Supporting documentation for permit application for EPR/NP3025MA/P001

JDR Cable Systems Ltd, Northumberland Energy Park, Blyth

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Comments

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Revision		Status	
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C*nn*	Contractual	S2	Information
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1. Non-Technical Summary

1.1 Activities requiring an environmental permit

This report provides the supporting information for a bespoke permit application for JDR Cable Systems Ltd's (JDR's) facility at Unit 1 Northumberland Energy Park, East Sleekburn, Bedlington, Blyth, NE22 7FJ. The bespoke installation permit is being applied for to undertake lead melting and extrusion of the molten lead into a protective layer around high voltage cables.

Lead melting and extrusion constitutes a regulated activity because the melting pot has a melting capacity of more than 4 tonnes per day. The installation is surrounded by other cable manufacturing activities undertaken in the same building. However, none of the other cable manufacturing operations are regulated in their own right and are not connected to the lead melting and extruding in a way that would constitute a Directly Associated Activity (DAA).

There are, however, certain activities included in the application which constitute DAAs. These are material storage and handling, the cooling plant for the extruder and air extraction and abatement plant serving the lead melting pot and extruder.

The lead melting and extruding plant were selected based on established technology used within a sister site to JDR. The plant is provided by a competent technology supplier with over six decades of cable lead sheath production experience.

1.2 Environmental management, raw materials and water management

The entire site's activities are being incorporated into JDR's Environmental Management System (EMS) that operates on all its other UK sites. A set of corporate policies and procedures will apply to the site and these will be supplemented with site specific procedures and documentation reflecting the regulated activity and DAAs.

Certification to an international management system standard will be expanded to the Blyth site. The EMS follows the Plan-Do-Check-Act (PDCA) cycle

There is only one raw material required to undertake the process, which is lead in ingot form. A limited number of additional materials are required to ensure all plant and equipment operate efficiently and reliably. These materials have been identified, and annual consumption is estimated to be very low.

Water consumption by the regulated activity and associated DAAs is minimal. Water consumption will be limited to top up water for the closed loop cooling circuit. Consumption will arise as a result of cooling water system servicing or to replace minor losses arising due to evaporation.

1.3 Process waste management

The regulated activity and DAAs will generate a small number of process waste streams. The largest stream by volume is waste lead, which will arise due to the start and end of a cable or start-up/shut-down of the plant. Small volumes of air emissions abatement plant waste and plant servicing or maintenance waste will also be produced.

The installation will seek to reuse waste on site or, where this is not possible, apply the waste hierarchy.

1.4 Emissions and Nuisance risk

There are no channelled point source process emissions to air as a result of the process, which will be undertaken inside the building. Air extracted from various points of the process will be treated in a series of filters to a high standard, enabling the discharge of treated air into the building without risks to workers.

There are no process emissions to surface water or groundwater. Minor fugitive emissions risks are presented by any accidents or spillages associated with material delivery or waste pickup in the external yard areas. Pollution prevention control measures include full retention interceptors to deal with any accidental release from the wider site. However the volumes associated with the lead melting and extrusion process are very small and the frequency of delivery and collections will be low.

There is no external processes or plant associated with the regulated activity. Any noise generated would be part of the overall manufacturing noise profile inside the building. In addition, due to the nature of the process and ancillary activities, there are no sources of potential malodour.

1.5 Environmental risk assessment

Sensitive human and ecological receptors have been identified and all potential impacts arising from the lead melting and extrusion activity have been assessed following the guidance set out by the Environment Agency and other relevant agencies, such as Natural England.

Risks from emissions to air, water and land were assessed alongside noise. It was concluded that existing process and pollution prevention and control measures in place at the wider site and specific to the lead melting and extrusion process are satisfactory in controlling and minimising potential environmental risks.

2. Introduction

This report provides the supporting information for the permit application EPR/NP3025MA/P001 for JDR Cable Systems Ltd's (JDR's) facility at Unit 1 Northumberland Energy Park, East Sleekburn, Bedlington, Blyth, NE22 7FJ.

The information presented support the requirements of the following permit application forms:

- Part A – about you
- Part B2 – new bespoke permit
- Part B3 – new bespoke installation
- Part F1 – charges and declarations

Basic pre-application advice was sought from the Environment Agency (EA) and the resulting written advice has been included as Appendix A. The application has been prepared in consideration of the guidance given.

2.1 Overview of Site Operations

The site manufactures high voltage subsea and land power cables. The production process can be split into various stages as follows:

- **Conductor manufacture:** Includes the drawing of copper or aluminium wire from incoming packs of rod, then the twisting of the resulting wires into stranded conductors of various cross-sections.
- **Insulation of the conductor through the Continuous Catenary Vulcanising (CCV) process:** Involves the simultaneous extrusion of three polymeric layers around the conductor, and their subsequent vulcanisation (crosslinking). The respective thicknesses of the three layers are dependent upon the electrical rating of the cable.
- **Degassing:** Diffusing the catalyst decomposition by-products from the insulation package in a controlled manner. The decomposition by-products include acetophenone (liquid), cumyl alcohol (liquid) and methane (gaseous).
- **Circuit / water protection:** Dependant on the electrical system design, the cable will include a metallic layer over the triple layer extruded insulation package to allow for the circuit protection to be activated following a spiking event. That metallic layer can include a helically applied copper or aluminium wire screen, a longitudinally welded aluminium sheath or extruded lead sheath, either individual solutions or multiple if the fault protection is very high, such as for National Grid 40 kA/3 sec. Both the welded aluminium and lead sheaths are also classified as water barriers.
- **Extruded Covering / Final Sheath:** An extruded thermoplastic polymeric layer is used to finish the individual power core. The extrudate includes a high density polyethylene, a semi-conductive polyolefin compound, or a layer of polyethylene costed with a thin skin of semi-conductive polyolefin.
- **Electrical testing of the single cables**. This is the final process for land cables.
- **Assembly of the final product:** For submarine cables, three single core power cables are assembled in the vertical assembly tower (VLM). Communication cables (fibreoptic) and fillers (plastic shapes or polypropylene string bundles) are added to produce a stable cylindrical product, which is bound by a tape.
- **Addition of physical protection and marking:** Polypropylene roving or extruded polyethylene are applied over the laid up three cores. Steel wire armour and bitumen are applied as a second layer. The final applied layer is either a second layer of polypropylene roving or extruded polyethylene, dependant on the finished cable design.

2.2 Activities requiring an Environmental Permit (the Regulated Activity)

The regulated activity forms a small part of the site's operations and is limited to the melting and extrusion of the molten lead into a protective electrical sheath and water barrier. It is intended to incorporate lead into a number of the cable designs intended to be manufactured at the site, alongside the associated storage of raw materials (lead ingots). The lead alloy being processed is defined as Alloy E (BS EN 50307:2002).

This activity is regulated under Environmental Permitting (England and Wales) Regulations 2016, as amended, Schedule 1, Part 2, Section 2.2 Part A(1)(b):

"Melting, including making alloys of, non-ferrous metals, including recovered products and the operation of non-ferrous metal foundries where—…

(b) the ***plant has a melting capacity of more than 4 tonnes per day for lead****…"*

Under normal operating conditions for processing lead Alloy E, the plant installed at JDR's installation will have an extrusion capacity of 960 - 1080 kg/hr of lead which correlates with a required a melting capacity of approximately 1 t/hr. Although daily operational hours will vary, the plant is not restricted to running times of 4 hours per day, or less. Hence, the process has a daily melting capacity in excess of the 4 t/day threshold.

There are some Directly Associated Activities (DAA) for the lead melting and extruding process which are as follows:

- Lead ingot and ancillary materials /consumables delivery, handling and storage;
- Horizontal lead extruder closed loop cooling water system – but not the chilled water ring main system, which provides the cooling effect to the extruder cooling system via heat exchangers;
- Process air extraction and treatment from various points of the lead melting and extrusion plant.

Traditionally an extruded lead sheath has been included within subsea power cables to provide a hermetic radial water barrier to protect the dielectric insulation systems and ensure safe, reliable operation of cables at high-voltage and extra high-voltage. Without such a hermetic layer, and in modern polymeric insulation systems, the electrical field would tend to form electrical treeing degradation which ultimately leads to breakdown of the insulation. The lead sheath is therefore a safety layer protecting the insulation system and extending cable lifetime whilst the cable is submerged on the seabed.

The operator has, however, been successful in developing an economically viable cable design without lead for high voltage cables up to 66kV and 132kV. This technology has reduced the use of lead in subsea cables, by using water tolerant and water-tree resistant polymers. This technology cannot be extended to cables operating above 132 kV due to material limits. Therefore, for voltages above 132kV a hermetic barrier must be used to protect this dielectric insulation from premature failure.

For voltages above 132kV, it is possible to use aluminium, copper and stainless steel barrier layer technologies to provide the hermetic radial water barrier. However, these are not currently economically viable and may present other manufacturing, corrosion resistance or other reliability challenges when used in long-length subsea cable applications. Hence, the subsea cable manufacturing industry is presently using a lead sheath to provide the most economically and technologically suitable hermetic layer to protect the insulated conductors from premature failure.

The absence of suitable alternatives has been recognised with lead use in high voltage power cables not currently restricted under the UK or EU Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) regimes. An exemption under the Restriction of Hazardous Substances Directive (RoHS) also concerns the use of lead in high voltage cables due to there being no viable substitutes.

The UK currently imports its lead-sheathed subsea cables from multiple cable manufacturers globally, many of whom are in Europe, with similar lead sheathing extrusion processes to those described herein.

A permit review of the site's upstream and downstream cable manufacturing activities was performed to establish whether there are any additional operations that constitute regulated activities in their own right under the Environmental Permitting (England and Wales) Regulations 2016, as amended and to ascertain whether any of the other activities are categorised as DAA to the lead extrusion process. Limb I and Limb ii tests were applied as set out in Appendix 2 of the Regulatory Guidance Note RGN2 – Understanding the meaning of the regulated facility.[1]

The permit review concluded in the negative: none of the up or downstream cable manufacturing or ancillary activities undertaken at the wider site are either a 'listed' activity (also termed a 'regulated activity') in its own right nor a DAA.

2.3 Supporting Plan Drawings and Assessments

As the installation occupies a small footprint entirely inside the larger building also containing non-regulated activities. Two plans have been provided to show the location and setting of the site.

The Plan included as Appendix B.a shows the site location including local features to place the regulated facility it its local environment. The second plan included in Appendix B-b shows the regulated facility boundary and layout alongside its setting within the wider cable manufacturing building. The Drawing included in Appendix B-b also shows raw material and waste storage areas.

A site condition report has been prepared and is included in Appendix C.

An environmental risk assessment has been prepared following the guidance published on the EA website[2].

A Best Available Technique (BAT) assessment has been undertaken in line with the following applicable guidance documents:

- Technical guidance EPR2.03: Non Ferrous metal and the production of carbon and graphite, March 2009.
- Best Available Techniques (BAT) conclusions, under Directive 2010/75/EU of the European Parliament and of the Council, for the non-ferrous metals industries, June 2016.
- Reference Document on Best Available Techniques for Energy Efficiency, February 2009 as corrected in September 2021.

