ANNEXE 11

LES COMMUNICATIONS ECRITES ENTRE ENVIRONNEMENT CANADA ET GREATER VANCOUVER REGIONAL DISTRICT EN 2001

(VERSIONS ORIGINALES EN ANGLAIS)

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File No: CP08-02-R401

Mr. Brian Wilson
Director, Environmental Protection Branch
224 West Esplanade
North Vancouver, BC
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Dear Mr. Wilson:

Re: GVRD Liquid Waste Management Plan

This letter summarizes the status of the five conditions that Environment Canada and Fisheries and Oceans attached to their support for the GVRD's approach in the Liquid Waste Management Plan (LWMP) as set out in your letter to me of May 25, 2000 and responds to the direction provided by you at the March 5, 2001 Workshop.

First, to consider the status with respect to the five conditions.

Condition 1: *"That the GVRD demonstrate, as soon as possible and to the satisfaction of DOE and DFO, that a receiving-environment approach to liquid waste management is both feasible and defensible with respect to the Fisheries Act. This demonstration, which should include data from the Lions Gate and/or Iona receiving environments, will outline the experimental design required to demonstrate statistically significant trends for at least a couple of key parameters at levels below those expected to cause significant impacts to the receiving environment. It will also show how the "risk assessment" and "constructive action " steps would be built into the monitor/trigger/act continuum – it is important that this matter not be left to scientific debate on cause and significance, resulting in possible inaction even though a trigger has been activated. The monitor/trigger/act concept is the GVRD's proposal and it is therefore up to you to demonstrate to DOE and DFO that it is feasible, defensible and compatible with the Fisheries Act."*

Clearly, Condition 1 is complex with a number of components. The GVRD addressed Condition 1 in several parts, presented at the three separate workshops (June 7, 2000; December 6, 2000; and March 5, 2001) – see attachment 1.

The initial workshop dealt with the first part of Condition 1. It presented available historical monitoring data and raised the pertinent questions that would have to be addressed to answer the first part of Condition 1. It discussed what trends to look for, where to look for them and the experimental design that is required to demonstrate statistically significant trends. This focused the work leading up to the second workshop. This workshop dealt with developing a "feasible and defensible" receiving environment monitoring program and being able to "demonstrate statistically significant trends" at "levels below those expected to cause significant impacts to the receiving environment". At this time, the data had become available from Iona's year 2000 monitoring program. This program was carried out under the rigorous protocols discussed in the first workshop. A team of recognized experts was assembled to assess and interpret this data as well as its relevance to additionally available historical data. This team included a hydrodynamic modeling expert, a chemist, an organic compounds specialist, a statistician, and a marine biologist. The technical reports from these experts were made available at the second workshop. A consultant was also engaged to provide an overview of the relevant elements of Environmental Effects Monitoring Programs being used in Canada - programs established by the federal government.

The Iona data was shown to have statistically significant trends. It was possible to show three different and distinct groupings representing reference sites, Iona outfall influenced sites, and a set of sites that the biologist, Dr. Brenda Burd, attributed to shrimp trawling activities. From this, a number of chemical tracers and benthic indicators pertinent to measuring the effect of the Iona outfall on the receiving environment were identified. These were also consistent with the modeling calculations for the dispersal characteristics of the Iona discharge. Using Iona receiving environment data, we were able to illustrate a program that is feasible and defensible and that the results were indeed statistically significant. Workshop two then presented the approach being used to design an appropriate monitoring program for Lions Gate. Questions and comments from the audience demonstrated support with the overall experimental design approach. This was followed up on January 12, 2001 with a session specifically intended to allow questions, suggestions and discussion of the monitoring programs by agency experts and others. Again, the validity of the overall monitoring approach was not successfully challenged. A commitment was made by the GVRD to consider all comments and suggestions within the context of the upcoming 2001 monitoring cycles and within the context of the long-term monitoring initiatives.

