Summary of representative risk management measures (RMMs) and operational conditions (OCs)

Public version

Legal name of applicant:	Tata Steel UK Limited
Type of application:	Review report
Submitted by:	Tata Steel UK Limited
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Substance:	Chromium trioxide (EC no. 215-607-8, CAS no. 1333-82-0)
Use title:	The use of chromium trioxide for the manufacture of electrolytic chromium coated steel (ECCS)
Use number:	1

ES1: Industrial use of chromium trioxide for the manufacture of ECCS

ECS and WCS	Task (ERC / spERC or PROC)	Annual amount per site	Technical RMMs	Organisational RMMs	PPE	No. of staff	Frequency & duration	Effectiveness of wastewater and waste air treatment and release factors: water, air and soil (for ERC)	Detailed info. in CSR (section)
ECS-1	ERC 5	[redacted] Public range: 100-150 tonnes per year CrO_3	Air: Process control system (automation). Local exhaust ventilation system with air passing to atmosphere via a wet scrubber. Wastewater: All sources of Cr(VI)-containing wastewater are collected and transferred to the wastewater treatment plant (WWTP) and undergo batch reduction. Reducing agents are dosed over-stoichiometrically to ensure full reduction to Cr(III). Level control instruments in the WWTP tank farm prevent overfill. Waste: Empty containers of CrO_3 are washed, crushed and sent for recycling. Single-use disposable PPE and other potentially contaminated materials are disposed of as hazardous waste. Sludge from the filter presses is collected and sent for recycling or disposed of as waste.	Air: Stack emissions monitoring verifying effectiveness of air abatement. LEV interlocked to process operation meaning that if LEV fails, the electric current to the process switches off. LEV subject to regular inspections and annual thorough examination. Wastewater: The Cr(VI) wastewater stream is monitored using a colorimetric analyser before joining other liquid waste entering the WWTP. A composite sampler collects a representative 24-hr sample of treated effluent discharged to the estuary. Administrative: Employee information, instructions and training. Procedures. Emergency response arrangements.	N/A	N/A	N/A	**Water: 0%** All wastewater potentially contaminated with Cr(VI) is reduced using an over-stoichiometric addition of reductant. **Air: 0.0293%** Monitoring data from the stack emissions between 2022 and 2024 was used to calculate the release factor using the highest values recorded. **Soil: 0%** There is no release to soil at the site. All solid waste is collected and either sent for recycling or disposed of as (hazardous) waste.	9.2.1

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WCS 1	Receipt, transport and storage of chromium trioxide PROC 1	-	Primary containment: Chromium trioxide is delivered in sealed containers on shrink-wrapped containers and transported by forklift truck. The containers are stored in a dedicated storage room. The containers are not opened at any point in this WCS. The storage area is kept locked shut by padlock when not in use.	Restricted access: the keys to the storage room are kept locked in the control room. Only the team leader has access to these keys. Maximum storage capacity of 360 containers (18 tonnes). Procedures are in place covering receipt, delivery and transport of chromium trioxide. Only authorised personnel perform this task. All personnel performing this task receive appropriate information, instructions and training. Emergency procedures are in place. First aiders and first aid equipment and facilities are available at all times. Firewater is retained. Workers performing this task are subject to health surveillance and biological monitoring.	Standard site PPE: protective clothing, safety helmet, safety footwear, hearing protection, protective eyewear	1	Frequency: 12 times per year Duration: 15 mins	N/A	9.2.2
WCS 2a	Sampling & analysis: taking samples of electrolyte PROC 9	-	Primary containment: While taking the samples is not itself an enclosed process, once the sample bottles are filled they are then sealed prior to being taken to the on-site laboratory. Secondary containment: Sampling is undertaken at a dedicated location in the basement area which is bunded. Sampling takes place inside the chromic acid area which is	Only small sample volumes are collected. Sampling time is limited. Procedures are in place covering sampling. Only authorised personnel perform this task and all personnel performing this task receive appropriate information, instructions and training. Emergency procedures are in place. First aiders and first aid equipment	Full chromium PPE: chemical resistant gloves, respiratory protective equipment (RPE), a chemical protective suit (coveralls) and a pair of safety Wellingtons.	1	Frequency: Once per shift (twice per day) Duration: 10 mins	N/A	9.2.3