[1] RGN 2 - Understanding the meaning of regulated facility
[2] https://www.gov.uk/guidance/risk-assessments-for-your-environmental-permit

3. Environmental Management

3.1 Introduction

JDR Cable Systems Ltd (JDR) operates an EMS in line with the Plan-Do-Check-Act (PDCA) cycle. The EMS is certified to ISO 14001:2015 by a UKAS-accredited certifier and is subject to biannual audits to ensure the system continually improves. The certificate currently includes six locations across the UK. The certification will be expanded to include the Blyth site. Implementation of the EMS is underway at Blyth in preparation for certification.

3.2 Outline Summary of EMS

The most appropriate guidance setting out requirements on the EMS at the installation are considered to be the BREF Note and BAT conclusions (BATC) for non-ferrous metal industries identified in Section 2.3. Table 1 presents a summary of the JDR's EMS in comparison to the requirements of BAT1 from the non-ferrous metals industries BATC.

The UK sites' corporate and site specific policies have been used as a basis to describe in outline the EMS that will be in place At JDR Blyth site. Corporate policies and procedures have been referenced in Table 1, but Blyth site-specific documents have been omitted as they are under development.

Table 1: Outline summary of JDR's EMS compared to BAT requirements

BAT requirements [3]	JDRs EMS components	Document references
In order to improve the overall environmental performance, BAT is to implement and adhere to an environmental management system (EMS) that incorporates all of the following features:	The company has implemented a written Occupational Health and Safety (OH&S) and EMS (OHSEMS).	JQ0.01.12125 - UK Health, Safety and Environmental (HSE) Manual
Commitment of the management, including senior management	The Health, Safety, Environmental and Quality (HSEQ) Policy is signed by a Director of the company who holds the Chief Strategy and Compliance Officer position for the company. UK HSE Manual Section 4.1 – Leadership and Commitment, states the following: *"…The Executive Team at JDR are committed to the maintenance and development of the OH&S and Environmental Management Systems.* *The Integrated HSEQ Policy is set by the Executive Team and is signed by the Chief Executive Officer and the Board of Directors.* *It is reviewed annually to ensure that it continues to reflect the business needs."* The HSEQ policy statement states that "*the Executive Management Team maintains overall accountability for HSEQ performance and continual improvement of the management system.*"	JQ0.01.12125 - UK HSE Manual JQ2.02.6544 - HSEQ Policy

[3] Requirements derived from BAT1 within the Best Available Techniques (BAT) conclusions, under Directive 2010/75/EU of the European Parliament and of the Council, for the non-ferrous metals industries, June 2016

BAT requirements [3]	JDRs EMS components	Document references
An environmental policy that includes the continuous improvement of the installation by the management	The HSEQ Policy includes the following wording: *"Promote a strong HSEQ culture through employee involvement, continual improvement, and the provision of appropriate information, instruction, supervision, and training."* "*Establish and monitor annual HSEQ and sustainability objectives through audits, inspections, KPIs, and management review processes.*" "*Ensure the Executive Management Team maintains overall accountability for HSEQ performance and continual improvement of the management system."*	JQ2.02.6544 - HSEQ Policy JQ2.02.6544 HSEQ Policy
Planning and establishing the necessary procedures, objectives and targets, in conjunction with financial planning and investment	The OHSEMS is documented in the UK HSE Manual and structured as follows: **Level 1: HSE Manual** This document details the Integrated HSEQ Policy, structure of the Company and references key procedures aligned to ISO 45001:2018 & ISO 14001:2015 requirements. **Level 2: Procedures** These documents describe the process and controls applied to activities identified as key requirements of the OHSEMS. **Level 3: Work Instructions** These documents describe the actual process and controls applied to activities identified as key requirements of the OHSEMS as per the business, site and/or department. Objectives and Targets for the business are detailed in the published template JQ1.02.9582 - QHSE Objectives and Targets. Progress of objectives to achieve these targets is tracked on a monthly basis within the QHSE Objectives and Targets Smartsheet. Resources are discussed in Section 6 of the UK HSE Manual. The JDR Executive Team monitors resources to ensure operation, maintenance and improvement of the OHSEMS. Direct responsibility for resources lies with the Chief Operating Officer (COO). The level of resourcing is discussed at monthly management meetings and reviewed formally in the annual management review.	JQ0.01.12125UK HSE Manual JQ1.02.9582 - QHSE Objectives and Targets
Implementation of procedures paying particular attention to:		
(a) structure and responsibility;	Addressed in UK HSE Manual Section 4.3 which states: *"…The Executive Team ensure that all required roles within JDR are identified with a structure established to ensure all activities are undertaken with risk to people, product, process or the environment.* *All organograms are available on Livewire. The Management Representative for the OH&S and Environmental Management Systems is the UK HSE Manager.* *The following briefly details the key personnel with regard to setting and maintaining the* OHSEMS. • *Chief Executive Officer (CEO)* *The Chief Executive Officer is directly responsible to the board of directors for developing and implementing high level strategies, corporate decisions and managing overall operations and resources to achieve business objectives and satisfy customer requirements.* • *Chief Operating Officer (COO)*	JQ0.01.12125 - UK HSE Manual, Section 4.3

BAT requirements [3]	JDRs EMS components	Document references
	The Chief Operating Officer is directly responsible to the Chief Executive Officer. The Chief Operating Officer is responsible for the Company's Quality strategy and implementation. *• UK Operations Director* *The UK Operations Director is directly responsible to the Chief Operating Officer. The UK Operations Director is responsible for the overseeing of the Company's Operations, Quality, Health, Safety and Environmental strategy and implementation.* *• UK HSE Manager* *The UK HSE Manager is directly responsible to the UK Operations Director and responsible for all site HSE activities and maintaining the OHSEMS in accordance with ISO 45001:2018 & ISO 14001:2015 requirements…."*	
(b) recruitment, training, awareness and competence;	The Executive Team ensures that all personnel are suitably trained and have the required experience to perform their assigned activities. This is undertaken in accordance with: • Training & Development Policy. • Competency & Certificate Process. The company also utilises annual Personal Development Programmes to evaluate employees and encourage the adoption of values that shape and define the culture of the company. Employee competency levels are recorded using JQ2.16.12589 - Competency & Certificate Process. JDR ensures all persons undertaking work under their control are aware of the following: • JQ2.02.6544 HSEQ Policy. • JQ1.02.9582 – QHSE Objectives & Targets. The above are communicated via Livewire (the company intranet) and are also displayed in prominent places throughout the business.	JQ0.01.12125 - UK HSE Manual Section 6.2 and 6.3 JQ2.16.12596 - Training & Development Policy JQ2.16.12589 - Competency & Certificate Process JQ2.02.6544 HSEQ Policy JQ1.02.9582 – QHSE Objectives & Targets
(c) communication;	Internally, JDR communicates OHSEMS issues via the following: • Daily Hub meetings. • Toolbox Talks. • Key Risk Condition Campaigns. • Employee Forums. • Continuous Improvement Initiatives. • TH!NK Safety Observation System. • Site TH!NK Safety Notice Boards. JDR communicates with the customer through several different avenues, examples being: • Project Safety Days. • Regular Project Meetings. • Project HIRA Meetings. • Project HSE Meetings (Onshore/Offshore). • Project Pre Manufacturing Meetings. • Formal Health, Safety & Environmental Documentation. • Project Lessons Learnt Meetings (internal/client). • Customer Feedback (formal and informal).	JQ0.01.12125 - UK HSE Manual Section 6.4

BAT requirements [3]	JDRs EMS components	Document references
(d) employee involvement;	JDR encourages active and ongoing worker participation and consultation in the development and review of health and safety practices and, where appropriate, the development of the OHSEMS. The OHSEMS states that employees should participate in: • Hazard elimination and identification. • Training & competence. • Control measures. • Communication. Employees should be consulted on: • OHS Policies. • Measure & monitoring. • Continual improvement. • Audit procedures. • OH&S planning and objectives. • Assignment of responsibilities & roles. • Expectations and needs of involved parties.	JQ0.01.12125 - UK HSE Manual Section 4.4
(e) documentation;	All documentation utilised within the Company related to the OHSEMS or to the execution of individual customer contracts is controlled in accordance with QHSE Document Control Procedure. This procedure aims to ensure that documentation is issued to the appropriate personnel under the correct level of authority, and that it is revised and reissued as necessary and all obsolete versions are removed. The Company uses an electronic system to control documents. The UK HSE Manual and other key HSE documentation are maintained by the UK HSE Manager, who ensures that the appropriate documents, at the correct revision levels, are issued to all who need them within the Company. Project documentation is controlled by the use of project document controllers, who are responsible for the circulation of project documentation. The latest versions of these documents are accessible via the Project Material Data Record (MDR). Each project has a file which contains all relevant information (including HSE-specific requirements) in a structured manner. Information is held on the Company's computer system for ease of access. Storage facilities on- and off site ensure all stored records are identifiable and retrievable. Storage areas are free from damp and other agents which could cause premature deterioration to paper copies. Where records are maintained on computer magnetic media, back-ups are stored in separate protected locations to ensure security from loss or damage to active data.	JQ0.01.12125 - UK HSE Manual Section 6.5 JQ2.02.10125 - QHSE Document Control Procedure
(f) effective process control;	All work within JDR is planned and undertaken in accordance with the Company's procedures and any specific documents or requirements agreed for individual contracts. These activities are planned and controlled using the following procedures and software tools. • Project Management. • P6 – planning software to plan manufacturing operations	JQ0.01.12125 - UK HSE Manual Section 7.1 JQ2.06.10050 – Project Management JQ2.02.9592 – Process Control

BAT requirements [3]	JDRs EMS components	Document references
	• Process Control. • Supplier Validation Procedure.	
(g) maintenance programmes;	Company operates a Computerised Maintenance Management System (CMMS) called 'Limble'. Limble holds all asset information for machines, preventative maintenance plans, schedules and also coordinates responses to breakdowns. Maintenance arrangements are set out specifically in Asset Management and Maintenance Procedure Maintenance programmes are described in further detail in Section 4.4 to this document.	JQ3.22.14137 Asset Management and Maintenance Procedure
(h) emergency preparedness and response;	JDR's Operational teams are required to take the following steps should an emergency arise: • Assess emergency. • Stop, monitor, control, contain. • Ensure safety of all employees, contractors, visitors and buildings, calling the emergency services if required. • Liaison with relevant authorities. • Investigate / report. • Address action(s) required. The above will apply to the following as a minimum but not exclusively top these scenarios: • Emergency spillage of hazardous and non-Hazardous substances. • Fire. • Explosion. • Emissions gas, dust, fumes or other pollutants to air. • Pollution of water courses, surface water drains or foul water sewers. • Human health and safety incidents. Each JDR site has an Emergency Response Procedure, which covers further detail of potential emergencies and steps to take.	JQ0.01.12125 - UK HSE Manual Section 7.1 JQ2.01.14512 – Blyth Emergency Response Procedure
(i) safeguarding compliance with environmental legislation	A legal register is maintained and documented in a Smartsheet document. Internal compliance audits of the register are undertaken at planned intervals to evaluate compliance with legal requirements Compliance audits are carried out in accordance with the QHSE Audit Procedure.	JQ0.01.12125 - UK HSE Manual Legal register Smartsheet JQ2.02.8962 - QHSE Audit Procedure
Checking performance and taking corrective action, paying particular attention to:		
(a) monitoring and measurement	The JDR Executive Team has identified key metrics that require monitoring and measuring to ensure the effectiveness of the OHSEMS itself. All parameters that require monitoring are collated in a Smartsheet including what is monitored, any monitoring standards (if applicable), who is responsible and where results are to be stored. These metrics are managed via the monthly Senior Management meeting and annually in accordance with QHSE Management Review procedure. Lessons learned are recorded on a project by project basis in accordance with Lessons Learned Procedure Management. Any issues are raised and managed by the Project Manager.	JQ0.01.12125 - UK HSE Manual Section 8.1 Monitoring Programme Smartsheet JQ2.02.6019 - QHSE Management Review procedure

