

## **SUMMARY OF COMMENTS/RECOMMENDATIONS**

**PROPONENT:** RES/OP Technologies Inc.  
**PROPOSAL NAME:** Orverter™ Pilot Plant  
**CLASS OF DEVELOPMENT:** 1  
**TYPE OF DEVELOPMENT:** Manufacturing and Industrial Plant  
**CLIENT FILE NO.:** 5240.00

### **OVERVIEW:**

On December 14, 2006, Manitoba Conservation received a Proposal dated November 13, 2006, to construct and operate a prototype gasification plant at NW 12-12-4 WPM in the Rural Municipality of Portage la Prairie. The proponent plans to use gasification technology to process biological materials including animal carcasses, offal, manure, and plant matter. The prototype plant is designed to control air emissions by maintaining a minimum exhaust temperature of 1260°C for a retention period of at least two seconds. The gasification plant will operate 24 hours a day, 365 days a year.

The Department, on December 19, 2006, placed copies of the Proposal in the Public Registries located at 123 Main St. (Union Station), the Winnipeg Public Library, the Portage la Prairie City Library, and the Manitoba Eco-Network. Copies of the Proposal were also provided to the Technical Advisory Committee (TAC) members. The newspaper and TAC notifications invited responses until January 24, 2007.

### **COMMENTS FROM THE PUBLIC:**

No public responses were received.

### **Disposition:**

No action needed

### **COMMENTS FROM THE TECHNICAL ADVISORY COMMITTEE:**

#### **Manitoba Culture, Heritage, and Tourism – Historical Resources Branch**

No concerns.

#### **Manitoba Science, Energy, Technology & Mines – Mines Branch**

No concerns.

## **Manitoba Science, Energy, Technology & Mines – Energy Development Initiative**

Recommend that Manitoba Conservation consider:

- Imposing a strict time period limit on the pilot Orverter™ operation within the license, with potential for the applicant to reapply for a further extension as a pilot operation, or apply for a permanent installation license once the technology is finalized and performance is understood.
- Setting reasonable timeframe for pilot Orverter™ operation at three years.
- Not requiring specific emissions controls for the unit, given its pilot nature, but instead restricting the feedstocks that are permitted to be used and requiring emissions monitoring to be undertaken.
- Specifically listing the materials that would be permitted to be processed under the license.
- Specifically listing materials that may NOT be processed under the license
- Listing materials that may be processed under the license, but with further authorization, particularly SRMs (specified risk materials).
- Specifically restricting energy recovery from being undertaken, and in particular, indicating that the license does not permit electricity generation, which requires a separate Class 2 development permit.
- Imposing a restriction that the license explicitly does not permit the use of any fossil fuels to be used in the system, particularly coal.
- Imposing a requirement that if it is found the system cannot process a particular material that may be stockpiled on site, it is the proponent's sole responsibility to ensure that any unusable feedstock material be disposed in an appropriate manner
- Including regular monitoring for odour, VOCs (volatile organic compounds), NOx (nitrogen oxides), PM (particulate matter), and PAH's (polyaromatic hydrocarbons).
- Requiring that all ash materials be transported to "permitted" sites only, given pilot operation nature and associated variability of feedstocks.

### **Disposition:**

Clauses A – D, 6, 7, 46, 21, 13, 3, 31, 28 of the draft license addresses these recommendations.

## **Manitoba Infrastructure and Transportation – Highway Planning and Design Branch**

No concerns.

## **Manitoba Agriculture, Food and Rural Initiatives – Land Use Branch**

- There are no concerns with the planned location of this pilot plant from an agricultural perspective. However, if the applicant plans to apply the ash produced during this process to land, careful testing should be done first to ensure that it will not be harmful to

the soil. If it is inorganic, biologically inactive carbon, as indicated in the proposal, it will have no value as a fertilizer as purported as an advantage in the attached assessment.

Disposition:

Clauses 24 – 29 of the draft license addresses these concerns.

**Manitoba Health – Regional Health Authority – Central MB Inc**

- Advised that airborne emission with small particulate material may have an impact on health depending upon amount of discharge and the proximity of neighbours/residences.

Disposition:

Clause 35 of the draft license addresses these concerns.

