

Woodbine, Susan ENV:EX

2

From: Freyman, Liz ENV:EX
Sent: Thursday, May 3, 2007 11:16 AM
To: Woodbine, Susan ENV:EX
Subject: RE: Wildwood landfill expansion EA by Golder April 2007

- ① Sue just a reminder that Golder/Catalyst should investigate the complaint from a community member of black smelly "goop" observed on the shore of Powell River downslope of the mill's landfill.

From: Freyman, Liz ENV:EX
Sent: May 3, 2007 9:01 AM
To: Woodbine, Susan ENV:EX
Cc: Moore, Brent ENV:EX
Subject: Wildwood landfill expansion EA by Golder April 2007

Hi Sue

I reviewed the Golder report submitted to Catalyst Paper in Powell River and have the following comments/recommendations:

- ✓ • Strongly recommend that a hydrogeologist review this report especially the section on the water balance modelling e.g. Tim Bennett, Water Stewardship Division
- ✓ • Strongly recommend that a meteorologist review the report sections on dustfall e.g. Cindy Walsh
- ② • Climate data used in the report comes from the Powell River Airport in Westview but I noticed there is a met station right at the Catalyst mill site. If possible, this met station data should be used instead.
- Yes • Section 3.5 "Conceptual Water Balance Model": does the HELP model input take into account the extra moisture from the wastes that are mixed with water to form a slurry prior to disposal as well as the wash water from cleaning out the cement mixer trucks that transport the wet ash mixture to the landfill, and any water applied for dust suppression?
- ③ • In Section 3.6 "Rationale for Landfill Design Concept" the report mentions that the magnitude of settlement cannot be determined accurately and uses woodwaste landfills as an example of observed settlement rates of 2%- 10%. Woodwaste is quite different than the proposed landfill material in phase 2. It is recommended that a more thorough investigation of landfills in other jurisdictions (or scientific literature) be done to better predict the estimated amount of landfill settlement not only in the new phase 2 portion but also to the phase 1 portion that is uncontained. The concern is whether the additional weight added on to the phase 1 landfill would increase the likelihood of additional settlement and/or generate additional landfill leachate in the phase 1 portion.
- ④ • In Section 3.7 "Engineering Concept" the report mentions an additional electrical leak detection system for the phase 2 geomembrane. Can this leak detection system account for leaks that may be generated in the phase 1 portion of the landfill?

In summary, the main concern from an Environment Quality Section standpoint is the potential generation of phase 1 landfill leachate entering groundwater and surface waters beyond the leachate collection system. While the proximity to the mill is advantageous for conveying collected landfill leachate, this landfill location suffers from a legacy of incompatible landuse planning resulting in this expansion occurring adjacent to a residential community.

Liz Freyman

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- ① Monitoring is being conducted.
- ② Climate data from the Wildwood ambient monitoring station used.
- ③ Settlement monitoring is to be included in permit.
- ④ Electrical leak detection is to be used during installation. A leak detection system is to be installed for use during operation.

Catalyst Paper
Particulate Matter Monitoring Recommendations
Powell River Landfill site

Dustfall Monitors

- Relocate dustfall monitors to sites discussed on-site, so that monitors are closer to the active landfill area
- Place monitors away from fences, obstructions and large shrubbery in all directions to ensure dust is being captured from the ambient environment, and is not influenced by surrounding features. Ensure monitors are placed in locations that are representative of the surrounding average ground level (i.e. not at the base of the landfill)
- Consider carrying out dustfall monitoring at the current locations until the end of the summer (end of September) to allow for interpretation of summer season results.

Hi-Vol Monitor

- Change the sampling frequency from every 7 days to every 6 days to comply with National Air Pollutant Surveillance schedule. This removes any possible day of the week bias that may occur during a long-term sampling regime (MoE has received documentation indicating that this recommendation has already been fulfilled)
- Relocate PM monitor to a location that is not influenced by a surrounding terrain features.

(4)

Woodbine, Susan ENV:EX

From: Saxton, Julie ENV:EX
Sent: Monday, March 31, 2008 2:39 PM
To: Woodbine, Susan ENV:EX
Cc: Moore, Brent ENV:EX
Subject: Powell River TRS and PM monitoring

Hi Sue

To clarify our discussions and my thoughts about the TRS and PM monitoring:

I would expect the current TRS analyzer location (Lawn Bowling Club) to be adequate under certain circumstances. Discussions with Sarah Barkowski of Catalyst Paper led me to believe that there have been instances of incorrect readings due to instrument error because of inadequate climate control at the station. I therefore have no problem with the proposed move in location to provide better climate control for the instrument as the proposed new location is situated between the mill source and the population. As I have not visited the proposed site, I cannot comment on its suitability in terms of the physical surroundings so it should be noted that there are siting criteria that must be considered when assessing the best location for the instrument.

The PM monitoring at the Cranberry Lake site no longer provides a useful assessment of particulate emissions from the mill, particularly with respect to PM10 due to local issues at the site, and due to changes in the sources from the mill. Based on the PM10 dispersion model results from the 2003 report, the main impact from the mill is expected to be close to the Wildwood monitoring station. Cindy Walsh, formerly Air Quality Meteorologist for the Lower Mainland Region, visited Powell River and provided recommendations about the suitability of the site at the school to the north of the landfill for PM10 and PM2.5 monitoring, including specific recommendations about exactly where the instruments should be located to comply with Ministry siting criteria. Based on the data I have reviewed, I would not expect the proposed site to provide a more useful assessment of emissions specifically from the mill site than the current station in Wildwood but it will allow monitoring of PM impacting on the community in that area from the land fill site, specifically at the school. I have no objection to the PM10 and PM2.5 monitors being moved to the proposed site but it is very close to the Wildwood PM monitors and may not provide useful additional information on PM for the community in that area. I would suggest reviewing the data from these stations in 2-3 years.

- Julie

Julie Saxton

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Woodbine, Susan ENV:EX

From: Bennett, Timothy A ENV:EX
Sent: Wednesday, October 10, 2007 11:06 AM
To: Woodbine, Susan ENV:EX
Subject: FW: Review comments (GAL report for Wildwood landfill expansion)

Timothy Bennett, M.Sc., P.Eng.
A/ Section Head, Water Allocation
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Timothy.Bennett@gov.bc.ca

From: Bennett, Timothy A ENV:EX
Sent: May 17, 2007 7:50 AM
To: Woodbine, Susan ENV:EX
Subject: Review comments (GAL report for Wildwood landfill expansion)

Hi Sue,

I've completed a quick review of the hydrogeological components of Golder's April 13, 2007, "Environmental Assessment, Wildwood Landfill Expansion, Powell River, BC" report.

Generally, the approach seems reasonable. However, I note two overall issues: (I) the results and interpretation of impacts are based on inferred hydrogeologic conditions / previous site characterization data which were unavailable for review; and (II) It would be useful to have more rationale/discussion to support the values chosen for the water balance model.

My 'detailed' questions and comments are below. I'll also apologize in advance in case any of my questions have been addressed in previous reports, studies or correspondence.

Hydrogeology:

1. The conceptual hydrogeological model includes perched zones (~ 11, 19, 29 and 38 m depth) overlying a regional aquifer. However, this model appears to be inferred from boreholes 300 m apart, at the upgradient/downgradient periphery of the landfill (and does not appear to include any data within the extent of the landfill). Is there other data to support the continuity of these perched zones? Ultimately, could Golder comment on how discontinuity of these perched zones will affect their interpretation of groundwater flow, contaminant distribution and transport, and leachate capture within the recovery wells?

2. Unfortunately, I haven't seen previous reports which may document contaminant distributions (e.g., laterally, and within each perched/regional flow zone) and the rationale for the location/distribution of the recovery well network. For my review, it would have been useful to have contaminant concentration contour maps to confirm that contaminant plume(s) have been adequately delineated. These figures would also have been useful to assess the suitability of the recovery

well locations, and conditions used as 'baseline' for this assessment.

3. Unfortunately, I haven't seen previous reports which may document temporal groundwater levels and flow directions (e.g., again, within each perched/regional flow zone). For my review, it would have been useful to understand the overall flow regime better.

Water Balance Model and potential impacts:

1. The water balance model appears to be based on a single specified value for the hydraulic conductivities (K) of various soil layers.

(a) Was the single value chosen considered to be conservative or 'reasonable' for each material layer?

(b) Can Golder comment on whether the assumed value of 10^{-6} cm/s for ash (specified to account for cracks) is conservatively representative, given the (unknown/unspecified, from my point of view) potential variability in waste composition and that only 1 sample appears to have been tested for K?

(c) I'm not familiar with estimated K values for geomembranes, can Golder comment on the conservativeness/representativeness of the value (2×10^{-13} cm/s) chosen for this layer?

(d) Golder's report appears to provide 2 sets of HELP modelling results for leachate percolation (i.e., asphalt cracked and non-cracked, for operational and post-closure scenarios). Can Golder comment on whether the scenarios/conditions simulated are sufficient to completely bracket the range of expected percolation rates (e.g., sensitivity analyses)?

2. It appears they used meteorological data for Vancouver airport, within the HELP model. Could they comment on how representative that data is expected to be for Powell River, and what impact any difference might have on the model results?

3. Potential impacts are inferred following calculation of groundwater-to-leachate volume mixing ratios. These mixing ratios appear to be based on estimated volumetric fluxes through the perched zones, excluding portions that are inferred to be captured by the recovery wells. Could Golder comment on how variability in perched zone distribution and saturated thickness (in those perched zones) might impact their results? It would seem prudent to include a sensitivity analyses given the potential uncertainty in some of the parameters.

regards,

Timothy Bennett, M.Sc., P.Eng.
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April 4, 2008

E/08/0723
08-1411-0080/2000

Catalyst Paper
Powell River Division
5775 Ash Avenue
Powell River, BC
V8A 4R3

Attention: Sarah Barkowski
Manager, Environment & Quality Systems

**RE: MAY 17, 2007 COMMENTS FROM MOE
PHASE 2 WILDWOOD LANDFILL
POWELL RIVER, BC**

Dear Sarah:

This letter responds to comments from Timothy Bennett of the Water Stewardship Division of the Ministry of Environment (MOE) contained in a May 17, 2007 e-mail and received by Catalyst Paper and Golder from MOE on March 26, 2008. A paraphrase of the questions from MOE are in *italics*.

1.0 HYDROGEOLOGY

1.1 Conceptual Hydrogeological Model

Is there other data to support the continuity of the perched zones? How would the discontinuity of the perched zones affect the interpretation of groundwater flow, contaminant distribution and transport, and leachate capture within the recovery wells?

The conceptual model was developed from the available borehole data and geophysical surveys conducted by others. It is acknowledged that the lateral and vertical extents of the perched flow zones are complex and may not be fully characterized. As a result, a conservative approach to the impact assessment was adopted, whereby the perched flow zones were considered as a collective unit and potential leachate loading was calculated



solely within this unit, rather than within the regional aquifer. By considering the perched zones as one unit, with a saturated thickness of 2 m, any potential discontinuities of individual perched zones became irrelevant. Consideration of leachate loadings solely within the perched aquifers, using a saturated thickness of only 2 m, resulted in the calculation of conservatively high potential loadings. In other words, if potential leachate loadings had been calculated for the regional aquifer (with a greater saturated thickness), concentrations would have been even lower than those presented in the assessment.

1.2 Contaminant Distributions

It would have been useful to have contaminant contour maps to confirm that contaminant plumes(s) have been adequately delineated.

A comprehensive assessment of lateral, vertical and temporal groundwater chemistry concentrations has been presented in each of the annual monitoring reports for the Wildwood Landfill. Results of "snap-shot" sampling, showing the lateral extents of specific conductivity, pH, alkalinity and sulphate in the 11 m, 19 m, 38 m and regional flow zones are illustrated in Figures 17, 18, 19 and 20 of the 2004 annual report, dated April 27, 2005.

1.3 Groundwater Levels and Flow Directions

It would have been useful to have previous reports which may document groundwater levels and flow directions.

Groundwater levels and flow directions are presented in each of the annual monitoring reports for the Wildwood Landfill. Groundwater contours for the 11 m, 19 m, 38 m, regional and bedrock flow zones are illustrated in Figures 10 through 14 of the 2006 annual report (dated May 23, 2007). Groundwater levels are summarized in Table II-2 and plotted relative to historical trends in Figures 15A through 15F of the 2006 annual report.

2.0 WATER BALANCE MODEL AND POTENTIAL IMPACTS

2.1 Water Balance

- (a) *Were the selected k values conservative or reasonable?* – This varied depending on the material and our confidence in the value of the saturated hydraulic conductivity, k:

- Drainage layer in final cover – this will be an imported material and therefore there will be a specification associated with it that the material would need to meet. We are therefore confident that this is a slightly conservative value.
 - Fly ash – As stated in our July 26, 2007 report, (Section 3.2.2 of Appendix III), we consider this to be a conservative value since it is two orders of magnitude higher than the results of a laboratory hydraulic conductivity test and significant cracking is not observed on the surface of the ash in the mini-landfill.
 - Leachate collection and leak detection layers – these will be imported materials and therefore there will be a specification associated with it that the material would need to meet. We are therefore confident that this is a slightly conservative value.
 - Geomembrane Liner – this is a default k value contained in the HELP model program. However, it is not the geomembrane k value that controls leachate losses to the environment. Rather it is the number of installation defects that control leachate losses. Golder has assumed a relatively conservative value of one installation defect per hectare, compared with the median hole frequency of 0.7 holes per hectare reported by McQuade and Needham (1999). In addition as stated in Section 5.6 of Golder's July 26, 2007 report, a leak location survey will be carried out after liner installation and before placement of waste to repair all detected installation defects. Therefore, it is our opinion that the number of installation defects assumed by Golder is conservative.
 - Asphalt Cover and Old Waste – The properties of these two layers are immaterial to the environmental assessment because Golder conservatively assumed that all of the leachate that infiltrates through the geomembrane will flow past these layers and enter the groundwater.
- (b) *Was the assumed k value for the fly ash conservative?* See above for fly ash
- (c) *Was the assumed k value for the geomembrane conservative or representative?* – See above for geomembrane liner.
- (d) *Does the modeled scenarios completely bracket the range of expected percolation rates?* Yes, the indicated leachate percolation rates bracket the predicted range of likely leachate percolation rates.

