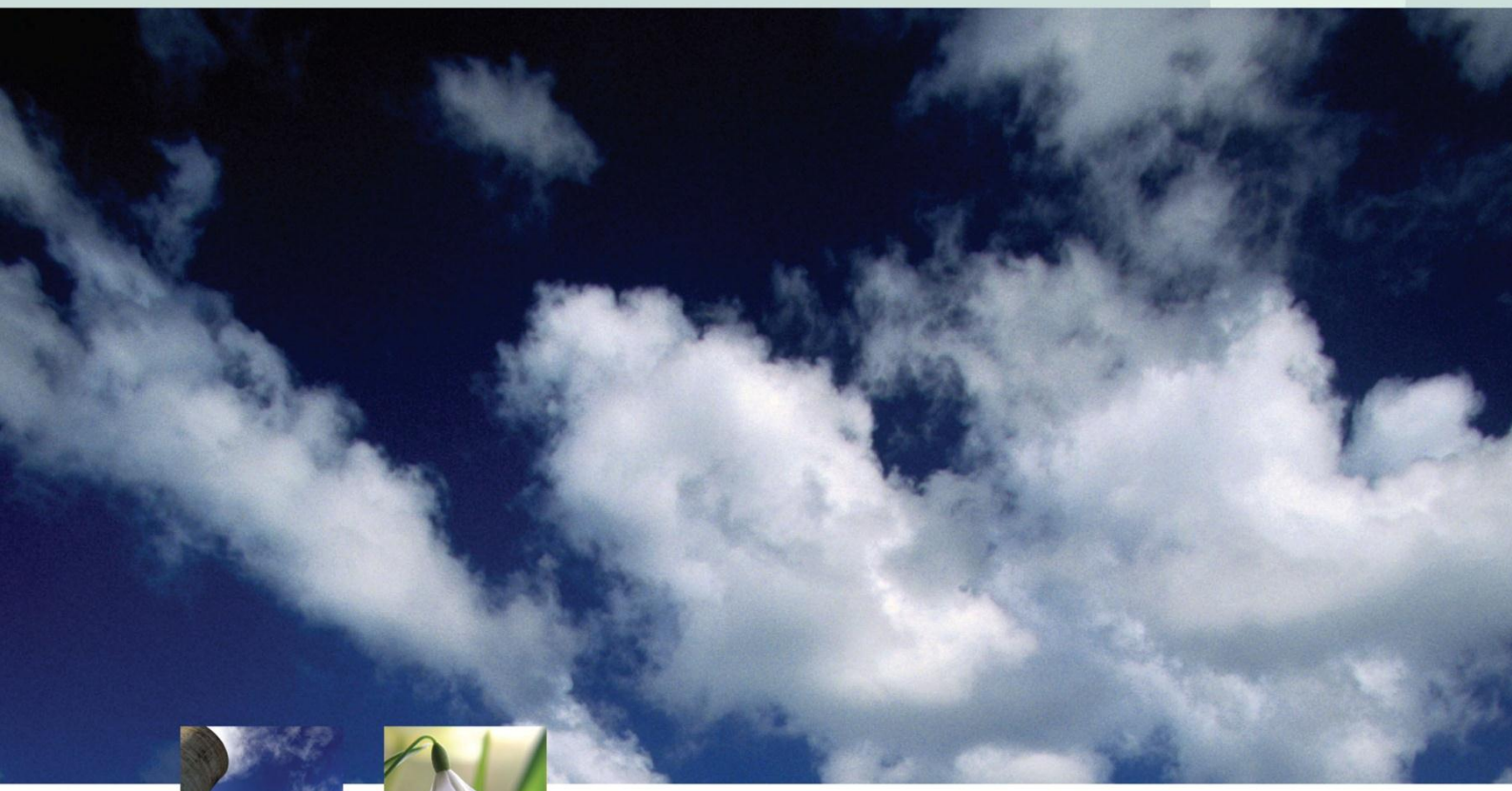

EPR APPLICATION VARIATION: VOLUME 1

Aleris Recycling (Swansea) Ltd
Waunarlwydd, Swansea
EPR/EP3935UC

Prepared by:
Sol Environment Ltd

Date:
April 2013

Project or Issue Number:
SOL0113AL01 VOL 1

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Contract/Proposal No:	SOL0113AL01 VOLUME 1
Issue:	1
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Date:	April 2013

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VERSION CONTROL RECORD

Issue	Description of Status	Date	Reviewer Initials	Authors Initials
1	First Issue to Natural Resources Wales	10/05/2013	HB	SB

Contents

NON TECHNICAL SUMMARY

Aleris Recycling (Swansea) Ltd ('Aleris' hereafter) are permitted to operate an existing Part A(1) '*Non Ferrous Metals*' Installation for their secondary aluminium recycling facility in Waunarlwydd, Swansea.

The facility is regulated under Chapter 2 '*Production and Processing of Metals*', Section 2.2 '*Non-Ferrous Metals*' Part A(1) paragraph (b) *'Melting, including making alloys, of non-ferrous metals, including recovered products (such as refining or foundry casting) where-*

i) The plant has a melting capacity of more than 4 tonnes per day of lead or cadmium or 20 tonnes per day for all other metals.'

The site is currently permitted under the conditions established by Environmental Permit EP3935UC.

As required by the EPR regime, the company operates an Environmental Management System which has been designed around, and certified to, the international environmental standard ISO14001:2004 and EMAS. Under the requirements of these standards and under the requirements of Permit Condition 2.7 '*Energy Efficie*ncy' the company has made commitments to reduce both the specific energy use, impacts to the environment and resource usage associated with it operations. One of the key means through which the above objectives have been achieved is through the installation of oxygen enriched combustion systems on their rotary furnaces and the upgrading of the emissions abatement systems.

In addition to the above, a number of changes in the nature of the operations at the site have necessitated a variation to the existing EPR permit and associated conditions.

The key changes on site are provided below;

- A change in the Installation Boundary arising from both the need to increase the available external raw materials storage space and to account for the closure of manufacturing operations of the wider Alcoa Manufacturing (GB) Ltd site ('AMGB' hereafter) and the fact that Aleris no longer has a technical linkage (or shared installation boundary) with AMGB[1];
- A change in the combustion control and melting technologies on both rotary furnaces to include oxygen enriched (Oxy-Fuel) combustion systems;
- The installation of a replacement baghouse abatement plant which replaces both the existing baghouse plants;
- Minor changes in the external plant layout of the site; and
- To address a number of minor operational changes and minor permit application inaccuracies[2] identified since the original determination and issuance of the original Installation Permit EP3935UC.

1 Since the closure of AMGB's manufacturing operations, Aleris no longer directly transfer dross/molten metal to AMGB.

2 The original application overcommitted the emissions performance of the plant and hence unachievable ELV's were agreed with the Environment Agency in the original permit.

OPERATIONAL CONTROLS

Aleris operates and maintains a formal environmental management system which has been certified to meet the requirements of the International Standard BS EN ISO14001:2004 and EMAS.

All key plant and equipment is fully automated and operated through PLC and SCADA controls.