The second part of Condition 1 required the GVRD to show how "the risk assessment and constructive action steps would be built into the monitor/trigger/act continuum". The March 5, 2001 Workshop dealt with this requirement by firstly having a recognized international expert review the methodology and application of the science of risk assessment and by having this expert available for the duration of the workshop to assist in answering questions pertaining to risk assessment and its applicability to the tasks at hand. This was followed by showing how risk assessment and constructive action steps were included in the LWMP process through the presentation of three case studies.

The first case study was the examination of the "potential for health risks associated with using Fraser River water for irrigation of crops eaten raw". The primary intent of highlighting this case

study was to show the appropriate inclusion of the various responsible government authorities in the process. Actions being taken are with the consensus of these mandated agencies. Information has also been assessed within the context of appropriate risk. The standard being applied is the Province's microbiological Water Quality Objective. As a result of data arising from the GVRD's recent monitoring initiatives, the outcome of the assessment was changed to a much more favourable status, showing the importance of using current data rather than reliance on historic data. Bacterial levels have been reduced since the initiation of secondary treatment at Annacis and Lulu Island treatment plants.

The second case study was the examination of the Clark Drive Combined Sewer Overflow (CSO) and its associated activities. This Case Study illustrates the way in which a receiving environment risk assessment would be triggered under the LWMP to more completely understand the nature of the environmental impact. The risk assessment, although confirming the benthic community disruption in the vicinity of the CSO, determined that the health of fish and higher level species was not impacted by the CSO. It also provides the basis for the actions that the GVRD and its member municipalities are taking to eliminate this environmental impact. These actions fall into three initiatives. One is a long-term program to separate the sewers feeding this outfall so that sanitary sewage will flow in a separate pipe that would always be directed to a Wastewater Treatment Plant. This requires that all pipes in the sewer collection grid have to be twinned, to keep storm water and sanitary sewage separated. The second is a set of measures in the system to minimize the effect of storm events on the Clark Drive CSO that would reduce the annual volume of sewage discharged through CSOs by about 30%. These measures are now specifically committed to in the LWMP. The third initiative is to assess site specific options which may be available to reasonably address, in the short term, further reduction of the sewage discharged by the CSO at Clark Drive. This case study demonstrates the importance of undertaking a risk assessment to place the relative risks in proper perspective. Fish, mammals and birds were not found to be negatively impacted by this CSO. It also shows the various elements of undertaking an appropriate options assessment strategy for a very complex circumstance. It is necessary to consider long term versus short term, site specific versus overall system, and permanent versus temporary options, all with very large budgetary and social implications. Finally, it demonstrates that the identification of risk triggers speedy and effective action under the LWMP.

The third case study was the examination of Wastewater Treatment Plant (WWTP) Toxicity. This Case Study illustrates the nature of the relationship between end-of-pipe fish bioassay results at the GVRD's WWTPs and the assessment of risk to the receiving environment. An assessment of ammonia levels in the Fraser River and its subsequent fate and effect concluded that the effect of the ammonia resulting from the discharges by the GVRD's WWTPs was not significant to the health of the receiving waters (Fraser River). Consequently, from a receiving environment health perspective, no need for action plans was indicated. Any action plans forthcoming would therefore have to be based on rationale other than that provided by the "monitor/trigger/act continuum" wherein the trigger is based on a negative projected impact on receiving environment health. This trigger was found in the case of Clark Drive, at least with respect to the near-field benthic community. This trigger has not been found in the case of the waste water treatment plants, even though the end-of-pipe LC50s were found to be less than

100% on some occasions. Actions to address end-of-pipe LC50 failures are therefore a separate consideration addressed under Commitment 11 of the LWMP.

