SLR

NEW ENGLAND QUARRY RESOURCE RECOVERY CENTRE
DEVON

ENVIRONMENTAL PERMIT (EP) APPLICATION
RESIDUE MANAGEMENT PLAN

Viridor

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solutions for today's environment

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1.0 INTRODUCTION

SLR Consulting Limited (SLR) has been instructed by Viridor to prepare an Environmental Permit (EP) application to operate a non hazardous Resource Recovery Centre (RRC) at New England Quarry, Devon.

The RRC will include an Energy from Waste (EfW) facility and non hazardous landfill. The EfW plant is being designed to treat up to 275,000 tonnes of municipal solid waste, commercial and industrial waste per year, in 2 parallel treatment lines. It is anticipated that the proposed EfW facility would export approximately 22MW_e per annum of electricity to the National Grid when fully operational.

A significant environmental consideration of the plant is the management and reduction of residues arising from the process. Appropriate options need to be considered to ensure that the best practicable environmental option is identified and implemented. This document provides a brief overview of the origins of each waste stream and the treatment options identified, as presented in Section 2.0. The summary and conclusions of the key issues for Viridor to consider when implementing the best practicable environmental options are provided in Section 3.0.

2.0 RESIDUE MANAGEMENT OPTIONS

2.1 Introduction

The residues arising from the plant will primarily be a function of the treatment process, with the largest volumes associated with bottom ash. Although other waste streams will be generated at the installation, such as domestic waste and maintenance by-products, process by-products are the key residues generated and are the subject of this document.

Of the waste material introduced to the EfW facility process, two main waste residues will be generated. Incinerator bottom ash (IBA) from the grate combustion unit will account for approximately 22% of input material; and air pollution control residues (APCR), which will contain boiler fly ash (approximately 3-5% of input material). Recovered material i.e. metals also account for a proportion of the output stream. An estimation of the tonnage of these waste streams is provided in Table 2-1 and detailed information on the origins and key issues associated with each is provided in Sections 2.2 to 2.4.

Table 2-1 Waste Arisings

Waste Source	Approximate Tonnes Per Year	Disposal/ Recovery Route
Incinerator Bottom Ash (IBA)	60,500	Recycle as aggregate
Air Pollution Control Residue (APCR) mixed with fly ash	13,200	Hazardous Landfill
Recovered Metals	5,500	Recycle into metals market

In accordance with the requirements of the Waste Incineration Directive (WID) Article 9, Best Available Techniques (BAT) and the BREF Note on Incineration, the intermediate storage and transport of dry residues in the form of dust i.e. the boiler dust and dry residues from the treatment of combustion gases will take place in such a way so as to prevent as far as practicable emission to the environment. Intermediate storage will therefore take place within the New England Quarry facility to the west of the EfW building. All vehicles leaving the facility, transporting, dry residues will be enclosed or covered.

2.2 Incinerator Bottom Ash (IBA)

The most significant residue associated with MSW incineration is IBA, comprising siftings and fine ash falling through the combustion grate. This is combined with boiler ash. IBA output is typically around 22% of the total tonnage into the plant.

IBA is currently regarded as non-hazardous waste. If it can be subjected to further treatment to remove metals and grade by size, it can then be used as a replacement for primary aggregates, such as sand and gravel. There are several IBA treatment plants in the UK and resulting inert material can be used in concrete and concrete block construction, replacing up to 50% of the aggregate traditionally used. IBA has also been used successfully in the sub-base and roadbase layers in road construction, after a process of hot asphalt stabilisation and mixing with cement or bitumen. The sub-base and roadbase layers refer to the intermediate layers of the road, below the final surface wearing course and above the lowest subgrade layer. Over 710,000 tonnes of IBA was produced by incinerators in England and Wales in 2007. About 45% was 'weathered', through exposure to air and rain, before being used as an aggregate.

It is proposed that IBA will be treated and recycled to produce aggregate material at an on-site plant adjoining the EfW. The material will be moved from the EfW via a covered conveyor to the bottom ash facility.

The proposed IBA recycling facility will be 130m long and 57m wide and will provide processing and storage capacity for the anticipated 60,500tpa of recyclable aggregate to be generated by the EfW facility.

Maturation will involve exposure to air and water, achieved by stockpiling the IBA material in the open air. Carbon dioxide in air will reduce both ash pH through carbonation reactions and metal solubility. Water will be used to remove soluble metal salts, chlorides and sulphates. The maturation process will last for several weeks and will take place in the external walled storage area. Maturation will be required to stabilise ash to ensure leaching properties are acceptable for use as an aggregate.