All releases to atmosphere are extracted and abated through the baghouse filtration plant. Since the original application, the main baghouse plant has been upgraded and replaced with a new but essentially similar plant. This plant also has sufficient duty to provide extraction and abatement to the salt cake / mudroom building. As such the existing mudroom baghouse has been decommissioned.

All surface water discharges associated with the site are collected and contained within a surface water collection system prior to release to controlled waters under consent. This system is fitted with an oil water interceptor prior to discharge to the environment.

All processes and emissions carried out within the installation have been compared to the indicative Best Available Techniques (BAT) and Emission Benchmarks stated within the Environment Agency Sector Guidance Note S2.02 '*Technical Guidance for Non-Ferrous Metals and the Production of Carbon and Graphite' (IPPC S2.02*)'. All processes and emissions are considered to meet the indicative BAT references for the sector.

RAW MATERIALS

The process modifications prompting this variation have also changed the nature of the materials processed by the plant. At the time of the original permit application the site was processing approximately 65,000 tonnes per annum of which approximately 40% was directly sourced from AMGB.

The closure of the neighbouring plant means that the site will no longer directly transfer aluminium dross from the AMGB ingot plant and instead is now 100% reliant on the procurement of secondary sourced aluminium scrap materials and used beverage cans (UBC's).

The site now uses lime, lime/carbon and sodium bicarbonate as sorbent additives within the abatement systems.

The introduction of oxygen enrichment (Oxy-Fuel) technologies on site necessitated the use of compressed liquid oxygen within the combustion processes.

AIR EMISSIONS

The changes in combustion technologies in this variation has resulted in a mass reduction in total air (combustion products) emissions arising from the plant.

The use of the oxygen enriched (Oxy-Fuel) combustion system has significantly reduced the mass volume of emissions produced at the site, but has subsequently increased concentrations of SO_2 emissions from the plant. Correspondingly, Aleris require an increase in their maximum SO_2 ELV to reflect the change in combustion systems in use at site.

The proposed emission limit is 50mg/m^3 which is within the indicative sector BREF benchmark ELV.

The increase in SO_2 concentrations is as a direct response to the reduction in volumetric flow of combustion products from the site. The proposed increase in emission limit values is still within the indicative benchmark ELV concentrations provided within the Sector Guidance Note S2.02 *Technical Guidance for Non-Ferrous Metals and the Production of Carbon and Graphite'*

The company also requests that in increase in the permissible VOC emissions from the plant are permitted. The increase is required for same reasons as the increases in SO_2 ELV's. Furthermore, since the original application the profile of the raw materials processed at the site has changed, which combined with the reduced volume of combustion products necessitates an increase in ELVs at the plant.

The proposed emission limit is 50mg/m^3 which is within the indicative sector BREF benchmark ELV.

It would be anticipated that the reduction in combustion products from the site would be expected to give rise to an increase in Nitrogen Oxide (NOx) emissions. However the site has reported that as the plant can achieve the existing permitted ELV of 60mg/m^3 there is no requirement to increase the NOx ELV beyond the existing permitted concentrations. Sector benchmarks for NOx emissions with Oxy-Fuel are 300mg/m^3.

The replacement of the main filter baghouse has allowed the existing mudroom/saltcake baghouse abatement plant (and emission point A3) to be decommissioned. All emissions from the plant are now released from A4.

WATER RELEASES

The new storage area has introduced approximately 1.25 acres of new concrete hardstanding which drains to the Gors Fawr Brook. All surface water emissions discharge from the site via the existing authorized release point WA1 and are controlled by an oil/water interceptor.

There are no proposed changes to any water emission ELV's from the site

All other aspects of the Installation will essentially remain and continue to operate in a largely similar manner as currently.

IMPACTS TO THE ENVIRONMENT

The Applicant has carried out detailed air dispersion and impact modeling in order to assess the effects of this potential increase in emission concentrations of both SO_2 and VOC to the 50mg/m^3 respectively.

Sulphur Dioxide: The findings of the assessment indicate that the long term PEC is predicted to be less than <70% of the long term EAL and the process contribution is less that 2% of the EAL. At a majority of the receptor locations, the short term process contributions re predicted to be less than 10% of the short term AQS values and less than 20% of the headroom figures. There are no exceedences of the long term air quality standards.

Volatile Organic Compounds (VOC's): The findings of the assessment the long term PEC figures are <70% of the long term AQS at all locations and the process contributions is predicted to be <2% of the AQS. The short

term process contribution is predicted to be less than 10% of the short term AQS and less than 20% of the headroom at all receptors.

Therefore given that Aleris' variation requests that the ELV for SO_2 and VOC's emissions increased to the indicative sector benchmark, and that the impacts the emissions will not cause a breach of long term or short term air quality standards it has been determined that the overall impact is negligible.

BEST AVAILABLE TECHNIQUES

The over-riding principle under the Environmental Permitting (EP) regime is the use of Best Available Techniques (BAT) to prevent and, where that is not practicable, generally to reduce emissions and the impact on the environment as a whole. In determining the application of BAT, consideration of other criteria, is also appropriate, so that the application of BAT can be clearly defined, particularly if there are cross media effects.

Aleris' operational control and emissions abatement systems will meet all of the indicative sector BAT requirements e.g. use of oxy fuel combustion, use of low sulphur fuels, dust abatement through the use of baghouses etc and are able to demonstrate that sector benchmark Emissions Limit Values are met for all parameters.

Oxy-Fuel combustion is a recognised with in the Sector Guidance Note as being a Best Available Technique and is quoted as follows:

'Oxygen enrichment and oxyfuel burners should also be considered as the volume of the products of combustion is markedly reduced by the elimination of nitrogen. The benefit in terms of cost and fuel efficiency is off set to a degree by the costs arising from oxygen manufacture, but significant environmental benefit can arise as a consequence of the much smaller volumes of exhaust gas. providing a reduced gas volume and better energy efficiency.'

Further BAT considerations for this variation are the reduced consumption of energy, with reduced environmental impacts from airborne emissions associated with the increased energy efficiency of using Oxygen enriched combustion. The use of oxy-fuel combustion systems in the rotary furnaces has allowed production to be largely switched to one furnace, thus leading to a substantial increase in resource efficiency through both the reduction in primary energy use, but also through the reduced demand on ancillary plant (extraction systems etc), improved process control, reduction in the use of fluxes, and reduced maintenance.

In the long term, and if sufficient secondary sourced materials can be procured, it is the intention to operate both rotary furnaces on a continuous basis.

1 INTRODUCTION

This document (SOL0113AL01 Volume 1) provides supporting evidence as required by Parts 2 to 6 of the Environmental Permit Application Form Part C2 provided by Natural Resources Wales. The application is made on the behalf of Aleris Recycling (Swansea) Ltd ('The Operator' or 'The Company') by Sol Environment Ltd, and relates to a Variation of their existing Permitted Installation (EPR/EP3935UC) to take into account a number of minor process and operational changes that have taken place at the facility since the granting of their original application in 2007.

Aleris Recycling (Swansea) Ltd ('the Site') is located at Waunarlwydd Works, Waunarlwydd, Swansea, SA5 4SF. This Installation is operated in accordance with the conditions made by EPR/EP3935UC which has been made under Section 2.2 'Non-Ferrous Metals' Part A(1) paragraph (b) 'Melting, including making alloys, of non ferrous metals, including recovered products (such as refining or foundry casting) where-

i) The plant has a melting capacity of more than 4 tonnes per day of lead or cadmium or 20 tonnes per day for all other metals.