By April 30, 2001, we will complete our preliminary design of the District's monitoring programs and their direct links to decisions and actions in the manner you suggested at the workshop on March 5, 2001. These programs range from the well developed environmental effects monitoring already in place at the Iona Deep Sea Outfall location, to improved ambient and effects monitoring planned for the Fraser River Main Arm, to new effects monitoring initiatives underway in the Lions Gate Wastewater Treatment Plant receiving environment. For CSO discharges, the program includes CSO event monitoring at all District outfalls, selected CSO effluent sampling, and further assessments of the environmental effects of discharges at the Clark Drive and New Westminster CSO locations. As well a regional bacteriological water quality monitoring program is being upgraded to ensure the safety of the Region's bathing beaches. Ambient monitoring, and the monitoring of reference stations for the effects programs, is included in the programs. This is needed to ensure the technical/scientific validity of the monitoring program conclusions. These efforts include effluent chemistry and toxicity characterization, and receiving environment monitoring of the water column, sediment, and biota. Monitoring parameters include physio-chemical parameters, nutrients, pathogen indicators, metals, and organic contaminants. We are looking at the appropriate inclusion of parameters such as you indicated. Biotic effects measures include benthic community structure and biota contaminant body burden. This monitoring framework is being used to develop indicators of ecological health and corresponding triggers. As suggested, risk assessment methodologies will be utilized within the monitoring programs and trigger processes, so that there is a clear and prompt link between the identification of an effect or a potential effect and the selection and implementation of appropriate action.

Condition 2: *"If the GVRD can demonstrate to the satisfaction of DOE and DFO that the receiving environment approach to liquid waste management is feasible, defensible and compatible with the Fisheries Act, then DOE and DFO will look seriously at working with the GVRD to assess the effectiveness of this approach (with a particular focus on the receiving environments of the Lions Gate and Iona Sewage Treatment Plants). The details of the assessment, including its duration, would be defined in an addendum to the BIEAP/FREMP MOU which would include provisions for any party to terminate its support for the assessment early, as well as for the parties to extend the assessment beyond it's prescribed deadline."*

This condition requires a satisfactory outcome to Condition 1, that the LWMP is "feasible, defensible and compatible with the Fisheries Act", for DOE and DFO to consider participating in the LWMP approach. This is a matter for the federal authorities to determine in the first instance, taking into account the information and process summarized in this letter.

Condition 3: *"That the GVRD commit, on an ongoing basis, to run monthly 96-hr bioassays on full strength effluent at each of its five sewage treatment plants, and report the results, as soon as available, to DOE, DFO, and MELP."*

As per Condition 3, since July 2000, we are undertaking monthly bioassays at all five wastewater treatment plants. We are now reporting these results, as soon as available, to DOE, DFO and MELP.

Condition 4: *"That the GVRD commit to determine the cause of residual effluent toxicity at each of its five sewage treatment plants and report the results, including plans and schedules to reduce the toxicity, to DOE, DFO, and MELP by March 31, 2001."*

We have completed a Toxicity Identification Evaluation (TIE) Study (see attachment 2) that identified the causes of residual effluent toxicity at the wastewater treatment plants. Additional copies are available from Albert van Roodselaar (436-6772). At the Lulu Island and Annacis Island Wastewater Treatment Plants, the cause of residual effluent toxicity was identified as ammonia. The study also indicated that LC50 (acute rainbow trout bioassays) test failures were largely an artifact of the testing procedure. The introduction during the test procedure of air into an isolated volume (in a small aquarium) of the treatment plant effluent caused the pH of the sample to rise (become more basic), leading to an increase of the more toxic, un-ionized, form of ammonia. This change in the quality of the water during the test procedure caused the water to become unsuitable for fish survival. This was demonstrated in the study by showing that fish survived in the same plant effluent when it was not subjected to aeration during the testing procedure. A further fate and effects study determined that this effluent ammonia does not adversely affect the receiving environment, the Fraser River (based on a comprehensive ammonia survey undertaken on the Fraser River in November 2000). The GVRD intends to confirm these results by measuring the Fraser River ammonia level on a seasonal basis and reviewing ongoing monitoring results on the Fraser River. While the GVRD continues efforts to reduce toxicity test failures, it now looks to consultation with MELP and Environment Canada as to what would be an appropriate further effort as per the LWMP commitment considering the results arising from the TIE study. For the Northwest Langley Wastewater Treatment Plant, no evidence of effluent toxicity has been identified to date. Consequently, no TIE study was required for this plant.

