Witness Statement Re:
Proposed Belledune Project by Bennett Environmental Inc.

ADDENDUM: L.D. Pengelly, 2004-11-25

Recent Action by the Minister of the Environment for the Province of Québec

On September 16, 2004 the Minister of the Environment for the Province of Québec gave notice of the issue of an Order under Sections 25 and 27 of the Environmental Quality Act (L.R.Q., c. Q-2). This Order was directed to Récupère Sol Inc. (RSI) with respect to their contaminated soil thermal treatment facility at Saint-Ambroise, (Québec). RSI is ordered to limit emission of dioxins and furans to a level such that in the immediate vicinity of the plant the ambient air concentration will be less than 60 fg Éq T/m^3 (annual average) and that the maximum 24hr concentration will not exceed 500 fg Éq T/m^3. As part of the Order, a process of follow-up is to be put in place which includes special monitoring procedures which must be implemented within 15 days of the order taking effect.

This order was issued as a result of the observation of "abnormally elevated concentrations of dioxins and furans in the surrounding area" reported by RSI and also found by the Ministry of the Environment (MENV) in 2003 and 2004.

The order has not been implemented. RSI has now submitted further information to MENV that claims the elevated levels of these substances are not attributable to the company's operations. This information is currently being reviewed by MENV. However, implementation of the order is not an issue at present as the facility recently announced that it is being shut down for an extended period and will not begin operation again until 2005.

Dioxin/Furan levels in soil at Saint-Ambroise

Before the RSI plant went into operation, the level of dioxin/furans measured in the soil in the surrounding area was 0.5 ppt Éq T, or less [1]. The Canadian Council of Ministers of the Environment (CCME) have recommended a level not to be exceeded in soil of 4 ppt Éq T, for protection of human health. More importantly, as stated in a report of the Public Health Department, Saguenay-Lac-Saint-Jean region: "The CCME mentions that these recommendations are used 'to decontaminate to a tolerable level' contaminated sites, not 'to pollute to a tolerable level' uncontaminated sites."[2]

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[1] Régie Régionale De La Santé et des Services Sociaux du Saguenay-Lac-Saint-Jean, *Évaluation du Risque à La Santé d'aprés la Qualité des Sols de la Zone D'influence de L'usine de Récupère Sol à Saint-Ambroise,* 14 Janvier 2004; translation Exhibit R3, Table 3.

[2] Ibid.; (français, p8, translation p9)

In 1999, RSI instituted a continuing program to monitor soil levels, and (in 2001) ambient air levels of dioxins /furans (D/F) on and around the installations of its plant. With respect to this Order, two sites in particular are of interest: one is 400 m west of the plant, one is 400 m east of the plant (we will refer to them as F_w and F_e), all on an east-west line passing through the plant, representing the line of the prevailing wind directions.

The 2003 sampling program showed that the soil concentration of D/F at F_e rose from 0.72 ppt in 2002 to 18 ppt Éq T in 2003, and at F_w the concentration rose from 3.5 ppt in 2002 to 29 ppt. The 2004 sampling program showed further increases: for F_e, to 25 ppt and for F_w, to 35 ppt.

On receipt of this information, MENV proceeded with their own sampling program at the two sites in June 2004, and found levels of D/F at F_e of 39.63 ppt and at F_w of 38.9 ppt. In addition, in June and July 2004 MENV carried out ambient air sampling which revealed, after analysis ambient air concentrations of D/F up to 1677 fg Éq T/m^3. The criterion for dioxins in ambient air recommended by MENV on an annual average basis is 60 fg Éq T/m^3, and in this case the Minister has made a further recommendation that the maximum level during a 24 hour period should not exceed 500 fg Éq T/m^3.