2.2 Meteorological Data

How representative is the use of Vancouver Airport meteorological data compared with Powell River? – The use of Vancouver airport data is considered to be conservative because, as stated in Section 3.2.1 of Appendix III of the report, the modeled annual precipitation using Vancouver Airport data is greater than the average annual precipitation at Powell River.

2.3 Mixing Ratios

How does the variability in perched zone distribution and saturated thickness impact the results? It would seem prudent to include a sensitivity analysis given the uncertainty in some of the parameters.

As discussed in Section 1.1, any potential variability in the distribution of the perched zones was negated by considering the perched zones collectively as one unit.

Mixing calculations were completed for a “best estimate” of hydrogeological input parameters. In addition, a sensitivity analysis was conducted whereby mixing calculations were also conducted for an upper and lower range of hydraulic conductivity and precipitation recharge values. The hydraulic conductivity and recharge values were selected for the sensitivity analysis as these parameters were generally the most uncertain and had the most significant impact on the predicted leachate concentration.

The inferred saturated thickness of the perched aquifer (2 m) was not varied during the sensitivity analysis since the assumed range in hydraulic conductivity appeared to be sufficient to address the uncertainty in the predicted groundwater discharge through the perched aquifers. For example, for the upper bound estimate, the hydraulic conductivity of the aquifer was assumed to be a factor of two lower than the best estimate. When the lower hydraulic conductivity was combined with the inferred hydraulic gradient and saturated thickness, the calculated groundwater discharge rate was 5.8 m³/day. This is approximately equivalent to the volume of groundwater recovered by the pumping wells (6 m³/day). If the aquifer thickness and hydraulic conductivity were lowered further, the predicted discharge would be unreasonably low (i.e., below that which we know to be recovered by the pumping wells).

The results of the sensitivity analysis (Table II-E-1 of the Environmental Assessment report) show that, similar to the “best estimate”, the “reasonable upper bound” leachate-to-groundwater mixing ratio would be below the percentage of leachate required to exceed the most conservative standard (Table II-E-2 of the Environmental Assessment report).

3.0 CLOSURE

We trust that this letter provides the information you require at present. Should you require anything further, please do not hesitate to call.

Yours very truly,

GOLDER ASSOCIATES LTD.

ORIGINAL SIGNED BY

Jillian Sacré, P.Geo.
Principal/Hydrogeologist

ORIGINAL SIGNED BY

Colin L.Y. Wong, P. Eng.
Principal

JPS/CW/rja

O:\Final\2008\1411\08-1411-0080\let 0404 Response to May 17 2007 MoE e-mail.doc

Woodbine, Susan ENV:EX

From: Bennett, Timothy A ENV:EX
Sent: Wednesday, May 14, 2008 9:52 AM
To: Woodbine, Susan ENV:EX
Subject: FW: Review of Golder Letter Response to your comments

Hi Sue,

FYI, I'd passed on Golder's responses to my hydrogeologist. Her comments are attached.

Regards,

Timothy Bennett, M.Sc., P.Eng.
Section Head, Water Allocation
Water Stewardship Division
Ministry of Environment
10470 - 152 Street, Surrey, BC V3R 0Y3
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Timothy.Bennett@gov.bc.ca

From: Lepitre, Michele ENV:EX
Sent: May 1, 2008 5:26 PM
To: Bennett, Timothy A ENV:EX
Subject: Review of Golder Letter Response to your comments

Hi Tim,

After reviewing the report their response seems reasonable and complete. I also think that their approach in the report seems reasonable. They did complete a bit of a sensitivity analysis in the report (appendix II annex E). I have attached excel sheet that checks the calculations (and can also do further sensitivity by varying the input). The variables the Golder used in their sensitivity analysis are highlighted in yellow. Also checked their geomean calculation which was slightly different than the value they used; however, the difference was insufficient to make significant changes to their calculations. We have also been provided with groundwater contour maps (for the different layers) and time trend graphs. Groundwater in all layers flows towards Powell River. We also have maps showing concentrations of selected parameters in the various layers and the impacted area is mainly in the upper 2 perched zones (11 m and 19 m) and near the landfill footprint.

Hope this helps!

Michele

Michele Lepitre, M.Sc., P.Geo.
Regional Hydrogeologist
Water Stewardship Division
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Review and Comments

Consultation Report, Wildwood landfill Expansion Golder and Associates (September 21, 2007)

I have completed a review of the above referenced document. Based on the information provided, it is my opinion that Catalyst Paper Corporation (applicant) has adequately completed the stakeholder consultation and review process pursuant to their permit amendment application. The only shortfall I identified was that it might have been prudent for the applicant to hold a second open house after the final Environmental Assessment Report became available to the stakeholders. However, this omission **does not** take away from the overall adequacy of the process.

The report includes in excess of 100 pieces of correspondence (letters or emails) from 96 stakeholders expressing their opposition to the expansion of the landfill, the subject of the amendment application. The applicant responded to each stakeholder individually providing information to address his or her specific concerns. On the advise of Ms. Susan Woodbine, I focused my review of correspondence to those from and to Rhonda Alton, Pam Brown and Dave Harris. Furthermore, based on personal knowledge, I also reviewed correspondence from and to Paddy Goggins, John Keays and Lee Lorenzen. In addition, I also reviewed a random sampling of approximately 15 other letters and a DVD entitled Powell River, Pearl Peril on the Sunshine Coast produced by the Powell River Legacy committee.

Of the correspondence reviewed, the greatest concern expressed was regarding dust and the degradation of air quality in the community of Wildwood. Concerns regarding the proximity of the landfill to Wildwood, groundwater contamination and recycling of waste were also very prominent.

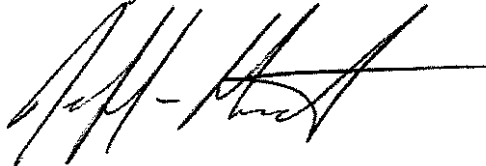
I would like to comment on the focus of Ms. Alton's letter, that being compliance with the landfill criteria. The ministry's *Landfill Criteria for Municipal Solid Waste* (June 1993) was adopted as ministry policy for the environmentally sound disposal of municipal solid waste (MSW). The *Environmental Management Act* defines MSW as (a) refuse that originates from residential, commercial, institutional, demolition land clearing or construction sources, or (b) refuse specified by a director to be included in a waste management plan. The amendment application is for the expansion of an existing industrial landfill for the discharge of industrial waste (fly ash) originating the Catalyst Paper mill. Clearly the source of waste does not originate from one of the areas indicated in the definition of MSW, nor has the waste been specified by a director to be included in a waste management plan. Therefore compliance with the Landfill Criteria does not apply for this facility. Notwithstanding, it is common practice to use the landfill criteria as a **guidance** document in designing and operating industrial (non MSW) landfills. This is the approach taken by Golder and Associates in the development of the Environmental Assessment Report (July 2007),

As mentioned previously concerns regarding the proximity of the landfill to the community of Wildwood were very prominent. More specifically the concerns state that the landfill is within 300 metres of residences and a convenience store/restaurant. I suspect that the reference to this distance is based on a requirement of the Landfill Criteria, namely Section 5.2, Other Facilities. This section of the criteria states that the distance between the discharged MSW and the nearest residence, restaurant and other facilities be a minimum of 300 metres. The primary reason for this requirement is to protect residences and other facilities from vectors (birds and rodents), odour issues and methane gas migration. As noted above this is not a MSW landfill and therefore compliance with the Landfill Criteria is not required. Notwithstanding, based on the type of waste that will be discharged at the landfill it is unlikely that vectors, odour or methane gas migration will be an issue.

Although the Environmental Assessment Report addresses most concerns raised by members of the public, the amended permit should contain clauses addressing the following:

- Dustfall and ambient air monitoring,
- Groundwater and surface water monitoring,
- A review of the geotechnical and hydrological study at least every 5 years,
- Leachate management plan,
- Surface water diversion strategies,
- Operating plan, including the concept of progressive closure,
- Slope stability and settlement, and
- Recycling and/or reuse of waste,

Submitted by

A handwritten signature in black ink, appearing to read 'Jeff - Haastregt', written over a horizontal line.

Jeff van Haastregt

Contract CLE08-009-EP
March 12, 2008

Review and Comments

Environmental Assessment Report, Wildwood landfill Expansion Golder and Associates (July 26, 2007)

I have completed a review of the above referenced document and would provide the following comments:


General comments

- In keeping with other refuse permits issued by the ministry, waste quantity should be measured in tonnes.
- The permit should include a total maximum authorized discharge, this being the design capacity of the landfill. An annual discharge rate is only relevant for fee purposes.
- It is noted that throughout the report contaminant levels are compared to drinking water standards even though aquatic life standards would be appropriate. This is not a fault as it provides a greater level of environmental protection in that the drinking water standards are more stringent.
- Reference is made (Section 1.1) to the fact that the permit amendment only applies to Phase 2. In my opinion this is inaccurate, during an amendment process the entire permit is subject to review and amendment.
- Has consideration been given to solidifying the fly ash at the mill and then placing the solidified waste at the landfill (similar to the "bale and place" method of land filling used at Premier Street landfill)
- Throughout the report there are references to "sliding" monitoring requirements. This can be handled in one of two ways, 1) permit amendment or 2) as a condition of an approved report (see Vancouver Landfill OC for an example)

Specific comments

Section 2.1 (3rd paragraph) – As per the first and second bullet above.

Section 4.2 and Appendix 3 – Provides good baseline geotechnical information. The permit should include a requirement that this information be reviewed on a regular basis (every 5 years) during the operation of the landfill. Should the information change indicating an impact to the environment then remedial action should be taken. In this regard it may be advisable to have slope stability and settlement monitoring devices installed and monitored as a requirement of the permit.

Section 4.4 – Insufficient information with respect to the interface between the Phase 1 landfill and the mini landfill. 

Section 4.5.3 – Has there been any up gradient groundwater characterization which could be used as a baseline?

Section 5.1.2 – It is not clear (Figure 7) if there is a monitoring well at the property boundary closest to the Wildwood residences and other facilities (gas/store/restaurant). If not it may be prudent to have one established.

Section 5.5 (4th paragraph) – It does not make sense that the potential for the leachate percolation rate to be greater post closure. An explanation of this fact should be obtained from the consultant. Furthermore, reference to the greater rate is made and used in reaching conclusions in subsequent sections in the report.

Section 5.6 & 5.7 (3rd paragraph) – Shingling of the Phase 2 liner over the mini landfill liner does not provide adequate protection in the event that there is leachate mounding in the mini landfill. The two liners should be connected.

Section 5.7 (6th paragraph) – How will leak detection be handled after operation ~~have~~ *has* started?

Section 5.7 (7th paragraph) – If the “active pond” is exposed to the elements, then it must be of sufficient size to prevent an overflow situation in a worse case scenario. Figure 16 does not reflect the text in this

Section 5.7 (7th paragraph) – Figure 16 does not show the leachate collection line from Phase 2 as being connected to the active pond.

Section 5.8 (1st paragraph) – The height of other landfills in BC is irrelevant to this application.

Section 5.9 (b) – This is a select waste landfill. All justifications and conclusions are based on this premise. Accordingly, there should be no discharge for other wastes as described (MSW) under any condition.

Section 5.9 (c) – Same comment as in Section 2.1.

Section 5.9 (d) – Indicates that select fly ash will be used for exterior berms, however Figure 20 implies the entire waste pile is select fly ash.

Section 5.9 (d) – The concept of progressive closure should be incorporated into the land filling method especially if fly ash is to be used for the exterior berms.

Section 5.9 (e) (2nd paragraph) – Truck washing should be done at the mill or in a separate area away from the landfill.

Section 5.9 (f) – The leachate collection should be configured in away to allow for leachate monitoring from each of the following: Phase 1 landfill, mini landfill and Phase 2 landfill.

Section 5.9 (f) – The addition of water for dust control is not preferred. Alternate methods should be investigated.

Section 5.10 (c) (last paragraph) – This is a description of progressive closure and should be a permit requirement.

Section 6.1.3 – It is unclear if the recovery well pumping will continue during operation or only used as a contingency.

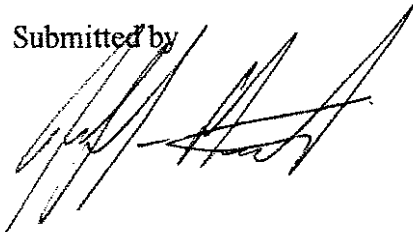
Section 6.2 (last paragraph) – Same comment as Section 5.9 (f).

Section 6.3 – Same comment as Section 6.1.3.

Appendix 3 Section 3.4.2 – Has consideration been given to the amount of leachate from any exposed waste?

Appendix 3 Section 3.4.3 (last paragraph) & Section 3.4.4 – Recommendations should be included in the permit.

Submitted by

A handwritten signature in black ink, appearing to read 'Jeff van Haastregt', written over a horizontal line.

Jeff van Haastregt

Contract CLE08-009-EP
February 20, 2008

Review and Comments

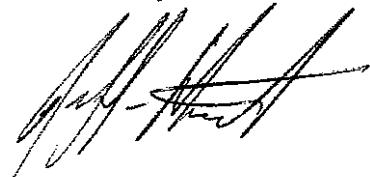
Data Review and Compliance Assessment Report Wildwood Landfill, Powell River Hatfield Consultants (November, 2007)

I have completed a review of the above referenced document including minor revisions submitted on March 3, 2008. In arriving at the conclusions of the report, the consultant has taken a very systematic approach in comparing historical data to authorizations (permit), regulations, criteria and guidelines. Furthermore, the consultant has justified and provided sound logic in any assumptions taken. The conclusions support the findings of the Environmental Assessment Report (Golder and Associates, July 2007).

