WARD

Nottingham Operating Techniques Appendix 4 February 2026

Fragmentiser (aka metal shredder) Process Description

1 dry process (with water injection) hammer mill fragmentiser, Texas 98/104 NG 4000HP electric operated, continuous operation, 125 tonnes per hr (3000 tonnes per day based on 24 hr operation) capacity for treating non-hazardous (5.4 A (1) b) (iv)) & hazardous wastes for recovery (5.3 A (1) a) (ii)). Re Hazardous waste for recovery the actual daily treatment capacity for 5.3 A (1) a) (ii) is likely to be in region of approx. 500 tonnes.

From OT section 2.6 The 'daily treatment capacity' of the shredder STU is 3,000 tonnes, based on 24-hour operation. Additionally, the site permit restricts annual throughput to 480,000 tonnes.

The actual daily treatment capacity for 5.3 A (1) a) (ii) is likely to be in region of approx. 500 tonnes.

The metal shredding plant and downstream plant and processes are specifically designed, commissioned and operated to be fit for purpose, considering physical hazards and including an assessment of the environmental risks and emissions from the plant and processes.

A process flow plan of the process is attached as Appendix 3, with an outline description of the process as follows:

i) Pre-shredder
All depolluted ELV, flattened / logged and baled ELV scrap, plus ELV depolluted on site will be fed into a pre-shredder machine to reduce the risk of deflagrations/ energy releases. The depolluted and baled ELV will be stockpiled separately from shredder infeed in a designated area adjacent to the pre-shredder. Any non-conforming items identified are segregated. The pre-shredder is a hydraulically driven, high torque, low speed machine which uses a slicing action to tear open

automotive baled material without generating sources of ignition. Once processed the feedstock will be visually inspected by the material handler operative for any further non-conforming items before being placed either directly onto the horizontal loading section of the shredder infeed conveyor, or into a stockpile adjacent to the infeed conveyor.

The pre-shredder machine is enclosed within its own high steel supported structure building to minimise potential noise emissions.

ii) Shredder infeed

Feed stock is stockpiled near to the fragmentation plant for loading with the aid of a Material scrap handler (MSH) aka grab crane. All feed materials are placed onto the horizontal loading section of the infeed conveyor. The conveyor is hydraulically driven and consists of a static frame and support structure within which the steel fabricated belt carries the loaded feed materials. The uppermost section of the infeed conveyor is provided with rubber curtains that extend over the infeed chute of the scrap shredder to prevent uncontrolled ejection of high velocity fragments from the Fragmentiser.

iii) Shredder / fragmentiser

Feed materials fall by gravity from the head section of the infeed conveyor into the infeed chute of the Fragmentiser. In the lower section of the infeed chute, a single feed roller compression device is fitted. This device is a hydraulically driven roller which move in a rotational motion as well as up and down. Their purpose is to provide initial densification of feed materials and to control / regulate the ingress of feed material into the shredding chamber of the Fragmentiser.

The Fragmentiser is a top and bottom discharge Hammer mill. A cylindrical fourteen hammer rotor is turned by a 4000HP electric motor, within a heavily fabricated steel enclosure. A vibration isolation system comprising spring dampeners is fitted between the concrete stanchions (on which the fragmentiser is mounted) and the fragmentiser itself.

The fragmentiser has a rotor which uses hammers to cut and grind the waste into ‘fist sized’ fragments. Material entering the Fragmentiser is disintegrated by rotating hammers and an interactive shredding mechanism. The shredding chamber of the fragmentiser is fitted with sizing grids and an ejection door for the safe removal of unshreddable materials. The fist sized fragments then fall through holes into the inside of the mill. The scrap comprising of a mixture of materials leaves the shredding chamber via the under-mill vibrator. The under-mill vibrator feeds the mixed material onto a conveyor for transport to the ferrous

cleaning system which is comprised of an air system, magnet system and eddy current system.

