



## **PURPOSE OF STUDY**

Based on a review of the BSU EHS preliminary indoor air investigation and discussions with the BSU Resident Life and EHS staffs, Tetra Tech developed a Sampling and Analysis Plan (SAP) to:

- Evaluate custodial staff exposure to ozone (typical and worst-case) for the full task and full shift durations;
- Evaluate ambient ozone concentrations in complaint and non-complaint areas (for comparison purposes);
- Evaluate general indoor air quality (presence of common indoor air pollutants) and ambient environmental conditions (temperature and relative humidity) in sampling locations;
- Evaluate ozone concentrations in the stabilized aqueous solution at water draw and over time; and
- Evaluate if ozone exposure is attributable to HCUs.

This study is not intended to evaluate the efficacy of the Lotus Pro Cleaning System® generated water as a cleaning or sanitizing agent.

## **AMBIENT OZONE AND INDOOR AIR QUALITY MONITORING**

The Tetra Tech investigation team included a Certified Industrial Hygienist (CIH), Ms. Michelle Gillie, with more than 30 years of professional experience and indoor air quality investigation expertise to conduct the two-day site visit and perform indoor air quality sampling. BSU provided Residential Life staff to escort the Tetra Tech team to the various buildings.

### **Ambient Air Continuous Ozone Monitoring**

Tetra Tech conducted full-shift ambient air ozone monitoring in select HCU rooms and closets with calibrated continuous ozone monitors (AeroQual Series 500) with datalogging capability. The instruments have a calibrated measurement range of 0 to 5 ppm, with a lowest detection limit of 1 part per billion (ppb). Full-shift ozone monitoring (minimum 8 hours) was conducted in larger custodial rooms and smaller closets where HCU units are operational and in use during each day. A total of 10 rooms were monitored for the full shift over the 2-day site survey. Most locations were sampled both days, with the exception of Noyer Hall and LaFollette Hall, which were each sampled for one day only. Tetra Tech posted a work area access log so that employee use of the HCU and work duration in the custodial room or closet could be documented. The full-shift HCU room air sampling data, which includes the minimum, peak,

**Table 3**  
**Full-Shift Employee Ozone Monitoring Results**  
Ball State University  
Muncie, Indiana

Badge Sample #	Name/Title	Building	Sampling Period	Tasks	Ozone (ppm)
LR2389	Ramona Hall Custodian	DeHority Hall	4/27/2016 07:39-15:31	Filling pails and small containers with ozone water, cleaning 1 <sup>st</sup> floor bathrooms and halls	0.0082
LR2365	Susan Woolf Custodian	Studebaker East	4/27/2016 07:44-15:22	Cleans 2 <sup>nd</sup> floor bathrooms, elevator, uses mop pads	0.0091
LR 1902	Tony Martin Custodian	Johnson East	4/27/2016 08:00-15:50	Mop lounge	0.012
LR1753	Patrick Sheffield Part-time Custodian	Johnson East	4/27/2016 08:00-15:51	Cleaned bathrooms, hallways on 2st floor and basement	< 0.0071
LR1685	Patrick Sheffield Part-time Custodian	Johnson East Dock	4/28/2016 07:30-15:30	8 <sup>th</sup> floor lounge mopping	0.013
LR1716	Tony Martin Custodian	Johnson East Dock	4/28/2016 07:25-15:30	Filled mop buckets, spray bottles, mopped floors	0.0079
LR2001	Barbara (last name unknown) Custodian	LaFollette 8 <sup>th</sup> floor	4/28/2016 07:35-15:50	Filled mop buckets, spray bottles, cleaned bathrooms	<0.0068
LR1704	Tonya Price Group Leader	DeHority Hall	4/28/2016 07:23-15:34	Filling pails and small containers with ozone water, cleaning 1 <sup>st</sup> floor bathrooms and lounges	0.012
LR1562	Susan Woolf Custodian	Studebaker East	4/28/2016 12:19-15:41	Cleans 2nd floor bathrooms, elevator, uses mop pads	<0.017
LR1764	FIELD BLANK	Not Applicable			Not Detected