2017 MaineDOT Employee Exposure Monitoring Assessment Summary

Submitted to:
Maine Department of Transportation
98 State House Station
Augusta, ME 04333-0098

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Table of Contents

1. Purpose and Summary

Between July 11, 2017 and October 3, 2017 (the "Monitoring Period"), Ransom Consulting, Inc. (Ransom) completed exposure monitoring assessments at a total of twenty (20) separate locations throughout the State of Maine. The primary purpose of these monitoring assessments was to evaluate and characterize Maine Department of Transportation (MaineDOT) employees' exposures to respirable crystalline silica (RCS) dust while performing various activities associated with typical MaineDOT work tasks. Through this work, Ransom conducted personal exposure air monitoring for a total of 79 MaineDOT employees. Air samples were collected from employees' breathing zones and submitted for laboratory analysis of RCS (reported as tridymite, cristobalite, and quartz) and respirable dust. Sample results were compared to the Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit (PEL) of 50 $\mu g/m^3$ for RCS and 5 mg/m^3 (5,000 $\mu g/m^3$) for respirable dust, based on an 8-hour time-weighted average (TWA). Table 1, attached, shows the locations of the monitoring events, as well as the employees which were monitoring, and the type of task completed by each employee during the monitoring event.

As part of these RCS monitoring assessments, Ransom also performed a compliance review to determine if work tasks were being conducted in accordance with the MaineDOT Silica in Construction Compliance Plan and the OSHA Silica Standard 29 CFR 1926.1153, which took effect on June 23, 2016 and became enforceable on September 23, 2017.

During five (5) of these monitoring events, Ransom also conducted personal noise exposure monitoring using a dosimeter to record average noise levels experienced by the MaineDOT employees. As part of these assessments, Ransom conducted personal noise monitoring of fourteen (14) MaineDOT employees. OSHA requires employers to institute a hearing conservation program if noise exposures exceed an 8-hour TWA sound level of 85 dBA, the Action Level (AL). The OSHA occupational noise standard also requires that sound levels are compared to the 8-hour TWA of 90 dBA, the PEL. Table 2, attached, shows the employees which were monitoring, and the results of the noise exposure assessment.

To address potential exposures associated with using and mixing road paint, Ransom conducted personal exposure monitoring for ethyl alcohol (ethanol) at one (1) site during the 2017 Monitoring Period. Samples were collected utilizing passive air organic vapor monitoring badges and were compared to the OSHA PEL of 1,900 mg/m^3 based on an 8-hour TWA.

The purpose of this summary report is to provide an overview of the exposure monitoring assessments which were conducted in the 2017 Monitoring Period, to provide a summary of monitoring results, to discuss the results and make conclusions regarding specific tasks and activities; and to use those conclusions to develop recommendations which will create the framework for the location and type of monitoring assessments which will be conducted in 2018.

Ransom also updated the historic silica monitoring results table (back to 2005) such that historic results could be compared to the current OSHA ALs and PELs. This revised table has been attached to this report as Appendix A. This table will be used to help develop future RCS sampling plans.

2. Overview of Activities and Locations

In June of 2017, MaineDOT Occupational Safety Specialists (OSSs) from each region created a list of twenty (20) typical work tasks which were to be monitoring during the 2017 summer season for silica exposures. The list of tasks is as follows:

- Tow-behind broom/front-mounted broom;
- Hand-held power broom;
- Hand sweeping on road;
- Sweeping garage floors;
- Culvert replacement;
- Ditching with an excavator;
- Ditching with an Athey Loader;
- Ditching with a front-end loader;
- Grinding pavement on a large project;
- Grinding pavement with skid steer;
- Removing striping;
- Cleaning under the guard rail;
- Trucking on a pit road;
- Trucking at the pug mill;
- Cutting pavement;
- Backing up pavement;
- Grading shoulders;
- Changing tires (Fleet Garage);
- Power broom; and
- Hand-held blower.

The MaineDOT and Ransom were successful in monitoring each of these tasks (in some cases, multiple times) over the course of 2017.

As part of the 2017 Monitoring Period, Ransom completed silica exposure monitoring assessments in the following locations to assess those tasks outlined above:

- Alna;
- Augusta (two separate monitoring events);
- Bancroft/Woodville;
- Belgrade;
- Big Moose Township;
- Burnham;
- Eliot/York;
- Howland;
- Levant/Kenduskeag;
- Lyman (pug mill operation);
- North Yarmouth;
- Parlin Pond Township;
- Presque Isle;
- Searsmont;
- Sweden;
- West Bath;
- Augusta (Fleet Garage);
- Bangor (Fleet Garage); and
- Dixfield (Fleet Garage).

The breakdown by region is as follows: five (5) monitoring events in Region 1; seven (7) monitoring events in Region 2; four (4) monitoring events in Region 3; two (2) monitoring events in Region 4; and two (2) monitoring events in Region 5. Table 1, attached, contains a summary of this information, organized by RCS monitoring locations.

Noise assessments were conducted in Alna, Augusta, Burnham, Dixfield Fleet Garage, and Parlin Pond Township. Exposure to ethyl alcohol (ethanol) was monitored in Augusta.

3. Summary of 2017 Results

3.1 Personal Silica Exposure Results

As stated previously, during the 2017 Monitoring Period, Ransom evaluated twenty (20) different work tasks, completed silica assessments at twenty (20) sites throughout the State, and conducted personal air monitoring for a total of 79 MaineDOT employees.

Only one employee had exposure monitoring results which exceeded the applicable OSHA PELs for RCS and respirable dust. An air sample collected from the breathing zone of Billy Cummins (Augusta Fleet Garage, August 23, 2017) contained an 8-hour TWA concentration of respirable dust of 35.3 mg/m^3, and an 8-hour TWA concentration of total RCS of 391.2 $\mu g/m^3$. During the assessment, Mr. Cummins performed sandblasting activities and wore a Bullard Abrasive Blasting Helmet. When calculating the assigned protection factor associated with this helmet (APF=1,000), Mr. Cummins' sampling results were reduced by a factor of 1000, thus lowering them to concentrations which were below the applicable PELs. This suggests that the type of respiratory protection currently being worn during this task is appropriate and adequate to protect MaineDOT from exposure to RCS. It should be noted that sandblasting was not on the list of the twenty (20) work tasks that MaineDOT wanted to monitor during the 2017 Monitoring Period; however, while performing the silica assessment at this location, the MaineDOT requested that this task be monitored. None of those selected activities (refer to Section 2 for list of activities) resulted in RCS or respirable dust exposures that exceeded the OSHA PEL.

