Worcester Public Schools

Environmental Management System

Status Update

November 2019

Table of Contents

EXECUTIVE SUMMARY

This report highlights (1) environmental health and safety issues commonly found in K-12 schools; (2) the activities and programs implemented in Worcester Public Schools to prevent and/or address those issues; and (3) challenges and needs going forward to build on current successes and results.

The report is organized around buildings (both "legacy" issues and "occupant-induced and operations"), academics, facility operations, and district-wide topics.

A wide variety of departments and individual employees have actively developed and implemented an Environmental Management System (EMS) over the past nine years. The goals of the EMS are to (1) comprehensively address environmental issues; (2) achieve and maintain environmental compliance; and (3) integrate sound environmental health and safety (EHS) management practices into its educational and operational activities.

An EMS uses a "Plan-Do-Check-Act" framework to assess its operations, set priorities, and continuously make improvements. An EMS requires an organization to "Say what you do, Do what you say, and Prove it" as a way to ensure compliance and overall improvements.

This report provides information and updates on challenges every large school system faces:

> **"Legacy" Issues**: Common building-based issues exacerbated by building age, maintenance history, original or modified design, and the use of materials with risks identified long after they were originally used in construction and/or renovation (e.g., asbestos; lead based paint, lead and copper in drinking water, PCBs, radon)
>
> **Occupant-Induced and Operational Issues:** which are unintentionally created through use, operation and maintenance of the building (e.g. indoor environmental quality, integrated pest management, universal waste such as fluorescent light bulbs, and hazardous waste)

It also provides information about improvements made in **Academics** (art, science, career and technical vocational education) and **Facilities** (trades, custodial, grounds maintenance). Improvements are also highlighted in **Operations** (school nutrition, transportation, nursing, purchasing, and information technology) and in **District-wide focus areas** (inspections and corrective action; safety-personal protection; bloodborne pathogens; emergency preparedness and response; and training).

Supporting this system of improvements involves training and capacity-building, program development, written standard operating procedures, guidance documents, records, work instructions, and periodic evaluations to make adjustments to continuously improve.

In developing and implementing the EMS, WPS has:

- Improved compliance, operations, and practices
- Improved collaboration and communication across the district
- Reduced the risk of non-compliance
- Prevented pollution
- Created a safer environment for our employees and visitors
- Created a better learning environment for our students

The Worcester Public Schools remains committed to continuously improve environmental health and safety throughout our schools and other buildings to support excellence in

teaching and learning.

EMPLOYEE ENGAGEMENT

Developing and implementing the WPS EMS involved representatives from a wide variety of departments with different roles and responsibilities across academics, support services and administration. They have been engaged in the EMS in numerous ways, including assessment activities, program development, implementation and oversight.

Most of these participants are from the Facilities, School Nutrition, Transportation and Science Departments. The number of personnel actively engaged in the EMS continues to increase as draft programs are finalized and implemented in Art, Special Education, Nursing and Career and Technical Vocation Education.

There has also been extensive, invaluable administrative support from administrators and their staff from the following departments: Finance and Operations, Materials Management, Information Technology, Human Resources, Curriculum and Professional Learning, Safety, Grants, Instructional Technology & Digital Learning, and Instruction & School Leadership.

The approximate number of WPS personnel involved in these phases and components of the EMS is approximately 660. This includes personnel who assisted in developing the EMS as well as those who currently implement the EMS and associated activities. These activities include:

- **Assessment and Benchmarking** environmental health and safety systems and compliance: attending meetings with department administrators and EMS subcommittees; reviewing systems; conducting surveys of and meetings with staff, department heads and managers; conducting self-inspections; and reviewing records and documents.
- **Program Development** after needs and issues were identified: developing and piloting new initiatives; developing environmental management plans, protocols, work practices and training; developing procurement guidelines and bid specifications for services; and ordering equipment and supplies.
- **Program Implementation** including: attending trainings; adhering to new work practices and protocols; maintaining records; reorganizing storage systems; cleaning out old products; using new supplies and equipment; and monitoring new systems.

While some initiatives affect only the department personnel implementing them, many of the EMS initiatives have a district-wide impact. Examples include cleaning and sanitizing, integrated pest management, and indoor environmental quality. Thus, the outcomes and improvements resulting from the EMS-related work ultimately affect the learning and working environment of all teachers, staff and students.

Recognition of Worcester Public Schools as a "Champion of Toxics Use Reduction" by the Toxics Use Reduction Institute

School Nutrition and Transportation Toxics Reduction Projects, June 2018

Building and Bus Maintenance Safer Alternatives Projects, June 2019

These above grant-funded projects are examples of the extensive efforts by the Facilities, School Nutrition and Transportation departments to transition their operations to the use of safer products and work practices. Projects involved EMS tools and strategies (assessment of operations; program development and evaluation; guidance documents; records; operational controls; training; product substitution; continuous improvement).

OVERVIEW

This report highlights (1) environmental health and safety issues commonly found in K-12 schools; (2) the activities and programs implemented in Worcester Public Schools to prevent and/or address them; and (3) the challenges and needs going forward to build on current successes and results.

The report is organized around environmental health and safety issues related to:

1) **Buildings,** including the following types of issues (which can also overlap):
   a. "**Legacy"** issues such as asbestos, lead based paint and copper in drinking water; and
   b. **Occupant-induced and operational** issues such as indoor air quality and pest management.
2) **Academics** such as science laboratories or vocational/technical education.
3) **Facility operations** such as food services, maintenance, custodial and transportation.
4) **District-wide** topics such as emergency preparedness and response, and bloodborne pathogens.

BACKGROUND

The Worcester Public Schools developed an Environmental Management System (EMS)[1] in order to (1) comprehensively address environmental issues; (2) achieve and maintain environmental compliance; and (3) integrate sound environmental health and safety management practices into its educational and operational activities. Applying to all schools, facilities and operations, the Worcester Public Schools' EMS is the system to meet the following commitment:

WPS Environmental Statement

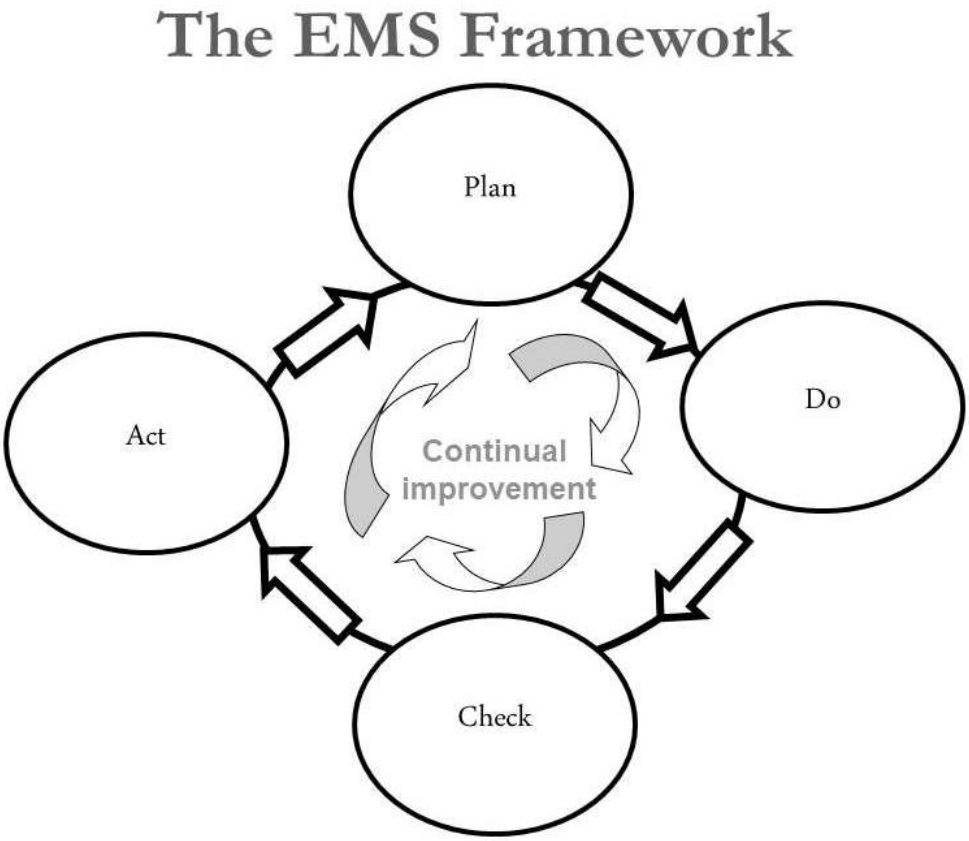
In keeping with the Worcester Public School's mission to provide learners with a quality education in a safe and healthy environment, the Worcester Public Schools is committed to:

- Complying with federal, state and local environmental laws and regulations
- Creating and maintaining a healthy and safe environment for our students, faculty and staff
- Modeling safe chemical use and management
- Preventing pollution and implementing toxic use reduction strategies
- Continuously improving our environmental performance

[1] The Worcester Public Schools entered into a Consent Order with the MA Department of Environmental Protection in December of 2009 to settle compliance issues related to the handling of asbestos-containing floor tiles at the Vernon Hill School. As a result of the Consent Order, the Worcester Public Schools developed an Environmental Management System "to address environmental issues comprehensively in order to achieve and maintain environmental compliance throughout the Worcester public school system and to integrate commitment to environmental compliance and sound environmental practices into the daily mission of the public schools."

WHAT IS AN ENVIRONMENTAL MANAGEMENT SYSTEM (EMS)?

An EMS is a system of processes to support an organization in integrating environmental concerns into its daily operations. An EMS uses a "Plan-Do-Check-Act" framework to assess its operations, set priorities, and continuously make improvements. An EMS requires an organization to "Say what you do, Do what you say, and Prove it" as a way to ensure compliance and overall performance improvements.



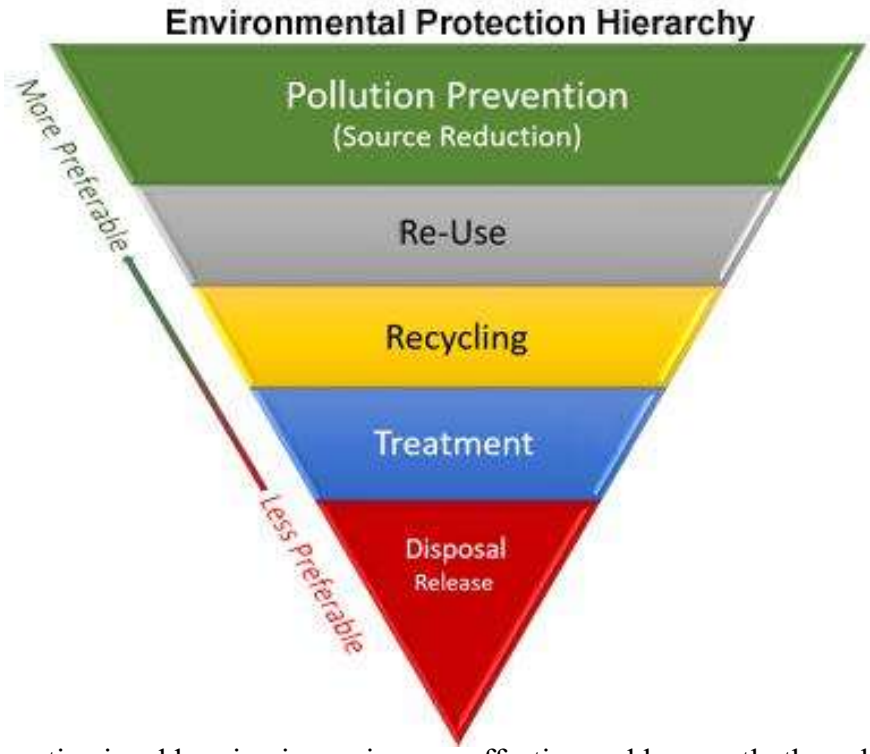
Elements of an EMS are:

- Roles and responsibilities
- Lines of communication and command
- Improvements to maintain environmental compliance
- Corrective action
- Protocols, Standard Operating Procedures (SOPs), including emergency response
- Training
- Priorities
- Tracking compliance
- Toxics use reduction and pollution prevention

GUIDING PRINCIPLES IN DEVELOPING THE EMS

- Environmental health and safety issues can affect both the learning environment for students, and the working environment for teachers, administration and staff.
- The identification and addressing of imminent hazards and non-compliance issues are the highest priority.

- "Legacy" issues are challenging, and require identification, monitoring and priority-setting to address them.
- Preventing pollution from occurring is the most cost-effective approach to reducing issues and associated risks and liabilities.[2] Pollution prevention (P2) is any practice that reduces, eliminates, or prevents pollution at its source, also known as "source reduction" and commonly "toxics use reduction". Source reduction is fundamentally different and more desirable than recycling, treatment and disposal.



- Being proactive in addressing issues is more effective and less costly than always reacting.
- Maintenance and management of assets (e.g., buildings, infrastructure and mechanical systems) prevents issues and their associated costs from occurring.
- While short term fixes are essential, the goal is to create a system than ensures compliance and risk reduction over the long-term.
- Key elements in the EMS include: understanding and keeping up with regulatory requirements, assignment of roles and responsibilities, implementing management plans, training and capacity-building, providing written guidance materials and standard operating procedures, improving procurement of vendor services, and conducting inspections and tracking corrective actions,
- Responsibility for environmental health and safety is not confined to one department or position.
- **Everyone in the Worcester Public Schools has a role and responsibility.**

[2] https://www.epa.gov/p2

INTRODUCTION TO THE REPORT

The following sections provide information about (1) common environmental health and safety (EH&S) issues in K-12 schools and (2) activities and results addressing these issues in the Worcester Public Schools. Information is organized by buildings, academics, facility operations and district-wide issues.

A. BUILDING-BASED ISSUES

All buildings have potential environmental health and safety issues which are exacerbated by age, past investments in maintenance, design, and the use of materials with risks identified long after they were originally used in construction and/or renovation. In addition to management of these "legacy" issues, buildings also have "occupant-induced and building-based" issues such as indoor air quality, integrated pest management, hazardous materials management and universal waste.

Worcester Public Schools

62 buildings

3,600,000 square feet

Average age of buildings: 71 years (oldest built in 1842; newest in 2017)

Student population: 25,400

Employees: 4244

B. "LEGACY" ISSUES

As mentioned previously, building age, maintenance history, design, and the use of materials with previously unidentified risks affect school environmental health and safety. Given the prevalence of "legacy" issues in older school districts, it is even more important to proactively work to reduce or eliminate pollutants.

The following sections provide information on the "legacy" issues listed below.

- Asbestos
- Lead-based paint
- Lead and copper in drinking water
- PCBs
- Radon

Historical information on Building Materials later discovered to pose environmental health and safety risks:

Building Material	Years Materials Were in Use
PCBs	Between 1950 to 1978
Lead-Based Paint	Before 1978
Asbestos Containing Materials	Between 1945 to 1980

1. ASBESTOS

OVERVIEW OF ISSUE

Originally used and valued for its heat, chemical, fire and abrasion resistance, strength and sound proofing and insulating qualities, asbestos has been used in over 3,000 kinds of building construction materials. Asbestos-containing building materials were used extensively in buildings between 1945 and mid-1980s for insulation, structural materials, flooring and sound and fire proofing.

The *Asbestos Hazard Emergency Response Act* (AHERA) and its regulations require public school districts and non-profit schools, including charter schools and schools affiliated with religious institutions, to: (1) inspect their schools for asbestos-containing building material; (2) prepare asbestos management plans; and (3) take action to prevent or reduce asbestos hazards. Note that the principle of "in-place" management of asbestos-containing material (ACM) is the underpinning of the regulatory approach; removal of these materials is not necessary or required unless the material is severely damaged and cannot be mitigated, or the materials will be disturbed by a building demolition or renovation project.

In-place management of ACM involves implementation of an Asbestos Operations and Maintenance Program to inspection, monitor and manage the ACM. In addition, schools are required to develop, maintain and update building-specific asbestos management plans and to keep a copy at each individual school. These plans are required to document the location and condition of any known or suspected ACM in the building, results of the required inspections, any asbestos response actions (operations and maintenance, repair, removal or encapsulation), staff training information and notifications about these activities to the community.[3]

ACM has been identified in 41 schools. Many schools have had some or all of the asbestos removed during significant renovations. New schools and new additions and/or renovations, built after 1980 must have a letter from the architect or an accredited inspector certifying that the building or the building materials in renovations and additions contain no asbestos.

Responsibilities and impacts are summarized in the following table.

	Supervisory and Reporting Responsibility	**Day to Day Responsibility**	**Potential Impacts to Occupants, Environment and the Building**
Asbestos	• Facilities District Leadership • Principals	• Custodians (e.g. wet cleaning areas where friable asbestos is located, containing and reporting, releases or confirmed asbestos containing materials, wet stripping asbestos floors). Note: clean-up of releases is done by licensed contractors. • Tradesmen (e.g. noting locations prior to repairs and reporting)	• Potential long term health problems depending on exposures.