Based on the information provided, I do not have any concerns with the report. I did however, identify two minor typographical errors, namely:

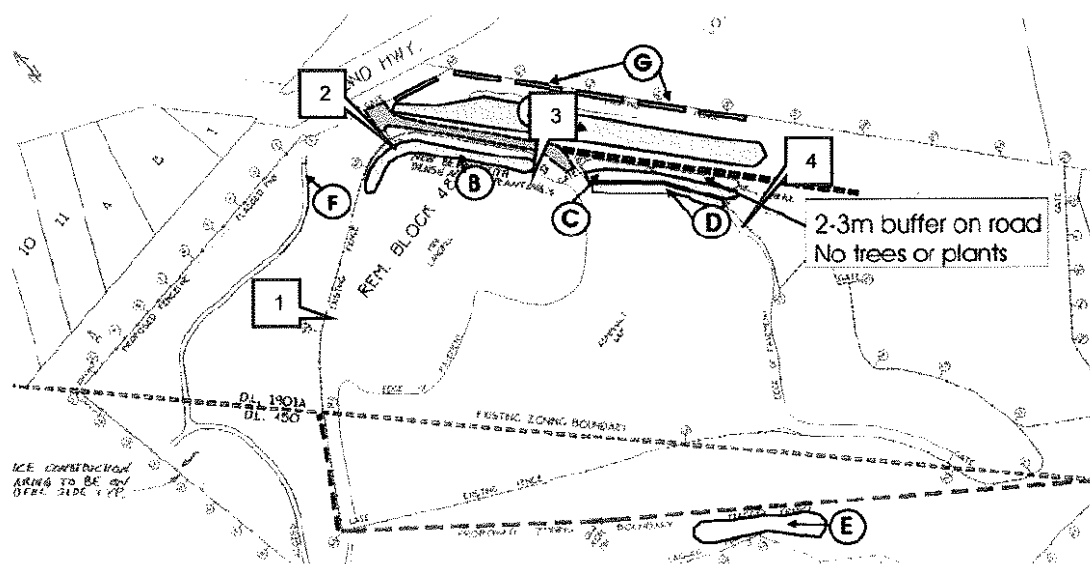
- Page 30, 3rd paragraph – I believe the first sentence should read "...but it is notable that where low field pH concentrations did not meet the minimum pH guideline, the laboratory pH's did.", and
- Page 32, 4th line – the reference should be to "Appendix 6" not Appendix 5.

Submitted by



Jeff van Haastregt

Contract CLE08-009-EP
March 5, 2008



Locations for Catalyst Powell River Dustfall Monitors

July 1, 2008

Monitor #1 is located approximately 5 feet inside the inner fence, 4 feet outside of the perimeter road. This monitor was not moved after 2007.

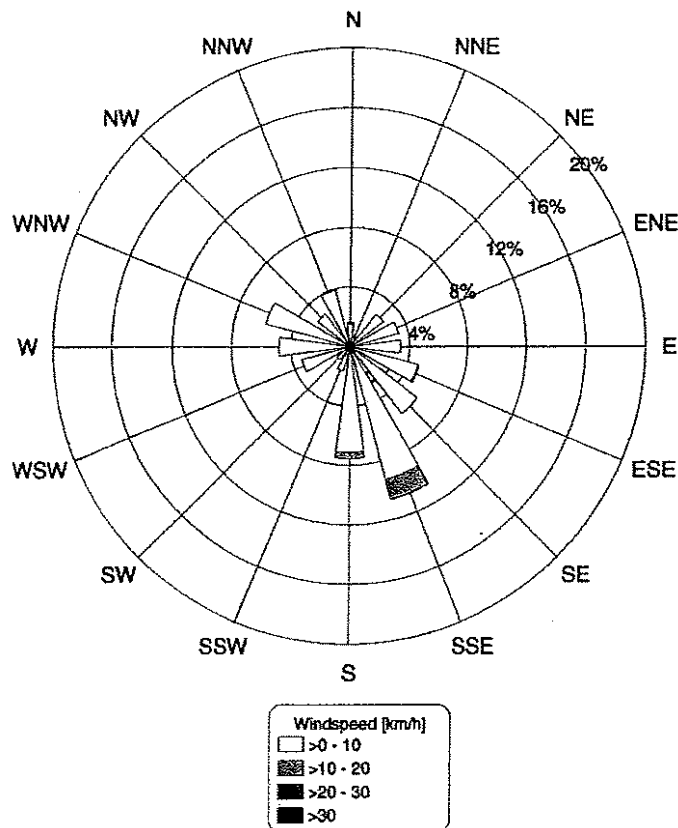
Monitor #2 is on top of the berm, in the north corner. This monitor was moved after 2007, although it was only moved vertically, to accommodate the berm (B).

Monitor #3 is inside the inner fence and inside of the original inner road. It is approximately 11 paces from the inside edge of the pump house and 18 paces from the inside edge of the berm. This monitor was moved after 2007, approximately 15 paces in a westerly direction, i.e., away from the inner fence, to accommodate the berm.

The PM₁₀ HiVol is located approximately 9 feet northwest of Monitor #3.

Monitor #4 is approximately 2 feet inside the inner fence, 9 feet outside of the asphalt edge, near the southeast edge of the landfill. This monitor was not moved after 2007.

Note: The map is provided to show the approximate locations of the 2008 dustfall monitors. Proposed fence line information is not accurate.

FIGURE 4: WILDWOOD WINDROSE (JANUARY TO DECEMBER 2006)

5.0 SITE CONDITIONS

When the sampling canisters were installed, site conditions were dry, but there was little visible airborne dust. The Landfill boundary was forested and as such, dustfall transport by wind was moderated. Dustfall measurements occurred during a time when there was no precipitation on 28 of the 34 monitoring days. During the monitoring period, the mill deposited 5 to 6 loads of flyash slurry per day in the mini-landfill.

There was a period of onsite drilling that occurred between August 21 and September 7, 2006 at which time the sampling containers were capped to avoid measurement of dustfall associated with these activities.

88

PCB test results 1992

Table 3 - Organochlorines, Soils

Parameter	MDC	Units	AH6-8&9	AH1-5	AH1-7	AH2-5	AH2-6	AH6-5	BCELP LEVEL B	BCELP LEVEL C
Aldrin	0.002	µg/g	✓	✓	✓	✓	✓	✓	total = 2	total = 20
BHC, alpha-	0.002	µg/g	✓	✓	✓	✓	✓	✓		
BHC, beta-	0.002	µg/g	✓	✓	✓	✓	✓	✓		
BHC, delta-	0.002	µg/g	✓	✓	✓	✓	✓	✓		
Chlordane, alpha-	0.01	µg/g	✓	✓	✓	✓	✓	✓		
Chlordane, gamma-	0.01	µg/g	✓	✓	✓	✓	✓	✓		
DDD, p,p'-	0.01	µg/g	✓	✓	✓	✓	✓	✓		
DDE, p,p'-	0.005	µg/g	✓	✓	✓	✓	✓	✓		
DDT, o,p'-	0.01	µg/g	✓	✓	✓	✓	✓	✓		
DDT, p,p'-	0.01	µg/g	✓	✓	✓	✓	✓	✓		
Dieldrin	0.01	µg/g	✓	✓	✓	✓	✓	✓		
Endosulfan I	0.01	µg/g	✓	✓	✓	✓	✓	✓		
Endosulfan II	0.01	µg/g	✓	✓	✓	✓	✓	✓		
Endosulfan sulphate	0.02	µg/g	✓	✓	✓	✓	✓	✓		
Endrin	0.01	µg/g	✓	✓	✓	✓	✓	✓		
Hexachlorobenzene	0.001	µg/g	✓	✓	✓	✓	✓	✓		
Heptachlor	0.002	µg/g	✓	✓	✓	✓	✓	✓		
Heptachlor epoxide	0.004	µg/g	✓	✓	✓	✓	✓	✓		
Lindane (BHC, gamma-)	0.002	µg/g	✓	✓	✓	✓	✓	✓		
Methoxychlor	0.02	µg/g	✓	✓	✓	✓	✓	✓		
Mirex	0.02	µg/g	✓	✓	✓	✓	✓	✓		
Nonachlor, trans-	0.01	µg/g	✓	✓	✓	✓	✓	✓		
Oxychlorodane	0.01	µg/g	✓	✓	✓	✓	✓	✓		
PCB	0.05	µg/g	✓	✓	✓	✓	✓	✓		
Surrogate Recovery										
Dibromobiphenyl (Ar 1254)		%	100	79	88	68	79	82		



Table 11 - Organochlorines, Water

Parameter	MDC	Units	SPRING	89-4 A1	AH6 A1	AH3 A1	89-3 A2	BCELP Bdw ug/L	BCELP Bds ug/L
BHC, alpha-	0.01	µg/g	<	<	<	<	<	-	-
BHC, beta-	0.01	µg/g	<	<	<	<	<	-	-
BHC, delta-	0.01	µg/g	<	<	<	<	<	-	-
Chlordane, alpha-	0.05	µg/g	<	<	<	<	<	-	-
Chlordane, gamma-	0.05	µg/g	<	<	<	<	<	-	-
Chlordane, all	0.05	µg/g	<	<	<	<	<	7	-
DDD, p,p'-	0.05	µg/g	<	<	<	<	<	-	-
DDE, p,p'-	0.05	µg/g	<	<	<	<	<	-	-
DDT, o,p'-	0.05	µg/g	<	<	<	<	<	-	-
DDT, p,p'-	0.05	µg/g	<	<	<	<	<	-	-
DDT, sum	0.05	µg/g	<	<	<	<	<	30	-
Dieldrin	0.05	µg/g	<	<	<	<	<	7	-
Endosulfan I	0.05	µg/g	<	<	<	<	<	-	-
Endosulfan II	0.05	µg/g	<	<	<	<	<	-	-
Endosulfan sulphate	0.1	µg/g	<	<	<	<	<	-	-
Endrin	0.05	µg/g	<	<	<	<	<	0.2	-
Hexachlorobenzene (HCB)	0.05	µg/g	<	<	<	<	<	-	-
Heptachlor	0.01	µg/g	<	<	<	<	<	-	-
Heptachlor epoxide	0.02	µg/g	<	<	<	<	<	3	-
Lindane (BHC, gamma-)	0.01	µg/g	<	<	<	<	<	4	-
Methoxychlor	0.1	µg/g	<	<	<	<	<	100	-
Mirex	0.1	µg/g	<	<	<	<	<	-	-
Nonachlor, trans-	0.05	µg/g	<	<	<	<	<	-	-
Oxychlordane	0.05	µg/g	<	<	<	<	<	-	-
PCB	0.4	µg/g	<	<	<	<	<	-	-
Surrogate Recovery									
Dibromobiphenyl (Ar 1254)		%	120	79	47	81	64		



AGRA

Earth & Environmental Group

Table 1
Perched Zone (11m) Analytical Results

	MDC	Unit	Trip Blank	Perched Zone (11m)								BCELP		
				89-2	89-3	89-4	89-5	AH-3	94-2	94-18U	AW	DW		
General	pH	0.1	pH units	7.1										
	Specific Conductance	1	uS/cm	1	1110	8980	7980	4810	2530	2280	751			
	Residue Nonfilterable	4	mg/L	<	119	839	190	428	138	133	171			
	Residue Filterable 1.0u	4	mg/L	48	846	4790	6430	3990	na	na	1210			
	Hardness Dissolved		mg/L	<	14.7	7.7	136	234	19.1	5.4	29.8			
	Mineral Oil & Grease	1	mg/L	<	<	24	10	6	5	3	1			
	Alkalinity Total 4.5	0.5	mg/L	3.5	378	2430	3340	2200	144	906	658			
	Biochem Oxygen Dem.	6	mg/L	<	48	180	420	46	15	41	<			
	Phenols	0.002	mg/L	<	0.033	1.15	0.645	0.33	0.003	0.002	0.011			
	Sulfide Total	0.005	mg/L	<	4.81	99.8	73.5	40.4	48.1	53.3	<			
Dioxins and Furans	Carbon Total Organic	1	mg/L	<	13.7	214	221	59	35.2	24.8	16.5			0.05
	Sulfate	1	mg/L	<	150	285	523	185	304	256	158	100	500	
	T4CDD (TOTAL)		pg/L	4.8	ND	17	140	310	39	94	640			
	P5CDD (TOTAL)		pg/L	ND	ND	120	380	660	430	230	1900			
	H6CDD (TOTAL)		pg/L	74	7.9	3000	5000	6100	210	780	540			
	H7CDD (TOTAL)		pg/L	32	35	11000	4000	2100	190	480	170			
	O6CDD		pg/L	52	27	52000	5200	3300	250	400	100			
	TOTAL PCDD		pg/L	160	70	66000	15000	12000	1100	2000	3400			
	T4CDF (TOTAL)		pg/L	4.3	ND	190	61	98	28	33	3.5			
	P5CDF (TOTAL)		pg/L	12	ND	1100	470	610	37	200	25			
Volatile Organics	H6CDF (TOTAL)		pg/L	6.5	ND	4000	4100	2700	48	540	120			
	H7CDF (TOTAL)		pg/L	17	ND	1800	4000	1400	28	180	46			
	O6CDF		pg/L	ND	ND	98	360	82	8.7	21	6.8			
	TOTAL PCDF		pg/L	41	0	7100	9100	4900	150	970	200			
	TOTAL PCDD + PCDF		pg/L	200	70	95000	24000	17000	1300	3000	3600			
	TOTAL TEQ * (ND=1/2DL)		pg/L	7.741	4.805	223.523	175.89	177.047	8.473	22.432	7.9			
	TOTAL TEQ * (ND=0)		pg/L	2.834	0.217	221.188	172.95	171.652	5.989	19.931	3			
	Chloroform	0.4	ug/L	2	<	<	0.9	0.7	na	na	na			
	Toluene	0.4	ug/L	<	<	7	1.2	<	na	na	na	300	24	
	Pesticides	Ethylbenzene	0.4	ug/L	<	<	8.9	1.2	<	na	na	na	700	2.4
Xylenes		0.5	ug/L	<	<	65	9.8	<	na	na	na	300	300	
Styrene		0.4	ug/L	<	<	0.8	<	<	na	na	na			
Polychlorinated Biphenyls (Total)		0.0004	mg/L	<	<	<	<	0.0008	na	na	na	1E-07		
Phenoxy Acid Herbicides		0.0001-0.0002	mg/L	<	<	<	<	<	na	na	na			
Carbamates		0.0005	mg/L	<	<	<	<	<	na	na	na			
Diagnostic Scan		0.0001-0.0005	mg/L	<	<	<	<	<	na	na	na			

MDC = Minimum Detectable Concentration
 < = Less than MDC
 - = Criteria concentration not established
 na = not analyzed