None of the air samples collected from the remaining 78 MaineDOT employees had 8-hour TWA concentrations of respirable dust or crystalline silica which were above the applicable OSHA PELs of 50 $\mu g/m^3$ for silica and 5,000 $\mu g/m^3$ for respirable dust.

It is worth noting that two employees likely had exposure to non-silica related chemicals: Corey LeClair - Augusta Fleet Garage, August 23, 2017; and Matthew Lloyd – Dixfield Fleet Garage, August 23, 2017. Both employees performed cutting/grinding/welding activities. Mr. LeClair worked in the vicinity of local ventilation trunks while wearing a full-face PAPR hood (APF = 40) and Mr. Lloyd wore a half-face APR (APF=10). Although neither of their air samples had RCS concentrations which exceeded regulatory limits, both of their sampling media was observed to be dirty and brown. Based on Ransom's observations, it is likely that the brown substance on their sampling media was associated with metal welding byproducts. It should be noted that in November of 2015, Ransom completed an indoor air assessment of the Augusta Fleet Garage. As part of this assessment, a total of ten personal air samples were collected during welding activities to determine if workers were exposed to hexavalent chromium during welding activities. All ten of these air samples had concentrations of chromium which were below the OSHA PEL; therefore, we do not anticipate that Mr. LeClair or Mr. Lloyd had hexavalent chromium exposures which exceeded OSHA standards.

3.2 Silica Compliance Review

On each of the twenty sites, Ransom performed a general compliance review of the site, evaluated engineering and administrative controls, and completed a job site compliance monitoring form. All activities monitored in the summer of 2017 were short-term silica sites; as such, no changing rooms, wash stations, or break/lunch rooms were necessary, no site zones were established or required, nor were full decontamination procedures required.

In general, the sites were found to be in compliance with the MaineDOT Silica in Construction Compliance Plan and the OSHA Silica Standard, with small exceptions, as noted below. The following paragraphs represent a summary and notable highlight from Sites that were observed in the summer of 2017.

3.2.1 Engineering Controls

Engineering controls eliminate or reduce exposure to dust and silica through the use or substitution of engineered machinery or equipment. Engineering controls for silica sites may involve modifying equipment (i.e. adding vacuum-shrouding mechanisms or ventilation), or making related physical changes at the source of silica exposure (i.e. incorporating water suppression techniques).

Water Suppression of Dust

Engineering controls, in the form of water suppression of dust, were observed at several locations. MaineDOT truck-mounted brooms were observed to be equipped with water tanks which automatically applied water to the ground surface during sweeping activities. Ransom also observed a separate water truck used in conjunction with truck-mounted and tow-behind brooms (typically driving immediately in front of the broom and applying water to the road surface) to control dust during sweeping activities. In general, Ransom observed that these forms of water suppression were effective in mitigating dust, and controlling employee exposure to RCS. Street sweeping, using truck-mounted or tow-behind brooms, without application of water or other engineering controls should be avoided.

Ransom also observed MaineDOT personnel using water to control dust during pavement cutting activities in Bancroft/Woodville and Belgrade, during striping removal activities in Augusta, and to control dust on dirt roads in Lyman (pug mill operations). In these cases, water was applied manually to the ground surface prior to use of the walk-behind saw/grinder. In general, Ransom observed that these forms of water suppression were effective in mitigating dust and controlling employee exposure to silica. Because the application of water is controlled by a MaineDOT employee (as opposed to a standard flow rate, as is the case for water trucks or integrated tanks systems as described above), the volume and direction of water can be adjusted and modified accordingly to prevent the creation of dust based on environmental conditions. Neither cutting asphalt nor striping removal (for any duration of

time) should be performed unless water suppression methods (integrated water delivery systems or manual application of water) or other engineering controls are utilized.

Mechanical Suppression/Management of Dust

The three Fleet Garages (Augusta, Dixfield, Bangor) were observed to be equipped with engineering controls in the form of ventilation fans and exhaust systems. MaineDOT employees were observed to perform work tasks in proximity to local exhaust trunks and ventilation units; however, hood/vent placement must be very close to the emission source to be effective. As a general rule-of-thumb, the maximum distance from the emission source to the hood/vent should not exceed 1.5 duct diameters (i.e. for an 8-inch diameter duct, the distance from the duct to the emission source should not exceed 12 inches). Ransom observed that much of the work performed in the fleet garages was conducted several feet away from the ventilation sources; as such, the intake trunks may not have been achieving the maximum capture possible. With the exception of sandblasting, tasks performed inside the Fleet Garages were not observed to create significant amounts of dust.

Alternative Engineering Controls

During sweeping operations at the Augusta Fleet Garage, Ransom observed MaineDOT employees using a sweeping compound. This sweeping compound is a saw dust-type material that has been treated with chemical oil-based additives that prevents dust from becoming airborne during sweeping. The OSHA Respirable Crystalline Silica in Construction Standard specifically prohibits dry sweeping and dry brushing; however, an October 19, 2017 Interim Enforcement Guidance memorandum issued by OSHA states that "using sweeping compounds (e.g., non-grit, oil- or waxed-based) is an acceptable dust suppression housekeeping method." This sweeping compound should be used in conjunction with all interior garage sweeping activities.

MaineDOT employees were also observed to apply calcium carbonate to the dirt road leading to the pug mill in Lyman, Maine on August 15. The use of calcium carbonate in this manner was effective in reducing dust.