[3] https://www.epa.gov/asbestos/learn-about-asbestos#asbestos and https://www.epa.gov/asbestos/asbestos-and-school-buildings#comply

WHAT WE HAVE DONE

The Facilities Department is the lead in managing the Asbestos Operations and Maintenance Program. They have been supported by a contractor specializing in asbestos management and by WPS's EH&S consultant.

Remediation at schools as needed, through:

Enhanced vendor/contractor services
The Facilities Department revised the Asbestos RFP for Inspection, Design, Management Planner and Monitor to include a significant number of additional criteria to ensure that the awarded contract complied with all of the AHERA requirements. Enhancements include:

- **Documentation** - More comprehensive inspections with significantly better documentation such as locations of ACM, photos, percentage of damage, risk levels, etc.
- **Database** - Development of an extensive database to more effectively; track locations and status of asbestos conditions, conduct data sorts to set priority response actions, etc.
- **Inspection Reporting** - Improved reporting formats that significantly increased the usability of the data.
- **Project Designs** - Improved project designs for repair and removal. This has resulted in improved compliance with design requirements and provided significantly more effective guidance for the abatement contractors to follow during mitigation activities.
- **Emergency Response** - Improved vendors' emergency response and WPS's capabilities in the event of releases of suspected or documented asbestos containing materials.
- **Asbestos Management Plans (AMP)** - Updated and completely replaced school-specific AMP binders in all schools. In addition to the updated and enhanced three-year inspection reports, these AMPs now contain extensive information for the school community to understand what asbestos is, what it means to have asbestos in a building, what WPS's responsibilities are, inspections schedules, training provided, assigned roles and responsibilities, vendor information, any response actions, and the WPS's Asbestos O&M program for their building. The Facilities Office provides ongoing updates to these binders (e.g. new inspection reports, personnel changes, response actions plans and outcomes).

Improved practices and controls

- An **Operations and Maintenance (O&M) Program** was created to provide guidance across the district. It should be noted that although the on-site Asbestos Management Plans have some relevant district information, they are largely specific to a particular building. The O&M Program provides administrative level guidance to asbestos management.
- An annual **Asbestos Awareness** training program for Facilities Department administrators, tradesmen and custodians has been implemented. Information about asbestos management is also incorporated into other trainings on special cleaning practices in buildings with lead-based paint, PCBs and asbestos.

- **Monitoring** is done through an enhanced inspection system. In addition, monitoring for asbestos is also now integrated into daily activities of custodian and tradesmen.
- **Reporting/Documentation** has been improved through the creation of a system to collect, document and disseminate all required information to school and community personnel as well as to the files.
- **Emergency Preparedness and Response** procedures related to ACM have been improved. A system, based on AHERA requirements, has been created to respond and report any fiber releases while also serving as the basis for reporting on other types of building-based containment releases.
- **Communication and Notification** procedures and system have been created to notify the school community, vendors and short term workers (e.g., phone company) regarding the location and condition of ACM, and any ACM related projects.
- **Recordkeeping** has been improved in a newly-created *Response Action Recordkeeping System* to obtain, review and file documents from the following vendors: asbestos inspector, designer, monitor and planner, and from the separate company that conducts the asbestos abatements.

RESULTS/IMPACTS

WPS has improved its management of ACM and in doing so, has:

- **Reduced risk of exposure** to students, staff, visitors, custodians, tradesmen and contractors due to improved monitoring, operations and maintenance activities and response actions.
- **Reduced liability for WPS** due to improved awareness of location and conditions of suspected and known ACM, improved emergency response, proper management and disposal, and planning and mitigation of compromised materials.
- **Reduced "unknowns"** based on the system of sampling suspect materials prior to repairs and other projects with the potential to impact ACM.
- **Safer, healthier learning and working environment** due to ongoing monitoring which helps prevent releases of asbestos, as well as an emergency response system to efficiently respond to any releases.
- **Remediation actions** as needed.

NEXT STEPS AND CHALLENGES

- **Increased planning and costs** of normal maintenance and repairs in buildings with known and suspect materials. For **known asbestos**, even the smallest repair or project work (e.g. installation of an item in an asbestos containing wall or plaster ceiling) may require a vendor rather than WPS employee to conduct the work. Such work requires another level of training and licensing, a respirator program, use of specialized equipment and project containment. This can significantly increase the cost of small projects, may require the work to be scheduled when school is not in session (which may require overtime), and involve significant recordkeeping. For **suspect materials**, prior to a repair or work in a building by a vendor or tradesman, all areas slated for work must be assessed and possibly sampled for the potential to contain asbestos. This can delay work prior to or during a project (if uncovered during a project).

- **Disruption of school operations** in order to address asbestos.
    - **Planned response actions** involve finding adequate time to conduct actions when school is not in session. This can involve shutting down a space or a building depending on the extent of the project. This can create delays for use of the space or work in the building, thus, may incur additional labor costs.
    - **Emergency response actions** may involve shutting down a space until sampling can be done and any mitigation measures are implemented. This can pose a significant issue if it is in an area where there is major student traffic and use (e.g. main hallway or cafeteria).
- **Continued attention and investment** are needed for (1) a robust **operation and maintenance program** to: monitor conditions of asbestos through the 6-month periodic surveillance and 3-year re-inspections and (2) conduct response actions to repair or remove asbestos as needed; and (3) sample suspect materials as needed.
- **Annual and other training** to ensure that staff are knowledgeable about the requirements, where asbestos is located in buildings, how to interpret the inspection reports, and understand their roles in monitoring, documenting and responding to releases of ACM.
- **Communication** to (1) annually notify the school community, vendors, short term workers (e.g. phone company) regarding the location and condition of ACM; (2) notify schools when projects involving ACM will commence at their building; and (3) update the on-site AMPs as data is generated.
- **Recordkeeping** (central and school-based) of asbestos-related documents for (1) response actions, and (2) on-site asbestos management plans.

2. LEAD BASED PAINT

OVERVIEW OF ISSUE

For over a century, lead was used as a key ingredient in paint. Deteriorating lead based paint (LBP) and associated dust are concerns in school buildings built before lead-based paint was banned in 1978 because of concerns about lead poisoning in children.

Intact paint inside a building does not release lead unless it becomes damaged by moisture or other conditions, or if it is compromised by maintenance and/or occupant activities. Intact paint surfaces can release lead-contaminated dust from wear and tear and friction (e.g. window opening and closing). Exterior paint can deteriorate from wear and tear, friction, age and the weather and can contaminate soil close to the building. Depending on the location of the contamination in the soil, people can track it into the building.

LBP in schools is most dangerous when it is in the form of dust. Lead dust pollutes the air, soil, dust, and any surface it lands on (e.g. toys, furniture, shelves, books) and tends to stick to surfaces. Children are at a high risk for lead poisoning from hand-to-mouth contact from lead contaminated objects and surfaces. Children are also exposed to lead paint when they bite lead painted surfaces, chew on lead contaminated items, or eat lead paint chips.

Custodial exposure has not been found to produce hazardous occupational exposure to lead based paint by the National Institute of Occupational Safety and Health (NIOSH). Based on the results from a 1994 study[4], they concluded that, "it would be reasonable to assume that routine janitorial tasks (such as sweeping, vacuuming, emptying trash receptacles, cleaning fixtures, and other related activities) in buildings with LBP generally do not produce hazardous occupational exposures to lead."

Lead paint is assumed to be found in school buildings built or renovated prior to 1978, as listed in the table below. Thus, the Facilities Department monitors the condition of lead paint dust and chips found in and around school buildings listed in the table on the next page.

Responsibilities and impacts are summarized in the following table.

	Supervisory and Reporting Responsibility	**Day to Day Responsibility**	**Potential Impacts to Occupants, Environment and the Building**
Lead Based Paint	• Facilities District Leadership • Principals	• Custodians (e.g. wet cleaning areas where LBP is located and reporting). Note that clean-up of releases is done by licensed contractors. • Tradesmen (e.g. noting locations prior to repairs and reporting	• Potential health impacts.

[4] Brooks DR, Rabin R, Davis LK [1994]. Lead at work: elevated blood lead levels in Massachusetts workers. Boston, MA: Massachusetts Department of Public Health, Occupational Health Surveillance Program. 11/94.

WPS Buildings that are assumed to contain Lead Based Paint Built or Renovated Pre-1978			
Building Name	Year Built	Building Name	Year Built
Adult Learning Center (Fanning)	1936	Lake View School	1922
Belmont Street Elementary	1970	Lincoln Street School	1929
Burncoat High School	1962	May Street School	1927
Burncoat Middle School	1952	Midland Street School	1896
Burncoat Prep. School	1916	Milbury Head Start	1898
Chandler Elementary School	1977	Mill Swan Head Start	1962
Chandler Magnet School	1953	Nelson Place School	1927
Clark Street School	1953	New Citizen Center (New Ludlow)	1963
Columbus Park	1913	Parent Information Center	1885
Doherty High School	1966	Rice Square School	1923
Durkin Administration Building	n/a	South High School	1978
Elm Park Community	1971	Tatnuck Magnet School	1909
Flagg Street School	1953	Taylor Building	1842
Foley Stadium	1936	Thorndyke Road School	1927
Forest Grove Middle School	1960	Union Hill School	1890
Francis J. McGrath	1977	University Park Campus School	1910
Gerald Creamer Center	1926	Vernon Hill	1931
Goddard School	1900	Wawecus Road School	1963
Grafton Street School	1879	West Tatnuck School	1960
Greendale Head Start	1977	Worcester Arts Magnet	1961
Harlow - First Step	1897	Worcester East Middle	1924
Heard Street	1932		

Facilities Department has the lead in managing lead-based paint (LBP). They have been supported by WPS's EH&S consultant. Activities include:

- **Identification of regulatory requirements** under a number of state and federal regulations.[5]
- **Enhancement of vendor/contractor services** for inspections and monitoring. The Materials Management Department and Facilities Department revised and rebid RFP contract specifications for licensed lead inspectors and monitors as part of the RFP for asbestos monitoring and removal. They have been successfully working with the selected inspector to conduct inspections and monitor LBP abatements.
- **Sampling/Assessments**: The Facilities Department worked with the City Inspectional Service and WPS's contracted licensed lead inspector to conduct lead paint surveys in 10 buildings built prior to 1978 and currently have Pre-K facilities. Two buildings that had been previously tested were not retested because the original data were found to be adequate. The inspections, conducted during summer break, included Pre-K classrooms,

[5] De-leading (abatement removal) work, regulated by the Massachusetts Department of Public Health (DPH) and the Massachusetts Department of Early Education of Children as pertains to child care programs. Renovation Work (Lead Safe Renovation work), regulated by the Massachusetts Department of Labor Standards. OSHA worker safety requirements.

cafeterias and egress areas occupied or used by children under six years of age. The Facilities Department has suspect areas inspected as needed (e.g. when problems are identified, and prior to disturbances such as renovations, or repairs).

- **Remediation/Removal/Actions** are overseen by the Facilities Department. Results of the 2017 surveys of the kindergarten and preschool classrooms were prioritized and mitigated based on hazard level and exposure potential. Test and inspection results identified areas in four preschools with exceedances in the lead-based paint levels. Three of those preschools required some mitigation. Damaged areas were stabilized by a licensed Lead Renovation, Repair and Painting contractor before students and staff arrived back at school. (Only authorized, trained contractors can abate (remove) or repair LBP, and paint areas with lead-based paint.)
- **Dust Mitigation and Maintenance** programs by the Facilities Department have improved due to; (1) the purchase of special equipment and supplies, including the purchase and use of High Efficiency (HEPA) vacuum cleaners and microfiber cloths in schools with special cleaning practices, and through ongoing replacement of existing equipment and supplies in all buildings); (2) cleaning and maintenance of ventilation systems; (3) clearing of items that block HVAC vents; and (4) implementation of a deep cleaning program, including wet cleaning methods and HEPA vacuums for Burncoat High Schools and Doherty Memorial High School.
- **Improved Practices and Controls** in the Facilities Department's written draft ***LBP Operations and Maintenance Plan*** which contains guidance on roles and responsibilities, testing, recordkeeping and special cleaning methods to guide the program. Additional elements include:
    - **Annual training** provided to; (1) custodians and tradesmen on how to monitor LBP conditions and prevent disturbing LBP, and (2) custodians on wet cleaning and HEPA vacuuming practices.
    - **Monitoring** by custodians and tradesmen followed by the reporting of any observations of LBP deterioration and/or release, moisture damage, tracking of fallen paint to other locations, and any work by outside contractors that has disturbed or has the potential to disturb LBP.
    - **Documentation** of all lead inspection or survey results as part of the draft *Lead-Based Paint O&M Program*.
    - **Reporting** by (1) senior custodians to document scheduled cleaning practices in monthly cleaning logs, and (2) tradesmen or custodians who must submit a *Facilities Building Incident Report* for a release of documented or suspected LBP.

RESULTS/IMPACTS

By reducing the risk of exposure to students, staff, visitors, custodians and contractors, liability for WPS, and "unknowns" (and associated costs to WPS when renovating or conducting repairs), WPS has created a safer, healthier learning and working environment.

CHALLENGES include (1) increased costs for managing areas with lead-based paint; (2) ensuring that LBP incidents (e.g., a water leak) do not turn into an abatement project; and (3) requiring

WPS custodians, tradesmen and supervisors as well as WPS contractors and short-term workers (e.g. utility company technicians) to know where lead paint is located in regulated areas to be able to monitor it and/or prevent compromising it.

NEXT STEPS

- Continue to monitor, inspect and mitigate as needed the LBP paint conditions in the preschool and kindergarten rooms.
- Monitor any changes in room use by preschool classes to identify new spaces that might require inspection and possibly mitigation.
- Monitor use of the WPS buildings by private preschools to determine need for additional inspection and monitoring.
- Finalize the draft *LBP Operations and Maintenance Plan*.
- Conduct abatements and repairs as needed.
- Revise and rebid the contracts for (1) abatement of LBP, and (2) renovation, repair or painting of LBP.
- Continue to replace existing vacuums with HEPA vacuums in all buildings.

Sources: The National Institute of Building Sciences, *Lead-Based Paint - Operations & Maintenance Work Practices Manual for Homes and Buildings*, May 1995; 105 CMR 460.000: *Lead Poisoning Prevention and Control*; 606 CMR 7.00: Sta*ndards for The Licensure or Approval of Family Child Care; Small Group and School Age and Large Group and School Age Child Care Programs*; MA Department of Labor Standards under 454 CMR 22.00.

3. LEAD AND COPPER IN DRINKING WATER

OVERVIEW OF ISSUE

Over the last few years, there has been increased national and state attention on the issue of lead and copper in water used for drinking and food preparation in schools, largely in response to lead-contaminated drinking water in Flint, Michigan.

BACKGROUND

The Worcester Water Operations Division has historically tested for lead and copper every three years at two locations (one drinking fountain and one kitchen faucet) at two schools per cycle.

Per the federal *Lead Control Contamination Act***,** MassDEP requests all school districts in Massachusetts to complete Drinking Water Checklists for each school building every 5 years. The most recent cycle commenced in 2016. In addition, MassDEP made funding available to conduct sampling of all fixtures used for drinking, food preparation and medicine in Massachusetts schools.

In response, the Facilities Department (1) attended meetings and webinars by MassDEP on completing the checklists and implementing a sampling program; (2) applied for technical assistance to implement a sampling program (funded by the grant from MassDEP); and, (3) reached out to the Worcester Water Operations Division to explore collaborating on this effort.

Responsibilities and impacts are summarized in the following table.

	Supervisory and Reporting Responsibility	**Day to Day Responsibility**	**Potential Impacts to Occupants, Environment and the Building**
Lead & Copper in Drinking Water	• Facilities District Leadership • Senior Custodians	• Custodians (e.g., flushing, reporting fixtures requiring repairs) • Tradesmen (e.g., replacement , repair of plumbing fixtures)	• Potential health impacts.

WHAT WE HAVE DONE

The Facilities Department developed a ***WPS Drinking Water Management Program***. The District completed sampling plans, sampling and analysis for lead and copper, developed action plans and reports, communicated to the WPS community, and implemented mitigation measures. This effort required extensive coordination between WPS and MassDEP and between multiple WPS departments.

The Facilities Department:

(1) **Sampled** fixtures potentially used for drinking water, food preparation and medicine in 52 buildings. Sampling was done between the fall of 2016 and January 2017. The sampled fixtures included; (a) sinks in classrooms, nurses' offices and teachers' lounges; (b) water fountains and bubblers; and (c) kitchen fixtures used for cooking and washing

produce. Fixtures in bathrooms, slop sinks, and science and art rooms were not sampled unless they were used for drinking water or food prep.

Sampling involved collecting two water samples for each fixture, one in the morning before water was used, and one taken after a 30 second flush. Two tests for each sample were analyzed, one for lead and one for copper, with a total of 5,096 tests conducted.

