

Fortescue Metals Group

Turning Better Wastewater Management into a Financial Win for FMG

Summary

Environmental Fluid Systems (EFS) has paved the way for better environmental outcomes across the entire mining industry by making eco-friendly wastewater management a profit driver – rather than a cost. For Fortescue Metals Group (FMG) this has meant costs savings in the hundreds of thousands of dollars. For the industry it means a better future where cost concerns no longer limit environmental decisions.

EFS has long been a leader in the chemicals market. Its innovative range of worksafe, eco-friendly cleaners, degreasers and industrial chemicals replace a myriad of toxic and dangerous products in common use today. For OH&S professionals these chemical substitutes have become the mainstay of good chemical safety. Not surprisingly what is good for people is often better for the environment, and that is why these products are also achieving great environmental outcomes for a range of industries – mining in particular.

EFS was initially approached by FMG to solve worker health issues related to the toxic cleaning chemicals being used to wash down locomotives and rail equipment. The team at EFS, however, went even further and implemented a change in chemical use that improved wastewater quality and water recycling. In doing so EFS put an end to serious health risks, improved the environmental sustainability of FMG's operations and it did so at a cost saving to the business.

Situation

Fortescue Metals Groups operates a number of train services transporting ore from its mining operations to various ports for export. As part of the regular maintenance regime, rail equipment workers are required to clean dust and oils from trains and carriages using pressure cleaners and chemical cleaning agents.

The previous regime employed Butyl Cellosolve which is a common chemical agent found in many commercial degreasers. Due to the atomising effect of the high-pressure cleaner on hot train surfaces this was being inhaled and ingested by workers causing nose bleeds, migraines, dizziness as well as long-term health risks.

The degreaser in use was also having a disastrous impact on wastewater quality. This was putting the environment at risk and costing FMG hundreds of thousands of dollars a year in waste disposal. FMG's existing cleaning process resulted in a high volume of wastewater which was laden with toxic cleaning chemicals as well as extremely high levels of toxic hydrocarbon contaminants. Due to the nature of the surfactants being applied these hydrocarbons could not be separated effectively from the wastewater forcing FMG to store the toxic water and then pay for costly disposal.

The Challenge

FMG's locomotives have always required regular cleaning to remove thick layers of Pilbara dust combined with fuel, oils and other hydrocarbons. To effectively remove this build-up a powerful degreasing surfactant has to be used and, for labour efficiency, it must be applied with high-pressure cleaners. This process resulted in a high volume of wastewater containing emulsified hydrocarbons. Because the cleaning chemical in use created an

emulsion, the oily contaminants could not be removed with an oil-water separator.

Oil-water separators work by retaining or slowing down the flow of wastewater in a specially designed tank long enough to allow suspended droplets of oil to coalesce and rise to the surface. This oil forms a layer on the surface of the separator where it is removed by skimmers and other methods.

The gravity type oil water separators used by FMG rely on the phase separation between oil and water and the specific gravity difference between the two. For a gravity oil water separator to work the oil and water mixture must be allowed to “break” when passing through the separator.

The emulsifying degreasers being used were actively working against this phase separation and were, therefore, not allowing the oil water separators to work effectively.

The result was very high volumes of toxic water which had to be stored by FMG and then disposed of, incurring enormous financial costs. The act of storing toxic wastewater also creates an ever-present risk of accidental release should equipment fail or an accident occur.

This type of toxic wastewater is also unsuitable for reuse meaning that fresh water must be continually used for the cleaning of trains. This increased water use places even further strain on the environment and increases costs.

The Solution

To solve FMG’s environmental and OH&S challenges in one step EFS substituted the cleaning chemical with its quick break, non-toxic degreaser **triple7** Heavy Duty.

triple7 Heavy Duty is a bio based, colloidal surfactant combined with a range of other non-toxic ingredients designed for optimal wastewater quality.

triple7 Heavy Duty specially designed “quick break” surfactant lifts oil, grease and other hydrocarbon soils from surfaces without forming a permanent emulsion. Once the oil and water has been rinsed away the degreaser rapidly releases the oil again, allowing it to be separated in an oil-water separator. This leaves behind wastewater containing little or no toxic hydrocarbon content.

When mixed with water **triple7** Heavy Duty forms a particular type of electrochemical structure called a “micelle”. These micelles energetically lift soils from cleaning surfaces with as much, or more power than harsh caustics, metasilicates and other salt-based cleaners.

triple7 Heavy Duty is:

- Non-toxic
- Non-reactive
- Non-carcinogenic
- Readily biodegradable
- Derived from renewable resources
- Safe to use, store and dispose of

The product was substituted in place of the original cleaning chemicals and applied via a pressure washer to clean dust and oil from the trains. This resulted in faster, more effective cleaning and better health and environmental outcomes. No change to work practices was required.

The Outcome

By implementing a simple change in the choice of cleaner / degreaser EFS achieved the following outcomes for FMG – and the environment:

Enhanced Oil Water Separator Performance

FMG oil water separator performance was instantly and radically improved. This led directly to a huge reduction in oily wastewater storage and disposal and will save the business hundreds of thousands of dollars a year in disposal costs.

Increased Water Recycling & Lower Water Use

The hydrocarbon level that is satisfactory for re-using water for dust suppression is 15ppm (parts per million). By using **triple7** Heavy Duty FMG are now achieving hydrocarbon levels of 0.75ppm. This has enabled them to reuse the water for dust suppression activities which has lowered the operations overall water consumption dramatically.

Dramatic Cost Savings

The combination of lower water use combined with the reduction in toxic waste has had a dramatic impact on costs. FMG will never pay the huge oily water disposal costs again which was costing many hundreds of thousands of dollars per year.

Better Health Outcomes

Since the change of cleaning chemicals was implemented there have been zero incidences of worker illnesses or injury due to chemical exposure in train cleaning operations. Aside from the instant improvement to acute health effects the change in chemistry is also protecting workers long-term health by removing Butyl Cellosolve from the workplace.

Environmental Leadership

EFS believes that better environmental management doesn't need to come at a cost to businesses. On the contrary it can actually be a source of profit. This win-win situation provides the perfect set of circumstances for better environmental practices to really take hold.

Profit drives businesses. By introducing better performing and safer chemical technologies at an overall cost saving EFS is giving the mining industry more opportunities to make better environmental decisions. By applying its innovative chemical technology to FMG's problem EFS has come up with a profit creating environmental improvement that can potentially revolutionise oily wastewater processing industry wide.

EFS hopes that this award entry and case study will serve to inspire other mining industry decision makers to take another look at their water use and re-use practices.