The company is making this variation application to address a number of operational changes that have taken place on site since 2007 namely:

- The closure of the wider Alcoa Manufacturing (GB) Ltd site ('AMGB' hereafter) resulting in Aleris no longer being technically linked (or having a shared installation boundary) with AMGB[3];
- A change in the combustion control and melting technologies to include oxygen enriched (Oxy-Fuel) combustion which has resulted in a significant improvement in the energy efficiency and emissions performance of the facility;
- The installation of a new single baghouse abatement plant;
- Minor changes in the external layout of the site; and
- To address a number of minor operational changes and minor permit application inaccuracies[4] that have been identified within the Installation since the determination and issuance of the original Installation Permit EP3935UC.

Since the closure of the adjacent Alcoa plant, Aleris has had to source the 40% material shortfall that was historically provided directly by AMGB. Although Aleris have been successful in sourcing secondary aluminium supplies for the plant to meet the shortfall, a much larger proportion of baled secondary scrap materials are now received and handled by the facility.

3 The site no longer processes dross or transfers molten metals directly from or to the AMGB site.

4 At the time of the original application the original Applicant IMCO recycling Ltd overstated the performance of the plant and quoted ELV's which were unachievable.

This change in material make up combined with the change in combustion control systems have resulted in a change in the emissions characteristics and require a variation to the site emission limits values (ELV's) to be made.

The changes described in this variation have further reduced the specific energy use on the site as well as reducing the overall mass emissions of atmospheric emissions from the plant.

This variation is also being used to formally document a number of minor changes at the site most notably the recent modifications to the site combustion systems, replacement baghouse plant and the extension to the Installation Boundary.

The variation of the permit will bring about the following changes to the process and requires to be made in relation to the following key aspects of the site:

- **Installation Boundary:** The installation boundary is required to be slightly increased to accommodate Storage and Handling of Raw Materials (Directly Associated Activities);
- **Raw Materials:** Key changes to the quantity and location of the type of materials stored and used at site;
- **Operational Techniques:** The change in combustion technology on both rotary furnaces will give rise to a net reduction in atmospheric emissions of the site but will result in an increase in the concentrations of the sulphur dioxide emissions.
- **Emissions:** This variation sets to establish revised emission limit values in line with the ELV's stated within the *Sector Guidance Note IPPC S.2.02 'Technical Guidance for Non-Ferrous Metals and the Production of Carbon and Graphite'.* All atmospheric emissions from the plant are now released via Authorised Release Point A4.

All other aspects of the Installation will essentially remain and continue to operate in a largely similar manner as currently. Where information provided in the original IPPC permit application[5] and subsequent variations is unchanged as a result of this proposed change, reference to the relevant information contained in the original application and variation application is made in this current variation application report.

The remainder of this application support document is structured accordingly:

- Section 2: Provides a details of the Planning Status of the Site;
- Section 3: Provides specific nature of the proposed changes associated with the variation application;
- Section 4: Provides specific nature and detailed description of the emissions to air and water associated with the installation;
- Section 5: Provides an Environmental Impact and Assessment of the Installation against the requirements of H1.

5 Submitted by Imco Recycling Ltd during December 2001 and subsequently granted 5th September 2003

This document forms Volume 1: Application Support Document and should be read in conjunction with Volume 2: Technical Appendices.

The boundary of the current installation and the new proposed Installation Boundary is provided below and marked in Figure 2 in Appendix A.

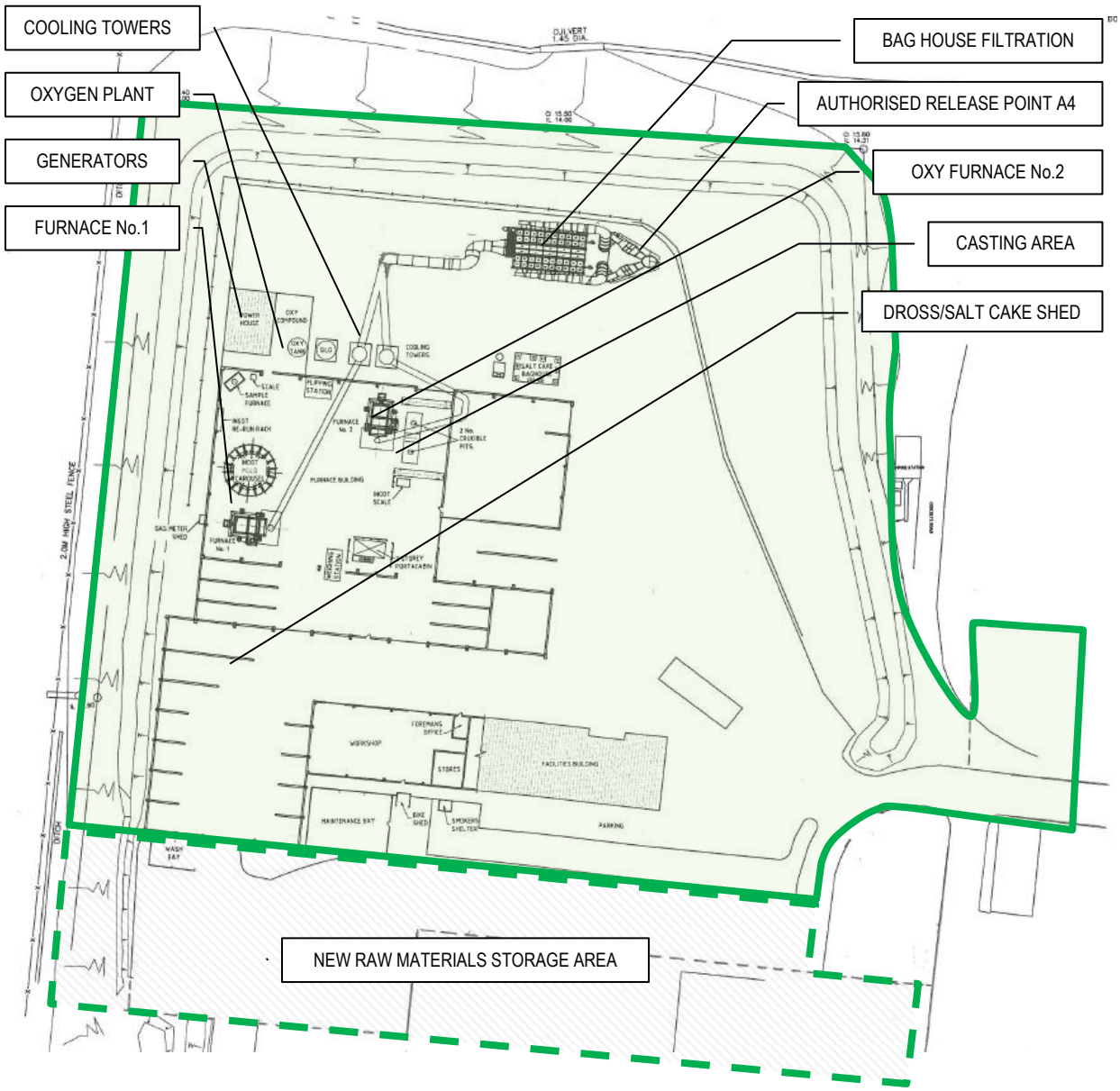

Figure 1: Installation Boundary

2 PLANNING STATUS

City and County of Swansea (Planning Authority) have been consulted in relation to works brought about by the installation of the replacement baghouse.

