Energy from Waste, Combined Heat and Power Facility

North Yard, Devonport

Environmental Permit Application (Application EPR/WP3833FT/A001)

Resource Management

June 2011

Prepared for

MVV Environment Devonport Ltd

Revision Schedule

Resource Management Report
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Rev	Date	Details	Prepared by	Reviewed by	Approved by
01	Feb 2011	Initial Draft	**Andrew Oliver** Consultant	**Angela Graham** Principal	**Mike Nutting** Associate
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Limitations

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The methodology adopted and the sources of information used by URS Scott Wilson in providing its services are outlined in this Report. The work described in this Report was undertaken between May 2009 and April 2011 and is based on the conditions encountered and the information available during the said period of time. The scope of this Report and the services are accordingly factually limited by these circumstances.

Where field investigations are carried out, these have been restricted to a level of detail required to meet the stated objectives of the services. The results of any measurements taken may vary spatially or with time and further confirmatory measurements might need to be made after any significant delay in issuing this Report.

Table of Contents

1 Report Context

Scott Wilson Ltd has been commissioned by MVV Environment Devonport Ltd (MVV hereafter) to prepare an application for an environmental permit for an Energy from Waste, Combined Heat and Power Facility located at Devonport Dockyard, Plymouth (Devonport EfW/CHP hereafter).

Within the Site, as defined in planning terms, and the Installation, as defined in permitting terms, the proposed facility will comprise:

- Tipping Hall;
- Waste Bunker Hall with Waste Handling Cranes;
- Bale Store/Baling System;
- Turbine Hall with Steam Turbine Generator;
- Boiler House with Grate, Boiler and Ancillary Systems;
- Flue Gas Cleaning System and Chimney;
- Air Cooled Condensers;
- Water Treatment Plant;
- Bottom Ash Handling System.
- Administration Block; and
- Workshop and Stores

This report has been prepared to support an application for an environmental permit and details the resource management systems proposed for the site. The report should be read in conjunction with the other supporting application reports and risk assessments.

2 Raw Materials Management

2.1 Introduction

This section provides evidence of the existence of relevant controls for the management of raw materials to the standard indicated by the Environment Agency document *“Guidance for the Incineration of Waste and Fuel Manufactured From or Including Waste*” (SGN S5.01, Sections 2.4.1 and 2.4.2).

2.2 Raw Materials Management

2.2.1 Material Selection and Procurement Procedures

Procedures will be developed within the Integrated Management System (IMS) which will ensure:

- The selection of materials will consider the environmental impact of each of them across their entire life cycle, including keeping the use of high-embodied energy materials to a minimum, while consideration will be given to such factors as degradability, bioaccumulation potential and toxicity;
- The consideration of the impact of raw materials on human health will be acknowledged by considering the harmful or hazardous nature of the material;
- That, where practical, materials will be specified from renewable and sustainable sources;
- That, where practical during construction and subsequent plant operation, materials will be specified from local sources and/or with a high recycled content; and
- A small a quality as possible of each raw material needed enters the facility, and that each is used as efficiently as is possible.

2.2.2 Raw Material Inventory

The most significant material input to the EfW/CHP will be the waste materials accepted, anticipated to be up to 265,000tpa. This waste material comprises mostly household waste, which will typically include a mixture of paper, textiles, wood, some plastics, and an organic fraction, along with grit, glass and ferrous and non-ferrous metal.

The other raw materials that will be used as part of the treatment processes are:

- Urea solution – this is used as a nitrogen oxide reducing agent in the flue-gas;
- Powdered activated lignite carbon (PAC) – this will be used as one of the reagents in the dry APC system, and is injected into the flue-gas upstream of the fabric filter. This reagent also adsorbs mercury and organic compounds including dioxins and furans;
- Sodium Bicarbonate – this is a reagent in the dry APC system; a controlled amount of dry sodium bicarbonate is injected into the flue-gas upstream of the fabric filter to absorb acid gas components;
- Hydrochloric Acid – this is used for the regeneration of the ion exchange columns of the demineralised water plant. In the event of condensate losses due to increased water demand, HCL will also be used to neutralise alkaline waste water before discharge to sewer;

- Sodium Hydroxide – this is used for the regeneration of the ion exchange columns of the demineralised water plant and for pH adjustment of boiler water;
- Corrosion inhibitor for protection of the boiler systems;
- Auxiliary fuel – a low sulphur content light fuel oil will be used to supplement furnace temperatures at the time of plant start-up, shut-down or to maintain WID temperature requirements in abnormal conditions;
- Gases for monitoring equipment calibration; and
- Lubricants (oils/greases) for plant maintenance.