For Lions Gate, the toxicants identified were ammonia and Methylene Blue Active Substances (MBAS), consisting of surfactants such as are found in household laundry detergents. Both of these toxicants are non-persistent in the environment. These were the only toxicants that were identified. Removal of MBAS and/or un-ionized ammonia from the sample eliminated the toxicity of the sample, indicating that it was not linked to other parameters such as BOD (Biochemical Oxygen Demand) or TSS (Total Suspended Solids). To date, no negative impacts have been seen in the receiving environment. However, knowing that the primary toxicant is MBAS, the GVRD is committing to undertake a risk assessment for MBAS in the Lions Gate receiving environment in 2001. Cycle 1 environmental effects monitoring will also commence in 2001. MBAS will be monitored and will be included in the routine monitoring parameters. With respect to both ammonia and MBAS, the treatment plant process will be evaluated to determine any potential options. An assessment of the liquid stream from the centrifuge (used to dewater the plant biosolids and having ammonia levels in the order of 1000 mg/l) will be made to see if ammonia in the effluent stream can be reduced via the centrifuge stream. A source control

assessment for MBAS will also be undertaken to determine if there are any opportunities for reduction.

For Iona, no toxicant was identified. However, fish mortality was observed to occur in the TIE study due to inadequate levels of oxygen during the test procedure. During the test procedure the oxygen levels fell below the DO (dissolved oxygen) level tested at the time of sample collection. The GVRD therefore believes that the oxygen levels available in the actual effluent are sufficient to allow the survival of rainbow trout during the 96-hr test period. It was determined that if the test were undertaken at an initial oxygen concentration of 3 milligrams per litre (mg/l) or greater, passing LC50 results were obtained. Since the Iona effluent has a historical average DO of greater than this value, the effluent would not cause fish mortality at its typical BOD and TSS levels. Further, no negative effects have been observed in the receiving environment to date. To confirm these findings, included in the GVRD's action steps is an extremely comprehensive Cycle 3 monitoring program initiative in 2001 which includes a sixteen station sediment survey in the spring as well as a fish health survey in the fall. Also, the GVRD is pursuing operational efforts as detailed in our response to Condition 5 below.

At Workshop 3 on March 5, 2001, we outlined a number of potential action steps to reduce toxicity. Appropriate actions will a) match the priority of the risks, b) consider all applicable legislation, c) be based on an understanding of the issues, and d) be executed in a timely and efficient manner.

To address the Annacis Island and Lulu Island Wastewater Treatment plants, a fate and effects study was undertaken to assess the environmental risk in the Fraser River of ammonia, the only toxicant identified for these two plants. The final report for this assessment will be available by April 30, 2001. The TIE study that identified ammonia is included as an attachment to this letter. For further appropriate efforts for Annacis and Lulu, we now look to consultation with MELP and Environment Canada.

Specific plans and schedules to reduce toxicity at the Lions Gate and Iona Wastewater Treatment Plants are listed in response to Condition 5.

Condition 5: *"That the GVRD act to improve the treatment systems at the Lions Gate and Iona sewage treatment plants with the objective of substantially reducing the frequency of failure of the monthly 96-hr acute bioassay tests on full-strength effluent."*

The steps stated here are intended to address the issue of improving LC50 fish bioassay results at the Lions Gate and Iona Island Wastewater Treatment Plants.

For Lions Gate, identified toxicants were surfactants (measured as MBAS) and ammonia. The GVRD is undertaking three initiatives at Lions Gate to reduce the frequency of failure of the monthly 96-hr acute bioassay tests on full-strength effluent.

