BRITISH COLUMBIA
The Best Place on Earth

MINISTRY ASSESSMENT

To: Steffanie Warriner **Date:** July 16, 2008

From: Susan Woodbine **File:** PR-04565

Application: Major Amendment		**Pre-Application Date:** Aug 17, 2006
SIC: 2711	**Production Capacity:** 2450 Adt/d	**Application Date:** Sept 25, 2007
Applicant: Catalyst Paper Corporation and Catalyst Pulp Operations Limited doing business as Catalyst Paper, General Partnership		
Location of Facility: 5775 Ash Avenue, Powell River		

1. Application Request

The permittee requested an amendment to the permit to increase the total authorized volume from 100,000 cubic metres to 850,000 cubic metres and to increase the annual authorized discharge volume from 14,000 cubic metres per year to 25,000 cubic metres per year. There are no changes proposed to the type of materials to be discharged.

The permittee sent in a letter dated November 19, 2007 requesting that the total authorized discharge volume be changed to 620,000 cubic metres. The original estimate of the total volume was based on the possibility that the waste would fill the space between the bluff and the current landfill area. Since this is no longer part of the proposal, the total volume has been recalculated as 620,000 cubic metres.

2. History

The permit was originally issued on December 7, 1976. It was most recently amended on August 2, 2006 in order to reflect the company name change from Norske Skog Canada Limited and Norske Skog Canada Pulp Operations Limited doing business as NorskeCanada, General Partnership to Catalyst Paper Corporation and Catalyst Pulp Operations Limited doing business as Catalyst Paper, General Partnership. The last significant permit amendment was completed on September 15, 1995 to authorize the mini-landfill.

Landfill History

The company, then MacMillan Bloedel Ltd., originally started using an old sand and gravel quarry as a landfill in the 1960s. A permit was issued on December 7, 1976. As was common practice with most landfills in operation at that time, the landfill was not lined. Consequently leachate from the site was able to enter the receiving environment, namely the groundwater table. In the late 1980s it became evident, based on monitoring, that the groundwater was being contaminated by leachate. Seven groundwater wells were installed in 1989 and a groundwater monitoring program was initiated. Additional wells were installed in 1991, 1993, 1994, 1995, 1998 and 1999 and most recently in 2006 as part of the environmental assessment for this proposed amendment.

Based on groundwater monitoring data which indicated contamination from the leachate generated from the refuse, the ministry determined that the landfill should be closed. The company therefore began to look for a suitable site for a new, engineered, landfill. The company submitted an application, dated October 7, 1994, for a permit for a new landfill. After much discussion with the company and with Victoria staff a Pollution Abatement Order was issued on November 9, 1994. The company was ordered, among other things, to design a surface barrier system which would halt the infiltration of precipitation into the refuse. The company was required to install this system by September 29, 1995. The surface barrier system was to be installed over the *entire* landfill if a permit had been issued for a new landfill site by August 31, 1995. If no new landfill permit had been issued by August 31, 1995 the surface barrier system was to have been placed over at least 90% of the landfill, allowing the remaining area to be used until 30 days after a permit for a new landfill site was issued. Due to rezoning issues and much public concern regarding the sites under consideration, the company abandoned their attempts to site a new landfill and, on April 16, 1996, withdrew their application for a permit for a new landfill. The company decided instead to create a small engineered landfill (mini-landfill) to be constructed in the north east corner of the existing site.

This mini-landfill area was lined with compacted clay and then with a high-density polyethylene (HDPE) liner. A leak detection system was installed underneath the clay liner. The leak detection system consists of a drainage material and a sump beneath the clay liner. Any leachate which might pass through the HDPE liner and clay liner would be expected to be captured in the sump. A pump was installed in this sump which is activated weekly to determine if there has been a leak in the liners. To date, these weekly checks for leakage have not produced any leachate. Above the HDPE liner another sump was installed to collect leachate from inside the mini-landfill. This sump was fitted with two pumps and an automatic level-control system so that leachate could be pumped out on an as-needed basis. Leachate from the mini-landfill and any leachate from the leak detection system are directed to the mill's effluent treatment system for treatment and discharge.

Ministry staff inspected the landfill site during construction of the liner systems. During an inspection on December 14, 1995, it was noted that the clay liner covered the whole of the mini-landfill surface. The form also notes that a temporary storage area for waste material has been installed and that the waste is covered by tarpaulins. Construction of the mini-landfill was completed in the summer of 1996. At a later inspection, on September 18, 1996, it was noted that the HDPE liner was complete. The liner appeared to be well installed and all seams were welded.

The Pollution Abatement Order was amended on December 1, 1994, February 10, 1995 and May 17, 1995. Two of the amendments extended the deadlines for installation of the groundwater monitoring system by approximately 2.5 months, and added additional requirements to test pH and conductivity on grab samples until the monitoring system was installed.

The most recent amendment required the installation of a surface barrier system over the entire landfill site regardless of the status of any new permit, and also added the requirement to install a collection system to collect and treat the leachate contaminated groundwater. The company preloaded the site, graded the site and covered the Phase 1 area of the site with low permeability asphalt. For the remainder of the site (mini-landfill) the combination clay and HDPE liners served as the surface barrier. The company also installed three groundwater pumping (recovery) wells.

Once the surface barrier system, groundwater monitoring system and groundwater recovery wells were in place the company was considered, by the ministry, to have complied with the requirements in the Pollution Abatement Order. Subsequent to the installation of the three groundwater recovery wells in 1995, water quality data led to the installation of three additional groundwater recovery wells in 1999. To date, the combined volume of contaminated groundwater collected from these wells, plus leachate collected from the mini-landfill, on an annual basis, remains as a very small percentage of the mill effluent on a daily basis. For example, in 2006 the average daily volume of leachate collected from the landfill was 0.067% of the average daily mill effluent.

The mini-landfill went into operation in 1996 and the company used it to dispose of their mill waste, which initially was mostly grate ash from the old power boilers, dregs from the Kraft process, plus lesser quantities of waste asbestos from the mill and miscellaneous mill waste (dirt contaminated wood chips, road sweepings, asphalt and concrete rubble from minor demolition/construction projects, elemental sulphur, spent activated carbon, lime, lime dregs, effluent treatment solids, boiler feedwater treatment resins and fibreglass). The pollution treatment works on the common stack for the old boilers was a wet bottom electrostatic precipitator. Effluent from the precipitator was sent to the effluent treatment system. Consequently only grate ash from the old boilers needed to be landfilled.

During 1997 a new bubbling fluidized bed power boiler (#19 power boiler) was constructed and the old (cold stack) boilers were to be decommissioned. Towards the end of 1997 a small amount of flyash from the new #19 power boiler (405 m3) created during the commissioning of the boiler was added to the mini-landfill. Early in 1998 #19 power boiler went into full time operation and dry flyash was discharged to the landfill. The material is very fine and dust was evident when the trucks tipped the flyash into the landfill. Residents became very concerned about the potential for flyash dust to reach their property. Despite significant differences between the chemical profile of dust collected from the nearby gas station/convenience store and dirt collected beside the road near the landfill, as compared to the chemical profile of #19 power boiler flyash, residents remained concerned.

