respect to the applicable criteria on a continual basis. The Regional Manager, Environmental Protection, must be notified if the data indicates deterioration of the ambient air quality. A summary of the evaluation must form part of the Annual Report required in Section 3.7.

2.15 Design and Operating Plan

The permittee must operate the landfill authorized in Section 1.1 in accordance with a design and operating plan certified by a qualified professional registered in British Columbia and acceptable to the Director. The plan must include, but is not limited to, information regarding:

- a fill plan for the design capacity of the landfill. The plan must incorporate the concept of progressive closure and take into consideration environmental protection measures and the proposed end use of the site,
- a contingency to close the landfill, including funding, prior to the design capacity being achieved should early closure be required for any reason,
- estimated elevations at 5 year intervals,
- cell size, progressive closure and intermediate and final cover details including types of materials used,
- details of how refuse will be managed/discharged,
- surface water diversion measures,
- measures to minimize leachate generation,
- leachate detection/collection maintenance details,
- operational hours, internal road network and truck wash facility,
- measures to prevent dust,
- contingencies to address slope stability issues and settlement issues should monitoring indicate slope movement or settling,

Date issued: December 7, 1976
Date amended: May 3, 2011
(most recent)

Cassandra Caunce
for Director, *Environmental Management Act*
Lower Mainland Region

- contingencies to address environmental protection issues, including leachate management, settlement and slope stability, in the event of an earthquake or any other emergency, and
- estimated closure/post-closure costs and details of how the closure/post-closure funds will be accrued.

The permittee must review the plan on an annual basis to determine if changes are required. Any revisions to the plan, certified by a qualified professional registered in British Columbia, must be submitted to the Regional Manager, Environmental Protection, as part of the Annual Report required in Section 3.7.

2.16 Environmental Assessment Report

In addition to the annual report specified in Section 3.5, the permittee must submit an Environmental Assessment Report of the landfill authorized in Section 1.1 (acceptable to the Director) by December 31, 2013 and every five years thereafter for the life of the landfill. Terms of reference for each update must be submitted to the Regional Manager, Environmental Protection at least 6 months prior to the due date. The Environmental Assessment Report must include, but is not limited to:

1. a review of all monitoring data collected since the date that discharge to the expanded landfill commenced (in the area outside of the existing mini-landfill),

2. a comparison to baseline data which is established, by a qualified professional registered in British Columbia, as being representative of conditions prior to the date when discharge to the expanded landfill commenced,

3. an evaluation of the overall impact on the receiving environment as a result of the expanded landfill operation, and

4. an evaluation of the effectiveness of the monitoring program.

Data for this assessment must include, but is not limited to, monitoring data from groundwater wells, recovery wells, surface water, leachate, dustfall canisters, and ambient monitoring stations as well as slope stability and settlement measurements.

Date issued: December 7, 1976
Date amended: May 3, 2011
(most recent)

Cassandra Caunce
for Director, *Environmental Management Act*
Lower Mainland Region

The Environmental Assessment Report and subsequent updates must be conducted by a qualified professional registered in British Columbia. Actions recommended as a result of these updates must be incorporated into the Design and Operating Plan required in Section 2.15.

If any Environmental Assessment Report, or any other information, indicates that there is an adverse impact on the receiving environment, the Director may at his/her discretion require that the permittee immediately cease the discharge authorized in Section 1.1.1 and close the landfill in accordance with the Closure Plan required in Section 2.18.

2.17 Completed Areas of the Landfill

The permittee must apply final cover to any area of the landfill which will not receive any further refuse. The design, method, and frequency of application of final cover must be determined by a qualified professional registered in British Columbia and be acceptable to the Director.

2.18 Closure Plan

The permittee must submit a closure plan for the landfill authorized in Section 1.1 at least 6 months prior to the closure of the landfill to the Director for approval. The plan must be prepared by a qualified professional registered in British Columbia and include information regarding:

- estimated total waste volume and the closure date,
- a topographical plan showing the final elevation contours of the landfill and surface water diversion and drainage controls,
- design of the final cover including the thickness and permeability of barrier layers, drainage layers details and information on topsoil, vegetative cover and erosion prevention controls,
- proposed end use of the property after closure,
- a post-closure monitoring program for groundwater, surface water, erosion and settlement for a minimum period of 25 years, and
- contingencies to address environmental impact concerns which may arise during the minimum post-closure period of 25 years.

2.19 Closure/Post-Closure Funding

The permittee must record a financial obligation on its books, consistent with relevant provisions of the current Canadian Generally Accepted Accounting Principles ("GAAP"), to reflect future closure and other regulatory requirements related to the landfill. The estimated cost of meeting these requirements, and how this cost is determined, must be included in the Design and Operating Plan required in Section 2.15.

The estimated cost of future closure, post closure and other regulatory requirements must be reviewed annually and reflected appropriately in the accrued obligation in the permittee's books. The outcome of this annual review must be reported to the Regional Manager, Environmental Protection, as part of the Annual Report required in Section 3.7.

2.20 Site Decommissioning

In accordance with the Environmental Management Act and its regulations, the permittee must submit a site profile to the Regional Manager, Environmental Protection, not less than 10 days prior to decommissioning the landfill authorized in Section1.1.

2.21 Legal Survey

Upon closure of the landfill, the permittee must register a covenant or other legal notification (acceptable to the Director) that the property described in Section 1.1.5 was used for the purpose of refuse disposal as a charge against the title of the property. The Regional Manager, Environmental Protection, must be notified of the covenant or legal notification.

3. MONITORING AND REPORTING REQUIREMENTS

3.1 Discharge Monitoring

3.1.1 Leachate Monitoring

The permittee must obtain representative grab samples of the leachate collected in the mini-landfill sump and from the expanded landfill and have the samples analyzed for the following parameters:

Parameter	Frequency
pH	Semi-annually
Specific Conductivity	Semi-annually
Biochemical Oxygen Demand	Semi-annually
Dioxins & Furans	Annually

The leakage detection/collection system must be monitored semi-annually for the presence of flow. If any groundwater is collected by the leakage detection/collection system, the collected groundwater must also be analyzed for the same parameters and on the same frequency as listed above.

Proper care must be taken in sampling, storing and transporting the samples to adequately control temperature and avoid contamination, breakage, etc.

3.1.2 Discharge Quantities

The permittee must record the types and volumes (uncompacted cubic metres) of refuse discharged to the landfill (excluding cover material).

3.2 Receiving Environment Monitoring

3.2.1 Dustfall Monitoring

In order to determine compliance with Section 2.13, the permittee must conduct an annual dustfall monitoring program, acceptable to the Director. The program must include a minimum of 4 dustfall sampling locations and one PM10 sampling location that take into consideration the horizontal and vertical aspects of the landfill.

3.2.2 Groundwater Monitoring

The permittee must maintain at least six groundwater monitoring wells and at least six groundwater recovery wells. The water collected in the groundwater pumping wells must be directed to the effluent treatment system. The exact design and location of the groundwater monitoring and groundwater recovery wells must be designed by a qualified professional registered in British Columbia and be acceptable to the Director.

3.2.3 Analysis

For the groundwater monitoring wells specified in Section 3.2.2, the permittee must obtain grab samples for each of the wells and other monitoring sites and analyze the samples for the following contaminants at the specified frequencies:

The abbreviations used in this section are described in Section 3.2.4.

Sample Location	Dry Weather (July / August)	Wet Weather (November / December)
93-2b	GP	GP, CP, D.MET, D&F, PCB
89-5	GP	GP, CP, D.MET, D&F, S, PCB
AH-3	GP	GP, CP, D.MET, D&F, PCB
AH-6L	GP	GP, CP, D.MET, D&F, PCB
94-1/3	GP	GP, CP, D.MET, D&F, PCB
94-16L	GP	GP, CP, D.MET, D&F, PCB
94-16B	GP	GP, CP, D.MET, D&F, PCB
PW-COMP	GP	GP, CP, D.MET, D&F, S, PCB
SPRING-S1	GP, D&F	GP, CP, D&F, T.MET, PCB
MILL-FH	GP, D&F	GP, CP, D&F, T.MET, PCB

Sample Location	Dry Weather (July / August)	Wet Weather (November / December)
Snapshot * Monitoring	Field Indicator Parameters	N/A
All Ground-water Wells	Manual Water Levels	Manual Water Levels

Sample Location	Monthly Monitoring
All Active Recovery Wells	Flow, pH, Conductivity

* Snapshot Monitoring Wells: upgradient well 93-2B and downgradient wells 94-16 (11m, 38 m, regional and bedrock flow zones), 94-17 (regional and bedrock flow zones), 94-18 (38 m and regional flow zones), 94-19 (38 m, regional and bedrock flow zones)

Date issued: December 7, 1976
Date amended: May 3, 2011
(most recent)

Cassandra Caunce
for Director, *Environmental Management Act*
Lower Mainland Region

3.2.4 Abbreviations - Analysis

GP (General Parameters)	total suspended solids, total dissolved solids, alkalinity, sulphate and total organic carbon
CP	chlorinated / non- chlorinated phenols
T.MET	total metals
D.MET	dissolved metals
D&F	dioxins and furans
S	sulphide
Field Indicator parameters	pH, specific conductivity, alkalinity, sulphate (lab test), dissolved oxygen, temperature and redox

3.3 Sampling Procedures

Sampling is to be carried out in accordance with the procedures described in the "British Columbia Field Sampling Manual for Continuous Monitoring and the Collection of Air, Air-Emission, Water, Wastewater, Soil, Sediment, and Biological Samples, 2003 Edition (permittee)", or the most recent edition, or by suitable alternative procedures as authorized by the Director.

A copy of the above manual may be purchased from the Queen's Printer Publications Centre, P. O. Box 9452, Stn. Prov. Gov't. Victoria, British Columbia, V8W 9V7 (1-800-663-6105 or 250-387-6409) or via the internet at www.crownpub.bc.ca. A copy of the manual is also available for review at all Environmental Protection offices.

3.4 Analytical Procedures

Analyses are to be carried out in accordance with procedures described in the "British Columbia Laboratory Manual (2009 permittee Edition)", or the most recent edition, or by suitable alternative procedures as authorized by the Director.

A copy of the above manual may be purchased from the Queen's Printer Publications Centre, P. O. Box 9452, Stn. Prov. Gov't. Victoria, British Columbia, V8W 9V7 (1-800-663-6105 or 250-387-6409) or via the internet at www.crownpub.bc.ca. A copy of the manual is also available for review at all Environmental Protection offices.

Date issued: December 7, 1976
Date amended: May 3, 2011
(most recent)

Cassandra Caunce
for Director, *Environmental Management Act*
Lower Mainland Region

3.5 Reporting

An annual report must be prepared by the permittee and submitted to the Regional Manager, Environmental Protection, by April 30 of the following year. The report must include, but is not limited to the following items:

1. remaining design capacity of the landfill (uncompacted cubic metres) and an estimation of closure date at the current rate of disposal,
2. efforts made in waste reduction and alternate disposal as required in Section 2.8,
3. measures taken to minimize leachate generation, their effectiveness and any proposed measures as required in Section 2.11,
4. an evaluation of slope stability and settlement monitoring as required in Section 2.12,
5. an evaluation of air quality (PM10 and PM2.5) in the adjacent community of Wildwood as required in Section 2.14,
6. any changes to the design and operating plan as required in Section 2.15,
7. estimated costs of closure and post-closure activities as required in Section 2.19,
8. monitoring data as required in Section 3.1.1,
9. types and volumes (uncompacted cubic metres) of refuse discharged as required in Section 3.1.2,
10. details of the proposed dustfall monitoring program for the coming year.

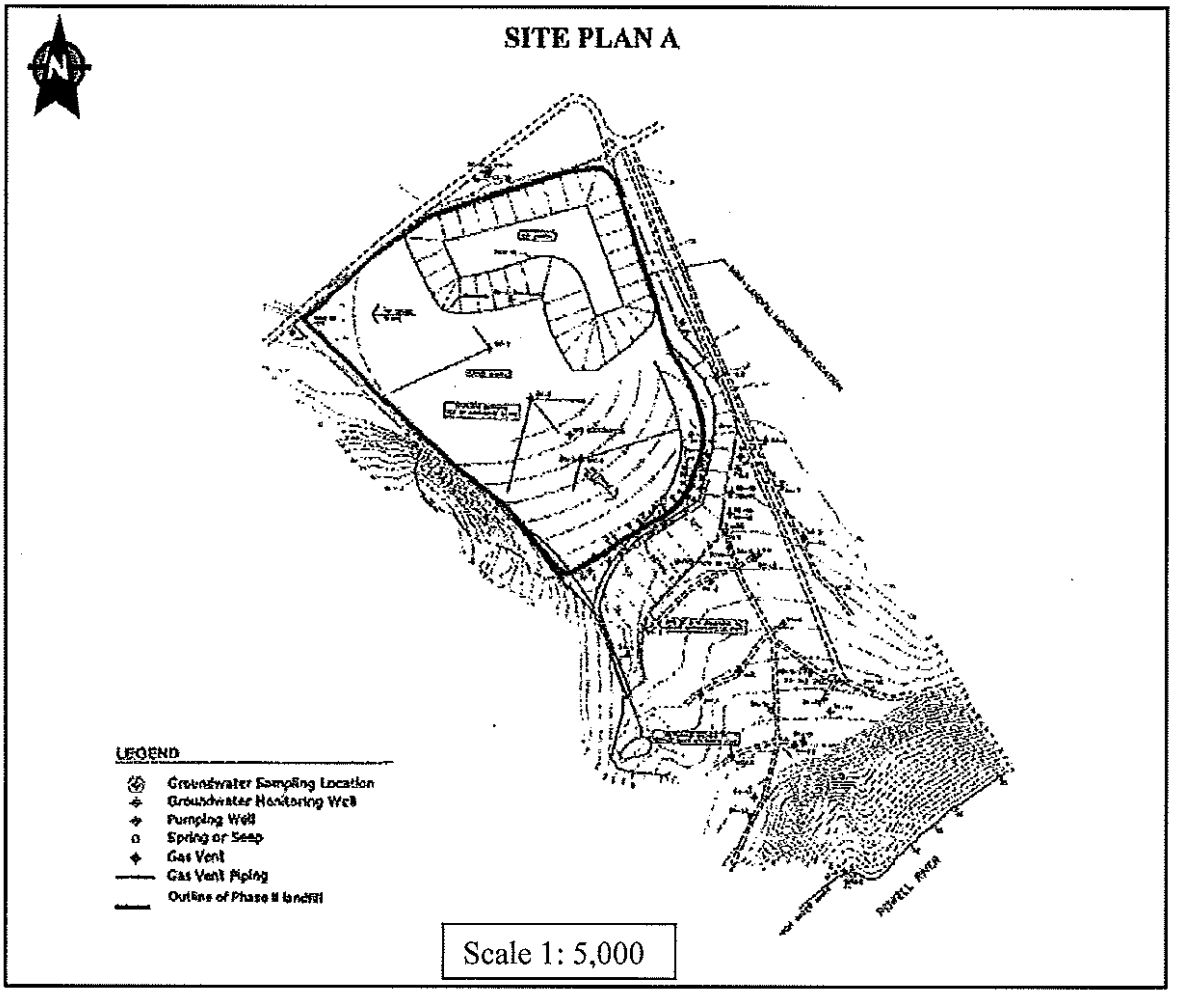
The following information must be posted on the company web page at the specified frequencies:

1. Ambient Monitoring Data Graphs – within 30 calendar days of the end of each month;
2. Dustfall and Hivol Monitoring Results – within 30 calendar days following receipt of the data; and
3. Groundwater Update Report, Annual Report (Section 3.5) – within 30 calendar days of receipt of the report.

Date issued: December 7, 1976
Date amended: May 3, 2011
(most recent)

Cassandra Caunce
for Director, *Environmental Management Act*
Lower Mainland Region

SITE PLAN A



Scale 1: 5,000

Location Map

Date issued: December 7, 1976
Date amended: May 3, 2011
(most recent)

Cassandra Caunce
for Director, *Environmental Management Act*
Lower Mainland Region

46

May 2, 2011

REPORT

2010 Annual Report
Wildwood Landfill
Powell River, BC

Submitted to:
Catalyst Paper Corporation
Powell River Division
5775 Ash Avenue
Powell River, BC
V8A 4R3

This is Exhibit "K" referred to in the affidavit of J. Braman
sworn before me at Vancouver in the Province of British Columbia this 20 day of April, 2012

A Commissioner for taking Affidavits within the Province of British Columbia

Report Number: 10-1435-0925/5025
Distribution:

2 Copies - Catalyst Paper Corporation
2 Copies - Ministry of Environment, Surrey, BC
1 Copy - Environment Canada, Vancouver, BC
2 Copies - Golder Associates Ltd.

A world of capabilities delivered locally

Golder Associates

Executive Summary

Groundwater and air quality monitoring at the Wildwood Landfill in Powell River, British Columbia, continued in 2010 with monitoring programs that were carried out in accordance with landfill permit PR-4565 (amended on August 6, 2008). Catalyst Paper Corporation operates the landfill, which consists of the closed Phase I Landfill and an operational landfill referred to as the "Mini-Landfill."

BACKGROUND

The Phase 1 Landfill was operated from the 1960s until its closure in 1995 by landfilling with waste-material from the mill site. Leachate from the Phase 1 Landfill is extracted from groundwater wells and treated at the mill site, and leachate formation is reduced by an asphalt cover. Discharge of waste-material from the mill site is ongoing at the Mini-Landfill, which is contained by an engineered leachate collection system. Historically, groundwater downgradient of the Phase 1 Landfill has included several chemical constituents at elevated concentrations, including pH as high as 12.1, total organic carbon as high as 68,325 mg/L, chlorinated phenols as high as 0.122 mg/L, dioxins and furans as high as 26,706 pg/L, and several metals in exceedance of the standards set by the BC Contaminated Sites Regulations (CSR). Since closure of the Phase 1 Landfill and commencement of operation of the groundwater extraction system in 1995, water quality at the site has improved considerably.

MONITORING OF THE MINI-LANDFILL

A total volume of 11,637 m^3 of waste-material, 98.9% of which was flyash, was placed in the Mini-Landfill during the 2010 monitoring year. Similar to previous monitoring years, grab samples of leachate collected by the collection system were characterized by elevated specific conductivity and pH. Dioxin and Furan concentrations (as total toxicity equivalent) in the leachate were 0 pg/L, and general chemical indicators were similar to previous years. No leachate was detected beneath the liner of the Mini-Landfill during the 2010 monitoring year.

GROUNDWATER MONITORING

A total volume of 1,890 m^3 of groundwater was removed from the Wildwood Landfill's groundwater extraction system in 2010. This extraction rate was 42% more than that of 2009, due primarily to the re-activation of the pumps after testing of the discharge lines in 2009 and the above average precipitation rates during the 2010 monitoring year. Of the total extraction rate, 87% was extracted from pumping well PW99-5, completed in the 29 m flow zone. This well, together with pumping wells completed in the 19 m flow zone (PW99-2 and PW99-4) and 11 m flow zone (PW95-1), appear to have aided in the partial dewatering of the upper two flow zones. Groundwater recovered by the extraction system was below the Contaminated Sites Regulation (CSR) for all constituents.

Monitoring of groundwater levels at the entire network of 86 wells at the Wildwood Landfill site indicates that groundwater at the site generally flows toward the southeast, toward Powell River. Flow patterns through several perched groundwater flow zones, the regional flow zone, and the bedrock flow zone in 2010 were generally similar to previous years.