MacMillan Bloedel Limited		Wildwood Landfill		BOREHOLE NO: 94-16						
Powell River Division, B.C.		Regional Groundwater Investigation		PROJECT NO: VE-S0299						
May 1994 Multipart Installation Program		Drill Rig: Air Rotary-8" Casing Advance		ELEVATION: 105.65 (m)						
SAMPLE TYPE <input checked="" type="checkbox"/> GRAB <input checked="" type="checkbox"/> AIR RETURN <input checked="" type="checkbox"/> SPLIT SPOON <input type="checkbox"/> DRIVE SAMPLE <input type="checkbox"/> n/d <input type="checkbox"/> n/d										
DEPTH (m)	WELL INSTALLATION	WELL INSTALLATION	WELL INSTALLATION	Well Completion Data	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT(N)	DEPTH (ft)
34.0				Backfill (drill returns)						111.0
35.0										114.0
36.0						-wet air returns				117.0
37.0						-fine grained, silty, v. dense,				120.0
38.0						occ. coarse sand, greenish grey, 50 mm				123.0
39.0				10 slot screen with filter cloth set in sloughed-in material (middle)		silty gravel layer, black angular gravel				126.0
40.0						-some silt, some gravel				129.0
41.0										132.0
42.0										135.0
43.0						SAND & GRAVEL, trace to some silt, wet				138.0
44.0				10 slot screen with filter cloth set in sand pack (lower)						141.0
45.0										144.0
46.0						BEDROCK				147.0
47.0				Backfill (drill returns)						150.0
48.0				Bentonite seal						153.0
49.0										156.0
50.0				10 slot screen with filter cloth set in sand pack (bedrock)						159.0
51.0						END OF HOLE @ 164 ft DEPTH				162.0
52.0										165.0
53.0										168.0
54.0										171.0
55.0										174.0
56.0										177.0
57.0										180.0
58.0										183.0
59.0										186.0
60.0										189.0
61.0										192.0
62.0										195.0
63.0										198.0
64.0										201.0
65.0										204.0
66.0										207.0
67.0										210.0
										213.0
										216.0
										219.0
HBT AGRA Limited						LOGGED BY: M.S.	COMPLETION DEPTH: 50.0 m			
Burnaby, B.C.						REVIEWED BY: G.S.	COMPLETE: 21/05/94			
						Fig. No: 94-16	Page 2 of 2			

MachMillon Bloedel Limited		Wildwood Landfill		BOREHOLE NO: 94-17	
Powell River Division, B.C.		Regional Groundwater Investigation		PROJECT NO: VE-50299	
May 1994 Multipart Installation Program		Drill Rig: Air Rotary-8" Casing Advance		ELEVATION: 102.42 (m)	
SAMPLE TYPE <input checked="" type="checkbox"/> GRAB		<input checked="" type="checkbox"/> AIR RETURN		<input checked="" type="checkbox"/> SPLIT SPOON	
		<input type="checkbox"/> DRIVE SAMPLE		<input type="checkbox"/> n/d	

DEPTH (m)	WELL INSTALLATION	WELL INSTALLATION	Well Completion Data	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT(N)	DEPTH (ft)
0.0			Monument base (concreted)		GRAVEL, sandy, brown, subangular				0.0
1.0							W1		3.0
2.0									6.0
3.0			2" PVC WELL PORT (BEDROCK)				W2		9.0
4.0			1" PVC WELL PORT (LOWER)		-sandy, trace silt, subangular to subrounded, light grey, damp				12.0
5.0									15.0
6.0			Backfill (drill returns)		-sandy, trace silt, increasing fine sand content, subangular gravel, light grey, damp		W3		18.0
7.0									21.0
8.0									24.0
9.0							W4		27.0
10.0					SAND, fine grained, silty, some clay, trace coarse sand, greenish grey, some plasticity, moist to wet				30.0
11.0									33.0
12.0			Bentonite seal				W5		36.0
13.0					SILT, clayey, some plasticity, moist, greenish grey				39.0
14.0					SAND, fine to med. grained, trace silt, trace gravel, subangular gravel, light grey, damp		W6		42.0
15.0									45.0
16.0					SAND & GRAVEL, trace silt, light grey, damp		W7		48.0
17.0									51.0
18.0							W8		54.0
19.0					SAND, trace gravel, light grey, damp				57.0
20.0							W9		60.0
21.0					-gravelly, trace silt, light grey, damp				63.0
22.0			Backfill (drill returns)						66.0
23.0									69.0
24.0							W10		72.0
25.0					-some gravel, light grey				75.0
26.0							W11		78.0
27.0					-gravelly, light grey, damp				81.0
28.0									84.0
29.0					-fining downwards		W12		87.0
30.0					-coarse grained, silty, dry				90.0
31.0					SAND & GRAVEL, subangular gravel, light grey, dry		W13		93.0
32.0									96.0
33.0			10 slot screen with filter cloth set in sand pack		-trace silt, subrounded, damp, grey		W14		99.0
							W15		102.0
									105.0
									108.0

HBT AGRA Limited		LOGGED BY: W.S.		COMPLETION DEPTH: 39.3 m	
Burnaby, B.C.		REVIEWED BY: G.S.		COMPLETE: 22/05/94	
		Fig. No: 94-17		Page 1 of 2	

MacMillan Bloedel Limited	Wildwood Landfill	BOREHOLE NO: 94-17
Powell River Division, B.C.	Regional Groundwater Investigation	PROJECT NO: VE-S0299
May 1994 Multiport Installation Program	Drill Rig: Air Rotary-8" Casing Advance	ELEVATION: 102.42 (m)
SAMPLE TYPE <input checked="" type="checkbox"/> GRAB <input checked="" type="checkbox"/> AIR RETURN <input checked="" type="checkbox"/> SPLIT SPOON <input type="checkbox"/> DRIVE SAMPLE <input type="checkbox"/> n/d <input type="checkbox"/> n/d		

DEPTH (m)	WELL INSTALLATION	WELL INSTALLATION	Well Completion Data	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT(N)	DEPTH (ft)
34.0			(lower)		BEDROCK		W15		111.0
35.0									114.0
36.0			Backfill (drill returns)						117.0
37.0			Bentonite seal				W16		120.0
38.0			10 slot screen with filter cloth set in sand pack (bedrock)						123.0
39.0									126.0
40.0					END OF HOLE @ 129 ft DEPTH		W17		129.0
41.0									132.0
42.0					Dry at completion of drilling				135.0
43.0									138.0
44.0									141.0
45.0									144.0
46.0									147.0
47.0									150.0
48.0									153.0
49.0									156.0
50.0									159.0
51.0									162.0
52.0									165.0
53.0									168.0
54.0									171.0
55.0									174.0
56.0									177.0
57.0									180.0
58.0									183.0
59.0									186.0
60.0									189.0
61.0									192.0
62.0									195.0
63.0									198.0
64.0									201.0
65.0									204.0
66.0									207.0
67.0									210.0
									213.0
									216.0
									219.0

HBT AGRA Limited
Burnaby, B.C.

LOGGED BY: M.S.

REVIEWED BY: G.S.

Fig. No: 94-17

COMPLETION DEPTH: 39.3 m

COMPLETE: 22/05/94

Page 2 of 2

MacMillan Bloedel Limited		Wildwood Landfill		BOREHOLE NO: 94-19	
Powell River Division, B.C.		Regional Groundwater Investigation		PROJECT NO: VE-S0299	
May 1994 Multipart Installation Program		Drill Rig: Air Rotary-8" Casing Advance		ELEVATION: 107.97 (m)	
SAMPLE TYPE <input checked="" type="checkbox"/> GRAB		<input checked="" type="checkbox"/> AIR RETURN		<input checked="" type="checkbox"/> SPLIT SPOON	
		<input checked="" type="checkbox"/> DRIVE SAMPLE		<input type="checkbox"/> n/d	
				<input type="checkbox"/> n/d	

DEPTH (m)	WELL INSTALLATION	WELL INSTALLATION	Well Completion Data	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT(N)	DEPTH (ft)
0.0			Monument base (concreted)		LOGGING REQUIRED				0.0
1.0			Backfill (drill returns)				U1		3.0
2.0									6.0
3.0			2" PVC WELL PORT (BEDROCK)						9.0
4.0			1" PVC WELL PORT (LOWER)				U2		12.0
5.0			1" PVC WELL PORT (MIDDLE)						15.0
6.0			1" PVC WELL PORT (UPPER)						18.0
7.0			Bentonite seal				U3		21.0
8.0									24.0
9.0			Backfill (drill returns)				U4		27.0
10.0							U5		30.0
11.0							U6		33.0
12.0			Bentonite seal				W7		36.0
13.0							U8		39.0
14.0							U9		42.0
15.0							U10		45.0
16.0									48.0
17.0									51.0
18.0									54.0
19.0							W11		57.0
20.0					SAND & GRAVEL, trace silt, light grey, damp				60.0
21.0									63.0
22.0					-subrounded gravel		W12		66.0
23.0			Backfill (drill returns)						69.0
24.0							W13		72.0
25.0									75.0
26.0							W14		78.0
27.0									81.0
28.0							W15		84.0
29.0					SAND, some gravel, light grey, damp				87.0
30.0							W16		90.0
31.0					-fine to med. grained, trace gravel, light grey, damp to moist				93.0
32.0									96.0
33.0							W17		99.0
									102.0
									105.0
									108.0

HBT AGRA Limited		LOGGED BY: M.S.		COMPLETION DEPTH: 55.2 m	
Burnaby, B.C.		REVIEWED BY: G.S.		COMPLETE: 29/05/94	
		Fig. No: 94-19		Page 1 of 2	

MacMillan Bloedel Limited		Wildwood Landfill		BOREHOLE NO: 94-19					
Powell River Division, B.C.		Regional Groundwater Investigation		PROJECT NO: VE-50299					
May 1994 Multipart Installation Program		Drill Rig: Air Rotary-8" Casing Advance		ELEVATION: 107.97 (m)					
SAMPLE TYPE <input checked="" type="checkbox"/> GRAB <input checked="" type="checkbox"/> AIR RETURN <input checked="" type="checkbox"/> SPLIT SPOON <input type="checkbox"/> DRIVE SAMPLE <input type="checkbox"/> n/d <input type="checkbox"/> n/d									
DEPTH (m)	WELL INSTALLATION	WELL INSTALLATION	Well Completion Data	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT(N)	DEPTH (ft)
34.0			Backfill (drill returns)	0000					111.0
35.0			Sloughed-in material	▲▲▲	GRAVEL, fine sandy, subangular, light grey, dry		W18		114.0
38.0				▲▲▲	-sandy, some silt, rounded gravel, light grey, damp to moist		W19		117.0
39.0				0000	SAND, some silt, trace gravel, moist to wet		W20		120.0
40.0			10 slot screen with filter cloth set in sloughed-in material (upper)	0000					123.0
41.0				0000					126.0
42.0				0000	-some silt, greenish grey, saturated		W21		129.0
43.0				0000					132.0
44.0			10 slot screen with filter cloth set in sloughed-in material (middle)	0000					135.0
45.0				0000					138.0
46.0				0000					141.0
47.0				0000					144.0
48.0			10 slot screen with filter cloth set in sand pack (lower)	▲▲▲	SAND & GRAVEL, coarse sand, fine gravel, rusty brown		W22		147.0
49.0				▲▲▲	-subangular to angular gravel		W23		150.0
50.0				0000	BEDROCK		W24		153.0
51.0				0000					156.0
52.0			Bentonite seal	0000			W25		159.0
53.0				0000					162.0
54.0			10 slot screen with filter cloth set in sand pack (bedrock)	0000					165.0
55.0				0000					168.0
56.0				0000					171.0
57.0				0000					174.0
58.0				0000					177.0
59.0				0000					180.0
60.0				0000	END OF HOLE @ 181 ft DEPTH		W26		183.0
61.0				0000					186.0
62.0				0000					189.0
63.0				0000					192.0
64.0				0000					195.0
65.0				0000					198.0
66.0				0000					201.0
67.0				0000					204.0
				0000					207.0
				0000					210.0
				0000					213.0
				0000					216.0
				0000					219.0
HBT AGRA Limited				LOGGED BY: M.S.		COMPLETION DEPTH: 55.2 m			
Burnaby, B.C.				REVIEWED BY: G.S.		COMPLETE: 29/05/94			
				Fig. No: 94-19				Page 2 of 2	

(10)

Woodbine, Susan ENV:EX

From: Fournier, Jeff G ENV:EX
Sent: Wednesday, May 14, 2008 9:36 AM
To: Woodbine, Susan ENV:EX
Subject: FW: Search for an Underwater Discharge Location

From: Barkowski, Sarah (Powell) [mailto:Sarah.Barkowski@catalystpaper.com]
Sent: Wednesday, May 14, 2008 9:33 AM
To: Fournier, Jeff G ENV:EX
Cc: Brigitte and Dave
Subject: Search for an Underwater Discharge Location

Jeff,

During a phone conversation on May 5th you indicated that Bryce George stated there is a source of discharge from the landfill near the concrete footings just upstream of spring 1. This discharge is said to be below the level of the lake at the time of your May 1st meeting with PR Legacy (271 feet). It was noted that this discharge was last observed in the 1960s, and that there may be a method of locating the point of this discharge, perhaps by plotting pH variations in the water column, as described in the May 6, 2008 letter from Dave Harris to yourself.

It was suggested that we obtain an opinion from Golder on this approach. Jill Sacre, M.Sc., Professional Geologist, Principal, Hydrogeologist from Golder Associates Ltd., has provided her opinion on such an effort. Her comments are below.

Our conceptual model, as described in the EA report, acknowledges that groundwater within bedrock is inferred to discharge as underflow to Powell River. Such discharge could be expected at any number of locations along the shoreline (above or below the River). There is no benefit to trying to locate these points of discharge because representative groundwater from the bedrock flow zone is monitored prior to discharge at monitoring well 94-16B and as part of the annual "snap shot sampling" program at bedrock monitoring wells 94-16B, 94-17B and 94-19B. Monitoring of the in-situ groundwater quality within these bedrock wells is preferred, as the groundwater in the monitoring wells has been unaffected by atmospheric conditions and possible dilution by surface waters. From Dave Harris's previous letter dated February 28, 2008, there appears to be a misconception that the groundwater from these bedrock monitoring wells is not representative, because groundwater flows through "channels or sandbars" within the rock. Such features do not exist within bedrock; rather, groundwater flow through bedrock occurs primarily through fractures.