In October 1998 the company started shipping their flyash to the Rabanco landfill in the US, primarily to extend the life of the mini-landfill but also due to the continued concerns of the residents. Beginning at time the landfill was primarily used for Kraft mill waste (grits and dregs), plus lesser quantities of waste asbestos from the mill and miscellaneous mill waste. In November 2001 the Kraft mill was permanently closed and after that date very little material was landfilled each year.

The cost of transporting flyash to Rabanco escalated each year until in 2006 the company decided to try using their Wildwood Landfill for flyash disposal again. In order to address dust issues the company did bench scale testing, mixing water with flyash to create a slurry. The resulting mixture set and became very hard, similar to concrete. A few larger scale tests were done using a cement truck and in the summer of 2006 the company started discharging the flyash slurry to the landfill on a routine basis. Some aspects of the operation needed to be refined to ensure that no flyash slurry spilled onto the roads and to ensure that the slurry was at an optimum consistency.

If the slurry was too wet the material could and on occasion did, spill out of the cement truck. The mixture is now made with less water before transportation to the landfill and additional water is added just before discharge. No dust was observed during numerous inspections by ministry staff, including several times when flyash slurry was being discharged. The reaction of water mixing with flyash is exothermic and the heat is generated creates steam which is frequently observed during transportation and discharge. Photographs of one of the inspections are attached (1).

Due to the higher volume of refuse discharged to the landfill since the summer of 2006 the landfill is filling up quickly. The company estimates that they have less than a year of landfill capacity in the mini-landfill. The current permit has a total limit of 100,000 cubic metres.

The company has researched various disposal options for the flyash. The options included storing the waste in one of their empty buildings (an idea suggested by a member of the community), construction of a new landfill on top of the Phase 1 asphalt area (also a suggestion from a member of the community), a vertical expansion of the mini-landfill and construction of a new landfill on a greenfield site. Golder Associates Ltd. (Golder) was retained to evaluate these options. Based on Golder's evaluation and input from members of the Catalyst Paper - Community Stakeholder Committee, it was determined that the best option was to build a new landfill on top of the combined mini-landfill and asphalt-capped Phase 1 landfill.

A pre-application meeting was held on August 17, 2006 in order to discuss the application process for an amendment to the refuse permit to accommodate the proposed expansion and to develop the terms of reference. On August 21, a draft application was submitted. The company initiated public consultation and Golder was retained to complete an Environmental Assessment.

The Environmental Protection Notice was published in the BC Gazette and the Powell River Peak on September 21, 2006 and September 20, 2006 respectively. It was also circulated to the following agencies and community groups for comment.

Powell River Regional District
BC. Ministry of Agriculture and Lands
Ministry of Environment, Environmental Quality
Ministry of Health (Local Health Authority)
Wildwood Ratepayers Association
Townsite Ratepayers Association
Sliammon First Nation
City of Powell River
Cranberry Ratepayers Association
Environment Canada

On April 18, 2007 an open house was held for the public and on May 17, 2007 an open house was held for the Sliammon First Nation. The company explained what the expansion project would entail and a draft Environmental Assessment Report was handed out to the people who attended. The company extended the consultation period to June 1, 2007 for the general public and to June 17, 2008 for the Sliammon First Nation. Letters received after these dates were to be given a response but would not be included in the Consultation Report. The ministry received a large number of letters which had not been copied to the applicant. The authors of these letters received a reply from the ministry advising that their letter was being forwarded to the applicant for response.

The company submitted their application forms and an Environmental Assessment Report completed by Golder on July 30, 2007 with the application fee. The Consultation Report was submitted on September 25, 2007. At that time the permit amendment application was considered to be complete. All letters received by the ministry after that time continued to be forwarded to the applicant so that they were aware of the concerns.

In mid 2007 the ministry retained Hatfield Consultants (Hatfield) to complete an independent review of the water quality data relating to the Wildwood Landfill. The consultant was to do the following:

1. review all leachate monitoring data (contained in annual reports submitted) from the past 15 years for the Wildwood Landfill,
2. compare the monitoring data to compliance requirements of the permit and provide an assessment of compliance to those requirements, and
3. assess trends in the data and provide recommendations for subsequent monitoring or mitigation actions.

A report was completed by the consultants and submitted in November 2007. The report was made available to the Catalyst Paper - Community Stakeholder Committee members and posted on the Catalyst Paper web page.

The Hatfield report confirms that following the installation of the asphalt cap in 1995 and the groundwater recovery wells in 1995 and 1999, annual reports submitted by Golder on behalf of the company, indicate that concentrations of contaminants in the groundwater have decreased over the succeeding years. Concentrations of contaminants in a spring which discharges to Powell River from an area downgradient of the landfill have also declined over the years. Based on the report completed by Hatfield, the groundwater quality in the groundwater wells, nearest to Powell River (within 200 metres), in the last 5 years, do not indicate an environmental effect from the landfill or significant risk to human health. Similarly, concentration levels of contaminants in the surface water collected from seeps on the river bank and from the mill filterhouse did not indicate an environmental effect from the landfill or significant risk to human health.

Jeff Van Haastregt, former Solid Waste Officer with the ministry, was retained to assist with the review of the Consultation Report, the Environmental Assessment Report and the Hatfield Consultants Report and to provide advice to ministry staff. Mr. Van Haastregt's recommendations will be discussed later in this report.

3. Consultation Report

Consultation Report Acceptable:	**Yes**	x	**No**		**N/A**	
Environmental Quality Section Consulted:	**Yes**	x	**No**		**N/A**	
Other Ministry Sections Consulted:	**Yes**	x	**No**		**N/A**	

Environmental Quality Section

Liz Freyman, Environmental Quality Section, advised that a meteorologist should review the file with respect to dust issues from the landfill and that a hydro-geologist should review the file with respect to the site hydrology and the water balance. An email with comments from Ms. Freyman is attached (2)

Cindy Walsh, ministry meteorologist, visited the site and gave advice regarding the locations of the dustfall canisters and the hi-vol monitor. Ms. Walsh also reviewed the proposed site for PM10 and PM2.5 TEOM monitors at the James Thompson Elementary School and found the site to be acceptable to the ministry. A document outlining Ms. Walsh's recommendations is attached (3). Conditions at the landfill site changed following the construction of the earthen berm. Julie Saxton, subsequent regional meteorologist, reviewed photographs showing the proposed new locations for the hi-vol sampler and two of the dustfall canisters and found the proposed locations to be acceptable to the ministry. An email with Ms. Saxton's comments is attached (4).

Water Stewardship Section

Following the suggestion from Ms. Freyman Tim Bennet, hydro-geologist with the Water Quality Section was asked to review the Environmental Assessment and had several questions. The questions were passed on to Golder. Tim Bennet appeared satisfied with the response from Golder. Copies of the relevant emails and the response from Golder are attached (5).

Jeff Van Haastregt, General Comments

- In keeping with other refuse permits issued by the ministry, waste quantity should be measured in tones.
  Both cubic metres and tonnes are used in ministry permits. For this particular site, it is more practical to measure the refuse discharge in cubic metres. No weigh scales are available to measure the discharge 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.
  Agreed. The permit currently contains a total maximum authorized discharge volume as well as an annual discharge rate. Any future permit will continue to include a maximum authorized discharge in addition to the annual discharge rate.

- 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.
  Noted.