(2) **Analyzed results** that indicated 2.92% of tests had exceedances above drinking water action levels. It should be noted that on-site investigation of the exceedances often found that many exceedances were due to low water flow issues. When a fixture has low flow, it may be difficult or impossible to use. Thus, the water sits in the pipes where the metals can concentrate. Also, fixtures that are not often used will also have water sitting in the fixture for long periods of time which enables the metals to concentrate. This information has been noted and incorporated into the strategies to address these fixtures.

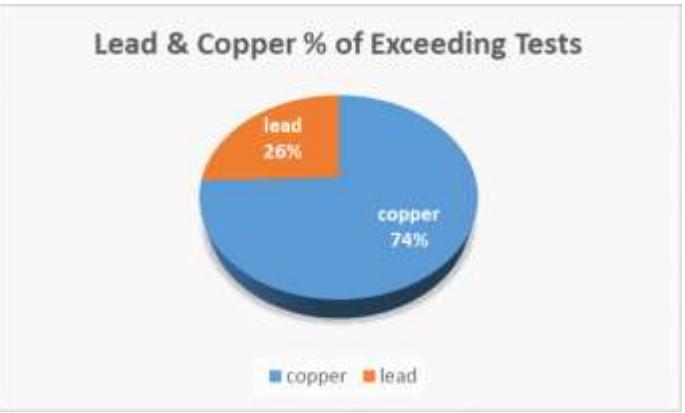
149 of 5,096 tests had exceedances that were above the action level for lead or copper. (Note that one fixture can have up to 4 exceedances, thus, the actual number of fixtures is less than 149.)

111 tests exceeded for lead. 38 tests exceeded for copper. [Note that copper issues can be the result of newer fixtures which can release copper for approximately five years. Another cause of higher copper levels can be improper grounding of the pipes which can cause the pipes to degrade and release copper.]

Chart 1 below illustrates the 2.92 percentage of tests that had exceedances out of the total amount of tests taken. Chart 2 below illustrates the percentage of lead and copper in those exceedances.

Chart 1

Chart 2



With the assistance and support of school principals, the Facilities Department **disseminated information and notifications** within WPS and to the City Manager and School Committee. Notifications were translated into seven languages, which principals were asked to disseminate to their school staff, custodians and community. Principals sent the notification letters home with children through student back packs with a "Connect Ed" message. The

Facilities Department posted lead and copper fact sheets from the Massachusetts Department of Public Health on the WPS website.

The Facilities Department worked with the EH&S Consultant to develop **action plans with mitigation/remedial actions to address results.** Based on the Action Plans, the Facilities Department posted signs on hand washing signs on fixtures not needed for drinking water, medicine or food, and generated work orders for tradesmen to: (a) take fixtures off-line; (b) fixture replacement; (c) added filtration; (d) bringing new fixtures on-line; and (e) increased water flow rates to prevent increased metals uptake due to water sitting in pipes with little or no movement. Efforts also included developing a system to manage and track data on the status of work orders, remediation measures, notifications and other record-keeping (e.g., flushing notifications and logs, charts of flushing locations).

- **Initial Mitigation** measures included:
  - Flushing protocols.
  - Signage (e.g., "Handwashing Only" signage faucets in classrooms, lounges, and nurse's office, and "Use Cold Water Only for Cooking" signs in food service areas).
  - Taking fixtures off line, followed by more in-depth investigations (e.g. checking for improper grounding, cross connections)
  - Increased maintenance (e.g., clean faucet screens, check and/or replace filters)
- **Repair or Replacement of Fixtures** which included the repair, removal and replacement of bubblers, and installation of in-line filters.

RESULTS/IMPACTS

Fixtures that were the source of lead and copper exceedances have been removed, taken off line or replaced. Additional testing and analysis were conducted to follow-up mitigation measures.

NEXT STEPS AND CHALLENGES

- Re-sampling of new fixtures, maintenance and replacement of filters, monitoring of any flow issues on an as-needed basis.
- Communication to the WPS community about updates and/or issues.
- Completion of the MassDEP Drinking Water Checklists in 2021.
- If the threshold for allowable levels of lead in drinking water is revised by MassDEP in conjunction with EPA, WPS will have to reevaluate the results of the sampling data from the 2016-2017 sampling to determine if there are any additional fixtures to be addressed.

Elements of the *WPS Drinking Water Program*

- *Roles and Responsibilities:* sampling, communications, remediation, recordkeeping
- *Schedule:* sampling, completion of checklists, corrective actions
- *Water Sampling:* criteria, schedule, protocols, sampling plans, labels, chain of custody, locations, labs, vendors, coordination with WOD sampling
- *Protocols:* sampling, short and long-term mitigation measures (e.g. flushing, taking fixtures off-line, replacing fixtures, installing filtration)
- *Administrative Controls:* tracking sampling results, monitoring mitigation measures
- *Recordkeeping*: location of records, sampling data, mitigation measures
- *Corrective actions:* mitigation strategies and action plans when needed to follow-up data results
- *Communication Plan:* between municipal departments, school district and school community, the district and the school committee, WPS and the press and regulators (MA Department of Public Health, MassDEP)

4. PCBs

OVERVIEW OF ISSUE

PCBs are a type of chemical used in caulk, electronics, fluorescent light ballasts and other building materials from the 1950s to the late 1970s. Congress banned their use in 1976. Schools built during this period of time may contain PCBs. Per EPA guidance, WPS considers all caulk found in buildings built during this time frame to possibly contain PCBs and treats it accordingly. Health concerns related to PCB exposure include, but are not limited to, cancer and reproductive or neurological effects.[6]

EPA has issued Best Management Practices (BMP) guidelines on how to manage building materials that may contain PCBs. EPA advocates these steps as the key parts of the BMPs:

- Remove fluorescent light ballasts that may contain PCBs and change light fixtures that may have been in contact with PCBs from a failed fluorescent light ballast
- Remove PCB-containing caulk, paint and other PCB-containing building materials during planned renovations and repairs (when replacing windows, doors, roofs, ventilation, etc.)
- Ensure ventilation systems are operating properly
- Clean inside schools and other buildings frequently using special practices to reduce dust and residue

To prevent disturbing materials and thereby inadvertently causing a release of PCBs, EPA does not recommend testing intact suspect materials as part of their BMPs.

PCBs in caulk have been assumed to be present in 27 buildings in the Worcester Public Schools. Remediation has been done at 21 schools. Approximately 4,500 windows have been replaced.

Responsibilities and impacts are summarized in the following table.

	Supervisory and Reporting Responsibility	**Day to Day Responsibility**	**Potential Impacts to Occupants, Environment and the Building**
PCBs	• Facilities District Leadership • Senior Custodians	• Senior custodian and tradesmen report any compromised conditions and/or releases of caulk. Note that repairs nd removal are performed by contractors. • Custodians conduct wet cleaning in designated schools.	Potential health impacts.

[6] EPA, https://www.epa.gov/schools-healthy-buildings/renovations-and-polychlorinated-biphenyls-pcbs-healthy-school-environment

WHAT WE HAVE DONE

The Facilities Department has adopted and is implementing EPA's BMP guidelines. Both EPA and the Massachusetts Department of Public Health agree that PCBs in school's building materials do not pose a health risk to students and staff provided that EPA's BMPs are followed. The following list is a summary of actions to date, followed by a list of key actions WPS has taken in detailed chronological order in Table 1 below, and planned actions are listed in Table 2:

- School Committee created a district *Comprehensive Maintenance Plan for PCBs*.
- The Facilities Department identified priorities for removal of PCB-containing materials.
- The Facilities Department and Materials Management Department worked to procure contractors specializing in this issue to monitor, mitigate and remove PCB containing materials when warranted, and to test the air for PCBs.
- A WPS contractor removed and monitored PCB light ballasts and affected light fixtures.
- A WPS contractor conducted and completed window removal/replacement projects.
- Custodians have implemented wet cleaning methods and a schedule for targeted schools suspected to have PCBs in some building materials.
- The Facilities Department's EH&S consultant trained custodians and tradesmen on typical locations of PCBs in buildings, how to monitor these locations and report releases of suspected materials, and how conduct wet cleaning methods.
- A WPS contractor, overseen by the Facilities Department, conducted quarterly inspections and implemented recommendations such as encapsulation and repairs.
- The Facilities Department worked with the Massachusetts Department of Public Health to evaluate the adequacy of HVAC systems. Facilities conducts maintenance based on assessments and on a preventative maintenance schedule.

Detailed Chronology of Actions

Dates	Completed Activities
Since 2004	City of Worcester partnered with the Massachusetts School Building Authority providing approximately $260 million of investments into the Worcester Public Schools through building replacement projects and Accelerated Repair Projects (e.g. windows).
March 2, 2010	First meeting of District's Environmental Management System Committee
February 2011	In Massachusetts, approximately 900 schools were constructed during 1950-1980. The district self identifies the following schools as being constructed or having major renovation during period of time PCB's were used in building materials in school construction projects in the country: Belmont Street, Burncoat High, Burncoat Middle, Chandler Elementary, Chandler Magnet, Clark Street, Doherty, Elm Park, Flagg Street, Forest Grove, McGrath Elementary, Mill Swan, New Citizens Center, North High, South High, Union Hill #2, Wawecus Road, West Tatnuck, Worcester Arts Magnet.

Dates	Completed Activities
February 22, 2011	Worcester Public Schools engage Triumvirate Environmental, Inc. as environmental consultant to conduct building assessments.
February 23, 2011	First Meeting with EPA regarding upcoming plans to assess buildings for the presence of PCB-containing material.
March-May 2012	Bid Invitations for Best Management Practices work are issued.
June 6, 2012	Nelson Place School invited into Major Renovation / Replacement Program with the Massachusetts School Building Authority (MSBA).
Summer 2012	Consultant inspected caulk conditions in 29 schools.
Summer 2012	Best Management Practices completed, to include: 1. Removal of unlabeled ballasts (680 units replaced) Vendor: Triumvirate Environmental 2. HVAC work to address fresh air intake optimization and system balancing. Vendor: Renaud HVAC & Controls 3. Targeted surface cleaning in all schools Vendor: American Green Building Services 4. Interior and Exterior (9 schools) and Exterior (15 schools) weatherization of windows (caulking and glazing over existing materials). Vendor: Chapman Waterproofing
September 4, 2012	Worcester Public Schools provides update to EPA regarding best management practices.
December 14, 2012	Worcester Public Schools provides follow-up information to EPA regarding best management practices.
April 2013	Worcester Public Schools engage O'Reilly, Talbot, and Okun as an environmental consultant after RFP selection process.
Summer 2013	Windows replaced at the following schools through MSBA Accelerated Repair Program: Chandler Magnet School Lake View School May Street School New Citizens Center
Summer 2014	Windows replaced at the following schools through MSBA Accelerated Repair Program: Columbus Park Tatnuck Magnet Worcester Arts Magnet
January 14, 2015	South High School invited into Major Renovation / Replacement Program with the MSBA.
February 27, 2015	Worcester Public Schools provides update to EPA on all projects completed to date.
April 15, 2015	Worcester Public Schools provides additional information to EPA on projects completed.
June 22, 2015	Worcester Public Schools provides documents relating to 2014 window replacement projects to EPA.

Dates	Completed Activities
Summer 2015	Windows replaced at the following schools through MSBA Accelerated Repair Program: Goddard Elementary Union Hill School West Tatnuck Clark Street School
May 4, 2016	O'Reilly, Talbot, and Okun submits visual inspection sample summary to the Worcester Public Schools.
Summer 2016	Windows replaced at the following schools through MSBA Accelerated Repair Program: Jacob Hiatt Magnet Flagg Street McGrath Elementary Grafton Street
December 2016	Comprehensive surface cleaning, additional window caulking encapsulation, and HVAC improvements occur at Burncoat High School and Doherty Memorial High School.
January 2017	Damp cleaning methods implemented at Burncoat High School as part of daily cleaning methods. (All classroom surfaces damp cleaned every two weeks).
January 12, 2017	Massachusetts Department of Public Health conducts indoor air quality assessment and visual inspection of window caulk at Burncoat High School.
February 15, 2017	Doherty Memorial High School invited into Major Renovation / Replacement Program with the MSBA.
March 3, 2017	Massachusetts Department of Public Health conducts indoor air quality assessment of the adequacy of the ventilation system and visual inspection of window caulk at Doherty Memorial High School.
March 2017	Damp cleaning methods implemented at Doherty Memorial High School as part of daily cleaning methods. (All classroom surfaces damp cleaned every two weeks).
March 2017	Frequent damp cleaning methods implemented at all schools where windows have not yet been replaced to MSBA program.
April 3, 2017	Air Testing for PCBs conducted at Burncoat High School. All samples were well below the EPA's level of concern of 500 ng/m3.
April 2017	Training developed and provided by technical consultants and the Worcester Environmental Coordinator to custodians and tradesmen on PCB in buildings and related special cleaning practices.
April 2017	Air Testing for PCBs conducted at Doherty Memorial High School. All samples were well below the EPA's level of concern of 500 ng/m3.
April 2017	School Committee adopts Comprehensive Maintenance Plan and re-sampling as needed at Burncoat High School and Doherty Memorial High School, consisting of cleaning, remediation, testing, removal, and staff and parent involvement.
Summer 2017	Windows replaced at the following schools through MSBA Accelerated Repair Program: Belmont Street School Chandler Elementary Gerald Creamer Center Wawecus Road School

Dates	Completed Activities
August 2017	Quarterly Visual Inspection at Burncoat and Doherty High Schools completed as part of the Comprehensive Maintenance Plan. Recommendations contained within are implemented.
October 2017	Administration presents School Committee with FY18 First Quarter Update of Comprehensive Maintenance Plan for PCBs (see gb#7-167.1 on October 19, 2017 School Committee agenda).
November/ December 2017	Quarterly Visual Inspection at Burncoat and Doherty High Schools completed as part of the Comprehensive Maintenance Plan. Recommendations contained within are implemented.
January 2018	Administration presents School Committee with FY18 Second Quarter Update of Comprehensive Maintenance Plan for PCBs (see gb#7-167.2 on January 18, 2018 School Committee agenda).
February 2018	Quarterly Visual Inspection at Burncoat and Doherty High Schools scheduled as part of the Comprehensive Maintenance Plan.
March 2018	Annual Air Testing for PCBs as included in Comprehensive Maintenance Plan to be scheduled at Burncoat High School and Doherty Memorial High School.
June 2018	Quarterly Visual Inspection at Burncoat and Doherty High Schools scheduled as part of the Comprehensive Maintenance Plan.
August 2018	Over caulking of exterior caulking at Burncoat High School.
November 2018	Quarterly Visual Inspection at Burncoat and Doherty High Schools scheduled as part of the Comprehensive Maintenance Plan.
December 2018	Air Testing for PCBs conducted at Doherty Memorial High School. All samples were well below the EPA's level of concern of 500 ng/m3.
December 2018	Windows replaced at the following schools through MSBA Accelerated Repair Program: Thondyke Road Lincoln Street
February 2019	Quarterly Visual Inspection at Burncoat and Doherty High Schools completed as part of the Comprehensive Maintenance Plan. Recommendations contained within are implemented.
April 2019	Windows being replaced at the following school through MSBA Accelerated Repair Program: Elm Park

Schedule of Planned Actions

Dates	Planned Activities
Summer 2019	Project approved for roof, window, and boiler replacement projects: Harlow Street
April 2019	Resubmit Burncoat High School to the MSBA for major renovation / replacement projects consideration. This school will remain the priority project of the district until acceptance into the replacement program.

RESULTS

Major improvements have been made in removing suspected PCB-containing material, including light ballasts and the replacement of 4,500 windows.

NEXT STEPS AND CHALLENGES

WPS will continue to:

- Implement Best Management Practices as needed.
- Retain technical consultants and monitor and inspect suspected PCB materials in identified school buildings on a quarterly basis.
- Conduct annual PCB air testing at Doherty and Burncoat High Schools per the *WPS Comprehensive Maintenance Plan for PCBs*.
- Use wet cleaning methods on the established schedule.
- Provide on-going training on wet cleaning to custodians and tradesmen.
- Remove PCB-containing caulk and other suspected PCB-containing building materials during planned renovations and repairs (e.g., when replacing windows, doors, roofs, ventilation).

Detailed information related to the district's *Comprehensive Maintenance Plan for PCBs* can be viewed at http://worcesterschools.org/environmental-management/pcbs.