BAT requirements [3]	JDRs EMS components	Document references
		JQ2.06.13684 – Lessons Learned Procedure Management
(b) corrective and preventive action;	Any product or service that falls under JDR's control that does not conform to the required specification is highlighted and managed in accordance with Control of Non-Conformance and/or Quality Issue Management System procedures. Any additional risks highlighted due to a nonconformity are required to be fed back to the project team for inclusion in future project risk registers. Additional audits shall be scheduled to ensure that the non-conformity has been closed out successfully with robust preventive actions.	JQ0.01.12125 - UK HSE Manual Section 9.2 JQ2.02.12847 - Control of Non-Conformance and/or JQ3.00.12106 - Quality Issue Management System procedures
(c) maintenance of records;	All records are required to be retained and managed in accordance with QHSE Document Control Procedure.	JQ0.01.12125 - UK HSE Manual Section 10 JQ2.02.10125 – QHSE Document Control Procedure
(d) independent (where practicable) internal or external auditing in order to determine whether or not the EMS conforms to planned arrangements and has been properly implemented and maintained	Internal audits are undertaken of the OHSEMS in accordance with the QHSE Audit Procedure. Biannual external audits of the OHSEMS are undertaken by a UKAS-accredited certification body.	JQ0.01.12125 - UK HSE Manual Section 8.2 JQ2.02.8962 QHSE Audit Procedure
Review of the EMS and its continuing suitability, adequacy and effectiveness by senior management;	Annual management reviews of the suitability and effectiveness of the OHSEMS are undertaken annually. The reviews are chaired by the Chief Operating Officer. This review is undertaken in accordance with the QHSE Management Review procedure. Management review actions are allocated to ensure continued development and alignment with ISO 45001, ISO 14001 and business needs. The Executive Team is required to ensure participation of personnel responsible for the activities within the Management Review. The review follows a set agenda as per the relevant standard ensuring that all actions from this meeting are communicated to the appropriate areas. Confirmation that the requirements are carried out shall be recorded. Reviews also consider any additional monthly information collated by the UK Quality Manager and UK HSE Manger.	JQ0.01.12125 - UK HSE Manual Section 10 JQ2.02.6019 - QHSE Management Review procedure.
Following the development of cleaner technologies;	JDR and TF Kable are actively seeking alternatives to lead sheathing. Research and development are ongoing to improve cable design, supporting a continued reduction of the use of lead sheathing for high voltage subsea and land cables.	

BAT requirements [3]	JDRs EMS components	Document references
	The operator has been successful in developing an economically viable cable design without lead for high voltage cables up to 66kV and 132kV. This technology has reduced the use of lead in subsea cables, by using water tolerant and water-tree resistant polymers. This technology cannot be extended to cables operating above 132 kV due to material limits. Therefore, for voltages above 132kV a hermetic barrier must be used to protect this dielectric insulation from premature failure. For voltages above 132kV it is possible to use aluminium, copper and stainless steel barrier layer technologies to provide the hermetic radial water barrier, but these are not currently economically viable and may present other manufacturing, corrosion resistance or other reliability challenges when used in long-length subsea cable applications. Hence the subsea cable manufacturing industry is presently using a lead sheath to provide the most economically and technologically suitable hermetic layer to protect the insulated conductors from premature failure. The absence of suitable alternatives has been recognised with lead use in high voltage power cables not currently restricted under the UK or EU Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) regimes. An exemption under the Restriction of Hazardous Substances Directive (RoHS) also concerns the use of lead in high voltage cables due to there being no viable substitutes.	
Consideration for the environmental impacts from the eventual decommissioning of the plant at the design stage of a new plant, and throughout its operating life;	HFSAB, the manufacturer of the horizontal lead extruder, is considered an industry leader. The company has over 70 years of experience in continuous lead extrusion cable machinery. The extruder has been designed to deliver high availability, robustness, durability and reliability. A guaranteed supply of spare parts is available. Original spare parts are designed in house by the supplier and are intended to remain state of the art for the whole service life of the machine. HFSAB offers support to upgrade and modernise mechanical, electrical and control systems for its machinery, where available. HFSAB supplies complete solutions for the extruder equipment offered. This includes ancillary equipment such as air extraction, abatement, control system and cooling water systems. These systems are selected and/or designed for optimal compatibility and serviceability. Additionally, the equipment has been selected based on its use at another TF Kable Group site in Poland and experience gained during its commissioning, operation and maintenance.	

4. Operational Techniques

4.1 Raw material delivery, handling and storage

The regulated process requires a limited number of raw and ancillary materials. A proportion of these materials are also utilised by other production activities across the wider site.

The site will operate under a just in time policy, with third party off site storage of the bulk of materials delivered to site as and when required.

The raw materials and consumables for the regulated activity and any DAA as identified in Section 1 are as follows:

- Cable to be sheathed, which is manufactured on site;
- Lead ingots;
- Cooling water treatment consumables (filter media/cartridges)
- Maintenance materials/consumables (lubricants)

4.1.1 Raw materials

The cable that is to include an extruded lead sheath is manufactured onsite. The cable core manufacturing process upstream will not constitute a DAA to the regulated activity (see Section 1). The cable is stored either on cable carousels or drums prior to be being fed through the horizontal lead extruder.

Alloy E lead ingots (>99%Pb) will be brought to site from the third party storage facility as and when needed. Lead ingots will be stored next to the ingot loading mechanism. Ingots will be stored inside for a short period before being melted to allow the material to acclimatise and reduce moisture on the ingots to ambient factory levels. There will be no introduction of additional heat or forced air flow to facilitate this. Delivery, storage and handling of lead ingots do not present a potential source for pollution of air, water or land.

There will be no other raw materials or process additives used.

4.1.2 Consumables

The closed loop cooling water system skid serving the horizontal lead extruder is equipped with inline filter cartridges to remove any solids and lead ions to maintain the required water quality. Other parameters, such as hardness and pH, are not considered to be required to require adjustment as the water source is demineralised water, which is well within the required parameters for the system. Cooling water treatment does not require dosing with chemicals other than for legionella control and is expected to produce approximately two waste spent cartridges per year.

Small volumes of maintenance materials and consumables are stored on site. The largest volume of maintenance consumable relevant to the regulated activity is bearing lubricants in the extruder: 50l will be held at any one time. Oils will be brought to site when an oil change is planned and all waste oil will be removed by the contractor after the completion of an oil change.

Other relevant maintenance consumables include gear lubricants in the extruder (20l is use at any one time), and top up oil for small hydraulic hand pumps in various locations. These hand pumps are sealed units with very small reservoirs of hydraulic fluid; the total amount of hydraulic fluid stored at the installation for the purpose of topping up would not exceed 5l. Other lubricants for various parts of the

horizontal lead extruder would be stored adjacent to the plant in very small quantities and in small individual primary containers of less than 1l in volume each in a lockable, safe storage cabinet.

4.2 Manufacturing process

4.2.1 Introduction – horizontal lead extruder overview

The horizontal lead extruder has been selected based on its melting pot capacity and capability to deliver the right amount of molten lead of the required specification to the screw press (extrusion). The machine and raw materials have been specifically selected for the planned production process, reflecting experience at a sister plant at another TF Kable Group site in Poland.

Figure 1 presents a process flow diagram and associated cooling water circuits diagram for the horizontal lead extruder.

Figure 1 Process flow diagram and cooling water circuits

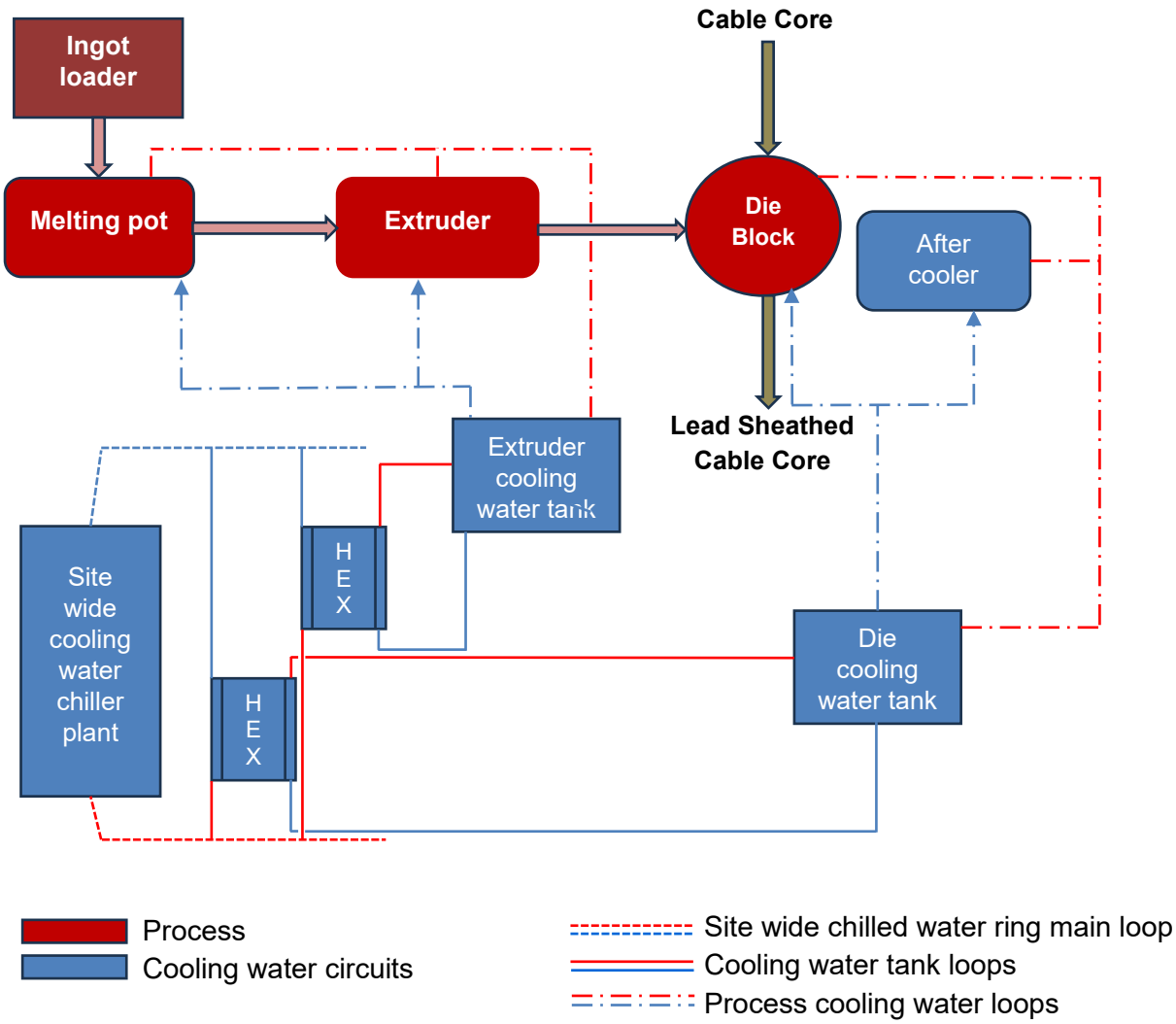
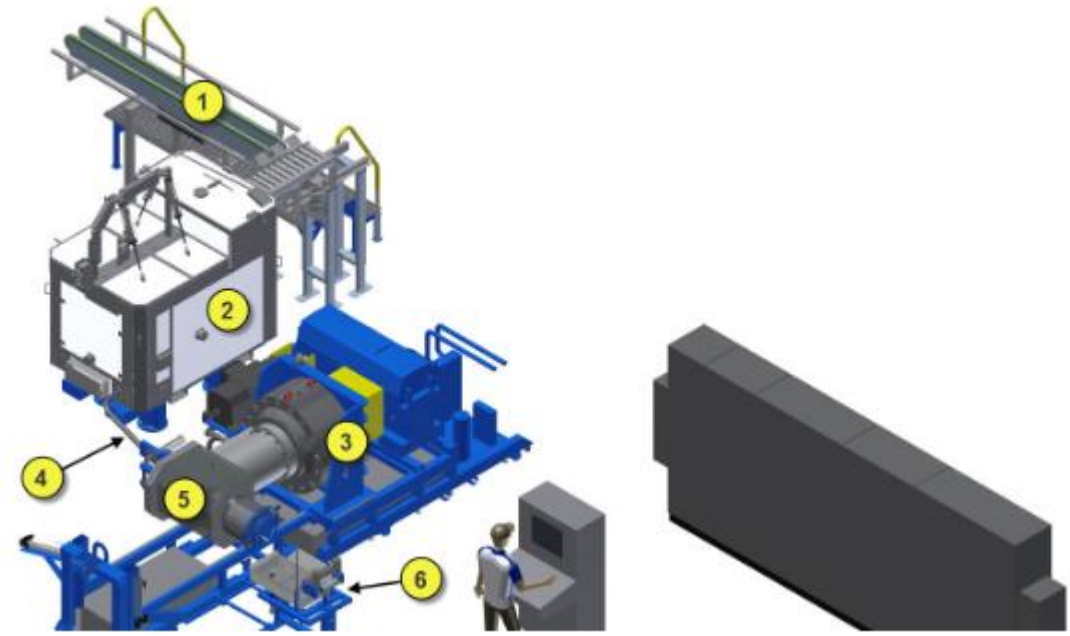