**Manitoba Conservation – Sustainable Resource & Policy Management Branch**

- Lands Branch notes that approval is subject to necessary Crown Lands Act allocation where applicable. In respect of Crown Land, no land tenure is granted by way of an Environmental Approval. Applicant must apply for applicable Crown Land Act Permit/Lease which will be subject to the standard Crown Land Property Agency review process.
- The proposal raises some concerns regarding planned and potential feedstock which includes the possibility of treated wood (railway ties were used repeatedly in the DVD), plastics (plastics were added on at least one occasion in the DVD), cardboard and sewage (as outlined in the proposal document). Use of treated wood, plastics and materials containing heavy metals should be discouraged.
- Control and storage of feedstock is also a concern, particularly mortalities and offal. The proponent indicates they will follow CFIA procedures and guidelines – these should have been specifically reference or included in the proposal.
  - *The proponent responds that site handling of dead stock and offal will be compliant with CFIA Section 54 of the Meat Inspection Act; Chapter 6 of the Meat Hygiene Manual of Procedures, and Section 48 of the Health of Animals Act.*
- Without any air emissions testing, it is not possible to be certain what emissions will result from this facility, notwithstanding the claim that the process breaks all feedstock down to three components: carbon, process gas and water vapour. It is recommended the proponent be required to conduct emissions testing to determine what emissions are being generated.
- Ash disposal may also present a concern. At this point, the proposal indicates ash will be transported to “permitted” sites but does not indicate where these may be. The proposal also alludes to direct land application of ash in the future after testing. It should be noted however, that ash composition will be influenced by feedstock composition.
  - *The proponent responds that ash analysis is require before a landfill facility will consider receiving material from the pilot plant. Shortly after attaining stable*

*pilot plant operation, the proponent will retain professional third party testing services to analyze a representative ash sample. All ash will be retained in an on-site bin pending laboratory analysis and identification of an approved disposal method.*

- If any testing is to be performed on this new unit, the testing program could include the following:
  - In the section untreated wood etc. including “assemblies”. If these “assemblies” include particle board, O.S.B. or plywood, testing for formaldehyde and MDI (methylene diphenyl diisocyanate) in the flue gas should be included.
  - When the Orverter™ is used for the treating of animal remains, manures, and kitchen wastes testing for HCL (acid gases) in the flue gas should be included.
  - When the Orverter™ is used for treating sewage waste testing for metals, H2S and SO2 should be included.
  - Due to the variety of wastes the Orverter™ can destroy, testing for emissions of dioxins and furans may also be of interest.
- Incineration is an approved method of disposal where the mortalities are burned in an incinerator that is installed and operated in compliance with the Incinerators Regulation or another device that is approved by the Director for burning mortalities. No person shall dispose of mortalities by incineration unless the disposal does not cause pollution of surface water, groundwater or soil.
- Prior to incineration, mortalities are proposed to be stored for a maximum of 36 hours in metal, leak proof covered containers. The *Livestock Manure and Mortalities Management Regulation* requires that mortalities are kept in a secure storage room, covered container or secure location and continually frozen or refrigerated if not dispose within 48 hours of death.
  - *The proponent responds that site storage of mortalities has been removed from the project.*
    - *Manitoba Conservation – Sustainable Resource & Policy Management Branch responds that it is unreasonable to presume that this type of material will always be immediately offloaded directly into the processing unit; there will need to be at least some type or form of short term storage. What provision will be made for short term storage?*
      - *Manitoba Conservation – Environmental Assessment & Licensing Branch responds that storage of mortalities on site will be governed by the requirements of the Livestock Manure and Mortalities Management Regulation.*
- Prior to incineration, manure is proposed to be stored for a maximum of 36 hours in metal, leak proof covered containers. Note: long term storage of solid manure in the same location year after year is now prohibited unless it is stored in a structure designed to contain both solids and liquids. Manitoba Conservation regulates the construction of manure storage facilities by requiring the proponent to submit an Application for Permit to Construct, Modify, or Expand a Manure Storage facility.
  - *The proponent responds that site storage of manure has been removed from the project.*
    - *Manitoba Conservation – Sustainable Resource & Policy Management Branch responds that it is unreasonable to presume that this type of*

*material will always be immediately offloaded directly into the processing unit; there will need to be at least some type or form of short term storage. What provision will be made for short term storage?*