- 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.
  A review of the entire permit document was conducted during the assessment of this application.

- 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).
  The company advised that their preferred method continues to be transportation of the flyash slurry via the use of cement trucks.

- 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).
  Agreed. If any changes to the monitoring requirements in the permit were requested, it is expected that an amendment would be required.

Mr. Van Haastregt's comments on the Consultation Report, the Environmental Assessment Report and the Hatfield report are attached (6).

Concerns submitted by the public:

Most of the concerned persons addressed their letters to the applicant with a copy to the ministry. However, a large number of letters were simply sent to the ministry. The applicant was provided with a copy of any letters which the ministry felt they might not be aware of.

Each of the concerned persons brought up one or more issues relating to the application. A spreadsheet has been created showing a list of concerns and which of the concerns each letter writer mentioned. Rather than address each individual letter, the concerns raised are discussed below.

General Concerns

Several of the letters simply stated that the person was opposed to the landfill expansion without giving any specific reason. Without a specific concern, these letters cannot be addressed in this report. Several of the other letters contained concerns relating to issues that are not in the jurisdiction of the Ministry of Environment as follows: These issues have not been forwarded to the other agencies but we understand they are aware of the issues.

1. The road and the bridge across Powell River are not suitable for traffic from heavy vehicles like concrete trucks. The Ministry of Transportation and Highway is responsible for this issue.
2. An expansion to the landfill would negatively affect their property values.
3. An expansion to the landfill would negatively affect tourism.
4. Part of the landfill is not zoned appropriately for landfilling. The City of Powell River has jurisdiction over zoning issues.
5. The landfill is visible from the highway and is an eyesore. This is addressed below because the applicant has attempted to address this issue.

Specific concerns organized by category as follows

Location of Landfill

Many people expressed concern about the proximity of the landfill to the residential area and to the nearby Elementary School in very general terms, simply stating that a landfill should not be in a residential area and that an Elementary School was nearby.

Another specific concern is that the landfill did not have a 300 metre buffer between the discharge area, residences and a gas station/convenience store/restaurant. The 300 metres buffer is assumed to be taken from the Landfill Criteria for Municipal Solid Waste. As mentioned in the consultation report review provided by Jeff Van Haastregt, the Wildwood Landfill is not a Municipal Landfill and therefore compliance with the Landfill Criteria is not required. The 300 metre buffer zone referenced in the Landfill Criteria is to protect residents from vectors (birds and rodents), odour issues and methane gas migration. Vectors, odour issues and methane gas migration are not issues at the Wildwood Landfill.

One specific concern in this general category, mentioned above, was the visibility of the landfill. In order to create a visual barrier the applicant has constructed an earthen berm between the landfill and the road. Trees have been planted on the berm and additional trees have been planted in a forested area between the road and the landfill to improve the visual barrier. The trees currently growing in the forested area are bare of branches until many feet above the ground and do not provide a good visual barrier. The new trees are expected to fill in the area closer to the ground and improve this. These measures should also serve as a noise barrier.

Dust Contamination

Many people expressed concerns regarding the possibility of dust from the landfill. Power boiler #19 went on line in November 1997, and flyash from power boiler started to be taken to the landfill. The dry flyash was discharged to the landfill, and dust became a concern for the nearby residents. This issue was resolved when the company started taking the flyash to Rabanco in Washington State. Now that the company has started putting the flyash slurry in the landfill there are concerns that dust may become a problem again. The slurry is agitated during transportation and up to the point of discharge to keep it from setting. Once it is discharged it solidifies to a "concrete like" matrix.

No dust is evident when the flyash slurry is discharged to the landfill but residents fear that, once the material is dry, wind may scour dust from the solid material. In order to determine if dust is being generated at the landfill site dustfall monitoring should continue to be conducted at the edge of the landfill during the drier summer months. Dust is not normally an issue during the wetter fall, winter and spring months. A requirement for continuing dustfall monitoring should be added to the amended permit. This requirement should also address one concerned person's concern that dustfall sampling has been inadequate. Only by continued monitoring can an ongoing assessment of dust from the landfill be completed.
Larger particulate matter which is normally considered as dust does not generally travel very far, with the dustfall concentration decreasing with distance from the source.
The amount of dust which would reach residences is, therefore, expected to be less than the amount collected at the edge of the landfill. Dustfall has been measured at the edge of the landfill, in 2006 and 2007, in four locations. Results of monitoring in three of these locations, is shown to be consistently below the residential criteria of 52.5 mg/100 cm^2 per 30 days with levels ranging from 10 mg/100 cm^2 per 30 days to 41 mg/100 cm^2 per 30 days. Result of monitoring in the fourth monitoring location, which is nearest to the landfill entrance road, had two sets of monitoring results which were below the residential criteria, with levels of 40/29 mg/100 cm^2 per 30 days (duplicates) and 33 mg/100 cm^2 per 30 days. The other two sets of monitoring results from the fourth monitoring location were above the residential criteria with levels of 75 mg/100 cm^2 per 30 days and 85/76 mg/100 cm^2 per 30 days (duplicates), but were below the criteria for non residential areas which are 87.6 mg/100 cm^2 per 30 days.

A "wind rose" graphic plot (based on wind direction data collected at the Wildwood ambient monitoring station during 2006) is shown in Appendix 1 (1-9) of the Golder Environmental Assessment report. An interpretation of the wind rose provided by Golder shows that winds at the landfill are predominantly from the south south east (SSE) and from the south. Wind is coming from the SSE approximately 11% of the time and from the south approximately 8% of the time. This does indicate that the wind is going in the general direction of the Wildwood community at least some of the time. The winds are light, generally less than 10 km/hour most of the time (88%) when coming from the SSE and from the south. Dustfall monitoring equipment appears to be located in good positions based on the wind rose assessment. Because the earthen berm has been created since last time the dustfall monitoring was conducted, two of the four dustfall monitors, and the hi-vol PM10 monitori will need to be moved somewhat. Monitor # 2 is to be placed on the top of the earthen berm because its previous position would otherwise be shielded by the berm. Monitor # 3 is to move a few metres west, towards the landfill, away from overhanging trees. The hi-vol PM10 monitor is now close to the proposed position of monitor # 3. Based on an inspection on May 6, 2008, Julie Saxton stated that she has no objections to the proposed locations of the dustfall equipment. A diagram showing the proposed locations of the dustfall equipment is attached (7).

Air Quality/Health Hazard

Smaller particulate matter, less than 10 microns in size (PM10) and less than 2.5 microns in size (PM2.5) travel farther from the source and would not be collected during dustfall sampling. These smaller particles can be inhaled and are considered to be a health hazard. There is an ambient monitoring station located in Wildwood, approximately 150 metres north east of the landfill, at the gas station/convenience store/restaurant, which measures PM10 and PM2.5.

Data has been collected at this ambient monitoring station since June 1997 for PM10 and June 2006 for PM2.5. Lorne Nicklason, Environmental Quality Section, advised that, between January 1998 and December 31, 2007, the 24 hour rolling average PM10 levels have reached a maximum of 39.25 $\mu g/m^3$ indicating that the air quality was within the provincial PM10 objectives of 50 $\mu g/m^3$.