Additional Comments in Minister's Notice of Order:

> Abnormally elevated concentrations of D/F have been found within 1000 metres of the RSI plant by RSI and by MENV in 2003 and 2004.
>
> A professional opinion prepared by Alexander Dumas on September 9, 2004 concludes that RSI is the source responsible for the elevated levels.
>
> After having received the results of the analyses by RSI, MENV proceeded with its own sampling program, which confirmed the significant increase in D/F levels in the soil in the area surrounding the RSI plant.
>
> The discharges of D/F are particularly likely to increase the risk of cancer in humans.
>
> The scientific community has not yet achieved a consensus which permits them to determine the threshold of exposure to D/F which may cause cancer.
>
> The Canadian Council of Ministers of the Environment (CCME) recommends that the criterion for soil quality relevant to human health for D/F be 4 ppt Éq T, for all soil uses.
>
> National recommendations for environmental quality with respect to dioxins and furans in soil, sediments and animal tissue play the role of "warning signs" for those jurisdictions who may use them as a point of reference in the monitoring and management of dioxins and furans already present in the environment.

Dioxins and furans are toxins which have the potential to attack the life and health of humans, and to adversely affect the quality of soil, vegetation and animals as defined in Article 20 of the Loi sur la qualité de l'environnement (LQE) (LRQ, c. Q-2)

Article 25 of LQE allows the Minister; when he notes the presence in the environment of a contaminant as described in Article 20; to order those responsible for the source of contamination to cease completely or temporarily or to limit emission, deposition, release or loss of the contaminant under such conditions that he may impose.

Article 27 of LQE allows the Minister; when he thinks it necessary to ensure monitoring of environmental quality; to order those responsible for the source of contamination to install without delay, and in a location which he determines any type of equipment or apparatus for the purpose of measuring the concentration, quality or quantity of all such contaminant, and to require those responsible to make available to the Minister the data obtained in a manner which he shall require.

Significant increases in the concentrations of dioxins and furans in the soil and ambient air in the neighbourhood of the RSI plant justify implementation of a new plan of environmental monitoring.

These increases justify limitation of atmospheric emissions of dioxins and furans generated by the RSI plant.

According to advice provided on September 16, 2004 by the Director of Public Health for Saguenay-Lac-Saint-Jean, it is understood that the additional constant and significant contributions of dioxins and furans in soil may lead to unacceptable levels near the plant, and levels of concern in the vicinity of populated areas.

The advice of the Director of Public Health for Saguenay -Lac-Saint-Jean supports unequivocally implementation of new environmental management measures whose purpose is to decrease exposure to the population.

The current situation presents a risk of serious harm to animals and human beings, and being mindful of the 'precautionary principle', it is necessary to take precautionary measures immediately.

Commentary by: the Public Health Branch of the Agency for the Development of Local Health and Social Services Networks for the Saguenay-Lac St-Jean

"*Saguenay, September 17th 2004*. The public health branch of the Agency for the development of local health and social services networks for the Saguenay-Lac St-Jean, after analysing sampling results provided by the Quebec Environment

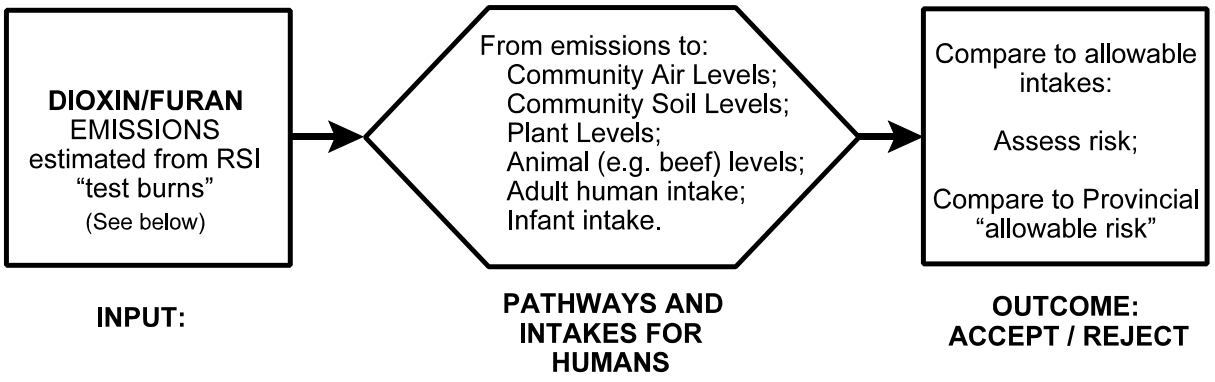
Department on the treatment of contaminated soils at Saint-Ambroise by Récupère Sol Inc. since the beginning of this year (2004), deems totally justified that new measures of environmental management be applied as soon as possible to protect the health of the population. In the period of one year, the regular operations of the enterprise have modified the quality of surface soils following non-negligible emissions of dioxins and furans in the environment."