5. RADON

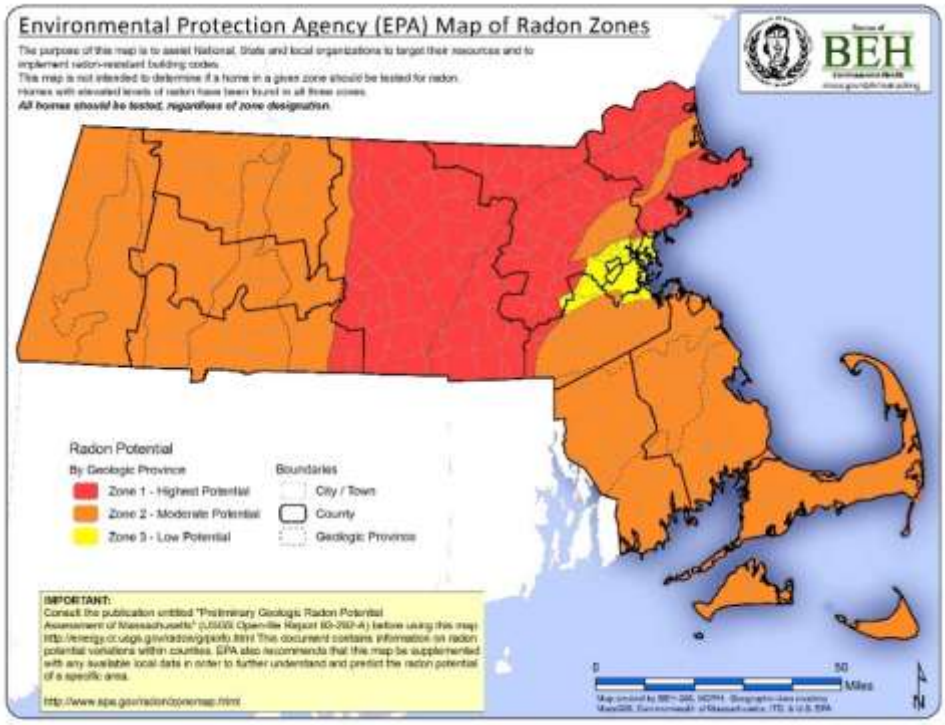
OVERVIEW OF ISSUE

Radon gas is the natural breakdown of uranium, which is present in varying levels in all water, soil and air. The amount of radon that escapes from the soil and rock into a building depends on external conditions, including the weather, soil porosity, and soil moisture. It also depends on internal building conditions, including the pressurization (suction) of air drawn into the building, and the various ways for the air to enter, such as cracks in the foundation or gaps around pipes penetrations into the building.[7]

Currently, there are no federal, enforceable regulations that control indoor radon levels. EPA has guidelines with recommendations for remediation when indoor radon air concentrations equal or exceed 4 pCi/L[8]. Identifying and mitigating the presence of radon gas above this established acceptable threshold in a building is important to maintain a safe learning and working environment.

It is important to note that the city of Worcester is located in Zone 1 on EPA's map of radon zones (Figure 1 below). Areas in Zone 1 have the highest level of radon potential with a predicted average indoor radon screening level greater than the action limit of 4 pCi/L.

Figure 1: Radon Zones in Massachusetts



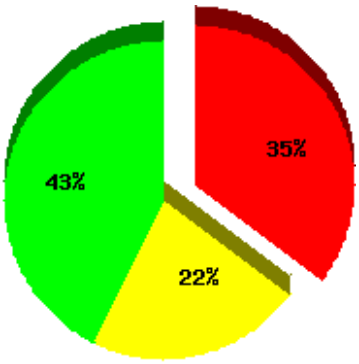
Source: https://matracking.ehs.state.ma.us/Environmental-Data/images/EPA_Radon_Geologic_wCounties.jpg

7 American Lung Association, Radon and Cancer, https://www.cancer.org/cancer/cancer-causes/radiation-exposure/radon.html

8 ATSDR, Radon Toxicity: *What are the Standards and Regulations for Environmental Radon Levels?* https://www.atsdr.cdc.gov/csem/csem.asp?csem=8&po=8

Figure 2 illustrates that 35% of all of the buildings tested in Worcester County had results above the EPA's recommended threshold for action. (Source: http://county-radon.info/MA/Worcester.html)

Radon Levels in Worcester County



The above figure illustrates that 35% of all of the buildings tested in Worcester County had results above the EPA's recommended threshold for action. (Source: http://county-radon.info/MA/Worcester.html)

Radon levels exceeding the acceptable threshold were discovered at a few schools after a comprehensive assessment of radon in all WPS buildings about 18 years ago. Schools with exceedances are listed in the section below.

Responsibilities and impacts are summarized in the following table.

	Supervisory and Reporting Responsibility	**Day to Day Responsibility**	**Potential Impacts to Occupants, Environment and the Building**
Radon	• Facilities District Leadership • Principals	• Custodian (e.g. record radon data) • Tradesmen (e.g. maintain ventilation systems)	• Levels exceeding thresholds can cause long-term health problems

WHAT WE HAVE DONE

Radon issues are being addressed through active school-specific radon mitigation systems and by proactively designing systems for new schools.

- **Installed Radon Mitigation Systems:** The Facilities Department worked extensively with the Massachusetts Department of Public Health's (DPH) Radon Program to create **mitigation systems** to address radon issues in the following existing buildings and as a precaution in new school construction projects.
  - **Existing Buildings**
    - **City View Elementary School** - DPH designed and helped install WPS's most extensive sub-slab radon mitigation, monitoring and emergency response system at City View. For approximately 15 years, DPH provided comprehensive

management and support this system including; loaning WPS radon monitoring equipment, maintaining and calibrating the equipment, downloading and analyzing monitoring data, and providing general oversight of the system's operation. (See Figure 3 for photos.)

- Quinsigamond Elementary School
- Union Hill Elementary

- **New Buildings:** All new WPS buildings either already have radon mitigation systems, or are being designed to have them as a precaution.
  - Worcester Technical High School
  - North High School
  - Nelson Place Elementary School
  - South High School

- **Radon Mitigation at City View Elementary School**

  Originally designed and managed by the Massachusetts Department of Public Health (DPH), the City View mitigation system became the responsibility of WPS in recent years. This transition included:

  - ***Training and Written Guidance.*** The Facilities Department worked with its equipment supplier to conduct three trainings on how to operate and maintain the equipment, download the monitoring data and swap out the equipment for calibration. The Facilities Department worked with the equipment supplier and EH&S Consultant to generate a comprehensive guidance document and related training videos on how to operate and maintain all the system components.
  - ***Program Budget and a Service Contract.*** Materials Management and Facilities Departments developed and issues an annual service contract for technical services, supplies, equipment, calibration, maintenance and repair.
  - ***New System Components.*** Materials Management supported the Facilities Department in the purchase of monitoring equipment, dehumidification equipment and a battery back-up system. This equipment enabled the district to continue to operate the monitoring system through loss of electricity, to save money and to swap units for calibration and maintenance.
  - ***Electronic Data Management System.*** The IT Department supported the Facilities Department to establish WIFI access. The Facilities Department created a dedicated laptop used to store downloaded data, system information, monthly reports and correspondence.
  - ***Emergency Response System.*** The WPS HVAC Technician and Coordinator of Buildings and Grounds addresses any issues with the ventilation system, and the Director of Environmental Management and Capital Projects, the EH&S Consultant and radon consultant enhanced the emergency response systems associated with the radon monitoring equipment.

The WPS Facilities Department oversees the operation of the sub slab system and related monitoring systems operate 24 hours a day, 365 days a year. Monitoring includes:

- ***Daily Monitoring:*** The senior custodian records the radon and humidity levels twice a day. If they encounter any problems, they call technical assistance for an assessment and/or support.
- ***Monthly Maintenance:*** WPS downloads and sends monthly monitoring data for technical review, monitors and calibrates some equipment, and writes and disseminates a monthly maintenance report to the equipment vendor and WPS personnel for analysis. WPS maintains an ongoing dialogue with their technical staff regarding the status of these systems. The vendor is available for consultation via email and phone during working hours, as well as through conducting on-site visits as needed.
- ***Periodic Maintenance:*** WPS conducts annual calibration, maintenance and repair of radon mitigation monitoring, and monitors and repairs the ventilation fans and emergency response equipment on an as needed basis.

RESULTS/IMPACTS

As a result of the comprehensive mitigation and monitoring systems that DPH and WPS have established, maintained and enhanced, the conditions in these buildings are safe for building occupants and visitors. The overall enhancements by WPS to the system DPH established fifteen years ago has enabled WPS to effectively and efficiently assume monitor and maintain the system. Specific results include:

- ***Quantitative****:*
  - The addition of the dehumidifying equipment has cut the cost of desiccant.
  - The use of the EH&S Consultant has cut the cost in half for the monthly maintenance.
  - The addition of back-up power equipment has ensured that the system will run even when power is lost, as well as automatically restart it when the power is restored.
  - The computer upgrade and addition of software and WIFI access have enabled WPS to download and send the data electronically for analysis. As a result, these upgrades have eliminated the need for an outside technical expert to conduct on-site monthly service calls.
- ***Qualitative:***
  - The sub slab radon mitigation system and comprehensive monitoring program ensure that the threshold levels of radon are not exceeded.
  - The extensive emergency notification system alerts the school and district personnel immediately if there were any problems with the equipment or radon exceedances.
  - The development of a management system, guidance documents and training videos tailored to the WPS City View Radon System serve as an institutional memory to ensure continuous operation, regardless of any change in staff or vendors.

NEXT STEPS AND CHALLENGES

WPS will continue to maintain these systems and associated training, contract support, and monitoring in order to provide a safe and healthy learning and working environment.

For the City View system, WPS will need to:

- Maintain radon mitigation and monitoring operations with trained staff as long as the building is used.
- Maintain a technical consultant contract to download and evaluate data, calibrate and repair equipment, and problem solve when needed.
- Monitor equipment, calibrate equipment annually and repair and replace equipment as needed.
- Consider (eventually) hooking the radon monitoring system into the Energy Management System at City View to enable remote monitoring.

WPS also need to continue monitoring and maintenance of the ventilation systems in the other buildings with radon mitigation systems.

A. Occupant-Induced and Operational Issues

1. Indoor Environmental Quality (IEQ)

Overview of Issue

Americans spend about 90% of their day indoors whether in classrooms, offices, or at home. Pollution indoors is 2 to 5 times (and occasionally more than 100 times) higher than outdoor levels.[9] Several factors and activities contribute to the pollutants in indoor air. The amount and type of ventilation determines the level of concentration of those contaminants in the indoor air.

Thus, the IEQ in a building is based on unique inter-relationship of occupants, the building itself, pollution sources and the HVAC system in each building, as illustrated in the graphic and related list of issues below. It is essential to understand these relationships when creating programs to prevent IEQ issues, determine their source, and address IEQ issues.

Why is this of concern?[10]

Recent comparative risk studies performed by EPA and its Science Advisory Board have consistently ranked indoor air pollution among the top five environmental risks to public health. Indoor air quality problems can:

- Increase long and short-term health problems for students and staff. Aggravate asthma and other respiratory illnesses. Nearly 1 in 13 children of school-age has asthma, the leading cause of school absenteeism due to chronic illness. There is substantial evidence that indoor environmental exposure to common allergens found in schools plays a role in

[10] EPA, *Why IAQ is Important in Schools*, https://www.epa.gov/iaq-schools/why-indoor-air-quality-important-schools

triggering asthma symptoms. There is also evidence that exposure to diesel exhaust from school buses and other vehicles exacerbates asthma and allergies.

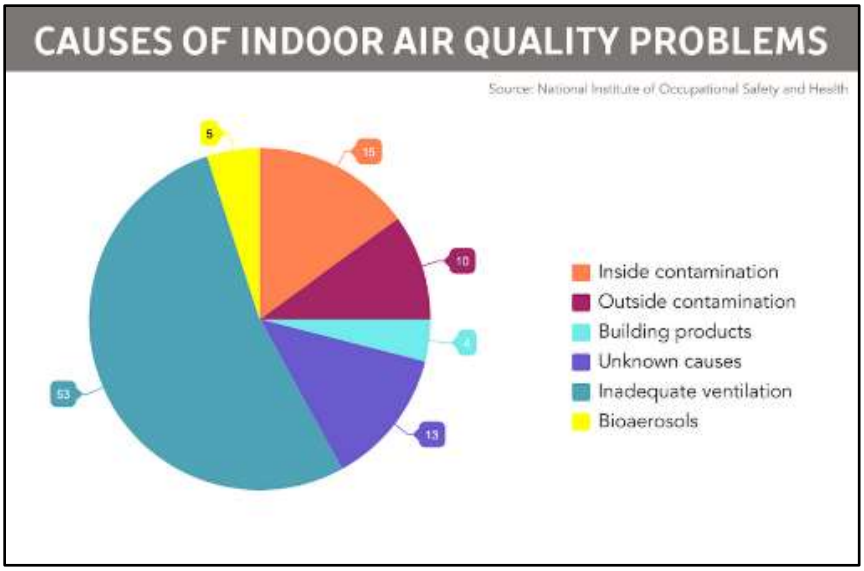
These problems can impact student, teacher and staff attendance, comfort and performance; accelerate the deterioration and/or reduce the efficiency of the school's physical plant and equipment; and create liability problems. Thus, good IEQ is an important component of a healthy indoor environment and can support schools' educational goals.

FACTORS AFFECTING IEQ

School Design Issues

- **Renovations,** made to reduce sound in "open concept" classrooms designed in the 1970s, which can sometimes result in restricted air flow or an imbalance between supply and exhaust.
- **Plumbing** located on outside walls which can cause condensation and mold.
- **Passively designed systems** in older buildings that do not have mechanical systems to condition and move the air into and through a building.

Occupant Induced Issues in new and older buildings



Age-Related Conditions

- Ventilation systems, designed under **outdated codes** and/or with outdated mechanical systems that have reached end of life.
- **Deterioration** of building components (windows, doors, roofs, exterior walls) that allows infiltration of unconditioned outside air, moisture and pests.
- **Contaminants** resulting from the use and/or improper storage of hazardous curriculum products, air fresheners and cleaning products, scented personal care products, and proliferation of biological contaminants from plants, pets and upholstered furniture.
- **Management of hard-to-clean** classrooms, mismanagement of HVAC systems, blockage of air intakes, exhausts and air flows.

Construction, Operations and Maintenance Issues in new and older buildings

- **Use of products** in building, maintenance, repair and cleaning activities.
- **Maintenance and repair** of building components and mechanical systems that result in compromised and/or contaminated ventilation systems and contribute to the building's contaminant load.
- **Modification of many ventilation system** components in the 1970's to reduce energy usage, but at times compromised air exchange.

Responsibilities and impacts are summarized in the following table.

	Supervisory and Reporting Responsibility	**Day to Day Responsibility**	**Potential Impacts to Occupants, Environment and the Building**
Indoor Environmental Quality (IEQ)	• Facilities • District Leadership • Principals	• Tradesmen (e.g. repairs) • Custodians (e.g. sanitation, reporting filter changes) • Transportation (e.g. idling) • Food service (e.g. chemicals used, management of gas appliances)	• Potential health impacts. • Poor IEQ can affect academic and job performance as well increase absenteeism.

WHAT WE HAVE DONE

WPS buildings range greatly in age, a factor that can influence ventilation and overall indoor air quality. WPS has been working on the factors and activities that affect IEQ on several fronts. Since IEQ is an umbrella for a range of issues found in school building, this section of the report addresses the overall IEQ strategy and program components to prevent, assess and address IEQ issues.

Detailed information on building-based contaminants (asbestos, lead-based paint, PCBs, radon, pest by-products) is covered as separate topics in this report under *Legacy Issues*. The reduction in use of hazardous products (in academics and operations) is covered under the *Purchasing to Reduce Risk* section in this report. These factors are particularly important in buildings with limited ventilation.

The Facilities Department has worked on improving **ventilation** issues by:

- Enhancing the maintenance of HVAC systems and replacing windows (to prevent uncontrolled infiltration)
- Developing and piloting training materials for classroom teachers to understand, assess and better manage the HVAC or passive ventilation systems in their rooms
- Developing an HVAC Assessment System
- Developing a program based on a modified version of EPA's *Indoor Air Quality Tools for Schools Program (TfS)* based on information from trainings by EPA, Harvard School of Public Health and the MA Department of Health

The Facilities Department, the WPS EH&S Consultant, the WPS Nursing Department and the Worcester Department of Housing have worked together with a city-wide initiative, the ***Prevention Wellness Trust Fund*** (one of nine projects funded by DPH to reduce chronic disease, including pediatric asthma) to pilot EPA's *Tools for Schools* program. It included classroom IEQ training and "walk-through" assessments. The goal of this component of this project was to identify conditions that could cause or trigger asthma. Participation in this project provided an opportunity for WPS to establish new relationships with Worcester's Housing and Health Departments and local health initiatives.