In the period between 1998 and 2002 99.38% of the 24 hour rolling averages were below 25 $\mu g/m^3$ and between 2003 and 2007 99.82% of the 24 hour rolling averages were below 25 $\mu g/m^3$.
Since July 1, 2006 when the company started discharging the flyash slurry to the end of 2007 there were no PM10 24 hour, rolling averages, above 25 $\mu g/m^3$. Based on the Air Quality Index, 24 hour rolling averages below 25 $\mu g/m^3$ are considered to be "good".

The applicant advised that, based on PM2.5 monitoring conducted at the Wildwood ambient monitoring station during 2007, the maximum 24 hour average PM2.5 level was 8.5 $\mu g/m^3$ and the average 24 hour average value was 2.3 $\mu g/m^3$. A 24 hour average value of 8.5 $\mu g/m^3$ would be in the "good" category on the Air Quality Index scale, the tool used for assessing ambient air quality across the province.

Many people expressed concerns regarding the proximity of the Wildwood landfill to the nearby James Thompson Elementary School. In order to address this concern, and following discussion with the ministry, the applicant has proposed moving the PM10 and PM2.5 monitors from the ambient monitoring station at Cranberry Lake to a new location on top of the gymnasium roof at the Elementary School. Cindy Walsh, meteorologist with the ministry, inspected the proposed location and advised that it was acceptable to the ministry. Ms. Walsh and Julie Saxton, meteorologist, Lower Mainland Region, advised they have no objection to the proposed move. The Cranberry Lake ambient monitoring station is addressed in the Catalyst Paper air permit PA-03149 and a minor amendment to that permit has been completed in order to authorize moving the monitors

Toxic Waste / Material

Many of the letters referred to the material (flyash) being deposited at the landfill as toxic waste, with dioxins and furans being the contaminants mentioned most often. The Golder Environmental Assessment Report, section 5.4.1, indicates that the flyash, based on an average of 25 separate analytical results, is not a hazardous waste as defined in the Hazardous Waste Regulation. This section of the report also indicates that the levels of metals in the flyash when compared to Schedules 4 and 5 of the Contaminated Sites Regulation are within the criteria for commercial and industrial land. Dioxin and furan levels when compared to Schedule 5 of the Contaminated Sites Regulation are within the criteria for residential land. Synthetic leachate was extracted from the solidified flyash and submitted for analysis using the US Environmental Protection Agency (USEPA) methods. Analytical results indicated that the dioxin and furan level were 3.68 pg/L. This is far below the level of 30 pg/L set by the USEPA for the maximum concentration of dioxin and furan in drinking water. The USEPA drinking water standard is used because no Canadian criteria for dioxin and furan currently exist.

Golder states that, Based on the Toxicity Characteristics Leachate Procedure which was conducted on the flyash from Power Boiler #19, the material is not a Hazardous Waste.

Golder also states that, if this material were soil it could be used on a commercial or industrial property, based on levels of metals. It could be used on a park or residential property, based on levels of dioxins and furans. However, as the material is alkaline, with a pH of 12.3, it needs to be properly managed.

The company has stated that they have no plans to use the site as anything other than an industrial site in the future.

Transformers placed in the landfill

At a Catalyst Paper – Community Stakeholder Committee meeting on March 6, 2008 Mr. David Harris provided a written statement containing allegations that, in the past, transformers were placed in the landfill. The concern is that if transformers were placed in the landfill, they might have contained poly-chlorinated bi-phenyls (PCBs).

To support this position, the statement points out that chlorinated phenols (PCPs) have been detected in contaminated groundwater. Chlorinated phenols are of concern environmentally but come from pesticides, herbicides, and wood preservatives and do not indicate the presence of PCBs. Chlorinated phenols were not detected in samples collected from the groundwater recovery wells in 2006. Furthermore the Hatfield report states that there were no exceedences of chlorinated phenols in surface water or near-shore groundwater wells within the last five years.

Interviews were carried out with several members of the public and their concerns included statements that they saw a transformer in the landfill in 1995. These interviews are addressed later in this report under the heading "PR Legacy Interviews".

The company advised that they have been questioning their employees, but have not found anyone who can provide any information regarding the placement of transformers in the landfill. The company has supplied copies of the logs kept of materials placed in the landfill. The logs cover the period from 1992 to 1999. There is no mention of transformers in the logs. The applicant has provided monitoring data, conducted in 1992, by HBT AGRA Limited, which indicates that 6 soil samples and 5 water samples were tested for many organochlorines, including PCB. All samples had non-detectable levels of PCB. A copy of the data is attached (8). A second set of PCB monitoring was conducted in 1995, which indicates that three of four wells tested had non-detectable levels of PCB. The fourth well had detectable levels of PCBs measuring 0.0008 mg/L. The detection limit for the test was 0.0004 mg/L.

Although it has not been possible to determine whether or not any transformers are buried in the landfill, to err on the side of caution, a requirement for PCB testing, on a periodic basis, should be added to the monitoring program of any future permit.

Leachate/Water Quality

Concerns were raised regarding leachate coming from the closed Phase 1 area, and from the mini-landfill.

Historically, leachate from Phase 1 did contaminate the groundwater, however since the site was covered with an asphalt cap and six groundwater recovery wells were installed, the groundwater quality has substantially improved as noted in the History section of this assessment.

As stated in the Hatfield Consultants report, the contaminant levels in the groundwater wells within 200 metres of Powell River currently do not indicate an environmental effect from the landfill or significant risk to human health. Likewise the contaminant levels in the spring and in seeps which discharge to the river do not indicate an environmental effect from the landfill or significant risk to human health. Leachate collected by the groundwater recovery wells, which recover groundwater from perched aquifers at depths of 11m, 19m and 29m at the downgradient edge of the landfill is routinely analysed and data from 2006 indicates that the leachate meets regulatory standards for drinking water.

Leachate collected from within the mini-landfill is also routinely analysed and the data indicates that, with respect to dioxins and furans, the leachate meets USEPA water quality criteria of 30 pg/L, with one sample being 2.83 pg/L and all other samples being below 1.0 pg/L.
The proposal outlined in the Golder Environmental Assessment includes grading the Phase 1 area with sand to slope the area towards the south west and installing a HDPE liner on top of the sand. There are plans to use a leak location system after installation of the liner.

If leaks are found they will be repaired prior to placement of any waste material in the landfill. Pipes are to be placed in the sand between the asphalt and the HDPE liner to provide a leak detection system for the operational life of the landfill. In the unlikely event that any leachate was to penetrate the HDPE liner the leakage would be collected in these pipes and diverted to the leachate collection pond. Inside the HDPE liner a system of pipes is to be placed within a gravel layer. Leachate above the HDPE liner will follow the slope of the landfill and be collected by the pipes and also diverted to the leachate pond. From the pond the leachate will be gravity fed to the mill's effluent treatment system and then discharged along with the mill effluent.

Mini-landfill leaking
Concerns have been raised by Mr. David Harris that the liner in the mini-landfill is leaking. To address this concern Golder conducted a simple water balance utilizing the HELP (Hydrological Evaluation of Landfill Performance) model.

Using an annual precipitation rate of 1.103 m (Environment Canada) and a footprint of 27000 m^2 (2.7 hectares from mini-landfill catchment area) the volume collected in the mini-landfill is 29781 m^3. Adding 260 m^3 that Mr. Harris estimated from truck washing a total of 30041 m^3 is obtained.