Implication of These Observations and Actions with Respect to the Proposed Bennett Facility at Belledune

The following is a brief review of the process that was carried out to estimate the potential human health risk associated with D/F emissions from the proposed Belledune "Thermal Oxidizer" facility, as part of the Human Health Risk Assessment (HHRA). The process was carried out in a series of steps, as shown in the block diagram accompanying our Witness Statement. The diamond-shaped blocks labelled M1 to M6 in that diagram represent individual components of the mathematical relationships used to go from one part of the process to the next.

Shown below is a simplified version of that diagram with some additional components to aid in the understanding of the relevance of the recent findings at Saint-Ambroise to the Belledune HHRA and the potential for increased risk as a result. For simplicity, we have combined all the process components in the hexagon labelled "pathways and intakes for humans" below.

Figure 1. Human Health Risk Assessment Process for Belledune Thermal Oxidizer Facility.



Input

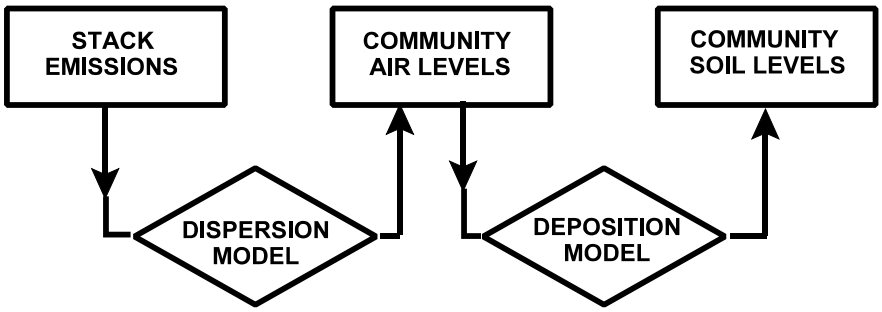
The first step in the process is to estimate the amount of Chemicals of Potential Concern (COPC, in this case dioxins / furans) emitted by the facility, since the facility is not in operation, and thus emissions cannot be measured. The most reliable way to make this estimate is to find an existing facility which, in as many respects as possible is the same as the proposed facility, and make measurements of its emissions under operating conditions as close as possible to those at the

proposed facility. In this case the dioxin/furan emissions estimate for Belledune would most logically be based on data obtained by Bennett at its existing facility (RSI, Saint-Ambroise), and referred to as "test burns". However, we have not been provided with information about the operating conditions at RSI during the test burns, as noted in our Witness Statement dated 2004-03-01, and there have been concerns expressed in 1998 by an MENV Commission about the reliability of test burn data from Saint-Ambroise.

The Commission, in Recommendation No.1 of its Report stated (with respect to test burns carried out for the operation of the RSI facility): ***"That the results of the test burns are declared to be non-representative, and should be repeated with the conditions of operation in all aspects identical to those which will ultimately prevail for normal decontamination operations."*** [3]

Determining Pathways and Intakes

Figure 2. Relating stack emissions to soil levels
(the first two steps in the process).



