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Risk Assessment

EPR Permit Variation Application

Permit Reference: KP3732PL/EPR/KP3732PL/V003

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Hydrochloric Acid

The Hydrochloric Acid used within the process will still be held in the bulk storage tanks currently used for the original permit. The storage tanks are located at the rear of the coil to coil pickling line, exterior to the building, specifically designed for the bulk delivery of acid also with a designated acid tanker route which is not to be used by other HGV traffic with the delivery point located within the Bulk Acid Delivery Area.

The Bulk Hydrochloric Acid Storage consists of two tanks, each capable of storing 45,000 litres. The tanks are constructed of polypropylene & fibre glass coated. The tanks are located within a bunded area which has a maximum storage capacity of 46900 litres which represents 104 % of an individual tank's storage capacity. However the tanks are never more than 90% filled, so the 110% minimum bund capacity requirement of the Environment Agency is met. The tanks are continuously vented to the abatement scrubber to relieve pressure changes. This minimises fuming at the connector during transfer of hydrochloric acid, which is pumped from the delivering tanker by Servosteel pumps, not by the tanker. A small length of pipe work leads from the tanks to a connecter which is kept padlocked at all times.

The Hydrochloric Acid will utilise existing pipework where possible with a break in stage to use within the new process tank. The new pipework installed will have the same UPVC property that is currently in use. The process tanks, when in use, will be heated to a maximum of 85oC to ensure maximum efficiency of the conversion from HCl to Ferrous Chloride.

No other chemicals are needed for the manufacture of Ferrous Chloride other than water.

Extraction system – Emissions to Air

Emissions to air will again also utilise the current abatement scrubber extraction system currently in place for the original permit with extraction pipework directly installed into the system. The bulk acid storage, coil pickle line with all associated tank & the new installation are all directly connected to the abatement scrubber system which is run continuously to ensure storage tanks are vented. The system is currently controlled by automatically pH controlled probes & monitored as part of the engineer's daily checks. The system is also subject to an MCERTS bi-annual external approved testing regime. In line with legal compliance, the system is also subject to annual LEV inspection

which is conducted by an external company whose results are actioned if required. Further to this periodic servicing is also conducted to ensure the system stays free of heavy contaminants & filter changes are undertaken.

The abatement scrubber system is used to minimise the release of Hydrogen Chloride to the atmosphere. Fumes are drawn from the acid processing tanks and bulk acid storage using a fan to the two stage scrubber system. In the first stage, fumes are drawn through mist eliminator which removes almost all liquid particles. Liquid particles go into scrubber sump reservoir which is used to top up acid recirculation tanks. Fumes are then drawn to second scrubber, which is dosed with Sodium Hydroxide solution via automatic pH control. Fumes are drawn through packed scrubber filter which has water sprayed onto the top, which percolates down removing hydrogen chloride from the packed scrubber matrix. Water drains to the reservoir tank and the treated air stream is expelled from the stack A1 as denoted in the original permit. Table 41 below is taken from the original permit application and showed that the abatement scrubber system easily achieves the emission limit for hydrogen chloride of 10mg/m3 set in the BREF document.

Table 41. Comparison of actual emissions from abatement scrubber system with BREF limit.

	Hydrogen Chloride
Emission Limit set in BREF Document	10mg/m3
Actual emission measured in January 2004	3mg/m3
Actual emission measured in April 2004	1.5mg/m3

Since the original permit was granted & external testing was implemented through an MCERTS approved methodology, Servosteel have seen actual results much lower than these stated in the table, as reported when required by the permit conditions.

Based on worst case measurement of 3mg/m3 for the original tank sizes included within the results, a calculation comparison for the new installation process is a 24% increase of process tank size. This is calculated from the new process base tank of 16m3 & the original acid process tanks only which are 66m3. A 24% increase on 3mg/m3 equates to a calculated maximum emission of 3.72 mg/m3, which is an increase of 0.72 mg/m3.
Actual result data suggests an average emission result of less than 0.5 mg/m3 as shown in the table below.

Test date	**Hydrogen Chloride**
March 2016	0.15 mg/m3

October 2016	0.03 mg/m3
March 2017	0.05 mg/m3
September 2017	0.03 mg/m3
March 2018	3.1 mg/m3
November 2018	0.08 mg/m3
March 2019	0.09 mg/m3
October 2019	0.08 mg/m3
August 2020	0.05 mg/m3
May 2021	0.05 mg/m3
5 year average	**0.371 mg/m3**

Based on both processes working con-currently, this calculates an emission of less than 50% of max emission limit of 10mg/m3.

H1 assessment was not undertaken based on Table 41. For the original permit application. The above calculation is based on the original Table 41. And from data available for tank size fume extraction only.

Visual and olfactory assessments of all emissions to air from within the installation boundary are made on at least a monthly basis. The circulation of caustic soda liquor for the scrubber is checked daily. Visual indication of low levels of caustic soda liquor is available via warning light on abatement scrubber control panel.

Ferrous Chloride Solution

The Ferrous Chloride Solution produced through the new installation is to be transferred into the current storage tanks that have been agreed & installed through the previous permit variation applications, prior to sale and subsequent despatch. Due to the reductions is processing volumes as mentioned previously within this application, the overall capacity of volumes handled and stored is only being brought back to volumes previously managed.

The liquor is typically of the following concentration:

- Free Acid Concentration is less than 0.5% w/w
- Iron Concentration is 12.9% w/w (+/-0.5%)

This solution would not be expected to produce gaseous emissions of any kind.