1. By August 31, 2001, decrease the levels of ammonia in the effluent through managing the release of the centrifuge liquid stream as it is returned back to the facility.

2. By July 31, 2001, undertake a technical assessment of options for the removal of ammonia from the liquid stream arising from the operation of the WWTP's centrifuge, since the ammonia levels in this liquid stream are such as to cause a significant increase in ammonia concentrations in the plant's effluent.
3. By November 30, 2001, assess possible source control options with respect to MBAS.
4. By October 30, 2001, assess the relationship between LC50 (fish bioassay) performance and the effluent levels of BOD (Biochemical Oxygen Demand) and TSS (Total Suspended Solids).

For Iona, no toxicant was identified. However, fish mortality was observed to occur during the TIE study due to inadequate levels of oxygen during the test procedure. The GVRD is undertaking two initiatives at Iona to reduce the frequency of failure of the monthly 96-hr acute bioassay tests on full-strength effluent.

1. By June 30, 2001, assess the effect on the dissolved oxygen concentration and any consequent LC50 test results by using a disinfectant to achieve partial or complete inactivation of bacterial action in the plant effluent.
2. By September 30, 2001, assess options for treatment plant operational changes to improve the test failure rate.

We believe that we have fully responded to the five conditions stated in your letter, and that the stage has now been set for your further engagement pursuant to Condition 2.

On this basis and in response to the additional direction that you provided at the March 5, 2001 workshop, we are also working on the following.

We are participating in a BIEAP/FREMP committee to discuss the ramifications of the Vancouver Port Authority's Outfall Policy within the context of the Canada Marine Act and the responsibilities of other regulatory authorities. The applicability of this policy to municipal outfalls is a point of major concern. Consistency with other regulatory requirements is also an issue. Irrespective of these concerns, we have evaluated our site of primary interest, Clark Drive, and agree that action with respect to this outfall is required.

We are in the process of fast tracking action steps at Clark Drive. Specific commitments have been included in the Liquid Waste Management Plan to reduce the impacts from combined sewer overflows at Clark Drive independent of and prior to the completion of total sewer separation. Program commitments over the next five years now include key trunk sewer and catchment separation, key flow redirections, wet-weather storage, and operating protocol optimization. An additional commitment has now also been made to identify further site-specific options for reducing combined sewage overflowing at Clark Drive. Review of the options presented in the technical report will involve all key agencies.

On March 30, 2001, the GVRD Board adopted Stage 3 of the Liquid Waste Management Plan and forwarded it to the Minister of Environment, Lands and Parks for approval. All

municipalities have also adopted this plan. This version contains a number of provisions to respond to Environment Canada's very constructive comments on the draft Stage 3 plan.

In addition, we have considered the comments made by the Department of Fisheries and Oceans in a letter that we received after the Stage 3 plan had been finalized and forwarded to the municipalities for adoption. To respond to these comments, the Board adopted an addendum to its LWMP that will be considered by the member municipalities. The addendum includes the commitment to examine the option of partial biological treatment as an alternative to enhanced primary treatment (chemical addition) at Iona Island and Lions Gate. It also provides clarification of the timing as to when the District would initiate biological treatment at these plants, in any event, as well as clarification of our intent in respect to elimination of CSOs. The GVRD is intent to pursue the overall objective of the LWMP, to sustain and enhance the receiving environment.

Given your statement of intention on March 5th, to proceed to a pilot stage under BIEAP/FREMP as a consequence of our efforts through the workshops, associated studies and the provision of the above action plans, we look forward to continuing to work with you in this preferred partnership approach.

Yours truly,

Ken Cameron
Manager, Policy and Planning Department

/avr

cc: J. McCracken, MELP
J. Stott, BIEAP/FREMP

Attachments:
1. Studies and Presentations included in the Agency Workshops
2. Acute Toxicity Identification Evaluations of GVS & DD Wastewater Treatment Plant Effluents – March 2001