The mill has roughly estimated the volume of leachate collected from the mini-landfill as 24,313 m^3.

Golder estimated that the evaporation was approximately 19% of the total annual rainfall or 5658 m^3.

Therefore, using the following formula (volume generated (30041 m3) minus volume collected (24313 m3) minus volume lost to evaporation (5658 m3)) there is little or no water unaccounted for.

Hatfield verified the evaporation estimate with Mr. Tim Bennet, ministry hydrologist and Dr. Ilja Tromp-van Meerveld, Department of Geography, Simon Fraser University.

Hatfield supports Golder's conclusion that it is unlikely that the mini-landfill is leaking. This is further borne out by leak detection testing that the mill conducts on a weekly basis and by groundwater monitoring downgradient of the mini-landfill which does not indicate elevated contaminant levels in the groundwater.

Mr. Harris also raises a concern that leachate, leaking from the mini-landfill is entering Powell River via cracks in the bedrock, resulting in detectable levels of dioxin and furan in the river (as measured at the mill filterhouse). Monitoring of leachate collected in the mini-landfill indicates that concentrations of contaminants in the leachate are very low.

Dioxins and furans have only been greater than 1.0 pg/L (parts per quadrillion) on one occasion since monitoring began in 1996, based on Annual Monitoring Reports submitted by Golder. USEPA drinking water standards are 30 pg/L (parts per quadrillion). Even if leachate were leaking from the mini-landfill, which Golder and Hatfield agree is not likely, it would have to pass through the perched aquifers before reaching the bedrock (see below) and become diluted, with minimal chance of impacting the river from that source.

Damage to the mini-landfill liner.

Members of the public have alleged that the mini-landfill liner was damaged during installation in the fall of 1995. Several photographs were supplied showing the mini-landfill at various stages of construction. After a review of the photographs, it was determined that the liner could not have been damaged since it was not installed until August 1996. It is possible that if anything was damaged it was one of the geo-textiles which were installed during 1995. The geo-textile material was installed in part to act as a filter medium above the drainage material beneath the compacted clay. Golder advised that damage to the geo-textile is not likely to affect the operation of the landfill liner system or the performance of the leachate detection system.

Dioxins and furans

Concerns have been raised regarding low levels of dioxins and furans detected in the mill filterhouse samples in comparison to the levels of dioxins and furans found in the Wildwood drinking water intake. There have been a total of 33 samples taken at the mill filterhouse. Golder has reviewed the sampling results and advises that all but 10 of the samples are non-detectable, with blanks that can be reported as non-detectable. These samples can be considered to be reliable.

Of the remaining 10 samples, which show measurable levels of dioxins and furans, 6 of them have blanks which also show measurable levels of dioxins and furans. These 6 samples cannot be considered to be reliable.

Of the remaining 4 samples, which show measurable levels of dioxins and furans, 2 of them have blanks which cannot be reported as non-detectable. These 2 samples also cannot be considered to be reliable.

The two remaining samples, which show measurable levels of dioxins and furans, are considered to be reliable because all quality control criteria were met. The levels reported in these two samples are very low, being just above the method detection limit and are well below the USEPA maximum level of 30 pg/L for drinking water.

Hatfield concurred with Golder's evaluation of the reliability of the dioxin and furan results. Hatfield suggests that if the ministry wanted to evaluate this further, and obtain a precise numerical value for the dioxin and furan level, samples could be collected using a method which involves very large sample volumes. This suggestion was discussed with Steven Horvath, ministry Laboratory Services Officer, and he advised that the sampling method currently used by Golder for dioxin and furan sampling and the analytical method used by the laboratory are the methods outlined in the BC Field Sampling Manual and the BC Laboratory Manual. The methods contained in these manuals are referenced in all of the permits issued by the ministry which require monitoring. For different sampling or analytical methods to be used, the approval of a Director is needed. All of the commercial laboratories are CAEAL certified and undergo regular audits, as part of their quality control measures.

As mentioned in the Hatfield report it is not unusual that blanks occasionally show measurable levels of dioxins and furans due to the extremely low levels achieved by the analytical method. It has been suggested that the samples should be retested however, the entire sample is used in the analysis so repeating the test on a specific sample bottle is not possible.

At the Wildwood Landfill, sampling for the spring and the mill filterhouse is conducted on a semi-annual basis to determine the levels on a dry weather (July/August) and wet weather (November/December) basis. Due to the length of time it takes to receive the results from each analysis (turn around time is 3 weeks), conditions could possibly be different by the time re-sampling could be conducted.

Since every one of the 10 samples which had measurable levels of dioxins and furans were all well below the USEPA maximum levels of 30 pg/L for drinking water. It does not appear necessary to require the sampling to be conducted using larger volumes of water at this time. Steve Horvath concurred with this conclusion.

Compression of Phase 1 material by the new Phase 2 landfill

Concerns have been raised that the weight of the flyash placed above the Phase 1 area of the landfill will cause the Phase 1 waste to be compressed and cause leachate to be "squeezed out" of the waste material.

In general, leachate is caused by water infiltrating waste material in a landfill. Once the asphalt cap was installed in 1995, rainfall could no longer reach the Phase 1 waste material and leachate generation was minimized. The groundwater recovery wells have pumped contaminated groundwater from the perched aquifers for many years. The groundwater recovery wells start pumping whenever water present in the groundwater recovery well reaches a certain level. Two of the groundwater recovery wells, in the 11 metre perched aquifer, have not started pumping since 2000 indicating that the 11 metre perched aquifer is now dry in certain areas. The water levels in these two recovery wells are checked manually twice each year in order to determine if the wells are indeed dry. Golder assess the pumping data which is receives periodically from Catalyst. If any recovery well ceases pumping during a time when Golder expects it to be operating an instrument technician is sent to inspect the pump from the well in question.

Golder staff advised during a meeting with ministry staff that the water table is approximately 5 metres below level where the waste in Phase 1 was deposited. The waste material therefore, currently remains un-saturated and it is unlikely that appreciable levels of leachate could be squeezed out.

Golder staff also advised that the material in Phase 1 had a low compressibility further reducing the likelihood that leachate would be squeezed out. Preloading of the site which occurred prior to the installation of the asphalt cap would further reduce the likelihood of future compression of the waste material. Furthermore, even if liquid could be squeezed out, the groundwater recovery wells would capture contaminated groundwater. As a further safeguard against compression of the waste in Phase 1, a requirement to conduct settlement monitoring should be included in the permit. Information relating to settlement of the Phase 1 portion of the landfill should be included in the annual report. The company currently conducts settlement monitoring of Phase 1 but if waste is placed on top of Phase 1 as proposed, settlement monitoring will become more important and could serve as an early warning system if compression of the Phase 1 part of the landfill should start.

It should be noted that the Phase 1 area has not settled appreciably since 1995. Golder advised that from 1995 up to January 1, 2001 the site only settled 30 mm. Since January 1, 2001 there has been no measurable settlement. Golder advised that the expected settlement due to the Phase 2 waste material being added is between 0.3 and 1.0 metres.