- *Manitoba Conservation – Environmental Assessment & Licensing Branch responds that storage of manure on site will be governed by the requirements of the Livestock Manure and Mortalities Management Regulation.*
- Burning of livestock manure is prohibited unless the director has given prior authorization for the burning and the person complies with the terms of the authorization.
  - *The proponent responds that an objective of this proposal is to attain approval by the Director for the conversion and burning of livestock manure.*
- The unit design appears to avoid or reduce the use of auxiliary fuel. This feature has merit, but restricts the application of the Orverter™ to waste of a given minimum heating value, and still would require the use of a “clean” fuel during startups and shutdowns.
- Although the concept drawings provide little detail, the System Schematic drawing indicates that the exhaust heat recovery is accomplished by a surface heat exchanger. Such air-to-air heat exchangers have been used on fired equipment (i.e. sewage sludge and H<sub>2</sub>S incinerators, rotary air driers) with poor results due to high temperature oxidation and/or corrosion.
  - *The proponent responds that the heat exchanger materials for this project are similar to those in the heat exchanger used for the prototype. A major portion of our prototype internals were melted by high temperatures attained during our organic conversion technology demonstrations. However, the prototype heat exchanger showed no signs of degradation. As sewage sludge and other potentially high sulphur content feedstocks are not included in our proposal, we do not expect significant H<sub>2</sub>S issues.*
- The prototype shown in the CD video was only fitted with temperature sensors, and required recurrent manual adjustments to maintain the target temperature. The additional measurement of O<sub>2</sub> and CO in the exhaust gases is highly recommended as combustion diagnostics tool.
- It is understood that this proposal is for a research and development project (rather than for final verification of the unit for commercialization and general use). Since extensive emission testing is an expensive undertaking, it should be carried out only after thorough combustion optimization.
- In light of this focused development, it is agreed that the waste stream while optimizing the unit needs to be relatively clean and should not include materials known to include toxics (e.g. used railway ties), heavy metals (e.g. painted or treated wood), pathogens (e.g. biomedical waste) or general garbage where significant quantities of plastics are contained.
- During this R & D phase, it probably makes sense to track air emission by the use of surrogates such as particulate matter emissions and opacity.
- Once combustion is optimized, the unit should be thoroughly tested to ensure that its emissions comply with all emission standards for municipal/hazardous waste incinerators and related Canada-wide standards for mercury and dioxins/furans.
- All source testing needs to be performed in accordance with recognized test codes such as those listed by Environment Canada or the US EPA.

Disposition:

Clauses 6, 7, 21, 28, and 31 of the draft licence address these concerns.

**Environment Canada – Environmental Protection Operations Division**

Recommends that:

- Real-time gaseous and particulate sampling on the waste stream to fully characterize the output during start-up, various phases of operation and shut-down be required. Specifically there should be continuous monitoring in the exhaust stream of the exit volume and velocity, CO, CO<sub>2</sub>, NO, NO<sub>2</sub>, and PM<sub>2.5</sub>.
- There should also be integrated samples of total suspended particulate on filters with analysis for metals, Polycyclic aromatic hydrocarbons (PAH's) and ions. A set of filters should be collected during start-up, during operation and during cool down. The suggested method is to use hi-volume samplers to ensure sufficient mass for speciated analysis.
- There needs to be academic citations in support of the assertions that the operational temperatures will effectively destroy prions and adequately break down incinerated material.
  - *The proponent provided additional reference material.*

Disposition:

Clause 31 of the draft license includes these recommendations.

**Manitoba Water Stewardship – Ecological Services Division**

- There are two areas that might be of potential concern to Fisheries Branch. The first is the proximity of this plant to the creek and if there is any risk associated with flooding (potential to contaminate surface water). The second pertains to the distribution of the end product (ash) to fields, particularly if adjacent to water bodies. Again the concern is for potential contamination of surface water.
  - *The proponent responds that no manure, deadstock carcasses or offal will be stored on site and that there has been no occurrence of site flooding in the last 60 years.*
- A water line can be identified within the enclosed site layout. What will be the source of this water supply? Appropriate backflow prevention should be provided on water supply as per the provincial plumbing code and the WCS AWWA Cross Connection Control Manual or CSA B64.10-01 Manual for the Selection and Installation of Backflow Prevention Devices. Backflow protection should be commensurate with the degree of hazard.
  - *The proponent responds that site water comes from the water treatment plant at St. Eustache via the Cartier Regional Water Distribution system. The referenced water supply is for the site office. The Orverter™ requires no water connection.*