Figure 2 presents a labelling drawing of the horizontal lead extruder, depicting its functions.

Figure 2: Horizontal lead extruder function overview



Lead ingots are placed on the loading table of the lead ingot feeder table **[1]**. Ingots are then transported to the lead feeding table. The lead feeding table drops the lead ingots into the melting pot **[2]**. The lead ingot feeder is automatic and is interlocked to the amount of lead in the melting pot.

The molten liquid lead flows out from the melting pots to the extruder **[3]** in a feed pipe **[4]**. The pressure of the lead in the extruder is supplied by an extrusion screw. The temperature of the lead and the speed of the extrusion screw are monitored and controlled by an automatic control system.

A cable enters the die block **[5]** of the extruder. Inside the die block is a core and die. Lead is pressed out between the core and the die and applied around the cable. The cable exits the die block on the other side, and the lead sheath is cooled by an after cooler **[6]**.

4.2.2 Lead ingot loading

Conditioned lead ingots are picked up by a jib crane and placed on a feed conveyor which connects to an automated loading system comprising the loading table, which in turn connects to the feeding table. This process is controlled through a variety of roller head and photocell switches. The feeding table with driven rollers is interlocked to the melting process: it will only operate if melting zone is up to temperature AND melting pot lids and doors are closed.

The automatic lead ingot feeder puts approximately two ingots into the melting pot every two minutes. Loading pace must be higher than expected output. A sufficient amount of lead ingots must therefore always be kept on the lead ingot feeder.

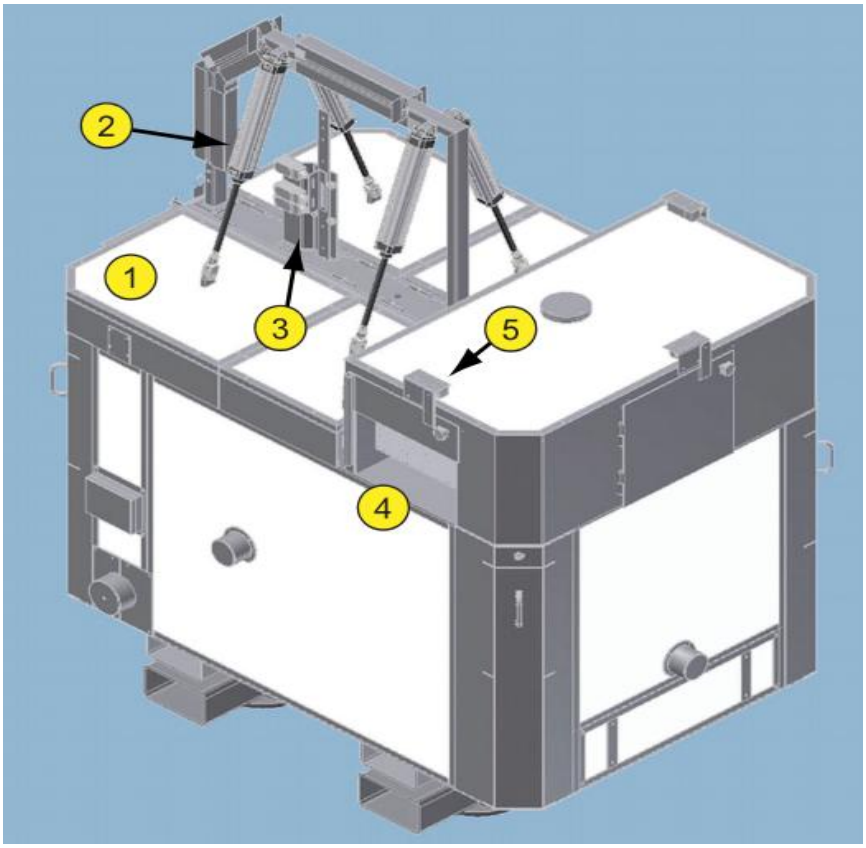
The melting pot feed has been designed around lead ingot shape and weight, so that feed weighing and metering systems are not required.

4.2.3 Melting and dross removal

Melting pot design

The melting pot configuration is shown in Figure 3.

Figure 3 Melting pot configuration



The melting pot lids **[1]** cover the various different melting zones and can be opened separately using pneumatic cylinders **[2],** with the levers being located at the side of the side of the melting pot.

The first time the extruder is started, the melting pot is loaded with lead ingots during the commissioning. During production, the lead ingot feeder (see Section 4.2.2) automatically supplies lead ingots to the melting pot through an opening in the melting pot **[4]**. The lead ingot feeder is controlled by the lead level indicator **[3]** in the melting pot. The operator is required to monitor the loading table of the lead ingot feeder, ensuring this is always full of lead ingots. Location **[5]** shows the door safety switch, which is part of the interlock system of the lead ingot feeder.

When the lead is melted, oxides and other unwanted material float to the surface. This unwanted material is called dross and requires removal before the start of the production.

Dross removal procedure

During normal operation, it is expected that dross will require removal twice a day, based on experience gained at the TF Kable Group site in Poland. The dross is removed manually with a dedicated ladle from one side of the melting pot and removed into the nearby dross bucket.

The following procedure will be followed for dross removal:

1. Open the side hatch on the melting pot.

2. Use the ladle to skim the lead's surface, removing dross.
3. Ensure that there are no drops of lead from the lead shovel. Then put the dross in the forced ventilated dross container. Place the lid securely on the dross bucket when finished.
4. Check that the lead level indicator floats freely.
5. Close the side hatch on the melting pot.
6. Once all lids and doors are closed the lead ingot feeder starts again.

4.2.4 Tapping and extruding

There are different procedures for starting the process: Firstly, without lead in the extruder and then going forward with lead already in the extruder from previous runs. The different operational procedures are described in detail in the Operator Manual. This section will describe the principal steps of operation but will not distinguish between startup first time or continued operation.

Before the extruder is started the operator is required to make sure that the lead in the melting pot is melted. The operator must also make sure that the lead's surface is clean (e.g., dross has been removed).

Prior to re-starting the extruder, all visual and audible alarms will be tested. This is followed by heating the various sections of the extruder to the preset temperature. Once all relevant areas including the die block have reached temperature, the core and die can be changed if a different diameter and thickness of lead sheath is required.

The concentricity and thickness of the extruded lead tube often require adjustment after every restart and change of die and core. This is achieved by repeat manual measurements and die adjustment whilst the temperature and speed are stable.

When all adjustments are completed, the operator may prepare to insert the cable into the die block. The cable feeder has its own independent speed, which can be adjusted by the operator. Once inserted into the die block, the extruder will automatically take the cable and pull it through the die block.

Operators are required to maintain checks of the lead levels in the pot during production. The lead level is communicated on the melting pot image on the PLC screen. If the lead level becomes too high or too low an alarm will sound automatically. Ideal conditions are achieved when the lead level is as constant as possible: changes in the lead level cause dross to build up on the walls of the melting pot, which in turn can reduce the quality of the lead sheath and hence the cable.

There are four different types of stop available. The choice depends on how long the extruder will be shut down.

- 'Production stop' shut down is used when the extruder is to be restarted as soon as possible. This is used for normal production stops, such as the change of core and die. Heating remains on full.
- 'Normal stop' (shut down for up to 10 days) is used for longer stops, for the rest of the day and up to 10 days. Heating remains on full.
- 'Standby stop' (11-30 days shut down duration) shuts down the extruder. The set temperatures in the heating zones are reduced to 200°C. This type of shut down can be used if the extruder will not be used for over a week. It can save energy compared to the Normal stop, but the Normal stop is recommended for shorter stops
- 'Complete shut down' (shut down >30 days duration) shuts down everything in the extruder. All heating is stopped. This type of shut down must only be used if the extruder will be shut off for a

longer period. This can be for maintenance, or if the production is stopped for a minimum of one week.

'Standby stop' and 'Complete shut down' would only be used if the extruder is stopped for a long time. For these two shut down options, heating would be reduced or shut down, which will cause oxidation of the lead and may affect the performance of the extruder on restart.

As part of regular maintenance, it is necessary to drain the melting pot to undertake melting pot cleaning and inspection. This requires extruding empty lead tubes through the extruder until the lead level is less than 200mm. The remainder is drained through a special outlet at the bottom of the melting pot. Lead is collected in moulds that will catch the lead and form recycled ingots which can be reused in the process using the existing automatic ingot feeding system.

4.2.5 Cooling water circuit

The schematic principle of the cooling water circuits used at the horizontal lead extruder is shown in the process flow diagram in Figure 1. There are three different types of loops/circuits.

1) Cooling of extruder and die head as well as aftercooler: The main components are the two water tanks providing cooling to the different parts of the extruder and a separate cooling tank for the die head and after cooler. The tanks are linked and use closed cooling. There are, however, some losses due to evaporation at the after cooler, which sprays chilled water over the completed lead sheath to allow downstream production to continue at ambient temperatures. Losses are replaced by topping up the main water tank with mains water.
2) There is no ongoing water treatment other than testing and biocide dosing to control legionella under the site's Legionella management.
3) The recirculated water is treated with inline filters to remove particulate and lead.
4) Water in each of the two tanks above is chilled. This is achieved through two separate heat exchangers, with one linked to each of the tanks.
5) Chilled water is provided to the other side of the heat exchanger by the chilled water ring main system. The chilled water ring main serves the wider site, supplying 15 further locations in the cable manufacturing process. Water is chilled by a large industrial cooling plant installed outside the main factory building. Although the regulated process is a user of this plant, it does not constitute a DAA after applying the limb tests. The operation of the industrial cooling plant and chilled water ring main will not therefore be discussed in further detail.