As shown in Figure 2, if stack emissions are known, or can be estimated, a dispersion model allows the level of pollutant in the air of the community to be estimated for a given location and set of meteorological conditions. Once the air levels are estimated, then a deposition model can be used to determine the concentration of pollutant found in the soil. For a given set of circumstances (weather, ground cover, soil type, etc.) this is a proportional relationship: double the emissions, the consequence is twice the soil concentration. It also works in reverse... if the soil concentrations have doubled, and there is no other source, then emissions must have doubled. However, the reliability of the model estimation depends on the reliability of the data input.

Modeling Belledune

Table 6.6 (AQA) gives the estimated emission rate of D/F for the combination of the Thermal Oxidizer stack and the Ventilation stack of 817 pg/sec. Using the Maximum Point of Impingement (MPOI) summary Table (7.3) it can be seen that the unitized particle-bound annual average air

[3] Commission technique et de concertation sur le traitement thermique, par Récupère-Sol inc., des sols contaminés aux BPC et autres organochlorés. Rapport présenté au ministre de l'Environnement et de la Faune, monsieur Paul Bégin (17 janvier 1998)

concentration at MPOI #2 is 1.87 ug/m3/g/s. Multiplying these together to calculate the estimated annual average air concentration at MPOI #2 gives 1.52 fg Eq T/m^3.

Modeling Saint-Ambroise

A similar dispersion modelling process was carried out for the RSI facility in 1997, and an extract from it is given in RRSS Jan.2004, Figure 3. Assuming an emission rate of 387 pg/sec, the statement is made that the maximum predicted annual concentration was "< 0.01 pg/m3" (<10 fg Eq T/m^3). It would appear, on the basis of the contours in Figure 3 that the actual level is > 3.2 fg Eq T/m^3.

On the basis of this limited information, it appears that at Saint-Ambroise an emission rate of 387 pg/sec is estimated to lead to a maximum annual average ambient concentration of greater than 3.2 fg/m3, whereas at Belledune an emission rate of 817 pg/sec is estimated to lead to a concentration of 1.52 fg/m3. This is a greater than four-fold difference: one unit of D/F coming out of the Belledune process is predicted by Jacques-Whitford to give rise to a maximum ground-level concentration more than 4 times smaller than the same emission at Saint-Ambroise. This inconsistency would suggest that the ambient air levels for D/F at Belledune have already been substantially underestimated especially in comparison to Saint-Ambroise.

In considering the estimation of ambient levels of D/F expected from Saint-Ambroise or Belledune, it is important to understand that the D/F emissions attributed to either facility were provided by Bennett, as mentioned above.

In addition, the observation at Saint-Ambroise of substantially elevated soil levels of D/F which continue to increase over time, combined with elevated ambient air levels of D/F would suggest that initially D/F emissions from the Saint-Ambroise facility were seriously underestimated. It is evident that the Minister of Environment for Québec would not have permitted the operation of RSI knowing that it would lead to D/F soil contamination well in excess of national guidelines. Recent actions of the Minister demonstrate that this is not an acceptable situation, and have made it clear that it will not be allowed to continue.

Following steps in the process

Once air and soil levels have been determined, the process is completed through the next steps. It should be borne in mind, however that for a given set of circumstances, the overall process is "linear" or proportional. Double the emissions, and the risks will be doubled.

Consequences to Belledune HHRA

The HHRA for Belledune has identified elevated risks (over criteria) related to D/F exposure for both non-cancer and cancer endpoints. Table 6.3 (non-cancer endpoints) shows for a breast-feeding infant in Scenarios 2, 3 and 4 the background hazard indices (HI) from 2,3,7,8-TCDD are 1.69, 5.51 and 4.18 respectively (HI >1.0 is unacceptable in New Brunswick). In Scenario 3, the estimated Bennett facility contribution is estimated to add a further 0.28 to 0.29 to the hazard index.