Overall, the chemistry results from monitoring of the network of groundwater wells in 2010 were similar to previous years. Groundwater impacted by leachate from the Phase I Landfill, particularly at some locations near the southeast (downgradient) edge of the landfill in the upper 29 m of the subsurface, can be generally characterized as alkaline groundwater with reducing conditions. When assessing groundwater quality, the CSR represents the standards that should be met by groundwater at the point of discharging from the site, which is represented by Spring S1.

Surface water samples taken from Spring S1 and the Mill Filterhouse (which is discharge from Powell Lake) in 2010 met the CSR standards and for all chemical constituents. For reference only, the BCWQG for freshwater aquatic life (0.006 mg/L) were exceeded for vanadium (0.0083 mg/L) and the BCWQG for freshwater aquatic life (4 mg/L) were exceeded for calcium (20.5 mg/L) at the Spring S1.

The groundwater quality elsewhere across the site was also compared to the CSR for reference purposes. Dissolved metals were found in excess of the CSR standards in 2010 within the 11 m, 29 m, bedrock, and regional flow zones; however, exceedances in the regional and bedrock flow zones are thought to be due to naturally-occurring conditions. Samples taken from 89-5, AH-3, AH-6L, 94-16B and 06-2L in 2010 included exceedances of CSR standards for arsenic, copper, iron, manganese, and sodium. In addition, exceedances of the BCWQG are reported in samples from those and several other wells, for those metals (excluding manganese and sodium) and aluminum, cadmium, calcium, chromium, lithium, mercury, vanadium and zinc.

Dioxins and furans were detected within the inferred capture zone of the groundwater extraction system in the 11 m flow zone and the 29 m flow zone at 89-5 (NATO TEQ 0.02 pg/L) and AH-6L (4.2 and 5.9 pg/L in duplicates), respectively, and nearby at AH3 (2.9 pg/L). Dioxin and furan concentrations in 89-5 and AH-6L were lower than those measured historically. Low levels of dioxin and furans were detected at 94-19L, 93-2B (duplicate sample only) and the Mill Filterhouse. Dioxin and furan concentrations (NATO TEQ 0 and 0 pg/L in August and December, respectively) in samples from Spring S1 were, similarly to those in all of the other sample locations, near or below the detection limits. PCB concentrations were below the detection limits (0.001 mg/L) at all sample locations.

The results of the 2010 groundwater sampling program confirm that the original capping and leachate collection controls, together with the enhanced leachate collection measures implemented during the 2000 monitoring year, have resulted in the reduction of contaminants downgradient of the landfill.

DUSTFALL AND AIR QUALITY MONITORING

Dustfall measured at the Wildwood Landfill site was below the British Columbia dustfall Pollution Control Objectives (PCOs) for Residential and Other Areas. The particulate levels measured were well below the applicable air quality criteria.

It is recommended that the current groundwater monitoring program and air quality monitoring program for the Wildwood Landfill continue for 2011.

Study Limitations

This report was prepared for the exclusive use of Catalyst Paper Corporation (the Client). Any use that a third party may make of this report, or any reliance on or decisions made based on it, is the responsibility of the third parties. We disclaim responsibility for consequential financial effects on transactions or property values, or requirements for follow-up actions and costs.

In evaluating the proposed project, we have relied in good faith on information provided by others as noted. We assume that the information provided is factual and accurate. We accept no responsibility for any deficiency, misstatement or inaccuracy contained in this report as a result of omissions, misinterpretations or fraudulent acts of persons interviewed or contacted.

The services performed as described in this report were conducted in a manner consistent with the level of care and skill normally exercised by other members of the engineering and science professions currently practising under similar conditions, subject to the time limits and financial and physical constraints applicable to the services. The content of this report is based on information collected during our monitoring program, our present understanding of site conditions, the assumptions stated in this report, and our professional judgement in light of such information at the time of this report. This report provides a professional opinion and, therefore, no warranty is expressed, implied, or made as to the conclusions, advice and recommendations offered in this report. This report does not provide a legal opinion regarding compliance with applicable laws. With respect to regulatory compliance issues, it should be noted that regulatory statutes and the interpretation of regulatory statutes are subject to change. The findings and conclusions of this report are valid only as of the date of the report. If new information is discovered in future work, or if the assumptions stated in this report are not met, Golder Associates Ltd. should be requested to re-evaluate the conclusions of this report, and to provide amendments as required.

The information, recommendations and opinions expressed in this report are for the sole benefit of the Client. No other party may use or rely on this report or any portion thereof without Golder's express written consent. Golder will consent to any reasonable request by the Client to approve the use of this report by other parties as Approved Users. The report, all plans, data, drawings and other documents as well as all electronic media prepared by Golder are considered its professional work product and shall remain the copyright property of Golder, who authorizes only the Client and Approved Users to make copies of the report, and only in such quantities as are reasonably necessary for the use of the report by those parties. The Client and Approved Users may not give, lend, sell, or otherwise make available the report or any portion thereof to any other party without the express written permission of Golder, except as required by law. The Client acknowledges that electronic media is susceptible to unauthorized modification, deterioration and incompatibility and therefore the Client cannot rely upon the electronic media versions of Golder's report or other work products.

Table of Contents

TABLES

FIGURES

APPENDICES

APPENDIX I
Landfill Permit

APPENDIX II
Mini-landfill Volume and Capacity Survey and Historical Discharge Record

APPENDIX III
Historical Monitoring Data

APPENDIX IV
Groundwater Sampling Forms

APPENDIX V
Laboratory Reports 2010 Monitoring Rounds

APPENDIX VI
Field Duplicate Results

APPENDIX VII
Dustfall and Air Quality Monitoring

APPENDIX VIII
Settlement Monitoring: Survey Report

APPENDIX IX
Design and Operating Plan, 2009

1.0 INTRODUCTION

This report presents the results of groundwater and dustfall monitoring conducted at the Catalyst Paper Wildwood Landfill over the 2010 monitoring year. The Wildwood Landfill receives waste from the Catalyst Paper mill site located in Powell River, BC.

The 2010 monitoring program was carried out in accordance with the requirements outlined in the landfill permit (PR-4565), which was amended by the Ministry of Environment (MoE) on August 6, 2008. A copy of the amended permit is provided in Appendix I.

2.0 BACKGROUND

A variety of waste-material from Powell River mill site, including flyash from a power boiler, was placed in a sand and gravel quarry, beginning in the 1960s, to create the Wildwood Landfill. The location of the landfill is shown in Figure 1 and site plans are presented in Figures 2 and 3. MacMillan Bloedel Ltd. owned and operated the landfill from the 1960s until its closure in 1995. The closed portion of the landfill is referred to as the Phase 1 Landfill. In January 1996, a new, smaller landfill (referred to as the "Mini-Landfill") was established within the footprint (on the northeast corner) of the older landfill (Figure 3). In June 1998, MB Paper Ltd. sold the pulp and paper mill located in Powell River, BC to Pacifica Papers Inc. Pacifica Papers Inc. merged with Norske Skog Canada on August 27, 2001, forming a new company, NorskeCanada. In October of 2005, NorskeCanada changed its name to Catalyst Paper Corporation (Catalyst). The Wildwood Landfill has been included in all of these corporate transactions.

Closure of the Phase 1 Landfill consisted of covering the landfill with a low-permeability asphalt cap to minimize recharge from precipitation and installation of a leachate collection system. The asphalt cap covers an area of approximately 4 hectares immediately south of the Mini-Landfill. The leachate collection system initially consisted of three pumping wells located within the uppermost perched groundwater flow system (PW95-1, PW95-8 and PW95-9) along the south edge of the landfill (Figure 3). Three additional pumping wells (PW99-2, PW99-4 and PW99-5) were installed to greater depths along the east edge of the landfill in 1999 (and became operational in March 2000) to intercept leachate that may have been by-passing the original collection system (Figure 3). The groundwater recovered by these wells is conveyed by pipeline to the Catalyst Paper mill site wastewater treatment plant, where it is treated along with the mill's wastewater prior to discharge.

Waste from the mill site is currently being placed in the Mini-Landfill, which has been in operation since August 27, 1996. Waste types permitted under the Environmental Management Act (Permit PR-4565) include flyash and a minor proportion of miscellaneous mill waste and waste asbestos. The Mini-Landfill is lined with a HDPE geomembrane and soil bentonite liner and has provisions for leachate detection and collection. Vertical expansion of the Mini-Landfill commenced in 2009. Further vertical expansion above the Mini-Landfill and the Phase I Landfill will create a Phase 2 Landfill. An engineered leachate collection system including a HDPE geomembrane will be constructed above the asphalt cap of the Phase I Landfill. The Design and Operating Plan is provided in Appendix IX.

The following technical documents provide further background information:

- Environmental Assessment Report, Wildwood Landfill Expansion, Powell River, BC, prepared by Golder Associates Ltd. (project no. 06-1411-080/9000), dated July 6, 2007; and,
- 2008/09 Fish and Sediment Sampling Program, Catalyst Paper – Powell Lake, prepared by Golder Associates Ltd. (project no. 08-1411-0080/2010), dated March 31, 2009.

3.0 GEOLOGY AND HYDROGEOLOGY

3.1 Geological Setting

The Wildwood Landfill is located at the southeastern edge of a coastal terrace, near the top of a minor watershed, approximately 700 m by 700 m, which drains toward Powell Lake. This minor watershed consists of a bedrock valley filled with deposits of gravel, sand, and silt. The ground surface slopes downward (at about 4 degrees) in a southeast direction from the southeast edge of the landfill to Powell Lake. The portion of the hillside immediately above Powell Lake is a steep bank with a slope on the order of 30 degrees. The northwest edge of the landfill appears to represent a saddle point in the surface topography, with the ground surface sloping downwards towards the west and southwest at some distance northwest of the landfill (Figure 2).

Prior to operation, the landfill site was a sand and gravel quarry. Inspection of the 6 metre high western quarry wall in 1977 revealed large-scale cross-stratification and at least one fine-grained marine sediment layer (pit no. 36, McCammon, 1977). The following interpretations are inferred from borehole logs recorded during the drilling investigations at the site. Sediment thickness, from the present surface to the top of the underlying bedrock, ranges from approximately 20 to 60 m. Several stratigraphic sequences are bedded approximately parallel to the present topography. These sequences appear to extend over large portions of the site but some units may pinch-out locally.

The sediments are likely to have been deposited in the last c. 125,000 years during one or more series of glacial activity, glacial melt, and sea inundation associated with icecap isostacy. While specific stratigraphic units have not been identified at the site, deposits of the Fraser Glaciation (c. 10,000 to 28,000 ya), possibly including the Coquitlam Sequence and Vashon Sequence, are likely to compose the sediment fill atop the bedrock (Ryder et al., 1991). The steep slope southeast of the landfill and adjacent to Powell Lake may have formed as the river cut through much of the glacial sediments during isostatic rebound following melting of the icecap. Some recent colluvium and soils overly the glacial sediments.

The area occupied by the landfill is bounded to the west and east by ridges of granitic bedrock, with exposed bedrock along the southwest edge of the landfill. Beneath the site, the bedrock surface slopes in a southeast direction from an elevation of approximately 100 m above sea level at the south edge of the landfill to an elevation of about 60 m above sea level just before the break in slope above the shoreline.

3.2 Hydrogeology

A conceptual hydrogeological model is provided in Figure 4 as a schematic cross-section through the site. A medium sand to sand and gravel layer is present above the bedrock surface. Regional groundwater flows in a southeast direction at the landfill site within the sand unit and the upper, fractured zone of the bedrock. The thickness of the saturated zone above the bedrock is inferred to range between 5 m and 10 m in the central portion of the landfill to between 2 m and 20 m downgradient of the landfill. Groundwater within the regional zone is estimated to flow under an average gradient of 0.011, resulting in a velocity of on the order of 1 m/day. Hydraulic conductivity of the regional flow zone has been estimated to be approximately 4×10^{-4} m/s from a single-well response test (Golder Associates Ltd., 2007).

Groundwater is inferred to discharge from the upper portion of the regional aquifer to springs located on the slope above Powell River and likely also directly to the river by seepage beneath the water level in the river (*i.e.,* underflow). Groundwater within bedrock is inferred to discharge as underflow to Powell Lake.

The regional aquifer is overlain by a sequence of sands and gravels that contain layers of clay, silt and fine sand ranging from 0.1 m to 1.5 m in thickness. The presence of these stratigraphic units has created perched groundwater conditions. Perched aquifers have been identified beneath the southern crest of the landfill above fine-grained sediment layers at depths of approximately 11 m, 19 m, 29 m and 38 m below ground surface. Groundwater is inferred to move laterally in the aquifers and vertically at any boundaries of the perched aquifers, as illustrated in the schematic in Figure 4. Hydraulic conductivity in the perched flow zones is estimated to range from approximately 3×10^{-7} m/s to 2×10^{-4} m/s, with a mean of 2×10^{-5} m/s, based on single well response tests and pumping tests at 8 wells (Golder Associates Ltd., 2007).

Based on this mean value and the hydraulic gradient at the site, groundwater flow through the perched aquifers in the region of the landfill is estimated to be between approximately 5 m^3/day and 20 m^3/d. Some groundwater from the shallower perched zones may discharge to the steep slope above the spring zone.

4.0 DESIGN AND OPERATING PLAN

4.1 Changes to the Operating Plan in 2010

The current Design and Operations Plan for the Mini-Landfill is dated September 2009 and is provided in Appendix IX. The Mini-Landfill was operated in 2010 in accordance with this plan, with the following amendments:

Section 2.3.1:

The method of filling at the Mini-Landfill in 2010 has continued to be pouring slurried flyash into rows of concrete blocks, which are periodically pulled away from flyash after it is hardened and then repositioned to form another row, above and set back from the previous row. The perimeter ditch that was previously cut out along the northeast and northwest sides to collect surface water runoff has been cleared of flyash that accumulated in it.

The site safety plan and procedure that was identified in the Design and Operations plan was developed.

Section 6.4:

The accrued obligation on Catalyst's books was not updated in 2010 and remained at $1,078,000. This is based on a closure date of 2012.

4.2 Landfill Capacity and Closure Plan

The capacity of the Mini-Landfill authorized by the landfill permit was increased from 100,000 m^3 to 620,000 m^3 by the August 6, 2008 amendment to the permit. This increase in capacity will be accommodated by discharging mill refuse in one or more lifts atop the current footprint of the Mini-Landfill, and then by commencement of discharge to the Phase 2 Landfill, as outlined in the Design and Operating Plan (Appendix IX). In 2010, the vertical expansion of the Mini-Landfill continued as described in the Design and Operating Plan.

Golder understands that Catalyst plans to increase the filling rate at the Mini-Landfill from an average rate of approximately 13,000 m^3 per year to approximately 18,000 m^3 per year after January 2012, after Catalyst's G12 Power Increase project has started operating. This increase in annual filling rate will result in a projected closure date of the Phase 2 Landfill in approximately the year 2030.

5.0 SCOPE OF WORK AND FIELD METHODS

5.1 Monitoring of Mill Refuse in 2010

5.1.1 Alternate Disposal: Assessment of Flyash Utilization Options

Previous efforts undertaken to assess options for alternative flyash disposal were presented in the July 2007 Environmental Assessment report and the 2008 Annual report. Options that were the subject of past investigations for flyash utilization are listed below:

- Liming agent and fertilizer in agriculture;
- Additive to concrete;
- Backfill material for oil wells;
- Additive to a patented composite binder;
- Additive to building bricks;
- Construction of an artificial reef; and,
- Solidification of mine tailings.

5.1.2 Efforts to Minimize Leachate Formation

Efforts to minimize leachate formation during the 2010 monitoring year were consistent with previous years. Specifically, a minimal amount of water was reportedly added to the flyash to create a slurry prior to discharging to the landfill and much of the water is chemically bounded in hydrated minerals. We understand that care was also taken not to use excessive amounts of water when washing the mixer trucks on-site.

5.1.3 Discharge Monitoring: Mini-Landfill

5.1.3.1 Discharge Types and Quantities

Catalyst records each truck load of mill refuse that is discharged to the Mini-Landfill and records the types and quantities of material. Authorized types of refuse include flyash, waste asbestos, and a maximum of 3,000 m^3 per year of miscellaneous waste. Under the amended landfill permit, the maximum rate of discharge to the Mini-Landfill authorized is 25,000 m^3 per year and the total volume permitted for the Mini-Landfill is 620,000 m^3. Results of the discharge monitoring are presented in Section 6.2.

The remaining capacity of the Mini-Landfill is monitored by annually conducting a land survey of the Mini-Landfill.

5.1.3.2 Leachate Monitoring

Leachate draining from the Mini-Landfill is collected by an engineered collection system including an HDPE liner and is conveyed to the mill for treatment prior to discharge. In accordance with the landfill permit, two samples of the leachate were collected by Catalyst in 2010 and were analyzed for pH, specific conductance, and biological oxygen demand (BOD_5) by Catalyst Paper's laboratory. The samples were also analyzed for dioxins and furans by Pacific Rim Laboratories Ltd. The collection system includes a leak detection monitoring port, which is monitored by Catalyst on an approximately weekly basis. Results of the leachate monitoring are presented in Section 6.2.

5.2 Groundwater Monitoring Program

The permit for active waste disposal at the Mini-Landfill requires the following groundwater monitoring activities be carried out at the Wildwood Landfill site:

- Collection of groundwater samples from at least six groundwater monitoring wells and at least six groundwater pumping wells (when sufficient water is available);
- Monitoring for leachate indicator parameters ("snap-shot" sampling) at 14 monitoring locations on an annual basis; and,
- Monitoring of water samples from the active pumping wells for the field indicator parameters on a monthly basis.

In addition to the monitoring outlined above, Catalyst Paper monitors the volumes of groundwater removed from the pumping wells of the closed Phase 1 landfill on a weekly basis.

As part of the amended permit, the groundwater monitoring program now includes the analysis of polychlorinated biphenyls (PCBs) at all sampling locations on an annual basis. The scope of the 2010 program also included monitoring of halogens (Cl, F, and Br) and ammonia at all sampling locations for assessment purposes and monitoring of dissolved aluminum at the Spring (S1) and Mill Filterhouse to allow a comparison with the BC Water Quality Guidelines.

A summary of the current, approved groundwater program is provided in Table 1.

