Variation for Permit BJ7298IF

Appendix C3 4a Monitoring of emissions - amended

Process 5 – the manufacture of Ferrous chloride has fugitive emissions from the opening of the dissolver units. The steam created by the dissolving of millscale in Hydrochloric acid, is primarily made of water, however there is the potential for Hydrogen chloride gas to be present. However, from the operations of the sister process under permit EP3635TU, there is no requirement for the monitoring of emissions, therefore as Industrial Chemicals has successfully operated the permit EP3635TU for 9 years, without a fugitive emission issue, and the process that will be constructed at Wet Thurrock will be identical in construction & operation that the likelihood of this being required is none. The only water used in this process, is product dilution water and this is added in steps to ensure that the correct strength of product is produced. Going on the figures supplied by the established plant at Runcorn, for every tonne of ferrous chloride produced there will be 49kg of waste produced. The waste from the process is oily sludge that covers the mill-scale that has been delivered & subsequently used.

Process 6 – the manufacture of Ferric chloride, using the Ferrous chloride produced in process 5, will require continuous emission monitoring for chlorine during the manufacturing process. This levels emitted are low - as seen in the emissions reported at the sister site in Runcorn – hourly average tends to be 0.13mg/m3 hourly average. It is presumed that as this will be an identical manufacturing process, that the emissions will also to an extent be identical. Industrial Chemicals would propose the installation of chlorine detectors, which read at such a low level. However, due to the nature and existing requirements of these types of monitors, none of them are currently Mcerts accredited. However, as some of the manufacturing companies are based within Europe, they have signed up to the TUV scheme that is the european equivalent of Mcerts. The Chlorine detectors that will be installed, will be continuous monitors and Industrial Chemicals will ensure that quarterly testing carried out by an external company e.g. Exova catalyst, who will use Mcerted staff, using Mcerted sampling equipment & Mcerted tests to determine & show how well the monitoring system works and also how close the results will be (as is the current case at the Runcorn Site). Industrial Chemicals propose, quarterly reporting to the Environment Agency for the levels of chlorine emitted along with the external monitoring reports to be submitted as well. As with Process 5 (the production of Ferrous chloride), in manufacturing Ferric chloride there is the requirement for the additional addition of mill-scale to increase the iron content of the product, taking it from Fe^{2+} to Fe^{3+}. The use of Chlorine gas, acts as an oxidising agent enabling the conversion from Fe^{2+} to Fe^{3+}. The use of additional mill-scale, does create waste, but for every tonne of product there is 2kg of sludge (the same oily mass as process 5) produced. There is no waste water from this process.

Process 7 – the cleaning of Sulphuric acid, using a glass evaporator. The acid comes to site at a weaker strength than what is suitable for use in process 4, with some low level organics. The aim of the water evaporation is to increase the strength to a suitable level to enable the product to be used in process 4 without affecting product quality or causing issues within the production process & to remove the organics from the acid. There is a steam release point, as with all evaporation units, but the design of this plant does not allow the release to atmosphere of sulphuric entrained steam – this is condensed for removal from the system into IBC's. If there are to be any emissions from this process they would be fugitive and not constant. Currently, a decision has yet to be made regarding

what to do with the condensate with the unwanted organic component. The initial plan, which was agreed with the suppliers, that the condensate would be neutralised with Sodium hydroxide by Industrial Chemicals (to reduce the hazard when transporting it) and then returned to the suppliers. This view point has since changed and a decision as to what to do with the waste condensate has yet to be determined. The condensate is to collected in IBC's, however as yet it is still not known if the supplier will be taking this product back or if ICL will have to send it for off-site disposal to an approved waste contractor who can treat this type of waste product. Industrial Chemicals have already identified an approved contractor for this, if the disposal route is decided upon. The contaminated acid, is a by-product from the supplier and as such has not been classified as a waste stream (an email confirming this by the supplier is attached), which is why the code used in Appendix C3 1 Table 1a has it as an acid and not as a reclaimed waste stream. No water is added to this process