Confirmation has been provided by the Planning Authority that the extant permissions on site (Class B) Lawfully Permit these changes and that no further planning permission is required.

As such, there are no changes to the planning status of the site brought about by this Variation.

Documentation relating to this confirmation is provided in Annex B2.

3 PROPOSED CHANGES

The standard rules you are applying for.

3.1 Description of the Proposed Changes

Aleris Recycling (Swansea) Ltd (the '*Operator*' or '*Applicant*') are making an application for a 'Normal Variation' of their existing permitted installation EP3935UC.

The existing permit has been made under Chapter 2 '*Production and Processing of Metals*', Section 2.2 '*Non-Ferrous Metals*' Part A(1) paragraph (b) *'Melting, including making alloys, of non-ferrous metals, including recovered products (such as refining or foundry casting) where-*

i) The plant has a melting capacity of more than 4 tonnes per day of lead or cadmium or 20 tonnes per day for all other metals.'

Aleris Recycling in common with all aluminium processors is a high temperature, energy-intensive process. The key environmental impacts associated with the process are associated with the emissions of products of combustion i.e. sulphur dioxide, carbon dioxide, and nitrogen oxides. Furnace emissions also contain dust, volatile organic compounds, traces of chlorides, fluorides and metals if present as impurities in the raw materials.

The main reasons for the Operator to be making this variation is two fold, primarily it is to permit the change in combustion technologies used on both rotary furnaces and the associated effects on atmospheric emissions, secondly Aleris wish to formally increase their Installation Boundary to include an additional area for the external storage of clean scrap materials Baled secondary source scrap and used beverage cans (UBC's)).

The variation of the permit will bring about the following changes to the process and requires to be made in relation to the following key aspects of the site:

- *Raw Materials:* Key changes to the quantity, type and location of materials stored and used at site;
- *Installation Boundary:* The scope of the installation boundary as defined by Schedule 5 of EP3935UC has increased to accommodate some of the former AMGB 'Extrusion' plant land for the purposes of raw material storage. As such the installation boundary now incorporates an external yard area (part of the former Alcoa Extrusion plant) to the south of the site for the storage of clean scrap material;
- *Operational Techniques:* The combustion technologies used at the Installation now include oxygen enrichment resulting in a significant reduction in combustion products from the process. Oxy-Fuel systems require the replacement of combustion air with pure oxygen.
- *Air Emissions*: The net atmospheric emissions of the site will reduce, however the concentration of the sulphur dioxide and VOC emissions have increased proportionally. The replacement of the main baghouse abatement plant means that all emissions are now released from the Authorised Release Point A4.

All of the changes brought about by this variation are considered to be inline and consistent with the current Sector and EU sector BREF guidance notes, which promotes the use of oxygen enrichment (Oxy-Fuel) combustion systems and revises the atmospheric emissions associated with the process accordingly.

The technical guidance note used in the preparation of this application document is:

- EPR 2.02 Sector Guidance Note '*Technical Guidance for Non-Ferrous Metals and the Production of Carbon and Graphite'*;
- EU BREF Guidance Note: Integrated Pollution Prevention and Control (IPPC): *'Reference Document on Best Available Techniques in the Non-Ferrous Metals Industries December 2001'*.

The main issues identified within this guidance document and the relevant Best Available Techniques have been built into the procedures that the site will follow during operation of the site.

3.2 Changes to the Existing Activities

3.2.1 Installation Boundary

Due to the change in raw material usage and the increased volume of merchant scrap materials processed on site. Aleris have increased their leased area from the site owners AMGB by 1.25 acres, for the purposes of storing baled scrap aluminium feedstocks.

The use of this area for a listed directly associated activity necessitates the need to increase the permitted boundary of the site

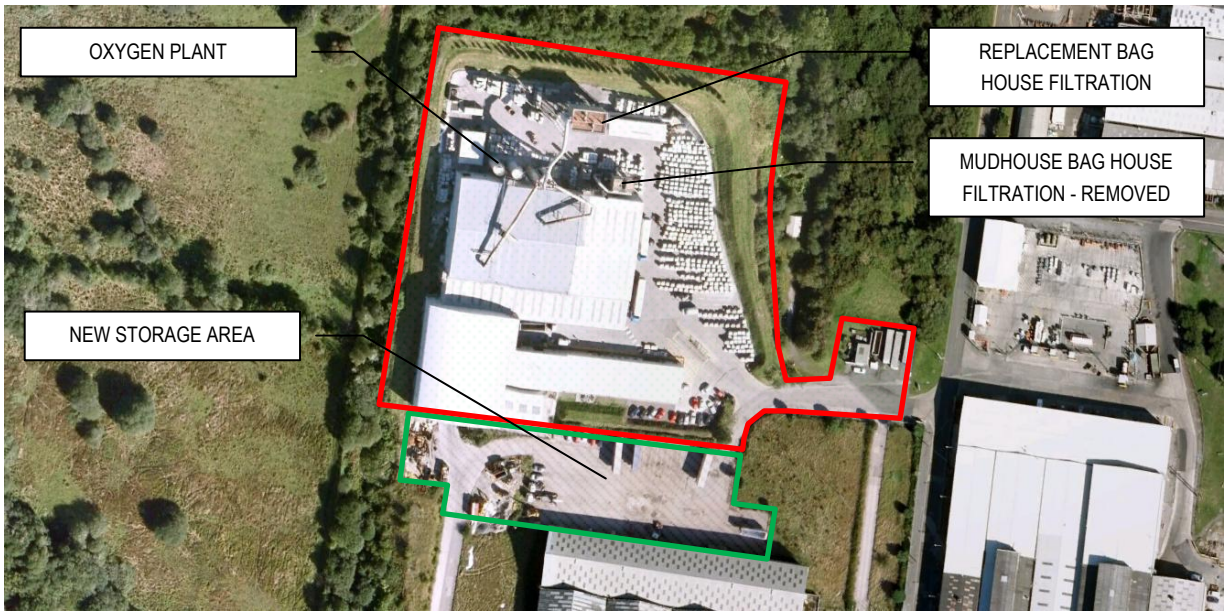

Figure 2: Proposed Changes

All areas used for storage comprise concrete hardstanding. An H5 assessment of this new area has been carried out and is included as part of this variation application. The H5 Assessment of the historical land use of this area and provides a contamination baseline. All materials stored in this location are clean and uncontaminated and will predominantly comprise lacquered materials.

The use of this new area for the storage of baled scrap materials does not increase the potential for ground contamination from the site.

No other changes to the site Installation Boundary have taken place.

The entire Installation now occupies an area of approximately 6.5 acres.

The nature of the proposed changes has not introduced any new potentially contaminating chemicals or materials. Therefore no changes to the existing Site Condition Report are required.