Table 1: Summary of Groundwater Monitoring Program

Sample Location	Dry Weather Monitoring Event (August 2010)	Wet Weather Monitoring Event (December 2010)
MW 93-2B and 06-2L* (upgradient)	GP	GP, CP, D. MET, D & F, PCB
MW 89-5	GP	GP, CP, D. MET, D & F, S, PCB
MW AH-3	GP	GP, CP, D. MET, D & F, PCB
MW AH-6L	GP	GP, CP, D. MET, D & F, PCB
MW 94-1/3	GP	GP, CP, D. MET, D & F, PCB
MW 94-16L	GP	GP, CP, D. MET, D & F, PCB
MW 94-16B	GP	GP, CP, D. MET, D & F, PCB
PW-Composite (includes PW95-1, PW95-8, PW95-9, PW99-2, PW99-4 and PW99-5)	GP	GP, CP, D. MET, D & F, S, PCB
Spring S1	GP and D & F	GP, CP, D &F, T. MET, D. Al, PCB
Mill Filterhouse	GP and D & F	GP, CP, D &F, T. MET, D. Al, PCB
QA/QC field duplicate	GP	GP, CP, D & F, PCB

Notes:
Field parameters monitored at all Sample Locations during each Monitoring Event: Specific Conductance (Electrical Conductivity at 25°C), pH, Oxidation-Reduction Potential (ORP), and dissolved oxygen.
GP (General Parameters) = Total Suspended Solids (TSS), Total Dissolved Solids (TDS), total alkalinity, hardness, bromide, chloride, fluoride, ammonia, nitrate, nitrite, sulfate, Total Organic Carbon (TOC)
S = Sulfide
T.Met = Total Metals
D.Met = Dissolved Metals
D.Al = Dissolved Aluminum

CP = Chlorinated/non-chlorinated Phenolics
D&F = Dioxin & Furans (includes selected congeners)
PCBs = Polychlorinated Biphenyls (total PCBs and Aroclors 1016, 1221, 1232, 1242, 1248, 1254, 1260, 1262 and 1268)
* = Sampling of 06-2L is not required as part of the landfill permit but was conducted in 2010 to provide an additional upgradient monitoring location.
Snapshot Wells: 06-1L, 06-2U, 06-2L (snap shot sampling of these three upgradient wells was carried out in 2010 for characterization purposes but is not a requirement of the landfill permit), 93-2B; 94-16U, 94-16M, 94-16L, 94-16B, 94-17L, 94-17B, 94-18U, 94-18M, 94-18L, 94-19U, 94-19M, 94-19L, 94-19B; Snap-shot analysis: pH, specific conductivity, alkalinity, temperature, redox potential, dissolved oxygen and sulfate.

Groundwater sampling is conducted on two occasions during the year; a dry weather sampling event in August and a wet weather sampling event in December. During each sampling event, the water level is measured in each of the 86 monitoring points of the monitoring network to determine the direction of groundwater flow at the site. These 86 monitoring points are located at 56 unique well locations that include multilevel and nested wells. Locations listed in Table 1 consist of a groundwater seep (Spring S1), discharge from Powell Lake (Mill Filterhouse), and a set of monitoring wells selected from the network of wells. The selected monitoring wells aid in analysis of (1) the groundwater quality between the landfill and the Wildwood residential community to the north and the freshwater aquatic environment of Powell Lake to the South, (2) the performance of the groundwater extraction system, and (3) the geochemical evolution of groundwater flowing towards Powell Lake.

Geochemical analyses include monitoring of metals, phenolics, dioxins and furans, and polychlorinated biphenyls (PCBs). General geochemical parameters such as total dissolved solids and alkalinity, as well as major anions and common halogens (including chloride), are monitored to allow an assessment of the evolution of the geochemistry at the site. A full suite of analyses is done annually on samples from two wells located north of the landfill, four monitoring wells and the six extraction wells located immediately south of the landfill, two monitoring wells and a groundwater seep near the shoreline of Powell River, and the surface water of Powell River. An annual "snap-shot" sampling event is conducted to monitor the indicator parameters in four wells located at various depths north of the landfill and an additional 13 wells located at various depths near the shoreline.

Groundwater at the site consists of moisture in unsaturated soil, perched water tables located at several depths, a regional aquifer, and a bedrock aquifer. Groundwater flow zones have been defined, based on sediment logs prepared from notes taken during drilling for monitoring well installation and from the historical water level measurements obtained at wells throughout the site. Sample Locations have been selected based on the conceptual model for groundwater flow discussed in Section 3.2. A summary of the sample locations and their respective groundwater flow zones is presented in Table 2.

Table 2: Sample Locations and Associated Groundwater Flow Zones

Groundwater Flow Zone	Sample Location	Pumping wells
11 m Perched Zone	AH-3, 89-5	PW95-1, PW95-8, PW95-9
19 m Perched Zone	06-2U (upgradient)	PW99-2, PW99-4
29 m Perched Zone	AH6L	PW99-5
38 m Zone	94-1/3, 94-18M, 94-18U, 94-19M, 94-19U, Spring S1	
Regional Aquifer	93-2B (upgradient), 06-1L, 06-2L, 94-16L, 94-17L, 94-18L, 94-19L	
Bedrock Aquifer	94-16B, 94-19B, 94-17B	

Note: PW95-8 and PW95-9 are dry or nearly-dry (since 2000 and 2002, respectively) and are no longer sampled.

During each monitoring event, groundwater levels are measured at all monitoring and pumping wells (the entire 86-well network) using an electronic water-level meter. Totalizer flow meters monitor the discharge rate of the water pumped from the extraction wells. The totalized discharge is recorded weekly, and the electrical conductivity and pH of the discharge is recorded monthly, where available.

Prior to sampling, monitoring wells were purged of three standing well volumes with dedicated lengths of Waterra™ tubing. Field indicator parameters (pH, specific conductivity, temperature, dissolved oxygen and redox potential) were measured in the field at the time of sampling and documented on standard field sampling forms for each location (copies of the forms are presented in Appendix IV). Grab samples were obtained from the pumping wells (the majority of water recovered in 2010 was from PW99-5; therefore, the pumping well samples were obtained from this location in 2010), and surface water samples were collected approximately 30 m from a discharging seepage face at its inflow to Powell Lake (Spring S1) and from discharge from Powell Lake (the Mill Filterhouse).

Quality control measures were taken during the sampling events and laboratory analyses conducted in 2010 to assure that the methods provided results that may be incorporated into analytical interpretations. A duplicate sample was taken in August from 89-5 for analysis of general parameters. A duplicate sample was taken in December from AH-6L for analysis of general parameters, dissolved metals, phenolics, dioxins and furans, and PCB's.

5.3 Monitoring of the Landfill Gas Composition

The sediment in the landfill and the surrounding ground is unsaturated to a depth of approximately 10 to 40 m. In general, a landfill containing organic material may create conditions favourable for microbiological production of methane. Gas vent piping was installed beneath an asphalt cap within the engineered cover on the Phase I Landfill, and passive venting has been allowed since 1999. Four vents (GV1 to GV4) of the landfill gas control system were monitored on August 24, 2010, to determine whether changes in landfill gas conditions occurred relative to previous years. Gas monitoring consisted of placing a sealed end cap on each vent and measuring gas vapours (methane, hydrogen sulfide, oxygen, CO_2 and vapour pressure) at various time intervals during purging of the vents with an air pump. Each gas vent was purged and monitored until the measurements stabilized. The results of this monitoring are presented in Section 6.5.

5.4 Inspection and Repair of Landfill Cover

Inspection of the asphalt cap covering the landfill is conducted by Golder on an annual basis to monitor its integrity and identify any repairs that may be required. Inspection of the asphalt cap was conducted during dry season monitoring in August 2010, and any cracks were sealed using a commercially available sealant. A discussion of the findings of this inspection is presented in Section 6.6.

5.5 Dustfall and Particulate Monitoring

Catalyst conducted an ambient dustfall monitoring program to determine dust deposition rates adjacent to the Wildwood Landfill. The methods and results of the dustfall monitoring are provided in Appendix VII. The dustfall sampling devices were placed in the field for 3 sampling periods, with each period lasting 28 days. Dustfall samplers were installed at four separate locations on the northwestern and northeastern boundaries of the landfill (Figure 3). These locations were chosen to be close to the Mini-Landfill because "dustfall" materials typically travel only a short distance from the source. Furthermore, the sampling sites are located between the potential dust source (the Mini-Landfill) and nearby residential areas. Generally dust levels decrease as distance from the source increases. Four locations were selected to provide sufficient geographic coverage of any elevated levels of dustfall associated with the landfill.

Sampling of particulate matter 2.5 microns and smaller ($PM_{2.5}$) and particulate matter 10 microns and smaller (PM_{10}) was conducted at the following locations:

- The Wildwood air quality monitoring station located at the intersection of King Avenue and Highway 101 (Wildwood Station), from January 1, 2010 through December 31, 2010 (PM_{10}), and from January 24, 2010 through December 31, 2010 for $PM_{2.5}$.
- The Wildwood School from January 1, 2010 through December 31, 2010.

Measurements were recorded using Tapered Element Oscillating Microbalance (TEOM) technology. Sampling of PM_{10} was also conducted at the Mini-Landfill using a high-volume (Hi-Vol) sampler.

5.6 Settlement of the Mini-Landfill

Settlement of the Phase 1 landfill is monitored annually by conducting a land survey of selected points located on the asphalt cover. The change in elevation is monitored at three survey points on the southern portion of the cover, with an accuracy of +/- 0.015 m. The results of this monitoring are discussed in Section 6.8. At least one of these monitoring points will be covered by the Phase II Landfill, and new monitoring points are included in the Design and Operating Plan (Appendix IX).

6.0 RESULTS OF 2010 MONITORING PROGRAM

6.1 Precipitation

Total precipitation at the Wildwood Landfill in 2010 is estimated to be 1177 mm, based on measurements made primarily at the Powell River weather station, located 8 km to the southeast of the landfill (Environment Canada, 2011). Data from the weather station were missing for 71 days in 2010. For those days, this estimate includes rainfall assumed to be equal to a total value of 109 mm reported at the Cortes Island weather station (located approximately 35 km northwest of the landfill). Precipitation in 2010 was 17% greater than the mean annual value (1070 mm), as calculated from measurements at the station from 1924 to 2010 (Figure III-1)[1]. 2010 was considerably wetter than previous years, during which six of the previous ten years were drier than average. In 2010, the seasonal variation in precipitation (Figure III-2) was generally typical of the region, with rainy conditions from January to May, drier conditions from June to September, and rainy conditions from October to December. However, the beginning and end of the year was particularly wet and the summer months were particularly dry with respect to normal precipitation.

6.2 Monitoring of the Mini-Landfill

6.2.1 Discharge Quantities - Mini-Landfill

The types and volumes of uncompacted refuse discharged to the Mini-Landfill during 2010 (as monitored by Catalyst Paper) are summarized in Table 3. For comparison, types and volumes of refuse discharged historically to the Mini-landfill are summarized in Table II-1. A total volume of 11,637 m^3 of refuse material was placed in the Mini-Landfill during the 2010 monitoring year, the majority of which (11,505 m^3) was flyash. Minor amounts of asbestos and calcined lime were also discharged in 2010, together accounting for 1.1% of the total waste.

Based on a survey of the landfill carried out by Emery & Rae Land Surveying Ltd. on February 2, 2011 (Appendix II), the total volume of waste and associated cover material that has been deposited in the Mini-Landfill since the start of landfilling on August 27, 1996, is 140,500 m^3. Refuse discharged to the Mini-Landfill in 2010 continued landfilling as part of a vertical expansion over the original cell of the Mini-Land fill, as described in the Design and Operating Plan (Appendix IX). The total volume of landfill material tracked by continuous recordings of each truckload is estimated to be 121,570 m^3 (Table II-1).

Table 3: Refuse Types and Quantities Discharged to the Mini-Landfill in 2010

Date	Bed Sand	Fly Ash (m^3)	Misc. (m^3)	Asbestos (m^3)	Total (m^3)	Permitted (m^3)	Miscellaneous Category Comments
Jan-10	0	1,020	0	8	1,028	2,123	
Feb-10	0	802	0	0	802	1,918	
Mar-10	0	1,002	0	0	1,002	2,123	
Apr-10	0	977	0	0	977	2,055	

[1] It should be noted that the mean precipitation of 1070 mm is lower than the mean precipitation presented in the 2009 report (1157 mm). This is because a longer period of record (1924 through to the present) was available to calculate the mean in 2010 as compared with 2009 (1954 to 2009).

Date	Bed Sand	Fly Ash (m^3)	Misc. (m^3)	Asbestos (m^3)	Total (m^3)	Permitted (m^3)	Miscellaneous Category Comments
May-10	0	949	0	0	949	2,123	
Jun-10	0	901	0	8	909	2,055	
Jul-10	0	1,100	0	0	1,100	2,123	
Aug-10	0	905	0	0	905	2,123	
Sep-10	0	1,167	0	0	1,167	2,055	
Oct-10	0	900	0	0	900	2,123	
Nov-10	0	906	0	8	914	2,055	
Dec-10	0	876	91.7	16	984	2,123	91.7 m^3 calcined lime
Total (m^3)	**0**	**11,505**	**92**	**40**	**11,637**	**25,000**	
Total (%)	0%	98.9%	0.79%	0.3%	100%		

6.2.2 Leachate from the Mini-Landfill

In accordance with the monitoring requirements, leachate from the collection system of the Mini-Landfill cell was sampled by Catalyst in February and July, 2010. The results from the 2010 analyses of pH, specific conductance, BOD_5, and dioxins and furans are summarized in Table 4 and presented graphically in Figure 5. Historical results are presented in Appendix III (Table III-1).

Table 4: Analysis of Leachate from the Mini-Landfill in 2010

Date of Sample Collection	pH	Specific Conductance (uS/cm)	BOD_5 (mg/L)	Dioxin/Furan	
				NATO TEQ (DL=0) (pg/L)	WHO TEQ (DL=0) (pg/L)
February 4, 2010	7.94	10,400	118.9	0	0
July 29, 2010	8.89	5,140	403.1	-	-

The leachate from the Mini-Landfill remained alkaline in 2010 with pH of 7.94 and 8.89, and the specific conductance remained high (10,400 µS/cm and 5,140 µS/cm in 2010). These values represent a rise in pH and a modest decline in specific conductance since 2009, but the results are similar to the results from previous years. In comparison to the groundwater sampled downgradient of the Phase 1 landfill (Table 5), the pH of the Mini-Landfill leachate was higher than the pH at any of the sample locations except AH-6L (pH 9.06), and the specific conductance was higher than that of any of the downgradient sample locations.

BOD_5 is the biological oxygen demand, as the amount of dissolved oxygen consumed in five days by the microbiological decomposition of organic matter. The BOD_5 results (118.9 and 403.1 mg/L in 2010) indicate that the leachate contains a significant amount of dissolved organic matter that is actively being decomposed by microbes. Historical trends in BOD_5 (Figure 5) have been similar to trends in pH, each of which increased in the early 2000s and subsequently decreased. BOD_5 has typically been higher in the warmer summer months. BOD_5 reached a peak of 704.8 mg/L in 2004 and subsequently declined, due possibly to a decrease in disposal of biodegradable material in the Mini-Landfill. The flyash consists of approximately 1% organic carbon, and

leachate extracted from a flyash sample in the laboratory had total organic carbon concentration of 0.50 mg/L (Golder Associates, 2007).

Dioxins and furans in the leachate from the Mini-Landfill remained low in 2010, with a toxic equivalency (TEQ) of 0 pg/L, using the NATO toxic equivalency factors (TEF's) and setting the concentration of each congener equal to zero for results with concentrations below the detection limit (DL). Since the beginning of the operation of the Mini-Landfill in 1996, the maximum dioxin and furan TEQ in 15 samples collected from the leachate was 2.83 pg/L, significantly below the maximum contaminant level of 30 pg/L established for 2,3,7,8-TCDD in drinking water by the US EPA (mentioned here for reference purposes only).

Historically, the primary wastes placed in the Mini-Landfill have been flyash and lime mud and dregs, the latter of which is particularly high in dissolved salts. In early 1999, landfilling of the flyash at the Mini-Landfill was discontinued as the disposal moved off-site, leaving lime dregs to dominate the waste profile until May of 2002 (Table II-1). In May 2002, the placement of lime dregs waste material in the Mini-Landfill was discontinued, due to the closure of the Kraft Mill at the Catalyst Paper Mill site in November 2001. Once the Kraft Mill ceased operation, placement of waste in the Mini-Landfill was reduced to about 200 m^3/year. Landfilling of fly ash in the Mini-landfill was reinstated in 2006, when the mixer truck method of hauling was developed. Fly ash has been the predominant waste placed in the landfill from 2003 to the present. The predominance of lime dreg disposal in the Mini-Landfill between 1999 and 2002 is likely the reason for the more significant increasing trend in pH during that time, and the material may continue to contribute to the elevated pH of the leachate. The flyash has a pH of 12.3, and leachate extracted from a flyash sample in the laboratory had a pH of 11.7 (Golder Associates, 2007).

6.2.3 Monitoring of Leakage Detection System – Mini-Landfill

The leakage detection pump located beneath the liner of the Mini-Landfill is activated on a weekly basis by Catalyst to determine whether leachate has leaked through the collection system. No leachate was detected beneath the collection system during the 2010 monitoring year.

6.2.4 Surface Water Drainage Related to Mini-Landfill

On December 24, 2010, surface water runoff caused by heavy rain reportedly resulted in a breach at the northeast perimeter berm of the Mini-landfill. During this event, leachate reportedly flowed out of the Mini-landfill across the paved road and down the unpaved road toward the forested area. The leachate did not reportedly reach any waterways and did not leave behind a residue. The spill was reportedly stopped by adding sand to the berm to increase the height. This incident was reported to the MOE by way of a letter from Catalyst dated January 21, 2011 and is provided in Appendix II for reference purposes.

6.3 Monitoring of Groundwater Discharged from the Extraction Wells

The current leachate recovery system consists of one operational pumping well (PW95-1) that extracts groundwater from the 11 m flow zone, two pumping wells (PW99-2 and PW99-4) that extract groundwater from the 19 m flow zone, and one pumping well (PW99-5) that extracts groundwater from the 29 m flow zone. Pumping wells PW95-8 and PW95-9, which are completed in the 11 m flow zone, have remained dry or nearly-dry since June 2000 and May 2002, respectively. Pumps in PW95-8 and PW95-9 were activated in March 2010

as a check, but no flow reported to the totalizing flow gauge. Pumping wells PW95-1, PW95-8 and PW95-9 were initially activated on September 30, 1995, and pumping wells PW99-2, PW99-4 and PW99-5 were first activated on March 30, 2000.

Catalyst Paper recorded totalizer flow meter pumping volumes for each of the four operational pumping wells on a weekly basis during 2010. The results were sent to Golder for input into the historical dewatering database and routine assessment of the performance of the dewatering wells. In addition, field measurements of pH and specific conductivity of the discharge from each pumping well was measured on a monthly basis. The results of these measurements for the 2010 monitoring year are presented in Table III-2 and plotted in Figures 6, 7, 8 and 9.

6.3.1 Discharge Volumes and Discharge Rates from the Extraction Wells

A total volume of approximately 1,890 m^3 was removed by the extraction wells in 2010 (Table III-1). This discharge volume is a 42% increase over the discharge recorded in 2009. The increase appears to be representative of the extraction wells returning to pre-2009 typical pumping behaviour[2] and due to wetter-than-normal conditions in 2010.

Over the life of the extraction system (1995 to 2010), a total volume of approximately 37,730 m^3 has been extracted. Approximately 7,000 m^3 was extracted from the 11 m flow zone by PW95-1, PW95-7, PW95-8, PW95-9, PW95-10, and PW95-12 to effectively dewater the zone by 1997, except for water associated with the rainy season discharged by PW95-1. In 2010, approximately 225.1 m^3 of groundwater was pumped by PW95-1, primarily in January, February, and March. Much less water was pumped from PW99-2 and PW99-4 in the 19 m flow zone (16.9 and 0.2 m^3, respectively). Pumping well PW99-5, completed in the 29 m flow zone, extracted 1,648 m^3 of groundwater, approximately 87% of the groundwater removed from the landfill site in 2010.

Figure 6 presents the total pumping rate since installation of the extraction system in 1995, as a sum of the rates from each well. The total pumping rate in 2010 ranged from a minimum of 4.02 m^3/d on December 23, 2010 to a maximum of 9.98 m^3/d on January 27, 2010. The total discharge behaviour was similar to previous years, with higher rates during the wet season.