Following maturation mechanical treatment will be carried out using mobile plant. Magnetic over-belt and eddy current separators will remove ferrous and non-ferrous metals respectively. Metals will be collected separately and sent off-site for recycling. Ash will be sorted into several different size fractions by mechanical trommel screens. Remaining fractions will be transferred to the external stockpile area for maturation.

Run off from the ash piles will be contained within the walled storage area and directed to a drainage system. This water will drain into a wash water storage tank that provides settlement/storage, before re-use on the ash piles. The water will be sprayed onto the ash to maintain correct conditions for maturation and prevent fugitive dust emission. Once processed, aggregate will be stockpiled in the maturation areas awaiting sale.

2.3 Air Pollution Control Residues

The APC residues also include fly ash from combustion that is removed from the flue gases, together with the other contaminants, prior to release into the atmosphere. Fly ash comprises particulate material precipitating from the boiler passes. These are collected from the base of each pass and transferred into collection silos. Fly ash consists mostly of carbon dust, along with some pollutants, organic compounds and heavy metals. These are removed from the flue gases so that the emissions from the facility are clean prior to release, preventing pollution of the environment. The bulk of the APC residues comprise spent hydrated lime reagent (slaked lime is used for flue gas cleaning).

All storage and handling of APC residues will be undertaken within the building in enclosed handling systems and storage vessels/silos.

At present APCR is considered unsuitable for recycling, although Viridor are reviewing this on an ongoing basis. APCR is classified as hazardous waste, and will be collected within sealed silos and taken off site for disposal at a suitably authorised facility. Quantities will be in the region of 3-5% of annual throughput.

APCR will be collected in the bag filters and comprises a mixture of activated carbon and lime, used to remove heavy metals, dioxins and acid gases present in the flue gases. APCR will be recirculated into the flue gases to optimise reagent consumption; excess material is transferred to a silo. The resulting waste is listed in the European Waste Catalogue as an absolute entry[1], hence is hazardous. The hazardous properties primarily relate to H4 (irritant), due to the alkaline pH.

[1] 19 01 07* solid wastes from gas treatment

The bag filter system will be used for separation of particle pollutants from the flue gas. These pollutants mainly consist of entrained dust, unused absorbent and used absorbent.

Fabric bag filters for the abatement of particulates are accepted as demonstrating BAT. Bag filters contain multiple compartments each containing a specific number of filter bags and allow the isolation of particular compartments for repair or refit of any bag in the case of failure, while also allowing these operations to take place without the risk of emissions. All compartments will have pneumatically operated gas cut off valves. In the facility, the bag filters will be located after the carbon and activated lime are added to the flue gas.

The cleaning of the bag filters produces a certain amount of un-reacted lime. Most of the dust will be recycled. For this purpose, mechanical fully proven self-controlled re-circulation equipment will be implemented.

2.4 Metal Recovery

Following weathering of the IBA, metals will be separated from the IBA using mobile plant within the IBA treatment area. This process improves both the composition of the IBA for its after-use and recovers valuable metals for recycling. The quantity of metal that can be recovered from the IBA is typically around 2% depending on the waste feedstock and thus represents a useful opportunity for significant amounts of metals recovery.

Magnetic over-belt and eddy current separators will remove ferrous and non-ferrous metals respectively. Metals will be collected separately and sent off-site for recycling.

2.5 Residue Testing

As required by WID Article 9 Viridor will undertake appropriate sampling and testing of the residues to establish the physical and chemical composition of the residues prior to determining suitable routes for recycling or disposal. Testing of residues will be undertaken to ensure compliance with the regulatory regime appropriate to the outlet. A sampling and testing methodology will be agreed by Viridor with the Environment Agency prior to commencement of operations at the facility.

Waste emissions will be fully characterised and monitored to ensure that the associated hazards are understood and that risks to human health and the environment are managed appropriately. This will typically comprise an initial detailed analysis to confirm the exact composition of the waste, followed by periodic check testing of key contaminants to ensure that characteristics do not significantly change. In the event of a significant change the waste would be subject to detailed analysis again.

Ash volumes will be monitored through weighbridge tickets, waste transfer notes and consignment notes. Amounts sent to recovery or disposal will be reported to the Environment Agency in accordance with the Environmental Permit.

An IBA and APCR sampling programme is to be agreed with the recipient of the wastes and the Environment Agency to ensure that all regulatory requirements are met.

IBA recycling will be kept under review. This will be formally documented at least every four years, as part of the overall site waste minimisation review.

