Solvent Recycling Project
Cabinetworks Group
Mount Jackson, Virginia
EPA Region 3
NAICS: 337110

Facility Description:

Cabinetworks Group (CWG) is a cabinet manufacturing company that manufactures kitchen cabinets and other home improvement products. Cabinetworks manufactures over 20 brands of cabinets, which are shipped to a plant where they are assembled, shipped to, and sold from distributors. The Mount Jackson plant is responsible for manufacturing components such as frames, panels, and door fronts that go through a rough mill, sanding unit, and finishing department where paint related material is applied. The facility produces over 1 million components every year. The facility used over 250,000 gallons of paint related material and solvent every year. It is also classified as a large quantity generator of hazardous waste. The facility operates under the Title V Air Permit, which sets a Volatile Organic Compound (VOC) emissions limit of 463 tons.

Pollution Prevention Background:

Cabinetworks has been a member of the Virginia Environmental Excellence Program since 2010 for their Mount Jackson plant. The Mount Jackson facility has made efforts to reduce their hazardous material use, volatile organic compounds, and purchased electricity.

Solvent Recycling Project:

In 2019, the CWG management team was concerned that the increase in demand and utilization of a solvent containing 100% VOCs would result in the facility exceeding the permitted VOC emissions limit. The facility used an average of 10,000 gallons of finishing belt cleaning solvent every month, which is used to flush out the transfer lines of finishing materials during color changes and to clean the belt trolleys.

With the projected increase in production, the management team was concerned with the facility exceeding the VOC emissions limit issued within the Title V Air Permit. The team was looking into solutions that would help reduce the emissions. The CWG management team did not have a strong desire to install pollution control devices (i.e., scrubbers) as it would have been a very costly expense and would not address the use of solvents with a high VOC content, so they had sought out more innovative solutions to resolving the issue.

CWG reached out to Blue Ridge Solvents and Coatings (BRSC), a company that specializes in supplying industrial chemicals and recycling. CWG and BRSC were able to find two solutions to reduce VOC emissions. The first solution was to adjust the composition of the solvent to where it

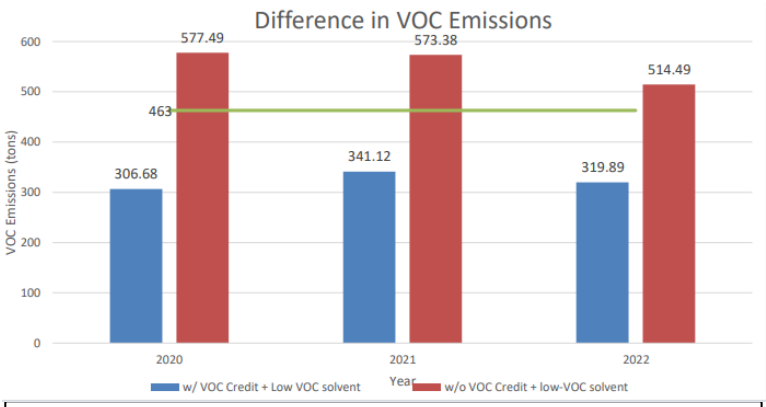
would contain 25% less VOCs. The second solution was to implement a Solvent Recycling Project. The recycling project involved converting used solvent from the facility to solvent that can be reused. The Solvent Recycling Project allows the facility to manage what was previously disposed of as a hazardous waste to be reclaimed through distillation. Spent solvent is transported to the BRSC facility to undergo the distillation process, in which drums of spent solvent are fed into a distillation vessel and the material is brough to a boiling point. Once the waste is separated, vapors of the recovered solvent are channeled to a water-cooled condenser to cool into a liquid. A total of five spent solvents from the facility can be turned into reusable solvent.

There have been many benefits of implementing and continuing the Solvent Reclaim Project.

Results:

The project has reduced the environmental footprint by reducing the amount of hazardous waste disposed, increasing recycling, decreasing raw material use, and decreasing VOC emissions at the facility. Almost 70% of the hazardous waste has been converted to reclaimed solvent over the last three years, which helped reduce the volume of hazardous waste disposal.

Year	Waste (lbs.)	Reclaimed (lbs.)
2020	52,511	33,100
2021	461,201	319,890
2022	453,789	295,097
2023	344,953	257,176
Total	**1,312,454**	**905,263**
Percent (%) of hazardous waste converted to reclaimed solvent		**69%**



The volume of hazardous waste disposed of has greatly diminished. Almost 70% of the hazardous waste has been converted to reclaimed solvent.

The implementation of the Solvent Recycling Program and the utilization of solvent containing 25% less VOCs has resulted in VOC emissions reductions of 42% over the last three years. Additionally, the facility received VOC emissions credit for the disposal of the waste going to BRSC. Since CWG was proactive in seeking these solutions, the facility VOC emissions have been able to stay below the permitted limit of 463 tons.

The Solvent Recycling Program has contributed to the substantial decrease in raw material use (virgin solvent). Since the beginning of the project, utilization of the virgin solvent has decreased by 51% over the last three and a half years. The facility forecasts the reliance on virgin solvent will continue to decrease.

Year	Virgin Solvent Used (gallons)	Reclaimed Solvent Used (gallons)	Reduction in Raw Material
2020	40,798	3,202	8%
2021	87,816	42,216	48%
2022	78,739	39,205	50%
2023	59,758	52,242	87%
Total	**267,111**	**136,865**	**51%**

Financially, the Solvent Recycling Program has generated cost savings in several ways. With the reduction of hazardous waste accumulated; the facility has been able to save thousands of dollars in hazardous waste disposal costs every year.

The cost of reclaimed solvent is significantly less than virgin solvent. As more reclaimed solvent has accumulated, the facility has been able to save almost $1 million over the last three years. The implementation of the project has also reduced the cost in hazardous waste disposal annual emissions fees. With the program contributing to keeping the VOC emissions below the permitted limit, it has also prevented the facility from receiving penalties from the Virginia DEQ.

Year	Potential cost of virgin solvent	Amount spent on reclaimed solvent	Cost savings
2020	$21.229.26	$12,007.50	57%
2021	$407,384.40	$181,106.64	56%
2022	$462,619.00	$175,246.35	62%
2023	$679,668.42	$232,476.90	66%
Total	**$1,570,901.08**	**$600,837.39**	**62%**

Transferability

This case study shows that there are options for mitigating waste issues without compromising the production demand. The readjustment of the composition of the solvent along with the Solvent Recycling Project has shown that an innovative and simple approach to reducing VOC emissions can address the problem without increasing spending. This program proved to be both efficient and cost effective and could be implemented at facilities with a similar waste stream that could be reclaimed. Substitutions chemicals for less hazardous materials and finding a way to reclaim or reuse waste have long been a cornerstone of pollution prevention as this project illustrates.