On over half of the Sites monitoring during the 2017 Monitoring Period, Ransom observed MaineDOT personnel performing manual street sweeping activities using a push broom. We also observed MaineDOT personnel using a blower to remove dirt and hay from a driveway during a culvert replacement in Belgrade. The OSHA Respirable Crystalline Silica in Construction Standard specifically prohibits dry sweeping and the use of blowers unless the use of engineering controls (application of water, HEPA vacuum, etc.) are not feasible. MaineDOT employees should apply water to the ground surface prior to hand-sweeping activities on roadways; if this is not feasible, MaineDOT employees must use administrative controls to control exposure, such as limiting the amount of time that workers perform dry sweeping activities and ensuring that workers use appropriate work practices to position themselves and others in an up-wind direction from the point that dust is created. In general,

the sweeping which was conducted to support the road maintenance tasks observed by Ransom in 2017 did not significantly contribute to employee exposure to RCS, due to the short duration of sweeping events which were conducted.

3.2.2 Administrative Controls

Administrative controls (or work practice controls) are changes in work procedures such as written policies, training, and actions, with the goal of reducing the duration, frequency, and severity of exposure to hazardous chemicals or situations. Administrative controls for silica sites typically include practicing good personal hygiene, decontamination, and housekeeping.

Hygiene/Decontamination

Ransom did not observe that MaineDOT employees washed their hands or face prior to leaving the job site, taking breaks, or eating/drinking/smoking. It is Ransom's understanding that wipes are provided to employees, and are typically stored in the MaineDOT work trucks. Employees have been, and should continue to be trained and encouraged to practice appropriate personal hygiene procedures in accordance with the MaineDOT Silica in Construction Compliance Plan.

In the Fleet Garages, some (but not all) of the MaineDOT employees were observed to wash their hands and face prior to eating/drinking and prior to leaving the Site at the end of the day. Employees should be encouraged to utilize existing hand washing sinks located in the building. Additionally, Ransom did not observe all MaineDOT employees cleaning their respiratory protection devices at the end of the day. Appropriate decontamination, cleaning, inspection and maintenance must be conducted daily in accordance with the MaineDOT Respiratory Protection Program.

Housekeeping

Most short-term exterior silica work sites do not have housekeeping requirements.

Although the MaineDOT Silica in Construction Compliance plan does not specifically apply to Fleet Garages (due to the fact that they are not "construction" sites), housekeeping measures should be conducted in accordance with best management practices, and work areas should be vacuumed on a daily basis using a HEPA filter-equipped vacuum.

The interior of MaineDOT work trucks, dump trucks, and equipment (excavators, loaders, etc.) were typically observed to be dusty and in need of cleaning. In accordance with the MaineDOT Silica in Construction Compliance Plan, trucks and equipment should be vacuumed and wiped down on a regular basis. Based on interviews with MaineDOT employees, this does not always occur.

3.2.3 Personal Protective Equipment/Respirators

Standard MaineDOT PPE was observed to be worn by MaineDOT personnel on all job sites (steel toe boots, high-visibility vest, hard hat, eye protection). Respiratory protection was not required or worn on any of the exterior job sites which were assessed by Ransom during the 2017 Monitoring Period.

At the Augusta Fleet Garage, Billy Cummins was observed to wear a Bullard Helmet while performing sandblasting activities, and Corey Leclair was observed to wear a full-face powered air purifying respirator (APR) while performing cutting/grinding/welding activities on stainless and galvanized steel parts. At the Dixfield Fleet Garage, Matthew Lloyd was observed to wear a half-face APR while performing welding activities. These respiratory protection devices were observed to be worn properly throughout the day, although Ransom did observe that during welding activities, the respirators were not worn consistently (typically removed between actual welding activities). Additionally, as noted above, Ransom did not observe MaineDOT employees cleaning their respiratory protection devices at the end of the day. Appropriate decontamination, cleaning, inspection and maintenance must be conducted in accordance with the MaineDOT Respiratory Protection Program.

3.3 Personal Noise Exposure Results

As stated previously, noise exposure assessments were conducted at five separate locations: Alna (milling, 8/22/17); Augusta (yellow paint striping, 8/17/17); Burnham (ditching with Athey Loader, 7/11/17); Dixfield Fleet Garage (8/23/17); and Parlin Pond Township (backing up pavement, 8/31/17). As part of these five noise assessments, a total of fourteen (14) MaineDOT employees were monitored for personal exposure to noise. Noise exposure results are presented on Table 2.

During milling activities in Alna, one employee experienced an average 8-hour TWA noise level which exceeded the OSHA 8-hour TWA PEL while walking behind the milling machine, and a second employee experienced a peak noise level which exceeded the OSHA Peak Limit of 140 dBA while operating a dump truck. Based on these results, there is the potential that MaineDOT employees are exposed to unsafe levels of noise while performing milling activities; as such, hearing protection should be required when working in the vicinity of the milling machine.

In Burnham, instantaneous noise dosimeter readings in the vicinity of the Athey Loader exceeded the OSHA PEL, and two truck drivers experienced peak noise levels which exceeded the OSHA peak limit (neither of these employees were wearing hearing protection). Based on these results, there is the potential that MaineDOT employees are exposed to unsafe levels of noise when performing this task; as such, hearing protection should be required when laborers are working the vicinity of the Athey Loader, and administrative and engineering controls should be considered to mitigate noise levels associated with operating a dump truck.

During the Augusta Pavement Striping Operations, instantaneous dosimeter readings in the vicinity of the paint guns exceeded the OSHA PEL, and instantaneous dosimeter readings in the vicinity of a blow-off valve approached/exceeded the OSHA peak limit. Additionally, one of the employees had an average 8-hour TWA noise level which exceeded the OSHA 8-hour TWA Action Level. Based on these results, there is the potential that MaineDOT employees are exposed to unsafe levels of noise when performing this task; as such, hearing protection should be required when working near the truck, paint guns, and blow-off valve. In both Parlin Pond Township and the Dixfield Fleet Garage, employees experienced peak noise levels which exceeded the OSHA peak limit; however, no other noise readings exceeded the OSHA PELs. There is the potential that these peak readings are false peaks caused by brushing the dosimeter windscreen or dropping the instrument. Because all field and construction-related MaineDOT employees are enrolled in a Hearing Conservation Program when hired, the noise levels recorded at the Parlin Pond and Dixfield sites are not anticipated to represent a significant risk to MaineDOT employees.

