CITY OF IQALUIT - DEPARTMENT OF PUBLIC WORKS

DATE: **APRIL 25, 2005**

TO: **JEFFERY WHITE**

CC: **JOHN KEYUK, JONATHAN BROWNE, IAN FREMANTLE, BRAD SOKACH**

FROM: MARK HALL

RE: **CONFIRMATION MEMO**

Hi Jeffery,

Thank you for your response of April 20, 2005. We appreciate your clarification of the term Snowfluent and EVC. For consistency and ease of understanding we will continue to refer to the EVC system as snowfluent as this is the term we are familiar with.

The purpose of this memo is to confirm our understanding of your proposal and the additional information provided. We wish to confirm our understanding of the answers provided in your letter of April 20, 2005 and ask two additional questions.

1. Application Areas – As requested three Options have been provided to the City for the application of the snowfluent.

    - Option 1 is located in the West 40.

    - Option 2 is located in the North 40 within or adjacent to the metals dump.

    - Option 3 is located in the area know as Upper Base. If this location was selected, additional infrastructure including lift stations and piping would be required and it is unclear whether the existing sewage treatment building could be used. These additional costs are not included in the quote provided by Northern Watertek Corporation (NWC).

2. Our understanding is that the price quoted would be for location Option 1 or Option 2 and would likely not apply for Option 3. We appreciate the breakdown of each component of the project provided, however we were hoping to receive a cost breakdown associated with each section as opposed to just the fixed cost. At this time the information provided is adequate.

3. NWC proposes to use the lagoon for denitrification during the summer with the addition of enzymes and as a settling pond in the winter. In the summer effluent from the lagoon would be sprayed on land. During the winter and when the weather is cold enough the lagoon effluent will be converted to snow. If the weather is too warm for the production of snow, and there is an existing snow pile in the snow deposit area the lagoon effluent will be sprayed on the snowpile. The proposed expansion of the lagoon to 40,000 cubic meters will provide up to 22 days of storage over warm periods when snowfluent or land application can not be undertaken due to adverse weather conditions.

4. The guarantee provided by NWC is based on the past success of NWC and the Snowfluent technology to date. With the exception of the 10% holdback, a financial mechanism to provide protection to the City and GN, should the technology prove to not be effective in Iqaluit, is not being offered by NWC. Construction bonding is not being offered by NWC for this project.

5. The timeline provided by NWC is summarized as follows based on interpretation of the schedule provided by NWC:

Task	**Time Frame**
Contract Preparation and Approval	April – May 15
Design Brief Preparation	May 8 – May 31
Regulatory Approvals and Public Consultation	May 1 – May 31
Order Equipment	May 15 – May 31
Design/Construction	May 15 – October 31

6. Prior to commencement of this project NWC will:

   - meet with the GN to discuss the Snowfluent technology and to ensure Fisheries and Oceans and Environment Canada are not involved in the review of the project;
   - visit the selected snow deposition site to confirm current site assumptions;
   - confirm shipping schedules and reservation confirmations;
   - reconfirm budget costs for the project;
   - order accurate mapping of the existing sewage lagoon.

7. The initial deposit area of 800 meters by 375 meters by 2.5 meters results in a volume of approximately 750,000 cubic meters of snowfluent snow. Later in this section it is noted that man-made is snow 50% density, which we interpret to mean that one cubic meter of man-made snow is approximately half a cubic meter of liquid. As such 750,000 cubic meters of snowfluent snow would consist of approximately 375,000 cubic meters of sewage. Assuming our current yearly generation volume of sewage is approximately 700,000 cubic meters, approximately 225,000 cubic meters of sewage would be sprayed onto the snow deposit spray area either onto existing melting snow or the ground surface as liquid. As the population of Iqaluit expands, the depth of the snow pile could be increased to approximately 6 meters to accommodate the increased sewage production.

8. The melting of the snow pack would not be an issue due to the amount of radiation energy we receive and the number of days Iqaluit typically has above 5 Celsius. The design report brief will further detail the snow melting projections.

9. Upon completion of the melting of the snow pack, the remaining precipitates will be broken down from rainfall and absorbed by plant growth in the snow deposit area.

10. The yearly operations and maintenance cost ceiling is based on energy costs of 0.27kW/Hr and includes:

    - Labour;
    - Maintenance replacement costs;
    - Consumables/lubricants/cleaning products;
    - Lab tests;
    - Insurance

    The operations and maintenance cost does not include a reserve fund for upgrades related to expansion of the system to accommodate the growth of the City population or for the replacement of equipment as it reaches the end of it's design life.

11. One or more of the references provided by NWC under Item 14 of their letter is of the opinion that the Earth Tech system will not operate in Iqaluit. This question will be posed to each of the references provided who are contacted by the City.

12. Our understanding is that the snowfluent snow initially has toxic levels of ammonia which breaks down over a period of weeks. Thus a sample of recently deposited snowfluent snow would be expected to have significantly higher concentrations of ammonia than snowfluent deposited several weeks earlier. The death of the fish in the Inuvik study was likely not the result of deficient concentrations of oxygen.

    Further to this, toxic ammonia concentrations would not occur in the lagoon during the summer due to the added capacity and the RIF System noted in Item 2 of NWC's April 20, 2005 response.

13. Unfortunately we do not really understand the response provided. At this time it likely does not have a significant impact on the future of the project. If this project is to proceed we will likely request additional clarification.

14. We will attempt to contact the references provided prior to the Council meeting of April 26, 2005.

15. We understand that IMG has a direct contract with Watertek and will not be entering into a separate contract with the City should Watertek be awarded a contract. In addition we understand that IMG's contract with Watertek is performance based and as such they would receive compensation from Watertek if Watertek was retained by the City. As such the City does not require the requested references and statement of qualifications from IMG.

16. Messages were left after several calls had been made and unanswered. We will again be attempting to contact the provided references.

ADDITIONAL QUESTIONS

If possible, could you please provide a comment on the following two additional questions prior to noon Tuesday April 26, 2005.

17. Further reading we have done on the melting of snow piles suggests that 80% of contaminants in the snow pile would be flushed out with the first 20% of melt water. During this melting the ground surface may be beginning to thaw, however it would be unable to accommodate the volume of melt water generated and thus there would a significant migration of water from beneath the snow pack through macropores in the soil. Based on our understanding of this it appears that the melt water could potentially be transporting offsite significant concentrations of contaminants during this early melting. Based on this we have the following questions:

    - Can you please provide a comment on our understanding of this process as described above.

    - Is there flushing which occurs during melting.

    - If there is flushing during melting what stops the contaminants which have been separated from the snow or ice during sublimation from being either dissolved or suspended in the melt water and thus being transported off-site.

18. Upon completion of the melting of the snow pack there would be the concentrated sludge resulting from the sublimation processes. Based on this we have the following questions:

    - Would the snow making area need to be fenced to restrict access by the community.

    - Would there be a yearly accumulation of sludge which would need to be dealt with on a regular basis (such as every 5 or ten years).

Regards,

Mark Hall
Director of Public Works
City of Iqaluit

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