For cancer endpoints, Table 6.4 shows the Incremental Excess Lifetime Cancer Risk for Individuals (IELCR). For all four scenarios, the background risk due to D/F is greater than the "acceptable" New Brunswick risk of 1/100,000 (from 1.3 to 3.6 per hundred thousand); in Scenario 3 the additional Bennett facility contribution is estimated to add a further 0.15 to 0.16 (per hundred thousand) to the IELCR.

It has been argued by Bennett that these elevated risks were estimated as a result of an "overly conservative model". However, on the basis of evidence of current, consistent and continuing increases in D/F contamination of soil in the neighbourhood of the Saint-Ambroise plant of RSI, there is good reason to believe that the test burn data from RSI are unreliable, and not representative of the actual emissions from the plant. Thus it appears that exposure to D/F from the Belledune facility may be much greater than previously estimated, and the predicted human health risk from adverse effects of D/F exposure should be increased proportionately. If, as it appears, the exposure to D/F used in the HHRA represents less than one-fourth of the actual emissions under operating conditions; then, if approved unchanged, the Bennett facility contribution to risk would be unacceptable.

Before any "adjustments" were made, the HHRA for Belledune predicted for non-cancer outcomes background hazard indices (HI) from 2,3,7,8-TCDD of 1.69, 5.51 and 4.18 respectively (HI >1.0 is unacceptable in New Brunswick), and in one scenario, the estimated Bennett facility contribution is estimated to add a further 0.28 to 0.29 to the hazard index. For cancer outcomes, the background Incremental Excess Lifetime Cancer Risk due to D/F is greater than the "acceptable" New Brunswick risk of 1/100,000 (from 1.3 to 3.6 per hundred thousand) and in Scenario 3 the additional Bennett facility contribution is estimated to add a further 0.15 to 0.16 (per hundred thousand). A four-fold increase in emissions would raise the facility-related hazard index from 0.28 to 1.12, which is in excess of the New Brunswick regulatory limit of 1.0. In other words, on the foregoing basis, according to the HHRA estimates, the facility operating by itself (without adding in background levels) would, standing alone represent an unacceptable risk.

In this further review, examining the information with respect to Saint-Ambroise, additional serious matters of concern have been found. There is a discrepancy between the dispersion modeling of the two facilities, such that one unit of dioxin/furans emitted from the proposed facility at Belledune is predicted to lead to ground level air concentrations one-fourth of those predicted for the same amount of D/F emitted at Saint-Ambroise. In addition, actual measurements have shown that soil levels of D/F in the area of impact of the RSI facility have exceeded guidelines by an order of magnitude. Taken together, these two observations raise serious doubts about the validity of the claim that minimal human health risk will be associated with D/F emissions from the proposed Belledune facility operations.

The Outcome

The outcome is, or should be equally straightforward. If the estimated risk for a COPC is less than the regulatory limit in the jurisdiction (here the Province of New Brunswick), then the proposal as presented is accepted; if it is greater than the limit, it is rejected.

CONCLUSION

New information has become available which appears to undermine the validity of the existing Human Health Risk Assessment (HHRA) for Belledune. At Saint-Ambroise, Récupère Sol Inc. (RSI) test burns have been found unrepresentative in the past. The most current test data shows that soil levels for dioxins and furans in the area close to the facility are close to 80 times background levels, and more than 9 times the level recommended by the Canadian Council of Ministers of the Environment in 2002. For Belledune, Bennett has predicted four times lower ambient dioxins / furan levels than it predicted at RSI for the same emission. It now appears that if the Belledune facility is allowed to operate, the facility alone will create non-cancer risks that exceed New Brunswick's regulatory limit. When combined with background risks from dioxins and furans, emissions from the facility will also exceed the cancer risk limit established by the Province. Therefore, it appears that this facility should not be allowed to operate.