It should be noted that the height of the Phase 2 landfill, and therefore the weight of the material in the landfill will increase fairly gradually over many years. Refuse is to be placed over the area of the landfill to an approximate depth of 3 metres in each lift. Golder agreed that if compression were to occur it would be a gradual process. Any settlement would be expected to be detected by the settlement monitoring measures and action could be taken before the problem became acute.

Fractured Rock

Concerns have been raised about fractured rock and the likelihood that high concentration leachate may reach Powell Lake via fractures in the rock. If as mentioned above, the waste in Phase 1 is at least 5 metres above the water table, leachate would have to pass through at least two perched aquifers (as shown in figure 6 of the Golder Environmental Assessment) before reaching the bedrock. Any leachate reaching the bedrock would therefore be diluted. Golder has supplied groundwater well installation logs which indicate that samples are taken of water from within the upper fracture zone by three different wells. Copies of these logs are attached (9).

The Hatfield report indicates that, based on sampling results to date, concentrations in the groundwater decrease with depth, with concentrations in the 11 metre perched aquifer being considerably higher than the concentrations in the regional groundwater flow and in the water within the upper fracture zone of the bedrock. It appears therefore that water travelling in rock fractures is likely to contain similar or lower concentrations of contaminants than that in the regional groundwater flow and based on the concentrations in the regional groundwater, the possibility of impact to Powell Lake from water travelling in rock fractures is low. An email from Ms. Jill Sacre with information relating to the expected quality of any sub surface discharges to the river is attached (10)

Black Goo

Concerns have been raised about "black goo" which is said to have been noticed on the bank of the river below the landfill when the water level is very low in Powell Lake and Powell River. Ministry staff first became aware of this issue at the open house on April 18, 2007 when Ms. Debby Waslewski brought it up, saying a couple she knows saw some "black goo" last year (presumably 2006). In a letter dated June 2, 2007 Mr. Dave Harris states that "three years ago" during a long dry summer the water level in the river was at an all time low. Mr. Harris states that several people saw "black goo" coming out of the rocks and entering the river. Mr. Rod Innes mentions in a letter dated November 22, 2007 seeing "black goo" a "few years ago". This information indicates that the "black goo" observations occurred within the last few years.

In a letter dated December 3, 2007, Mr. Harris states that it was the observation of "black ooz" from the rocks that led to a drinking water ban which occurred in approximately 1990 – 1992 and ultimately to the capping of the old landfill. In other letters Mr. Harris reports others seeing the "black goo" coming from a rock in a sand bar near the old bridge over Powell River. A file review, going back to December 1976, was conducted by ministry staff but no mention was found of this issue.

Most of the information regarding the "black goo" is anecdotal, with the exception of a letter from one member of the public who stated that he saw the "black goo" himself. There are conflicting reports as to when the material was observed. Catalyst Paper staff advised that they do not recollect hearing of the "black goo" before the April 18, 2007 open house and that they do not have any test results relating to the material. Golder sampling personnel have made site visits on four occasions, May 2007, August 2007, September 2007 and October 2007 looking for signs of "black goo" with no success, although they report seeing dark material beneath the water surface on both sides of the river and at areas upstream of the area where groundwater downgradient of Wildwood Landfill reaches Powell River.

During a recent period of low water Mr. Rod Innes has pointed out the area where he saw the "black goo". Mr. Bryce George confirmed with ministry staff during an inspection that this is the same general area where the "black goo" was seen.

Golder undertook monitoring with respect to "black goo" which they refer to as "material of interest". Samples of the material of interest were collected from two locations down gradient of the landfill where "black goo" had been observed. A sample of material of interest was also collected at one background location for comparison. Samples were taken of water that was observed to be discharging from the hill slope in the vicinity of the material of interest at all three locations.

A water sample was also taken from a ditch located upgradient from the landfill. At the time of sampling the ditch water appeared to be stagnant.

The material of interest was submitted for microscopic analysis and examination by a vegetation specialist. Golder stated that all three samples appeared on examination to be organic material in various stages of decomposition.

Results of water sampling indicate that with the exception of aluminum, iron and vanadium at various locations, all other inorganic constituents had concentrations below the BC Water Quality Guidelines (Approved and Working) and the Contaminated Sites Regulations standards. Golder states that aluminum and iron frequently occur in groundwater and surface water.

Golder also states that vanadium in the two locations downgradient of the landfill is slightly above the BCWQG AW standard of 0.006 mg/L with levels of 0.0065 and 0.008 mg/L. The vanadium is likely to be naturally occurring in the granitic bedrock.

Chlorinated and non-chlorinated phenolics from the four locations are all below the detection limits and levels of dioxins and furans in the water samples from all four locations are all well below the maximum USEPA drinking water standard of 30 µg/L.

A an excerpt from of the relevant report "Sampling Related to Material of Interest, Catalyst Paper Wildwood Landfill, Powell River, BC" is attached (11).

Wildwood drinking water supply

Concerns have been raised about the proximity of the Wildwood Landfill to the water supply for the Wildwood community. Additional wells were installed by Golder staff, upgradient to the landfill, in 2006 in order to verify the direction of groundwater flow. Golder verified that the groundwater flow is to the south, from the landfill downhill to Powell River, upstream of the dam, and approximately 500 metres downstream of the lake outlet. This is based on their new wells and on information found in a HBT AGRA Limited report dated 1992. The water supply for the Wildwood community is approximately 1.5 km upstream of the lake outlet.

Any leachate which may leave the landfill is unlikely to impact the water supply so far upstream. Samples of the water supply are analysed by the Ministry of Health and to date indicate that the water meets the drinking water standards. A copy of a letter from Dr. Paul Martiquet, dated February 27, 2008, regarding the Wildwood drinking water, is attached (12).

Site Geology

Concerns have been raised that the site is not appropriate based on earthquake risk. However, the Golder report indicates that criteria was used to evaluate the landfill site, with respect to earthquakes, that is more stringent than that specified by the Local Government Act, Geotechnical Slope Stability (Seismic) Regulation of December 13, 2006.

Concerns have also been raised regarding slope stability. The concern is that the weight of the Phase 2 material will cause the slope below the landfill to fail. The Golder Environmental Assessment report indicates that the foundation soils under the landfill and at the toe of the landfill are considered to be stable with respect to static forces and with respect to the design earthquake. As a further safeguard, slope stability monitoring should be conducted with the results included in the annual report. This would serve as an early warning system in case the slope started to move. As with the settlement issue, measures could be taken, if slope movement were noticed, before a stability problem arose.

Concerns have been raised regarding the extreme weight of the Phase 2 landfill. As noted above with respect to slope stability and settlement, Golder advised that if the weight of the landfill were to become a problem it would do so gradually and the company would have an early warning system due to the slope stability and settlement monitoring.

Miscellaneous Issues

Company may go bankrupt

Concerns have been raised regarding what would happen if the company closed down or went bankrupt and the likelihood that the taxpayers would have to pay for the landfill closure. The company advised that in accordance with Generally Accepted Accounting Principles (GAAP) they record the future liability on their books to cover closure of the mini-landfill. If the permit amendment is granted, the future liability amount would be increased, in accordance with GAAP, to cover closure/post closure costs for the expanded landfill. A letter from the applicant's accountant is attached (13). A clause should be inserted in any future permit to describe this method of recording the future liability. If the Powell River mill were to close, Catalyst Paper would still have the future liability recorded on their books.