Even if there was a benefit to identifying regions where groundwater is discharging to the river, these areas could not be identified using pH because there is not a discernable difference in pH between the groundwater and the lake water. A review of field pH measurements from 2007 shows that the pH associated with groundwater in the bedrock wells ranged from 6.9 to 7.4, while the pH of the lake (as represented by the Mill Filterhouse sample) ranged from 6.1 to 7.

On the basis of this opinion from Golder, we do not intend to conduct an underwater search for a point of discharge

Please let us know if you have any concerns with this decision.

Regards,
Sarah

Sarah Barkowski
Manager, Environment and Quality Systems
Powell River Division
Catalyst Paper
5775 Ash Avenue
Powell River, BC V8A 4R3
604-483-2850 (office)
604-483-1415 (cell)

June 16, 2008

E/08/1317
08-1411-0080/2000

Catalyst Paper
Powell River Division
5775 Ash Avenue
Powell River, BC
V8A 4R3

Attention: Ms. Sarah Barkowski, Manager
Environmental and Quality Services

**RE: SAMPLING RELATED TO MATERIAL OF INTEREST, CATALYST
PAPER WILDWOOD LANDFILL, POWELL RIVER, BC**

Dear Ms. Barkowski:

This letter presents the results of a sampling program related to “materials of interest” and associated waters located near the shoreline of Powell River in the vicinity of the Wildwood Landfill. The program was conducted by Golder Associates Ltd. (Golder) over the period of May 7 through May 9, 2008. The Wildwood Landfill is owned by Catalyst Paper Corporation (Catalyst).

1.0 FIELD PROGRAM

“Material of interest” has been identified by certain members of the public near the shoreline of Powell River, in the area of the Wildwood Landfill. In order to characterize this material of interest, a sampling program was undertaken at two locations downgradient (southeast) of the landfill and at one background location for comparison purposes. In addition, a water sample was collected from a ditch located upgradient (northwest) of the Wildwood Landfill at the request of the BC Ministry of Environment (MoE).

The sampling program was conducted over the period of May 7 through 9, 2008 by Golder, accompanied by a Catalyst representative. The sampling locations were selected based on consultation with Catalyst following a site reconnaissance and verified in the field using a hand-held GPS (Figure 1).

1.1 Material of Interest Sampling Sites

Two of the sampling locations are located along the shoreline of Powell River downgradient of the Wildwood Landfill in the vicinity of Spring S1 (Site 1) and east of Spring S1 (Site 2). A background, or control sample (Site 3), was collected along the shoreline of Powell River, approximately 450 m east of this area at a location west of the Highway 101 Bridge (Site 3).

The material of interest was logged and photographed in the field. Representative samples of the material of interest were collected in 125 mL clean, glass sample jars and transported to the Golder Burnaby office in coolers, on ice, for microscopic analysis and examination by vegetation specialists.

In addition, water that was observed to be discharging from the hill slope in the vicinity of the material of interest was collected using standard sampling protocols. The water samples were collected in clean bottles provided by the laboratory and transported in coolers, on ice, under chain-of-custody to ALS Environmental Laboratory (ALS), a CAEL certified laboratory in Vancouver, BC, for analysis. In accordance with standard sampling protocol, field indicator parameters, consisting of temperature, pH, specific conductivity, dissolved oxygen, and redox were measured in the field at the time of sampling and recorded on water sampling sheets. The water samples were submitted for laboratory analysis for the constituents listed in the Wildwood Landfill operating permit (PR-04565), consisting of alkalinity, sulphate, total suspended solids (TSS), total dissolved solids (TDS), total organic carbon (TOC), chlorinated and non-chlorinated phenols, total metals, sulphides, and dioxin and furans.

Following the sampling, a shovel was used to excavate into the material of interest to determine the extent of the material and the nature of the underlying sediments.

1.2 Ditch Sampling Site

At the request of the BC Ministry of Environment, a water sample was collected from the ditch located northwest of the Wildwood landfill on May 9, 2008.

The ditch water sample was collected in clean bottles provided by the laboratory and transported in coolers, on ice, under chain-of-custody to ALS for analysis. Field indicator parameters were measured in the field at the time of sampling and recorded on a water sampling sheet. The water samples were submitted for laboratory analysis for the constituents listed in the Wildwood Landfill operating permit (PR-04565).

2.0 RESULTS

2.1 Nature of the Material of Interest

The nature of the material of interest for each of the three sampling locations (Sites 1 through 3) is described below. The descriptions are based on field observations, microscope observations and input from a Golder vegetation specialist. The latitude and longitude are approximate.

TABLE 1: Materials of Interest Sample Descriptions

Sample Name	Sample Location	Sample Setting	Material Description	Horizontal and Vertical extent
M-1-1 Site 1	Approximately 2.5 m west of Spring S1, south of MW98-5. 49 ° 52.790' N 124 ° 33.153' W	Water originates from the same location as Spring S1 and flows over bright yellow-green moss (Photograph 1).	Dark brown, saturated, organic matter coated in fine (silt to clay size) particles. Roots and moss pieces visible. Sample has an organic odour (Photograph 2)	The material of interest is less than 2 cm thick and overlies undisturbed native sand and gravel. The material extends less than 0.5 m horizontally.
M-2-1 Site 2	42 m east of Spring S1 and the "old bridge footings". 49 ° 52.800' N 124 ° 33.122' W	Sample collected at the top of the embankment where groundwater exits the soil horizon (Photograph 3)	Dark brown organic matter (very fine particle size), with roots and some moss. This sample is the most amorphous of the three. The sample has an odour of decomposing organic matter (Photograph 4)	The material of interest is less than 2 cm thick and overlies undisturbed native sand and gravel. The material extends less than 0.5 m horizontally.
M-3-1 Site 3	West of the Hwy 101 Bridge 49 ° 52.959' N 124 ° 32.799' W	Appears to be green moss growing in a rock depression where water flows through it (Photograph 5).	Moss, likely hook moss (from the dicranum, broom mosses, family) (Photograph 6).	The material appears to be a surficial feature resting in a bedrock depression. The material extends 0.3 m horizontally.

In summary, all three samples of “material of interest” appear to be organic in nature at various stages of decomposition. The sample collected at Site 3 consisted of moss that was in the earliest stages of decomposition. The sample collected at Site 1 was next most decomposed sample, consisting of fine mud pieces of intact roots and mosses. The sample collected at Site 2 was most decomposed, displaying the finest particle size, an almost amorphous consistency and no visible roots or moss.

2.2 Observations during Ditch Sampling

A sample of ditch water was collected from the ditch network in the former poplar stand northwest of the landfill (Figure 1). A series of three ditches run parallel to the north landfill boundary in this area. When present, water from the outer two ditches would appear to be directed into the central ditch. At the time of sampling, the ditches were predominantly dry, with the exception of some stagnant water present in the central ditch. The area surrounding the ditches is very flat and a land survey would be required to determine the direction of flow in the central ditch. The ditch water sample was collected where the water from the outer ditch located closest to the landfill enters the central ditch (approximately 49° 53.032' N, 124° 33.580' W). At the sample location, the ditch is approximately 1.5 m wide and 1.5 m deep, with approximately 20 cm of standing water.

2.3 Water Quality Results

The results of the laboratory analysis of the water samples collected in the vicinity of the materials of interest and from a ditch northwest of the landfill (Figure 1) are presented below.

Water quality results were compared to the BC Water Quality Guidelines (BCWQG) for freshwater aquatic life (AW) and drinking water (DW) and the Contaminated Sites Regulations (CSR) standards for freshwater aquatic life (AW) and drinking water (DW).

2.3.1 Inorganic Substances

With the exception of aluminum, iron and vanadium at some locations, the results of the inorganic analyses for the water samples indicated that all other inorganic constituents had concentrations below the BCWQG and CSR.

The water from all sampling locations was characterized by near-neutral pH values (Table 3) and low concentrations of TSS (less than 12 mg/L). The TDS of the water collected from the vicinity of the materials of interest ranged from 177 mg/L to 211 mg/L, indicative of mineralized groundwater. This composition is consistent with spring water, which supports field observations indicating that groundwater springs are

the source of the water in the vicinity of the materials of interest. Unlike the waters collected from the springs, the water from the ditch northwest of the landfill had a TDS concentration of 39 mg/L, which is more indicative of infiltration from a precipitation source.

The water from Sites 1 and 2 had similar concentrations of alkalinity (83.8 mg/L and 101 mg/L, respectively) and sulphate (24.4 mg/L and 26.3, respectively). These values are consistent with recent alkalinity and sulphate concentrations measured in water collected from the Spring S1 location. The water sample collected from Site 3 had lower concentrations of alkalinity and sulphate (28.3 mg/L and 1.43 mg/L, respectively) than water from Sites 1 and 2. The water samples from the ditch had a low alkalinity concentration (13.6 mg/L) and no detectable sulphate.

Concentrations of metals in the spring water and the ditch northwest of the landfill were generally low and dominated by the major cations (calcium, magnesium, and sodium). Vanadium concentrations in the waters collected from Sites 1 and 2 (0.0087 mg/L and 0.0065 mg/L, respectively) slightly exceeded the BCWQG AW of 0.006 mg/L. There are no applicable CSR standards for vanadium. The vanadium measured in the water samples from Sites 1 and 2 is likely naturally occurring in the granitic bedrock. Aluminum exceeded BCWQG AW (0.1 mg/L) at background Site 3 (0.101 mg/L) and BCWQG AW and CSR DW (0.2 mg/L) in the ditch (0.341 mg/L). It should be noted that the BCWQG AW is defined for dissolved aluminum and the water samples were analysed for total aluminum. However, given the low concentrations of suspended solids in the samples, the dissolved and total aluminum concentrations may be considered equivalent and thus the guideline is considered applicable. The iron concentration in the ditch water (1.63 mg/L) exceeded the BCWQG AW (1 mg/L) and DW (0.3 mg/L) and the CSR DW standard (0.3 mg/L). Iron and aluminum are common constituents of the earth's crust and are frequently elevated in groundwater and surface water.

2.3.2 Chlorinated and Non-chlorinated Phenolics

Concentrations of chlorinated and non-chlorinated phenolic compounds were all below detection limits in each of the water samples (Table 3).

2.3.3 Dioxins and Furans

The dioxin samples had no detectable 2,3,7,8 TCDD and the TEQs of all four field samples were below the laboratory method blank and below 1.5 pg/l using both the WHO and NATO TEQ calculations. The complete dioxin and furan results are presented in Table 4.

A list of congeners that were detected is provided in Table 5. As shown in the table, no congeners were detected at Site 2. While some congeners were detected at Site 1 and the ditch, the greatest number and concentrations of congeners (Table 4) were detected at the background sampling location, Site 3.

TABLE 5: Detected Dioxin and Furan Congeners

Sample	Congener detected
Site 1	1,2,3,4,6,7,8 – HpCDD OCDD
Site 2	No detectable congeners
Site 3	HxCDD –total and HxCDF -total 1,2,3,4,6,7,8-HpCDD and –HpCDF HpCDD – total and HpCDF - total OCDD and OCDF
Ditch	OCDD and OCDF

3.0 CONCLUSIONS

The material of interest appears to be mainly decomposing organic matter, most likely moss. The low to non-detectable concentrations of landfill indicator parameters (alkalinity, sulphate, chlorinated phenolics compounds, and dioxin and furans) in the water samples suggests the source of the waters is groundwater that had not been affected by landfill leachate. These results suggest that the materials of interest do not result from landfill activities or landfill leachate-affected groundwater, but rather from moss growing in water from naturally occurring springs.

The water collected from the ditch northwest of the Wildwood Landfill also has low to non-detectable concentrations of landfill leachate indicator parameters and low TDS, indicating that the ditch water has not been affected by the landfill and is most likely surface runoff and recent infiltration.

4.0 CLOSURE

We trust that this letter provides the information you require at present. Should you have any questions or comments, please do not hesitate to call.

Yours very truly,

GOLDER ASSOCIATES LTD.

ORIGINAL SIGNED BY

Kathryn Baker, P.Geo.
Hydrogeologist

ORIGINAL SIGNED BY

Jillian Sacré, P.Geo.
Principal/Hydrogeologist

KMB/JPS/cap

Attachments

O:\Final\2008\1411\08-1411-0080\Let 0616 Sampling Related to Material of Interest Final\Let 0605 Sampling Related to Material of Interest.doc