4.2.6 Air extraction and treatment

Air is extracted at numerous locations in the process:

- Headspace of melting pot (2 no extraction points, one on each side);
- The dross bucket storage location; and
- Flexible extraction to be directed where needed, for example serving dross removal.

Abatement plant was selected to deliver efficient removal of lead fume and dust, so that residual air can be discharged back into the main manufacturing hall. The system has been designed to treat an air volume of 4,500m³/hr at a filtration velocity 0.53m/min.

The main component parts of the extraction and abatement plant are as follows:

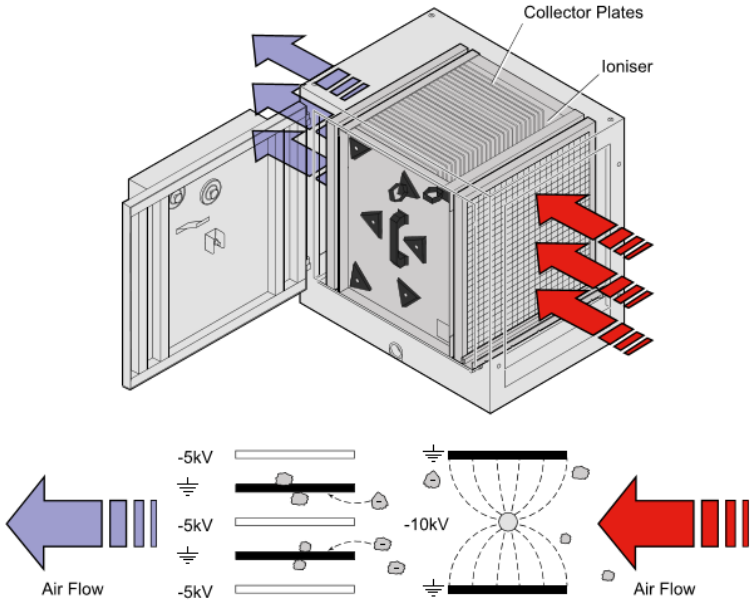
- Extraction ductwork from five extraction points joining together to a single duct entering the abatement plant train;

- Collected extracted air enters an oil mist separator (a Purified Air Ltd electrostatic precipitator (ESP);
- ESP-treated air then flows into bag filter unit suitable for indoor use with a “Bag-In, Bag-Out” (BIBO) dust drum; and
- Bag filter treated air is then dispelled through a High-Efficiency Particulate Air (HEPA) filter back into the manufacturing hall.

Oil mist separator – ESP unit

The ESP is designed to remove particulate and fume and the principle components and their arrangements are shown in Figure 4.

Figure 4 Operating principle of electrostatic precipitator (ESP)



The operating principle described in Figure 4 are summarised below:

1. The air first passes through a pre-filter.
2. The air then passes into the combined collector cell/ioniser section where the particulates in the air stream are charged to a negative potential.
3. The negatively ionised air then passes between the collector cell’s plates, which are alternatively negatively charged or earthed.
4. The negatively charged particulates passing through the plates are then simultaneously repelled away from the negatively charged plates and attracted to the earthed plates, where they stick, effectively filtering them from the airflow.
5. The particulates remain on the plates or drain down into the sump (hence the need for regular cleaning).
6. The cleaned air exits through a post filter.

Bag filter dust collector

The bag filter unit selected is a Donaldson Downflo® Evolution Dust Collector suitable for indoor execution, complete with Ultra-Web filter cartridges, fan, twin HEPA filters H14, BIBO dust drum, HIFLO inlet box and pulse cleaning controller.

The horizontally mounted triagonal filter cartridges to be installed include the Ultra-Web® fine fibre technology, which includes more filter media at the bottom of the cartridge. This design helps direct pulse-cleaning energy so that the ejected dust moves toward the containment vessel.

Ultra-Web filtration technology features a layer of fine fibres (0.2 – 0.3 microns in diameter) on the surface of the media to capture sub-micron contaminants. This is intended to support easy release of the dust cake during automated cleaning cycles for reliable system operation.

The chosen pulse controller aims to simplify operations by providing the operator with real-time access to critical equipment performance metrics. The system activates easily and quickly delivers data, trend tracking and troubleshooting information. This is intended to address potential issues before they can impact productivity and dust collector plant availability. The pulse controller includes programmable High, Low, and Alarm setpoints with lockout to prevent unauthorized adjustment as well as multiple cleaning options (continuous cleaning, differential pressure cleaning, down-time cleaning or a combination of the latter two).

Filter cartridge cleaning would be achieved through compressed air provided by the factory ring main.

HEPA filter

The overall abatement provides for a final filtration step comprising of a F9 filter and 2 No Hepa H14 filters with an overall particulate removal efficiency of 99.995% of particulate down to 0.3µm. This is necessary in order to ensure that the air inside the manufacturing hall remains suitable for the shop floor workers.

4.3 Process control

4.3.1 Introduction

Separate control systems will concern the following elements of the regulated activity:

- The horizontal lead extruder, inclusive of lead ingot loading table, melting pot, screw press and associated cooling system.
- The air extraction and abatement plant.

The crane for ingot loading onto the conveyor supplying the ingot loading table will be operated manually. The ingot loading table is linked to the horizontal lead extruder controls.

Chilled water and compressed air will be provided from factory ring mains and are not controlled by the regulated activity.

The control systems are considered suitable and sufficient for the complexity of the regulated activity to achieve adequate control over the process and meet the relevant BAT criteria.

4.3.2 Horizontal lead extruder

The horizontal lead extruder process control is of the PLC type. The process control panel is situated adjacent to plant inclusive of the Human Machine Interface (HMI) to control the machine. The plant operates in three in different modes:

- Start mode;
- Running mode (manufacture); and
- Shut down modes (emergency, production, normal, standby or complete shutdown).

The horizontal lead extruder process control system includes the lead ingot loader system, inclusive of lifting, loading and feeding tables. PLC interlockings are programmed to ensure lead only enters the melting pot when the set temperature is reached and the melting pot lids and doors are closed. Roller head switches and photocells are used to control the correct operation of the loading system.

Process parameters measured and controlled are summarised in Table 2

Table 2 Summary of process parameter monitoring at the horizontal lead extruder plant

Horizontal lead extruder component	Parameter	Parameter	Alarms and interlocks
Melting pot	Lead level	5 different levels	High and low levels are alarmed
	Temperature	Melting zone	Interlocked with the feeding table – ingots can only feed if the temperature is correct and the melting pots are closed
		Holding zone	Set points are alarmed
Lead feed pipe	Temperature	Holding zone outlet	Set points are alarmed
		Feed pipe	
		Screw housing inlet	
Screw housing	Temperature	Distributed along length of screw housing – 3 locations	Set points are alarmed
Die block	Temperature	Distributed evenly around circular die head – 3 locations	Set points are alarmed
Main cooling (extruder) system	Temperature	–	Set points are alarmed
	Pressure	–	Set points are alarmed
	Water level	–	Set points are alarmed
Die cooling system	Temperature	–	Set points are alarmed
	Pressure	–	Set points are alarmed
	Water level	–	Set points are alarmed
Main motor, gearbox and thrust bearing	Motor amperage	–	Set points are alarmed
	Screw speed	–	Set points are alarmed
	Oil temperature	–	Set points are alarmed

Alarms

If something is wrong, there is an audible and visual alarm and an alarm window will display on the HMI.

Emergency Stop

There are three emergency stops at the horizontal lead extruder:

- On the front of the control panel;
- At the ingot feeding conveyor; and
- Near the die head.

The emergency stop button stops the machine immediately and with it all rotating parts. The pneumatic systems are not depressurized and the power to the heaters is not disconnected.

The reset of the system after an emergency stop should be done without delay as the oil pump and hydraulic adjusting device in the die head block are stopped and require re-start as soon as possible. If not, the bearings and seals can become too hot and be damaged.

4.3.3 Interfaces with the cable manufacture up and down stream

The cable to be lead sheathed is processed through the extruder die block from a cable drum or carousel, with the cable motion and speed being initiated and controlled by the lead plant. After the lead sheathing, the cable proceeds directly through a polymeric sheathing head, following which the cable is wound back onto a cable drum or into a carousel. The maximum speed of the process is dictated by the maximum output of the horizontal lead extruder of approximately 1t of lead per hour.

4.3.4 Air extraction and abatement

The unit can be started manually using a start button or automatically when one of the extraction points is opened and a microswitch is activated or by timer control. The filter is automatically cleaned after vacuum shutdown.

4.4 Inspection and maintenance

4.4.1 Introduction

JDR will implement the overarching Asset Management and Maintenance Procedure (JQ3.22.14137) at the Blyth site. This procedure defines how JDR Cables assets are managed and maintained on all sites, and includes planned and unplanned maintenance and the requirements and methodology for documenting maintenance activities. This procedure also includes the setup of preventative maintenance within the site dedicated computerized maintenance management system (CMMS). The site will operate a CMMS called ‘Limble’ which holds all asset information for the machines, the preventative maintenance (PM) schedule and records completed maintenance tasks, whether preventative or corrective, including after breakdowns. PM requirements for the plant will be based on the maintenance manual provided by the technology suppliers.

All maintainable manufacturing equipment, facilities and utilities will have its frequency defined on a case-by-case basis. The maintenance frequency will be assessed from the following criteria:

- The extent and criticality of use of the equipment.

- The manufacturers recommended frequency.

- Previous records and history of reliability.

- Redundant / back-up equipment availability.

- Availability of spare parts.

- Environmental conditions.

There are provisions for maintenance to be undertaken via an external contractor and the horizontal lead extruder manufacturer offers an extensive support package including inspection, on-site service, online support and service, repair and modernisation services as required to ensure the plant will continue to offer high availability.

5. Raw materials, water and waste management

5.1 Raw materials

5.1.1 Selection, approval and review

The only raw material for the regulated process is the lead alloy, Alloy E. The alloy selected reflects the required properties of the finished lead sheath in its function within the overall cable produced.

Traditionally an extruded lead sheath has been included within subsea power cables to provide a hermetic radial water barrier to protect the dielectric insulation systems and ensure safe, reliable operation of cables at high-voltage and extra high-voltage. Without such a hermetic layer, and in modern polymeric insulation systems, the electrical field would tend to form electrical treeing degradation which ultimately leads to breakdown of the insulation. The lead sheath is therefore a safety layer protecting the insulation system and extending cable lifetime whilst the cable is submerged on the seabed.

The operator has, however, been successful in developing an economically viable cable design without lead for high voltage cables up to 66kV and 132kV. This technology has reduced the use of lead in subsea cables, by using water tolerant and water-tree resistant polymers. This technology cannot be extended to cables operating above 132 kV due to material limits. Therefore, for voltages above 132kV a hermetic barrier must be used to protect this dielectric insulation from premature failure.