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			segregated from the rest of the ECCS4 line.	and facilities are available at all times. Firewater is retained. Workers performing this task are subject to health surveillance and biological monitoring.					
WCS 2b	Sampling & analysis: laboratory analysis of samples PROC 9	-	LEV: The sample bottles are handled inside a fume cabinet.	Analysis involves handling only very small quantities of electrolyte. Following analysis, waste electrolyte is returned to the chrome sump. Procedures are in place covering sampling. Only authorised personnel perform this task and all personnel performing this task receive appropriate information, instructions and training. Emergency procedures are in place. First aiders and first aid equipment and facilities are available at all times. Workers performing this task are subject to health surveillance and biological monitoring.	Standard site PPE plus lab coat and nitrile gloves.	1	Frequency: Once per shift (twice per day) Duration: 10 mins	N/A	9.2.3
WCS 3	Dissolving chromium trioxide in the circulation tank PROC 8a	-	Chromium trioxide is delivered in sealed metal containers and only opened immediately prior to their addition into the circulation tanks. Drums are always emptied completely. The addition to the circulation tanks in the basement is through a dedicated entry (tundish) on the mill	Procedures are in place covering additions. Only authorised personnel can perform this task which takes place in a restricted area. All personnel performing this task receive appropriate information, instructions and training. Emergency procedures are in place. First aiders and first aid equipment	Since the additions area is within the chromic acid area, operators must wear full chromium PPE.	1	Frequency: Once per shift (twice per day) Duration: 30 mins	N/A	9.2.4

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			floor above which is designed to avoid contact with the chromic acid in the circulation tanks. Additions take place inside the chromic acid area which is segregated from the rest of the ECCS4 line. Additions are made using a lifting device to allow controlled pouring into the tundish. There is no dedicated LEV around the tundish but the LEV to the plating tanks remains operational throughout and creates negative pressure around the tundish opening, helping capture and draw in any dusts created during pouring. Chromium trioxide is supplied and used as flakes, limiting dust formation and exposure by inhalation as compared to powder.	and facilities are available at all times. Firewater is retained. Workers performing this task are subject to health surveillance and biological monitoring.					
WCS 4	Electroplating PROC 13	-	The plating tanks are mostly (but not wholly) enclosed. This is achieved through the design of the tanks (steel strip passes through openings on the sides), the LEV (canopy hoods positioned above the entire liquid surface of the electrolyte) and the use of blanking plates (minimising emissions from the tank sides). Secondary containment is provided in that any loss from the plating	Only dedicated personnel perform this task. All personnel performing this task receive appropriate information, instructions and training. Emergency procedures are in place. First aiders and first aid equipment and facilities are available at all times. Firewater is retained.	Standard site PPE.	1	Frequency: Once per shift (twice per day) Duration: 1 hour	N/A	9.2.5

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			section on the mill floor level (e.g. leaks or rupture of line tanks or associated pipework) would result in the liquid being channelled back into the plating sump in the basement, which is itself fully bunded. The floor under the installation is acid-resistant tilework. The process control systems allow for automated and remote operation of the plating line, almost eliminating the need for operator intervention on the line itself (within the chromic acid area), thereby significantly reducing exposure. LEV in the form of receiving (canopy) hoods covers the entire surface area of the top of the tanks and extracts Cr(VI) containing air through a wet scrubber system. Waste scrubber water is directed to the chrome sump and then enters the WWTP where it is treated (over-stoichiometric addition of a reductant). The plating area is physically segregated from the rest of the ECCS4 line.	Workers performing this task are subject to health surveillance and biological monitoring.					
WCS 5	Control room activities PROC 1	-	All measures concerning minimisation of emissions and control of exposure described in the various other WCS are relevant for this scenario as well, because control room activities are 'far field'.	Only dedicated and authorised personnel will be present in the control room. Workers in the control room follow specific procedures in which they have been appropriately trained.	Standard site PPE.	7	Frequency: Once per shift (twice per day)	N/A	9.2.6

ECS and WCS	Task (ERC / spERC or PROC)	Annual amount per site	Technical RMMs	Organisational RMMs	PPE	No. of staff	Frequency & duration	Effectiveness of wastewater and waste air treatment and release factors: water, air and soil (for ERC)	Detailed info. in CSR (section)
			The operator is in a separate room (personal enclosure) 20m away from any potential Cr(VI) source. The process control systems allow for automated and remote operation of the plating line, almost eliminating the need for operator intervention on the line itself (within the chromic acid area), thereby significantly reducing exposure.	Emergency procedures are in place. First aiders and first aid equipment and facilities are available at all times. Production shift team members are subject to health surveillance and biological monitoring.			Duration: Up to 12 hours		
WCS 6	Loading and unloading of steel coils PROC 1	-	All measures concerning minimisation of emissions and control of exposure described in the various other WCS are relevant for this scenario as well, because activities involving the loading and unloading of steel coils are 'far field'. Areas where Cr(VI) emissions can occur are physically segregated and marked as the chromic acid area.	Only dedicated personnel perform this task. All personnel performing this task receive appropriate information, instructions and training. Emergency procedures are in place. First aiders and first aid equipment and facilities are available at all times. Production shift team members are subject to health surveillance and biological monitoring.	Standard site PPE.	1	Frequency: Once per shift (twice per day) Duration: 60 mins	N/A	9.2.7
WCS 7a	Maintenance activities (excluding confined space entry) PROC 28	-	Production is stopped during all maintenance activities. The electrolyte solution is then dropped to the circulation tanks in the basement. Secondary containment is provided in that any loss from the plating section on the mill floor level results in the liquid being channelled back into the plating sump in the	Maintenance activities are subject to risk assessment which informs the risk management measures required for, and procedures covering, the work. A permit-to-work must be issued before any maintenance activity can commence. The permit will describe the specific preparatory procedures that need to be completed and	For maintenance activities within the chromic acid area, operators wear full chromium PPE, otherwise standard site PPE.	8	Frequency: Variable, see Table 51 in CSR Duration: Variable, see Table 51 in CSR	N/A	9.2.8