One key strategy to reduce indoor air pollutants in buildings that does not depend on ventilation is to reduce the use of hazardous products used in the building by occupants and operations departments. The Facilities Department and Materials Management Department have worked with the Toxics Use Reduction Institute on **toxics use reduction** to replace commonly used disinfectants, sanitizers and cleaning products with a significantly less hazardous products in buses, food serving areas and school buildings. Purchasing criteria has been developed and implemented to replace products of concern in Transportation and School Nutrition Departments. Draft criteria have been developed for the Custodial products, with replacement of the disinfectant currently underway. Efforts are also underway to reduce use of hazardous products in maintenance. Details on these efforts are available in the section on *Purchasing for Risk Reduction.*

Operational Controls improve IEQ in WPS buildings. Facilities has developed**:**

- An **IEQ Management Plan** that identifies roles and responsibilities, protocols, assessment systems, guidelines for classroom IEQ management, and work practices.
- **Draft Contract Specifications** for assessment and mitigation of mold, bird waste and guano.
- **Strategies on mold mitigation,** with input from a Certified Industrial Hygienist.
- **Assessment tools** for classrooms, buildings and grounds walk-throughs; environmental health **surveys** and classroom surveys.
- A **list of test equipment** to purchase to better assess IEQ and related complaints in-house (and related training).
- **Emergency protocols and system** to assess IEQ complaints, including a flow chart of response protocols with roles and responsibilities, a comprehensive assessment checklist, occupant survey and diary, record keeping system.
- **Reporting/Documentation** of records related to complaints, electronic classroom and survey instruments, environmental health surveys and building walk-through forms. WPS uses its electronic maintenance program scheduler, *SchoolDude*, to identify, assign and track repairs.
- **Remediation,** conducted on an as-needed basis, following draft protocols established in the draft management plan.
- **Preventative Maintenance** two times/year to change filters and conduct annual maintenance on HVAC systems.
- **Capital Improvements** that prioritize HVAC systems for major repair and replacement.
- **Training and Improved Practices,** including a pilot program for teachers and a more extensive IEQ and Ventilation Training for custodians and tradesmen.
- **Improved Controls for Cleaning Equipment and Supplies,** including the replacement of vacuums with HEPA filtered vacuums to prevent the dispersion of allergens and contaminants, and a switch to the use of microfiber cleaning cloths and dry mops, which has an electromagnetic charge to attract and hold dust.
- **Communication and Notification System** for principals, tradesmen and custodians to report issues to the Facility Director and the Coordinator of Buildings and Grounds, and,

if warranted, the Director of Environmental Management and Capital Projects. Facility Administrators directly communicate status of efforts to principals who communicate to their staff. Facilities Department staff are available to meet with school staff upon request.

RESULTS/IMPACTS

WPS efforts to improve IEQ have increased awareness by staff and administrators of (1) how the interrelationship between use of hazardous materials, management of building based contaminants, occupant activities and operations and maintenance activities affect IEQ, and (2) what can be done to prevent, assess and mitigate these impacts. WPS now has the tools to more effectively prevent and address IEQ issues.

The programs to improve IEQ have (1) reduced the risk of IEQ issues affecting students, teachers, staff and visitors; (2) reduced liability for WPS (e.g. workers compensation, union grievances); and (3) created a safer, healthier learning and working environment.

NEXT STEPS AND CHALLENGES

- Finalize specifications for (1) mold assessment contractor, (2) mold remediation contractors, and (3) custodial cleaning products.
- "Cleaning for Health", continuing the transition to HEPA Vacuums and microfiber; procuring environmentally-preferred products; transitioning custodial staff to their use; and cleaning out old products.
- Building IEQ assessments on an as-needed basis.
- Purchasing of IEQ test equipment.
- Preventative Maintenance to implement enhanced protocols.
- Capital improvements initiatives to seek MSBA funds to upgrade or replace HVAC systems on priority list.
- Continued training, including implementation of IEQ Ventilation Training for Facilities administrators, custodians and tradesmen, and continuation of "Cleaning for Health" training for custodians, Classroom IEQ Training as needed, and training for Facility Administrators on the use of IEQ test equipment.

Additional Plans for Renovation/Replacement that will improve health learning and working environments:

Window replacement at Harlow Street

New roofs (will prevent water damage and related mold, and possible release of asbestos and lead based paint) at 4 schools (Vernon Hill, Burncoat Prep, Tatnuck Magnet, Worcester East Middle

Replacement of a boiler system at 1 school

Feasibility study for renovation or replacement of Burncoat High School.

2. INTEGRATED PEST MANAGEMENT (IPM)

OVERVIEW OF ISSUE

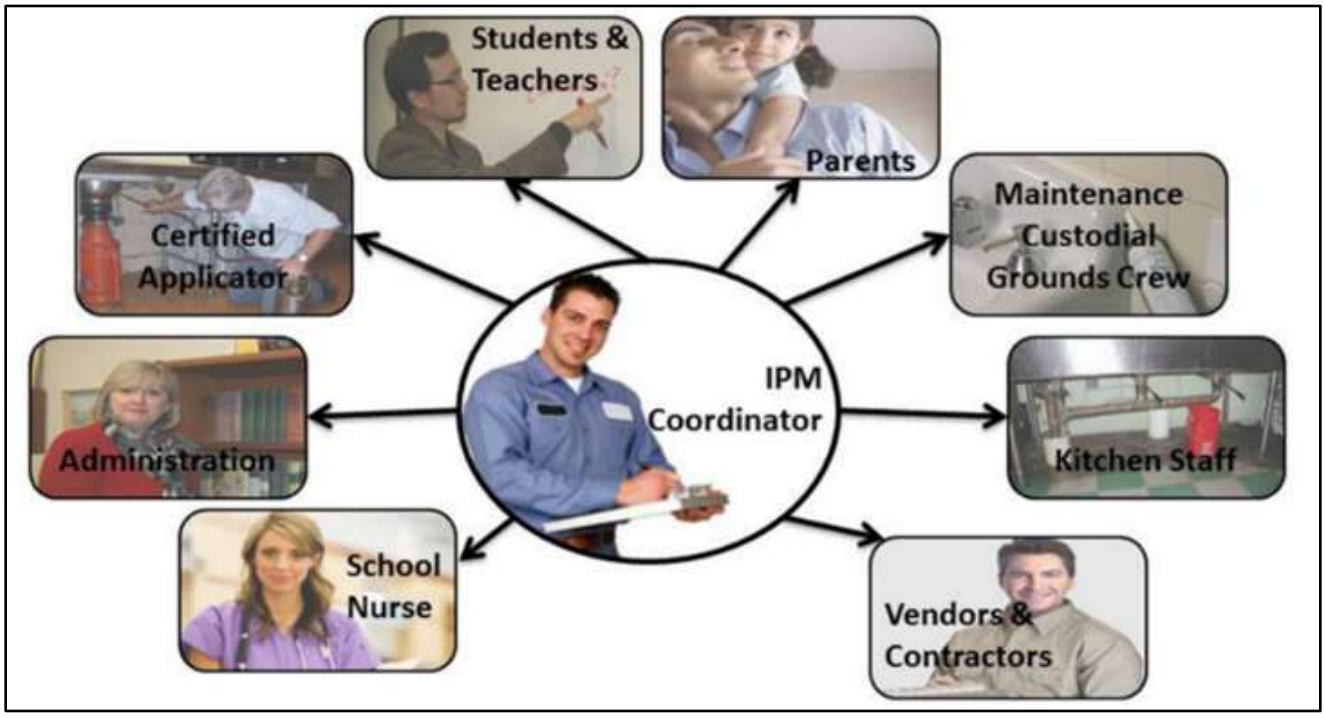
Pests (insects, rodents and other wildlife) and their by-products can trigger allergies, cause asthma, transmit several serious infectious diseases, contaminate food products, chew wires and cause fires, and damage building materials, curriculum materials and other items.

Schools are required by the Massachusetts Families Protection Act to prevent and address pest issues by developing and implementing indoor and outdoor *Integrated Pest Management* (IPM) plans to implement IPM strategies to prevent and management pest problems, limit the use of the least toxic pesticides and avoid pest and pesticide exposure to students and employees.

Per the Massachusetts state legislature, IPM is defined as *"A comprehensive strategy of pest control whose major objective is to achieve desired levels of pest control in an environmentally responsible manner by combining multiple pest control measures to reduce the need for reliance on chemical pesticides; more specifically, a combination of pest controls which addresses conditions that support pests and may include, but is not limited to, the use of monitoring techniques to determine immediate and ongoing need for pest control, increased sanitation, physical barrier methods, the use of natural pest enemies and a judicious use of lowest risk pesticides when necessary."* [MGL Chapter 32B §2]

Responsibilities and impacts are summarized in the following table.

Integrated Pest Management (IPM)	**Supervisory and Reporting Responsibility**	**Day to Day Responsibility**	**Potential Impacts to Occupants, Environment and the Building**
	• Principal • Senior Custodians • Kitchen Managers • Facilities Administrators	• Tradesmen (e.g. repairs) • Custodians (e.g. sanitation & pest reporting) • Staff and School Nutrition (e.g. sanitation & pest reporting)	• Potential health impacts (potential allergens and infectious disease).



WHAT WE HAVE DONE

The Facilities Department and School Nutrition Department have implemented an enhanced IPM program that involves vendors, training, assigning responsibilities, and monitoring/treatment to control pests in order to create a safe and healthy learning and working environment.

Elements of this program include:

- Enhanced **pest control vendor services** provided to Worcester Public School that provide on-call services for pest incidents as well as monthly monitoring of the kitchen facilities (common hot spots in any building). These enhancements include more specific requirements for the vendor's services, including providing onsite binders, updating reports, providing technical information and training, etc.
- Improved practices and controls in **School Nutrition** (food services) practices and controls: (a) assessments of food service operations in 62 buildings; (b) training for all staff; (c) a pest monitoring system by kitchen managers in 62 buildings to monitor conditions on an ongoing basis; (d) an IPM inspection program; (c) improved logs and other record-keeping procedures and tools; (d) improved food storage and waste management procedures.
- Improved practices of **custodians and tradesmen,** including training on common pest issues, IPM strategies and state regulatory requirements.
- **Indoor and outdoor IMP plans,** updated on an annual basis and as conditions change throughout the year for all 62 buildings, as required by the Families Protection Act.
- Enhanced system to prevent indoor air quality issues by **integrating pest issues into IEQ inspections**.
- **Treatment and monitoring** by the pest management vendor when a problem is discovered.

RESULTS/IMPACTS

These include: (a) increased awareness and management of issues associated with pests, and the role of integrated and preventive strategies; (b) reduced risk of infectious disease (c) enhanced IPM management systems for food service; and (d) reduced pest related damage to buildings, food products and other items.

NEXT STEPS AND CHALLENGES

WPS will continue to implement proven IPM strategies that prevent and effectively manage pest problems by integrating these strategies into daily operations, maintenance and classroom management. Regular training, annual updating of IPM plans, and attention to maintaining the system of inspections, monitoring, and addressing any issues are needed. Additionally, the following are needed:

- **Installed and/or improved shelving** to (a) make it easier to inspect and monitor for pests in food storage areas, and (b) reduce areas that attract or harbor pests.
- **Finalized integration of inspection criteria** into food service inspection systems and continue annual inspector training.
- **Finalized guidance for custodial rodent removal** which involves working with state and federal agencies to concur on guidelines.
- **Increased attention to classrooms**: *"Breakfast in the Classroom"* has created new challenges to pest management in schools because students are now eating in the classrooms. As a result, any crumbs, spills and food-contaminated trash remain in the classroom until clean up at the end of the day. These issues are being explored with the School Nutrition Department as some of the issues can be minimized by the type of food and drink containers served. In addition, School Nutrition and Custodial will explore issues related to the extra impacts to classrooms as well as mitigation measures (e.g. options for removing food contaminated trash earlier in the day).

3. UNIVERSAL WASTE

OVERVIEW OF ISSUE

Universal waste is hazardous waste that is less stringently regulated to facilitate the recycling of the materials if handled correctly. Commonly found "Universal Waste" items in schools are batteries (e.g. NiCad, lithium, lead acid, and equipment containing these batteries), mercury-containing devices (e.g. mercury thermostats, thermometers, manometers, barometers, electrical switches and relays, mercury-filled vacuum pumps), and mercury-containing lighting (e.g. fluorescent, high-pressure sodium, mercury vapor and metal halide lamps).

The amount of universal waste typically found in a school building classifies the school as a "Small Generator of Universal Waste." There are no associated requirements for notification or record keeping.

Universal waste can be stored on-site for a year. Releases to the environment can be prevented through proper storage, labelling, handling, responses to releases, and transportation by a facility that is permitted or otherwise designated for receiving hazardous waste, like a licensed recycler.[11]

Used lightbulbs are the most common kind of universal waste in WPS buildings. It should be noted that as more and more fluorescent bulbs are replaced with longer-lasting LED lights, the volume of used fluorescent lightbulbs will decrease.

Responsibilities and impacts are summarized in the following table.

	Supervisory and Reporting Responsibility	**Day to Day Responsibility**	**Potential Impacts to Occupants, Environment and the Building**
Universal Waste	• Facilities District Leadership • Senior Custodian	• Custodians (e.g. removing and storing mercury containing light bulbs and batteries) • Tradesmen (e.g. removing and storing mercury containing light bulbs, instrument panels and batteries) • Science and Vocational teachers handling batteries containing heavy metals	• Potential health impacts • Safety hazards associated with broken glass, batteries. • Potential releases to the environment

WHAT WE HAVE DONE

The Facilities Department has improved the system to manage universal waste through:

- **Enhanced contractor services.** Materials Management and the Facilities Department have established an agreement with a vendor to reimburse the district for universal waste disposal.

[11] EPA, https://www.epa.gov/hw/universal-waste

- **Assignment of roles and responsibilities** for managing universal waste. We conduct annual training to custodial staff and tradesmen on establishing and maintaining universal waste accumulation areas.
- **Established universal waste storage areas** in 10 buildings. The Facilities Department has created and provided guidance documents, signage and labels at training sessions and in *Custodial Handbooks* located on site in every school building. Criteria for monitoring these areas have been incorporated into custodial and other building-based inspections.

RESULTS/IMPACTS

These include (1) less breakage of used lightbulbs and associated risks to workers and building occupants; (2) prevented mercury vapor emissions; (3) less disruption to daily operations; and (4) reduced risk of being in non-compliance.

NEXT STEPS AND CHALLENGES include continuing to establish and manage the storage, labeling and management of universal waste in individual buildings and across the district.

Examples of proper labelling and storage practices for universal waste:

4. HAZARDOUS WASTE

OVERVIEW OF ISSUE

Schools generate hazardous waste, defined by MassDEP as having one or more of these characteristics:

- Ignitable (catches fire easily, with a flash point lower than 140°F)
- Corrosive (very acidic or basic, with a pH of less than 2.0 or more than 12.5)
- Reactive (unstable, reacts violently with water, potentially explosive)
- Toxic (leaches contaminants into the environment and has the capacity to harm the body)
- Listed specifically as "hazardous" by MassDEP

Common areas or activities that generate hazardous waste in schools are experiments in science labs, curriculum activities in art rooms and vocational shops, custodial cleaning, trades maintenance and repairs, transportation maintenance and cleaning, cleaning and sanitizing in food preparation and serving areas, nurse's offices, etc.

MassDEP regulations (310 CMR 30.000: Massachusetts Hazardous Waste Regulations) require generators of any of these wastes to properly identify and safely manage them, and to track them from where they are generated to their ultimate destination for recycling, treatment, or disposal. Facilities such as schools generating smaller quantities of hazardous waste have less stringent requirements, but still need to safely manage wastes and prevent releases to the environment.

These regulations require separating the waste from other items, segregating the waste into compatible categories, posting storage areas with a sign designating it as hazardous waste, labeling the items as waste, and having a system for emergency response.

Responsibilities and impacts are summarized in the following table.

	Supervisory and Reporting Responsibility	**Day to Day Responsibility**	**Potential Impacts to Occupants, Environment and the Building**
Hazardous Materials & Waste	• Facilities District Leadership • Principals • Science Liaison • Art Liaison • Safety Liaison • Transportation Director • School Nutrition Director • Director Vocational Programs • Senior Custodian • Materials Management Department	• Chemical Safety Officers who support the implementation of the *Chemical Management and Lab safety Program* • Science, Art and Vocational Teachers who manage chemicals in the curriculum and facilitate the student safety program • Custodians and tradesmen who use and manage chemical products and materials) • Bus Drivers and Monitors • Classroom teachers and staff • Materials Management staff who oversee purchasing of products and materials	• Potential health impacts • Potential to impact ability to learn (e.g. exposures to some chemicals can impact the neurological system, making it hard to concentrate, or some affect the respiratory system, making it hard to breathe) • Can impact the building condition. • Potential threat of fire and explosion.

WHAT WE HAVE DONE

An EMS subcommittee was established and facilitated by the Director of Materials Management. The subcommittee included the departments that generate hazardous waste (Facilities, School Nutrition, Science and Art, Nursing, Career and Technical Education). This collaboration enabled the district to more efficiently educate the departments on requirements, disseminate information and tools to establish hazardous waste accumulation areas and coordinate collection of hazardous waste. The following program elements were developed:

- **Training, technical assistance and protocols** on how to establish, inspect and maintain a hazardous waste accumulation area, how-to clean-out the waste, and oversee waste removal and transport. Information on managing the accumulation areas was also printed on a poster and mounted in storage areas.
- **Inventories** on hazardous waste used for obtaining disposal quotes.
- **Implementation of strategies** to reduce the toxicity and/or volume of purchased hazardous materials, thereby reducing the amount of hazardous waste. This information is covered in the report section on *Purchasing for Risk Reduction*.
- **Tools** to manage the waste including signage, labels, secondary containment and storage equipment.
- **Contracts** for removal of hazardous waste.
- **Registration of buildings as hazardous waste generators** under MassDEP's system which has recently changed to an electronic based system. Thus, although it is not required, the Facilities Department has begun to re-register buildings under the new system. This will make the required tracking of the transportation paperwork more efficient.
- **Establishment of hazardous waste accumulation areas** in some schools and buildings
- **Clean-Outs** of waste in science, art, school nutrition, custodial and trades. Initial clean-outs of each department, with the exception of art, yielded a significant amount of waste from over stocking, compromised materials, and materials no longer being used.