Based on the results of these noise exposure assessments, it appears that truck drivers may experience peak noise readings at levels which exceed the OSHA standard. Based on Ransom's observations, these peak noise readings may be attributed to the slamming of a tailgate during dumping activities. Because hearing protection may not be feasible, truck drivers should be encouraged to avoid slamming their tailgate by decreasing the speed of truck-bed closure/dumping. The MaineDOT may consider the use of inexpensive rubber gaskets on the tailgate, which may also mitigate noise associated with tailgate slamming. Personal Ethanol Exposure Results

Ethyl alcohol (ethanol) samples were obtained from the breathing zone of four MaineDOT employees. All four air samples had 8-hour TWA concentrations of ethyl alcohol which were below the applicable OSHA PEL of 1,900 mg/m^3. Based on our observations and the air monitoring results, Ransom does not anticipate that ethanol represents a significant exposure risk to MaineDOT employees.

4. Summary of Historic Silica Sampling (2005-Present)

The MaineDOT has been performing silica exposure monitoring since circa 2000, and Ransom has been assisting the MaineDOT since circa 2005. This historic sampling has been summarized in a table which includes: the date/location/region of the sampling event; the type of containment used; the type of engineering control used; the employee name, task, and type of respiratory protection that was worn; and each employee's exposure monitoring results. Ransom recently updated the historic silica monitoring results table (back to 2005) such that historic results could be compared to the current OSHA ALs and PELs. A copy of this revised table has been included in Appendix A.

When comparing historic monitoring data to the current OSHA regulations, a considerable number of historic sampling events created situations where employees were exposed to concentrations of RCS and respirable dust which exceeded the current OSHA regulations. In many cases, even when the historic exposure results were revised based on the assigned protection factor associated with respiratory protection, their exposure exceeded the current OSHA regulations. Ransom recommends that many of these tasks be re-sampled in the near future, if possible. A list of tasks which have RCS exposure exceedances (i.e. respiratory protection was not adequate to control exposures) is as follows:

- Concrete chipping and demolition (inside and outside of containment structures);
- Concrete sawing and drilling (inside and outside of containment structures);
- Concrete repair (inside and outside of containment structures);
- Sweeping, grinding, and chipping with skid steer; and
- Wear surface replacement.

5. Conclusions and Discussion

The OSHA RCS Standard states that if monitoring indicates that employee exposures are below the OSHA AL of 25 µg/m^3, then the employer may discontinue monitoring for those specific tasks. Based on Ransom's observations of the engineering and administrative controls which are implemented, and the exposure monitoring results recorded during the 2017 Monitoring Period, the following tasks likely do not require additional monitoring for RCS exposure:

- **Ditching with an Excavator, Front-End Loader, and Grader**: Ransom monitored excavator ditching in Sweden (September 13, 2017), Big Moose Township (August 29, 2017), Howland (August 9, 2017), and Presque Isle (August 8, 2017); front-end loader ditching in Levant/Kenduskeag (September 21, 2017); and grader/Athey Loader ditching in Burnham (July 11, 2017). As part of these events, a total of 26 employees were monitored for RCS exposure; none had 8-hour TWA concentrations of respirable dust or crystalline silica which were above the applicable OSHA ALs or PELs. Minimal to no dust was observed to be created, and appropriate engineering controls (water suppression of dust) were used.
- **Sweeping Garage Floors (Using Sweeping Compound)**: This task was monitored in the three Fleet Garages which were assessed during the 2017 Monitoring Period. As part of these events, a total of four (4) employees were monitored for RCS exposure; none had 8-hour TWA concentrations of respirable dust or crystalline silica which were above the applicable OSHA ALs or PELs. In a typical day, this is considered a short-term task (typically less than one hour). Minimal to no dust was observed to be created during our assessments, and appropriate engineering controls (sweeping compound) were used.
- **Culvert Replacement**: Ransom monitored a culvert replacement in Belgrade on October 3, 2017. None of the employees monitored had RCS exposure which exceeded the 8-hour TWA AL or PEL for respirable dust or crystalline silica. Minimal to no dust was observed to be created during culvert replacement. Dust was observed during hand sweeping operations; however, the short duration of sweeping did not cause significant employee exposure to RCS.
- **Cleaning Under Guardrail**: Ransom monitored MaineDOT employees while they cleaned under a guardrail in Searsmont using an excavator and skid steer on August 2, 2017. None of the employees monitored had RCS exposure which exceeded the 8-hour TWA AL or PEL for respirable dust or crystalline silica. Minimal dust was observed during hand sweeping operations; however, the duration of sweeping was short enough that this action did not cause significant employee exposure to RCS.
- **Backing Up Pavement**: Ransom monitored pavement backing activities in Parlin Pond Township on August 31, 2017 and in North Yarmouth on August 3, 2017. None of the employees monitored as part of these events had 8-hour TWA concentrations of respirable dust or crystalline silica which exceeded the applicable OSHA ALs or PELs. Minimal to no dust was observed to be created.

- **Changing Tires**: This task was monitored in the three Fleet Garages which were assessed during the 2017 Monitoring Period. While employees changed tires, minimal to no dust was created. Additionally, none of the employees monitored had 8-hour TWA concentrations of respirable dust or crystalline silica which were above the applicable OSHA ALs or PELs. In a typical day, this is considered a short-term task (typically less than one hour).

  Driving Truck with Tow-Behind or Front-Mounted Broom: Ransom monitored the drivers of MaineDOT trucks equipped with front-mounted brooms during pavement milling activities in Alna (August 28, 2017) and during street sweeping activities in York/Eliot (September 15, 2017); and drivers of MaineDOT trucks equipped with tow-behind brooms during ditching activities in Burnham (July 11, 2017), ditching activities in Levant/Kenduskeag (September 21, 2017), and pavement backing activities in Parlin Pond Township (August 31, 2017). None of these drivers had 8-hour TWA concentrations of respirable dust or crystalline silica which were above the applicable OSHA ALs or PELs. Although minimal amounts of dust were observed in connection with these sweeping activities, appropriate engineering controls (application of water) were observed to be used. Additionally, because drivers are typically inside of their cab during these dusty conditions, their exposure to RCS is minimized (drivers who operate the trucks with windows closed are further protected from RCS exposure).

