

Black Powder Solutions Partnering with Targa Resources

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Summary

Targa Resources Corp. was encountering a number of issues at their Galena Park LPG loading terminal linked to black powder contamination, a small and highly pervasive form of particulate contamination. This case study reviews results from the installation and operation of a patented magnetic separator system manufactured by Black Powder Solutions Inc. for the removal of the black powder contamination.



Overview

Targa Resources Corp. (Targa) is a leading provider of midstream services in North America and they operate in two primary segments: gathering and processing, and logistics and marketing. Their gathering and processing segment primarily (1) gathers production from oil and gas wells from various hydrocarbon basins in the broader region in and around Texas and (2) produces marketable natural gas by extracting value-added products (ie. NGLs) and removing impurities. Their logistics and marketing (downstream) segment includes the activities and assets necessary to convert mixed NGLs into NGL products and also includes other assets and value-added services such as storing, fractionating, terminaling, transporting and marketing of NGLs and NGL products. Much of the Company's fractionation, storage and terminaling of NGLs occurs in and around the Mont Belvieu NGL hub. Targa loads and markets up to 15 million barrels per month of purity NGL products out of its Galena Park LPG ship loading terminal.

Targa was experiencing high levels of Black Powder™ (black powder) contamination at its Galena Park terminal in purity NGL products and loading, vapor handling and facility lubrication systems. Black powder is a type of particulate contamination that is common in hydrocarbons and it consists of both ferrous and non-ferrous elements and compounds, in varying amounts, typically in high concentrations of particles under 10 microns in size. It is difficult and expensive to remove with conventional filtration, and as a result it has significant negative impacts on oil and gas equipment and facilities; this includes pipelines, pumps, compressors, meters and so on, as well as product quality.



Figure 1. Uncaptured black powder built up in a conventional filter housing.

Black Powder Solutions Inc. (BPS) designs and manufactures patented magnetic separation systems for the removal of black powder contamination in hydrocarbon and related products in pipelines, processing facilities, fractionators, refineries, storage facilities and other upstream, midstream and downstream facilities. Targa was introduced to BPS's technology in 2016 and subsequently proceeded with the deployment of this technology at Galena Park.

At Galena Park, low ethane propane (LEP) vaporizes in the flash tanks prior to ship loading operations, and the vapor is subsequently compressed by large Howden compressors and chilled to convert it back into LEP liquid for future sale. The compressors utilize injected oil as a sealing mechanism to reduce slip and to increase efficiency. The black powder in the LEP vapor was contaminating the compressor lube oil, thereby reducing its effectiveness and not only impacting compressor operations but the IMO lube oil pumps. The conventional filtration system was ineffective at capturing the black powder, particularly the particles below 10 microns in size.



Figure 2: Compressor lube oil system before installation.



Figure 3: BPS System pre-installation.



Figure 4: BPS System installed.

BPS designed and manufactured an inline magnetic separator to capture the black powder down to and below sub-1 micron in the lube oil system. The system was installed immediately upstream of an IMO pump. The goals of installing the magnetic separator were: (1) eliminate the presence of black powder in the lube oil system, (2) reduce wear and tear on the compressors and pumps, (3) extend the life of the pumps and compressors, and save on maintenance and replacement costs, and finally (4) improve on the performance of the conventional filtration system to reduce costs related to replacement filter cartridges. Targa installed this unit in their lube oil system in 2017, and only during 2018 and 2019 (year to date) have the impacts been fully realized.

Impact Assessment

Since installation, the lube oil system has functioned at a significantly higher level due to the removal of the black powder contamination. **The cost of the magnetic separator was \$19,989, and the total quantifiable annual savings have been in excess of \$300,000 per year.**

1. The IMO pumps in the system are now performing as expected. Prior to installation, contamination issues had Targa replacing 2 pumps per year at a cost of \$65,000 per pump due to contamination issues. Since installation, no replacement pumps have been required, thereby saving the company \$130,000/year.
2. The cost of conventional filter elements has decreased significantly.
 - In 2016, Targa had 67 filter change-outs at a cost of \$268,000.
 - In 2018, that dropped to 24 filter change-outs at a cost of \$96,000.
 - In 2019 and 11 filter change outs for a cost of \$44,000 (half-way through 2019).
 - Based on 2018, the annual savings have been \$172,000 per year.
3. The Howden compressors have also been performing well, and no unexpected shutdowns have occurred due to contamination issues.

Targa has been highly pleased with the performance of BPS's magnetic separator system and has installed (and is in the process of installing) multiple additional BPS magnetic separator systems at Galena Park as well as multiple other locations in their extensive facility network.



Left: Disposed conventional filter cartridge waste.

Right: Black powder contamination captured on the magnetic elements.



Table: Compositional analysis of black powder captured on magnetic elements.

Mineral	Line	Intensity (c/s)	Atomic %	Cone	Units	
Al	Ka	12.59	7.93	5.53	wt. %	
Si	Ka	28.15	14.55	10.56	wt. %	
P	Ka	58.93	28.27	22.62	wt. %	
S	Ka	14.89	7.30	6.05	wt. %	
Cl	Ka	3.34	1.44	1.32	wt. %	
Ca	Ka	36.07	12.13	12.56	wt. %	
Fe	Ka	57.56	26.67	38.47	wt. %	
Zn	Ka	2.01	1.71	2.89	wt. %	
			100.00	100.00	wt. %	TOTAL