Process Tank Construction Materials

The new process tanks will be manufactured from mild steel & will be rubber lined. This mirrors the current set up of the main coil to coil processing line.

Control Techniques

Operating Method

The process starts with steel bobbins placed into the empty reaction tank. The lids are then closed and sealed. Water is heated within the water tank and when to 78oC is transferred from the water tank to the base tank. When processing commences, water is pumped from the base tank through the reactor and cascades back into the base tank. During this recirculation, HCL is added at a pre-determined rate that is calculated to be fully consumed during the reaction. The process will consume 8000ltrs water & 6,700ltrs of HCL at 36%, resulting in a concentration of no greater than 18% HCL. The water will be added to the tank first and will be fully automated to shut-off when it reaches a level indicator. The HCl will then be added directly into the water and again is fully automated and will shut-off when the mixture reaches the required volume. This mixture will then be circulated through the reactor over the preloaded steel bobbins to produce the ferrous chloride. Process temperature will be controlled at a maximum of 85oC, resultant from the mild exothermic reaction. If necessary internal electric pad heaters to guarantee temperature above a minimum will be used. Hydrogen gas levels in the extraction system are monitored and controlled up to safe maximum limit of 3.5%, anything in excess of this will result in the liquid in the reactor tank being automatically discharged into the base tank to prevent any further reaction. Samples are taken during the process to confirm when the hydrochloric acid has fully converted to ferrous chloride through a simple measure of specific gravity. Once an SG of 1.25 is reached, the reaction will be stopped the ferrous chloride is transferred to the base tanks before being transferred to the current storage tanks.

Resource efficiency

The hot water will be supplied by a new gas energy efficient water boiler purchased specifically for this activity and utilised within the dilution/process of the manufacture of the Ferrous Chloride. The Base tank will have heating elements to maintain an optimum process temperature control, based on the strength of the liquor, as previously explained. All tanks & associated transfer pipework within the system are to be lagged to retain as much heat as possible. The process will not create any waste under normal operating conditions.

Incompatible materials

Servosteel only have HCl delivered into large storage tanks and employees have a written system of receipt to ensure the correct pipework is used and is subject to our management system. Servosteel do use Sodium Hydroxide which is an incompatible material, however receipt is in 1000 litre IBC's which are stored in an area away from both Hydrochloric acid & Ferrous Chloride.

Monitoring

External emissions to air monitoring is currently conducted twice yearly by an MCERTS accredited external company, namely Element for Hydrogen Chloride to EN1911. The sampling location meets all the requirements specified in EA guidance note M1 and EN 15259.

Raw materials & water use

Due to the nature of the process the raw materials that are used are necessary. Servosteel will produce steel bobbins that derive from another in house process, along with small batch amounts of hydrochloric acid that is currently used within the main manufacturing process of the acid coil to coil pickle line. Servosteel have a rainwater harvesting system for the dilution of hydrochloric acid for the main permitted process, however this is unlikely to be used within the new process at present due to the size.

The amount of water needed for the process is heated by a gas fired hot water boiler, then transferred to the base tank followed by the transfer of hydrochloric acid. Temperature is controlled in the base tank with a number of electrically operated immersion heaters. When the process is complete, the ferrous chloride will be transferred into the already permitted storage tank area. When a collection is made the liquor is further diluted with water to an agreed SG by the customer requirements. All water used within the system will become a part of the manufactured product, so no waste water that requires treatment through the ETP will be produced under normal operation.

Fugitive Emissions

Air

Hydrochloric acid has a distinctive pungent smell, however the new tank installation will be an enclosed process that mirrors the current coil to coil pickle line, which will have a lid with extraction & fully sealed pipework for input & output liquor. If a small leak were to occur this would be contained within the bunded area and transferred directly

into the effluent treatment plant via the permanent sump pumps to be treated & disposed of as waste. This would result in a small amount of fugitive emissions to air, however the system does not have any additional risks to the current setup in terms of odours.

Ferrous Chloride at ambient temperature does not fume and would not be expected to be the source of fugitive emissions to air. The original tank farm & subsequent additional storage was not connected to the abatement scrubber system and there have been no incidents of odour complaints from work personnel or recorded issues from personal exposure monitoring.

Water

The process tanks are to be located in an existing wet section area. Hydrochloric acid can be an aggressive liquid, but all movement of liquor will be in fully sealed pipework for input, circulation & output. If a small leak were to occur this would be contained within the bunded area and transferred directly into the effluent treatment plant via the permanent sump pumps.

Ferrous Chloride is not considered to be aggressive if leaked in this area and would be contained within the process bunded area before being either pumped to one of the other tanks or in the worst case disposed of as waste, posing no threat of fugitive emissions to water. The area is already subject to preventative maintenance and the measures detailed in the original SPMP for the IPPC permitted installation.

Land

The process tanks are located in an existing wet section area which is designed to handle occasional leaks from the Coil Pickle Line. Ferrous Chloride would not be as aggressive if leaked in this area and would be contained within the process bunded area before being either pumped to one of the other tanks or in the worst case disposed of as waste, posing no threat of fugitive emissions to land. The area has an epoxy resin coated floor & already subject to preventative maintenance and the measures detailed in the original SPMP for the IPPC permitted installation.

The new process tanks are located in an area free from vehicular traffic reducing the risk of a catastrophic tank failure to zero. The only expected leakage would come from potential weeping over time, which would be identified during the existing preventative maintenance programme and SPMP for the IPPC permitted installation.