

Intern: Lindsey Choi
Major: Biological Sciences
School: Wichita State University



Company background

RedGuard was founded in 1998 in Wichita, Kansas, as a portable storage unit provider under the name "ABox4U." A refinery explosion in 2005 led RedGuard to become what it is today: a blast-resistant modular building manufacturer. Since its rebranding, RedGuard has opened 23 locations across the U.S. with eight divisions employing more than 420 people. RedGuard supplies blast-resistant buildings to governments and private parties around the globe with a key emphasis on petroleum refineries.



Project background

RedGuard previously hosted a Pollution Prevention Institute circuit rider intern in 2019. The circuit rider investigated pollution prevention, or P2, opportunities to help the company reduce its environmental impacts and operational costs. RedGuard requested another intern for 2022. This intern was funded through a sustainable materials management, or SMM, grant and used SMM's three core principles – reduce, reuse, recycle – to address waste concerns at RedGuard's Wichita Production Center.

Incentives to change

RedGuard is actively working toward ISO 14001 certification, which requires consideration of all environmental issues related to production with a strong emphasis on continual improvement. As a result, RedGuard identified five waste streams for the 2022 intern to investigate with the goal of diverting waste from landfills: wood, cardboard, paint, solvents and abrasive blast media.

PROJECTS REVIEWED FOR SMM POTENTIAL

Wood waste

RedGuard generates oriented strand board, plywood, 1x4, 2x4 and pallet waste from production operations, such as framing and flooring, and from receiving shipments on pallets. The intern estimates the company produces 66 tons of wood waste a year. To reduce the amount of waste to landfills, the intern identified groups interested in taking the excess wood. Selling used pallets could generate \$2,600 per year and reduce disposal fees by \$727 per year. Donating the other wood items could allow RedGuard to claim a tax deduction of up to \$57,172 per year and further reduce disposal fees by \$1,435. These alternatives have a potential to reduce up to 63 tons of waste a year and save \$4,762 annually. Savings in reduced taxes due to tax deductions were not evaluated.

Cardboard waste

Cardboard accompanies nearly all product received by the host company and is supposed to be disposed of in two recycling dumpsters. The intern investigated and found that not all cardboard is recycled. The intern estimates the company recycles 11 tons of cardboard waste per year

and landfills 2.3 tons a year. The intern recommended the company purchase recycling bins and place them in strategic locations to improve recycling rates and purchase a baler to sell cardboard bales directly to vendors. These recommendations could generate \$9,072 per year with a simple payback period for the baler of 18 months.

Paint waste

RedGuard paints its product in customer-specified colors using airless sprayers for large areas and high-volume low-pressure sprayers for touch-ups. The intern investigated losses in this process and recommended two actions: change from airless sprayer systems to air-assisted airless sprayers, and purchase a spray paint simulator for training. These two recommendations are estimated to improve transfer efficiency by 10% each, which together could save 1,064 gallons of product at \$67,533 per year. The overall simple payback period for both recommendations combined is 6 months.

PROJECTS REVIEWED FOR SMM POTENTIAL, CONTINUED

Solvent reduction

The company uses MEK to clean spray guns and clear paint lines for paint changes. The resultant waste is distilled to recycle solvent. The intern observed this process and found that four buckets of MEK are consistently left uncovered nine shifts a week, allowing solvent to evaporate. Controlling evaporation could save 0.14 tons of solvent at \$653 per year. The intern also examined replacing MEK with methyl acetate as it is considered less environmentally hazardous, but further research is required to determine its effectiveness.

Alternative blast media

RedGuard cleans steel structural frames by abrasively blasting them with coal slag. This slag breaks apart after

one blasting cycle and is discarded. On average, 315 tons of coal slag is purchased and 504 tons disposed of each year, costing the company \$119,499 annually. The discrepancy between purchase and disposal weights is due to contamination from blasting product and from water intrusion into the waste site. The intern investigated switching from coal slag to steel grit, which could be reused up to 200 times before recycling. A blast recovery system is required to use steel grit effectively, costing \$260,602. To exceed the value of coal slag, steel grit only needs to be reused four times. At 25 reuses, \$102,071 per year could be saved yielding a simple payback period of 2.5 years.

SUMMARY OF 2022 SMM INTERN RECOMMENDATIONS

Project	Annual estimated environmental impact	Estimated cost savings (\$/year)	Status
Wood waste	63 tons wood reused	\$4,762	Recommended
Cardboard waste	2.3 tons cardboard recycled	\$9,072	Recommended
Paint waste	1,064 gallons paint reduced	\$67,533	Recommended
Solvent reduction	0.14 tons solvent reduced	\$653	Recommended
Alternative blast media (25 reuses)	315 tons coal slag reduced	\$102,071	Recommended
Total¹	380 tons solid waste, 1,064 gallons paint	\$184,091	
GHG reductions^{1,2}	77 MTCO₂e		

¹Does not include projects "not recommended" or where "more research needed."

²EPA P2 GHG Calculator with Cost, Apr. 7, 2016 & EPA WARM Tool- Version 14, Mar. 13, 2018