Figures 7A, 7B, and 7C present the pumping rates for each of the pumping wells. The pumping rate from PW 99-5 has decreased from approximately 27 m^3/d in 2000 to an average of approximately 4.6 m^3/d in 2010, and shows little variation during the annual cycle in precipitation (Table III-2, Figure 7B). Discharge from PW95-1, PW99-2, and to a lesser extent, PW99-4, is influenced by the seasonal variation in precipitation, with the onset of increases in discharge typically coming during the rainy season (November to April). In 2010, discharge from PW95-1 rose to a peak of 5.5 m^3/d on January 27, returned to zero by September, and rose again to approximately 0.4 m^3/d in December in response to heavy rainfall in November and December (Table III-2, Figure 7B). Discharge from PW99-2 in 2010 was higher than in 2009 (maximum discharge of 0.09 m^3/day). Discharge from PW99-4 remained relatively low in 2010 (maximum discharge of 0.003 m^3/d), following a trend of decreasing flow rates since 2007. The last activity in PW95-8 and PW95-9, in 2000 and 2002, is evident in Figure 7A. Extraction of groundwater from the 1995 and 1999 pumping wells, together with reduction in recharge by the asphalt cover, have resulted in the partial dewatering of the 11 m and 19 m flow zones along the southeast edge of the landfill. Therefore, these wells are considered to provide a hydraulic impediment to

[2] During the 2009 monitoring year, the recovery wells were turned off during testing of the discharge system.

leachate movement in both the 11 m and 19 m flow zone. The extraction system appears to provide sufficient containment of leachate-impacted groundwater, based on analyses of groundwater flow directions and the trends in indicator geochemical parameters measured downgradient from the landfill, which are discussed below.

6.3.2 Quality of Pumped Groundwater

Measurements of specific conductance and pH, made on a monthly basis when available, are provided in Figures 8 and 9 and in Table III-2. A more detailed analysis of the sample collected from the pumping wells during the wet season is presented below in Section 6.4.2.

Specific conductivity of the groundwater discharged from PW99-5 (Figure 8) was less than 0.3 mS/cm in 2010, and has demonstrated a gradual decline over the period of record from 1999 through 2010. The groundwater pumped from PW95-1 and PW99-2 has had a specific conductivity that has declined from levels as high as 9 mS/cm and 4 mS/cm, respectively, in the several years after pumping began to below 1 mS/cm. Some seasonal variation in specific conductivity is apparent at these wells, particularly PW99-2, with concentrations highest over the period of February through April. Concentrations during this period were higher in 2010 than the last few years, but returned to typical levels by the end of 2010. The small volumes of water extracted from PW99-4 continue to yield samples with specific conductance higher than 2 mS/cm. For reference purposes only, the guideline for specific conductivity of drinking water established by the BC Water Quality Guidelines (BCWQG) is 0.7 mS/cm.

The pH decreased significantly in the discharge from the 11 m flow zone (PW95-1, PW95-8, PW95-0), from alkaline levels between 9.5 and 12.6 in 1995 to relatively neutral conditions between 6.4 and 7.7 by the latter part of 2000 (Figure 9). Since 2003, the pH of the discharge from the 11 m flow zone (PW95-1) has been at relatively neutral levels between 6.5 and 7.5. Since the installation of PW99-2, PW99-4, and PW99-5, the pH in the water pumped from the 19 m and 29 m flow zones had trended downward from between approximately 7.2 and 8.6 in 2000 to between approximately 6.3 and 8.4 in 2010. In 2010 pH was similar to recent years at 95-1, 99-2, 99-4, and 99-5. For reference purposes only, the guideline for the acceptable pH of drinking water established by the BCWQG is between 6.5 and 8.5.

6.4 Groundwater Monitoring Results

Groundwater monitoring was carried out at the Wildwood Landfill during the months of August and December 2010. During each monitoring round, groundwater levels were measured manually at all monitoring locations, and groundwater samples were collected from select monitoring wells in accordance with the monitoring program outlined in Section 5.2. As discussed in Section 5.2, a round of "snap-shot" sampling for leachate indicator parameters at all monitoring locations was also conducted from August 26 through 31, 2010. The results of these tasks are presented below. The snap-shot well 94-16U was dry for the third consecutive year, and the snap-shot well 94-16M could not be sampled for the second consecutive year due to an obstruction in the well.

6.4.1 Water-level Monitoring

6.4.1.1 Groundwater Flow Patterns

The results monitoring groundwater levels in 2010 are included in the database of historical results provided in Table III-3. Groundwater level contours inferred from measurements made in November 2010 in the 11 m, 19 m, 38 m, regional, and bedrock flow zones are presented in Figures 10 through 14, respectively.

Figure 10 presents groundwater contours in the 11 m flow zone. Thirteen of the twenty-seven wells in this shallow zone were dry in November 2010. Groundwater in the 11 m flow zone is inferred to flow toward the south to southeast, based on the measurements of hydraulic head.

Groundwater flow in the 19 m zone (Figure 11) occurs predominantly along the east edge of the site, where the 19 m silt layer is present. The figure shows that several of the wells installed within the 19 m flow zone are dry, which may be result of the partial dewatering of this flow zone due to the operation of pumping wells PW99-2 and PW99-4. Groundwater in the 19 m zone flows toward the southeast, both in the region to the north of the landfill and in the region to the south of the landfill. The measurements at monitoring wells located between the landfill and the Wildwood community indicate that groundwater at an approximate depth of 19 m continues to flow toward the landfill.

A figure of the 29 m flow zone is not presented because only three wells (AH4, AH6L and PW99-5) are completed in that zone. Levels in AH6L and PW99-5 are shown in Figure 11, as they are similar to levels in nearby wells in the 19 m flow zone. Figure 12 presents groundwater contours in the 38 m flow zone. Groundwater flow in this zone is inferred to flow toward the southeast.

Regional groundwater flow (Figure 13) appears to be influenced by the topographic knob immediately west of the landfill, based on water level measurements in twelve wells. Water level measurements indicate that unsaturated conditions may exist at depths as great as approximately 40 m. To the south of the landfill, groundwater in the regional aquifer located 2 to 20 m above the bedrock flows east to southeast toward Powell Lake.

Groundwater in the uppermost portion of the bedrock (Figure 14) is inferred to flow east to southeast, away from the topographic knob west of the landfill and toward Powell Lake.

6.4.1.2 Variations in Water-level Elevations

A summary of water-level measurements obtained at select monitoring locations is illustrated in Figures 15A through 15F for each groundwater flow zone. Gaps in the records indicate that the water level was too low to be measured.

In the upper (11 m) perched zone, water levels along the south edge of the landfill decreased at most wells by approximately 3 m from 1995 to 2000, and the levels have remained relatively stable since then (Figure 15A). At that location, the flow zone is generally dewatered, and water level measurements are indicative of standing water in the sumps of the wells located in the silt layer below the flow zone. Exceptions to this observation are apparent at 89-5, 95-2, and PW95-1. At 89-5 and 95-2 water levels have remained relatively stable since times prior to activation of the extraction system. Based on this response and the low hydraulic conductivity at 89-5 (3×10^{-7} m/s), these wells are inferred to represent the aquitard rather than the aquifer at the 11 m depth.

Groundwater appears to enter the 11 m flow zone in the wet season and flow toward low points of the silt layer which is 11 m below the original land surface, to locations such as PW95-1. Water levels in wells in the 11 m perched zone at other locations at the site either decreased slightly in 2010 or remained stable (Figure 15A). In the 11 m flow zone, some seasonal fluctuations in water levels were evident.

In the 19 m perched zone, water levels were generally slightly higher in 2010, relative to 2009 (Figure 15B). Particularly in the wells downgradient from the landfill (Figure 15B-3), the higher water levels appear to be due to the higher than average precipitation received in 2010 (Figure III-1). As is the case with PW95-1 (in the 11 m perched zone), groundwater at the south edge of the landfill in the 19 m perched zone appears to flow to low points in the silt layer, such as PW99-4.

A perched flow zone at the 29 m depth has been identified only in the region near PW99-5, based on well logs. This flow zone is inferred to extend across a larger region or be hydraulically connected to other flow zones, as would be required to enable the sustained discharge from this zone observed at PW99-5. Water levels in the region near PW99-5 (Figure 15C) indicate that water flows from AH6L to PW99-5, but water at AH4 (approx. 30 m downgradient from PW99-5) is not captured by PW99-5. An estimated capture zone for PW99-5 (Golder Associates, 1999) extends laterally a width of approximately 70 m to the north and approximately 20 m to the south (longitudinally). However, the region in the immediate vicinity of AH6L shows a limited hydrogeologic response to pumping at PW99-5, located about 3 m away. Water levels in the 29 m perched zone increased slightly in 2010, relative to the levels in 2009, and appeared to respond to annual changes in precipitation.

Water levels in the 38 m flow zone (Figure 15C) have exhibited similar trends as other zones that are not impacted by pumping: fluctuations in response to annual variation in precipitation and slightly increased levels in 2010.

Water levels in the regional flow zone (Figure 15D) have also historically changed in response to annual variation in precipitation. Water levels in the regional flow zone generally increased slightly in 2010, relative to the levels in 2009.

Water levels in the bedrock flow zone (Figure 15E) have changed historically in response to annual variation in precipitation. An assessment of the vertical flow direction between the regional flow zone and the bedrock flow zone is provided in Figure 15 F. This history of the vertical flow direction indicates that some amount of water flows downward from the regional flow zone into the bedrock in the regions upgradient and immediately downgradient of the landfill. Nearer to the shoreline, however, hydraulic gradients indicate that some amount of groundwater in the bedrock typically discharges upward into the regional flow zone. Gradients at 94-16, however, indicate that in the central portion of the slope below which the landfill is situated, this pattern reversed between 2000 and 2007. This change from upward flow from the bedrock to downward flow from the sediments may be related to focussed infiltration of runoff from the asphalt cover over the Phase 1 Landfill. Since 2007, groundwater in the bedrock near the discharge zone of the Powell River has drained to the more conductive regional zone at all locations.

6.4.2 Chemistry Results

The results of the 2010 groundwater sampling are tabulated in Tables 5 through 10. Figures 16 A through 16 T present time-series plots of selected geochemical constituents and general parameters. These historical data are also provided in Table III-4. Historical results of the dry season "snap-shot" sampling round of field parameters, alkalinity, and sulfate are tabulated in Table III-5 and plotted for each groundwater flow zone in Figures 17 A-G. Laboratory reports are provided in Appendix V.

The pumping wells completed in the 11 m zone (PW95-1, PW95-8 and PW95-9), together with those in the 19 m zone (PW99-2 and PW99-4) were dry or nearly dry at the time of sampling in December 2010. As a result, the composite sample obtained from the recovery system was representative of groundwater captured by the only pumping well that was active at that time, PW99-5 (completed in the 29 m zone). Throughout 2010, PW99-5 extracted 87% of the total volume of groundwater pumped by the recovery system. This sample is referred to as "the pumping wells" in the text of this report, and "PW-Composite" in the tables.

Indicator parameters of the leachate from the Phase I Landfill have been identified over the course of groundwater monitoring. Groundwater quality has been monitored downgradient of the landfill since 1990. The following parameters are presented with their maximum concentration/level observed historically in groundwater from the recovery wells and 89-5 (located in the 11 m flow zone immediately downgradient of the closed landfill) because concentrations representative of pure leachate are not available: specific conductance (16,700 µS/cm), pH (12.1), sulfate (2,890 mg/L), alkalinity (>15,400 mg/L), total organic carbon (TOC) (68,325 mg/L), metals, chlorinated phenols (0.122 mg/L), and dioxins and furans (26,706 pg/L[3]). Leachate from the Phase I Landfill is alkaline and carbon-rich, with a high ionic load relative to freshwater.

In general, for each geochemical constituent, concentrations along the flow path increase at the landfill and decrease downgradient of the extraction system. Temporal trends in groundwater chemistry based on historical results and the 2010 groundwater sampling and snap-shot monitoring results, are discussed below for individual constituents.

6.4.2.1 Specific Conductance

Specific conductance (SC) remained at levels similar to recent years at most sample locations, with the exception of some locations upgradient of the landfill and near the shoreline (Figure 16A and Figure 17B). An increase in specific conductance was observed at AH-6L from 2006 through 2009, but this trend did not continue in 2010 and the conductance declined to 2008 levels. Increases in specific conductance relative to August 2009 were measured at the upgradient well 06-2L (to 323 µS/cm), at the Mill Filterhouse (to 254 µS/cm), and possibly near the shoreline at Spring S1 (to 1960 µS/cm). The recorded value for SC at the Spring S1 was approximately six times greater in December 2010 than in 2009, but this value is likely an errant reading related to the field instrumentation. This is supported by the TDS measured by the laboratory in December 2010, which was lower than that of the August sample (which had an SC of 330 µS/cm).

The SC at the downgradient well 94-19L remained elevated in 2010 (325 µS/cm) after an increase was observed from 121 µS/cm in 2008 to 350 µS/cm in 2009 (Figure 17B). This well was sampled and analyzed for a full suite of water quality parameters, and the results of these analyses are discussed below, specifically in Section 6.4.2.12.

[3] The TEQ reported was calculated using the North Atlantic Treaty Organization (NATO) method where values less than the detection limit were set equal to zero.

6.4.2.2 pH

The pH has trended downward or remained between 6.5 and 8.5 in nearly all sampling locations since groundwater extraction began in 1999 (Figure 16B and Figure 17C). Exceptions to these trends include: (1) pH which has been largely above 8.5 at AH-6L; (2) highly variable pH at the Mill Filterhouse; and (3) several instances prior to 2001 of pH greater than 8.5 near the shoreline (Figure 17C). The somewhat elevated pH at AH-6L may be related to the leachate from the Phase 1 Landfill directly (associated with either flyash or lime dregs) or due to biodegradation of carbon, similarly to a reaction zone in leachate from a typical carbon-rich landfill.

6.4.2.3 Sulfate

Sulfate concentrations have typically been below 50 mg/L upgradient of the landfill and near the shoreline (Figure 16C and Figure 17D). Notable exceptions to this trend are sulfate concentrations as high as 119 mg/L at Spring S1 prior to 1996, sulfate between 34 and 119 mg/L at 94-16U (near the shoreline, dry since 2006), and sulfate between 92 and 116 mg/L at 06-2U (upgradient of the landfill).

At sample locations at the south edge of the landfill and downgradient of the landfill, sulfate concentrations are consistently several times higher than levels at locations upgradient of the landfill. Historically, sulfate has ranged between 10 and 500 mg/L at 89-5, AH-3, and AH-6L. In 2010, sulfate ranged from 75 to 329 in samples from these wells, at values similar to those in recent years. Sulfate concentrations indicate that sulfate minerals in the Phase 1 Landfill continue to dissolve, sulfate is captured by the extraction wells and attenuates downgradient of the landfill, possibly due more to mineral precipitation than sulfate reduction.

6.4.2.4 Alkalinity and Calcium

Alkalinity (reported as $CaCO_3$ for all samples) in the 11 m flow zone at the south edge of the landfill has decreased since operation of the extraction system began in 1995, from a concentration at 89-5 as high as 15,400 mg/L to a concentration of approximately 476 mg/L in 2010 (Figure 16D). Alkalinity in the discharge water from PW99-5 (PW-Comp) has remained somewhat constant at a relatively low level in the last several years and was 62 and 63 mg/L in August and December 2010, respectively. Alkalinity upgradient of the landfill in several flow zones has been between 43 and 111 mg/L (aside from an anomalous result in 1998). Alkalinity in the 11 m and 19 m flow zones downgradient of the landfill has decreased from between approximately 1000 and 1720 mg/L prior to 1995 to between 129 and 680 mg/L in 2010 (AH-3 and AH-6L, Figure 16D). The decreasing trend in alkalinity in the 38 m flow zone has been similar in samples from 94-1/3 and Spring S1, each with decreases from approximately 280 mg/L in 1995 to between 80 and 90 mg/L in 2010.

Alkalinity at the Mill Filterhouse has been low (1 to 5 mg/L) as would be expected for lakewater in a watershed dominated by granitic rocks. Alkalinity in the 40 to 115 mg/L range upgradient of the landfill is thought to be due to the mineralogy of the glacial sediments. Alkalinity elevated above these levels is likely due to dissolution of calcite and other carbonate compounds in Phase 1 Landfill material.

While calcium is a metal and is presented with metals in Tables 6 and 7, its geochemical relevance as an alkaline earth metal is more similar to alkalinity than to the other metals discussed below. Plots of historical calcium concentration are presented in Figure 16E. Calcium is the most prevalent alkaline earth metal in water samples collected at the site (Tables 6 and 7). Calcium concentrations have been fairly constant at each sample location since monitoring began, with averages over time in a range from 11 to 61 mg/L in the groundwater samples (including Spring S1) and approximately 1 mg/L in the surface water from Powell Lake sampled at the Mill Filterhouse in 2010. Calcium concentration in all groundwater sampled, including seepage from Spring S1, continue to exceed the working BCWQG of 4 to 8 mg/L for freshwater life. The highest concentrations of calcium along the flowpath are present at the south edge of the landfill and at 89-5 (74 mg/L in 2010). Calcium concentrations are significantly lower than alkalinity levels, and may be limited by the solubility of calcite. With high alkalinity, calcium concentrations in the groundwater might be expected to remain at approximately the present levels for a considerable period of time.

6.4.2.5 Metals

Sodium, aluminum, iron, manganese, arsenic, cadmium, chromium, copper, lithium, mercury, vanadium and zinc have been identified as metals and cationic elements of interest in the groundwater at the Wildwood Landfill, based on their presence at concentrations above either the CSR or BCWQG at one or more locations in the past few years. While a comparison to the CSR and BCWQG is provided below for reference purposes, these standards are only considered to be applicable at the point of discharge (Spring S1), as described further in Section 6.4.2.12. Results from sampling in 2010 are listed in Tables 6 and 7, and the historical trends are discussed below.

6.4.2.5.1 Alkaline metals

Sodium concentrations (Figure 16F) appear to be between approximately 5 and 40 mg/L under background groundwater conditions at the site and approximately 1 mg/L in Powell River. Sodium has trended downward or remained stable since 1999 at all sample locations except AH-6L. In particular, sodium concentrations have declined at 89-5 (from 1,770 mg/L in 1998 to 197 mg/L in 2010) and the extraction wells (PW-Comp from 1,140 mg/L in 1998 to 14 mg/L in 2010) at the south edge of the landfill and at AH-3 (from 420 mg/L in 1998 to 99 mg/L in 2010) and Spring S1 (from 114 mg/L in 1998 to 32 mg/L in 2010). Sodium concentrations at AH-6L have remained relatively constant after an abrupt decline in 2006. In samples collected in 2010, sodium concentrations remained elevated above background at the edge of the landfill and immediately downgradient of the landfill. Sodium concentrations at background levels near the shoreline suggest that sodium is captured by the extraction wells and attenuated between the landfill and Powell River, possibly by precipitation as sodium-carbonate, -oxyhydroxide, or -sulfate minerals.

Aluminum concentrations (Figure 16G) at the south edge of the landfill and downgradient of the landfill decreased from levels as high as 40.8 mg/L since operation of the extraction system began in 1995. Since 2005, aluminum concentrations have remained fairly stable at all sample locations at the site at relatively low levels. Since 1999, aluminum concentrations near the shoreline have been at or below the BCWQG FAW. Aluminum concentrations at the Mill Filterhouse have typically been higher than those at Spring S1 and at the wells near the shoreline in recent years. Aluminum concentrations near the BCWQG (0.05 mg/L at pH > 6.5) in recent years may be related to the presence of alumino-silicate rocks in Powell Lake watershed. Sampling in 2010 indicates no significant change in aluminum at the site.