ECS and WCS	Task (ERC / spERC or PROC)	Annual amount per site	Technical RMMs	Organisational RMMs	PPE	No. of staff	Frequency & duration	Effectiveness of wastewater and waste air treatment and release factors: water, air and soil (for ERC)	Detailed info. in CSR (section)
			basement, which is itself fully bunded. The floor under the installation is acid-resistant tilework. The plating line is physically isolated from the circulation tanks by means of double valves or blind flanges. The installation is thoroughly flushed with water. Water from flushing is collected in the basement chromium plating sump prior to wastewater treatment by reduction. Prior to leaving the chromic acid area all tools and parts are thoroughly rinsed with water. Rinsing water is collected in the basement chromium plating sump prior to wastewater treatment.	communicated before maintenance activities can be initiated. All personnel performing maintenance activities receive appropriate information, instructions and training. Emergency procedures are in place. First aiders and first aid equipment and facilities are available at all times. Workers performing this task are subject to health surveillance and biological monitoring.					
WCS 7b	Maintenance activities: confined space entry PROC 28	-	Production is stopped during all confined space entry. The electrolyte solution is removed and sent to the WWTP where it is treated by reduction. Secondary containment is provided around the circulation tanks in the basement and around the bulk tanks in the WWTP tank farm. The line will be isolated both mechanically and electrically following a lock out tag out procedure with personnel carrying out the task following a “one person, one lock” protocol.	Confined space entry can only be carried out under permit-to-work and based on a thorough risk assessment. Only authorised personnel can carry out these activities. All personnel performing confined space entry receive appropriate information, instructions and training. A rescue plan will be in place and rescue operatives remain present outside the vessel at all times.	Full chromium PPE.	2	Frequency: Once every 2.5 years Duration: Up to 4 hours	N/A	9.2.8

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			The vessel is thoroughly flushed with water. Water from flushing is collected and treated at the WWTP by reduction. Entrants to a vessel will carry gas monitors and a two-way radio. After work is completed, all tools and parts are thoroughly rinsed with water. Rinse water is collected in the basement chromium plating sump prior to wastewater treatment in the WWTP.	Entrants wear a harness with a rescue rope attached. First aiders and first aid equipment and facilities are available at all times. Workers performing this task are subject to health surveillance and biological monitoring.					
WCS 8a	Waste management: sampling and analysis prior to batch reduction PROC 8a, 9	-	Primary containment: The chromic acid bulk tank and the batch reduction tank on the WWTP are enclosed Secondary containment: The bulk tanks on the WWTP are fully bunded. A fume cabinet is present in the WWTP laboratory.	Operators will take samples of a limited volume only, and via a dedicated sampling system, reducing exposure. The only exposure that can arise is from the sampling point itself. Procedures are in place covering sampling. Only authorised personnel perform this task and all personnel performing this task receive appropriate information, instructions and training. Emergency procedures are in place. First aiders and first aid equipment and facilities are available at all times. Workers performing this task are subject to health surveillance and biological monitoring.	Standard site plus nitrile gloves.	1	Frequency: Once per day Duration: 10 mins	N/A	9.2.9

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WCS 8b	Waste management: cleaning of the filter press PROC 8a, 9	-	The reductant (ferrous sulphate) is dosed over-stoichiometrically, to result in full reduction of Cr(VI) to Cr(III) and Cr(0). No Cr(VI) is present in the filter cake, confirmed by weekly analysis.	Procedures are in place covering cleaning of the filter press. Only authorised personnel perform this task and all personnel performing this task receive appropriate information, instructions and training. Emergency procedures are in place. First aiders and first aid equipment and facilities are available at all times. Workers performing this task are subject to health surveillance and biological monitoring.	Standard site PPE.		Frequency: Once per day Duration: 45 mins	N/A	9.2.9

Abbreviations: RMM=Risk Management Measures, OC=Operational Conditions, ES=Exposure Scenario, WCS=Worker contributing scenario, ECS=Environmental Contributing Scenario, ERC=Environmental Release Category (or spERC if available), PROC= Process category, LEV=Local Exhaust Ventilation, PPE=Personal Protective Equipment, RPE=Respiratory Protective Equipment