It should be noted that the short-duration ancillary tasks (i.e. road sweeping, pavement cutting, etc.) which are required to complete the tasks listed above will not require additional monitoring, provided they are completed as part of the work task listed above. For example, road sweeping conducted as part of ditching activities will not require additional monitoring; however, longer-duration road sweeping as part of spring cleanup may require future exposure monitoring. Additionally, it should also be noted that additional monitoring may need to be conducted on the tasks listed above if there were significant changes to equipment, materials, or engineering controls.

Other tasks monitored during the 2017 Monitoring Period had exposure monitoring results which were below the applicable OSHA AL and PEL; however, based on observations, potential variations in future work methods, insufficient amounts of data, and the potential for varying field and/or equipment conditions, Ransom recommends that additional exposure monitoring be conducted as part of routine future tasks. These tasks include trucking/operating dump trucks on dirt roads, hand-held sweeping and power brooms (only on tasks not outlined above), and cutting and grinding pavement (only on tasks not outlined above).

6. Recommendations

Based on our observations, results, and discussions over the past year, Ransom recommends the following:

1. The OSHA Respirable Crystalline Silica in Construction Standard specifically prohibits dry sweeping, dry brushing, and blowers unless the use of other methods is not feasible. MaineDOT employees should apply water to the ground surface prior to hand-sweeping activities on roadways; if this is not feasible, MaineDOT employees must use administrative controls to control exposure, such as limiting the amount of time that workers perform dry sweeping activities and ensuring that workers use appropriate work practices to position themselves and others in an up-wind direction from the point that dust is created.

   An October 19, 2017 Interim Enforcement Guidance memorandum issued by OSHA states that "using sweeping compounds is an acceptable dust suppression housekeeping method." When employees are sweeping Fleet Garages (or other interior spaces), sweeping compound (e.g., non-grit, oil- or waxed-based) should be used to control dust.

2. In some cases, MaineDOT employees did not use appropriate administrative controls, including personal hygiene, decontamination, and housekeeping. Employees have been, and should continue to be trained and encouraged to practice appropriate personal hygiene procedures in accordance with the MaineDOT Silica in Construction Compliance Plan. This would include using wipes to wash their hands and face prior to leaving the job site, taking breaks, or eating/drinking/smoking. Wipes should continue to be provided to employees, and stored in the MaineDOT work trucks. If sinks are available (Fleet Garages), employees should be encouraged to utilize existing hand washing sinks to wash their hands and face prior to leaving the job site, taking breaks, or eating/drinking/smoking.

   Although the MaineDOT Silica in Construction Compliance plan does not specifically apply to Fleet Garages, housekeeping measures should be conducted in accordance with best management practices, and work areas should be vacuumed on a daily basis using a HEPA filter-equipped vacuum.

   The interior of MaineDOT work trucks, dump trucks, and equipment (excavators, loaders, etc.) should be vacuumed and wiped down on a regular basis in accordance with the MaineDOT Silica in Construction Compliance Plan.

3. In the Fleet Garages, Ransom did not observe MaineDOT employees cleaning their respiratory protection devices at the end of the day. Appropriate decontamination,

cleaning, inspection and maintenance must be conducted in accordance with the MaineDOT Respiratory Protection Program.

4. The results of exposure assessments conducted at the Augusta and Dixfield Fleet Garages suggest that employees performing stainless steel welding activities may be exposed to airborne chemicals associated with welding activities. Although exposure monitoring conducted in November of 2015 suggests that employees performing welding activities are not exposed to hexavalent chromium at concentrations which exceeded the OSHA PEL. Ransom recommends that follow-up exposure monitoring be conducted for MaineDOT employees conducting welding, grinding and cutting activities; this exposure monitoring would focus on welding fumes, particulates and heavy metals associated with stainless and galvanized steel. We also recommend monitoring for employees conducting these activities at other Fleet Garages throughout the State. In conjunction with this monitoring, we recommend conducting an evaluation of existing ventilation exhaust systems (i.e. hoods) that are used for engineering controls.

5. Based on the results of the five noise exposure assessments that were conducted during the 2017 Monitoring Period, Ransom recommends that hearing protection be required when working in the vicinity of the pavement milling machine, when working in the vicinity of the Athey Loader, and when working in the vicinity of paint guns (and the associated blow-off valve). All field and construction-related MaineDOT employees should continue to be enrolled in the MaineDOT Hearing Conservation Program. Noise monitoring should continue to be conducted during future monitoring tasks.

6. Based on our evaluation of the updated historic silica results table (2005 to 2017), Ransom recommends that the following tasks be re-sampled, if possible: concrete chipping and demolition (inside and outside of containment structures); concrete sawing and drilling (inside and outside of containment structures); concrete repair (inside and outside of containment structures); sweeping, grinding, and chipping with skid steer; and wear surface replacement).

7. Based on the OSHA RCS Standard, if monitoring indicates that employee exposures are below the OSHA AL of 25 $\mu g/m^3$, then the employer may discontinue monitoring for those specific tasks (provided that adequate engineering controls are employed and there are no changes to equipment, materials, or practice). Based on Ransom's observations and the sampling results recorded during the 2017 Monitoring Period, the following tasks likely do not require additional monitoring: ditching with an excavator, front-end loader, and grader; sweeping garage floors (using sweeping compound); culvert replacement; cleaning under guardrails; backing up pavement; changing tires; and driving truck with tow-behind or front-mounted broom.

8. We recommend that an annual summary report be prepared (similar to this document), which provides a summary of work which was performed over the previous year, a summary of results, discussion and conclusions regarding those results, and recommendations for the upcoming year. As part of this annual summary report, the historic silica monitoring table would be updated, and recommendations would be made for modifications to the MaineDOT Job-Site Compliance Manual.