6.4.2.5.2 Redox-Sensitive Metals

Iron concentrations (Figure 16H) upgradient of the landfill and near the shoreline remained at low levels (less than 0.05 mg/L) in 2010, except at the sample location in the bedrock flow zone, 94-16B. Iron concentrations have declined (over the long-term) or remained stable at most sample locations (except 94-16B) since operation of the extraction system began. In recent years, iron has ranged from below detection (0.03 mg/L) to 3.8 mg/L at the south edge of the landfill and from below detection to 0.8 mg/L downgradient of the landfill. Elevated iron concentrations are typical of groundwater flow through a carbon-rich landfill, due to dissolution of iron from sediments under reducing conditions. Iron concentrations at 94-16B have fluctuated in recent years, perhaps due to changes in vertical flow direction such that groundwater flows to the shallow bedrock upward from deeper, likely anoxic, bedrock in some years, and downward from the overlying, relatively oxygenated sediments in other years (see Figure 15F).

Manganese concentrations (Figure 16I) have trended upward since 1998 at 89-5, peaked (between 2003 and 2006) at 94-1/3, decreased at AH-3, and remained relatively stable at the other sample locations, except 94-16B. Elevated and fluctuating manganese levels at 94-16B may be related to changes in vertical flow direction between the bedrock and overlying sediments in that area (see Figure 15F). Similarly to iron, elevated manganese concentrations are typical of groundwater flow through a carbon-rich landfill, due to dissolution of manganese from sediments under reducing conditions. The upward trend at 89-5 might indicate onset of manganese reduction as the dominant biodegradation electron acceptor in that area. In recent years, since 2008, manganese concentrations at AH-3 have fluctuated around the CSR DW standard of 0.05 mg/L. Historically, manganese concentrations at 89-5 and 94-16B have remained above the CSR DW standard.

6.4.2.5.3 Trace Metals

Arsenic concentrations (Figure 16J) have been found below the CSR DW standard (0.01 mg/L) since 2004 at all sample locations except AH-6L (to 0.069 mg/L) and 06-2L (to 0.02 mg/L). Changes in arsenic concentration at AH-6L reflect changes in the redox indicator iron at that location. At 94-16B (to 0.0056 mg/L), the arsenic concentration in 2010 was below the CSR DW standard (0.01 mg/L) and above the BCWGQ (0.005 mg/L), and higher than most of wells completed in sediments perhaps due to the relatively reducing conditions in the bedrock. The relatively low concentrations of arsenic observed in the liquid removed from the landfill by comparison (PW-Comp) suggests that the arsenic concentrations measured north of the landfill at 06-2L and in the bedrock at 94-16B may be naturally occurring. Arsenic concentrations at the Spring S1 sample location have decreased from a maximum of 0.02 mg/L in 1992 and have been well below the CSR standards and BCWQG since 2004.

Cadmium concentrations (Figure 16K) in general have trended downward at most locations over the course of the monitoring period (i.e., since 1998). In 2010, cadmium concentrations continued to decline at AH-6L (to 0.00012 mg/L), and remained below detection at Spring S1 and at the Mill Filterhouse. It should be noted that the detection limit for the analysis of the sample from Spring S1 was lower than the hardness-dependent BCWQG for that location and the detection limit for the analysis of the sample from the Mill Filterhouse was above the hardness-dependent BCWQG for that location.

Chromium concentrations (Figure 16L) have decreased to, or remained stable at levels below the CSR aquatic life standard for Cr(VI) (0.01 mg/L) since 2004 at all sample locations except AH-6L. In recent years, the chromium concentration at AH-6L was above the Cr(VI) standard, but in 2010 the chromium concentration decreased to 0.0072 mg/L, a level that is just below the Cr(VI) standard. Near the shoreline, chromium has been below the detection limit since 2004.

Copper concentrations (Figure 16M) have generally decreased or remained stable at all sample locations since the extraction system began operation In 2010, the copper concentration in a sample from AH-6L (0.024 mg/L) decreased slightly from that of 2009, but remains just above the CSR FAW standard. Copper complexes with carbonate at moderately-elevated pH to become mobile in groundwater, but its solubility is controlled by precipitation of a copper oxide mineral.

During the 2010 monitoring year, lithium was found above the BCWQG (working guideline for aquatic life) at AH3. There are no CSR standards for this constituent.

Mercury concentrations (Figure 16N) exceeded the CSR FAW standard (0.001 mg/L) in three samples at PW95-1,8,9 prior to 2004, but concentrations have since been below CSR standards at all sample locations. Mercury has historically been detected at low levels at AH-6L, but concentrations there continue to follow a long-term declining trend. Mercury has never been detected at sample locations upgradient of the landfill or at sample locations near the shoreline.

Vanadium concentrations (Figure 16O) have trended downward since 2001 at 89-5 and AH-6L (from maximum concentrations of 5.1 and 1.06 mg/L, respectively), but have remained above the BCWQG for aquatic life (0.006 mg/L; a working guideline) since 1998 or earlier. Vanadium solubility is high under alkaline conditions, and redox conditions at 89-5 and AH-6L are not reducing enough for vanadium to exist in a less mobile state. Standard laboratory detection limits for vanadium are higher than the BCWQG, so that historic concentrations below the detection limit may have, on occasion, exceeded the guideline. Vanadium concentrations have exceeded the BCWQG for aquatic life at Spring S1 on several occasions, including 2010. In 2010, vanadium concentrations also exceeded the BCWQG in samples from 89-5, AH6L, 06-2L and 94-19L.

Zinc concentrations decreased at the pumping wells, from the highest level on record in 2009 (0.363 mg/L) to 0.0081 mg/L in 2010; decreased at AH-6L from the highest level on record (0.0077 mg/L) in 2009 to below the detection limit in 2010; and decreased at 94-16B from the highest level since 1999 (to 0.0102 in 2009) to below the detection limit in 2010. Zinc concentrations exceeded the BCWQG for aquatic life only at the pumping wells in 2010.

6.4.2.6 Total Organic Carbon

Total Organic Carbon (TOC; Figure 16P) has typically been between 0 and 6 mg/L upgradient of the landfill, has decreased significantly at the south edge of the landfill from typical concentrations greater than 1,000 mg/L and as high as 63,825 mg/L to typical recent values of 1 to 75 mg/L, has recently ranged between 1 and 100 mg/L downgradient of the landfill, and ranged from 1 to 15 mg/L near the shoreline. TOC at 89-5 decreased from 72 mg/L in 2009 to the lowest levels on record in 2010 (3.7 mg/L in August and 5.4 mg/L in December).

6.4.2.7 Chlorinated and Non-chlorinated Phenols

Results of analysis of phenols from sampling in 2010 are listed in Table 8 and the historical trends of total chlorinated phenols are presented in Figure 16Q. Chlorinated phenols at the south edge of the landfill in the 11 m flow zone (89-5) and downgradient of the landfill in the 29 m flow zone (AH-6L) have remained low from 2003 to 2010 after a period characterized by higher and more variable concentrations. In 2010, no detectable chlorinated or non-chlorinated phenols were found at any location.

6.4.2.8 Dioxins and Furans

Dioxins and furans are compounds that are similar in chemical structure to 2,3,7,8- tetrachlorodibenzo para dioxin (TCDD) that are present throughout the environment. The World Health Organization (WHO) and the North Atlantic Treaty Organization (NATO) have developed a method of quantifying the toxic equivalency (TEQ) of 17 dioxin and furan congeners by multiplying the concentration of each congener by a corresponding toxic equivalency factor (TEF). No guidelines for dioxins and furans in water have been established in Canada. A maximum contaminant level of 30 pg/L for 2,3,7,8-TCDD has been established by the United States Environmental Protection Agency for drinking water, and is noted here for reference only. Analysis of water samples at such low concentrations requires highly-specialized laboratory equipment.

Table 9 lists results of dioxin and furan analyses conducted on samples collected in 2010. In 2010, toxic dioxin or furan congeners were detected in samples from AH-6L (TEQs 4.2 and 5.9 pg/L in duplicate samples), AH3 (TEQ 2.9 pg/L), Mill Filterhouse (TEQ 0.22 pg/L in August 2010 and 0.006 pg/L in December 2010), 89-5 (TEQ 0.02 pg/L), 94-19L (TEQ 0.003 pg/L) and the laboratory duplicate for 93-2B (0.11 pg/L). At AH-6L, 8 of the 17 toxic congeners were detected in duplicates, and toxicity was due mostly to HxCDD and HxCDF congeners; concentrations were generally significantly higher than the detection limit.

Figure 16R presents the historical trends in total TEQ for dioxins and furans. In the figure, the total TEQ is presented using the NATO TEF's and an assumption that non-detection represents a concentration of 0 pg/L. This approach tends to highlight instances in which the TEQ for dioxins and furans is above detection limits. Dioxins and furans concentrations were generally similar in 2010 to recent years. The concentration at AH-6L continued a long-term decreasing trend. Dioxin and furan TEQ at 89-5, the pumping wells and the Spring S1 decreased to lower levels than in 2009. These concentrations represented either continued long-term downward trends or concentrations below detection limits.

6.4.2.9 Polychlorinated Biphenyls (PCBs)

Monitoring of polychlorinated biphenyls (PCBs) at each of the sample locations began in 2008, in accordance with the amended landfill permit. The purpose of the PCB analysis is to investigate the potential for PCBs in water related to anecdotal reports of electrical transformers buried in the landfill. Table 10 presents the results of analyses conducted on samples collected. PCBs were not detected in any of the 12 samples collected from each of the sample locations during the December 2010 sampling event.

While there are no standards for PCBs in water under the Contaminated Sites Regulation (which are applicable at the site), the BC Approved Water Quality Guidelines (which are used solely for "assessment purposes" at the site) have established a guideline for aquatic life of 0.1 ng/L total PCBs. The detection limit of the laboratory method used to analyze for PCBs is 0.0010 mg/L, a value higher than the guideline.

The low aquatic guideline for PCBs (0.1 ng/L) is based on reports of high bio-accumulation factors. PCBs have a low solubility, which causes the chemical to release slowly from a source zone, transport in the groundwater at low concentrations, and then adsorb and accumulate in living tissue or on sediments. The Canadian Council of Ministers for the Environment (CCME) removed the guideline for PCBs in freshwater (formerly 1 ng/L) from the Canadian Environmental Quality Guidelines in 2007. They note that, while PCB's are persistent, bioaccumulative, toxic, and should be subject to virtual elimination strategies, environmental exposure is primarily via sediment and/or tissue rather than water.

6.4.2.10 Halogens

Monitoring of the halogens chloride, bromide, and fluoride at sample locations began in 2008. Halogens are often non-reactive solutes in groundwater and may therefore be useful as tracers when present in a source of contamination. Sources of chloride could include salts used for road de-icing, Phase 1 landfill material, degradation of chlorinated chemicals such as dioxins, chlorinated phenols, and PCBs, and potential continued dissolution of marine anhydrite precipitates formed in glaciofluvial sediments during isostatic rebound 5,000 to 10,000 years ago.

Results of the analyses from samples collected in 2010 are listed in Table 5, and Figure 16 S presents chloride results since 2008. In 2010, chloride concentrations ranged from approximately 5 mg/L upgradient of the landfill to a maximum of 157 mg/L downgradient of the landfill at AH-6L, to approximately 22 mg/L at Spring S1, and to approximately 1 mg/L at the Mill Filterhouse. All of these concentrations are below the CSR and BCWQG except the August sample from AH-6L (157 mg/L). Chloride concentrations in 2010 were generally similar to concentrations in 2009, except at 89-5 where they declined from 68 mg/L in December 2009 to 14 mg/L in December 2010. Bromide concentrations were below the detection limit at all sample locations in 2010. Fluoride concentrations ranged from levels below the detection limit to a maximum of 0.59 mg/L in a sample taken from the 29 m flow zone at AH-6L.

6.4.2.11 Comparison to Applicable Criteria

The groundwater chemical analysis results were assessed relative to the groundwater standards specified in the B.C. Contaminated Sites Regulation updated to October 4, 2010 (CSR). The CSR represents standards that should be met by groundwater along the flow path to the point of discharging from the Site, in the form of groundwater springs and groundwater flowing directly into Powell River. At the site, the CSR standards are considered applicable at the point of discharge, namely Spring S1. For reference purposes only, the results of groundwater analysis from the other monitoring locations are also compared with the CSR. Similarly, the British Columbia Approved and Working Water Quality Guidelines (Criteria) (BCWQG), updated January 2010, represent criteria that surface water should meet. Since groundwater ultimately discharges to surface water, groundwater results were also compared with the BCWQG criteria for drinking water (DW) and the criteria for the protection of freshwater aquatic life (AW) in the tables.

Table 11 summarizes the exceedances of the CSR standards and the BC Water Quality Guidelines. In 2010, there were no exceedances of the CSR standards at Spring S1, Mill Filterhouse, or the sample locations north of the landfill, except for at 06-2L where arsenic exceeded the CSR standard for drinking water purposes. General parameters did not exceed the CSR standards at any sample location, nor did they exceed the BCWQG at the Spring S1 or the discharge from the extraction system. No detectable concentrations of chlorinated and non-chlorinated phenols, nor PCBs were found at any of the groundwater or surface water monitoring locations.

Dioxins and furans with reported toxicity were not detected north of the landfill (with the exception of the laboratory duplicate sample from 93-2B), in the recovery well, at 94-1/3, near the shoreline at 94-16L and 94-16B, or at Spring S1; however they were detected at low levels downgradient from the landfill at 89-5 (0.02 pg/L), AH-3 (2.9 pg/L), and AH-6L (5.9 pg/L), in the regional flow zone near the shoreline at 94-19L (0.003 pg/L) and at the Mill Filterhouse (0.22 pg/L in August 2010, 0.006 pg/L in December 2010).

6.4.2.11.1 Groundwater Exceedances

While there were no exceedances of the CSR standards at the approximate point of discharge (Spring S1), other locations along the groundwater flow path where exceedances of the CSR were observed are described below for reference purposes.

Concentrations of one or more metals in groundwater exceeded the CSR standards at five locations in 2010: 89-5 and AH-3 (11 m flow zone), AH-6L (29 m flow zone), 94-16B (bedrock flow zone), and 06-2L (upgradient in regional flow zone). Metals listed in Table 11 refer to the dissolved form for groundwater samples and the total form for surface water samples. BCWQG for metals refer to the total form for all metals with exception of aluminum, which refers to the dissolved form.

Arsenic exceeded drinking water (DW) standard (0.01 mg/L) in the 29 m flow zone at AH-6L (0.048 mg/L) and in the regional flow zone at 06-2L (0.015 mg/L). Arsenic has exceeded the DW standard at AH-6L since 1998 with two exceptions. The concentration peaked in 2002, followed by a decline to 2006, and has remained relatively stable from 2007 through 2010. The increase and subsequent decline may be due to changes to redox conditions caused by landfill leachate. Arsenic has exceeded the DW standard at 06-2L since monitoring began at this location in 2006.

Copper (0.024 mg/L) exceeded the CSR FAW standard (0.02 mg/L at a hardness of 75 mg/L) at AH-6L, similar to previous years. Copper is likely naturally present in the aquifer sands and bedrock and under alkaline conditions it dissolves into groundwater.

Iron exceeded the CSR DW standard (0.3 mg/L) at 89-5 (3.76 mg/L) and at AH-6L (0.43 mg/L). Manganese exceeded the CSR DW standard (0.05 mg/L) at 89-5 (1.52 mg/L), 94-16B (0.115 mg/L), and AH-3 (0.052 mg/L). The reducing conditions present due to microbial decomposition of organic carbon in the landfill and perhaps due to natural conditions in the bedrock, promote dissolution of iron and manganese from aquifer material.

Sodium exceeded the CSR DW standard (200 mg/L) at AH-6L (448 mg/L). Sodium is a leachate indicator and is elevated at this well located in one of the most impacted regions of the site.

6.4.2.11.2 Surface Water Exceedances

There were no exceedances of the CSR standards in the surface water samples taken from Spring S1 and the Mill Filterhouse. The sample taken from Spring S1 (20.5 mg/L and 0.0083 mg/L), however, exceeded the BCWQG FAW for calcium (4 – 8 mg/L) and vanadium (0.006 mg/L), respectively.

6.4.2.12 *Summary of the Water Quality Monitoring in 2010*

The 2010 water quality results are generally consistent with previous results. Phenols, PCBs, and dioxins and furans remained at non-detectable or low levels, below all applicable standards at all locations. Some metals concentrations continue to exceed CSR standards. The apparent decline or stabilization in specific conductivity, pH, sulphate, alkalinity, TOC, dissolved metals, total chlorinated phenols and dioxins and furans at most monitoring locations downgradient of the landfill and in Spring S1 is an indication that the leachate control measures are resulting in some renovation of the shallow groundwater quality.

Monitoring well 94-19L was sampled and analyzed for a full suite of water quality parameters for the first time on record in December 2010, due to an increase in specific conductance measured during snap-shot sampling in August 2009 and August 2010. No PCBs or phenols were detected in the sample and the total dioxin and furan TEQ was near the detection limit. Water quality in the sample from 94-19L was generally similar to the water quality in recent samples from the adjacent well 94-16L. Most parameters were 10% to 300% higher at 94-19L than the concurrent sample from 94-16L. Notable differences were non-detection of cadmium at 94-19L, as compared to exceedance of the BCWQG at 94-16L (noted here for reference purposes only), and exceedance the BCWQG (0.006 mg/L, noted for reference only) for vanadium at 94-19L (0.0078 mg/L), as compared to a concentration of 0.0026 at 94-16L.

6.4.3 Quality Assurance/Quality Control

One set of blind duplicate samples was collected during each of the 2010 monitoring events and submitted for analysis. For duplicate analyses, a control limit of 20% for the Relative Percent Difference (RPD)[4] is applied to the original and duplicate samples that are greater than or equal to five times the method detection limit. Where one or more concentrations were less than five times the detection limit, (MDL) values that differed by less than the value of the MDL were considered acceptable. A summary of the relative percent difference (RPD) for the duplicate samples collected in 2010 is provided in Appendix VI. Due to the very low concentrations of dioxins and furans, control limits are not applied to duplicate analyses for each congener.

A review of the QA/QC data for all consituents except dioxins and furans (Table VI-1) indicates that with the exception of total suspended solids (TSS) for 89-5, all of the results were considered acceptable according to the criteria outlined above. For the duplicate analyses of dioxin and furans (Table VI-2), the relative percent difference between the total dioxin and furan TEQ was 23% where concentration was set to 1/2 detection limit for non-detection and using the NATO TEFs. In analyses of dioxins and furans in three laboratory method blanks (Table 9), only non-toxic congeners were detected in one of the blanks, and the total TEQ was equal to that of non-detection for all congeners in all three blanks. The acceptable limits for laboratory method blanks apply only to the 2,3,7,8-substituted dioxin and furan congeners, and are as follows: 5 pg/L for TCDD/TCDF, 10 pg/L for penta and hexa-CDD/CDF, 15 pg/L for hepta-CDD/CDF, and 50 pg/L for OCDD/OCDF (Reference Method 19 of Environment Canada, 1992).