For voltages above 132kV it is possible to use aluminium, copper and stainless steel barrier layer technologies to provide the hermetic radial water barrier, but these are not currently economically viable and may present other manufacturing, corrosion resistance or other reliability challenges when used in long-length subsea cable applications. Hence the subsea cable manufacturing industry is presently using a lead sheath to provide the most economically and technologically suitable hermetic layer to protect the insulated conductors from premature failure.

The absence of suitable alternatives has been recognised with lead use in high voltage power cables not currently restricted under the UK or EU Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) regimes. Additionally, an exemption under the Restriction of Hazardous Substances Directive (RoHS) concerns the use of lead in high voltage cables due to there being no viable substitutes.

5.1.2 Raw material inventory and consumption

Table 3 represents a summary of raw materials, ancillary materials and consumables for the regulated process.

Table 3 Raw material inventory and estimated annual consumption

Material/ resource	Description	Estimated annual consumption	Storage location	Hazard statements (physical and environmental)
Raw materials				
Lead ingots	High purity lead alloy ingots	Depends on the contracts won requiring lead sheathing. A conservative estimate is that 600 tonnes of lead ingots will be used per year	Stored inside next to horizontal lead extruder	H360FD May damage fertility. May damage the unborn child. H362 May cause harm to breast-fed children. H372 Causes damage to central nervous system, blood and kidneys through prolonged or

				repeated exposure by inhalation or ingestion
Maintenance consumables	Molykote Cu -7439 Plus spay	Maximum of 3 No 0.5 kg cans per year	COSHH cabinet line side	H315 Causes skin irritation. H318 Causes serious eye damage. H335 May cause respiratory irritation
	Molykote D321 anti-friction coating spray	Maximum of 2 No 0.5 kg cans per year	COSHH cabinet line side	H222 Extremely flammable aerosol. H229 Pressurised container: May burst if heated. H373 May cause damage to organs (Central nervous system) through prolonged or repeated exposure. H412 Harmful to aquatic life with long lasting effects.
Ancillary materials				
Cooling water filtration	Filter media/ cartridges	Annual exchange of water filters - 1 filter per removal of fines and lead ion removal	Line side or engineering store	N/A
Other maintenance materials/consumables	Hydraulic oil – ISO Class VG32	Insignificantly small consumption: only present in sealed hydraulic hand pump used to assist during operational and maintenance tasks ca 5l per annum	Not to be stored on site – brought in as and when required	SDS to be available when plant is handed over
	Gear box lubricating oil – Mobil SHC 632	60l	Undertaken by site maintenance department oil to be stored in engineering store	Not classified under CLP
	Greases/ lubricants for various moving parts	motor lubrication – 15 l, bearing lubrication oil – 150l gear oil – 60l	Stored adjacent to the plant in COSHH cabinet or engineering store	Not classified under CLP or no environmental hazard statements declared (H400 group)

A raw material and ancillary, material inventory will be maintained for the above materials.

5.2 Water

5.2.1 Sources and consumption

Mains water is used for cooling, which is primarily closed loop. There is no other process water consumption by the regulated activity.

The water consumption of the factory-wide chilled water system has not been explored further as this is not considered to be a DAA to the regulated activity. The horizontal lead extruder cooling requirement is less than 10% of total site's requirement.

Annual water consumption cannot be definitively confirmed at this point but is considered to be less than 5m^3 per annum. This is based on the assumption that the cooling water tanks will be fully serviced quarterly, which involves emptying and inspection of tanks, followed by replenishing with new mains water. This would bring consumption to ca 3m^3 per annum. Losses through evaporation are not known at this moment but are considered to be minimal as the temperature of the lead sheath at the point of the after cooler is less than 50°C. Water consumption data will be collected once production has started.

The best estimate for specific water consumption for the site is 0.0083 m^3/t of lead (representing just below 5m^3/a for 600t/a of lead extruded). Comparing this to specific water consumption figures for cooling water consumption in the primary and secondary lead smelting sector[4], which are stated to be up to 6m^3, the regulated activity at Blyth is well below reported figures for the sector.

5.2.2 Water efficiency measures and review

Water efficiency is built into the design of the plant by deploying primarily closed loop chilled and cooling water systems at the horizontal lead extruder plant. The after cooler after the pipe exits the die head operates as a spray and the system is open at that point.

The water treatment skid will maximise the life of the cooling water by removing solids and lead ions through filtration cartridges.

The only losses occur from cooling water evaporation when sprayed over the finished lead sheath as the cable leaves the die block. Due to the lead sheath temperature at the time of colling water being deployed being well below 100 degree C, losses through evaporation will be very low. Residual water is collected in the catch tray beneath and returned via filtration back into the die block cooling water tank. Losses are replenished from the main cooling water tank. The system has been designed to achieve the rapid temperature reduction required to achieve the desired properties of the lead sheath and to move the cable on to the next step in the manufacturing process, i.e., coiling the sheathed cable onto a cable drum.

The spray and accompanying catchment tray underneath are considered relatively small based on the size of the operation. Collected cooling water will not pool and the majority of losses will occur due to evaporation at the time of cooling water contact with the slightly hot lead sheath.

Used cooling water is returned to the water tanks and treated by filtration to remove fines and lead ions and this will extend both the life of the cooling water and the life and productivity of the cooling water system as a whole.

[4] BREF document non-ferrous metal industries, 2016

5.3 Waste

5.3.1 Waste streams and volumes

Table 4 provides details of waste streams, hazardous/non-hazardous classifications where known, estimates of volumes and planned fates associated with the regulated activity.

Lead purged at the start of each lead sheathing batch (new cable drum) will be cut off and reused by returning it back into the melting pot.

Cable from leader/trailer containing lead will be managed separately. This will be segregated from other cable wastes not including lead.

EWC codes have been provided where possible. For some waste streams waste classification will be undertaken when the wastes arise for the first time.

Table 4: Waste streams from the regulated activity

Waste stream	EWC codes	Annual tonnage (2024)	Classification	Fate
Dross*	10 04 02	TBC after commissioning based on dross produced per day and extrapolated over the year	Hazardous	R4
Lead fraction from cable leader/ trailer waste	17 04 03	Unknown but will be monitored and reduced as much as possible – data estimate at the end of commissioning	Non hazardous	R4
Bag filter fines	10 05 05	Unknown – estimate on annual volumes will be available at the end of a period of normal production	Hazardous	TBC
Waste cooling water from quarterly servicing	TBC	3.2t – to be confirmed after a period of normal production	TBC	R9
Waste lubricating oil (Gear box, Thrust bearing)	TBC	0.2*	TBC	R9
Other maintenance waste – e.g. filter cartridges	TBC	Unknown	TBC	TBC

* *Estimate based on one oil change per annum*

5.3.2 Waste management approach

The applicant has implemented a site waste management standard (JQ2.01.11634 Waste Management Procedure) as part of the OHSEMS. This procedure applies to the whole site, including regulated and non-regulated activities under the permitting regime.

In compliance with the Waste (England and Wales) Regulations 2011, as amended, the permit holder applies principles of waste management in accordance with the waste hierarchy. This includes taking reasonable measures to prevent waste and the application of the waste hierarchy to transferred or consigned waste.

6. Energy consumption and efficiency

6.1 Energy consumption

All energy requirements for the regulated activity are covered by electricity from the National Grid. Energy consumption will be monitored and recorded.

Annual consumption and specific energy consumption figures provided in Table 6 below are estimated based on the power requirements of the plant and equipment installed that form part of the regulated activity, i.e., the lead plant with its closed loop cooling systems and the associated air extraction and abatement system. Energy consumed for communal services such as the chilled water ring main, compressed air ring main, general lighting, heating and other building control processes have been excluded from these figures as they have been assessed not to be DAAs to the regulated activity.

Table 5: Estimated annual energy consumption for regulated activity

Energy source	Primary energy [MWh]	Specific Usage [MWh per tonne of lead extruded]
Electricity	185	0.3

6.2 Energy efficiency

6.2.1 Energy efficient design

The regulated facility is only a small part of the overall cable manufacturing activity with a modest energy demand. The company has implemented ISO 50001 across all sites in the UK and will extend the accreditation to the Blyth site. All factors of optimising and reduction of energy consumption at the design stage such as optimising the power correction factor, reducing harmonics and optimising supply to large consumers has been implemented.

Energy efficient motors

The extruder incorporates IE4 class motors. IE4 class motors have efficiencies of 92.6% or greater, which correlates to an EFF1 motor. These are the most efficient class of motors currently available.

Proper motor sizing

All motors have been sized appropriately, so that in a normal load profile they would be run at or near the most efficient load point. The horizontal lead extruder technology supplier HFSAB has over 70 years of experience in the manufacture of horizontal lead extruders. Modernisation is built into HFSAB's their service, repair and modernisation service package.

6.2.2 Energy efficient operation and maintenance of the operation

The company has implemented an Energy Management System (EnMS) in line with the International Standard ISO 50001: 2018 and has been accredited by Lloyds Register Quality Assurance (LRQA). The system will be implemented at JDR Blyth and the certification extended to cover this location in due course. The existing Energy Management System Manual (JQ2.01.14354) sets out how to manage energy at the three existing sites and this will be expanded to the Blyth site.

7. Emissions and monitoring

7.1 Point source emissions to air and controlled water

There are no point source emissions to air and controlled water under normal operating conditions and other than normal operating conditions (OTNOC). The air extraction and abatement plant releases the treated air back into the building and not to atmosphere.

There are no process effluents for discharge. Spent cooling water will be exchanged and removed off site as liquid waste.

7.2 Fugitive emissions to air

There are fugitive emissions to air through natural building ventilation associated with the treated horizontal lead extruder air emissions. As shown in Appendix B.b, the installation will occupy a central location within the factory building and there are no building openings near the source of these emissions. It is not possible to characterise and quantify fugitive emissions, other than to state that the workplace conditions are such that workplace exposure limits are not anticipated to be exceeded within the installation boundary. Additionally, significant dilution with the main factory building air will have occurred by the time any fugitive emissions leave the building to atmosphere. There is no forced ventilation in the wider factory.

7.3 Fugitive emissions to sewer and controlled waters

7.3.1 Introduction

There are no fugitive emissions to sewer or controlled waters from the regulated activity under normal operating conditions. All activities are undertaken inside the factory building.

The factory building floor slab has been constructed to prevent gas ingress and is sealed by a gas protection membrane underneath the concrete floor. A gas membrane installation verification report has been prepared to verify the correct installation of the membrane. Therefore, there are no pathways for potential leakage of gas into the building. In turn this is interpreted that there is no pathway for any spillages or leaks to permeate to the ground/ground water below.

7.3.2 Fugitive emissions to controlled waters under OTNOC

Fugitive emissions to controlled waters under OTNOC are considered to be mainly as a result of accident and emergency scenarios such as for example:

- Accidental loss of containment during material delivery and waste despatch;
- Fire water; or
- Contaminated flood water.

The identification, assessment, significance evaluation and assignment of control measures for these accident and emergency aspects will be set out in the company's aspects and impacts register developed as part of the EMS.

The planning application for the erection and operation of the main factory building included an assessment of flood risk and agreement of a surface water drainage strategy for the site.

The existing three surface water outfalls into the river Blyth estuary will be maintained and have been shown to be fit for use. There will be no stormwater attenuation through SUDS or underground storage

but three full retention interceptors (FRS) and one bypass interceptor (BPS) were proposed in the planning application indicative drainage strategy and approved in the planning consent.