TABLE 2
Results of Inorganics Analyses

Sample Name		CSR Groundwater Standards		BC Water Quality Guidelines		Water 1	Water 2	Water 3	North Ditch
Sample Location	Units					Site 1 by Spring S1	Site 2 East of Spring 1	Site 3 West of Hwy 101 Bridge	Ditch North of WLF
Sample No. Date		FAW (F)	DW (D)	FAW (f)	DW (d)	18822-01 08-May-08	18822-02 08-May-08	18822-03 08-May-08	18822-04 09-May-08
Field Parameters									
pH	s.u.			6.5-9	6.5-8.5	7.60	7.50	7.50	7.23
Conductivity	µS/cm					204	248	295	38
Dissolved Oxygen	mg/L					10.0	10.7	9.4	8.0
Physical Parameters									
pH-Laboratory	s.u.			6.5-9	6.5-8.5	7.59	7.87	7.66	7
Hardness CaCO ₃	mg/L				500	67.2	74.6	40.4	11.9
Total Dissolved Solids	mg/L					177	210	211	39
Total Suspended Solids	mg/L					3	5.5	5	11
Anions and Nutrients									
Alkalinity, Total (as CaCO ₃)	mg/L					83.8	101	28.3	13.6
Sulphate	mg/L	1000	500	100	500	24.4	26.3	1.43	<0.50
Sulphide S	mg/L				0.05	<0.020	<0.020	<0.020	<0.020
Sulphide (as H ₂ S)	mg/L	0.02	0.05	0.002	0.05	<0.020	<0.020	<0.020	<0.020
Total Metals									
Aluminum	mg/L		0.2	0.02-0.1 ^a		0.0298	0.0407	0.101 f^b	0.341 f^b
Antimony	mg/L	0.2	0.006	0.02	0.006	<0.00050	<0.00050	<0.00050	<0.00050
Arsenic	mg/L	0.05	0.025	0.005	0.005	0.00068	<0.00050	<0.00050	<0.00050
Barium	mg/L	10	1	5	1	<0.020	<0.020	<0.020	<0.020
Beryllium	mg/L	0.053		0.0053		<0.0010	<0.0010	<0.0010	<0.0010
Boron	mg/L	50	5	1.2	5	<0.10	<0.10	<0.10	<0.10
Cadmium	mg/L	0.0001-0.0006*	0.005	0.00001-0.00006*	0.005	<0.000017	<0.000017	<0.000017	<0.000017
Calcium	mg/L					19	21.2	12.8	3.48
Chromium	mg/L	0.01-0.09*	0.05	0.001	0.05	<0.0010	<0.0010	<0.0010	<0.0010
Cobalt	mg/L	0.04		0.11		<0.00030	<0.00030	<0.00030	0.00041
Copper	mg/L	0.02-0.09*	1	0.002-0.026*	0.5	<0.0020	<0.0010	<0.0010	0.0019
Iron	mg/L		0.3	1	0.3	0.053	0.054	0.144	1.63 Dfd
Lead	mg/L	0.04-0.16*	0.01	0.003-0.33*	0.01	<0.00050	<0.00050	0.00069	<0.00050
Lithium	mg/L			0.87		<0.0050	<0.0050	<0.0050	<0.0050
Magnesium	mg/L		100		500	4.8	5.25	2.04	0.77
Manganese	mg/L		0.05	0.8-3.8*	0.05	0.0013	0.00179	0.00403	0.0558
Mercury	mg/L	0.001	0.001	0.0001	0.001	<0.000020	<0.000020	<0.000020	<0.000020
Molybdenum	mg/L	10	0.25	2	0.25	0.001	<0.0010	<0.0010	<0.0010
Nickel	mg/L	0.25-1.5*		0.025-0.15*		<0.0010	<0.0010	<0.0010	<0.0010
Potassium	mg/L					2.2	2.4	<2.0	<2.0
Selenium	mg/L	0.01	0.01	0.002	0.01	<0.0010	<0.0010	<0.0010	<0.0010
Silver	mg/L	0.0005-0.015*		0.0001-0.003*		<0.000020	<0.000020	<0.000020	<0.000020
Sodium	mg/L		200		200	33.4	46.5	54.1	3.4
Thallium	mg/L	0.003		0.0003	0.0005	<0.00020	<0.00020	<0.00020	<0.00020
Tin	mg/L					<0.00050	<0.00050	<0.00050	<0.00050
Titanium	mg/L	1			0.1	<0.010	<0.010	<0.010	0.013
Uranium	mg/L	3	0.2	0.3	0.02	0.00077	0.00158	<0.00020	<0.00020
Vanadium	mg/L			0.006		0.0087 f	0.0065 f	0.0013	0.002
Zinc	mg/L	0.075-2.4*	5	0.033-0.265*	5	<0.0050	<0.0050	0.0053	0.0194

Notes:

All concentrations are reported in mg/L unless otherwise noted.

BC Contaminated Sites regulations pursuant to the Environmental Management Act, [SBC 2003], Contaminated Sites Regulation, [B.C. Reg. 375/96, O.C. 1480/96 [includes amendments up to B.C. Reg. 405/2004;76/2005], updated to July 1, 2007

FAW = Freshwater Aquatic Life, DW = Drinking Water

F - Exceedance of CSR FAW standard, D - Exceedance of CSR DW standard

BC MOE, 1998, Updated August, 2006, Approved and Working Criteria for Water Quality, Water Protection Branch, Ministry of Environment. Includes updates posted on the website to March 2008.

FAW = Freshwater Aquatic Life, DW = Drinking Water

f - Exceedance of BCWQG FAW, d - Exceedance of BCWQG DW

v. Dependent on valency.

a. Indicates a pH dependent standard

* - Indicates a hardness dependent calculated standard

b. The BCWQG for aluminum is defined for the dissolved form. The guideline has been applied to the total aluminum concentration because the samples have very low TSS concentrations.

TABLE 3

Results of Chlorinated and Non-Chlorinated Phenol Analyses

Sample Name		CSR Groundwater Standards		BC Water Quality Guidelines		Water 1	Water 2	Water 3	North Ditch
Sample Location	Units					Site 1 by Spring S1	Site 2 East of Spring 1	Site 3 West of Hwy 101 Bridge	Ditch North of WLF
Sample No. Date		FAW (F)	DW (D)	FAW (f)	DW (d)	18822-01 08-May-08	18822-02 08-May-08	18822-03 08-May-08	18822-04 09-May-08
General Parameters									
Field pH	s.u.			6.5-9	6.5-8.5	7.60	7.50	7.5	7.23
Temperature	°C				15	11.5	10.2	10.6	13.0
Chlorinated Phenolics									
2-Chlorophenol	mg/L	0.039-1.30*	0.0001	0.0039-0.130*	0.0001	<0.00050	<0.00050	<0.00050	<0.00050
3-Chlorophenol	mg/L	0.034-1.15*	0.0001	0.0034-0.115*	0.0001	<0.00050	<0.00050	<0.00050	<0.00050
4-Chlorophenol	mg/L	0.017-0.69*	0.0001	0.0017-0.069*	0.0001	<0.00050	<0.00050	<0.00050	<0.00050
4-Chloro-3-methylphenol	mg/L	-	-	-	-	<0.00050	<0.00050	<0.00050	<0.00050
2,3-Dichlorophenol	mg/L	0.011-0.38*	0.0003	0.0011-0.038*	0.0003	<0.00050	<0.00050	<0.00050	<0.00050
2,4 and 2,5-Dichlorophenol	mg/L	0.005-0.20*	0.0003	0.0005-0.020*	0.0003	<0.00050	<0.00050	<0.00050	<0.00050
2,6-Dichlorophenol	mg/L	0.02-0.68*	0.0003	0.002-0.068*	0.0003	<0.00050	<0.00050	<0.00050	<0.00050
3,4-Dichlorophenol	mg/L	0.006-0.20*	0.0003	0.0006-0.020*	0.0003	<0.00050	<0.00050	<0.00050	<0.00050
3,5-Dichlorophenol	mg/L	0.005-0.15*	0.0003	0.00050-0.015*	0.0003	<0.00050	<0.00050	<0.00050	<0.00050
2,3,4-Trichlorophenol	mg/L	0.005-0.16*	0.002	0.0005-0.016*	0.002	<0.00050	<0.00050	<0.00050	<0.00050
2,3,5-Trichlorophenol	mg/L	0.005-0.17*	0.002	0.0005-0.017*	0.002	<0.00050	<0.00050	<0.00050	<0.00050
2,3,6-Trichlorophenol	mg/L	0.016-0.54*	0.002	0.0016-0.054*	0.002	<0.00050	<0.00050	<0.00050	<0.00050
2,4,5-Trichlorophenol	mg/L	0.005-0.15*	0.002	0.0016-0.054*	0.002	<0.00050	<0.00050	<0.00050	<0.00050
2,4,6-Trichlorophenol	mg/L	0.012-0.40*	0.002	0.0012-0.040*	0.002	<0.00050	<0.00050	<0.00050	<0.00050
3,4,5-Trichlorophenol	mg/L	0.002-0.064*	0.002	0.0002-0.0064*	0.002	<0.00050	<0.00050	<0.00050	<0.00050
2,3,4,5-Tetrachlorophenol	mg/L	0.004-0.13*	0.001	0.0004-0.013*	0.001	<0.00020	<0.00020	<0.00020	<0.00020
2,3,4,6-Tetrachlorophenol	mg/L	0.011-0.36*	0.001	0.0011-0.036*	0.001	<0.00020	<0.00020	<0.00020	<0.00020
2,3,5,6-Tetrachlorophenol	mg/L	0.00-0.17*	0.001	0.0005-0.017*	0.001	<0.00020	<0.00020	<0.00020	<0.00020
Pentachlorophenol	mg/L	0.002-0.055*	0.03	0.0002-0.0055*	0.03	<0.00020	<0.00020	<0.00020	<0.00020
Non-chlorinated Phenolics									
o-Cresol	mg/L					<0.00050	<0.00050	<0.00050	<0.00050
m-Cresol	mg/L					<0.00050	<0.00050	<0.00050	<0.00050
p-Cresol	mg/L					<0.00050	<0.00050	<0.00050	<0.00050
2,4-dimethylphenol	mg/L		0.73			<0.00050	<0.00050	<0.00050	<0.00050
2,4-dinitrophenol	mg/L					<0.0010	<0.0010	<0.0010	<0.0010
2-methyl 4,6-dinitrophenol	mg/L	0.01				<0.0010	<0.0010	<0.0010	<0.0010
2-Nitrophenol	mg/L					<0.0010	<0.0010	<0.0010	<0.0010
4-Nitrophenol	mg/L	0.01				<0.0010	<0.0010	<0.0010	<0.0010
Phenol	mg/L	0.01				<0.00050	<0.00050	<0.00050	<0.00050

Notes:

All concentrations are reported in mg/L unless otherwise noted.

B.C. Contaminated Sites regulations pursuant to the Environmental Management Act, [SBC 2003], Contaminated Sites Regulation, [B.C. Reg. 375/96, O.C.

FAW = Freshwater Aquatic Life, DW = Drinking Water

BC MOE, 1998, Updated August, 2006, Approved and Working Criteria for Water Quality, Water Protection Branch, Ministry of Environment. Includes updates posted on the website to March 2008.

FAW = Freshwater Aquatic Life, DW = Drinking Water

* pH and temperature dependent standard or guideline

TABLE 4
Results of Dioxin and Furan Analyses

Location	Laboratory Method Blank	Water 1 Site 1 Spring S1 8-May-08 Laboratory Detection Limit 18823-01	Water 2 Site 2 East of Spring 1 8-May-08 Laboratory Detection Limit 18823-02	Water 3 Site 3 West of Hwy 101 Bridge 8-May-08 Laboratory Detection Limit 18823-03	Ditch North of WLF 9-May-08 Laboratory Detection Limit 18823-04
Dioxins (All results in pg/L)					
2,3,7,8-TCDD	ND	ND	ND	ND	ND
TCDD - Total	0.5	0.5	0.5	0.5	0.5
1,2,3,7,8-PeCDD	ND	ND	ND	ND	ND
PeCDD - Total	1	1	1	1	1
1,2,3,4,7,8-HxCDD	ND	ND	ND	ND	ND
1,2,3,6,7,8-HxCDD	ND	ND	ND	ND	ND
1,2,3,7,8,9-HxCDD	ND	ND	ND	ND	ND
HxCDD - Total	1	1	1	1	1
1,2,3,4,6,7,8-HpCDD	ND	ND	ND	ND	ND
HpCDD - Total	1.5	1.5	1.5	1.5	1.5
OCDD	2	2	2	2	2
Furans (All results in pg/L)					
2,3,7,8-TCDF	ND	ND	ND	ND	ND
TCDF - Total	0.5	0.5	0.5	0.5	0.5
1,2,3,7,8-PeCDF	ND	ND	ND	ND	ND
2,3,4,7,8-PeCDF	ND	ND	ND	ND	ND
PeCDF - Total	1	1	1	1	1
1,2,3,4,7,8-HxCDF	ND	ND	ND	ND	ND
1,2,3,6,7,8-HxCDF	ND	ND	ND	ND	ND
2,3,4,6,7,8-HxCDF	ND	ND	ND	ND	ND
1,2,3,7,8,9-HxCDF	ND	ND	ND	ND	ND
HxCDF - Total	1	1	1	1	1
1,2,3,4,6,7,8-HpCDF	ND	ND	ND	ND	ND
1,2,3,4,7,8,9-HpCDF	ND	ND	ND	ND	ND
HpCDF - Total	1.5	1.5	1.5	1.5	1.5
OCDF	2	2	2	2	2
Total PCDD/PCDF TEQ (using NATO I-TEF's)					
TEQs (ND=1/2 DL) [pg/L]	2.02	1.19	1.17	1.25	1.18
TEQs (ND=0) [pg/L]	1.10	0.023	0.00	0.093	0.012
Total PCDD/PCDF TEQ (using WHO 1998 TEF's)					
TEQs (ND=1/2 DL) [pg/L]	3.12	1.43	1.42	1.48	1.42
TEQs (ND=0) [pg/L]	2.20	0.018	0.00	0.071	0.001

Notes

All concentrations in pg/L.

ND - Not detected, DL - Detection Limits

Two methods of toxicity equivalence (TEQ) calculation;

TEQ WHO = $1[2,3,7,8\text{-TCDD}] + 0.1[2,3,7,8\text{-TCDF}] + 1[1,2,3,7,8\text{-PeCDD}] + 0.05[1,2,3,7,8\text{-PeCDF}] + 0.5[2,3,4,7,8\text{-PeCDD}] + 0.1[1,2,3,7,8\text{-PeCDF}] + 0.0001[OCDD/F]$ TEQ NATO = $1[2,3,7,8\text{-TCDD}] + 0.1[2,3,7,8\text{-TCDF}] + 0.5[1,2,3,7,8\text{-PeCDD}] + 0.05[1,2,3,7,8\text{-PeCDF}] + 0.5[2,3,4,7,8\text{-PeCDD}] + 0.1[1,2,3,7,8\text{-PeCDF}] + 0.001[OCDD/F]$

From the Office of the Medical Health Officer

Feb. 27, 2008

Sarah Barkowski,
Manager, Env. And Quality Systems
Catalyst Paper – Powell River Div.,
6270 Yew St.,
Powell River, BC
V8A 4K1

Dear Sarah;


Re: Drinking Water Quality Status

This is in response to your request for an opinion on the status of water quality in community water supply systems servicing the Powell River Catalyst Paper mill, and the community of Wildwood (City of Powell River). Both the Catalyst Paper water system and the Powell River-Wildwood water system are considered **water supply systems** under the *Drinking Water Protection Act*. As such, they are required to be operated as per the requirements of this legislation, including supplying water which meets the standards set out in the *Guidelines for Canadian Drinking Water Quality*.

A review of water sample results from both of these water supply systems has been undertaken. This includes bacteriological samples, full chemical water analyses and additional sample results for dioxins/furans collected between 1997 and 2007. A review of the report by Golder and Associates dated Sept. 17, 2007, regarding dioxin/furan sample results (Section 1.2) indicates that detectable levels of congeners were noted in 10 of the 33 samples collected from the Catalyst Mill filterhouse, over that time period. The results have limitations however, due to issues with laboratory blanks in 8 of the 10 samples. It appears evident that analysis of parameters at such low concentrations presents issues for laboratories. Based on the data presented, it does not appear that any of the sample results indicate dioxin levels present in the water at or near the USEPA maximum contaminant levels.

