2015 Case Study

Wolf Creek Nuclear Operating Corporation

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Company background
In 1985, Wolf Creek Generating Station became the first nuclear power plant in Kansas. The plant, operated by Wolf Creek Nuclear Operating Corporation (Wolf Creek), provides Kansas and Missouri with emission-free electricity. Wolf Creek is a single-unit site with a pressurized water reactor (PWR). The PWR keeps the water at a very high pressure so that the water inside the primary water loop never reaches a boil. Ownership of Wolf Creek Nuclear Operating Corporation is divided among Kansas City Power and Light (47%), Westar Energy (47%), and Kansas Electric Power Cooperative, Inc. (6%). Wolf Creek Nuclear Operating Corporation, with a trade name of WCNOC and Standard Industrial Classification Code of 4911, generates more than 1,250 megawatts (MW) of electricity, which is enough to power at least 800,000 homes. Wolf Creek employs approximately 1,000 people from Burlington, Kansas, and surrounding areas.

Project background
The intern started researching options for waste and energy reduction. These included having only two compressors, having smaller compressors and purchasing compressors that had variable-speed drive motors. Wolf Creek depends on repetition and reliability; therefore, having only two smaller compressors is not realistic. Compressors with variable-speed drive motors are an option Wolf Creek is still researching; however, at this point, the compressors are still reliable and there is no immediate need to replace them.

The intern was tasked with finding leaks within the compressed-air system. The project was then narrowed to the first floor of the turbine building. The intern first wrote a leak-detection procedure, and then conducted an air audit using said procedure and a UE Systems Ultraprobe 15000. The purpose of this project was to enhance the compressed-air system by reducing wasted air and energy, as well as putting less of a workload on the compressors. Potential economic benefits of implementing this project include saving thousands of dollars for Wolf Creek and its owner companies, as well as a reduction in energy use . The main waste reduction of the intern's project was in the form of electricity. Wolf Creek does not purchase all of it electricity via an electric company; instead, it uses some of the energy it produces. By reducing air leaks and making the compressed-air system more efficient, electricity can be saved, which in turn Wolf Creek can sell on the power grid.

Incentives to change
Wolf Creek has participated in the Pollution Prevention Institute's Intern Program for three years prior to the summer of 2015 in an effort to reduce its energy usage, as well as increase environmental sustainability. Wolf Creek produces an estimated 1,250 megawatts (MW) of power daily. Wolf Creek produces electricity, but also uses some of that electricity to power its own facility. Because only a small percentage of the generated electricity is used on site, the remaining electricity is sold on the power grid. Integral to the daily operation of Wolf Creek is the compressed-air system. Ideally, this would be a closed system, meaning no leaks exist. When the compressed-air system has fewer leaks, the compressors are not required to run as hard. This means they do not load and unload as frequently. When the compressors do not load and unload as frequently, it is easier on the equipment and it will have a longer lifespan. This efficiency allows Wolf Creek to replace its current compressors and parts less often.

Projects reviewed for P2 potential
The intern was assigned to the compressed-air system for a period of 10 weeks at Wolf Creek. After meeting with a systems engineer as well as the systems engineering supervisor, the intern decided to narrow the project scope to compressed-air leaks. Considering a compressed-air system can be very

extensive, the project was again narrowed to the first floor of the turbine building. The compressed-air system splits into two separate air systems – service air and instrument air. The intern started with the service air system, then moved to the instrument air system. She developed an air-leak audit procedure, then using the ultrasonic leak detector, set out to detect as many leaks as time would allow. Along with the air-leak audit procedure, the intern also created an Ultraprobe 15000 (ultrasonic leak detector) check list for future audits.

Within the turbine building are numbered structural poles. The intern used those numbered poles to set up a grid-like surveying plan. Along with the grid system, she used an official Wolf Creek drawing of the compressed-air system to highlight areas that had been surveyed. The intern numbered the grid areas and designated them into zones. When a leak was found, the corresponding zone was noted with the applicable location, description, line/valve number, pressure and decibel reading.

A leak was found by listening to the ultrasonic leak detector with the provided head phones and pulling the trigger. When the intern was out in the plant scanning for leaks, emphasis was placed on listening for a rushing sound, which indicated an air leak. When a rushing sound was heard, the intern placed the “rubber focusing probe” on the end of the ultrasonic leak detector to pin-point the air leak.

This project was the intern’s only project for the summer of 2015. She recommends implementing this project and suggests all leaks be repaired and air audits be conducted every 18 months.

Summary of 2015 2 intern recommendations for Wolf Creek Nuclear Operating Corporation

Project description	Annual estimated environmental impact	Annual estimated cost savings	Status
Compressed-air leak detection	66,228 kWh	$7,815.48	Recommended
Total savings *	66,228 kWh	$7,815.48	
GHG reductions *	**64.78 metric tons CO_2e**		

* Does not include projects that are “not recommended” or “further research is needed.”