Table 6**Error! Reference source not found.** summarises the control measures in place to reduce potential environmental impacts from the accident and emergency scenarios identified.

Table 6: Control measures for foreseeable accident and emergency scenarios with controlled water impact potential

Accident emergency scenario	Control measures	Document reference
Loss of containment in during delivery of liquid raw / ancillary materials or consumables	-Minimal quantities of potentially contaminative substances associated with the regulated activity. -Central location of the installation within the factory building on in situ cast concrete over welded gas membrane -Full retention interceptors: • Serving car park area and routed to existing outfall No 1 • Serving the yard to the north and west of the main building including material and waste storage areas for all site activities and routed to existing outfall No 2 • 3 no interceptors covering run-off for the cable drum/ carousel outside storage areas, routed to existing outfall No 3. -Impermeable hard standing in delivery and storage areas. -Bunded storage cabinets for the temporary storage of liquid - consumables and waste. -Site emergency plan. -Spill kits. -Spill response instruction and training, including on deployment. -Activation of the company's emergency plan would ensure the right actions are being taken to respond to loss of containment incidences.	JQ3.12.8143 Goods Inwards Inspection JQ2.01.12327 Emergency Procedures Drainage Strategy Plan (drawing reference No JDR-WSL-Z0-XX-DR-D-04002- revision A01
Fire	Fire risk assessment Sprinkler system and fire hydrant provisions at the site to fight fires quickly – minimise fire water runoff Emergency procedures – see above	
Flood	All outfalls to the river Blyth are fitted with a non-return valve. This is to prevent tide locking and the increased risk of flooding to the development which in turn would minimise the risk of flood waters being polluted by hazardous materials being stored onsite	

7.4 Odour

Ther are no sources of odour from the regulated activity.

7.5 Monitoring

7.5.1 Emissions to air

Monitoring of emissions to air would be indirect. Indirect monitoring would be associated with LEV inspection and testing as well as workplace exposure and health screening associated with the risks from hazardous substances used or generated by the regulated activity. Monitoring undertaken would be part of the site wide arrangements for Control of Substances Hazardous to Health (COSHH).

7.5.2 Emissions to sewer and controlled water

Emissions to sewer

There are no process effluents discharged to sewer. A trade effluent discharge consent is not required and no monitoring will be required.

Emissions to controlled waters

There are no point source emissions to controlled water and stormwater discharges are not and will not be monitored. Surface water pollution prevention measures are installed as detailed in Table 7.

8. Noise and vibration

8.1 Noise sensitive receptors

The nearest noise sensitive receptors (SRs) to the north of the site are as follows:

- **SRs A:** Residential SRs on Sandfield Road, Waterfield Road and Wilson Avenue with the closest at 50m from the site boundary; and
- **SRs B**: Residential SRs on West Bridge Street, immediately east to the site boundary.

8.2 Noise and vibration sources

There are no external sources of noise associated with the regulated activity beyond noise attributed to delivery of raw/ancillary materials and consumables, as well as periodic collection of finished products and waste streams for the process.

Internally, noise sound power level information has been provided by the technology suppliers of the two main items of plant:

- Horizontal lead extruder plant including ingot loading system, melting pot, extruder, control cabinet: The noise level at the operator's working station does not exceed 80 dB(A).
- Dust control unit DC-11: The maximum sound level stated for all possible configurations of this plant is 67 dB(A),

8.3 Noise control and management

The installation will be within the factory at a central location surrounded by a building envelope that has been insulated to protect against noise breakout as stipulated in planning condition 8 to the planning consent (Ref.: 22/00879/FUL).

No specific noise control and management are required over and above routine inspection and maintenance in accordance with the maintenance manuals provided by the respective equipment suppliers. These measures are anticipated to keep all plant working within design parameters.

9. Environmental risk assessment

9.1 Identification and location of sensitive receptors

In order to assess the impact of the facility on the surrounding environment, sensitive ecological and human receptors have been identified.

Sensitive ecological receptors were identified based on a Nature and Heritage Conservation Screening report (NHCSR) for bespoke installations provided by the EA as part of the pre-application process in 2026 (see Appendix A). This was further supported by appropriate web-based searches using links provided in the NHCSR.

Human receptors were identified using a local knowledge of the area and appropriate web-based searches including via https://magic.defra.gov.uk/. In particular dwellings, schools and hospitals were searched for as well as public open spaces.

In identifying sensitive ecological receptors, a 10km radius around the site has been considered. For human receptors, a 1km radius has been considered. The details of receptors are given in Table 7 below.

Table 7: Sensitive receptors relevant to the site

Name of receptor	Nature of receptor	Mechanism of effect/ impact during operation and *relevant hazard/pathways*
Designated environmental receptors within 10km of the installation		
Northumberland Marine (SPA)	The site supports a wide range of marine habitats. The Northumberland coast and surrounding sea supports important breeding colonies of seabirds and auks, protected at four existing SPAs: Farne Islands SPA, Coquet Island SPA, Lindisfarne SPA and **Northumbria Coast SPA (see below)** Qualifying Features: • A191 *Sterna sandvicensis*; Sandwich tern (Breeding) • A192 *Sterna dougallii*; Roseate tern (Breeding) • A193 *Sterna hirundo*; Common tern (Breeding) • A194 *Sterna paradisaea*; Arctic tern (Breeding) • A195 *Sternula albifrons*; Little tern (Breeding) • A199 *Uria aalge*; Common guillemot (Breeding) • A204 *Fratercula arctica*; Atlantic puffin (Breeding) • Seabird assemblage	*Noise:* Disturbance to feeding and roosting areas *Noise:* Disturbance of roosting common tern and sandwich tern *Pollutants in surface water runoff*: Materials entering the SPAs via ground or surface water drainage *Emissions to air:* There is potential for air quality impacts arising from process emissions from factory.
Northumbria Coast (SPA) and (Ramsar)	The Northumbria Coast SPA consists of mainly discrete sections of rocky shore with associated boulder and cobble beaches. The SPA also includes parts of three artificial pier structures and a small section of sandy beach. In summer, the site supports an internationally important population of breeding Little tern and Arctic tern, and two species of wintering waders occur in internationally important numbers, Turnstone and Purple sandpiper. Qualifying Features: • A148(NB): Purple sandpiper (*Calidris maritima*) • A195(B): Little tern (*Sterna albifrons*) • A169(NB): Turnstone (*Arenaria interpres*) • A194(B) Arctic tern (*Sterna*	

Name of receptor	Nature of receptor	Mechanism of effect/ impact during operation and *relevant hazard/pathways*
Berwick to St Mary's (MCZ)	Berwick to St Mary's MCZ holds nationally important numbers of breeding common eider. The area also supports regionally and nationally (England) important numbers of common eider in the non-breeding season. The conservation aim of the proposal for both breeding and non-breeding common eider is to provide a critical seaward maintenance and foraging extension surrounding the breeding colony at Coquet Island and Farne Islands. The site would cover areas on which common eider are ecologically dependent, in this case for behaviours such as foraging, preening, bathing and displaying.	*Pollution from discharges from terrestrial activity*
Coquet to St Mary's (MCZ)	This site helps protects several different types of rock and sediment on the shoreline and on the seabed. This range of habitats provides a home for a large variety of life. Aim of the designation is to maintain the protected habitats in favourable condition.	*Water quality* *Permitted discharges from terrestrial sources*
Northumberland Shore (SSSI)	Unit 17 of 21 – main habitat Littoral Sediment (favourable condition). Purple sandpiper has shown a long-term decline of -33% since SSSI designation but remains under the 50% decline threshold in the Common Standards Monitoring (CSM) Birds 2004 guidance so is classed as 'Favourable' condition. Turnstone has had a similar long-term decline of -34% since SSSI designation, but its medium-term trend is stable, so it is classed as 'Favourable' condition. The other four species are classed as 'Favourable' condition (Golden Plover -3%, Ringed Plover -7%, Sanderling 179%, Redshank 16%). There are no management issues in this unit.	*Noise,* *Air quality* *Water quality*
Local Wildlife Sites (LWS) – Blyth Estuary	Bird habitat- roosting and feeding – all interests covered off by other statutory designations mentioned above for the same geographical area	*Noise,* *Air quality* *Water quality*
Human receptors within 1 km of the installation		
Dwellings on Wilson Avenue, Waterfield Road and Sandfield Road ca. 350 north east of installation boundary	Human	*Noise, odour, air*
Dwellings ca 480m east of the installation boundary	Human	*Noise, odour, air*
Playing fields to the northeast ca 340m of installation	Human	*Noise, odour, air*

Name of receptor	Nature of receptor	Mechanism of effect/ impact during operation and *relevant hazard/pathways*
boundary		
Allotment Gardens to northeast ca 440 m	Human	*Noise, odour, air*
School ca 650m northeast	Human	*Noise, odour, air*

9.2 Emissions screening and data

9.2.1 Point source emissions to air (including odour), sewer and controlled water

There are no point source emissions form the regulated facility to air, sewer or controlled water.

9.2.2 Fugitive emissions to air (including odour)

Fugitive emissions to air are considered to have a negligible impact on off-site human and environmental receptors. The only fugitive emission to air starts of as release of residual air from the horizontal lead extruder LEV extraction and abatement plant into the factory building.

COSHH management at site for the workforce and contractors ensure that any emissions leaving the factory building openings as fugitive emissions present no risk to sensitive human and ecological receptors identified.

9.2.3 Fugitive emissions to controlled water

The only identified fugitive emissions to controlled water from the installation would be associated with emissions during OTNOC.

Pollution prevention measures comprising of three full retention interceptors and one bypass interceptor have been installed to manage the surface water pollution risks from the wider site activities and are adequate to control the risk from OTNOC releases associated with the regulated facility.

9.2.4 Noise

Human receptors

In order to assess the need for a Noise Impact Assessment (NIA) and a Noise and Vibration Management Plan (NMP) as part of the environmental permit application, the Noise advisory Tool (NAT)[5] has been completed and has been attached as Appendix D.

The NAT assessment concludes that a NIA and NMP are not required for the application.

[5] https://www.gov.uk/government/publications/noise-and-vibration-risk-assessment-using-the-noise-advisory-tool

A noise impact assessment was prepared for the planning application of the wider development that includes the regulated activity. Noise limits have been set for external plant and building services based on the established prevailing background and ambient noise levels. These limits are predicted to provide adequate safeguards for the existing residential amenity. Condition 6 to the planning consent (Ref.: 22/00879/FUL) adopted the proposed noise limits for fixed external plant and building services from the noise assessment.

Additional noise conditions (7, 8 and 31) under consent 22/00879/FUL require further assessment of cumulative levels of noise, appropriate insulation of the building fabric to reduce noise emissions from the building and provision of screening along the northern boundary to provide commensurate protection of residential receptors from the impact of noise and dust.

The noise assessment concluded that after assessment of the industrial and commercial noise on existing sensitive receptors, the overall development would have a low impact. This conclusion took into account changes in prevailing noise levels if the development goes ahead, as well as impact from road traffic noise.

The findings of the earlier assessments support the conclusion of the NAT, which only screened noise from the regulated activity and DAAs.

Ecological receptors

The planning application for the wider development included an assessment of likely significant effect on a European Site according to Regulation 63 of the Conservation of Habitats and Species Regulations 2017. A copy of the habitat assessment has been included here in Appendix E. The assessment established that noise from construction activities required additional mitigation. Additional noise mitigation for the operational phase over and above the planning conditions for noise and vibration was not required.