[4] Where RPD = |A-B|/((A+B)/2)*100

6.5 Results of Landfill Gas Monitoring

Gas content beneath the asphalt cover on the Phase I Landfill was analyzed in the field on August 24, 2010, during the dry season monitoring event. The results of monitoring these gas vents are presented in Table 12. Detectable methane concentrations were measured at GV-1 (4.5%), GV-2 (1.6%), GV-3 (1.9%) and GV-4 (6.8%). Methane concentrations at GV-4 were above the lower explosive limit (LEL), which is equal to 5% methane. A criterion of 100% LEL methane has been established for soil gas at municipal landfill property boundaries[5].

Hydrogen sulfide (H_2S) gas concentrations were measured to be 1 ppm at three of the four gas vent locations (exception was GV-4) and in the ambient air. Oxygen concentrations (<0 to 0.4% O_2) were very low relative to the atmospheric level (21% O_2) at each gas vent. Carbon dioxide concentrations (4.6 to 7.3% CO_2) were considerably higher than the atmospheric level (0% CO_2).

Figure 18 presents plots of methane concentrations measured at the gas vents since the start of passive venting in June 1999. Methane concentrations were as high as 25 % to 39 % total methane immediately after the vents were opened in June 1999. Since that time, total methane concentrations have generally fluctuated between approximately 0 and 15% CH_4. Methane concentrations in 2010 increased slightly at each vent from the concentrations that were measured in 2009 and remained within historical levels. Detection of methane indicates the presence of reducing conditions likely established by microbially-mediated degradation of organic carbon within the landfill.

6.6 Results of Asphalt Inspection

Inspection of the landfill's asphalt cover was conducted during the dry season monitoring in August 2010. No new major cracks were found in 2010. Similarly to previous years, numerous cracks, ranging in length from 5 to 100 cm and in width up to 2 cm were observed, primarily re-openning of previous cracks. These cracks were primarily located in the area of pavement at the southeast edge of the landfill near the pump shed and the top of the drain. These cracks were filled using approximately 4 L of asphalt tar patch sealer.

6.7 Results of Dustfall and Air Quality Monitoring

6.7.1 Dustfall Monitoring at Wildwood Landfill

All of the 2010 total dustfall results were below the British Columbia dustfall Pollution Control Objectives (PCOs) for Residential and Other Areas. The low fixed dustfall results relative to the total dustfall results indicate that organic matter contributed a significant portion to the total dustfall measured. The contribution of the Mini-Landfill landfill operation to the total dustfall is estimated to be no larger than the fixed dustfall results. Refer to Appendix VII for more detail.

[5] Landfill Criteria for Municipal Solid Waste, MoE, June 18, 1993, Section 6.4.

6.7.2 Air Quality Monitoring in the Community of Wildwood

The particulate levels measured at located at Wildwood Landfill, and in Wildwood at the intersection of King Avenue and Highway 101 and at the James Thomson School, were well below the applicable air quality criteria. Refer to Appendix VII for more detail.

6.8 Results of Landfill Settlement Monitoring

Survey results by Emery & Rae Land Surveying Ltd. for three settlement monitoring points (S1, S2, and S3) on the surface of Wildwood Landfill are presented for October 1995 through to February 2011 in Appendix VIII. The results indicate that minimal settlement of the asphalt cap has occurred (0 m to 0.05 m) since the monitoring stations were established in October 1995, with most of the settling occurring between 1995 and 2001.

7.0 CONCLUSIONS AND RECOMMENDATIONS

The results of the 2010 groundwater sampling program continue to confirm that the asphalt capping and groundwater recovery controls have resulted in the reduction of contaminants downgradient of the landfill. The rate of reduction in contaminant concentrations recorded in the upper two perched zones, where the most significant levels of impacted groundwater have been identified, appears to be declining. It is anticipated that groundwater quality will continue to improve, but at a more gradual rate, as a result of the apparent steady state flow conditions downgradient of the landfill. Monitoring results from the year 2010 indicate that groundwater discharging to Powell River and groundwater recovered by the extraction system (at PW-Composite) continue to have water of sufficient quality to meet the standards of the BC Contaminated Sites Regulation.

It is Golder's opinion that the offsite impacts of dustfall during normal operations will likely be low. Furthermore, due to natural and anthropogenic sources being distributed throughout the region, the contribution of the landfill to ambient $PM_{2.5}$ and PM_{10} is expected to be minimal.

It is recommended that the current groundwater monitoring program and air quality monitoring program for the Wildwood Landfill continue for 2011, with the following recommendations suggested as potential changes for future monitoring:

- Sampling at upgradient monitoring well 06-2L is not required as part of the landfill permit; however, the well has been sampled since its installation in 2006 to provide additional upgradient groundwater quality information. Sampling of 06-2L could be discontinued in 2011 because upgradient monitoring well 93-2B, also completed in the regional flow zone, provides sufficient characterization of upgradient groundwater chemistry conditions in this area.
- Groundwater chemistry conditions in the regional and bedrock flow zones near the shoreline are currently monitored by sampling monitoring wells 94-16L and 94-16B, respectively. Consideration could be given to monitoring the regional and bedrock flow zones at 94-19L and 94-19B instead, as 94-19 appears to be better positioned along the regional and bedrock flow paths downgradient of the landfill.
- Sampling at the Mill Filterhouse has been carried out since the start of monitoring as a means of monitoring water quality in Powell Lake. Because the water quality discharging from Powell Lake cannot be directly attributed to discharges from the landfill, consideration could be given to discontinuing sampling at the Mill Filterhouse. Instead, consideration could be given to sampling at another spring location at the base of the hillslope (east of Spring S1). The potential sampling location should be identified following a field reconnaissance to identify a spring that represents groundwater discharging from downgradient of the landfill.
- With the exception of monitoring wells 89-5 and AH-6L, chlorinated and non-chlorinated phenolics have been below detection limits at all sampling locations for the past six years. Consideration could be given to discontinuing sampling for phenolics at all locations except 89-5 and AH-6L.
- Groundwater sampling for PCBs has been conducted at the 11 monitoring locations for three years (2008, 2009 and 2010) in accordance with the amended landfill permit. The purpose of the PCB analysis was to investigate the potential for PCBs in water related to anecdotal reports of electrical transformers buried in the landfill. No PCBs have been detected in any of the samples over the three years of monitoring. As a result, consideration could be given to discontinuing sampling for these constituents.

A pumping test was conducted at recovery well PW99-5 when the well was first installed. Consideration could be given to conducting another pumping test at that location to re-assess the capture zone of the recovery well and its influence on adjacent well AH-6L, where a rise in specific conductivity has occurred and associated constituents, such as dissolved metals, are present.

8.0 CLOSURE

We trust that this annual report meets your current requirements. Should you have any questions or comments, please do not hesitate to call.

GOLDER ASSOCIATES LTD.

ORIGINAL SIGNED

Nicole Haroon, B.Env.Sc.
Hydrogeology Group

ORIGINAL SIGNED

Matthew Neuner, M.Sc.
Hydrogeology Group

Reviewed by:

ORIGINAL SIGNED

Jillian Sacré, M.Sc., P.Geo.
Principal – Hydrogeologist

NH/MN/JPS/rja

\\bur1-s-filesrv2\final\2010\1435\10-1435-0925\rep 0502_11 annual wildwood landfill - final\rep 0502_11 wildwood annual report - final.docx

9.0 REFERENCES

Christensen, T.H., Kjeldsen, Bjerg, Jensen, Christensen, Baun, Albrechtsen, and Heron, 2001. Biogeochemistry of landfill leachate plumes, Applied Geochemistry, v. 16, pp. 659-718.

Golder Associates Ltd., 2007. Environmental Assessment Report, Wildwood Landfill Expansion, Powell River, BC, *report prepared for* Catalyst Paper Corporation for submittal to the British Columbia Ministry of Environment, (project no. 06-1411-080/9000), dated July 6, 2007.

Golder Associates Ltd., 2009. 2008/09 Fish and Sediment Sampling Program, Catalyst Paper – Powell Lake, *report prepared for* Catalyst Paper Corporation for submittal to the British Columbia Ministry of Environment, (project no. 08-1411-0080/2010), dated March 31, 2009.

McCammon, J.W., 1977. Surficial geology and sand and gravel deposits of Sunshine Coast, Powell River, and Campbell River areas, Province of British Columbia Ministry of Mines and Petroleum Resources Bulletin 65, p. 17-25.

Ryder, J.M., Fulton, R.J., and Clague, J.J., 1991. The cordilleran ice sheet and the glacial geomorphology of southern and central British Columbia, *Géographie physique et Quaternaire*, vol. 45, n° 3, p. 365-377.

BRITISH COLUMBIA
The Best Place on Earth

MINISTRY OF ENVIRONMENT

This is Exhibit "L" referred to in the affidavit of J. Braman sworn before me at Vancouver in the Province of British Columbia this 20 day of April, 2012

A Commissioner for taking Affidavits within the Province of British Columbia

PERMIT

3149

Under the Provisions of the Environmental Management Act

Catalyst Paper Corporation and Catalyst Pulp Operations Limited doing business as Catalyst Paper, General Partnership
2nd Floor-3600 Lysander Lane
Richmond, BC V7B 1C3

is authorized to discharge air contaminants to the air from a pulp and paper mill located at 5775 Ash Avenue, Powell River, British Columbia, subject to the terms and conditions listed below. Contravention of any of these conditions is a violation of the Environmental Management Act and may lead to prosecution.

This Permit supersedes and amends all previous versions of Permit 3149 issued under Part 2, Section 14 of the Environmental Management Act.

1 AUTHORIZED DISCHARGE

1.1 This section applies to the discharge of air contaminants from THE No. 19 WOOD RESIDUE BOILER STACK. The site reference number for this discharge is E225337.

1.1.1 The maximum authorized rate of discharge is 10,550 cubic metres per minute. The authorized discharge period is continuous.

1.1.2 The characteristics of the discharge shall be equivalent to or better than:

Contaminant	Maximum Concentration
Particulate matter (excluding salt)	50 mg/m3 *
Nitrogen oxides (NOx)	300 mg/m3 * (as NO2, 1 hour average)
Opacity	10% (1 hour average)

* Corrected to 8% Oxygen

Date issued: October 12, 1977
Date amended: April 11, 2008
(most recent)

S. Warriner
Steffanie Warriner
for Director, *Environmental Management Act*
Lower Mainland Region
Permit Number: 3149

1.1.3 The materials authorized to be combusted in the boiler are limited to the following:

Wood residue,
Effluent treatment sludges,
Natural gas,

and, Subject to Section 2.10:
Oil-laden hog fuel,
Spent oil-laden absorbent pads, and
Activated charcoal

1.1.4 The authorized works are a bubbling fluidized bed wood residue boiler with an oversized furnace, a five-field electrostatic precipitator, exhaust gas recirculation, stack, and related appurtenances approximately located as shown on Site Plan A, dated April 2, 2008.

1.1.5 The location of the facilities from which the discharge originates and the point of discharge is L3088 (PID 015-890-333), L7212 (PID 004-781-821), L7213 (PID 004-781-856), L6071, Water L 6174, L6237A, L5922, L5923, L5924, L4071, L4072, L3437 (PID 015-875-121), L3090 (PID 015-890-325), L3091(PID 015-890-317), Lot A2, Ref. Plan 490, DL 3091 (PID 015-890-309), Part of Block 43 (PID 002-554-682), Block 44 (PID 010-264-469), and Block 46 (PID 002-560-194) of DL 450, Plan 8096, New Westminster District.

1.2 This section applies to the discharge of air contaminants from THE No. 18 STANDBY POWER BOILER STACK. The site reference number for this discharge is E101669.

1.2.1 The maximum authorized rate of discharge is 4,235 cubic metres per minute. The authorized discharge period is continuous.

1.2.2 The characteristics of the discharge shall be those of the combustion products of natural gas.

1.2.3 The authorized works are a stack, and related appurtenances approximately located as shown on Site Plan A, dated April 2, 2008.

1.2.4 The location of the facilities from which the discharge originates and the point of discharge is the same as Section 1.1 above.

1.3 This section applies to the discharge of air contaminants from a SULPHUR BURNER STACK. The site reference number for this discharge is E208433.

1.3.1 The maximum authorized rate of discharge is 50 cubic metres per minute. The authorized discharge period is continuous.

1.3.2 The characteristics of the discharge shall be equivalent to or better than:

Contaminant	Maximum Concentration
Sulphur Dioxide (SO2)	27 mg/m3

1.3.3 The authorized works are a caustic absorber system, fan, stack, and related appurtenances approximately located as shown on Site Plan A, dated April 2, 2008.

1.3.4 The location of the facilities from which the discharge originates and the point of discharge is the same as Section 1.1 above.

1.4 This section applies to the discharge of air contaminants from MISCELLANEOUS WOOD RESIDUE CYCLONES. The site reference number for this discharge is E208510.

1.4.1 The maximum authorized rate of discharge is 750 cubic metres per minute. The authorized discharge period is continuous.

1.4.2 The characteristics of the discharge shall be equivalent to or better than:

Contaminant	Maximum Concentration
Particulate matter	120 mg/m3

1.4.3 The authorized works are three wood residue cyclones, and related appurtenances approximately located as shown on Site Plan A, dated April 2, 2008.

1.4.4 The location of the facilities from which the discharge originates and the point of discharge is the same as Section 1.1 above.

1.5 This section applies to the discharge of air contaminants from the EXHAUST STACKS OF MECHANICAL PULP MILLS, FIVE THERMO-MECHANICAL PULPING LINES, THREE LINES OF MECHANICAL PULP BRIGHTENING USING HYDROGEN PEROXIDE, PAPER MACHINES NUMBERED 9, 10, AND 11 AND MISCELLANEOUS VENTS AND EXHAUSTS. The site reference number for this discharge is E208511.

1.5.1 The maximum authorized rate of discharge is 115,000 cubic metres per minute. The authorized discharge period is continuous.

1.5.2 The characteristics of the discharge shall be steam vapour and fugitive particulate originating from:

a. thermo-mechanical pulp manufacturing,
b. paper drying,
c. miscellaneous tank vents, including repulpers, and steam vents and
d. ventilation of buildings.

1.5.3 The authorized works are vents, stacks, and related appurtenances approximately located as shown on Site Plan A, dated April 2, 2008.

1.5.4 The location of the facilities from which the discharge originates and the point of discharge is the same as Section 1.1 above.

1.6 All air and gaseous volumes specified in Subsections 1.1 to 1.5 above are at standard conditions. These conditions are:

Standard temperature = 293.15 K;
Standard pressure = 101.325 kPa;
Water Vapour Zero unless otherwise stated

2 GENERAL REQUIREMENTS

2.1 Process Modifications

The Regional Manager, Environmental Protection, shall be notified prior to implementing changes to any process that may adversely affect the quality and/or quantity of the discharge.

2.2 Bypasses

The discharge of contaminants which have bypassed the authorized treatment works is prohibited unless the prior approval of the Director is obtained and confirmed in writing.

2.3 **Maintenance of Works and Emergency Procedures**

The Permittee shall inspect the authorized works regularly and maintain them in good working order. In the event of an emergency or condition beyond the control of the Permittee which prevents effective operation of the authorized works or leads to unauthorized discharge, the Permittee shall comply with all applicable statutory requirements, immediately notify the Regional Manager, Environmental Protection, and take appropriate remedial action for the prevention or mitigation of pollution. The Director may reduce or suspend operations to protect the environment until the authorized works have been restored and/or corrective steps have been taken to prevent unauthorized discharges.

2.4 **Fugitive Particulate Emission**

The Permittee shall control fugitive particulate emissions generated from the property. Should the Director have reasonable grounds to believe that fugitive particulate emissions cause pollution outside the property boundary, the Permittee shall undertake additional measures and/or curtail operations to control the emissions.

2.5 **Additional Treatment**

If the Permittee is not meeting the emission characteristics specified in this Permit or if the Permittee is causing an adverse impact on the ambient air quality, the Director may amend the Permit to require the installation of additional treatment works or the implementation of other measures necessary to meet Permit conditions or to lessen the impact on the ambient air quality.

2.6 **Emission Quality Limits**

Based on the results of the monitoring program and/or other information, the Director may, for the protection of the environment, amend the Permit to specify additional emission quality limits and the sampling methods or frequencies the limits are based on.

2.7 **Combustion Residues and Waste from the Air Pollution Control Facilities**

All combustion residues, including bottom ash from the power boiler, and waste from the air control pollution control facilities, such as fly ash from the electrostatic precipitator of the power boiler, shall be disposed of to a site and in a manner approved by the Director.

2.8 **Source Sampling Facilities**

Sampling ports shall be provided with nearby electrical and pneumatic outlets and, where required, approved access ladders and adequately sized platforms, for the discharges covered by Section 1 to enable Environmental Protection personnel to monitor these emissions.

2.9 **Natural Gas Emergency Systems Testing**

The Permittee may discharge natural gas once per year in conjunction with testing the mill's natural gas emergency shutdown system. Each annual discharge shall be limited to fifteen minutes and the volume of natural gas discharged shall not exceed 1 100 cubic metres. The Permittee shall notify the Regional Manager, Environmental Protection, at least 7 days prior to conducting the test.

2.10 **Wood Residue Boiler**

The Permittee shall maximize the usage of acceptable quality low salt content wood residue in the wood residue boiler from land clearing operations and the like.

A combined maximum of 100 cubic metres per year of oil-laden hog fuel, spent oil-laden absorbent pads and activated charcoal, if generated within the mill site, may be incinerated in the wood residue boiler. The date, time, duration of combustion and maximum NOx and Opacity readings shall be recorded each time any of these materials are incinerated and the report submitted to the Regional Manager, Environmental Protection. If the Permittee wishes to burn different materials, or materials in excess of 100 cubic metres per year, the approval of the Director must be requested and obtained in writing.

2.11 **Ambient Particulate and TRS Response Plan**

The permittee shall maintain ambient Total Reduced Sulphur (TRS) and PM10 particulate response plans detailing measures to be taken, including how emissions will be reduced, to prevent unacceptable impacts on local air quality. Any changes to the plans shall be submitted to the Regional Manager, Environmental Protection, for review. The Permittee shall maintain a log of each TRS and/or particulate alarm from the ambient monitoring stations and a description of the responses to each alarm. The log shall include a description of any complaints received by the company during the month.

3 MONITORING AND REPORTING REQUIREMENTS

3.1 Sampling Locations and Techniques

All sampling locations, techniques and equipment require the consent of the Director prior to use. Sampling and monitoring data, which also should include rate of discharge measurements, shall be accompanied by process data relevant to the operation of the source of the emissions and to the performance of the pollution abatement equipment involved in the testing.

3.2 **Discharge Monitoring**

Emission Source	Parameter	Frequency
No. 19 wood residue boiler stack (E225337)	Discharge rate	Semi-Annually
	Particulate matter*	Semi-Annually
	Nitrogen oxides (as NO2)	Continuous
	Opacity**	Continuous
	Dioxins & Furans	Annually
Sulphur burner (E208433)	Discharge rate	Annually
	Sulphur dioxide (SO2)	Annually
No. 18 standby boiler stack (E101699)	Discharge rate	***
	Sulphur dioxide (SO2)	***
	Nitrogen oxides (as NO2)	***

* The particulate matter collected during emission testing shall be analyzed for salt (NaCl) content.

** The continuous opacity monitor shall also be used to continuously monitor the particulate emissions via the establishment and maintenance of an opacity vs. particulate correlation.

