LINWOOD MINING & MINERALS

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COMPANY BACKGROUND

Linwood Mining & Minerals has been in operation since 1944 and is one of the largest underground limestone mines in the country. It is a privately owned business that serves 12 states throughout the upper Midwest via truck, train and barge. Linwood operates 24 hours a day, 365 days a year. The company mines more than 30 acres annually and has a reserve of more than 100 million tons of limestone.

PROJECT BACKGROUND

Linwood Mining & Minerals produces a variety of limestone products, including washed stone, chips, sand and agricultural lime. Currently, Linwood generates a silt-laden wash water that is not treated it before it flows into a series of settling ponds. The objectives of this project were to remove the solids from the wash water before it enters the ponds, and to examine overall water efficiency at the facility.

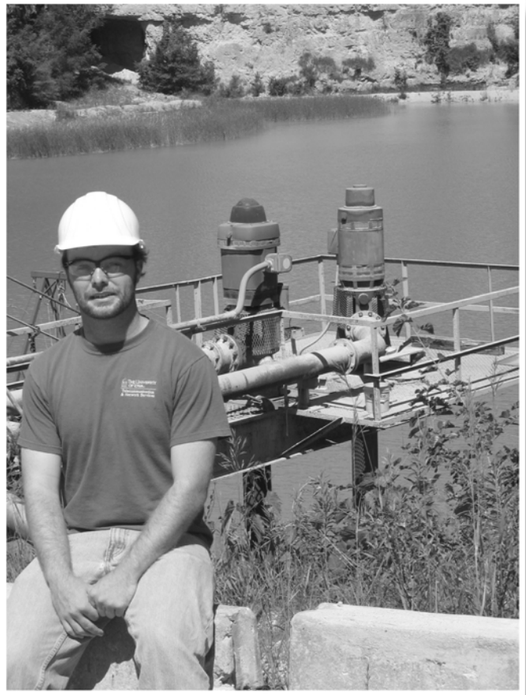
INCENTIVES TO CHANGE

By removing solids from the wash water before it enters the settling ponds, Linwood could reduce its environmental impacts and costs. Saleable product is lost to the ponds when it is not immediately sorted and dried. Additionally, the large amount of sediment that settles during the washing season requires Linwood to dig out the sediment and retrench the ponds each winter, resulting in more water being pumped to a creek on a more frequent basis.

RESULTS

There are several effective ways to remove solids from water. However, the smaller the solid particle, the more difficult it is to remove it in an efficient manner. After taking samples and performing multiple gradation tests, it was determined that a majority of the solids were very small clay-sized particles. Given the large flow rate of the wash water and minimal space to work with near the plant, the number of useful treatment options was limited.

The intern consulted with several equipment manufacturers around the country and found two manufacturers that produce a system capable of handling the high solids loading rate and effectively removing very small particles. However, one company could not meet the space requirement.
The remaining option involved installing a rapid mix and flocculation tank in series with a compact clarifier, which could remove an estimated 50 percent of the solids effectively. Testing would be required of the polymer that is added to the rapid mix tank to ensure that it does not degrade Linwood's saleable product in any way, and the intern recommended that Linwood install a solids conveyance line so the removed particles could gather in one place and dry.



In addition to installing the solids removal system, it was recommended that Linwood install several electromagnetic flowmeters in order to quantify the amount of water that is used throughout the treatment process. More water is not necessarily better when washing stone, so performing trial runs at various measurable flow rates would allow Linwood to determine an optimal flow for each product and reduce the amount of water the facility needs to pump.
Lastly, the intern recommended that the wash water be visually inspected on a weekly basis. Over the course of the summer, the number of large particles in the washwater steadily increased, resulting in increased solids loading rate and more lost product. This increase in lost product is a result of plugs in the sorting screen and could easily be avoided if the wash water were monitored.

CONVENTIONAL AIR POLLUTANTS AND GREEN HOUSE GASES DIVERTED IN STANDARD TONS

Total for all sectors					
CO_2	SO_2	CH_4	N_20	CFC	PM-10
173	293	12.8	3.98	1.77	.554

PROJECT	ANNUAL COST SAVINGS	ENVIRONMENTAL RESULTS	STATUS
MATERIAL RECOVERY	$200,000	--	RECOMMENDED