CAMBREX

CHARLES CITY

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COMPANY PROFILE
Cambrex, founded in 1981, is a global manufacturer of small molecule innovator and generic Active Pharmaceutical Ingredients (APIs). The company has a presence in seven locations globally and is one of the leading API producers in the market. With an accelerated demand in the market, Cambrex continues to use their technologies and expertise to meet the customers' needs for small molecule therapeutics. The plant in Charles City, Iowa, is home to approximately 350 employees.

PROJECT BACKGROUND
The focus of the 2018 Pollution Prevention Intern project was to assess the facility's steam operations and identify improvements to the overall operating efficiency of the plant. The intern conducted an audit of the steam system to identify inefficiencies in piping, steam traps, and condensate return lines. The intern analyzed the trends, gathered and interpreted data, and evaluated solutions for reducing steam usage. The intern also analyzed the boiler operations and assessed opportunities to improve boiler efficiency.

INCENTIVES TO CHANGE
Continuous improvement is a key component in Cambrex's strong commitment to achieve environmental excellence in all their facilities. Steam is widely used in production processes at the Charles City facility to optimize chemical reaction conditions. Utilizing steam for energy transfer enables a quality and cost-efficient heating application to take place. There are significant economic benefits of having a proper and efficient steam plant in operation. Exploring opportunities to optimize the efficiency of the current steam system has the potential to reduce operating costs, keep production running smoothly, and improve environmental performance.

RESULTS
Plant Steam System Survey: Using an infrared camera and an ultrasonic leak detector, the intern conducted an audit of the steam system to identify areas of steam loss. Opportunities to improve the efficiency of the steam system included correcting oversized pipes, failed steam traps, and improperly operating condensate return stations. The audit, along with test results, showed that 8 percent of the steam traps had failed. Work orders were submitted to repair or replace these steam traps to reduce losses of water, energy, and treatment chemicals.

Steam Trap Preventative Maintenance Program: Implementing a preventative maintenance program for the steam system would proactively reduce resource losses and costs. An annual steam trap functionality and leak detection audit would identify failed traps so that repairs could be scheduled in a timely manner. Annual analysis of steam trap failure based on location or associated processes could provide insight into trends and help to identify these failures at their earliest stage. It is anticipated that the preventative maintenance program will be implemented within 6-12 months to sustain repairs made based on the findings of the initial plant steam system survey.

Pipe Insulation: Steam pipes without insulation allow for heat to escape into the atmosphere. The boilers then have to compensate for these energy losses to maintain sufficient heating for all applications. A map was created to show the location of uninsulated pipes, and a contractor was hired to install Velcro insulation. Maintenance workers can now open up the insulation to work on pipes and then conveniently reattach it once they are finished. Maintaining the pipe insulation will reduce the load on the boilers and help the steam system operate more efficiently.

Boiler Operations: Because steam is critical to the production processes at Cambrex, two boilers are kept running at all times to avoid costly interruptions. In the summer the boilers operate at their lowest capacity, yet still provide more steam than the plant requires. To avoid pressure building up in the main steam line, a valve to atmosphere is opened to release excess steam. Installing and staging two new boilers with a lower capacity could reduce the need for venting steam. This would result in savings in make-up water, energy, and treatment chemicals. More research is needed to further evaluate the impacts, particularly on production, and the feasibility of this recommendation during different seasons and operating conditions.

PROJECT	ANNUAL COST SAVINGS	ENVIRONMENTAL RESULTS	STATUS
PLANT STEAM SYSTEM SURVEY	$16,069	1,888,446 gallons of water 2,065 gallons of HCl 1,475 gallons of NaOH 16,166 therms	IN PROGRESS
STEAM TRAP PREVENTATIVE MAINTENANCE PROGRAM	$4,527	840,477 gallons of water 919 gallons of HCl 657 gallons of NaOH 7,195 therms	RECOMMENDED
PIPE INSULATION	$3,420	11,595 therms	IN PROGRESS
BOILER OPERATIONS	$9,243	241,930 gallons 340 gallons of HCl 189 gallons of NaOH 26,668 therms	FURTHER RESEARCH RECOMMENDED