*** As required by the Director.

3.3 **Operating Conditions - Power Boilers**

The Permittee shall endeavour to conduct sampling under "actual operating conditions" that are as close as reasonably practical to the 90th percentile operating rate based on the previous ninety days of operation. The minimum "actual operating conditions" for sampling purposes is the 50th percentile operating rate based on the previous 90 days of operation. The Permittee shall document the actual operating conditions and report them to the Regional Manager, Environmental Protection, along with the 90th percentile and 50th percentile operating conditions. The operating conditions to be reported shall include the following:

Wood Residue Boiler:

Steam generated from wood residue (kg/sec),
Total steam generated (kg/sec),
Firing rate of effluent treatment sludge (t/d) for the day of sampling.

3.4 Receiving Environment Monitoring

3.4.1 Ambient Air Monitoring

The Permittee shall monitor the following ambient parameters:

a. continuous ambient TRS and NOx concentrations in terms of hourly and daily averages;

b. continuous ambient PM10 and PM2.5 concentrations in terms of hourly and daily averages using continuous TEOM analyzers.

These parameters shall be monitored at the following stations approved by the Director.

Cranberry	NOx, PM10*, PM2.5 *
Wildwood	PM10, PM2.5
James Thompson Elementary School	PM10 **, PM2.5 **
Townsite (Lawn Bowling Club)	TRS *
Heliport Pad	TRS **

* Until the equipment is moved to the new location, i.e from Cranberry Lake to the James Thompson Elementary School and from the Lawn Bowling Club to the Helipad site.

** To be installed not later than July 1, 2008

The above monitoring data shall be recorded on a data logger in a format compatible with the Ministry's computer system, and provisions shall be made for access by the Ministry on a real-time, dial-up basis. The data shall also be recorded on strip-charts, during auditing and calibration, to allow data validation and troubleshooting to take place.

Based on the results obtained and other information available to the Ministry, the Director may modify this monitoring program and/or specify additional parameters and/or locations to be monitored.

3.4.2 Discharges - Cyclones

Visual monitoring of the discharges authorized by Section 1.4 will be carried out by Environmental Management personnel as part of an ambient monitoring program for the entire mill operation. Based on these monitoring results, the permit may be amended to require source monitoring.

3.4.3 Meteorological Monitoring

The Permittee shall maintain and operate a meteorological station at the mill site to collect data relating to wind speed, wind direction, temperature and relative humidity.

3.5 Monitoring Procedures

3.5.1 Analytical Procedures

Analyses are to be carried out in accordance with procedures described in the most recent edition of the "British Columbia Laboratory Methods Manual for the Analysis of Water, Wastewater, Sediment, Biological Materials and Discrete Ambient Air Samples", or by suitable alternative procedures as authorized by the Director.

A copy of the above manual may be purchased from the Queen's Printer Publication Centre, P. O. Box 9452, Stn. Prov. Govt. Victoria, British Columbia, V8W 9V7 (1-800-663-6105 or (250) 387-6409). The manual is also available for review at all Environmental Protection offices.

3.5.2 Source Testing Procedures

Sampling is to be carried out in accordance with the procedures described in the most recent edition of the "British Columbia Field Sampling Manual for Continuous Monitoring and the Collection of Air, Air-Emission, Water, Wastewater, Soil, Sediment, and Biological Samples" or by suitable alternative procedures as authorized by the Director.

A copy of the above manual may be purchased from the Queen's Printer Publications Centre, P. O. Box 9452, Stn. Prov. Gov't. Victoria, British Columbia, V8W 9V7 (1-800-663-6105 or (250) 387-6409). A copy of the manual is also available for inspection at all Environmental Protection offices.

3.5.3 Quality Assurance

All analyses of samples shall be conducted by a laboratory acceptable to the Director. At the request of the Director, the permittee shall provide the laboratory quality assurance data, associated field blanks and duplicate analysis results along with the submission of data required under Section 3 of this permit.

3.6 **Reporting**

Maintain data of analyses, flow measurements and information relating to materials incinerated in #19 wood residue boiler for inspection, and submit the data, suitably tabulated, to the Regional Manager, Environmental Protection, for the previous quarter. The quarterly data submission shall also include quarterly calibration reports from the #19 wood residue boiler NOx Continuous Emissions Monitor. All reports shall be submitted within 31 days of the end of the relevant reporting period.

BRITISH COLUMBIA
The Best Place on Earth

April 14, 2011

Tracking Number: 200934
Authorization Number: 153

REGISTERED MAIL

Catalyst Paper Corporation and Catalyst Pulp Operations Limited doing business as
Catalyst Paper, General Partnership
2nd Floor
3600 Lysander Lane
Richmond BC V7B 1C3

Dear Permittee:

Enclosed is Amended Permit 153 issued under the provisions of the *Environmental Management Act*. Your attention is respectfully directed to the terms and conditions outlined in the permit. An annual fee will be determined according to 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. This permit is issued pursuant to the provisions of the *Environmental Management Act* to ensure compliance with Section 120(3) of that statute, which makes it an offence to discharge waste, from a prescribed industry or activity, without proper authorization. It is also the responsibility of the permittee to ensure that all activities conducted under this authorization are carried out with 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.

This is Exhibit "4" referred to in the affidavit of J. Braman
sworn before me at Vancouver
in the Province of British Columbia this
20 day of April, 2012

A Commissioner for taking Affidavits within the Province of British Columbia

Ministry of Environment
Environmental Protection Division
2nd Floor, 10470 - 152 Street
Surrey, BC V3R 0Y3
Lower Mainland Region
Telephone: (604) 582-5200
Facsimile: (604) 584-9751

Administration of this permit will be carried out by staff from the Lower Mainland Region. Plans, data and reports pertinent to the permit are to be submitted to the Regional Manager, Environmental Protection, at Ministry of Environment, Regional Operations, Lower Mainland Region, 2nd Floor, 10470 - 152 Street, Surrey, BC V3R 0Y3.

Yours truly,

Cassandra Caunce
for Director, *Environmental Management Act*
Lower Mainland Region

Enclosure

cc: Environment Canada

Sarah Barkowski, Catalyst Paper, General Partnership
5775 Ash Avenue, Powell River, BC V8A 4R3

BRITISH COLUMBIA
The Best Place on Earth

MINISTRY OF ENVIRONMENT

PERMIT

153

Under the Provisions of the Environmental Management Act

Catalyst Paper Corporation and Catalyst Pulp Operations Limited doing business as Catalyst Paper, General Partnership

2nd Floor, 3600 Lysander Lane
Richmond BC V7B 1C3

is authorized to discharge effluent to Malaspina Strait and Powell River from a pulp and paper mill located at 5775 Ash Avenue, Powell River, British Columbia, subject to the terms and conditions listed below. Contravention of any of these conditions is a violation of the *Environmental Management Act* and may lead to prosecution.

This Permit supersedes and amends all previous versions of Permit 153 issued under Part 2, Section 14 of the *Environmental Management Act.*

1. AUTHORIZED DISCHARGES

1.1 This section applies to the discharge of effluent from a **PROCESS EFFLUENT SECONDARY TREATMENT PLANT** to Malaspina Strait (Outfall #1). The site reference number for this discharge is E208487.

1.1.1 The maximum rate of discharge is 245 000 cubic metres per day. This limit includes the discharge authorized in Section 1.5.

1.1.2 The authorized discharge period is continuous.

1.1.3 The characteristics of the discharge shall be equivalent to or better than:

Total Suspended Solids (TSS)
Daily maximum (24-hour composite): 145 mg/L;
Monthly average (24-hour composite): 81 mg/L;

Date issued: April 6, 1966
Date amended: April 6, 2011
(most recent)

Cassandra Caunce
for Director, *Environmental Management Act*
Lower Mainland Region

Biochemical Oxygen Demand (BOD_5)		
Daily maximum (24-hour composite):		26 mg/L;
Monthly average (24-hour composite):		26 mg/L;
Temperature	Maximum:	40° C;
Rainbow trout 96hrLC50	Minimum:	100% (V/V)*;
pH	Maximum:	8 pH units;
	Minimum:	5.5 pH units;
Dissolved Oxygen	Minimum:	2 mg/L.

* A minimum 96hrLC50 of 100% (V/V) means that in a static bioassay on Rainbow trout, there must be no more than 50% mortality over 96 hours in undiluted effluent.

1.1.4 The authorized works are fibre recovery facilities, spill control system, primary clarifier, oxygen activated sludge secondary treatment system, two secondary clarifiers, two foam towers, submerged diffuser outfall extending a minimum of 820 metres from shore to a minimum depth of 45 metres at low water, any other works required to meet the effluent characteristics specified in Section 1.1.3 above and related appurtenances approximately located as shown on Site Plan A.

1.1.5 The location of the facilities from which the discharge originates is L3088 (PID 015-890-333), L7212 (PID 004-781-821), L7213 (PID 004-781-856), L6071, Water L 6174, L6237A, L5922, L5923, L5924, L4071, L4072, L3437 (PID 015-875-121), L3090 (PID 015-890-325), L3091(PID 015-890-317), Lot A2, Ref. Plan 490, DL 3091 (PID 015-890-309), Part of Block 43 (PID 002-554-682), Block 44 (PID 010-264-469), and Block 46 (PID 002-560-194) of DL 450, Plan 8096, New Westminster District.

The location of the point of discharge is Malaspina Strait, near or adjacent to DL450, Plan 8096, New Westminster District.

1.2 This section applies to the discharge of **COOLING WATER and STORM WATER** to Malaspina Strait (Outfall #2). The site reference number for this discharge is E208497.

1.2.1 The maximum rate of discharge is 74 000 cubic metres per day.

1.2.2 The authorized discharge period is continuous.

Date issued: April 6, 1966
Date amended: April 6, 2011
(most recent)

Cassandra Caunce
for Director, *Environmental Management Act*
Lower Mainland Region

1.2.3 The characteristics of the discharge shall be equivalent to or better than:

Temperature	Maximum:	35° C;
pH	Maximum:	8.5 pH units;
	Minimum:	5.5 pH units;
Rainbow trout 96hrLC20	Minimum:	100% (V/V)*.

* A minimum 96hrLC20 of 100% (V/V) means that in a static bioassay on Rainbow trout, there must be no more than 20% mortality over 96 hours in undiluted effluent.

1.2.4 The authorized works are an outfall and related appurtenances approximately located as shown on Site Plan A.

1.2.5 The location of the facilities from which the discharge originates is L3088 (PID 015-890-333), L7212 (PID 004-781-821), L7213 (PID 004-781-856), L6071, Water L 6174, L6237A, L5922, L5923, L5924, L4071, L4072, L3437 (PID 015-875-121), L3090 (PID 015-890-325), L3091(PID 015-890-317), Lot A2, Ref. Plan 490, DL 3091 (PID 015-890-309), Part of Block 43 (PID 002-554-682), Block 44 (PID 010-264-469), and Block 46 (PID 002-560-194) of DL 450, Plan 8096, New Westminster District, within the mill site and parts of Blocks 8, 9, 10, 13, 14, 15 and 18, District Lot 450, New Westminster District, within the residential area of Townsite, Powell River.

The location of the point of discharge is Malaspina Strait, near or adjacent to DL450, Plan 8096, New Westminster District.

1.3 This section applies to the discharge of **COOLING WATER and STORM WATER** to Powell River (Outfall # 3). The site reference number for this discharge is E208500.

1.3.1 The maximum rate of discharge is 81 400 cubic metres per day.

1.3.2 The authorized discharge period is continuous.

1.3.3 The characteristics of the discharge shall be equivalent to or better than:

Temperature	Maximum:	35° C;
Rainbow trout 96hrLC20	Minimum:	100% (V/V)*.

Date issued: April 6, 1966
Date amended: April 6, 2011
(most recent)

Cassandra Caunce
for Director, *Environmental Management Act*
Lower Mainland Region

* A minimum 96hrLC20 of 100% (V/V) means that in a static bioassay on Rainbow trout, there must be no more than 20% mortality over 96 hours in undiluted effluent.

1.3.4 The authorized works are an outfall and related appurtenances approximately located as shown on Site Plan A.

1.3.5 The location of the facilities from which the discharge originates is the same as 1.1 above.

The location of the point of discharge is Powell River, adjacent to DL 450, Plan 8096, New Westminster District.

1.4 This section applies to the discharge of **COOLING WATER and STORM WATER** to Malaspina Strait (Outfall #4). The site reference number for this discharge is E221871.

1.4.1 The maximum rate of discharge is 94 700 cubic metres per day. This limit includes the discharge authorized in Section 1.5.

1.4.2 The authorized discharge period is continuous.

1.4.3 The characteristics of the discharge shall be equivalent to or better than:

pH	Maximum:	8.5 pH units;
	Minimum:	5.5 pH units;
Temperature	Maximum:	40° C;
Rainbow trout 96hrLC20	Minimum:	100% (V/V)*.

* A minimum 96hrLC20 of 100% (V/V) means that in a static bioassay on Rainbow trout, there must be no more than 20% mortality over 96 hours in undiluted effluent.

1.4.4 The authorized works are a submerged outfall and related appurtenances approximately located as shown on Site Plan A.

1.4.5 The location of the facilities from which the discharge originates and the point of discharge is the same as Section 1.1 above.

Date issued: April 6, 1966
Date amended: April 6, 2011
(most recent)

Cassandra Caunce
for Director, *Environmental Management Act*
Lower Mainland Region

1.5 This section applies to the discharge of **NON- CONTACT COOLING WATER FROM THE SURFACE CONDENSER (731-756)**. The site reference number for this discharge is E285109.

1.5.1 A maximum limit for the rate of discharge is undetermined.

1.5.2 The authorized discharge period is continuous.

1.5.3 The characteristics of the discharge must be equivalent to or better than:

Total Suspended Solids (TSS)
Daily maximum (24-hour composite): 145 mg/L;
Monthly average (24-hour composite): 81 mg/L;

Biochemical Oxygen Demand (BOD_5)
Daily maximum (24-hour composite): 26 mg/L;
Monthly average (24-hour composite): 26 mg/L;

Temperature	Maximum:	40° C;
Rainbow trout 96hrLC50	Minimum:	100% (V/V)*;
pH	Maximum:	8 pH units;
	Minimum:	5.5 pH units;
Dissolved Oxygen	Minimum:	2 mg/L.

* A minimum 96hrLC50 of 100% (V/V) means that in a static bioassay on Rainbow trout, there must be no more than 50% mortality over 96 hours in undiluted effluent.

1.5.4 The authorized works are a submerged diffuser outfall extending a minimum of 820 metres from shore to a minimum depth of 45 metres at low water (as specified in section 1.1.4) or, subject to section 1.5.5, a submerged outfall (as specified in section 1.4.4) and related appurtenances approximately located as shown on Site Plan A.

1.5.5 Only when the discharge rate at outfall #1 is approaching its authorized limit or under special circumstances, non-contact cooling water from the surface condenser (731-756) may be discharged via outfall #4. Special circumstances must be documented, pursuant to Section 3.1.7.

1.5.6 The location of the facilities from which the discharge originates and the point of discharge is the same as Section 1.1.5 above.

Date issued: April 6, 1966
Date amended: April 6, 2011
(most recent)

Cassandra Caunce
for Director, *Environmental Management Act*
Lower Mainland Region

2. GENERAL REQUIREMENTS

2.1 Bypasses

The discharge of contaminants which have bypassed the authorized treatment works is prohibited unless the prior approval of the Director is obtained and confirmed in writing.

2.2 Notification

The Regional Manager, Environmental Protection, must be notified of a change in ownership of the works within 10 days of an ownership change.

2.3 Allowable Effluent Concentrations

The allowable concentrations (mg/L) of TSS and BOD_5 for the discharge described in Section 1.1 above are based on the 90th percentile production and flow rates for the period January 1, 2010 to December 31, 2010 as submitted by the permittee.

The 90th percentile rates are the total production rate (PROD) of 1 495 ADt/d, and an effluent discharge rate (EFF) of 107 576 m^3/day. At allowable levels of 10.4 kg/ADt for daily maximum TSS, 5.8 kg/ADt for monthly average TSS and 1.9 kg/ADt for daily maximum and monthly average BOD_5, the maximum allowable effluent concentrations have been calculated as follows:

TSS
(daily maximum) = 10.4 kg/ADt x 1 495 ADt/d ÷ 107 576 m^3/d x1 000 = 145 mg/L;
(monthly average) = 5.8 kg/ADt x 1 495 ADt/d ÷ 107 576 m^3/d x1 000 = 81 mg/L;

BOD_5
(daily maximum) = 1.9 kg/ADt x 1 495 ADt/d ÷ 107 576 m^3/d x 1 000 = 26 mg/L;
(monthly average) = 1.9 kg/ADt x 1 495 ADt/d ÷ 107 576 m^3/d x 1 000 = 26 mg/L;

The Director may amend the allowable concentrations in the effluent based on 90th percentile production and flow rates as submitted annually or based on other information obtained.

Date issued: April 6, 1966
Date amended: April 6, 2011
(most recent)

Cassandra Caunce
for Director, *Environmental Management Act*
Lower Mainland Region

2.4 Maintenance of Works and Emergency Procedures

The authorized works must be inspected regularly and maintained in good working order. In the event of an emergency or condition beyond the control of the permittee which prevents effective operation of the authorized works or leads to an unauthorized discharge, the permittee must take appropriate remedial action and notify the Director immediately. The Director may reduce or suspend operations to protect the environment until the authorized works has been restored, and/or corrective steps taken to prevent unauthorized discharges.

2.5 Foam

Should foam, attributable to the effluent, become objectionable in receiving waters, the Director may require additional treatment to remove the foam or eliminate the cause of the foam.

2.6 Storm Water

The characteristics of all storm water discharges which are not listed in this permit must be uncontaminated water.

2.7 Process Modifications

The Director must be notified prior to implementing changes to any process that may adversely affect the quality and/or quantity of the discharge. Despite notification under this section, permitted levels must not be exceeded.

2.8 Posting of Outfall

A sign must be erected along the alignment of the outfall above high water mark. The sign shall identify the nature of the works. The wording and size of the sign must be acceptable to the Director.

2.9 Sludge Wasting and Disposal

Sludge wasted from the treatment plant must be disposed of to a site and in a manner approved by the Director, or as authorized by regulation under the Environmental Management Act.

Date issued: April 6, 1966
Date amended: April 6, 2011
(most recent)

Cassandra Caunce
for Director, *Environmental Management Act*
Lower Mainland Region

2.10 Colour

Should colour, attributable to the effluent, become objectionable in receiving waters, the Director may require additional treatment to remove the colour forming constituents from the effluent prior to discharge.

2.11 Nutrients

Should nutrients be added to increase the efficiency of any biological treatment system, the quantity of nutrient must be so controlled that excess nutrients are not discharged to the receiving waters. The ratio of BOD_5:N:P must be recorded and data kept available for inspection.

2.12 Emergency Response Plan

The permittee must prepare and maintain an Emergency Response Plan that describes the procedures to be taken to prevent or mitigate any deposit of deleterious substance out of the normal course of events. The Emergency Response Plan must be immediately implemented if there is a deposit, or any risk of a deposit, of a deleterious substance out of the normal course of events. In addition, an updated emergency response plan, including a report on any emergency responses, taken in the previous year, must be kept available, on site for inspection.

The permittee must also prepare, update annually and keep available for inspection, a remedial plan describing procedures to be taken by the permittee to eliminate all unauthorized deposits of deleterious substances if the effluent fails an acute lethality test using rainbow trout.

2.13 Compliance with Federal Pulp and Paper Regulations

Notwithstanding the requirements in this permit, the permittee is required to adhere to all applicable legislation including the federal *Pulp and Paper Effluent Regulations (SOR/92-269 as amended by SOR/96-293 and SOR/99-166 and as amended from time to time)*. Where there are differences between federal and provincial requirements, the more stringent requirements will apply.

