ROSE ENERGY

Proposed Biomass Fuelled Power Plant

Land off Ballyvannon Road, Nr Glenavy, County Antrim

Effluent

Final

20th May 2008

Submitted to:

ROSE ENERGY

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Report reference: P036-R09-F2

Engreen Environmental Consultants Ltd.

Engreen Environmental Consultants have a dedicated team of environmental specialists, with a combined experience of over 30 years working in the environmental sector within the organisation. Qualifications of the authors of this document are listed below.

Authors	**Qualifications**
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Engreen have aided clients in obtaining planning permissions, preparing Environmental Impact Assessment planning applications, obtaining Waste Management Licenses, Integrated Pollution Prevention and Control permits and assisting with technical issues in relation to plant design and environmental protection.

Direct experience in relation to this report covers work to assist in design of effluent treatment facilities, BAT assessments for effluent treatment plants and modelling of impacts from effluent treatment plants on watercourses. Key experience has been gained from:

- Obtaining Permit Variations to IPPC Permits for the installation of dedicated on-site effluent treatment plants for clients;
- Undertaking Best Available Technique assessments for effluent treatment options at a number of industrial facilities;
- Evaluating options to select the most effective effluent treatment techniques to meet IPPC permit requirements;
- Performing impact assessments of effluent streams on the receiving environment;
- Assist in clients design specifications for effluent treatment plants.

Contents

1. Introduction

1.1 General

1.1.1 Rose Energy proposes to construct a biomass fuelled power plant, fuelled by Poultry Bedding and Meat and Bone Meal (MBM). As part of the Environmental Statement that is being prepared for the proposal there is a requirement to address effluent generation and disposal/recovery options, as this will be one of the most significant emissions for the facility.

1.1.2 Full functional design of the plant is currently underway. This includes a detailed design of the effluent handling and treatment system and a complete water and effluent balance across the system. Until this detailed design is complete the final effluent treatment system cannot be fully specified.

1.1.3 However, the following report uses currently available information to outline how effluent will be generated, potential contaminants expected and effluent treatment and disposal options available.

1.1.4 Preliminary discussions regarding effluent and its proposed treatment and discharge have been held with E&HS. A brief outline of these discussions is also discussed within this report.

1.2 Report Format

1.2.1 This report discusses the following:

- The sources of effluent generation;
- Assessment of potential contaminants;
- Risks associated with the materials;
- Treatment of the effluent streams;
- The disposal options for the effluent.

2. Effluent

2.1 Sources of Effluent

2.1.1 In addition to surface water run-off (which is dealt with by the SUDS design detailed in report Rose Energy Project: Drainage Assessment) the following potential sources will produce effluent at the facility:

- Discharge from the vehicle wash facility;
- Blowdown from the boilers;
- Blowdown from the cooling towers;
- Backflush effluent from the incoming water treatment plant;
- Plant washing and housekeeping;
- Domestic effluent.

2.2 Discussion of Effluent Sources

2.2.1 Vehicles which bring the poultry bedding fuels into the facility will all pass through a vehicle wash prior to rejoining the public highway after delivering their loads into the fuel reception areas. The vehicles will have their external areas washed to prevent tracking of debris onto the public highway. The system will be designed to have recycle and recovery techniques for maximum efficiency, but there will be some effluent for disposal.

2.2.2 The facility will have boiler(s) and cooling tower(s) which will produce blowdown. These emissions can potentially contain trace contaminants so all of these discharges will be directed to the effluent treatment system

2.2.3 The source of water for the facility will be one of two options, or a combination of both:

- Mains;
- Groundwater abstraction borehole.

2.2.4 The company will also be installing a rainwater harvesting and re-use system on site. All of these water sources will require some pre-treatment prior to their re-use at the facility. The water treatment plant which will be used to clean the water supply streams will have a residual discharge of effluent that will require treatment and disposal.

2.2.5 The facility will have a regular cleaning regime that will generate an effluent stream. This will comprise water mixed with cleaning chemical residues and particulates of fuel sources.

2.2.6 Domestic effluent will be generated from washing and toilet facilities at the installation. This will be treated separately and the discharge mixed with the treated effluent prior to discharge.

2.3 Effluent Constituents

2.3.1 The exact nature of the effluent stream from the above sources at this stage is unknown. Potential constituents within the effluent will depend on the chemical constituents of several materials, including:

- Boiler treatment chemicals;
- Cooling tower additives;
- Water treatment chemicals;
- Cleaning chemicals.

2.3.2 One potential source of contaminants within the effluent is the two fuel sources on site (MBM and poultry bedding). Residues of these materials can be expected to find their way into the effluent stream, particularly from in-house cleaning and the vehicle wash area.

2.3.3 The likely major contaminants from these sources can be anticipated to include:

- Ammoniacal Nitrogen;
- Phosphates;
- Chlorides;
- Total Nitrogen;
- Biological Oxygen Demand;
- pH;
- Suspended Solids.

2.3.4 Detailed understanding of the effluent stream constituents will be gathered during the IPPC application stage. This will comprise gathering detailed information on potential contaminant parameters from Material Safety Data Sheets for the cleaning chemicals, boiler and cooling tower treatment chemicals to be used at the facility and analyses of the two fuel sources.

3. Effluent Treatment and Discharge

3.1 Final Discharge Options

3.1.1 There is no opportunity to discharge effluent to public sewer since there is no available sewer connection at the facility.