IMPACTS/RESULTS

Improved management and prevention of the generation of hazardous waste have significantly reduced (1) the potential for non-compliance; (2) health and safety risks by eliminating potential releases and exposures; (3) the risk of spills and incidents. Department collaboration also enables the district to minimize costs for disposal and transportation.

NEXT STEPS AND CHALLENGES

These include:

- Continuing to train select administrators on DOT requirements to enable them to sign for the transport of waste from the district.
- Continuing to train administrators and staff on management of hazardous waste.

- Continuing to reapply for hazardous waste generator numbers under EPA/MassDEP's new electronic system.
- Continuing to establish, manage and inspect the storage, labeling, inventory and management of hazardous waste in individual buildings.
- Continuing to organize collections.
- Ensuring that departments budget for disposal.

Hazardous Waste Accumulation Area in Science Department

II. ACADEMICS

OVERVIEW

Class curricula traditionally involve the use of a variety of hazardous materials, particularly in grades 9-12. Examples include:

- **Laboratory chemicals** (e.g., Corrosives such as acids and bases, flammables, reactives, toxics)
- **Art supplies** (e.g., paints, thinners, heavy metals in glazes, photographic chemicals, adhesives)
- **Vocational/technical education** (e.g., petroleum-based oils and solvents, penetrants and lubricants, inks, paints, glues, degreasers, cleaners)

APPROACH

Goals have been to (1) improve the management of hazardous materials used in teaching; and (2) reduce the use of the materials and/or find safer alternatives while also meeting learning objectives and using desired teaching methods. Focus has been on (1) materials used in classrooms and curricula; (2) classroom tools and practices; and (3) tools and practices in facilities management.

Focusing on **materials used in classrooms and curricula** includes the following steps:

- Identify roles and responsibilities
- Determine the location and condition of materials currently in use and those not in use
- Identify and address any potential imminent hazards
- Properly remove and dispose of materials no longer needed or used
- Identify opportunities to reduce the volume, toxicity and hazards associated with materials currently used
- Change procurement and approval processes to prevent over-stocking of hazardous materials in the future

Improving **classroom tools and practices** involves:

- Tracking and inventory of hazardous products
- General “housekeeping” practices of teachers and students
- Self-inspections to assess adherence to best practices and requirements
- Storage and management systems, including; storage equipment, labeling of storage shelves and materials, product dispensing systems
- Development of written work instructions and guidance documents
- Training administrators, staff and students
- Emergency preparedness includes; supplies and equipment such as emergency wash stations, personal protection equipment, spill prevention and control, emergency protocols; and posting of signage, posters and emergency contact information

Improving **tools and practices in facilities management** includes:

- The incorporation of features and requirements into designs for new or renovated labs
- An improved work order system to ensure identified issues are mitigated

- Improved testing system for emergency wash stations
- Maintenance of utilities (gas, plumbing, electrical), emergency wash stations, ventilation and neutralization tanks

NEXT STEPS AND CHALLENGES

Continued attention to best practices, self-inspections, and preventive/corrective action will maintain compliance and model educational excellence.

A. SCIENCE LABORATORIES

OVERVIEW

11 WPS schools have science laboratories. Some of these have had significant challenges that resulted from over-purchasing, inadequate storage, and lack of guidance, chemical safety training and self-inspections.

The use of hazardous materials in a classroom requires:

- Special infrastructure: fume hoods; storage signs and labels for storage rooms, equipment, shelving and containers; equipment for chemical storage; supplies for emergency eye wash and spill response; and completely separate storage areas for hazardous waste
- Protocols: inventory: procurement, use, management and disposal
- Maintenance and corrective action: equipment testing and maintenance; self-inspections of chemical storage and emergency response systems
- Evaluation of proposed curricula and periodic evaluation of existing curricula

WHAT WE HAVE DONE

Facilities, Materials Management and the Science Departments have greatly improved science laboratories and classrooms by reducing the risk of exposure and non-compliance. They have:

- **Inventoried materials** that (1) are used in classroom and curricula; (2) are no longer being used (including location and condition); (3) may pose a potential imminent threat or special management unavailable in WPS; and, (4) require proper removal and disposal.
- **Cleaned out labs** at 11 middle and high schools with support from EPA Region I and WPS several times.
- **Reduced the** volume, toxicity and associated hazards of materials after reviewing curriculum needs, and then changing chemical procurement practices to prevent purchasing and over-stock of hazardous materials, and to eliminate use of highly hazardous materials.
- **Purchased** (1) emergency spill and exposure response supplies, equipment, and personal protective equipment and (2) chemical storage supplies and equipment to establish safe storage systems.
- **Tested emergency wash equipment** in classrooms as required.
- **Implemented an inspection program,** involving development of inspection criteria and conducting self-inspections and 3rd party inspections of PPE, emergency wash stations, general lab housekeeping, chemical storage, hazardous waste storage, labelling, records, etc.
- **Enhanced vendor/contractor services** for waste disposal.
- **Developed a guidance manual,** *Science Chemical Management and Lab Safety Manual*.

- **Improved practices and operational controls** such as container and shelf labeling, monitoring, notification procedures, reporting/documentation, identification of roles and responsibilities, etc.
- **Created a multi-tiered training program,** based on the manual, that includes a train-the-trainer component with information and tools for the Chemical Safety Officers to train their science teachers who then use the information to both train their students and implement the safety program in their classroom.
- **Conducted training** for the Science Liaison, Science Department Chairs, Chemical Safety Officers (CSOs) and science teachers (who in turn provide safety training to students at the beginning of each year).
- **Developed a student safety program** that includes posters, a training presentation, PPE and safety contracts
- **Incorporated required safety and emergency response features** into designs for new or renovated labs and related chemical storage areas.

RESULTS/IMPACTS

WPS has created a safer, healthier learning and working environment by reducing:

- The use of highly hazardous chemicals (e.g. flammable metals that require special firefighting supplies) and reduced quantities of hazardous chemicals (e.g. nitric acid, that requires special storage conditions).
- The risk of exposure to students and staff, and releases to the environment.
- The "unknowns" and associated future costs to WPS because of changes in the procurement process. (Extremely hazardous chemicals can only be used if required by the curriculum, cannot be replaced with a less hazardous alternative, and there are safety systems and training in place to address potential hazards.)
- Liability for WPS.

NEXT STEPS AND CHALLENGES

- Implement all aspects of the Guidance Manual through training.
- Create a system to inspect fume hoods and emergency deluge showers.
- Ensure that chemical management supplies and equipment and hazardous waste removal are budgeted..
- Continue to:
    - Ensure that chemical safety officers are allocated time to implement the program and provide training to science teachers.
    - Inspect and monitor lab practices and safety and emergency systems to prevent risk of exposure, and ensure effective response to emergencies and findings of non-compliance.
    - Conduct training of teachers and students.
    - Invest in safety equipment and systems.

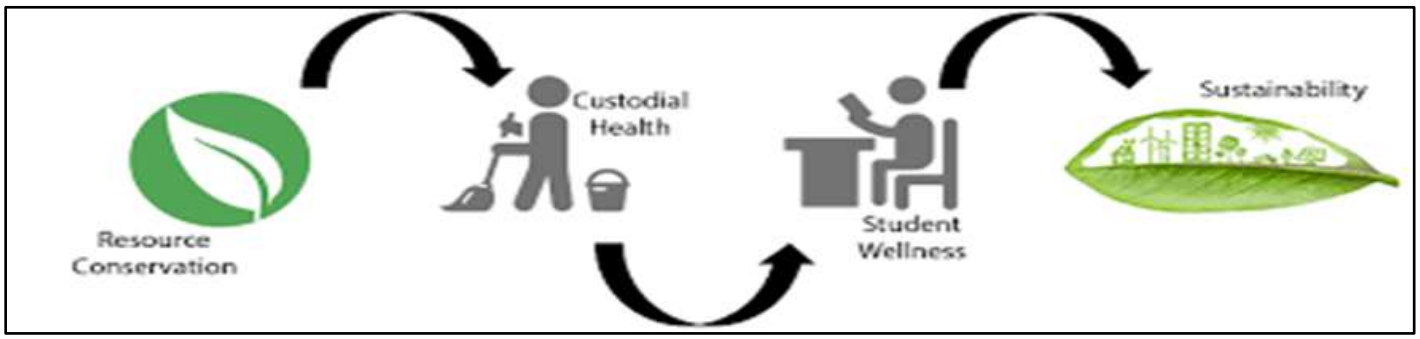
- Identify opportunities to use less chemicals in curricula without sacrificing academic excellence.
- Clean-out hazardous waste in conjunction with other departments.

EXAMPLES OF BEST PRACTICES

III. FACILITIES—TRADES, CUSTODIAL AND GROUNDS MAINTENANCE

Maintaining WPS's 62 buildings requires a variety of activities, all of which can result in environmental non-compliance and potential environmental health and safety issues.

Please note that other aspects of this department's work are integrated throughout this report, including; *Hazardous Waste*, *Universal Waste*, *Integrated Pest Management*, *Asbestos*, *Lead Based Paint*, *PCBs*, *Indoor Environmental Quality* and *Purchasing for Risk Reduction*. Thus, this section will simply highlight the importance of this department's efforts to reduce risks on both building based and operations issues.



OVERVIEW OF THE ISSUE

The following daily activities include the use of hazardous materials that can pose potential occupational exposures as well as potential exposure building occupants because of their flammability, corrosivity, reactivity and toxicity. These materials or products have the potential to cause or trigger asthma and respiratory effects, pose reproductive hazards, cause toxic effects to target organs such as liver and kidneys, and sensitize people (cause them to have an immune response) to a range of chemicals. Common products include but are not limited to materials used in:

- Maintenance (e.g., drain cleaners, adhesives, penetrants, paints, oils, boiler cleaners, fuels)
- Grounds Maintenance (e.g. fuels, fuel additives, lubricants, penetrants)
- Custodial activities (e.g. cleaners, disinfectants, degreasers, floor stripping and refinishing products)

WHAT WE HAVE DONE

In addition to the work to reduce the use and replace these toxics as noted in the *Purchasing for Risk Reduction* section, and the disposal of hazardous waste as noted in the *Hazardous Waste* section of this report, the Facilities Department has:

- Compiled Safety Data Sheets for all of the products used
- Drafted and circulated a *Hazard Communication Plan*.
- Created a *Custodial Environmental Health and Safety Handbook*
- Created an extensive training program for new hires and refresher training for existing staff.

- Identified safety hazards and purchased related personal protection equipment.
- Purchased secondary containment and storage equipment for the hazardous products that cannot be reduced.

RESULTS/IMPACTS

The above efforts have created (1) safer working conditions and reduced risk of exposures and accidents; (2) safer storage conditions and reduced risk of releases; and (3) improved compliance.

NEXT STEPS AND CHALLENGES

- Continue to provide and monitor the use of personal protective equipment.
- Continue to establish hazardous waste accumulation areas where needed, clean-out hazardous waste, and establish and inspect upgraded chemical storage areas as products are replaced by less hazardous products.
- Continue to provide training on existing topics as well continue to expand the training topics to meet the new OSHA requirements.
- Continue to provide updates to the *Custodial Environmental Health and Safety Handbook.*
- Finalize the *OSHA Hazard Communications Plan* by all departments using hazardous materials.
- Continue to implement new OSHA initiatives.

IV. OPERATIONS

A. SCHOOL NUTRITION

OVERVIEW OF ISSUES

This section provides an overview of how the School Nutrition Department's EMS-related work support efforts to improve efficiency, management and services. The activities have been an integral part of their efforts to enhance regulatory compliance, improve worker safety, create career paths and systems to evaluate and advance their employees, and provide healthier food, and safer cleaning products and serving ware.

Details are also included in other sections of this report, including *Integrated Pest Management*, *Purchasing for Risk Reduction* and *Hazardous Materials Management*.

WHAT WE HAVE DONE

Program development and implementation activities have included the:

- Collection of survey information (e.g. on existing roles and responsibilities for cleaning, personal protection needs, types of pest problems) to benchmark existing systems, and identify issues and needs
- Development and use of purchasing criteria and specifications for safety equipment, personal protective equipment, and cleaning supplies and equipment
- Establishment of hazardous waste collection areas, clean-out of old products and establishment of new safe chemical storage systems
- Development and implementation of:
    - Pilot projects (e.g. trial cleaning projects, pest inspection systems)
    - Management protocols and work practices to enhance safety and compliance, and use of new products and equipment
    - A new inspection system to continue to monitor program requirements
    - A new district-wide product dispensing and distribution system
- Development and provision of:
    - Training and competencies on safety systems, chemical use, pest management, safer cleaning and sanitizing practices
    - Posters and other job aides to implement new systems and products

RESULTS/IMPACTS

Although the procurement of environmentally preferable products was challenging because of limited product selection, issues with vendors and limited staff availability to work on the project, the School Nutrition Department made this work a priority which resulted in a Standardized Green Housekeeping Program. In order to accomplish this, they assigned staff at several levels in the department to help create, implement and now sustain the program. They completely renovated their cleaning program and implemented an extensive training, inspection/compliance and safety program. Thus, the extensive efforts of School Nutrition and the Facilities Department have reduced health and safety hazards and related risks and enhanced compliance in all WPS 62 food service facilities.

B. TRANSPORTATION

OVERVIEW OF ISSUES

Potential environmental health and safety issues associated with student transportation are associated with:

- ***Vehicle cleaning and sanitizing products*** that can cause health and safety exposures during use and storage, while inadequate disinfection enables the transmission of infectious disease to passengers, monitors and drivers. Providing safe disinfection on the SPED buses was an extremely high priority due to the potential risk of transmission of BBP and other infectious diseases. Compounding the exposure potential is the fact that buses are hard to clean and disinfect due to the types and conditions of materials (e.g. vinyl seats that crack), and access of materials to be managed (e.g. seat belts extending under seats, infectious materials migrating to inaccessible locations under seats, in window crevices).
- ***Maintenance products*** that are flammable, corrosive, toxic and reactive, thus poses safety and health risks in use and storage.

WHAT WE HAVE DONE

12,300 students are transported daily

Contractor: 134 vehicles

WPS: 48 vehicles

1. Cleaning and Disinfecting

Focus has been on finding ways to reduce the toxicity of products used for cleaning and sanitizing in vehicles while still maintaining levels of cleanliness.

The Facilities Department worked with the Transportation Department to obtain a Toxics Use Reduction Institute (TURI) Grant in 2017/2018 to conduct a pilot project on using environmental preferable cleaning and disinfectant products and equipment for safely cleaning the buses and preventing transmission of pathogens. This project revolutionized their system of cleaning the buses. Staff has been very enthusiastic and have embraced the program.

The outcome of the pilot resulted in a Standardized Green Housekeeping Program. At the successful conclusion of the pilot in the spring of 2018, they expanded the product and equipment use to all WPS buses and the training to all bus drivers and monitors.

The new program has the following components:

- **Changes in procurement practices** that created purchasing criterion for the hazard level of the cleaning products, as well as a standard list of products, equipment and supplies for the new housekeeping system.
- **Purchasing** of environmentally preferable products (EPP) and state of the art cleaning supplies (microfiber to more efficiently use product and prevent the

dispersion of dust during cleaning) and equipment (electrostatic sprayer that can reach challenging locations using a disinfectant with extremely low hazard levels). The pilot involved conducting a hazard assessment for assessing possible exposures of using the disinfectant in an enclosed space (the buses) in conjunction with the University of Massachusetts Lowell. The hazard assessment did not indicate an exposure risk for the user in the bus conditions.

- **Enhanced vendor services** for obtaining products, supplies and equipment, and receiving training and technical assistance.
- **Improved practices and controls,** including standardized cleaning and disinfection practices with EPPs on a new schedule, labeling for secondary containers, safe storage protocols and use of personal protective equipment.
- **Training,** including an extensive educational program (BBP, Hazard Communication, Cleaning and Disinfecting), with training presentations and videos, work practice poster, standard work practices and a cleaning schedule.

2. Vehicle Maintenance

The Facilities Department worked with the Transportation Department to obtain a TURI Grant in 2018/2019 to conduct a pilot project on using EPP vehicle maintenance products. Components of the project currently underway include:

- **Changes in procurement practices** with draft EPP purchasing criterion.
- **Piloting** of EPPs.
- **Exploring vendor/contractor services** for obtaining EPPs and receiving training and technical assistance.