7. Proposed Amendments to the Job-Site Compliance Manual

The Maine Department of Transportation (MaineDOT) Job-Site Compliance Manual, dated April 2017, contains the following documents:

- "Lead in Construction Compliance Plan, Revision 8, April 2017," prepared by Ransom Consulting, Inc. (Ransom).
- "Silica in Construction Compliance Plan, Revision 6, April 2017," prepared by Ransom.
- "Hazardous Waste Management Plan, Revision 2, April 2017," prepared by Ransom.
- "Respiratory Protection Plan, 29 CFR 1910.134," Undated, prepared by MaineDOT.
- "Hearing Conservation Plan, 29 CFR 1910.95," Undated, prepared by MaineDOT.
- "Lead in Construction Field Compliance Manual, April 2017," prepared by Ransom.
- "Silica in Construction Field Compliance Manual, April 2017," prepared by Ransom.

Based on the monitoring observations and results, Ransom recommends that the Silica in Construction Compliance Plan be modified. Ransom has tracked proposed changes, and a marked-up version of this text has been included in Appendix B.

8. Limitations and Closure

This report was prepared for the exclusive use of MaineDOT, for the specific application of summarizing the results of our work. We have based our work on our understanding of OSHA regulations and the requests made by MaineDOT. No other warranty, expressed or implied, is made. Assumptions, measurements, and data used for the assessment are stated herein.

The information and conclusions presented in this report are based upon work undertaken by trained professional and technical staff in accordance with generally accepted occupational hygiene practices current at the time the work was performed. Conclusions presented in this report should not be construed as legal advice.

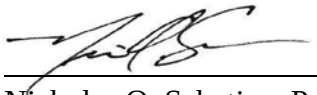
The conclusions presented in this report represent the professional judgment of Ransom based on the data obtained from the work and the site conditions encountered at the time the work was performed.

9. Signatures

The work was conducted by the undersigned in accordance with current regulatory requirements and MaineDOT recommendations for exposure monitoring techniques.

Jaime Madore, P.E.
Project Engineer

This report was reviewed by the undersigned to provide quality assurance and ensure that appropriate recommendations are made to address identified exposures.