The anticipated annual use requirements for each of these materials and their potential impact is summarised in the inventory table in Appendix A.

2.2.3 Raw Material Management

Site management arrangements for storage and containment of the raw materials which will be used at the site are detailed on the inventory table in Appendix A. Relevant chemical data sheets will be held by the Operations Engineer, and will be retained in the Control Room.

The utilisation of raw materials will be closely monitored to ensure the materials are used efficiently, and in accordance with the manufacturer's requirements and operational specifications. A full list of raw materials will be kept on site and a review of their use will take place on a regular basis.

2.3 Waste Minimisation

Waste minimisation considerations have been included in the design processes, including:

- Sodium Hydroxide will be controlled and optimised based on water treatment requirements; the nominal addition rate is calculated to be around 35kg per 120t of water to create the 50% solution required;
- Hydrochloric acid will be controlled and optimised based on water treatment requirements; the nominal addition rate is calculated to be around 90kg per 120t of water to create the 30% solution required;
- Urea solution will be used during the gas-scrubbing process, and will be controlled via the automated control process whereby the amount of urea solution injected into the flue gases will be adjusted by monitoring the concentration of nitrous oxides; use is optimised subject to the need not to compromise flue gas emissions;
- Sodium bicarbonate will be used during the gas scrubbing process and will be controlled via the automated control process whereby the amount of sodium bicarbonate injected into the flue gasses will be adjusted by monitoring the concentration of acid gases (i.e. HCl and SO_2) upstream and downstream of the flue gas cleaning system; use is optimised subject to the need not to compromise flue gas emissions;
- PAC injection rates (nominally 0.74kg/tonne waste fuel) will be 'calibrated' against flue gas flow rate during commissioning. This calibrated rate will then be used during normal operation and injection will be controlled automatically in line with the flue gas flow rate rate. The calibration will be checked using the extractive emissions monitoring tests for mercury and dioxins;
- The use of corrosion inhibitors will be optimised using the results of boiler water testing;

- Lubricant materials for maintenance of process plant will be minimised through preventative maintenance regimes to minimise the chance of leaks and spillages; and
- Diesel, used for the auxiliary burner, will be controlled by the automated plant control system – use will be minimised by ensuring that start-up/ shutdown frequencies are reduced through effective plant maintenance and by effective combustion control to maintain the temperature above 850^{O}C in the combustion chamber.

Raw materials used at the facility will be periodically reviewed to ensure that they are all appropriate for use, that consumption is optimised and that opportunities for reduction and rate-of- use improvements are implemented through the site's management system

3 Water Management

3.1 Introduction

This section provides evidence of the existence of relevant controls for the management of raw materials to the standard indicated by the Environment Agency *"Guidance for the Incineration of Waste and Fuel Manufactured From or Including Waste*" (SGN S5.01, Section 2.4.3)

3.2 Sources of Supply

3.2.1 Mains Supply

Mains supply will be primarily utilised to provide water for the demineralised water treatment plant and site welfare facilities, such as those that require potable water, and showers. The works metered supply will be provided by Kelda Water and information from the metered supply will be used to monitor water usage.

It is anticipated that initial charging of process systems and fire water tank will be facilitated by the mains supply.

3.2.2 Abstracted Supply

No abstracted supply is planned for the site.

3.2.3 Grey Water Supply

Rainwater will be harvested from buildings roofs, roads and hard standing areas, and will be used for landscape irrigation and dust suppression, on the site roads, as and when required.

Process water will comprise waste water from boiler blowdown, boiler water sampling and the demineralised water treatment process, and will be re-used for processes such as ash quenching. Under normal operation there will be no waste water discharge.