3.0 MINIMISATION OF RESIDUES

3.1 Introduction

In order to comply with the requirements of the WID Article 9, residues resulting from the operation of the incineration plant shall be minimised in their amount and harmfulness. In accordance with Article 9, Viridor proposes to recycle residues, where appropriate, directly in the plant at New England Quarry (in the case of APC residues returned to the flue gas reaction duct to use up unspent reagent) or will aim to identify markets for use of the residues as permitted by current UK legislation.

3.2 Techniques for Minimising the Harmfulness and Quantity of Residues

Control of incoming wastes and process design are key to minimising the quantity and harmful nature of waste residues. The installation will only handle non-hazardous wastes from known sources. These will be inspected to identify and remove non permitted components. Wastes are then homogenised in the reception pit prior to discharge into the furnace. Consequently there will be a number of control measures in place to prevent harmful materials from entering the combustion chamber.

The process design will also be optimised to ensure an even spread of incoming waste materials across the combustion grate and maximum burn-out of waste. The reverse-acting moving grate system is specifically designed for these purposes and, in so doing, maximises the opportunity for combustion of waste and minimises the volume of unburnt material being discharged as IBA. As discussed in Section 2.3, APC residues and reagent raw materials will be minimised through recycling back into the flue gas treatment process to use up unspent reagent.

The Best Available Techniques Report (SLR Ref: 407.0036.00463/BAT) submitted as part of this application provides a detailed assessment of the techniques proposed to be implemented at the facility.

Viridor will implement a programme of house keeping procedures: Any spillage of materials will be rapidly removed to enclosed areas / containers, and regular sweeping / cleaning of roadways will minimise the build up of and subsequent transport of dusts around the installation and off-site. All vehicles entering and leaving the installation will be enclosed, thereby minimising potential dust emissions during transport. Throughout the whole process, efforts will be made to reduce the release of dust, through a combination of enclosure of plant, preventative maintenance, monitoring and housekeeping.

Bottom ash will be transported from the furnace dischargers to the bottom ash storage area through enclosed conveyors. A dedicated wheeled loader will remove the ash onto HGVs for off-site removal to permitted premises. All vehicles carrying ash will be sheeted before leaving the building to minimise fugitive losses of dust, also ash will be damp.

Flue gas treatment residues will be removed from bag filters and stored in dedicated silos prior to off-site removal in fully enclosed tankers.

4.0 SUMMARY AND CONCLUSIONS

The most significant residues generated from the plant will be Incinerator Bottom Ash (IBA) and fly ash and air pollution control residue (APCR). IBA is the greatest quantity of these waste streams, comprising 22% of input tonnage to the incineration process. APCR comprise around 3-5% of input tonnage.

- Incinerator Bottom Ash and Fly Ash

IBA and Fly Ash are currently regarded as non-hazardous and can be recycled into secondary aggregates. The treatment requirements for this material are well documented and several UK suppliers of building products already use IBA. It is proposed that IBA will be treated and recycled to produce aggregate material at an on site plant adjoining the EfW and will provide processing and storage capacity for the anticipated 60,500tpa of recyclable aggregate to be generated by the EfW facility.

- APCR

APCR will be collected in silos prior to off-site tankering for disposal. The lime content of APCR causes high alkalinity of the waste, which is consequently classified as hazardous. Currently there is no commercially viable recycling route in the UK, and these residues are removed by enclosed tankers to designated hazardous waste landfill sites.

- Metals

Ferrous and non-ferrous metals will be recovered on-site using magnetic and eddy current separators, respectively. On-site metals extraction will also help ensure that the quality of IBA is suitable for reuse in aggregates. Extracted metals will be sold as scrap.

In conclusion Viridor has identified the key residues arising from the plant and indicative quantities generated. The management options for each waste stream are well understood and preliminary discussions with potential recipients of the wastes for recycling are encouraging. Viridor is committed to continuing engagement with these companies and identifying practicable opportunities for outlets for other residues typically disposed of in landfill.

When operational, waste disposal routes will be regularly audited to ensure legal and contractual compliance. A resource efficiency and waste minimisation programme will also be established to ensure that reagent use is minimised and that new opportunities for reusing and recycling process by-products are identified and acted upon at the earliest opportunity.

5.0 CLOSURE

This report has been prepared by SLR Consulting Limited with all reasonable skill, care and diligence, and taking account of the manpower and resources devoted to it by agreement with the client. Information reported herein is based on the interpretation of data collected and has been accepted in good faith as being accurate and valid.

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