Nicholas O. Sabatine, P.G.
Vice-President, Project Manager

Table 1: 2017 Silica Exposure Assessment Summary Table

Sampling Location	Region	Sampling Date	Employees Monitored	Activities Performed	Did Silica Exposures Exceed OSHA PEL?	Respiratory Protection Worn?	Did Calculated Exposure (With RP APF) Exceed OSHA PEL?
Alna	2	8/28/2017	Stuart Ryan	Pavement Milling	No	No	No
			Arnold Bickford	Operating Sweeper Truck (Windows Open)	No	No	No
			Mike Lagueux	Operating Dump Truck (Windows Open)	No	No	No
			Brian Pollis	Operating Dump Truck (Windows Closed)	No	No	No
Augusta (Fleet Garage)	2	8/23/2017	Corey Leclair	Sandblasting	No	PAPR, Full Face (APF = 40)	No
			Billy Cummins	Sandblasting	Yes	Bullard Helmet (APF = 1000)	No
			Aaron Ward	Garage Maintenance (Sweeping)	No	No	No
			Tim Monroe	Changing Tires, Garage Maintenance (Sweeping)	No	No	No
Augusta	2	7/14/2017	Daniel Wadleigh	Stenciling, Mixing Paint, Operating Blower	No	No	No
			Matthew McKenna	Stenciling, Operating Grinder, Weed Whacking	No	No	No
			Steve Gilbert	Stenciling, Sweeping (Hand Broom)	No	No	No
			Mike Vallee	Stenciling, Sweeping (Power Broom)	No	No	No
			Andy Dubay	Stenciling, Sweeping (Power Broom), Leaf Blower	No	No	No
			Zachary Work	Stenciling, Shoveling	No	No	No
Augusta	2	8/17/2017	Larry Beane	Paint Crew, Operating Paint Gun, Handling Paint	No	No	No
			Tina Gilbert	Paint Crew, Handling Paint Chips	No	No	No
			Peter Gagnon	Paint Crew, Operating Dump Truck (Windows Open), Handling Paint)	No	No	No
Bangor (Fleet Garage)	3	8/8/2017	Jake Clement	Garage Maintenance (Sweeping)	No	No	No
			Bruce Davis	Changing Tires, Garage Maintenance (Sweeping)	No	No	No
Belgrade	2	10/3/2017	Ryan Moore	General labor, sweeping, shoveling	No	No	No
			Ben Loiko	Operating Excavator (Windows Open)	No	No	No
			Ross Flannery	General labor, sweeping, shoveling	No	No	No
			Cody Coutts	General labor, sweeping, shoveling	No	No	No
			Troy Maheaux	Operating Dump Truck (Windows Open)	No	No	No
Burnham	2	7/11/2017	Dwayne Campbell	Operating Truck-Mounted Broom (Windows Closed)	No	No	No
			Jason Ritenbirk	Operating Water Truck	No	No	No
			Glenn Rowe	Ditching (Athey Loader), Miscellaneous Labor	No	No	No
			Joe Travis	Operating Dump Truck	No	No	No
			Josh Harwood	Ditching (Athey Loader), Operating Grader	No	No	No
			Danien Freberg	Operating Water Truck	No	No	No
			Stuart Ryan	Ditching (Athey Loader), Miscellaneous Labor	No	No	No
Dixfield (Fleet Garage)	3	8/23/2017	Justin Coulombe	Changing Tires	No	No	No
			Dana Bradbury	Changing Tires	No	No	No
			Matthew Lloyd	Welding	No	APR, Half-Face (APF = 10)	No
			Dean Harlow	Garage Maintenance (Sweeping)	No	No	No
Eliot/York	1	9/15/2017	Jeremy Dumont	Operating Truck-Mounted Broom (Windows Open)	No	No	No
Howland	4	8/9/2017	Kyle Nelson	Excavator Ditching, Miscellanous Labor	No	No	No
			Jake Boobar	Excavator Ditching, Miscellanous Labor	No	No	No
			Jason Crosby	Excavator Ditching, Operating Excavator	No	No	No
Levant Kenduskeag	4	9/21/2017	Brian Markey	Operating Grader (Windows Open and Closed)	No	No	No
			Tyler Loyte	Operating Loader (Windows Open and Closed)	No	No	No
			Danny Conary	General labor, sweeping, shoveling	No	No	No
			Kevin Ouellette	Operating Tow-Behind Broom	No	No	No
Lyman (Pug Mill)	1	8/15/2017	Brian Peters	Operating Dump Truck (Windows Open)	No	No	No
			John Robinson	Operating Dump Truck (Windows Closed)	No	No	No
			Ty Pooler	Operating Pug Mill	No	No	No
			Jason Durrel	Pug Mill, Miscellaneous Labor	No	No	No
Bancroft Woodville	5	8/7/2017	Jared Albert	Cutting Pavement with Walk-Behind Saw	No	No	No
			Elise Coffin	Cutting Pavement with Walk-Behind Saw	No	No	No
			Mike Flemming	Cutting Pavement with Walk-Behind Saw	No	No	No
			Stan Hull	Cutting Pavement with Walk-Behind Saw	No	No	No
			Lauren Kimball	Cutting Pavement with Walk-Behind Saw	No	No	No
			Leon Markie	Cutting Pavement with Walk-Behind Saw	No	No	No
Big Moose Township	3	8/29/2017	Jeff Mace	Ditching (Excavator), Operating Excavator	No	No	No
			Michael Mace	Operating Dump Truck (Windows Open)	No	No	No
			Kevin Goodrich	Operating Dump Truck (Windows Closed)	No	No	No
			Patrick Oconnor	Operating Dump Truck	No	No	No
			Allen Douglass	Ditching (Excavator), Miscellaneous Labor	No	No	No
North Yarmouth	1	8/3/2017	John Caron	Backing Up Pavement, Miscellaneous Labor	No	No	No
			Stuart Koretski	Backing Up Pavement, Miscellaneous Labor	No	No	No
Parlin Pond Township	3	8/31/2017	Joseph Pierce	Operating Tow-Behind Broom	No	No	No
			Leroy Baker	Operating Dump Truck (Windows Open)	No	No	No
			Daron Beane	Operating Shoulder Box Truck	No	No	No
			Leonard Sioch	Operating Dump Truck (Windows Closed)	No	No	No
			Craig Knight	Operating Dump Truck (Windows Open)	No	No	No
Presque Isle	5	8/8/2017	Mike Ouelette	Ditching (Excavator), Operating Excavator	No	No	No
			Joe Bourgoin	Ditching (Excavator), Miscellaneous Labor	No	No	No
Searsmont	2	8/2/2017	Nate Peaslee	Cleaning Guard Rails, Sweeping, Clearing Brush	No	No	No
			Brad Peters	Cleaning Guard Rails, Operating Skid Steer, Operating Chain Saw	No	No	No
			Nate Wright	Cleaning Guard Rails, Hay Mulching	No	No	No
Sweden	1	9/13/2017	Doug Kimball	Hand Sweeping, Shoveling, Raking, Seeding	No	No	No
			Matthew Jensen	Hand Sweeping, Shoveling, Raking, Seeding	No	No	No
			Tom Silvia	Hand Sweeping, Shoveling, Raking, Seeding	No	No	No
			Brian Meserve	Operating Dump Truck (Windows Open)	No	No	No
			Perry Skelton	Operating Dump Truck (Windows Closed)	No	No	No
West Bath	1	8/22/2017	Sam Randall	Pavement Grinding (Skid Steer), Flagging	No	No	No
			Bob Henderson	Pavement Grinding (Skid Steer), Miscellaneous Labor	No	No	No
			Rob Gagne	Pavement Grinding (Skid Steer), Miscellaneous Labor	No	No	No
			James Thigpen	Pavement Grinding (Skid Steer), Operating Skid Steer	No	No	No

Notes:

OSHA PEL = Occupational Safety and Health Administration Permissable Exposure Limit (8-Hour Time Weighted Average)

RP APF = Respiratory Protection Assigned Protection Factor

APR = Air Purifying Respirator

Table 2: 2017 Noise Monitoring Results

Sampling Location	Sampling Region	Monitoring Date	Activity	MaineDOT Employee	Dosimeter Number	Task/Noise Source	PPE	NRR for PPE (dBA)	Sample Time (Minutes)	Noise Monitoring Results					Regulatory Limits		
										Recorded Lavg (dBA)	8-Hour TWA Exposure without NRR (dBA)	Calculated 8-Hour TWA Exposure with NRR (dBA)	Recorded Peak Noise Reading without NRR (dBA)	Calculated Peak Noise Reading with NRR (dBA)	OSHA 8-Hour TWA AL (dBA)	OSHA PEL TWA-8hr (dBA)	OSHA Peak Limit (dBA)
Alna	2	8/22/2017	Milling	Stuart Ryan	20845	Walking behind milling machine	Moldex Pura-Fit Ear Buds	33	452	93.3	**92.9**	66.9	130.4	104.4	85	90	140
				Arnold Bickford	31466	Operating broom truck (windows down)	None	-	248	72.7	59.7	59.7	137.3	137.3			
				Mike Lagueux	17694	Operating dump truck (windows down)	None	-	495	75	74.3	52.4	**141.8**	**141.8**			
Augusta	2	8/17/2017	Yellow Paint Striping	Larry Beane	17649	Operating paint guns, placing cones, operating blow-off valve during paint refilling	David Clark Headphones	23	563	85.8	**87.0**	71.0	139.6	123.6	85	88.9 [(1)]	140
				Kris Moore	20845	Adjusting work zones, connecting hoses during paint refilling	Howard Leight Ear Muffs	23	551	73.5	74.5	58.5	137.5	121.5	85	89 [(1)]	140
Burnham	2	7/11/2017	Ditching Athey Loader	Jason Ritenbirk	26382	Operating water truck	None	-	448	NM	-	-	**143.3**	**143.3**	85	90	140
				Glenn Rowe	28443	Using hand tools, shoveling, walking next to Athey Loader during operation	Ear Plugs-Intermittent	33	488	77.5	77.6	51.6	120.2	94.2			
				Joe Travis	29235	Operating dump truck	None	-	479	65.7	65.7	65.7	**143.4**	**143.4**			
				Damien Freberg	31230	Operating water truck	None	-	441	NM	-	-	111.8	111.8			
				Stuart Ryan	35202	Using hand tools, raking ditch, walking next to graders during operation	Ear Plugs-Intermittent	33	432	NM	-	-	111.1	85.1			
Dixfield Fleet	3	8/23/2017	Fleet Garage	Matthew Lloyd	17694	Stainless steel welding and garage maintenance	Howard Leight Ear Buds	33	452	81.5	80.3	54.3	**142.2**	116.2	85	90	140
				Justin Coulombe	20845	Changing tires, changing brakes, and garage maintenance	Howard Leight Ear Buds	33	240	80.2	79.4	53.4	**140.5**	114.5			
Parlin Pond	3	8/31/2017	Backing Up Pavement	Daron Beane	29464	Operating shoulder box truck	None	-	398	88.7	**87.3**	**87.3**	138.7	138.7	85	90	140
				Craig Knight	35202	Operating dump truck (windows open)	None	-	382	77.4	75.8	75.8	**142**	**142**			