RESULTS/IMPACTS

The new programs have (1) reduced the risk of infectious disease exposure for students, bus drivers and monitors; (2) reduced chemical exposure for drivers and monitors who clean and disinfect the buses, and for repair staff who maintain the vehicles; and (3) reduced the risk of release to the environment.

NEXT STEPS/CHALLENGES

- Complete the 2018/2019 pilot of fuel and maintenance products.
- Monitor the Green Housekeeping program.
- Continue to provide new hire and annual refresher training.

C. NURSING

The Nursing Department dispenses a wide range of medications to students on a regular basis. Common medications include: Epi Pens, control medications, over-the-counter medications and prescription medications. The department also generates and manages several waste types, including controlled substance waste, and solid, hazardous and infectious waste and sharps.

OVERVIEW OF ISSUES

The management of medications and the disposal of the various waste streams are regulated by numerous state and federal agencies. There are also several different venues by which they must dispose of these different types of wastes. There are also regulated requirements for storage, labeling, recordkeeping and transportation.

WHAT WE HAVE DONE

The Nursing Department has a comprehensive system to collect, store and dispose of waste, and maintain required records. The Facilities Department is working with them to assist with regulatory compliance and the development of a *Medical Waste Management Plan*, which is in a draft form.

RESULTS/IMPACTS

These efforts have improved compliance with state and feral laws and have also prevented exposures to nurses and releases to the environment.

NEXT STEPS AND CHALLENGES

- Finalize the *Medical Waste Management Plan*.
- Evaluate the current vendor specification.
- Explore the feasibility of using any of the take back or reverse distribution programs identified as part of this research. EPA and MassDEP recently changed the guidelines on the reverse distribution systems. Further research is needed to understand the feasibility of using these systems under the new guidelines.
- Conduct a clean-out of any existing waste.

D. PURCHASING TO REDUCE RISK

Reducing the amount and hazard level of materials that they purchase, school districts can reduce their regulatory requirements for handling and storage, reduce safety hazards and risks, and avoid or reduce disposal costs. The fewer hazardous materials purchased and used, the easier it is to attain and stay in compliance. Changing procurement and purchasing procedures ensures that the least hazardous materials are purchased and prevents over-stocking of materials which then have to be disposed.

The majority of WPS academic and operations departments have worked to identify and assess the materials or products they use, identify safer alternatives, and change purchasing approvals and practices to increase the use of Environmentally Preferred Products (EPPs). The information contained in this section supplements information in other sections of the report (e.g., Academics, School Nutrition, Transportation).

WHAT WE HAVE DONE

- **Created a Purchasing Subcommittee:** The EMS Committee formed a Purchasing Subcommittee, led by the Materials Management Department, with representation from both academics and operations departments. The goal of this committee's work was to create a system to set standards and a process for procurement of hazardous materials to minimize the purchase of hazardous materials, and to oversee the implementation of that system.
- **Identified Product Concerns Through Hazard Identification:** The EH&S Consultant worked with each participating department to conduct the following activities to identify hazards, current operations and needs for products, existing infrastructure and management systems, and the ability of each department to properly manage the hazardous materials currently used and/or stored. The EH&S Consultant (1) compiled and reviewed safety data sheets of all the hazardous products each department used or stored; (2) interviewed staff to review operations and determine perceived need; and (3) conducted inspections and assessed storage, environmental conditions and management practices.

  This research enabled each department to make informed choices about which products to either try to replace through Toxics Use Reduction (TUR) strategies or to implement enhanced management practices and systems for items that could not be eliminated.
- **Created a Purchasing Program:** The subcommittee created an extensive district-wide Purchasing Program guidance document. The subcommittee identified roles and responsibilities, established a review process and schedule, set quantity and toxicity limits and product donation guidelines, and provided a related appeal process for staff to use to request items that do not meet established criteria.
- **Department Specific Procurement Initiatives to Reduce Hazardous Materials** - Within this framework, specific departments implemented initiatives in the following table:

Department EPP Procurement Initiatives	Results/Impacts[12]	Next Steps
The Science Department created and piloted a "Standard Use List" (SUL) which aligns with the curriculum and grade requirements. They initially used the SUL to identify and remove an extensive number of items not on the list. They recently used the list to evaluate curriculum options. They will continue to review and refine this list on an annual basis.	A major reduction in quantities and hazard level of chemicals stored and purchased. Reduction in cleanouts in science labs due to over-stocking. Future purchases controlled by the SUL.	Evaluate the MA Department of Education updated curriculum framework requirements with the SUL.
The Art Department identified heavy reliance on donations that were not all certified for use in schools, drafted some purchasing criteria for known items of concern, identified alternatives products to pilot, etc.	Reduced hazards from donated products.	Complete product inventory, finalize purchasing criteria, pilot EPPs.
The School Nutrition Department focused on: • <u>Cleaning and Sanitizing Products:</u> Based on assessment, they determined the need to create new specifications for EPPs and to find a new vendor. They had a very challenging experience finding less hazardous alternatives due to the lack of third-party certification standards[13] and a full line of alternative products at the onset of this initiative. Although the department worked with the EMS consultant on extensive research and piloting of some products over a several year period, a full line of available third party certified EPPs was not available until last year. At that time, the department developed new bid EPP specifications and procured an entire line of EPP products. Please see the department specific section on this report for information on the extensive transition over this last year to EPPs.	Cleaning and Sanitizing Products: Reduced number of products used from 27 to 8. Eliminated use of flammables, reduced corrosivity level of all products at use dilution and reduced hazard level of sanitizers. Thus, eliminated storage issues (e.g. fire hazards), and staff exposures (e.g. asthmagens, respiratory hazards, neurotoxins, chemical burns)	Cleaning and Sanitizing Products: Continue to monitor and inspect the new EPP program.

[12] There are other related impacts (e.g. disposal of identified waste and related reduction in risk) from this work listed in other sections of this report.

[13] Third Party Certification is defined as "an independent organization has reviewed the manufacturing process of a product and has independently determined that the final product complies with specific standards for safety, quality or performance." In this case we are referring to certification with criteria for human health, reduced environmental impact and performance.

Department EPP Procurement Initiatives	Results/Impacts[12]	Next Steps
The School Nutrition Department also focused on: • Foodware: Based on concern expressed by Toxics Use Reduction Institute (TURI), this department sought to identify and eliminate PFAS from their foodware packaging that they serve food in. They developed bid specifications to eliminate this contaminant and assessed the items they currently purchase.	Eliminated products. Procured bids for products without PFAS,	Foodware – select products without PFAS
The Facilities Department assessed products and initiatives the following procurement activities in the following operations:	Created an awareness of the hazard level of products used in all sectors of department.	Develop specifications for future purchases.
• Trades and Grounds: Research determined that many of the products being used were flammable, toxic and corrosive, which is typical for these kinds of activities. The Facilities Department obtained a grant from TURI to explore EPPs to pilot. This project is currently underway and will result in training, purchasing criteria and use of new products.	Once long-term alternatives are selected for products, the reduction in impacts will be beneficial to the tradesmen and will reduce hazards from off-gassing[14] products to building occupants.	Select which of the piloted products will be used for the long term.
• Custodians: Research determined that many of these products were flammable, reactive, toxic and corrosive, which is typical for conventional cleaning products. The Facilities Department has banned the use of bleach and has replaced one of the most hazardous products used in custodial work, the disinfectant. In addition, they have drafted EPP specifications for the rest of the custodial products to be finalized and put out to bid.	Reduced the use of corrosives and reactives by eliminating bleach and quaternary compounds (in disinfectants), thus reduced fire hazards as well risks for asthma and chemical burns.	Finalize the specifications, put them out to bid, and implement new products.
Transportation Department worked with the Facilities Department to obtain two grants from the Toxics Use Reduction Institute (TURI) to assess four	Created an awareness of the hazard level of products used in the	Develop specifications of EPP fuel &

[14] Volatile organic compounds (VOCs) are organic chemical compounds evaporate under normal indoor temperature and pressure. Indoors, VOCs are mostly released into the air from the use of products and materials containing VOCs. The main concern indoors is the potential for VOCs to adversely impact the health of people that are exposed. Source: https://www.epa.gov/indoor-air-quality-iaq/technical-overview-volatile-organic-compounds

Department EPP Procurement Initiatives	Results/Impacts[12]	Next Steps
types of products used to (1) clean, (2) disinfect, and (3) maintain.	four categories of products.	maintenance products for future purchases.
○ Maintenance and Fuel Products: This project is being conducted in conjunction with the new Transportation Service Manager, seeks to determine which EPPs and product systems were desirable as part of the expansion of buses and related maintenance services managed by WPS. This is especially important as WPS has started to significantly increase the amount of maintenance and repair work conducted in-house. This selection and piloting of alternative products in select vehicles is currently underway.	2018 – 2019 TURI Grant: through the pilot, have reduced the use of flammable, corrosive and toxic products, thus reducing health and safety risks.	Finalize purchase criteria. Implement new products. Train the repairmen once they are hired on the new products and work practices.
○ Cleaning and Disinfectant Products: This project with vehicle drivers and monitors sought to create a comprehensive EPP cleaning and disinfection program. It involved the selection and piloting of products, supplies and equipment with staff training in a select group of buses. The issues faced in this project involved addressing the transmission of potentially highly infectious bodily fluids from the special education sector that they transported. The complicating factor was that portions of the bus are extremely hard to reach for cleaning and disinfecting.  Protexus Electrostatic Sprayer The project worked with TURI to conduct exposure monitoring to ensure that the staff was not receiving any hazardous exposures which was a concern because they were applying the product in an enclosed space.	The project piloted a new less hazardous disinfectant with cutting edge technology that is very effective and efficient at reaching challenging areas. Thus, the potential for disease transmission is greatly reduced, while preventing exposure to staff doing the disinfecting. Due to the great success of the program and wholehearted endorsement of the staff and administrators, the department implemented the program in the entire fleet of buses that they manage.	Put new purchasing criteria out to bid. Roll out program to any new buses added to the fleet. Continue to provide new hire training and annual refresher training.

The School Nutrition Department – New Green Housekeeping Program

Packaging of new products and supplies for distribution to food serving sites.

Reduction in products under the new Green Housekeeping Program.

- **Challenges**
  - Availability of third-party certification standards for some types of products. This is an emerging field where new EPPs and related third-party certification standards are being created in an ongoing basis. At times this has meant that WPS has had to wait for a significant amount of time for product lines to be created and certification standards to be developed. This was a significant issue for the School Nutrition Department. Another issue is navigating the range of third-party standards to identify ones that are truly protective and worth substituting them for products currently being used. This has been true for the trades sector.
  - Availability of identified EPPs through existing suppliers. This has even been an issue for working with large distributers such as Grainger and MSC who are on state contract and claim to have EPP products.
  - Use of automated dispensing systems is not allowed by the Worcester Plumbing Inspector. These systems ensure appropriate dilution and enhanced safety for dispensing concentrated products for use, but are of concern to plumbing inspectors. Thus, it has been challenging finding non-plumbed dispensing systems that ensure appropriate dilution and minimize risk to the user. This is an issue for all departments dispensing hazardous products as concentrates are always more hazardous.
  - Ensuring effective control of infectious disease while reducing the use of hazardous disinfectants and sanitizers. This applies to custodial, food service, transportation, SPED, nursing and preschool departments. This issue must be addressed when alternatives are selected by the preschool department and the nursing department.

E. INFORMATION TECHNOLOGY

The IT department has assisted the EMS Committee and subcommittees to address a number of needs. Examples include:

- **Recordkeeping and Document Control:** IT worked with administrators to explore the most efficient system and location to maintain the EMS related documents.
- **Inspections Systems:** IT worked with the Inspections and Corrective Action Subcommittee to evaluate potential electronic based inspection systems and to explore the use of electronic equipment to conduct these inspections.
- **WIFI Access:** IT provided access to WIFI for staff conducting inspections and for communicating radon data from City View.

V. DISTRICT-WIDE FOCUS AREAS

District-wide focus areas are issues that apply across the district and are not related to any one particular department or school. These include safety, bloodborne pathogens and emergency preparedness and response.

A. INSPECTIONS AND CORRECTIVE ACTION

OVERVIEW

Inspections are a tool to benchmark existing conditions, assess regulatory compliance, identify opportunities for improvement, improve consistency across the district, and identify corrective actions to maintain and improve the EMS.

WHAT WE HAVE DONE: INSPECTIONS

- Developed or enhanced **existing tools** to benchmark compliance with requirements and best management practices, overseen by an EMS Inspections and Corrective Actions Subcommittee, chaired by the Director of Materials Management with representatives from the Science, Art, Nursing, School Nutrition and Facilities Departments and support from the IT Department. This subcommittee has done extensive work to: (a) develop a schedule/matrix of what operations/areas are to be inspected and with what frequency; (b) identify existing inspection protocols and criteria; (c) identify ways to enhance them or create new ones; and (d) explore the most effective way to collect and process information from the inspections.
- Created an **Inspection Program (**for Chemical and Hazardous Waste Management and Personal Protection) with a uniform inspection system using the same criteria for all participating departments. Inspection criteria include but are not limited to: housekeeping of classrooms, storage and prep rooms where chemicals are used and/or hazardous waste is stored; signage, container and shelf labeling of chemicals, hazardous products and waste; status of emergency response systems (e.g. emergency wash systems, spill control supplies, fire equipment); condition of utilities (plumbing, electrical and gas); adequacy of ventilation; safety data sheet management system; and availability of personal protective equipment.

  Tools created to support the inspection program include a "Safety Pre-Screen" system to ensure there were no imminent hazards prior to an inspection in areas of concern (e.g. that have never been inspected, or have not been inspected in a long time, or have stockpiles of old or compromised chemicals). Once a safety screen has been conducted and any issues addressed, regular inspections commence. Corrective Action Forms communicate and track the resolution of issues and are used for debriefing meetings in the Science Department.

  The Inspection system was piloted and subsequently implemented on an annual basis in Science classrooms, lab prep areas and chemical storage and hazardous waste areas. Because the magnitude of chemical use is much less (e.g. fewer types of chemicals, chemicals used in a more limited way) in Art, School Nutrition and Facilities, the inspection criteria were shortened and adapted for their use in the School Nutrition and Custodial Departments. They have implemented versions of this assessment and have also explored integrating the EMS inspection criteria into other inspections they conduct.

- **An electronic inspection system** (FieldID) was piloted for several years in the Science Department but ultimately found to be too challenging to use for several reasons, including usability, technical issues and web conductivity. Thus, this past spring, inspections in Science and School Nutrition were conducted on paper copies. The results of the science inspections were uploaded to a spreadsheet. The outcome was more efficiency in the field, but more work following the inspection to manage the data.
- **Two multi-media, 3rd party inspections** were conducted by UMass Lowell.

WHAT WE HAVE DONE: CORRECTIVE ACTION

- **Created and Implemented a Corrective Action System,** the purpose of which is to correct and prevent issues. It includes an analysis of the underlying or root cause of the non-compliance identified through the inspection process. The WPS corrective action process for the Science Department includes:
    - **Monitoring** - the status of work orders submitted based on inspection findings by inspectors and Facilities Department staff.
    - **Follow-up debriefing** - meetings with staff, department chairs and administrators (e.g. department directors, principals) to review results, status of work orders, identify trends and explore needs for training, enhancement of work practices, additional technical support (e.g. guidance tools, technical assistance), and recommendations for policy or procedural changes.
    - **Additional corrective actions** - based on outcome of debriefing meetings include a range of activities, including; enhancement of program tools, provision of training, additional staff oversight, purchase of equipment or supplies, and request for additional resources.

HIGHLIGHTED DEPARTMENT EFFORTS

- **Implementing Department Inspection Systems** by the WPS EH&S Consultant in conjunction with CSOs and the Science Liaison:
    - **Science Department** has the most comprehensive inspection and corrective action system in the district. The work to assess and address these issues has been ongoing since the beginning of the EMS. It has involved the close ongoing collaboration between the Science Liaison and EH&S Consultant and the science department chair and teachers to develop, implement and monitor the system.

      The Science Liaison created a Chemical Safety Officer (CSO) position for each high school to implement the Science Chemical Management and Lab Safety Program at the school building level. The CSO provides input into program materials, assists in the inspections, monitors the mitigation of identified issues, and provides training, tools and guidance to science teachers on the program throughout the school year.

      The Science Department Chairs and CSOs meet with the EH&S Consultant to debrief after inspections to address action plan items. The Science Liaison then follows up to modify or enhance the management system based on the outcome of the inspections.

Annual chemical safety inspections criteria includes: chemical housekeeping in classrooms and chemical prep and storage areas, hazardous waste management areas, personal protection, safety data sheets and student safety.

The trends of inspections results show that most of the extensive management system is in place and being maintained. The results highlighted the critical roles of the CSOs in this positive outcome. The findings have helped identify where some procedures need to be reinforced, as well as highlight how the level of follow-through during the transition of funding program startup costs at the district level to funding program operational costs at the school level. It indicated that principals need to be made aware that the budget requests are for safety items required to maintain the program. The trends from these inspections also identified a key issues continues to be installation and maintenance of some facility based systems.