3.2.2 Site Infrastructure and design

Surface Water Drainage

The drainage infrastructure for the Installation, remains largely unchanged. All drainage systems on the main site are as per the original permit application document and discharge under consent to the Gors Fawr Brook.

All site drainage associated with the new external area of the site are discharged directly to Aleris' oil water interceptor prior to discharge to the Gors Fawr Brook.

The details of the drainage system is provided in Volume 2 - Annex A.

3.3 Description of the process

The changes to the site have not bought about a significant change in the overall manufacturing processes at the site; however there are a number of key changes that need to be incorporated into this Variation.

A summary description of each of the key changes is provided below, with more detailed descriptions provided within Sections below:

- The site no longer directly processes and transfers dross and molten metal to and from the [now closed] AMGB facility. The main materials processed by Aleris are now predominantly secondary sourced aluminium scrap materials.
- The combustion systems installed on both rotary furnaces has been replaced with oxygen enriched burner (Oxy-fuel) systems, requiring the installation of a new oxygen plant and enabling a majority of production to be switched to one single furnace[6].
- The main site baghouse abatement plant has been replaced with a new, but essentially similar unit.

The key plant and equipment associated with the Installation are as follows:

- **Rotary Furnaces:** The melting processes at Aleris are still based on two tilting rotary furnaces, which are considered BAT for the recovery of aluminium from drosses, slags and other secondary sources materials.

  Both furnaces are identical in design and comprise of a 'long' refractory lined rotating cylinder fitted with a single oxy-fuel burner. Charging is carried out via the burner end of the furnace.

  The furnace rotation can be varied to give a complete reaction of the charged material and high efficiency. Raw materials are charged via an end door, which is enclosed and extracted to prevent fume emissions.

[6] Rotary Furnace will be operated on a continuous basis should plant volumes be increased.

All of the fumes emitted during the charging process is collected in the charging chamber and extracted by the fume abatement (baghouse) plant.

Both furnaces have now been fitted with oxy-fuel burners, requiring the installation of new burner technologies, new internal door and sealing arrangements.

Slags and recovered molten metal produced during the process are poured by tilting the furnace. Tilting rotary furnaces provide improved recovery rates over conventional rotary furnaces and have less reliance on fluxes.

The general description of both furnaces remains largely unchanged from the original application document, with the exception of the upgraded burner systems and the associated installation of new sealing door systems.

Both of these measures have significantly improved the energy efficiency of the process, led to a net reduction in combustion emissions and enabled all higher production throughput for each furnace. At present a majority of the production is carried out on Furnace No.2, with Furnace No.1 being utilised when production demands require.

It is the intention of Aleris to utilise both furnaces on a full time basis, should production demand require.

- **Combustion Systems:** The furnace burner systems for both rotary furnaces haves been replaced by an Oxy-Fuel system. Oxy-Fuel systems provide three basic benefits over conventional combustion systems:

  i) Oxy-Fuel provides an increase in heat transfer rate made possible by a higher flame temperature. For an air aspirated natural gas burner systems (as per the previous installed system and Furnace No.1), the maximum achievable flame temperature was approximately 1850°C, with a furnace temperature typically operated at about 1700°C. The use of enriched oxygen within the combustion system can boost this to over 2700°C, which significantly increases both the radiant heat transfer of the flame to the metal and the refractory lining. This increase in heat transfer has been used to reduce the overall fuel consumption of the process whilst achieving the same historical production throughput from one single furnace.

  ii) The second advantage of Oxy-Fuel burners over air aspirated systems is lower waste gas volumes. The use of Oxy-Fuel prevents the need to use ambient air, and hence reduces flue gas volumes substantially and eliminates the need to heat significant quantities of nitrogen. Oxy-Fuel combustion systems produce around 70% less flue gas than conventional air-fuel burners of the same rating. Less flue gas results in higher flue gas residence times in the furnace, improved heat convection and transfer, reduced flue gas heat loss, reduced flue gas clean-up and extraction systems, less dust entrainment, solids loss and workplace fume.

iii) The third advantage of oxygen is better flame control and flame stability, thus enabling a high degree of process control and furnace optimisation.

The installation of the Oxy-Fuel system has necessitated the installation of an external liquid oxygen supply plant (40,800L tank) in the northern portion of the site. This plant comprises a large vertical storage tank and associated gas compression, regulation and vaporisation plant.

The burner system for each rotary furnace comprises a single 6MWth rated burner capable of delivering 600Nm^3/h of gas and oxygen respectively.

This plant is installed in a dedicated compound directly to the rear of the main Furnace Building. Photos of the plant are provided in Annex D – Photolog.

- **Charging Systems**: All feed material is weighed and charged into the rotary furnace chamber by means of mobile equipment. All furnace charging remains identical to the description provided in the permit original application document.

- **Furnace and fume cleaning:** All fumes produced by the rotary furnaces are collected by the fume extraction hoods and ducted to the main extraction and abatement plant. The plant has been subject to replacement, however the mass, form and function of the new plant is essentially similar (albeit lower) to the plant described in the original application document.

  The new plant is equipped with a bank of Cleanpulse Nomex filters fitted with sodium bicarbonate sorbent injection, in lieu of the lime injection systems fitted previously. The CleanPulse filter is based on tubular mounted filter elements of fabric filtration media.

  The plant incorporates standard tubular bags with cages and venturies which are 127mm diameter are 4.5m in length.

  Table 3.1 provides details relating to the '*as-installed*' baghouse specification.

Table 3.1: Filter Plant Parameter

Parameter	Specification
Air Volume	268,553 Am^3/hr
Filter Arrangement	120 rows of 14 bags
Area per bag	1.8 m^2
Total Bags	1680
Filtration Area	3016.7 m^2
Filter Bag types (media)	Nomex[7]
Operating Temperatures	200^{o}C (220^{o}C Max)

7 Nomex is a registered trademark for flame-resistant meta-aramid material developed by DuPont.

Stated Performance[8]	
Dust	< 5mg/Nm^3
HCl	< 10mg/Nm^3

All emissions associated with the main baghouse filtration plant emits to atmosphere via a single 23 metre high stack (Authorised Release Point A4).

All emissions from the Salt Slag handling area are now extracted and abated by the new plant.

Photographs of the plant are provided in Volume 2 - Annex D – Photolog.

- Salt Slag Handling Fugitive Emissions Plant: This plant is no longer required and has now been decommissioned. All emissions from the Salt Slag storage area are now released to atmosphere via Authorised Release Point A4.

- Authorised Release Point A3 no longer exists.

3.3.1 Raw Materials

The changes proposed by this variation require an amendment to be made to the raw materials used within the process.