Use as a product

Several letters mentioned that the flyash should be used as a product instead of being landfilled. The ministry also encourages any beneficial use of the material. The company has researched the use of their flyash as a product but to date nothing has been successful. Golder outlines the company's efforts in this regard in the Environmental Assessment Report. The company should continue to try to find a use for the flyash as a product. To that end a requirement should be included in the permit stating that a report is to be submitted each year outlining the efforts that have been taken in the previous year to find a beneficial use for the flyash.

Traffic/Access Road

Concerns have been raised regarding the extra traffic which has been experienced due to the cement trucks visiting the landfill site several times each day. This issue does not fall under the jurisdiction of the Ministry of Environment however the company advised that they endeavour to ensure that the truck use is limited to Monday to Friday and 8:00 am to 4:00 pm. Occasionally they have to run as late as 7:00 pm. If they need to work after 7:00 pm during the week days, the material is hauled to the south yard at the mill site for temporary storage.

If the hogfuel supply is of poor quality and in the winter months when more steam is needed, more than the normal amount of ash is produced. In that event the company advised that they would have to operate the trucks on the weekends. On the weekends they restrict the truck use to 8:00 am to 4:00 pm.

As noted previously, local government representatives are members of the Catalyst – Community Stakeholder Committee. These issues have been discussed at several meetings so local government is aware of the amount of traffic.

Shipping to Rabanco

Many people have stated that the company should continue shipping the material to Rabanco. The company has stated that this option is too costly. At the time the company ceased shipping the flyash to Rabanco it cost approximately $2 million per year. The company advised that the cost is likely to have increased substantially since that time and that the negotiations necessary to arrange to start shipping the flyash to Rabanco again would be extended. By comparison, the cost of operating the new landfill would be approximately $500,000 per year. The company also stated that they wish to handle their flyash in a site which is closer to home and over which they have control.

Letters in favour of the proposal

A few letters were received which were in support of the application. One stated that the landfill expansion was a good idea because there would be less gas emissions from transportation to the Wildwood Landfill than when the material was transported to Rabanco. Another letter indicated that saving the cost of transporting the flyash to Rabanco would enable the company to employ more people and lead to less jobs being lost.

Request for a Public Hearing (21)

Many people requested that a public hearing be held in order to allow people to express their concerns in a public forum. It was felt that this is unnecessary as there has been ample opportunity for people to express their concerns, including an open house for the public, held on April 18, 2007.

PR Legacy Interviews

Many concerns were raised about various materials which the interviewees stated were placed in the landfill. These materials include barrels of solvents, transformers, batteries, paint cans, hydraulic fluid, "smelly material", asbestos, creosoted pilings, barrels of wood preservatives and blue sludge. Many of the statements could not be independently verified and some of the statements were conflicting. However, with the exception of transformers, it is expected that the existing monitoring program would identify any problems which were caused by the suspected materials. It has not been possible to verify whether or not transformers are in the Phase 1 part of the landfill but to err on the side of caution, periodic PCB testing should be included in any future permit.

A concern was raised by Mr. Dave Harris that the land on which the landfill sits (Block 48) does not remain contiguous with the land on which the mill sits (Block 43). Mr. Harris stated that land on which the dam sits and land beside Powell River had been sold to Powell River Energy Inc., making the two pieces of land not contiguous any longer. The company advised that no land had been sold but that Powell River Energy Inc. was using some of the land as a tenant. Catalyst Paper Corporation remains the title holder to the property. The land is therefore, still contiguous as required by Section 2.9 of the existing permit PR-04565. A small portion of the landfill is situated on Block 55. Any future permits will reflect this.

Many of the other issues raised have been previously addressed in this report. These include concerns that the mini-landfill liner was damaged during installation, and concerns regarding the method used to collect dioxin and furan samples.

A report completed by Jeff Fournier, Acting Head, Business and Standards Section, is attached (14). The report includes a spreadsheet showing the items of concern, a description of the actions taken to resolve the concerns and the recommended further actions needed.

Asbestos Discharge

Dave Harris raised the concern that asbestos discharges to the landfill are not done in accordance with the Hazardous Waste Regulation. The methods of disposal currently being used by the applicant were discussed with Shelly Metcalfe, who administers the Hazardous Waste Regulation in the Lower Mainland Region, and she advised that the methods are in accordance with the Hazardous Waste Regulation. The company has a British Columbia Generator Number (BCG# 02149) and manifests are used by their licensed carrier when the material is transported to the landfill.

4. Technical Report

Applicant Technical Report Acceptable:	**Yes**	x	**No**		**N/A**	
Prepared by Qualified Professional:	**Yes**	x	**No**		**N/A**	
Monitoring Proposal Acceptable:	**Yes**		**No**		**N/A**	x
Ministry Technical Report Attached:	**Yes**		**No**	x	**N/A**	

Comments:

The groundwater monitoring program, the monitoring of the mini-landfill and the monitoring of the groundwater recovered by the groundwater recovery wells, all of which is contained in the current permit, continues to be appropriate although PCB testing should be added on a periodic basis. Additional monitoring requirements should be added with requirements for the following:

1. dustfall monitoring,
2. an evaluation of PM10 and PM2.5 ambient air data from stations in Wildwood,
3. settlement and slope stability monitoring,
4. a sediment study similar to that conducted in 1992 by HBT AGRA Limited,
5. a fish sampling program similar to that conducted in 1992 by HBT AGRA Limited.

The terms of reference for the sediment study and the fish sampling study should be acceptable to the ministry.

5. Environmental Risk Assessment

See attached (15).

6. General Assessment

This application consists of a large increase in the total authorized volume for the Wildwood Landfill and an increase in the annual authorized volume. The proposal also includes provisions for a difference in how the landfill is operated. The current operation consists of filling the remaining area of an excavation (gravel mine) and the proposed operation is to discharge refuse above ground in 3 metre lifts to a height of approximately 18 metres.

It is acknowledged that the waste material in the Phase 1 part of the existing Wildwood Landfill resulted in contamination of the groundwater below and downgradient of the landfill. However, due to concerns raised by local residents and various government agencies and further to a Pollution Abatement Order, remediation measures were taken by the company to mitigate the effects of the landfill on the receiving environment.

As a result of these measures the contamination levels in the groundwater and in surface water discharges to Powell River (spring and seeps) downgradient of the landfill have decreased to the point that they do not indicate an environmental effect from the landfill or significant risk to human health (Hatfield report). In order to assess the application for the expansion of the refuse permit PR-04565 it is important to focus on the current situation at the site, but be mindful of the historical problems.

The main technical issues with this proposal relate to potential dust and air quality issues, site stability and leachate control. Many of these issues have been addressed in other sections of this report. A general discussion follows.

Dust is not likely to be an issue during transportation of the flyash slurry and during discharge at the landfill since the material is very liquid during these operations. Once the material is no longer being agitated in the cement truck it solidifies and becomes hard like concrete. Truck operations at the landfill could result in dust becoming an issue however. Meteorological data indicates that winds at the landfill are mainly from the South/South East (approximately 11% of the time) and next often from the South (approximately 8% of the time).
Both directions are generally towards Wildwood with the wind being generally light. Based on the meteorological evaluation (windrose), dustfall and hi-vol (PM10) sampling locations appear to be well sited. Dustfall and PM10 data from these sampling locations at the landfill will help to determine if dust is becoming a problem in the immediate area. Action could be taken to minimize impact from dust, possibly with the use of water sprays. As the landfill becomes higher the positions of the sampling equipment will need to be re-evaluated. Monitoring of PM10 and PM2.5 at the nearby Wildwood ambient monitoring station will continue to evaluate air quality and possible impact from smaller dust emissions.