3.1.2 It is proposed that the effluent will be treated to a suitable BAT standard and discharged into the Glenavy River. The consent for such discharge will be applied for with the IPPC application.

3.1.3 Initial design estimates are that the discharge will be approximately 60m^3/hr. The effluent will be treated to a sufficiently clean standard to allow it to be discharged to a salmonid river.

3.2 Effluent Handling

3.2.1 Effluent will be collected on site at the various points described above and via the on-site drainage system (to be designed as part of the IPPC application).

3.2.2 Where possible, clean surface water (comprising roof water and rainwater impacting on clean yard areas) will be harvested for re-use and the excess discharged to the SUDS scheme. This segregation of clean water from potentially contaminated waters represents Best Available Technique (BAT).

3.2.3 Effluent collected within the process drainage scheme on site will preferentially be discharged to the effluent treatment plant via gravity flow. Effluent collected within sumps and underground tanks and where essential within the drainage system, will be pumped to the effluent plant.

3.2.4 Screens will be used to remove solids prior to discharge to the effluent treatment plant. This will reduce contaminant loading on the ETP system.

3.3 Potential Effluent Treatment Techniques

3.3.1 The treatment technology selected will need to be compatible with the high volume and low loading nature that this effluent stream is expected to display. It is anticipated that the following technologies in combination are considered to be those necessary to achieve a suitable discharge quality:

- Primary treatment. To remove solids and suspended solids burdens some form of primary treatment will be required. A range of options, including DAF, static filters, rotary filters and belt filters is available and will be assessed to determine the most appropriate technique;
- Secondary treatment. To reduce COD, phosphate and ammonia/nitrogen levels some form of secondary, biological treatment is likely to be required. Techniques available for secondary treatment include membrane bioreactors, sequencing batch reactors and activated sludge systems of various types. Again, the intention is to select the most

appropriate technique to match the effluent details and the upstream and downstream techniques;

- Tertiary treatment. It may be that tertiary treatment is required in addition to or in place of the secondary treatment system to complete the filtration of solids and suspended materials and, if necessary, to complete the removal of dissolved trace contaminants. Ultrafiltration and reverse osmosis techniques are available for tertiary treatment duties and will be assessed. The feasibility and practicality of combining the tertiary treatment stage with the secondary treatment will also be assessed.

3.3.2 As part of the IPPC application stage, a full BAT assessment will be undertaken to assess the various technologies and determine which combination and particular system design represents BAT for this facility and the receiving environment.

3.3.3 This BAT assessment will include the use of a detailed H1 assessment of the impact of the discharge on the river.

3.3.4 Initial design estimates are that the discharge will be approximately 60m^3/hr. The effluent will be treated to a sufficiently clean standard to allow it to be discharged to a salmonid river. As a minimum discharge standard the BAT achievable limits from the waste treatment BREF will be applied to the discharge, i.e

- BOD <20 ppm
- Mercury <0.01 ppm
- Other Metals <0.1 ppm

3.3.5 Additionally a target discharge limit of 5ppm will be applied to ammoniacal nitrogen, 2ppm to phosphorus and 45ppm to suspended solids (taken from a known discharge consent to a salmonid river). All the target values will be discussed and agreed with the EHS department prior to issue of the IPPC permit.

3.3.6 As part of the PPC application the effluent treatment system will be fully specified and designed. This design will follow the BAT options appraisal route and will take the values above as a minimum starting standard. The actual final emission values will be determined by the application of BAT as a site-specific assessment. It is anticipated that an effluent treatment system based on bio-treatment and membrane separation will be installed to achieve the necessary effluent quality.

3.3.7 The final selection will be confirmed by a detailed H1 assessment of the impact of the discharge on the river. This assessment will involve modelling the spread of the discharge through the river system using a recognised plume spreads model (e.g. that contained within the H1 assessment documentation). The discharge will be modelled under two scenarios:

1. Normal, mean river flowrate. This will give a typical, long-term average impact concentration.
2. Low river flowrate. The minimum flowrate from available river flow data will be used – corrected for the actual discharge point. This will give a peak impact concentration.

3.3.8 The average and peak impact concentrations will be compared to the relevant water quality standards and assessment levels to confirm that the impact is within guideline values and that BAT is being achieved.

4. Conclusions

4.1 E&HS Discussions

4.1.1 Preliminary discussions have been held with E&HS regarding effluent treatment and disposal. E&HS confirmed that parameters would be agreed at the IPPC application stage and that BAT requirements would need to be met.

4.1.2 It is the intention of the project team to facilitate detailed effluent treatment plant discussions with the E&HS during the commencement of the IPPC application stage. Further discussions are planned as the BAT assessment for the effluent treatment plant develop and prior to the final IPPC application submission.

4.2 Summary

4.2.1 The following represent the identified sources of potential effluent generation:

- Discharge from the vehicle wash facility;
- Blowdown from the boilers;
- Blowdown from the cooling towers;
- Backflush effluent from the incoming water treatment plant;
- Plant washing and housekeeping;
- Domestic effluent.

4.2.2 Initial design estimates are that the discharge will be approximately 60m^3/hr. The effluent will be treated to a sufficiently clean standard to allow it to be discharged to a salmonid river. The initial constituent parameters have been established together with an indication of the likely technology that will be utilised to achieve the necessary discharge standards.

4.2.3 The next stage will be to design in detail the effluent treatment plant, model the output parameters and their impact on the receiving environment, and agree discharge consent limits and conditions with the E&HS as part of the PPC application.