Date issued: April 6, 1966
Date amended: April 6, 2011
(most recent)

Cassandra Caunce
for Director, *Environmental Management Act*
Lower Mainland Region

3. MONITORING AND REPORTING REQUIREMENTS

3.1 Discharge Monitoring

3.1.1 Grab and Composite Sampling

The permittee must maintain suitable sampling facilities and obtain grab and composite samples of the effluent as specified below. Composite samples must be taken using a method acceptable to the Director. Proper care should be taken in sampling, storing and transporting the samples to adequately control temperature and avoid contamination, breakage, etc.

The locations of the sampling sites must be the effluent discharges described in Sections 1.1, 1.2, 1.3, 1.4 and 1.5.

3.1.2 Analysis

Obtain analyses of the samples as follows:

Parameter (Unless otherwise specified, the units are mg/L)	**Effluent Sampling Sites, Types and Normal Monitoring Frequencies** 1.1	1.2	1.3	1.4	1.5
pH (pH units)	CONT	CONT	---	CONT	CONT
Temperature (°C)	CONT	CONT	CONT	CONT	CONT
Conductivity (µS/cm)	CONT	CONT	---	CONT	CONT
Dissolved Oxygen	G(3/W)	---	---	---	G(3/W)
Toxicity (%V/V)					
(Rainbow trout 96hrLC50)	G(M)	---	---	---	G(M)
(Rainbow trout 96hrLC20)	---	G(M)	G(M)	G(M)	---
(Daphnia magna 48hrLC50)	G(W)	G(W)	G(W)	G(W)	G(W)
TSS	C(D)	C(D)	C(D)	C(D)	C(D)
BOD_5	C(3/W)	C(3/W)	C(3/W)	C(3/W)	C(3/W)
Oil and Grease	---	C(Q)	C(Q)	C(Q)	C(Q)
Residual chlorine	---	G(M)	---	G(M)	---
Ammonia nitrogen	C(W)	---	---	---	---
Resin Acids	C(Q)	---	---	---	---

Parameter Unless otherwise specified, the units are mg/L.	**Reduced Monitoring Frequency*** Sites 1.2, 1.3, 1.4 and 1.5
Toxicity (%V/V) (Daphnia magna 48hrLC50)	G(M)
TSS	G(M)
BOD_5	G(M)

Date issued: April 6, 1966
Date amended: April 6, 2011
(most recent)

Cassandra Caunce
for Director, *Environmental Management Act*
Lower Mainland Region

CONT = continuous monitoring
G = grab sample
C = 24-hour composite sample (as described in B.C. Reg. 470/90)
D = once per day when an effluent is being discharged
W = once per week
3/W = three times per week
M = once per calendar month
Q = once per calendar quarter

* **Reduced Monitoring Frequency** of BOD_5, TSS and Daphnia Magna toxicity testing, for Sites 1.2, 1.3, 1.4 and 1.5 may be conducted if, for each sample of effluent from the site (tested during the preceding calendar month), the TSS and BOD5 levels were both less than 10 mg/L, the effluent was not acutely lethal to Rainbow trout (no more than 50% mortality in 100% effluent solution) and the effluent contained no other deleterious material. If any subsequent sample does not meet the above effluent quality requirements, **Normal Monitoring Frequencies** must be conducted for all parameters until one calendar month has passed where the discharge has met the above conditions. At that point, the Reduced Monitoring Frequency may be resumed.

3.1.3 Toxicity

For the discharges described in Sections 1.1, 1.2, 1.3, 1.4 and 1.5 above, rainbow trout toxicity testing must be increased from once per month to once per week if a sample of effluent fails the rainbow trout toxicity test. For the purpose of this section, a sample is considered to have failed if more than 50% of the test fish die in a 100% effluent solution within 96 hours. Samples must continue to be collected and tested on one day each week until they pass three consecutive tests, at which time testing can revert to once per month.

Daphnia magna toxicity testing must be conducted once per week as described above. However, if a sample of effluent fails the Daphnia magna toxicity test, a sample of effluent must be collected without delay and tested for 96hrLC50 using rainbow trout in accordance with accepted procedures. For the purpose of this section, a sample is considered to have failed if more than 50% of the test organisms die in a 100% effluent solution within 48 hours.

Date issued: April 6, 1966
Date amended: April 6, 2011
(most recent)

Cassandra Caunce
for Director, *Environmental Management Act*
Lower Mainland Region

For 96hrLC50 and 96hrLC20 tests, the percent of fish mortality after 96 hours in the undiluted sample must also be recorded. For 48hrLC50 tests, the percent of Daphnia magna mortality after 48 hours in the undiluted sample must also be recorded

3.1.4 Continuous Monitoring

The minimum, maximum and average daily values must be recorded for pH. For temperature and conductivity, the daily maximum and average values must be recorded.

3.1.5 Loading Values

The monthly minimum, maximum and average values (mg/L) must be recorded for TSS and BOD_5. In addition, the actual kg/d and kg/ADt values must be recorded for TSS and BOD_5. The actual kg/d values are calculated by multiplying the actual contaminant concentration (mg/L) by the actual discharge flow (m^3/d) and dividing by 1000. The kg/ADt values are calculated by dividing the actual kg/d values by the appropriate 90th percentile production rate.

3.1.6 Flow Measurement

Provide and maintain suitable flow measuring devices, which are calibrated to be accurate to within 10 percent, and record once per day the effluent volume discharged over a 24-hour period via the outfalls specified in Sections 1.1, 1.2, 1.3, and 1.4.

Also, record once each day the volume of non-contact cooling water from the surface condenser (731-756) (Section 1.5) that is diverted to outfall #1.

3.1.7 Non-contact cooling water from the surface condenser (731-756)

A record must be kept documenting the days and the reasons that non-contact cooling water from the surface condenser (731-756) (Section 1.5) is discharged via outfall #4.

Date issued: April 6, 1966
Date amended: April 6, 2011
(most recent)

Cassandra Caunce
for Director, *Environmental Management Act*
Lower Mainland Region

3.2 Production Figures

Record once per day the total mill production (ADt/d). Once per month, determine the monthly average total mill production (ADt/d).

Once per year, determine the 90th percentile of total mill production based on daily productions recorded during the same calendar year period used to determine 90th percentile of effluent volumes. In addition, determine the highest 90th percentile of total mill production based on 90th percentile values calculated each year for the previous three calendar year periods.

3.3 Environmental Study

The permittee must retain a qualified consultant to carry out a study, as required by Federal Regulation, on the environmental impact of the effluent discharges on Malaspina Strait. The study must be undertaken subject to consultation with the Regional Manager, Environmental Protection. It must include but not be limited to:

(1) Results of monitoring requirements for effluent and receiving environment (water, sediment and biota) specified in Aquatic Environmental Effects Monitoring Requirements (EEM/1997/1 as amended from time to time) by Environment Canada and the Department of Fisheries and Oceans, and the associated Pulp and Paper Aquatic Environmental Effects Monitoring Requirements (Annex 1 to EEM/1997/1 as amended from time to time).

(2) A comparison of results with previous data using graphs and tables and a discussion on whether the environmental impact is increasing or decreasing,

(3) Any other monitoring that is required to assess the environmental impact.

3.4 Monitoring Procedures

3.4.1 Sampling Procedures

Sampling is to be carried out in accordance with the procedures described in the "British Columbia Field Sampling Manual for Continuous Monitoring and the Collection of Air, Air-Emission, Water, Wastewater, Soil, Sediment, and Biological Samples, 2003 Edition (Permittee)", or most recent edition, or by suitable alternative procedures as authorized by the Director.

Date issued: April 6, 1966
Date amended: April 6, 2011
(most recent)

Cassandra Caunce
for Director, *Environmental Management Act*
Lower Mainland Region

A copy of the above manual may be purchased from the Queen's Printer Publications Centre, P. O. Box 9452, Stn. Prov. Gov't. Victoria, British Columbia, V8W 9V7 (1-800-663-6105 or (250-387-6409) or via the internet at www.crownpub.bc.ca. A copy of the manual is also available for review at all Environmental Protection offices.

3.4.2 Analytical Procedures

Analyses are to be carried out in accordance with procedures described in the "British Columbia Laboratory Manual (2009 Permittee Edition)", or the most recent edition, or by suitable alternative procedures as authorized by the Director.

A copy of the above manual may be purchased from the Queen's Printer Publication Centre, P. O. Box 9452, Stn. Prov. Govt. Victoria, British Columbia, V8W 9V7 (1-800-663-6105 or (250-387-6409)) or via the internet at www.crownpub.bc.ca. A copy of the manual is also available for review at all Environmental Protection offices.

3.4.3 Quality Assurance

All data of analyses required to be submitted by the permittee must be conducted by a laboratory acceptable to the Director.

If monitoring of permitted parameters is conducted in an on-site laboratory, the permittee must maintain a Quality Assurance protocol for each parameter. Any proposed changes to these protocols must be submitted to the Regional Manager, Environmental Protection, for review prior to implementing the changes. A Quality Assurance protocol is to be submitted to the Regional Manager, Environmental Protection, a minimum of 30 days prior to starting to use an on-site laboratory for a new parameter.

The Quality Assurance protocol must include but is not limited to the following:

1. The ratio of samples to blanks for each parameter and the acceptable blank values;

2. The ratio of samples to duplicates for each parameter and the acceptable relative percent difference between duplicates;

Date issued: April 6, 1966
Date amended: April 6, 2011
(most recent)

Cassandra Caunce
for Director, *Environmental Management Act*
Lower Mainland Region

3. The ratio of samples to reference standards for each parameter and the acceptable percent recovery for reference standards; and

4. The corrective measures to be taken if duplicates, blanks or reference standards are outside acceptable ranges.

At the request of the Director, the permittee must submit all relevant quality assurance information from the on-site or contracted laboratory.

3.5 Reporting

Maintain data of analyses, flow measurements, production figures, information pursuant to Section 3.1.7, and contaminant loadings (kg/d, kg/ADt, and statistics relating to monthly maximum, minimum and average reported values) for inspection and submit the data once per month, in hard copy or electronic format as specified by the Regional Manager, Environmental Protection, for the previous calendar month. The results of any additional TSS, BOD5 and toxicity testing conducted on the authorized discharges by the permittee must also be submitted.

Each data submission must include a statement outlining any reported value(s) that were outside the permit limits. Clearly identify the dates of these occurrences in the data submission, include an explanation as to the cause of each occurrence and provide a description of the measures taken to rectify the situation. Should all submitted values be within the permit limits, a statement to that effect must be included.

All reports must be submitted before the end of the following calendar month.

The 90th percentile values for each calendar year must be submitted by January 31, the following year.

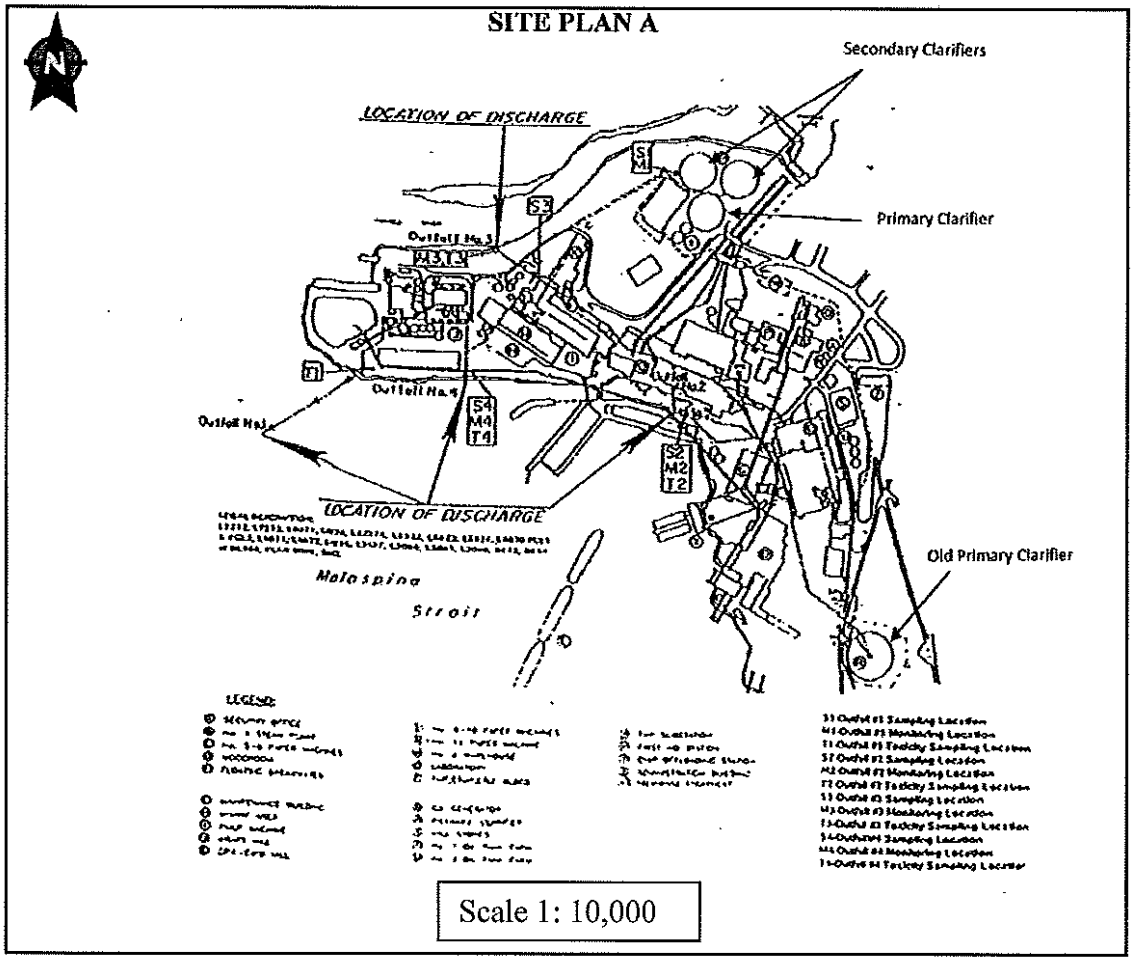
The permittee must report any deposits out of the normal course of events, in an acceptable format, as required by federal regulation.

The permittee must submit an effluent characterization and environmental study as required by federal regulation for the Environmental Effects Monitoring program.

Date issued: April 6, 1966
Date amended: April 6, 2011
(most recent)

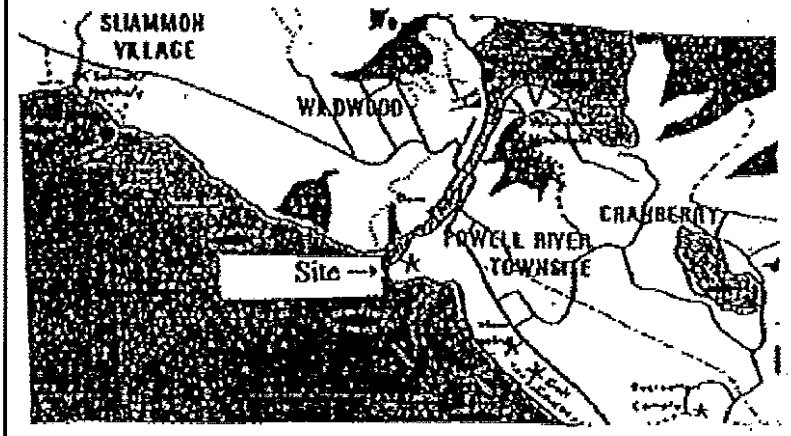
Cassandra Caunce
for Director, *Environmental Management Act*
Lower Mainland Region

SITE PLAN A



Scale 1: 10,000

Location Map



Date issued: April 6, 1966
Date amended: April 6, 2011
(most recent)

Cassandra Caunce
for Director, *Environmental Management Act*
Lower Mainland Region

113

Province of
British Columbia

Ministry of
Environment

Waste Management
Lower Mainland Region
15326 — 103A Avenue
Surrey
British Columbia
V3R 7A2
Telephone: (604) 584-8822
Fax (604) 584-9751

JUL 2 0 1990

PE-153 (PAO)

Our File: 50.23
(Powell River)

This is Exhibit "N" referred to in the affidavit of J. Braman sworn before me at Vancouver in the Province of British Columbia this 20 day of April, 2012

A Commissioner for taking Affidavits within the Province of British Columbia

DOUBLE REGISTERED

MACMILLAN BLOEDEL LIMITED
26th Floor, 1075 West Georgia Street
Vancouver, British Columbia
V6E 3R9

Gentlemen:

Re: Pollution Abatement Order under the Waste Management Act

It has been brought to my attention that past industrial activities at your pulp and paper mill site situated in Powell River, British Columbia, have resulted in ground contamination of:

1. The "Riverside Bunker C storage tank farm" area located 360 meters east of the southwest corner of and on Block 44, District Lot 450, Group 1, New Westminster District, Plan 8096, and

2. The "Old Bunker C storage tank farm" area located 160 meters southeast of the eastern border of and on Block 43, District Lot 450, Group 1, New Westminster District, Plan 8096.

Under Section 22(1) of the Waste Management Act, it has been determined that this condition is causing pollution at the two locations.

Pursuant to Section 22(2) of the Waste Management Act, you are hereby ordered to comply with the following requirements:

1. Identify all Special Wastes at the areas described in 1. and 2. above per criteria stipulated in the Special Waste Regulation. Manage these wastes in accordance with the requirements of the Special Waste Regulation. This includes management of wastes contained in numerous leaking barrels at the "Riverside Bunker C storage tank farm" area.

2. Carry out detailed monitoring and evaluation of soils and groundwater to characterize the extent of contamination at the "Riverside Bunker C storage tank farm" and at the "Old Bunker C storage tank farm" areas and submit the report to the Regional Waste Manager by September 28, 1990. The Regional Waste Manager may require further monitoring after an assessment of the report.

..../2

3. Submit a remediation plan which addresses treatment of contaminated soils and groundwater at the two sites to the Regional Waste Manager by October 15, 1990.

   British Columbia Standards for managing contamination at the Pacific Place site may be used as a guide in preparing the remediation plan.

4. Implement the remediation plan or other additional measures as required by the Regional Waste Manager.

This Order is without prejudice to any further action which may be taken under the Waste Management Act. Please note that a contravention to this Order is a violation under the Waste Management Act and may be subject to legal action.

If there are any questions, please contact Harold Riedler of this office.

Yours truly,

P. Khare', P. Eng.
Assistant Regional Waste Manager

c.c. Waste Management, Victoria

Mr. M. Ito
Conservation and Protection
Environment Canada

MacMillan Bloedel Limited
6270 Yew Street
Powell River, B. C.
V8A 4Z7

Assessment for the 21st non-compliance list **Date: August 13, 2001**

Mill Name **Pacifica Papers Inc.** Location **Powell River** File # **PR-4565**
OR-14398

Assessment of permit violations

The company is in compliance with the order, issued July 20, 1990.

The company is in compliance with the permit.

The annual monitoring submission includes all monitoring required. Environmental Impact staff is reviewing the submission. Since then three more monitoring wells have been installed. Additional extraction wells have also been installed.

A proposal to remediate hydrocarbon contaminated soil, from an Esso station, at the landfill, has been delayed, and possibly abandoned, due to public concern.

There were no permit violations between October 1, 1999 and March 31, 2001.

Sue Woodbine

Susan Woodbine
Pollution Prevention Officer
Industrial/Air Section