

# Koch Nitrogen Company

## COMPANY BACKGROUND



Koch Nitrogen Company is a subsidiary of Koch Industries, Inc., which is one of the largest privately owned companies in America. The Fort Dodge plant has 48 employees. Koch Nitrogen manufactures, markets, and distributes nitrogen fertilizer products. Its Fort Dodge facility produces up to 1,100 tons of ammonia and 1,800 tons of urea ammonium nitrate each day. The company places a high priority on the environment and it is committed to performing better than mandatory environmental regulations.

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### PROJECT BACKGROUND

Due to the low boiling point of ammonia, vaporization occurs easily within the storage tanks. When pressure builds, ammonia must be flared to reduce this pressure. Although the flare is operated within permit limits, Koch Nitrogen Company's goal was to further reduce the amount of ammonia flaring that occurs. An additional goal was to reduce the amount of ammonia lost to fugitive emissions within the process.

### INCENTIVES TO CHANGE

Every pound of ammonia burned or lost within the process is a pound of manufactured product that could have been sold. Flaring ammonia also produces NOx emissions. Using one year as an example, \$264,019 worth of ammonia was flared in 2007, emitting 80,088 pounds of NOx. With improvements made to the loading and storage system, Koch Nitrogen Company can keep more product available for sale and reduce emissions even further. Fugitive emissions also result in wasted product. Estimated losses for 2008 amount to 98,000 pounds of ammonia. The economic and environmental benefits from reducing lost product are incentives to change.

### RESULTS

**Compressor Replacement:** The refrigeration system includes a set of four back-up compressors that help keep storage tank pressure down. These supplement three primary compressors that are used all of the time. The primary compressors are sufficient under most circumstances. However, under extreme weather conditions, the back-up compressors do not have the capacity to continually handle all of the ammonia vapors from the two 30,000 ton ammonia tanks. Additionally, during plant shutdowns the primary compressors do not run and more ammonia is flared.



Because the primary compressors are able to keep tank pressures down in most circumstances, attention focused on the back-up compressors. The back-ups were installed in 1968. Therefore, efficiency is not as high as possible and parts are becoming obsolete. In order to reduce flaring and electricity costs, these compressors should be improved. Average potential profits would amount to \$41,324 each year, reducing NOx emissions by 12,030 pounds.

**Railcar Loading Reroute:** Railcars are loaded with liquid ammonia. When the railcars are filled, ammonia is left in the line between shut-off valves. Currently, this is routed to the flare. Although there is not a large amount per railcar, the total ammonia flared from railcar loading could produce an annual profit of \$824 and emit 288 fewer pounds of NOx. This ammonia could be rerouted from the flare back to a storage tank. However, there are not enough railcars loaded at this time to offset piping installation price quotes.

**Leak Detection:** In order to locate leaks accounting for the fugitive emission totals, an ultrasonic leak detector was used throughout the plant. The bolts on many valves, flanges, and other connections should be tightened more frequently, reducing the amount of ammonia that escapes. This kind of preventative maintenance would reduce electricity costs and also keep more product available for sale. Leaks found within reachable areas of the plant could prevent 63,700 pounds of ammonia from escaping and save \$18,836 annually.

### AIR POLLUTANTS DIVERTED IN TONS

Total for all sectors	
SO <sub>2</sub>	0.59
CO	1.29
NO <sub>x</sub>	1.18
VOC	0.42
PM	0.24

### GREEN HOUSE GASES DIVERTED IN TONS (CO<sub>2</sub> Equivalent)

Total for all sectors	
CO <sub>2</sub>	392.7
CH <sub>4</sub>	32.9
N <sub>2</sub> O	401.5
CFC	1.93

PROJECT	ANNUAL COST SAVINGS	ENVIRONMENTAL RESULTS	STATUS
SKID BUILDING COMPRESSOR REPLACEMENT	\$41,324	12,030 LBS NO <sub>x</sub> PREVENTED	RECOMMENDED
RAILCAR LOADING LINE REROUTE	\$824	288 LBS NO <sub>x</sub> PREVENTED	RECOMMENDED (UPON INCREASE IN PRODUCTION)
PREVENTATIVE MAINTENANCE – LEAK DETECTION	\$18,836	63,700 LBS NH <sub>3</sub> PREVENTED	IMPLEMENTING