The fundamental raw materials for the process have not changed significantly since the original application, however the quantities and proportion have differed significantly. Table 3.2 below provides an overview of the key changes:

Table 3.2: Raw materials Usage

Material	Original Application (% of total)	Current volumes (%) (2010 – 2013)	Quantity per annum (approx.) Tonnes	Storage description
Metal Recovery				
Coated Scrap	15%	1 – 4%	1500 – 1900	'New' external area
Uncoated scrap	18%	1 - 2%	100 - 1000	'New' external area
Dross	60%	50 – 60%	25,000 – 35,000	Covered bunkers (as existing)
Endstock	7%	0-1%	0 - 500	Paved area or in bays
Foil		2 – 4%	900 - 2000	Paved area or in bays
Baled Scrap (UBC's)		13 – 30%	7,000 – 18,000	Paved area
Swarf / Turnings		6 – 7%	3,000 – 4,000	Covered bunkers
Other		7 – 12%	4,000 – 7,000	Covered bunkers
Totals	Approx 65,000 TPA		Approx 52 – 52,000 TPA	
Fluxes	**Original Quantity**	Current Quantity		

8 At reference conditions 273K Pressure 101.3kPA 11% Oxygen

Sodium Chloride	55%	60 (55-70%)	5170 TPA	Covered bunkers
Potassium Chloride	45%o	40 (30-45%)	3450 TPA	Covered bunkers
Cryolite	300T	-	300T	
Total	6500 Tonnes	-	8620	
Abatement Plant Sorbants				
Lime	430 TPA	-	-	No longer used
Bi Carb	None	-	153	Sealed Silo
Oxygen Plant	None	-	2,677 T	External pressure vessel
Gas use	75,200 MWh[9]	30,377 – 37,977 MWh[10]	50% reduction in gas use since 2000	Pipeline

The secondary aluminium accepted onto site is sourced from the commercial market and generally comprises the following materials and descriptions (Table 3.3).

Table 3.3: EWC Codes and Mirror Entries from List of Waste 'Thesaurus'

Consignment Description	Applicable EWC Waste Codes	Comments
Aluminium	02 01 10, 12 01 03, 12 01 04, 15 01 04, 16 01 18, 17 04 02, 19 12 03, 20 01 40	All materials will be free from oil and contamination and accepted in accordance with EMS Procedure WI SR 1.0 Testing Raw Materials and SI SR 1.1 Visual Inspection Raw Materials
Aluminium Cans	15 01 04	
Aluminium Dross (Thermal Metallurgy)	10 03 04*, 10 03 05, 10 03 09*, 10 03 16	
Aluminium Foil	15 01 04, 19 12 03, 20 01 40	
Aluminium Skimmings	10 03 15*, 10 03 16	
Aluminium Slags	10 03 04*	
Ferrous metal scrap	02 01 10, 12 01 01, 12 01 02, 15 01 04, 16 01 17, 17 04 05, 17 04 09*, 19 01 02, 19 10 01, 19 12 02, 20 01 40	
Ferrous metal turnings	12 01 01, 17 04 05, 17 04 09*, 19 10 01, 19 12 02, 20 01 40	
Ferrous swarf	12 01 01, 17 04 05, 17 04 09*, 19 10 01, 19 12 02, 20 01 40	
Non Ferrous Scrap Metal	02 01 10, 12 01 03, 12 01 04, 15 01 04, 15 01 11*, 16 01 18, 17 04 07, 17 04 09*, 19 10 02, 19 12, 03, 20 01 40	
Non Ferrous Swarf	12 01 03	
Scrap metal - non-ferrous	02 01 10, 12 01 03, 12 01 04, 15 01 04, 15 01 11*, 16 01 18, 17 04 07, 17 04 09*, 19 10 02, 19 12, 03, 20 01 40	

[9] Based on 2000 data: annual gas usage 2,565,526 Therms

[10] Based on 2010 – 2013 CCLA / EPR reporting data

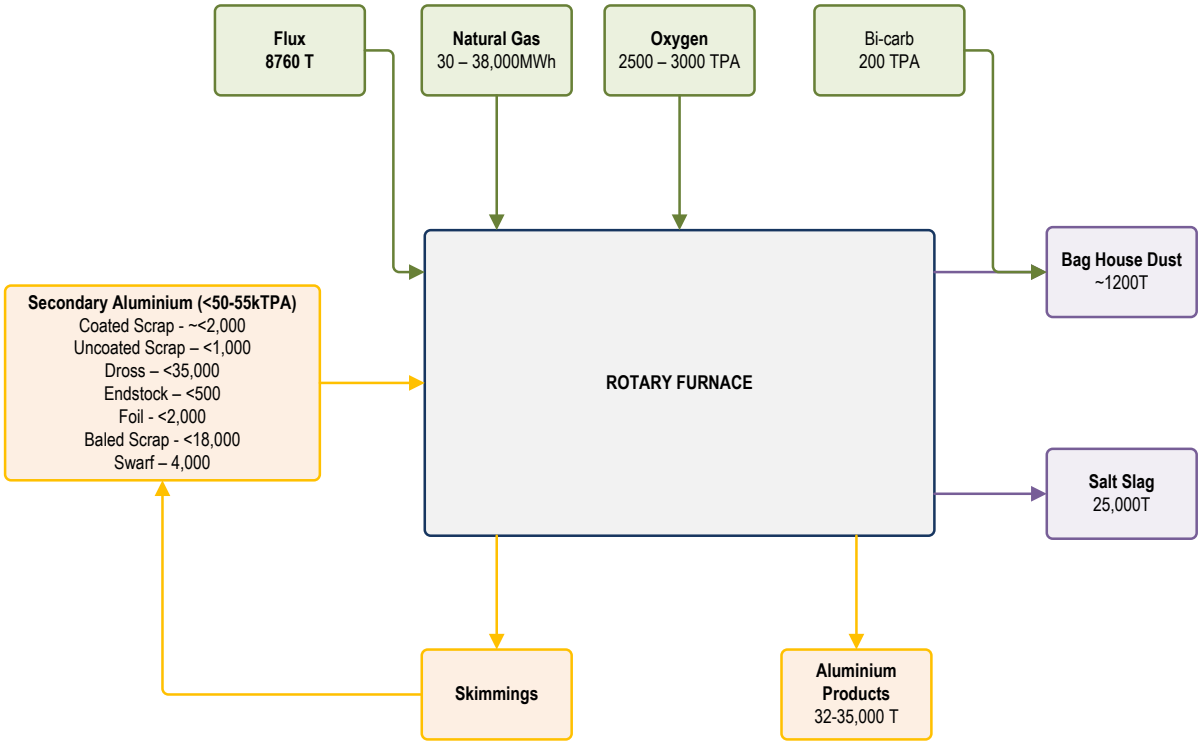

Figure 3: Simplified Mass Balance – Aleris Recycling Ltd

Since the closure of the AMGB plant in 2007, Aleris has had to have an increased reliance on secondary (market) sourced materials. The purchase and supply of market sourced material is in accordance with an agreed quality specification and supply agreements. The company operate a number of procedures to ensure that materials are devoid of contamination from iron, plastics, grease, explosive material, hollow containers etc.

The greater reliance on market sourced material has led to the general increase baled scrap material (Used Beverage Cans or UBC's) and an overall reduction in the quantity of lacquered and un-lacquered can, tab and endstock (i.e. AMGB) materials processed on site.

Accordingly the use of these feedstocks in combination with the change in the combustion technology leads to an unavoidable increase in the percentage concentration of sulphur and VOC emissions from the process. The increase in concentration does not reflect a greater mass emission of pollutants but is a net result of the smaller volume of combustion products produced by the process.

The impact of these increased emissions concentrations have been subject to air impact /dispersion modelling and calculation and have been included in Section 5 '*Impacts*' of this variation.