It is my belief that the water supplied by both the Powell River Catalyst Paper mill and the Powell River Wildwood water supply systems currently meets the legislated standards with the exception of protozoan treatment. Surface water supplies must incorporate treatment for the inactivation or removal of protozoa such as Giardia and Cryptosporidium. It is therefore necessary to begin reviewing treatment options and planning for implementation in the near future. I understand strategies for addressing this deficiency with the Catalyst Paper water supply system are currently underway and I look forward to receiving an application for a Construction Permit for the installation of treatment works which will address this. I can also confirm that the City of Powell River undertook a review of the options for addressing this deficiency with the Wildwood water supply system and will be moving towards full compliance within the City of Powell River in the near future.

Thank you for your concern. Please contact me if you have any further questions.
Yours truly,


Paul Martiquet, M.D., C.M., CCFP, M.H.Sc., FRCP(c)
Medical Health Officer
Coastal Health Services

Copy: Dan Glover, DWO/REHO

July 7, 2008

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Sarah Barkowski
Catalyst Paper Corporation
Powell River Division

Re: Capitalization of Anticipated Remediation Costs – Wildwood Landfill

Dear Sarah:

Below, you will find the process that was used to account for the anticipated remediation costs of the Wildwood Landfill in 2006. When our current proposal for the expansion is successful, a similar process would occur.

When Catalyst Paper Corporation began using the Wildwood Landfill again in 2006, a liability for the future remediation costs was booked. This liability was an estimate from Catalyst staff for the cost of the remediation upon its closure at the end of 2009. The estimate in 2006, was \$1.0MM. When we add the cost of inflation, 2%, the estimated cost in 2009 would be \$1.078MM. We capitalize this amount as a future capital cost and the corresponding liability that is booked on our accounts is disclosed to our shareholders.

Upon successful receipt of our current Landfill application, a similar process will occur. Catalyst staff would determine the useful life of the expanded landfill, as well as the expected costs upon closure of the site. Catalyst finance would book this additional liability, valued for inflation, on our books of account such that our restated liability would reflect the true cost of remediation at the end of the Landfill's useful life. This liability would ensure that sufficient monies are set aside over time to allow for remediation of the Wildwood Landfill.

One further note is that because of GAAP – Generally Accepted Accounting Principles, we actually book a capitalized amount that is discounted at an 8% cost of capital. The difference between the capitalized amount and the liability is charged into our books on a monthly basis over the discount period. If this process requires further clarification, I can include the details in a separate cover.

I trust this is the information you require, please do not hesitate to contact me if you require any other information.

Best Regards

Stephen G. Hunter, CMA
Senior Business Analyst,
Catalyst Paper Corporation, Powell River Division.

Summary of Follow-up Actions to Complaints by Citizens Regarding The Catalyst Landfill Application

History

In late 2007, a request was made by Alison Taplay for an opportunity to have anonymous persons to step forward and provide evidence of alleged wrong doing or technical problems surrounding the proposed Catalyst Landfill amendment application. On January 21, 2008 Jeff Fournier and Conservation Officer Gerry Lister took information from these individuals on an anonymous basis to look into the substance of these complaints.

The individuals that stepped forward provided a mix of concerns, second hand information and first hand observations of potential issues. It was apparent to me that certain concerns had technical merit that would warrant ministry follow-up while others did not. It was also apparent to me that a number of issues were raised out of a genuine concern for human health and the environment while others appear to be in the interest of restricting or shutting down use of the landfill.

After careful review of the transcripts and voice recordings, I identified the complaints that 1) pertained to the landfill and 2) had technical merit regarding potential environmental impacts. From this review, a number of questions associated with of potential key technical issues (Appendix A) were developed for follow-up by ministry staff and/or for input by Catalyst staff. On April 17th 2008, a meeting was held with Catalyst staff to obtain their initial input on the questions or issues that had been raised. A summary of their input from that meeting date as well as other subsequent salient information gathered is also found in Appendix A.

To deal with the unusual circumstances of having persons that want to provide anonymous complaints/allegations in a normally public administrative process, solicitor Dennis Doyle was contacted for advice. I was advised that in order for any information to be considered as part adjudication of the amendment application (or any other public process) the information and information provider needed to be disclosed in an open and transparent manner. I was further advised that with complaints of wrong doing or offences, the complaints and complainant could only remain anonymous while allegations were being assessed but once court action was to be pursued and a statement that would reveal the complainants name was needed to initiate an investigation.

On April 25, I advised Alison Taplay of what our lawyer had said and advised her to discuss these points with all parties that provided information. I further advised her that I needed to hear directly from each individual as to their ongoing interest in remaining anonymous or their interest in making the information they provided public, and accordingly, available for consideration as part of the landfill application evaluation process. Further, I advised her that complaints about wrongdoing at the mill would need to be dealt with through a separate and future process.

On April 30th thru May 1st, I made a second trip to Powell River to meet with Catalyst staff, members of the public that previously provided input, new members of the public that wished to provide input and members of the Powell Legacy group as follows:

- On April 30th, follow-up discussions were done with Catalyst staff with respect to clarifying or updating their input to the questions I had posed to them on April 17, 2008. Also, a field inspection was done to look at sites where concerns had been raised regarding "black ooze" material that had been reported going down slope from the landfill into the river. It is alleged that this material contains toxic substance that originated upslope in the land fill and is contaminating Powell River.
- On May 1st I did individual follow-up meetings with:
 - the persons that provided input on January 21st,
 - separate meetings with two additional individuals (Robb Matheson and Gil Wretham) that indicated they had information relevant to the landfill,
 - a group meeting with Powell River Legacy members and the persons that that had accompanied the persons that provided information.

Note - During these meetings Dave Sutton, George Bryce, Jack Vlug and Will Langlands all advised me of there interest to make all of their previously anonymous statements a matter of public record and part of the landfill amendment assessment process.

On May 14th I contacted Ted Belyea of T & R Contactors to gain more information on what he knew about the issues raised regarding materials in the landfill and any issues regarding construction of the landfill.

An Excel spreadsheet (Appendix B) was created to summarize key issues raised and actions taken to assess those concerns. The associated detailed notes were placed on file for reference.

April 17th Question to and Answers with Catalyst Staff Regarding Concerns Raised About the Landfill

In attendance : Brian Baarda, Drew Kilback, Sarah Barkowski of Catalyst and Sue Woodbine and Jeff Fournier of Ministry of Environment

The following questions were posed to Drew Kilback, Sarah Barkowski and Brian Baarda by Jeff Fournier in response to environmental concerns about the Catalyst landfill put forward in January 2008 by Dave Sutton, Bryce George, Will Langlands and Jack Vlug. Under each question the respective initial and subsequent responses by Catalyst staff are provided along with some ministry follow-up information.

1. What is the Kelly Spruce and what materials if any from it were placed in the landfill?
 - This building was originally for lumber storage and most recently to house old desks and office materials. Materials not sent to the landfill but were recycled.
2. What materials, if any, were taken from the cement ships and placed in the landfill.
 - Residual oil, oil fouled materials, asbestos and other hazardous wastes were handled and removed by Augusta Recyclers Inc.
3. Were there any investigations in or around 1995 done in response to materials unearthed in the old landfill during the modifications of that landfill? Alternatively was there a release of some sort toxic or potentially toxic materials where workers had to be moved to there work areas?
 - Not aware of such incidents but will follow-up.
 - April 28 follow-up. Advised us that WCB files from 1990- 1996 do not contain any report of an inspection of the site or an incident.
 - Records indicate that wastes were excavated to facilitate the closure of the old site and construction of the new site during 1995. But mill personnel surveyed do not recall discovering any toxic or potentially toxic substances which resulted in evacuation of personnel.
4. In the early 1990's, were there any piles of waste at the landfill covered with silver tarps and if so what were they?
 - These piles contained bunker C contaminated soils and an attempt was made to use them in the creation of asphalt in the covering of the old landfill. In the end the soil was used as part of the capping process for the old landfill and file records confirm this soils were remediated to a point that allowed this.
5. Were sensors or monitoring equipment mounted on heavy machinery used to evaluate worker safety or exposure to airborne risks specifically associated with the landfill excavation. If so, is there any documentation (including WCB reports) that relate to this site that can be provided to me?

- Not aware of this but will look into but it could be H2S monitoring.
 - April 28/08 – advised us they had reviewed WCB files for 1990-1996 and no records were found that indicate use of any vehicle mounted sensors.

- 6. Are there any records relating to WCB visits to the landfill to evaluate their handling of hazardous materials on site in the early 1990's.
 - Not aware of any WCB visits to the landfill site but will review their records.
 - April 28/08 - advised us that WCB files from 1990- 1996 do not contain any report of an inspection of the site or an incident.

- 7. Were transformers stored at Riverside location beside the fish hatchery and, if so, who owned/managed this material and how was it disposed of. Also if they were stored there, are there records that can be provided of soil sediment and water sample taken that monitor for potential pollution.
 - Fish hatchery was not near the Riverside location. PCBs were stored in buildings and then shipped directly to Swan Hills or other likened facilities for destruction. Building was closed and tests confirmed it to be free of PCBs before decommissioning.
 - April 22/08 -
 1. 2004 Special Waste Facility closure information and test results to the ministry confirm ministry records associated with the decommissioning.
 2. Jack Dice (mill electrical superintendent) confirmed with Catalyst that, to the best of his knowledge, all PCB contaminated materials and fluids were sent to Alberta or Eastern Canada for destruction and were never placed in the local landfill.

- 8. Were pipes collecting surface water broken during the grading of the gravel before the old landfill was capped.
 - Methane collection pipes were at the surface (ie below the asphalt cap) and these lines would have been tested for any leaks. Currently there is no substantial amount of gas being collected.

- 9. Were there any materials placed in the landfill that caught fire or may have been smoking when they arrived at the landfill? If so, what were they and how were they dealt with?
 - Not aware of any issues like this. Hot grate ash from the old #1 Steam Plant boilers may have made it to the site and been smoking/steaming. Only truly burning/smoking at the site was associated with the fuels used for the asphalt plant in 1995.

- 10. Do you have a historic list of the corrosive or caustic materials stored in the land fill?
 - Many mill wastes are caustic by nature. Will provide an inventory list of material put in the landfill for 1989-1995. From 1996 on the information was included in annual reports by Golder Associates.
 - Lists of material sent to the landfill from the mill between 1989 and 1995 were provided on April 25/08. No materials of concern were noted on that list.

11. Were barrels of liquid ever transported to the landfill, if so what did they contain.

- Not aware of this happening. Will provide an inventory list of material put in the landfill for 1989-1995.
 - Lists of material sent to the landfill from the mill between 1989-1995 were provided on April 25/08. No barrels of fluids or other materials of concern were noted on that list.

12. Where did red/dumpster garbage bins at the mill site get disposed of? What sort of controls existed regarding what went into those bins? Did barrels of liquids end up in these containers?

- Red bins were for disposal of grate ash from power boiler. Domestic waste from the site was burnt at the local incinerator (unknown if this possibly included barrels). Solvent and other hazardous fluids were recovered by on-site stills and other industrial wastes were hauled to the Augusta facility for recycling or disposal.

13. Where did soils that were contaminated by incidental fuel/oil spills at the mill sites get disposed of?

- They were either remediated on site or disposed of by Augusta Recyclers Inc. at a licenced facility.

14. Did mercury testing of landfill occur if so when was it done and by whom? If it was done was it verified by a third party?

- This is a hear-say based incident. The described sampling process (air samples using a hand-held device) did not make sense for mercury. Test was reported to have been done by unprotected and untrained mill staff.

15. What fenced gravel-based storage area was located about half-way between the sewage outfall and the road to Gibson's beach? Is there a map that shows this location?

- Described site is the location where municipal biosolids were dealt with in the early 2000's.
 - On May 6th 2008, photos of this now defunct facility were provided.

16. Where did PCB filled transformers from the mill get sent?

- These went to the special waste storage facility after which these materials were shipped to Swan Hills or other hazardous waste management facilities.

17. Is there a creek near the landfill (behind the Italian Hall) that carries surface water away from the land fill site?

- There is a series of drainage ditches between the landfill and the Italian Hall. However, there is a high point a short distance north of the landfill, so the water in the drainage ditches near the Italian Hall could not be affected by landfill runoff as alleged.
 - April 30th inspections confirm that a ditch (~~presently dry~~) runs directly from and perpendicular to the fence on the north side of the landfill. It is believed and some surface water from the asphalt cap could indirectly drain into that ditch. The first ditch drains into

another nearby ditch which runs parallel to the north side of the landfill. The low point of this second ditch contained stagnant water but the observed ditch outlet at the western corner of the landfill was dry at the time of the inspection.

- May 7th Catalyst agreed to sample stagnant water accumulating in the deep ditch that runs parallel to the north side of the landfill .
- May 9th Golder field technician collected a sample of the stagnant water in the deep ditch.
- June 16th report identifies that the samples from ditch at northwest end of site contain low/non-problematic levels of parameters of interest not attributed to the landfill.

18. There is a reported "blue sludge" being dumped in the landfill is there any information on what this is material.

- Not aware of this.

* Harold Riedler of the MOE indicated he had seen some deposits that met this description in his inspection of the landfill in the early 1990's and would have reported the material if it was an unauthorized substance.

19. Was black ooze in the sandbank across from the old City Motors ever searched for/ sampled by a diver and tested? Is this something you are willing to do with an independent consultant?

- Golder is currently putting together a plan to sample in that area and will include the sampling of this material if it can be found.
 - April 21 update. A member of the public will be showing Catalyst the location where they saw black ooze coming out of the hillside.
 - April 23 Rod Innes and Sarah Barkowski toured the area. Rod confirmed the material they observed that day was the material he had previously seen and reported to MOE.
 - April 30 site inspection confirmed that area to be sampled by Golder is the same general area where Bryce George had commented he had seen back ooze.
 - May 5 confirmed two sampling areas with Catalyst (near Spring 1 and the power lines).
 - May 7 Sarah Barkowski showed the Golder technician the material and water samples to be collected, which was done the following day.
 - June 16th report submitted indicates that ooze found is decaying organic matter and that seepage water is not contaminated by landfill leachate.

20. In the provided photos from October 1995, what stage of the mini-landfill do they represent? What are the various materials being laid down (black, white, soil, gravel) and

1. what are their individual purposes,
2. how often were they perforated and,
3. what are the impacts of potential tears/punctures of these materials?