Since sources of noise associated with the regulated activity are entirely inside the factory building and represent only a small proportion of the factory breakout noise assessed during the planning application, the potential environmental impact from installation noise/vibration on nearby sensitive receptors is deemed acceptable.

Other potential effects/ impacts due to light pollution, changes to water quality and impacts from vessel movements were screened out and required no further assessment or additional mitigation measures to be implemented. Since the basis of the assessment has remained the same due to the fact that no additional impacts in the form of emissions have been identified during the permit application, the results of the habitats assessment still stand and no amendment is required as a result of the permit application.

The only other area requiring further assessment was air quality due to the operation of a combustion plant at the wider site. However, this is not part of the regulated activity nor is it a DAA and is hence irrelevant to the permit application.

10. BAT Assessment

A BAT Assessment has been prepared for the permit application and has been presented in Table 8.

The following guidance documents are considered relevant to the preparation of the BAT assessment as agreed in advanced pre-application discussions with the EA:

- Technical guidance EPR2.03: Non Ferrous metal and the production of carbon and graphite, March 2009.
- Best Available Techniques (BAT) conclusions, under Directive 2010/75/EU of the European Parliament and of the Council, for the non-ferrous metals industries, June 2016.
- Reference Document on Best Available Techniques for Energy Efficiency, February 2009 as corrected in September 2021.

The BAT assessment is led by the requirements stated in the BATC document for the non-ferrous metals industries sector and complemented by additional requirements in the other two guidance documents.

When reviewing the BAT criteria in technical guidance EPR2.03, it was concluded that these criteria were adequately incorporated into the BATC for the non-ferrous metal industries from 2016. Therefore, a separate assessment against BAT from EPR2.03 are not included in the assessment.

BAT criteria not applicable to the regulated activity have been omitted from the assessment. If partially not applicable, this is noted in Table 9.

Table 8: BAT Assessment

Indicative BAT		Compliance Indicator	JDR Cable Systems Ltd arrangements
Best Available Techniques (BAT) conclusions for the non-ferrous metals industries - June 2016			
BATC 1	In order to improve the overall environmental performance, BAT is to implement and adhere to an environ mental management system (EMS) that incorporates all of the following features: (i) commitment of the management, including senior management; (ii) an environmental policy that includes the continuous improvement of the installation by the management; (iii) planning and establishing the necessary procedures, objectives and targets, in conjunction with financial planning and investment; (iv) implementation of procedures paying particular attention to: (a) structure and responsibility; (b) recruitment, training, awareness and competence; (c) communication; (d) employee involvement; (e) documentation; (f) effective process control; (g) maintenance programmes; (h) emergency preparedness and response; (i) safeguarding compliance with environmental legislation. (v) checking performance and taking corrective action, paying particular attention to: (a) monitoring and measurement (see also the Reference Report on Monitoring of emissions to Air and Water from IED installations — ROM); (b) corrective and preventive action; (c) maintenance of records; (d) independent (where practicable) internal or external auditing in order to determine whether or not the EMS conforms to planned arrangements and has been properly implemented and maintained; (vi) review of the EMS and its continuing suitability, adequacy and effectiveness by senior management; (vii) following the development of cleaner technologies; (viii) consideration for the environmental impacts from the eventual decommissioning of the plant at the design stage of a new plant, and throughout its operating life; (ix) application of sectoral benchmarking on a regular basis; (x) maintenance management system for dust abatement plant (BAT4)	**YES**	See Section 3 for detail as well BATC 4

BATC 2	In order to use energy efficiently, BAT is to use a combination of the techniques given below. • energy efficiency management system (e.g. ISO50001) • Suitable insulation for high temperature equipment such as steam and hot water pipes • Use high efficiency electric motors equipped with variable-frequency drive, for equipment such as fans; • Use control systems that automatically activate the air extraction system or adjust the extraction rate depending on actual emissions	**YES**	See Section 6
BATC 3	In order to improve overall environmental performance, BAT is to ensure stable process operation by using a process control system together with a combination of the techniques given below. • Inspect and select input materials according to the process and the abatement techniques applied • Feed weighing and metering systems • Processors to control material feed rate, critical process parameters and conditions including the alarm, combustion conditions and gas additions • On-line monitoring of the furnace temperature, furnace pressure and gas flow • Monitor the critical process parameters of the air emission abatement plant such as gas temperature, reagent metering, pressure drop, ESP current and voltage, scrubbing liquid flow and pH and gaseous components (e.g. O2, CO, VOC) • Temperature monitoring and control at melting and smelting furnaces to prevent the generation of metal and metal oxide fumes through overheating	**YES**	See Section 4
BATC 4	In order to reduce channelled dust and metal emissions to air, BAT is to apply a maintenance management system which especially addresses the performance of dust abatement systems as part of the environmental management system (see BAT1).	**YES**	The maintenance of the dust abatement plant installed by Roflow will be part of the CMMS. Inspection and servicing requirements will be included in the PM schedule for these assets.
BATC 5	In order to prevent or, where this is not practicable, to reduce diffuse emissions to air and water, BAT is to collect diffuse emissions as much as possible nearest to the source and treat them.	**YES**	See Section 4
BATC 6	In order to prevent or, where this is not practicable, to reduce diffuse dust emissions to air, BAT is to set up and implement an action plan on diffuse dust emissions, as part of the environmental management system (see BAT1), that incorporates both of the following measures: a) identify the most relevant diffuse dust emission sources (using e.g. EN 15445);	**N/A**	There are limited sources of diffuse dust emissions associated with the installation. This concerns moving dross into the bucket and emptying the dross bucket into the waste

	b) define and implement appropriate actions and techniques to prevent or reduce diffuse emissions over a given time frame.		container. An action plan is not required. Potential dust emissions are adequately controlled through operating instructions and waste management procedures.
BATC 9	In order to prevent or, where this is not practicable, to reduce diffuse emissions from metal production, BAT is to optimise the efficiency of off-gas collection and treatment by using a combination of the techniques given below. • Use a closed furnace with a properly designed dedusting system or seal the furnace and other process units with an adequate vent system • Dust or fume collection where dusty material transfers take place (e.g. furnace charging and tapping points, covered launders) • Optimise the design and operation of hooding and ductwork to capture fumes arising from the feed port and from hot metal, matte or slag tapping and transfers in covered launders • Furnace/reactor enclosures such as 'house-in-house' 'doghouse' for tapping and charging operations, or • Optimise the off-gas flow from the furnace through computerised fluid dynamics studies and tracers • Charging systems for semi-closed furnaces to add raw materials in small amounts • Treat the collected emissions in an adequate abatement system	**YES**	See Section 4 The technology provider (HSFAB) for the horizontal lead extruder recommended an air extraction system and points of extraction. Continuous development and improvement are part of HSFAB's philosophy of aftercare, adapting the process to advances in control technology as well as design of air extraction systems, if required.
BATC 93	In order to prevent or reduce diffuse emissions from remelting, refining and casting in primary and secondary lead and/or tin production, BAT is to use a combination of the techniques given below. • Hood on the crucible furnace or kettle with an air extraction system • Lids to close the kettle during the refining reactions and addition of chemicals • Hood with air extraction system at launders and tapping points • Temperature control of the melt • Closed mechanical skimmers for removal of dusty dross/residues	**YES**	See Section 4
BATC 97	In order to reduce dust and metal emissions to air from remelting, refining and casting in primary and secondary lead and/or tin production, BAT is to use the techniques given below. For pyrometallurgical processes: maintain the temperature of the melt bath at the lowest possible level according to the process stage in combination with a bag filter	**YES**	See Sections 4 and 7 BAT-AEL are not applicable to his process as residual emissions are returned after abatement into the

	BAT-associated emission levels: See table under BAT10 above		factory building and not to the environment via a point source.
BATC14	**Emissions to water, including their monitoring** In order to prevent or reduce the generation of wastewater, BAT is to use one or a combination of the techniques given below. • Measure the amount of fresh water used and the amount of wastewater discharged • Use a closed circuit cooling system	**Yes**	See Section 7
BATC 15	In order to prevent the contamination of water and to reduce emissions to water, BAT is to segregate uncontaminated wastewater streams from wastewater streams requiring treatment.	**N/A**	Not applicable: there is no uncontaminated wastewater arising from the regulated activity and only small amounts of contaminated wastewater will be generated annually.
BATC 18	In order to reduce noise emissions, BAT is to use one or a combination of the techniques given below." • Use embankments to screen the source of noise • Enclose noisy plants or components in sound-absorbing structures	**YES**	See Section 8
BATC 19	In order to reduce odour emissions, BAT is to use one or a combination of the techniques given below • appropriate storage and handling of odorous materials • Minimise the use of odorous materials • Careful design, operation and maintenance of any equipment that could generate odour emissions	**N/A**	There are no sources of odour from the regulated process
Reference Document on Best Available Techniques for Energy Efficiency, February 2009 (corrected version as of September 2021)			
BATC 21	BAT is to increase the power factor according to the requirements of the local electricity distributor by using techniques such as • Installing capacitors in the AC circuits to decrease the magnitude of reactive power • Minimising the operation of idling or lightly loaded motors • Avoiding the operation of equipment above its rated voltage • When replacing motors, using energy efficient motors	**YES**	See Section 6

BATC 22	BAT is to check the power supply for harmonics and apply filters if required	**YES**	See Section 6
BATC 23	BAT is to optimise the power supply efficiency by using techniques such as follows: • Ensure power cables have the corrects dimensions for the power demand • Keep online transformers working at a load above 40-50% of the rated power • Use high efficiency low loss transformers • Place equipment with a high current demand as close as possible to the power source (e.g. transformer)	**YES**	See Section 6
BATC 24	BAT is to optimise electric motors in the following order: 1. Optimise the entire system the motor(s) is part of (e.g. cooling system) 2. Optimise the motor(s) in the system according to the newly determined load requirements, by applying one or more of the following techniques System installation • Use energy efficient motors (EEM) • Proper motor sizing • Installing variable speed drives • Installing high-efficiency transmission reducers Use • Direct coupling where possible • Synchronous belts or cogged V-belts in place of V belts • Helical gears in place or worm gears • Energy efficient motor repair or replacement with EEM • Avoid rewinding and replace with an EEM or use certified rewinding contractor (EEMR) • Power quality control System operation and maintenance • Lubrication, adjustment, tuning	**YES**	See Section 6
BATC 26	BAT is to optimise pumping systems by using the following techniques: Design • Avoid oversizing when selecting pumps and replace oversized pumps • Match the correct choice of pump to the correct motor for the duty • Design of pipework system (see distribution below)	**YES**	See Section 6

Control and maintenance

- Control and regulation system
- Shut down unnecessary pumps
- Use of variable speed drives
- Use of multiple pumps (staged cut ins)
- Regular maintenance
- Where unplanned maintenance becomes excessive check for
    - Cavitation
    - Wear
    - Wrong type of pump

Distribution system

- Minimise the number of valves and bends commensurate with keeping ease of operation and maintenance
- Avoid using too many bends
- Ensuring the pipework diameter is not too small

Appendices

A. Pre-application Feedback

B. Plan Drawings

a. Site location plan

b. Factory Layout and Installation Boundary

c. Updated Drainage Strategy from planning application (22-00879/FUL)

C. Application Site Condition Report

D. Completed Noise Advisory Tool Vs 1 (NAT)

E. Regulation 63 Habitat Assessment from planning application

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