Water use

There is no change in the overall water use at site. No water is used in the aluminum recovery processes at Aleris.

A very limited quantity of water is used for normal domestic sanitary uses only.

3.4 Energy Use

Aleris Recycling (Swansea) Ltd are a member of the Umbrella Climate Change Agreement for the aluminium, titanium and magnesium sector (PP2.02). Aleris' facility number under this agreement is AF/IMCO/216.

The change in combustion systems from air aspirated gas to Oxy-Fuel combustion has led to a significant reduction in energy use and ensured that the facility target under the CCLA has been met.

Tables 3.4 and 3.5 below provide an overview of the historical and current energy consumption for the installation.

Table 3.4 Energy Consumption (2012)[11]

	Quantity Used 2012 *(2000 comparison)*	Delivered MWh	Primary MWh	% of total (Primary)
Electricity	3,816,000 kWh *(4,909,907)*	3,816 *(4,909)*	9,921 *(12,739)*	24.11% *(14.3%)*
Gas	30,273,000 kWh *(75,200,000)*	30,273 *(75,200)*	30,273 *(75,200)*	73.59% *(84.4%)*
Diesel[1]	88,743 litres *(108,220)*	949 *(1,146)*	949 *(1,146)*	2.30% *(1.3%)*
Total		**35,038**	**41,143 *(89,100)***	**100%**

3.4.1 Specific Energy Consumption

Table 3.5 summarises the Specific Energy Consumption per finished tonne of product at Aleris for the period of 2012, together with the range of BAT specific energy consumption for rotary furnace melting stated in the BREF note for non-ferrous metals.

The improvements made by the introduction of Oxy-Fuel systems have enabled the sector BREF BAT SEC of 1111 – 3333kWh/tonne to be met by the plant.

Table 3.5: Total Energy Consumption

Activity	2000	2012
Input (tonnes)	52,729	49,870
Total Energy (MWh)[12]	89,100 MWh 320,757,503 MJ	41,143 mWh 148,114,800 MJ
Output (tonnes)	34,000	32,135
Specific Energy Consumption MWh/tonne (Input)	1.69	0.825

[11] Diesel oil consumption is for mobile plant and not consumed in the process. Diesel = 10.7KWh per litre. The delivered MWh figures are a tool to compare the proportions of energy supplied to the installation

[12] The primary MWh are figures that represent the amount of primary fuel that is needed to supply the energy to the installation. The conversion factor for delivered electricity to the equivalent primary energy is 2.6, as stated in the Environment Agency guidance document H2 'Energy Efficiency'.

(MJ/tonne(Input))	(6,084)	(2,970)
Specific Energy Consumption MWh/tonne (Output) (MJ/tonne (Output))	2.62 (9,435)	1.28 (4,609)

Note: (1) Sourced from BAT Reference Note for Non-ferrous metals

3.4.2 Environmental Emissions

A summary of estimated CO_2 emissions resulting from energy usage is presented in Table 3.6.

Table 3.6: Annual Emissions of Carbon Dioxide (2012)[13]

	Tonnes *(2000 Comparison)*	%
Electricity	2002 (2119)	25.7% (12.7%)
Gas	5558 *(14,286)*	71.4% *(85.7%)*
Diesel	228 *(275)*	2.9% *(1.6%)*
Total	**7788** ***(16,680)***	**100%**

[13] CO_2 emissions (tonnes) = Energy consumption (kWh) x Fuel emission factor (kg CO_2/kWh) x 0.001
Electricity = 0.545 kgCO_2/kWh
Gas = 0.185 kgCO_2/kWh
Diesel = 0.267kgCO_2/kWh

4 EMISSIONS AND THEIR ABATEMENT

4.1 Emissions to air

Point-source Emissions to Air

A number of revisions to the specific emissions limit values from the plant are requested as a result of this variation application. Following the replacement of the main baghouse abatement plant, Emission Point A3 has now been decommissioned. All atmospheric emissions from the site are released via A4.

Under this variation application Aleris are requesting that their emission limit concentrations are revised to reflect the increases in emissions concentrations that will arise as a direct result of the reduced volume of combustion products from the Oxy-Fuel systems. It is important to note that the increased ELV's are only associated with the reduction of combustion product volume and not due to any other process control constraints or failure to be able to operate the plant within the indicative BAT ELV parameters.

Although increases in NOx are expected as a result of the use of Oxy-Fuel systems (a benchmark figure of 300mg/m^3 is quoted as part of the adopted and draft BREF and Sector Guidance Notes for Oxy-Fuel systems), Aleris have not had any compliance issues associated with meeting their existing ELV of 60mg/m^3. Therefore no changes in the ELV of NOx is proposed.

Table 4.1 overleaf provides details of the emission points, proposed ELV's, specific sources and monitoring frequency[14].

14 All extractive monitoring will be carried out using MCERTS qualified contractors and approved methodology as agreed with the Environment Agency / Natural Resources Wales.

Table 4.1: Emissions from the site						
Emission point	**Parameter**	**Monthly Ave**	**Unit**	**Source**	**Monitoring Frequency**	**Comment**
A4	PM	5[15]	mgm^{-3}	Release from furnace, post baghouse filter	Continuous and Annual Extractive	Key Note: It is proposed that the ELV for Sulphur Dioxide and VOC's are amended to reflect the reduced volumetric flow: Proposed BAT ELV's are all within the range quoted and 'Benchmark' within S2.02 and within the EU Sector BREF document.
	NOx	60	mgm^{-3}		Bi-Annual Extractive	
	HCl	10	mgm^{-3}		Quarterly Extractive	
	VOC	50	mgm^{-3}		Quarterly Extractive	
	SO_2	50	mgm^{-3}		Quarterly Extractive	
	HF	2	mgm^{-3}		Bi-Annual Extractive	
	Dioxin	0.1			Annual Extractive	

Note; Authorised Emission Point A3 has now been decommissioned and removed.

15 Rolling 3 hour average emissions

4.2 Emissions to water

4.2.1 Emissions to Controlled Water (WA1)

The emissions from the plant releasing to controlled waters will as a result of this variation now include the discharges arising from both the main site surface water run off and the new 1.25 acre external storage area surface to the south of the main site.

All surface water will be discharged to the site water drains after the main interceptor, into the Gors Fawr Brook (tributary to the Afon Llan) as per the current permit requirements (Authorised emission Point WA1).

There are no direct emissions from the process to controlled waters.

There are no proposed changes associated with the releases to the Gors Fawr Brook (WA1), as such Table 6.3.3 will remain as shown in Table 4.2 below;

Table 4.2: Emission limits into water

Parameter	Emission Point WA1	Monitoring Frequency
Total Suspended Solids – Spot Sample	50 mg/l	Monthly
Total Dissolved Solids – Spot Sample	1200 mg/l	Monthly
Oil and Grease Spot Sample	10	Monthly
Copper and its compounds as Cu (mgl^{-1}) Spot Sample	0.25	6 Monthly
Lead and its compounds as Pbu (mgl^{-1}) Spot Sample	0.1	6 Monthly
Tin and its compounds as Sn (mgl^{-1}) Spot Sample	0.1	6 Monthly
Zinc and its compounds as Zn (mgl^{-1}) Spot Sample	0.5	6 Monthly
Aluminium and its compounds as Al (mgl^{-1}) Spot Sample	1.5	Monthly
Mercury and its compounds as Hg (mgl^{-1}) Spot Sample	0.075	6 Monthly
Arsenic and its compounds as As (mgl^{-1}) Spot Sample	0.1	6 Monthly
Nickel and its compounds as Ni (mgl^{-1}) Spot Sample	0.5	6 Monthly
Ammoninical nitrogen as N (mgl^{-1})	1.5	Monthly
pH max	9	Monthly
pH min	6	Monthly

4.2.2 Emissions to Sewer (S1)

There will be no emissions to sewer arising from the Installation.