3.3 Consumption Requirements

Indicated water consumption requirements identified during the design process are given in Table 3.1 below.

Table 3.1: Predicted Water Consumption Requirements

Water Source	Peak Capacity	Annual Use (tpa)	Comment
Raw Water	4.46 tph	35,163	▪ From Mains Supply

Based on the above the predicted water consumption requirements will be around 35,000 tonnes/year. Flow volumes will be confirmed at the time of plant commissioning to finalise the flow diagrams and water balance. A water efficiency audit will be undertaken at the end of the first year and will be repeated at 4 yearly intervals thereafter.

3.4 Water Efficiency Measures

Water efficiency measures considered during design are as follows:

- Rain water capture and storage in a harvesting tank for use as grey water (i.e. landscape irrigation, dust suppression)
- Installation of low water use appliances such as;
    - Spray taps;
    - Dual-flush toilets;
    - Infra-red proximity detection urinals; and
    - Low flow shower heads
- Water consumption monitoring will be undertaken and will be used to support water consumption targets for the facility;
- A planted swale for surface run-off, a wildlife pond and hibernaculae designed to appear as natural features as much as possible with maximum habitat diversity will be included;
- Flood risk associated with Climate Change will be addressed;
- Provision of leak detection systems and water meters to the main supply; and
- Recycling of process water where possible.

Appendix A Raw Material Inventory

Raw Material	Nature and Composition of Material	Annual Consumption	Fate Product (P) Water (W) Sewer (S) Air (A) Waste/Land (L)	Environmental Impact	Suitable Alternative Available with Less Environmental Impact	Storage Provision	Secondary Containment or other mitigation/control
Urea	• Solid Pellets	215 Te	• (A) – Estimate <1g/s release to air as total particulate • (L) – Fraction in APC residue sent for disposal	None - expected	None identified	$50m^3$ Silo	• Silos have local dust filter • Level alarms on silos
Sodium Bicarbonate	• Powdered	4220 Te	• (A) – Estimate <1g/s release to air as total particulate • (L) – Fraction in APC residue sent for disposal	None - expected	None identified	$150m^3$ Silo	• Silos have local dust filter • Level alarms on silos
Activated Carbon	• Solid powdered carbon	181 Te	• (A) – Estimate <1g/s release to air as total particulate • (L) – Fraction in APC residue sent for disposal	None - expected	None identified	$80\ m^3$ silo	• Silos have local dust filter • Level alarms on silos
Corrosion Inhibitor	• Liquid for boiler water treatment	200 kg	• (P) – process water used for quenching ash which will then be recovered	Insignificant	None identified	Small containers (<25L)	• Kept in designated store with tray containment provided
Sodium Hydroxide	• Liquid for demineralisatio n of water	10 Te	• (P) – process water used for quenching ash which will then be recovered	Insignificant	None identified	$5m^3$ Tank	• Bund 110% capacity of tank • Spill kits available
HCl	• Liquid for demineralisatio n of water	28 Te	• (P) – process water used for quenching ash which will then be recovered	Insignificant	None identified	$3m^3$ Tank	• Bund 110% capacity of tank • Spill kits available

Raw Material	Nature and Composition of Material	Annual Consumption	Fate Product (P) Water (W) Sewer (S) Air (A) Waste/Land (L)	Environmental Impact	Suitable Alternative Available with Less Environmental Impact	Storage Provision	Secondary Containment or other mitigation/control
Diesel	• Auxiliary fuel		• (A) – release of combustion gases	Impact on air quality not expected to be significant	None identified	30,000 litre storage tank	• Bund 110% capacity of tank • Level alarm • Spill kits available • Valves/pipes inside containment
Lubricants	• Oils/greases for use in maintenance	<5 Te	• (P) – wastes will be sent for recovery	insignificant	None identified	205L drums or smaller containers	• Containment will be provided for drums & other containers • Spill kits available
Calibration Gases	• CEMS calibration gases (eg H_2, SO_2, etc)	<0.1 Te each Gas	• (A) – small release to air during calibration of CEMS	insignificant	None identified	20L gas cylinders	• Prescribed storage cage