Process 8 – the production of various types of aluminium chloride solutions. From operating permit DP3637SG, as with Process 8 there are no point source emissions to air. The steam from these reactors is pushed through a scrubber system to remove any trace of any unused hydrochloric acid. The scrubber water, once spent is then used as part of the dilution waters. If there are any emissions to air from this process, then they are fugitive. In operating this process under the permit DP3637SG, there has never been any need, requirement or request to monitor the steam from this process. Of all the processes looking to be transferred from the DP3637SG permit, this is the process that creates a significant volume of waste solids, due to the Aluminium hydrate powder being added in excess to enable the full reaction of the Hydrochloric acid. Over the past few years, the engineering team at the Grays site (DP3637SG) have been installing a different type of process filter that enables the unreacted Aluminium hydrate, to be washed sufficiently enough to remove any acid from it & it is then mixed to form a slurry & pumped back into the reactor to make the next batch. The waste water from this process, is then used as dilution water. Since these changes to, along with the reduction in the excess Aluminium hydrate that is added at the start of the process. There has been a significant reduction in the volume of waste produced. There is now no waste water produced from the cleaning of the unreacted Aluminium hydrate from the filters. However, there may be on occasions some waste water produced as a result of cleaning the plant.

Process 9 – the production of sodium silicate solution. From operating this process under an existing permit DP3637SG since 2005/6 (permit applied for/permit issued), but plant had been operational since 1984. It is known that there are no emissions to air during the process, except for the release of steam as this process is operated under pressure as a hydro-thermal process. There may be the potential for fugitive emissions, but it would just be steam. This process produces minimal waste. Whilst operating this process at the Grays facility, various changes to process (reducing the excess sand that was added to the reaction) has led to a significant drop in the volume of waste. In 2017, for the 30,000te of product produced there was 0.98 tonnes of undissolved sand that had to be removed from site as waste and no liquid waste either. The plant is set up, so that the undissolved sand from the previous batch is rinsed back into the reactor to act as a starter for the next batch. When the undissolved silica sand, has reached the point of not dissolving then, the sand is cleaned to remove any remaining sodium hydroxide from it and then it will leave site once a suitable volume has been created and will go to landfill.

Process 10 – the production of Sodium citrate. This product is produced by reacting Citric acid solution with Sodium hydroxide solution. This produces an exothermic reaction and requires no additional water or energy to it apart from the use of an agitator to mix the two chemicals together. The only emission from this process is steam and there is no waste. This will be a plant dedicated to this product only.

Process 11– the manufacture of Aluminium sulphate solution. As with process 8 & process 9, this product has been successfully manufactured under permits EP3630BB and subsequently UP3730WV and prior to 2005, operated since 1985 without any issues. Industrial Chemicals does once a year carry out external monitoring which has consistently proven that there is no sulphuric acid entrained in the steam produced as part of the reaction. Therefore it would be suggested that once a year monitoring be required. The test method used to determine if there were to be any sulphuric acid present in the steam is US EPA Method 8. A small volume of waste is produced from this process. This waste is as a direct result from the manufacturing process. The Aluminium hydrate powder is added in excess to the reactor. Then to start the reaction off, the undissolved Aluminium hydrate from the previous batch, is back-washed into the reactor from the filter, as a slurry. The sulphuric acid is then added to start the reaction, with the remaining Aluminium hydrate powder being added. Then after a pre-determined time, a pre-determined volume of mains water is then added to quench the reaction and produce the correct strength product. This reaction produces steam, with a minimum concentration of Sulphuric acid entrained in it. The levels recorded at the Newcastle site since 2008, have always been well below the requirement to qualify along with the volume of waste produced & the lack of energy required to manufacture this produce, that it if it were a stand-alone plant with no connections to over processes on the site, then it would qualify to be a low impact permit. However the shared source of Sulphuric acid, means that there are various technical connections present that mean for this process on this site a low impact permit would not be permissible. On the rare occasions that the spend hydrate has reached the point, where it will not dissolve any further due to only the other minerals present in the Aluminium hydrate are remaining, then this filtered spent hydrate is then removed from site as waste and sent to land fill.

Note

With all of the proposed above processes, designs and changes to the existing plants on other sites, will be incorporated into the designs for this site, to enable better use of the raw materials, recycling of filtered material & use of wash water as dilution water. These alterations to the volumes of raw material used, along with the use of wash water for dilution & reusing the filtrate from the filters have been monitored by ICL Site laboratories to determine that there is no impact on the quality of the product produced (so no effect on the customer). The reading that are used in the H1 report are taken from the various monitoring reports from the existing sites, which then illustrate that emissions from the processes will be monitored using the correct equipment and spot checks by external contractors will be used to add a further level of confidence in the monitoring.