Cover and vegetation could be used on the sides of each lift to minimize dust generation if the dried flyash were found to be the cause of excessive dust.

Golder has evaluated the site with respect to slope stability and with respect to earthquake risk and has determined that the site stability is suitable for the proposed vertical landfill. Slope stability and settlement monitoring should be conducted to ensure that, if issues do develop, they are identified early enough that action could be taken by the permittee. These actions could include ceasing discharge and early closure of the site. Golder specifies in the Environmental Assessment that waste is to be discharged in such a way that helps to maintain stability.

The Phase 1 part of the landfill will remain covered by asphalt and a HDPE liner will be placed above the asphalt. If any leaks are detected during installation of the HDPE liner they are to be repaired immediately, before any waste is discharged. A piping system under the liner will collect any liquid which reaches the area between the liner and the asphalt, thereby serving as a leak detection system during the operating life of the landfill. Golder has conducted an evaluation and determined that in the unlikely event that there are leaks in the HDPE liner and that the asphalt also cracks, a small amount of leachate could reach the waste in the Phase 1 part of the landfill. The amount of leachate which might reach the Phase 1 waste and the contaminant levels in the leachate are not expected to significantly increase the current contaminant levels in the groundwater close to the river or in the spring and the seeps which discharge to the river. Groundwater at the toe of the landfill will continue to be collected by the groundwater recovery wells.
Historical contamination of the sediments and the groundwater did occur. Continued groundwater monitoring will access the quality of the groundwater on an ongoing basis. The sediments should be evaluated to determine if the historical impacts from the Phase 1 landfill are decreasing. To this end a sediment study should be conducted to see if there is any improvement since the sediments were last monitored in 1992. A fish sampling program should also be conducted to determine if the impact on fish in Powell River, Powell Lake and Haslan Lake has changed since the last fish sampling program conducted in 1992.

7. Recommendations

I recommend that the subject permit is amended as requested with the following conditions.

Section 1

1. Change the legal address and the facility address on the permit document.
2. Change all references to Site Plan A to include references to the data of that document.
3. 1.1.1 Change the maximum annual rate of discharge from 14,000 m3/y to 25,000 m3/y and change the total volume of refuse from 100,000 m3 to 620,000 m3.
4. 1.1.2 Add a reference to Section 2.9 with respect to the miscellaneous mill waste and add a maximum annual volume of miscellaneous mill waste (3,000 m3/y).
5. 1.1.3 Change the authorized works to reflect the new landfill works.
6. 1.1.4 – New. Add a clause requiring the authorized works to be operational prior to discharge of waste in the area outside of the existing mini-landfill.
7. 1.1.4 – Old. Becomes 1.1.5 and is updated to reflect the fact that some of the mill site property has been sold.

Section 2

8. 2.1 Maintenance of Works and Emergency Clauses are now combined.
9. 2.2 – Old. Becomes 2.3.
10. 2.5 Site Preparation and Restoration – change to Site Security with minor rewording.
11. 2.6 - Old. Landfill Operation is now covered under 2.10 Refuse Deposition and Prohibitions with wording changes.
12. 2.6 – New. Buffer Zone clause is added to define a 50 metre buffer zone between the discharge area and the property boundary.
13. 2.7 – Old. Becomes 2.9 and now includes lime mud and fibreglass.
14. 2.7 – New. Inspections clause is added to require inspections of property boundaries to determine if there is any visual evidence of impact on neighbouring properties.
15. 2.8 Waste Reduction and Alternate Disposal now includes a requirement to submit a report indicating efforts made each year to find uses of flyash as a product.
16. 2.9 – Old. Maintenance of Contiguous Point – Blocks 48 and 55 with Block 43 Becomes 2.2. Now includes reference to the part of Block 55 which is part of the landfill.
17. 2.10 – Old. Closure Plans becomes 2.18 Closure Plan.
18. 2.10 Refuse Deposition and Prohibitions outlines how waste is to be discharged and makes reference to an Design and Operating Plan.
19. 2.11 – New. Leachate Management includes conditions relating to how leachate is to be managed and how the leachate containment pond is to be engineered and managed.
20. 2.12 – New. Slope Stability and Settlement includes the requirement for monitoring of slope stability and settlement.
21. 2.13 – New. Fugitive Particulate Emission standard clause.
22. 2.14 – New. Ambient Air Quality includes requirements for and evaluation of the ambient air quality data from the ambient monitoring stations in the Wildwood area.

23. 2.15 – New. Design and Operating Plan adds the requirement for a design and operating plan to be certified by a qualified professional. Includes a list of required elements.
24. 2.16 – New. Environmental Assessment Report adds the requirement for an updated Environmental Assessment Report to be completed every 5 years to periodically evaluate the environmental effect of the expanded landfill.
25. 2.17 – New. Completed Areas of the Landfill adds the condition that, when any area of the landfill has been completed, final cover is to be applied to that area as part of a progressive closure program.
26. 2.18 – New. Closure Plan outlines the required elements of the closure plan which is to be submitted no later than 6 months before the closure of the landfill.
27. 2.19 – New. Closure/Post Closure Funding adds the requirement to accrue a dedicated reserve fund to cover the cost of closure and post closure activities.
28. 2.20 – New. Site Decommissioning adds the requirement to submit a site profile prior to the site being decommissioned.
29. 2.21 – New. Legal Survey adds the requirement to register a covenant or other legal notification as a charge against the title of the property, that the property has been used for the purpose of refuse disposal.

Section 3

30. 3.1.1 Change the title to Leachate Monitoring and add leachate sampling in the expanded landfill.
31. 3.2.1 – New. Dustfall Monitoring adds the requirement for a dustfall monitoring program to be conducted.
32. 3.2.1 - Old. Groundwater Monitoring becomes 3.2.2.
33. 3.2.2 – Old. Analysis becomes 3.2.3.
34. 3.2.3 – Analysis. Add the requirement to conduct PCB testing.
35. 3.2.4 – New. Abbreviations – Analysis the abbreviations for clause 3.2.2 have been put in a separate clause.
36. 3.3.1 – Old. Sampling Procedures becomes 3.5
37. 3.3.2 – Old. Chemical Analysis – Water becomes 3.6 and changes to Analytical Procedures.
38. 3.3 – New. Sediment Study adds the requirement for a sediment study similar to the one conducted in 1992.
39. 3.4 – New. Fish Sampling Study adds the requirement for a fish sampling study similar to the one conducted in 1992.
40. 3.4 – Old. Reporting becomes 3.7 and has additional items in the list of required elements. Requirements for posting certain information on the company web page have been added.

Susan Woodbine
Environmental Protection Officer
Environmental Protection Division
Lower Mainland Region

Steffanie Warriner
I have considered these recommendations
Regional Manager, Environmental Protection
Environmental Protection Division
Lower Mainland Region