Program Title: Successfully Reducing the Incidence Rate of Nuisance Alarms from Microwave Ovens

I. Formative Evaluation – Planning

About ten years ago, Ohio University's Environmental Health and Safety Department partnered with the Athens Ohio Fire Department (AFD) to study the number of alarms on campus, what was causing them, and their impact on the AFD and the University. They found that a significant number of those alarms were nuisance alarms caused by smoke from microwave ovens.

Each year from 2007 to 2009, the AFD responded to 53 or more microwave incidents at OU properties. In 2010, the number was precisely 50. To address the problem, Ohio University successfully applied for a Fire Prevention & Safety Grant from the Department of Homeland Security's Federal Emergency Management Agency (FEMA) to:

i) Identify and test an engineered solution to help stop microwave related nuisance alarms;
ii) Purchase the chosen solution;
iii) Develop a comprehensive installation program;
iv) Rollout a simultaneous and equally comprehensive education program; and
v) Analyse the data and impact on nuisance alarm runs post-installation.

To eliminate these responses, Ohio University decided on an engineering solution utilizing the Safe-T Sensor, a device engineered to interrupt power to the microwave oven at the first sign of smoke to eliminate these responses. Early results from this initiative were collected by Brent Auker, the study's lead author and the University's Fire Protection Engineer, and presented at the Vision 2020 Symposium in 2012. According to the data presented, from 2007-2011, the AFD responded to about 770 fire runs annually. When Auker took all expenses into account, he found that on-campus nuisance fire alarms for burnt food events in microwave ovens alone were costing the University at least $2,000 per incident or more than $100,000 a year. Approximately 250 of those runs were to the Ohio University campus, with the leading cause (more than 50 each year) being nuisance alarms or 'burnt food events' in microwave ovens.

With the support and cooperation of the Athens Fire Department, we have been able to collect and analyze relevant fire department run data from 2011 to 2019. This new data clearly shows a significant and continuing reduction in the number of nuisance alarms and the related fire department runs associated with on-campus microwave ovens. The return on investment has been tremendous and includes the direct cost savings from fewer fire department calls over the past nine years, as well as a reduction in lost employee time, university facility resources, and resident disruption.

II. Process Evaluation – Implementation

After successfully securing a FEMA grant, Ohio University purchased 4,630 sensors in August 2010. Most of these sensors (3,593) were installed in December 2010, during the school's winter break. By early 2011, all of the University's microwaves were equipped with a Safe-T Sensor. Staff and students were informed about the Sensor in various ways, including educational presentations and material handouts. Today, the school continues to include this messaging, complete with a warning of potential fines for tampering, in its Student Housing Handbook.

III. Impact Evaluation – Short-Term Results

In the first 14 weeks of 2011, Ohio University saw a 92 percent drop in the number of false alarms compared to the corresponding 14-week period from the previous year. A little more than a year later,

Brent Auker noted that there were only 16 microwave incidents from April 2011 to April 2012 against an average of 53 incidents in the years prior. Looking at these early results, Auker believed that the University could realize a total reduction of 111 burnt food events (37 per year) for a net savings of about $222,000 ($74,000 per year). As we will see, he was right.

Beyond the immediate financial benefits, the decreased number of false fire alarms meant student residents were more likely to respond appropriately when an alarm went off, and fewer dormitories needed to be evacuated less frequently. Moreover, firefighters were kept free to handle real emergencies. Fire departments could also see a decrease in fuel costs, wear and tear on the fire apparatus, and risk of collision and injury during a response call.

IV. Outcome Evaluation – Long-Term Results

In each year (from 2011 to 2019), the number of nuisance runs by the AFD related to microwave burnt food events remained significantly lower than in the years preceding the installation of Safe-T Sensor. Even the worst year in those nine years -- 2019, when there were 27 microwave events/runs – was 46% lower than the 50 runs in 2010. Using 50 events per year as the baseline (before the product solution was installed), there were a total of 168 nuisance runs between 2011 and 2019 versus a possible 500 runs had Safe-T Sensor not been installed.

That reduces nuisance runs and associated costs by about 67% over nine years. A broad cost estimate of $2,000 per nuisance run – not including disruption to the student residents – represents a cost-benefit/savings of $664,000 over nine years.

The return on investment (ROI) associated with the risk initiative has been significant and continuing. Again, based on a broad cost savings estimate of $2,000 per nuisance run – not including disruption of the students – that represents a gross cost-benefit/savings of about $664,000 over nine (9) years and an ROI of more than $450,000.

Original Price:	$39.99 per unit
Units Purchased:	4,630
Total Purchase:	$185,154
Total Saved:	$664,000
Cumulative ROI:	**$478,846**