4.3 Emissions to land

There will be no emissions to land arising from the Installation.

4.4 Emissions of Waste

Table 4.3 below provides information relating to the typical disposal quantities and environmental fates of all waste materials arising at the Installation.

Table 4.3: Waste arisings and disposal

Substance	Quantity (Tonnes)	Waste Type (E.G. Hazardous)	Fate
Salt Slag	~25,000	Hazardous	R04
Main baghouse filter dust	0	Hazardous	R04
Main baghouse filter dust	~ 1500	Non-Hazardous	D09
Mudroom baghouse filter dust	0	Hazardous	R04
Refractory Waste	<0.5	Hazardous	R04
Interceptor Residue	<0.5	Hazardous	R04
Oily Waste	2	Hazardous	R13
Main baghouse filters	<0.1	Hazardous	D10
Mudroom baghouse filters	<0.1	Hazardous	D10
General Non-hazardous Waste	<100	Non-Hazardous	R3 / R4
Canteen waste	<20	Non-Hazardous	D1
Vehicle wash waters	~ 100	Hazardous	D09

5 IMPACTS

5.1 Impacts of emissions to air

The change in the combustion technology from air aspirated gas burners to oxygen enriched (Oxy-Fuel) systems is recognised and leading to a significant reduction (up to 50% or more) reduction in the overall mass emissions of combustion products, whilst also leading to an increase in the concentration of a number of parameters (specifically nitrogen oxides, sulphur dioxides).

Furthermore, due to the nature of the processes at Aleris, the current VOC emission limit value originally agreed as part of the original permit is considered too stringent for compliance to be assured by the Installation.

As such a number of revised ELV have been approached in line with the indicative benchmark concentrations quoted in the Sector BREF guidance notes and EPR Sector Guidance Notes EPR2.02.

Consequently, in order to assess the impact of this potential increase in emission concentrations, Aleris have commissioned AES (Analytical and Environmental Services Ltd) to undertake a detailed dispersion modeling assessment. The purpose of the assessment is to ascertain the impacts of the proposed increased emissions concentration on the ambient air quality standards and local receptors.

The key sources of information used to assess these impacts are as follows:

- Process and emissions data provided by Aleris Recycling (Swansea) Ltd;
- Site layout from Aleris and Ordnance Survey mapping;
- Baseline air quality data from surveys undertaken by Government bodies, Local Authorities and third parties;
- Ordnance Survey (OS) maps of the local area; and
- Meteorological data supplied by Atmospheric Dispersion Modeling Ltd.

The dispersion of emissions in this assessment is predicted using an appropriate dispersion model, with results presented in tabular and graphical form. The assessment considers short and long-term effects in relation to the air quality standards set in legislation and in Government and international guidance.

5.1.1 Dispersion Model & Methodology

The model used by AES to provide this assessment is the AERMOD advanced atmospheric dispersion model that has been developed and validated by USEPA. The model has been used extensively throughout the UK for regulatory compliance purposes and is accepted as an appropriate air quality modeling tool by the Environment Agency and local authorities.

The table below details the physical and process stack parameters for the furnace baghouse stack. This data has been derived from the extractive sampling obtained in 2008.

All prediction have been performed using the worst case operating times and conditions – 100% operation of the process operating throughout the year.

Table 5.1 Stack Physical and Process Parameters	
Parameter	**Value A4**
Stack Height	23 m
Stack Diameter	1.5 m
Volume Flow at Reference Conditions	53.3 m^3/s
Efflux Temperature (^oK)	358
Efflux Velocity (m/s)	31

All of the input parameters including, among others, data describing the local area, meteorological measurements, terrain data and emissions data are provided in Volume 2 - Annex B of this application report.

5.1.2 Receptor Data

The receptors considered during the assessment were both local human receptors, chosen on the basis of location and likely exposure duration and ecological receptors as defined by the requirement of H1.

Locations of all of the 14 identified receptors are provided within figure below Volume 2 - Annex B3 and listed below:

- Nearest Receptor - Oak Drive;
- Eastern Property – Tir Y Farchnad;
- Residential Receptor – Liiw Valley Close;
- Eastern Property – Alder Way;
- Residential Receptor – Dobes Acres;
- Residential Receptor – Roseland Road;
- Residential Property – Keepers Lodge Farm;
- Residential Property – Glasfryn Terrace;
- Residential Property – Pen Y Fodau Fawr;
- Residential Property – Cae'r Bont;
- Residential Property – Hoel Will George
- Residential Property – Sardis Close;
- Residential Property – Sardis Close; and
- Residential Property – Hoel Will George.

5.1.3 Background concentrations used in the assessment

Swansea County Council has not declared any AQMAs within its jurisdictional area

Annual mean background concentrations have been derived from the Defra maps for the grid square centred on the installation. The estimated annual mean background concentration of SO_2 from the PCM model for the 1km grid square covering the installation is 12 µg.Nm^{-3}.

The annual average process contribution is added to the annual average background concentration to give a total concentration at each receptor location.

For the current assessment, conservative short-term ambient levels have been derived by applying a factor of two to the annual mean background data as per the recommendation in Environment Agency Horizontal Guidance H1 Annex (f).

5.1.4 Modelled Air Quality Impacts

Based on the methodology used for this assessment and using the dispersion factors derived,

Sulphur Dioxide: The findings of the assessment indicate that the long term PEC is predicted to be less than <70% of the long term EAL and the process contribution is less that 2% of the EAL. At a majority of the receptor locations, the short term process contributions re predicted to be less than 10% of the short term AQS values and less than 20% of the headroom figures. There are no exceedences of the long term air quality standards.

Volatile Organic Compounds (VOC's); The findings of the assessment the long term PEC figures are <70% of the long term AQS at all locations and the process contributions is predicted to be <2% of the AQS. The short term process contribution is predicted to be less than 10% of the short term AQS and less than 20% of the headroom at all receptors.

Furthermore, due to the fact that the changes brought about by this variation have already taken place and that the mass release of emissions has remained unchanged (i.e. there is no increase in total mass deposition), the impacts on habitat receptors has not taken place.

Therefore given that Aleris' variation requests that the ELV for SO_2 and VOC's emissions increased to the indicative sector benchmark, and that the impacts the emissions will not cause a breach of long term or short term air quality standards it has been determined that the overall impact is negligible.

5.2 Impacts to Water

There are no impacts to water arising from this variation. All proposed emissions to controlled water are within the existing permitted consents / emission limit values.

5.3 Impacts to Land

There are no impacts to Land arising from this variation.