- According to the section viii, plant discharge will be disposed onto agricultural land. It is unclear whether any monitoring methods will be adopted to ensure the integrity of water quality.
- The proposed activities should not degrade the groundwater and surface water qualities on adjacent properties and subsequently make these unsuitable for use as drinking water sources. The proponent should identify such activities and recommend appropriate mitigation measures if required.
  - *The proponent responds that natural plant materials (untreated wood, straw, etc.) should not constitute a risk to groundwater and surface water qualities and that there will be no site storage of manure, mortalities, and offal. Any spills would be scraped from the site and processed through the gasification plant.*
- Since the Orverter™ is in its Research and Development stage, an incremental approach is recommended to approving various fuel-types for the pilot project of this technology. Specifically, for the initial stages of the pilot project, only “clean” materials should be allowed to burn. This would include those mentioned on page 12 of the proposal, but not include manure, kitchen waste, nor sewage holding contents, not biological sludge. Garbage and materials containing metals or pesticides should not be burnt during this initial phase.
- Regularly collected samples of ash produced by the Orverter™ should be analyzed by a CEAL accredited laboratory and provided to Manitoba Conservation, Environmental Assessment and Licensing Branch, as a condition of licensing. A variety of materials that have been burned by the Orverter™ should be included in the ash samples destined for analysis. Ash should be analyzed for total nitrogen, total phosphorus, and heavy metals.
- Ash produced by the Orverter™ during the phase should be directed to a licenced solid waste disposal facility, and not applied to agricultural lands.

Disposition:

Clauses 18, 25, and 28 of the draft licence address these concerns.

**Health Canada – Healthy Environments and Consumer Safety Branch**

- Will the farmer and his son be the only operators of the project? Will a training program be implemented to ensure that all future operators follow appropriate procedures regarding Occupational and Environmental Health and Safety?
  - *The proponent responds that the farmer and the son will be the primary operators. RES/OP will prepare plant operation procedures consistent with the Occupational and Environmental Health and Safety standards.*
- The demonstration video gave evidence as to potential for an unsafe condition i.e. smoke from input chute upon loading of the heart. The EAP indicates that such exposures should be eliminated due to the negative pressure and air lock features. How will the project differ in design and/or operation from this experimental run to effectively eliminate the potential for operator exposure to hazardous smoke?

- *The proponent responds that the prototype processor had only one feedstock air lock gate while the pilot plant has two feedstock air lock gates plus an exhaust duct*
- Similarly, the video demonstrated that upset conditions can occur frequently according to moisture content and type of feedstock etc. How will the conditions leading to increased flue emissions be reduced or eliminated? The EAP indicates “sustainable operation is maintained at up to 50% moisture (average by weight)” e.g. Animal carcasses would contain more than 50% water, especially when exposed to precipitation etc.
  - *The proponent responds that the majority of situations that may be interpreted as upset conditions were the result of a small prototype mass with low thermal inertia and no automation to accommodate changing conditions.*
- Will the license requirements limit the types of feedstock? Will record be retained of all feedstock? The incineration of some wastes can represent additional hazards in handling and incineration, especially during upset conditions (e.g. railroad ties – polycyclic aromatic hydrocarbons, pressure treated/coated wood – heavy metals).
- The EAP indicates that the residual ash will be tested prior to disposition. Will this include analysis for heavy metals? What standards will be used to determine disposition?
- Will a program be implemented prior to commissioning to effectively control and record the operating parameters/conditions and permit verification of such (e.g. Hazard Analysis Critical Control Point Program)?
- Will the geotextile fabric adequately protect groundwater resources? Will monitoring of groundwater at the project site and/or neighbouring wells be undertaken to verify the effectiveness of the protective measures?
- Will an emergency response plan be developed with local authorities prior to operation?
- It is recommended that public consultation be undertaken. Area residents may have concerns regarding traffic, containment of loads, odours etc.

Disposition:

Clauses 6, 7, 25, and 45 of the draft license address the majority of these concerns. The public have not provided any comments during the commenting period. In addition, public concerns would have been considered by the Portage la Prairie Planning District prior to granting a conditional use order. Therefore, there is no need for further public consultation.

**PUBLIC HEARING:**

A public hearing is not recommended.

**RECOMMENDATION:**

The Proponent should be issued a Licence for the construction and operation of the gasification plant in accordance with the specifications, terms and conditions of the attached draft Licence. Enforcement of the Licence should be assigned to the Environmental Assessment and Licensing Branch.



A draft environment act licence is attached for the Director's consideration.

Prepared by:

Ryan Coulter, P. Eng.  
Environmental Engineer  
Municipal, Industrial, and Hazardous Waste Section  
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Telephone: (204) 945-7023  
Fax: (204) 945-5229  
E-mail Address: ryan.coulter@gov.mb.ca