A PLC controlled water injection system is fitted for suppression of dust and emissions from the fragmentiser. This system is adjustable and can be operated at 100% capacity if required e.g. in the event of a fire. Additionally, a separate dousing system can be operated in an emergency which floods the shredder exit belt with water.

iv) The air system mainly comprises of a large rotary fan, ZBox (cascade), large plenum chamber with cyclones attached either side, rotary valves, and baghouse filter. The ZBox is positioned over the transfer conveyor / cascade shaker, that feeds the light and heavy mixed scrap material into it. The ZBox (cascade) works by way of a high counter air flow to the passage of the main material to be separated. The mixed scrap material is dropped into the top of the ZBox where it falls under gravity to the bottom. A large rotary fan supplying air, enters the lower chamber of the ZBox driving the airflow in an upwards direction. The airflow takes the light fraction and dust upward and enters the plenum chamber and cyclones thereby cleaning the heavy fraction scrap material. The light fraction and dust fines are then separated out by way of the plenum chamber and cyclones. The air system is a closed loop and with adjustable balance line vented to atmosphere by way of a baghouse filter. Residual air leaving the top of the cyclones is recirculated through the closed loop for reuse within the system. A small portion of air containing very fine particulate matter is captured within the baghouse filter and the cleaned air is able to be vented to atmosphere through the stack at emission point A1a. A1 – the old emission location no longer exists as the pipework is part of a closed loop system. Rotary valves located beneath the plenum chamber and cyclones, collect, and discharge the light fraction onto the waste conveyor. The waste is transported to the 'waste downstream plant' where light non-ferrous materials are recovered. The material that is not lifted into the air system enters the magnet system via vibratory feeder where the steel or ferrous material is extracted from the waste via a large rotating drum magnet.

v) At the waste plant the material is sized through a trommel and then passed over a dual eddy current separation system which removes any non-ferrous metallics from this light waste stream. This is achieved by eddy current magnets throwing non-ferrous material over a rotating shaft, where it is stored in a storage bay. The non-ferrous metallic stream is sent for further processing off-site (Non-Ferrous Residue NFR). The remaining waste stream is sent for further processing off-site (shredder waste / Metal Shredder Residue (MSR).

vi) The remaining heavy fraction material leaves the cleaning drum and is transported by conveyor to the magnetic separation drum magnet. Material falls by way of an enclosed chute onto the drum magnet vibrating deck conveyor where two material streams are produced namely, ferrous and non-ferrous.

vii) The magnetic ferrous materials are lifted over the magnet drum onto a new conveyor. Any non-magnetic non-ferrous material will pass under the drum magnet turned at 90 degrees on to another conveyor and into a storage bay

The magnetic ferrous material is moved by conveyor to a picking station where non-conforming material such as copper wire or armatures are removed by hand. The material is then dropped onto a further conveyor where the material is stacked by a radial stacker. This ferrous material is finally stockpiled ready for delivery as furnace feed to the steelworks.

Dust suppression details are shown in Appendix 3 – in summary, the principal abatement consists of water injection on the fragmentiser mill and the air system, which comprises cyclones and fabric filter technology.

The downstream plant is fed by conveyors – the majority of which are fully enclosed or equipped with water sprays as required. There is an improvement plan in place to cover the remainder of the non-metallic fraction process equipment that is not currently covered. Plans to enclose the shredder plant in an acoustic enclosure are being considered. Plans for installation to be confirmed. This is not required for emissions control. Emissions are adequately controlled by the other control techniques, which meet BAT, and it is not appropriate to fully enclose the shredder.

The wastes and residues discharge into bays. In terms of non-metallic fraction wastes and residues; SDA/SMW residue and SDA / SMW waste bays are enclosed on 3 sides and covered. Non-ferrous light fraction bay is enclosed on 3 sides and covered with netting.

An improvement plan is in place to cover the frag waste and frag residue output bays which currently comprises of a three-sided bunker, with misting sprays.

There is an appropriate regular inspection and maintenance programme covering all plant and equipment. This includes the shredder, the downstream plant and any protective equipment such as water injection and cyclone systems, curtains and covers which are required to minimise fugitive releases.