- Some of the photos appear to be after 1995. Photos from September show installation of the pre-liner geotextile.
- MOE needs to compare with the Catalyst photos provided to Sue Woodbine previously to get context/timing.
- At the end of 1995 the weather prevented the landfill from being completed so it was covered with plastic to protect the clay layer. In 1996 the landfill was completed.
- Refer to Agra and Golder reports for sequence information.
- During construction, any rips in liner/geo textile were fixed. Leak detection system in place to ensure that if there was a leak, it would be detected. No leak detected.

* May 2nd review of compiled sequence of photos with Catalyst staff, complainants and Powell River Legacy confirmed timing of the photos and timing of various phases of the construction of the mini-landfill.

21. Did rips of the mini-landfill liner occur from machinery traffic during placement and if so how frequently and how were they detected and repaired.

- As described above.
 - At times indicated 1995, only geotextile was being placed. The liner was installed in the fall of 1996.
- * Photo sequence confirmed liner could not have been ripped as was reported to have been.

22. Can we get copies of photos showing the process for laying of the laying down the liner as well as the sealing process of the liner?

- Copies of those photos are with Sue Woodbine.

23. Re: Photos of the rock processing machines, was it all sorting done or was there crushing done.

- Both sorting and crushing done. Crushing of large materials was done to create gravel for leak detection system and for other uses during the construction of the mini-landfill.

24. Re: Sept 17-1 & 2 photos, what is the green material at the base of the slope?

- It appears to be the old green fencing material.

Note : Other questions relating to issues raised about operations in the mill will be reviewed at a later time.

Key Environmental Issues Raised Re: the Landfill Application & Actions Taken to Evaluate/Resolve the Concerns

NOTE : The evaluation of concerns involved reviews of: Catalyst's landfill inventory, ministry files, ministry site inspections, all available photos & observations of mini-landfill site workers. Referenced information was provided with the understanding that both the information and the names of those providing it would be a matter of public record.

Information Source	Key Environmental Concern Raised	Actions Taken to Resolve Concerns	Recommended Further Actions Needed to Address Concern
Dave Sutton	barrels of "stinky" material placed in land fill	Landfill inventory & catalyst staff could find no evidence that barrels of material placed in the dump. Contractor Ted Belyea aware of barrels of solvent dumped in landfill in 1960's but nothing more recently.'	none - existing sampling/monitoring should address this situation with respect to oily materials that have been confirmed by a variety of sources to be in the landfill
	5-6 transformers stored at site	There remains no physical evidence that transformers were on site despite four persons indicating they saw them there. Landfill inventory & catalyst staff and contractor Ted Belyea provide no indication that transformers were ever placed in the land fill.	To err on the side of caution, any permit that may be issued should require periodic PCB monitoring.
	transformer hit & contents spilled near well 98-4a	No physical evidence that transformers were on site or that any had been rupture. Catalyst staff and contractor Ted Belyea are not aware of any transformers being punctured.	To err on the side of caution, any permit that may be issued should require periodic PCB monitoring.
	mystery materials stored under silver tarps	Confirmed that tarps covered piles of hydro-carbon contaminated soils that were authorized to be there.	none - existing sampling/monitoring should address this situation
	batteries, paint cans & oily material dumped	confirmed testing currently being used adequately addresses these issues	none - existing sampling/monitoring should address this situation
	liner ripped by machinery when laid & covered	Created a time sequence using all available photos and report information to confirm with complainant that what may have been ripped was in fact a geotextile layer and not the critically important landfill liner.	none
	wet spot part of underground lake	Photo and report review confirmed the presence of localized perched aquifers but otherwise normal drainage for the area	none
	Hydraulic fluid & oil leaking on site from machinery	confirmed testing regime for the area adequately addresses these issues.	none - existing sampling/monitoring should address this situation

	smoking & flaming materials dumped into land fill	No other information exists to support this report. Steam from hot ash may have been mistaken for smoke.	none
	smelly & toxic materials dumped that required a respirator be worn & warning monitor on machine	Catalyst confirmed that no WCB reports that are on file that support this. Contractor Ted Belyea also has no knowledge of this occurring.	none - existing sampling/monitoring should address this situation
	workers told not to take pictures or say anything about what they have seen	Contractor Ted Belyea also has no knowledge of this occurring and was not aware of workers taking pictures at all.	none
	asbestos & creosote pilings buried on site	Authorized activities under the permit. Hydrocarbon leachate is monitored under permit.	none - existing sampling/monitoring should address this situation
	slope below landfill is slipping into the river	Issue dealt with by geoscientists for Golder associates as part of their evaluation of the slope stability associated with the Phase 2 landfill.	none
	collection pipes broken & filled-up in area of GV-2	Used photo time sequence to confirm that pipe involved are for venting gas under landfill cap and not for leachate collection as first surmised. No supporting evidence that pipes were broken or let that way.	none
	6-8 barrels of wood preservative placed in landfill	After the review of all sources no other information to support this point.	None. Monitoring in existing permit would address this situation if for some reason it did occur
Will Langlands	heard mercury testing not done properly @ landfill	Anecdotal information and reported test approach technically does not make sense. No evidence to support this.	none
	Full drums and hazardous waste placed in red dumpsters that were dumped at landfill	Company confirmed standard disposal of waste from facility went to disposal contractor (Augusta) site. No evidence of improper disposal.	none
	Transformers stored at landfill near GV-1 & -2	There remains no physical evidence that transformers were on site despite four persons indicating they saw them there. Landfill inventory & catalyst staff and contractor Ted Belyea provide no indication that transformers were ever placed in the land fill.	To err on the side of caution, any permit that may be issued should require periodic PCB monitoring.

	Transformers stored outside of the haz waste facility near Gibson's beach	Catalyst identified the only facility in the area described handled municipal biosolids. Photo records were provided. No indication that anything other than biosolids stored there.	none.
	creek flowing down from the north side of the landfill towards the Italian hall was missed in the Golder report & should be sampled for toxins	During an April 30th inspection of the landfill site it was confirmed that some water does drain away from the north-western edge of the landfill towards the Italian hall area via a series of drainage ditches.	Catalyst has completed a full spectrum analysis of the water for toxins in ditch at the north end of landfill. No significant levels of toxins were found and no ongoing monitoring recommended at this time.
	Need to use sonar or subsurface imaging to look for buried transformers	No information provided on if this technology exists or its feasibility to be used in this situation.	none
George Bryce	Goosey blue sludge at far western edge of landfill	Inspection by ministry staff in the early 1990s confirmed the presence of a bluish sludge that was allowed for under the permit.	none
	Concerned about any plans to remove landfill cap because more toxins will be flushed out of the old land fill and into the river,	Current plans do not involve the removal of the existing cap	none
	Black material seeping out from the hillside near the original Wildwood bridge at water level last seen in 1960's. Not a natural seepage.	Water that is oozing out of this area has now been sampled and is be analyzed for toxins.	Sampling by Golder confirmed the black material in question is natural organic matter. Water samples from the immediate area do not contain problematic levels of toxic materials. No further sampling recommended at this time.
	Never ripped the liner and won a bet on that.	Confirms the findings that there is no evidence the actual liner was ever ripped or punctured	none
Jack Vlug	No direct observations of landfill issues but has concerns that are based on information heard from others and problems he has observed with the mill operations	Hearsay that was raised to point out the lack of trust about the landfill due to alleged compliance problems associated with the operation of the Catalyst mill. with environmental in the mill.	Continue to seek out information to confirm/refute allegations associated with the landfill and will need to initiate a subsequent review of allegations regarding the mills environmental monitoring program.

David Harris	Section 2.6. of existing permit. With asbestos being disposed of at the landfill makes to whole location a hazardous waste site and accordingly : it is sited too close to residences, a slope prone to failure to a river and other features.	Sect 40. of the hazardous waste regulation allows waste asbestos to be disposed of at the Catalyst landfill. Review of legislation confirmed that by definition site is not a hazardous waste site.	none
	Section 2.9 of the permit requires contiguous point between mill and land fill and this has not been maintained due to sale of land to P.R.E.	Slope stability was reviewed and found to be appropriate for Phase 2 landfill as per Golder report.	
		Reviewed contiguous point requirement with legal counsel and confirmed it has still been met	none
PR Legacy Group	A number of persons indicate they have seen transformers at the land fill so there are concerns about PCBs leaking into the water. Last time sampling done 1987.	Confirmed last time PCB sampling done was 1992 and 1995 not 1987 as indicated.	To err on the side of caution, any permit that may be issued should require periodic PCB monitoring.
	Want sonar to be used to look for old transformers	No information provided on if this technology exists or its feasibility to be used in this situation. No proven need to pursue such an activity.	none
	Testing of water in well should be as recommended in the Hatfield report March 2008 on page viii.	Hatfield provided this suggestion however, with concentrations in the parts per quadrillion range, the benefit an alternate extraction technique is questionable.	Consider this suggestion if future monitoring results become closer to thresholds where human or environmental health are at risk.
	Need to have updated lake sediment sampling considering the the last sampling was done in 1992	Agreed that more sampling required	Any permit amendment that may be issues should include lake sediment sampling to determine if background levels are decreasing.
	Review water analysis to evaluate rate of flow and potential for channelling through the bedrock and bypassing of the wells.	Concerns forwarded to hydrogeology consultants retained by Catalyst for their input and confirmation of the potential for this type of problem. Hatfield report reviewed by Ministry hydrologist and no concerns on this matter stated.	none

	Concerns raised about environmental problems the mill and the way sampling was conducted. This reflects the general distrust of the companies operations.	Point noted but decisions must be made on evidence that pertains to the landfill.	Scrutiny of all information regarding the amendment should be ongoing until decision made. Separate follow-up should occur regarding the way the mill conducted/recorded its air and effluent discharges.
	Need to drill test holes to sample and check for transformers and PCBs	There is conflicting information of whether or not transformers stored and/or buried in the landfill. If they were placed in the landfill no indication of where they may be and whether or not	To err on the side of caution, any permit that may be issued should require periodic PCB monitoring using existing wells.
	Ministry needs to order Catalyst employees that worked the landfill site to testify as to what we did or did not see.	A review of the nature of risk and evidence before the ministry does not support this type of approach.	none
	Need to obtain 1995 Dr. Forge report with reference to the landfill containing toxic materials and workers needing special protection if it was to be removed etc as per information quoted personally to his (DH).	Reviewed list of all Forge reports and reviewed two Forge reports (1994 & 95) in MOE files. All available reports pertain to siting for a new landfill and not those of potential hazards associated in the old land fill. Catalyst staff also confirm the quotes provided do not line up with the reports seen to date.	Landfill materials will not be removed so concerns raised are not applicable to proposed landfill amendment.
	Person will be providing information on systematic deception associated with well water sampling, analysis and reporting.	John Keays is the person mentioned and his report was reviewed both internally and externally to verify if it identifies problems with the data collection or analysis.	Interpretation taken by Powell River Legacy is not scientifically supportable. No further action.
	Need to have third party audits on the fly ash content to ensure they are appropriate.	Fly ash is regularly sampled to ensure it is not outside of appropriate parameters	Consider making a third party sample audit part of the permit requirement.
	As landfill changes in height and location of active deposition, existing dust collection system will become less effective in accurately measuring the potential dispersal of dust. Need to have the collection devices adjusted in height and location to give accurate representation of dust dispersal.	This issue is valid. The ministry's regional meteorologist has confirmed that Catalyst staff have their consultants looking into this issue. in a closer manner.	Any permit that may be issued should include a procedure to routinely review the placement dust monitoring stations to ensure that potential dispersal is accurately sampled.
	The catalyst proposed landfill amendment has changed over time. How much is required to trigger a new notification in the paper and a new round of consultation? Are we at that stage with the current amendment?	A switch to a "continuous cover approach was tabled at last stakeholders meeting but no substantial changes to the proposed plan have been put forth.	No change approach for consultation or notification process expected at this time.

(5)

Risk Ranking Scoring

Name: Susan Woodbine and Liz Freyman

Date: 2008-05-16

General Information:

Name of Discharger	Catalyst Paper, General Partnership
Category	Permitted
Type of waste	Refuse
Type of discharge	Point Source
Locality	Powell River
Description of facility or discharge	Pulp and Paper Mill
File No.	PR-04565

4=high
1=low 0
= n/a

category	attribute	factor		
Health Risk	HH Substance Health Hazard	acute toxicity	0 to 4	0
		cancer and mutagenicity potential	0 to 4	2
	PE Public Exposure	morbidity potential (illness)	0 to 4	1
Environmental Risk	MDh Magnitude of Loading Rate	number of people exposed	0 to 4	3
		impact on sensitive individuals	0 to 4	1
		ambient levels	0 to 4	1
	EH Substance Environmental Impact Hazard	acute toxicity	0 to 4	3
	EE Environmental Exposure	chronic / mutagenic	0 to 4	0
Nuisance Risk	MDe Magnitude of Loading Rate	contribution to global impacts	0 to 4	1
		area exposed	0 to 4	0
		persistence and bioaccumulation	0 to 4	2
	NH Substance Nuisance Hazard	ambient levels	0 to 4	2
		biodiversity/sensitive/rare habitats/species resources	0 to 4	1
Catastrophic Risk	SV Social Values Affected	water body aesthetics	0 to 4	3
		odour	0 to 4	0
		litter potential	0 to 4	0
	NP Number of People Affected	air visibility	0 to 4	0
	PM Potential Magnitude	non-health related drinking water quality	0 to 4	0
	CL Catastrophic Likelihood		0 to 4	3
			0 to 4	2
			0 to 4	0

Factor Weighting Calculations

Health Risk	HH	Substance Health Hazard	
	PE	Public Exposure	
	MDh	Magnitude of Loading Rate	
Environmental Risk	EH	Substance Environmental Impact Hazard	
	EE	Environmental Exposure	
	MDe	Magnitude of Loading Rate	
Nuisance Risk	AS	Substance Nuisance Hazard	
	SV	Social Values Affected	
	NP	Number of People Affected	
Catastrophic Risk	PM	Potential Magnitude	
	CL	Catastrophic Likelihood	

Risk Category Calculations

Health Risk	1.8
Environmental Risk	1.7
Nuisance Risk	0.0
Catastrophic Risk	0.0
Total Risk	1.12333333

NOTE: highlight cell to see comment providing short description, see guidelines document in references for more detailed explanation