- **Art Department** conducted initial inspections in three of the high school classrooms and storage areas to use as a basis to develop their program. Conditions in the newer buildings were significantly better due to the lack of product accumulation.
- **Custodial Department** worked with the Inspections Subcommittee to explore enhancing their electronic cleanliness evaluation system to include chemical management but found this was not feasible. As a result, inspections for chemical management and universal waste are conducted as part of building checks and walk-throughs. There have been several major clean-outs of old products as a result of these inspections.

  Once the new environmental preferable products are selected and disseminated in the upcoming year, custodial closets will be cleaned out, which will reduce the number of products used, simplify the storage systems, and make it easier to inspect.
- **School Nutrition** initially had a number of required inspections which served as a basis to incorporate addition EMS related inspection criteria. Each school within the district is regularly inspected by the Worcester Public Health Department twice during each school year for food safety inspections.

  WPS Nutrition Supervisors conduct *Serv Safe* on-site reviews for food and beverage safety, with required Corrective Action Plans and follow up review as needed. The new OSHA requirements were recently incorporated into the Serv Safe Inspection criteria.

  Guidelines for storage of new EPP products are currently being provided, which will streamline the inspections of product storage areas for cleaning and sanitizing products.

  An inspection system for Integrated Pest Management was developed and piloted in 2018. Based on the outcome of the pilot, the IPM inspection program is being refined.
- The **Nursing** Department and the EH&S Consultant conducted an initial assessment at (1) a school-based health clinic, and (2) a nurse's office as they do

significantly different work. It involved the collection and review of safety data sheets on products they use on a regular basis to identify what hazardous products could be reduced, eliminated or substituted. The results indicated that the Hazardous Materials sub-committee should focus on the school-based health clinics (10 clinics run by 2 private agencies) rather than nurses because the nurses are not using toxic products, whereas the clinics used significantly more hazardous products for their work.

In response to a recent request to the Facilities Department by the WPS Nursing Department regarding disposal of medical waste, they researched the requirements for managing the medical waste generated as part of normal nursing duties. Once the guidance on this waste is finalized, inspection criteria will be generated to monitor the management of this waste. The Nursing Department already has provided excellent guidance for nurses on the management of this waste.

- The **Transportation Department's** Bus Depot chemical storage areas were inspected several times as part of the initial needs' assessment. It has been completely reorganized as part of a larger effort to obtain less hazardous products and create safer chemical management systems.
- **Career and Technical Vocational Education** (CTVE) includes 24 shops at WTHS and shops at 3 other high schools. Inspections typically have included: annual Fire Department inspections; DPH inspections of the x-ray equipment at health and veterinary clinics; OSHA inspections; MA Department of Education's "Coordinated Program Review" (which includes health and safety reviews).

  Since the development of the EMS, two 3rd-party Multi-Media Inspection (combining air, water and waste criteria into one inspection) were conducted by a consultant through UMass Lowell.

IMPACTS/RESULTS

- The inspections have been instrumental in proactively identifying issues that need addressing and in identifying areas of the EMS that need enhancement, additional training, and/or tracking. It helps direct initial program development and subsequent technical assistance efforts, content in guidance documents and training and requests for resources.
- The inspections also provide an invaluable educational opportunity for the people conducting self-inspections as well as the people involved in the debriefing of the inspections to learn about the requirements.
- The new or enhanced inspections have reduced risk, improved compliance, and improved health and safety conditions for students, staff and teachers.

NEXT STEPS AND CHALLENGES

- Reconvene the subcommittee.
- Enhance the Correction Action Plan format that identifies priorities, timelines, needed resources, and assignments to address outstanding and/or emerging environmental health and safety issues.

- Explore platforms for a return to using an electronic, web-based inspection system to enable WPS to track and view (both at-a-glance and in-depth) all inspection results, corrective actions, responsible parties, trends in noncompliance and corrective actions.
- Continue to conduct and follow up on inspections in departments with established systems while also reviewing and enhancing inspection programs across all departments.

CHALLENGES

Challenges include the significant amount of time required to develop inspection criteria and tools, conduct inspections, compile results and generate recommendations for corrective actions, and then follow up with meetings and monitoring status of corrective actions.

Additionally, it is a challenge to select and implement an electronic web-based system that is affordable, user friendly and can be used when off-line and synced to the web.

B. SAFETY – PERSONAL PROTECTION

OVERVIEW OF ISSUES

A key strategy to improve compliance and overall environmental health and safety is to reduce the materials or practices that pose actual or potential risks. When engineering, work practice, and administrative controls are not feasible or do not provide sufficient protection, WPS must provide personal protective equipment (PPE) to staff, and at times, students. In addition, they must implement a management program that includes training and oversight to ensure its proper use and maintenance. PPE is worn to minimize exposure to hazards that cause serious workplace injuries and illnesses. These injuries and illnesses may result from contact with common chemical, biological, physical, electrical, mechanical, or other workplace hazards. Examples of PPE commonly used in schools are gloves, safety glasses/chemical splash goggles, aprons, booties and safety shoes, and aprons. [15]

WHAT WE HAVE DONE

The Facilities Department has worked with science, art, custodial, trades, transportation and school nutrition to determine what PPE is required for their respective activities and related hazards. WPS has created a PPE program as an integral part of each department's safety programs to address potential hazards. This program includes: risk assessment; selection, maintenance, and use of PPE; employee training; and monitoring of the program to ensure its ongoing effectiveness.

Please see below for an example of what PPE is required for various activities. This information is posted in kitchens and provided in training. Similar information has been developed for the Science Department, and Facilities Department (custodians and tradesmen).

[15] https://www.osha.gov/SLTC/personalprotectiveequipment/

PPE Hazard Assessment and Selection for WPS School Nutrition Department - Last Revision May 2017

PPE Cooks, Bakers, Kitchen Helpers	Impact Safety /Splash Glasses	N95 Dust Mask	Apron	Chemical Resistant Gloves	Foot Protection	Head Protection	Miscellaneous
							
• Cleaning and sanitizing pots and pans	Chemical splash goggles for dispensing product		Hot liquid & chemical resistant	Hot liquid & chemical resistant - elbow length	Slip resistant, covered shoe	hairnet	
• Opening boxes					Slip resistant, steel toe, covered shoe	hairnet	Safety Box cutters
• Opening 5 gallon liquid concentrate detergent	Chemical splash goggles/face shield			Reusable nitrile loves – elbow length	Slip resistant, steel toe, covered shoe	hairnet	
• Ware washing – loading detergent into machine	Chemical splash goggles		Chemical resistant	Reusable nitrile loves – elbow length	Slip resistant, covered shoe	hairnet	
• Ware washing – using equipment			Hot liquid & chemical resistant	Hot water resistant, elbow length	Slip resistant, covered shoe	hairnet	

RESULTS/IMPACTS

- The provision of PPE prevents injuries from daily and periodic activities for both students and staff. This reduces WPS's liability and workers compensation issues, while ensuring a safer learning and workplace. In the academic realm, it also models safe work practices.

NEXT STEPS

- Each time a new chemical or a new work practice is introduced, WPS must identify and provide required PPE.
- WPS must continue to provide and monitor the use of PPE as well as continue to incorporate this information into all safety training.
- WPS must ensure the cost of PPE is budgeted for in all departments, and that PPE is purchased and maintained.

C. BLOODBORNE PATHOGENS

OVERVIEW OF ISSUE

Bloodborne pathogens (BBP) are infectious microorganisms in human blood and body fluids that can cause serious disease in humans, some of which are potentially fatal. The pathogens of concern covered by the OSHA BBP Standard include hepatitis B, hepatitis C, and human immunodeficiency virus (HIV).

This issue applies in school departments such as custodial, athletics, nursing, special education and bus transportation. Incidents involving blood or bodily fluids containing blood (e.g., vomit, feces, drool) happen daily in school buildings, on the playground, in school buses and during sports activities. They include cuts, bloody noses, vomit and toileting accidents.

Responsibilities and impacts are summarized in the following table.

	Supervisory and Reporting Responsibility	**Day to Day Responsibility**	**Potential Impacts to Occupants, Environment and the Building**
Blood Borne Pathogens	• Facilities District Leadership • Principals • SPED leadership • Nursing Director • Athletics Director	• Custodians (e.g. cleaning up blood spills) • Employees who may come into contact with blood and body fluids from injuries, etc.: o Nurses o Athletic staff o SPED staff o Bus Drivers and Monitors o Security Staff o Teachers	• Exposure to infectious diseases

WHAT WE HAVE DONE

Created an EMS Subcommittee to address BBP: The Office of Curriculum and Professional Learning, and Human Resources, Custodial, Nursing, Special Education and Transportation Departments met for an extended period of time to explore the risks, regulations and resources available to address this issue. The subcommittee identified common ground between departments, and worked together to identify roles and responsibilities, needs for training, hepatitis B vaccinations, spill cleanup systems and resources to address identified needs.

Drafted an Exposure Control Plan (ECP): The subcommittee created an ECP as required by the OSHA BBP Standard to prevent transmission of disease by limiting occupational and student exposure to blood and other potentially infectious materials. The ECP:

- Identifies employees at risk for exposure and related at-risk activities
- Specifies workplace controls

- Specifies training content to prevent and respond to exposures
- Provides guidelines for offering and maintaining records for the preventative Hepatitis B vaccine
- Specifies district roles and responsibilities, and
- Provides guidelines for exposure response protocols and follow-up, required medical services and related recordkeeping.

Drafted a Syringe Pick-Up Addendum to the Exposure Control Plan that provides guidance based on the Massachusetts Department of Labor Standards requirements to custodians to safely pick-up and dispose of syringes that pose risk of contracting a BBP. It also specifies roles and responsibilities and equipment and supplies needed.

Improved practices and controls include the following:

- **Training**: The Facilities Department has implemented annual training on BBP for custodians. In addition, they have recently created and provided training on Syringe Pick-up. The Transportation Department has implemented annual training BBP programs. The Nursing Department is continuing their BBP training program that had been in place. The Special Education Department will schedule training for their department. Training covers all aspects of the BBP program as specified in the ECP.
- **Work Practices:** The subcommittee developed these practices to prevent and respond to exposures based on the potential risks identified for each department. They address the handling of people, items and situations posing an exposure risk. Response to BBP incidents includes spill cleanup protocols, disposal of infectious waste and exposure follow-up.
- **Workplace Controls:** Participating departments provided employees with tools to prevent exposures, including personal protective equipment, and tools and supplies to cleanup spills and sharp objects.
- **Reporting/Documentation:** The ECP contains guidance and forms to track vaccination offerings, exposures and medical follow-up.

RESULTS/IMPACTS

These include reduced risk of exposure to students, staff and visitors and associated complaints or claims against WPS.

NEXT STEPS AND CHALLENGES

These include additional work to finalize and fully institutionalize the ECP in all "at risk" departments. This involves:

- **Fully implementing the program and providing related training** in Special Education and Athletics Departments.
- **Exploring how to fund and provide Hepatitis B vaccinations** where needed. Please note that although Hepatitis B vaccinations are now routinely given to children as part of their vaccination series and many employees have had the vaccine, a limited number of employees still need to be offered the vaccine. Employees may decline the vaccination

when offered and then request it at a later date if desired. Once all existing employees have been offered the vaccine, the program can then offer the vaccine on an as-needed basis to new hires.

- **Providing personal protective equipment, tools and supplies** for custodians handling needle pick-up.
- **Monitoring the Program** to ensure spill kits are stocked, annual training is provided, vaccines are offered, recordkeeping is maintained, and work practices and spill clean-up procedures are followed in all departments.

D. EMERGENCY PREPAREDNESS AND RESPONSE

OVERVIEW OF ISSUE

Unfortunately, schools must prepare for and respond to a wide range of potential threats, incidents and emergencies. WPS has an established emergency preparedness and response program.

The Worcester Public Schools has developed and provides training on:

- *Crisis Response Plan*, Worcester Public Schools and Worcester Emergency Management , August 2018 (primary audience: administrators)
- *Worcester Public Schools Emergency Guide* (primary audience: teachers)

These documents have traditionally not included much focus on environmental issues. The focus of the EMS has been to work with the School Safety Liaison to supplement and enhance these existing guides, training and systems of communication and response to include environmental health and safety issues.

WHAT WE HAVE DONE

The risk of spills, fires, and explosion has been reduced because WPS has:

- Reduced the volume and toxicity of hazardous materials purchased and used in academics and operations
- Adopted better storage, handling, labeling and management practices for hazardous materials and waste
- Purchased spill kits and/or materials in science labs
- Providing training that includes prevention and emergency response
- Conducted self-inspections in science lab to identify practices, equipment or operations that pose a threat of an incident and/or need for equipment, supplies or training to prevent or mitigate incidents
- Improved other "operational controls" to prevent and/or minimize the impact of any release or incident (e.g., signage, inspections of eye-wash stations and fire extinguishers)
- Integrated:
    - Environmental health and safety issues and guidance into existing emergency response guides through the development of addenda related to chemical exposures and releases
    - Assessment of emergency response into inspection criteria
    - Inspection of emergency wash equipment into teacher duties
- Improved incident **"notification trees"** to ensure that any incidents or spills involving hazardous materials are handled consistently and involve the Facilities Department as appropriate.

NEXT STEPS

These include (1) further integration of environmental issues into existing safety inspections, training and guidance and (2) continued coordination with the Safety Department to conduct trainings and coordinate content and dissemination of guidance materials.

E. Training

OVERVIEW

Training is an integral part of maintaining regulatory compliance on environmental health and safety (EHS) issues and implementing the EMS (e.g. new work practices). All academic and operations departments participating in the EMS require training. Provision of this training involves a combination of hiring vendors and training trainers within the district.

Although opportunities are limited, we try to integrate information into existing trainings and to train effectively in small groups without incurring overtime. Some training topics are required by state and/or federal agencies. Even when not explicitly required, training and capacity-building in best practices is critical in order to avoid non-compliance, reduce risk and reduce and/or avoid cost.

CHALLENGES

Although school districts have professional development systems for their academic staff, they typically do not track training for operations departments, or for EHS in academic departments.

There are circumstances in both academics and operations where certain job responsibilities require informing others (e.g. senior custodian informing junior custodian, or chemical safety officer informing teachers) about requirements (e.g. work practices, personal protective measures). Thus, the EMS Training Program must also develop "train the trainer" and supervisor level materials.

Tradesmen and custodial staff are typically trained during school vacations, which competes with the limited time that these sectors can accomplish major cleaning and repair projects during those periods.

WHAT WE HAVE DONE

- **Established an Education Subcommittee** of the EMS Team. It was chaired by the Director of the Staff Development Office (now the Curriculum and Professional Learning) with support from the Human Resources Department. Representatives from departments participating in the EMS (Science, Art, Facilities, Nurses, School Nutrition. Career and Technical Vocational Education), worked together to determine what the training requirements were across the district, and how best to provide and track completion of required training. The goal was to integrate EHS training topics into existing staff training systems whenever possible, expand where needed and to track training when delivered.
- **Explored Training Formats,** including classroom training, on-the-job training, use of the Moodle system used by academic departments at the time, and very recently, the Google Classroom that the District academic departments are using.

  Training is provided through training workshops, on-site visits/inspections/reviews, and through regularly scheduled staff or departmental meetings.

  In general, we provide initial training for new employees, 'refresher' training, and job-specific and/or school specific training.
- **Established a Tracking System** which involved the expansion of academic tracking system to include non-academic EHS training topics and audiences. This system was

coordinated through the Staff Development Office who shared their "Bubble System" with the operations departments. The Facilities Department piloted this system and then used it for a few years.

- **Assigned roles and responsibilities** within each department for scheduling, tracking and providing training. We have identified certain roles in Science, School Nutrition and Custodial Departments which serve to varying degrees as "train the trainers" and have developed presentations and other educational aides to assist.
- **Identified a Key Trainer** who is the EH&S Consultant hired to assist with the EMS development and implementation, who has also been able to provide training on over 16 Massachusetts based school EHS regulations. With training materials developed in conjunction with state agencies and EPA, she has assisted with the development and provision of many of the required trainings, become very familiar with WPS's target audiences and their needs, and has developed train the trainer materials, training tools and handbooks that are now an integral part of the EMS program. These materials directly reflect the guidance developed under the EMS. She also works with the district to identify trainers or materials for topics she does not provide.
- **Worked with Vendors** to ensure that all training they provide includes related EHS information and EMS requirements.
- **Created Training Programs** for each participating department

NEXT STEPS

- Reconvene the Education Committee and engage special education and athletics departments.
- Continue to develop and provide the newly required OSHA trainings. Find trainers and add new trainings to meet new OSHA requirements that are not met in-house.
- Revisit the use of the "Bubble System" to track trainings in the operations departments.
- Seek efficient ways to conduct trainings in smaller sized groups for custodial, trades and school nutrition departments.
- Ensure administrators understand the importance and requirements for their staff to attend training.
- Explore the use on on-line training programs.