NOTES:
MaineDOT – Maine Department of Transportation
PPE- Personal protective equipment
NRR- Noise Reduction Rating based off of hearing protection utilized
Lavg - Average sound level measurement
TWA- Time Weighted Average
dBA – decibels
OSHA - Occupational Safety & Health Administration
PEL-TWA – OSHA's regulatory Permissible Exposure Limits based on an 8-hour Time-Weighed Average exposure
Bold values indicate exceedance of the applicable regulatory guideline
[(1)] Monitoring time exceeded 8-hours; therefore, the PEL was revised/recalculated based on OSHA Standard 1910.95, Appendix A.

Appendix A

Historic Silica Exposure Assessment Monitoring Table

Sampling Date	Town	Region	Containment (yes, no)	Engineering Controls	Job (project, e.g. wear surface replacement)	Employee	Employee Task	Respiratory Protection (RP) Worn?	RP Assigned Protection Factor (APF)	Sample Time (minutes)	Total Respirable Crystalline Silica (RCS) (ug/m3)	RCS 8-hour Time Weighted Average (TWA) Without RP APF (ug/m3)	RCS 8-hour TWA With RP APF (ug/m3)	RCS Notes	Total Respirable Particulates (mg/m3)	Respirable Particulates 8-Hour TWA Without RP APF (mg/m3)	Respirable Particulates 8-hour TWA With RP APF (mg/m3)	Respirable Particulates Notes
10/3/2017	**Belgrade**	2	No	None	Culvert Replacement	Ryan Moore	General site work, sweeping, shoveling	None	0	266	BRL (7.4)	-	-	None	BRL (0.07)	-	-	None
						Ben Loiko	Operating excavator (windows open)	None	0	360	BRL (5.4)	-	-	None	BRL (0.05)	-	-	None
						Ross Flannery	General site work, sweeping, shoveling	None	0	356	BRL (5.6)	-	-	None	BRL (0.06)	-	-	None
						Cody Coutts	General site work, sweeping, shoveling	None	0	322	BRL (6.2)	-	-	None	BRL (0.06)	-	-	None
						Troy Maheux	Operating dump truck (windows open and closed)	None	0	317	BRL (6.3)	-	-	None	BRL (0.06)	-	-	None
9/23/2017	**OSHA Silica Standard 29 CFR 1926.1153 became enforceable on September 23, 2017**																	
9/21/2017	**Levant & Kenduskeag**	4	No	Water tank mounted to sweeper truck	Ditching with Grader	Brian Markey	Operating grader (windows open and closed)	None	0	391	BRL (4.9)	-	-	None	0.06	0.05	0.05	None
						Tyler Loyte	Operating loader (windows open and closed)	None	0	397	9.00	7.44	7.44	None	0.06	0.05	0.05	None
						Danny Conary	General site work	None	0	378	BRL (5.2)	-	-	None	BRL (0.05)	-	-	None
						Kevin Ouellette	Operating tow-behind broom	None	0	370	BRL (5.2)	-	-	None	0.07	0.05	0.05	None
9/15/2017	**Eliot**	1	No	Water tank mounted to truck-mounted broom	Street Sweeping	Jeremy Dumont	Operating truck with front-mounted broom (windows open)	None	0	409	BRL (4.5)	-	-	None	0.05	0.05	0.05	None
9/13/2017	**Sweden**	1	No	None	Ditching with Excavator	Doug Kimball	Hand sweeping, shoveling, raking, seeding	None	0	399	BRL (4.7)	-		None	BRL (0.05)	-	-	None
						Matthew Jensen	Hand sweeping, shoveling, raking, seeding	None	0	388	BRL (4.8)	-		None	BRL (0.05)	-	-	None
						Tom Silvia	Hand sweeping, shoveling, raking, seeding	None	0	381	BRL (4.9)	-		None	BRL (0.05)	-	-	None
						Brian Meserve	Operating dump truck (windows open)	None	0	356	BRL (5.2)	-		None	BRL (0.05)	-	-	None
						Perry Skelton	Operating dump truck (windows closed)	None	0	355	11.00	8.14	8.14	None	0.16	0.12	0.12	None
8/31/2017	**Parlin**	3	No	Water tank mounted to tow-behind broom	Backing Up Shoulders	Joseph Pierce	Operating tow-behind broom	None	0	523	BRL (3.6)	-	-	None	BRL (0.04)	-	-	None
						Leroy Baker	Operating dump truck (windows open)	None	0	390	4.90	3.98	3.98	None	BRL (0.04)	-	-	None
						Daron Beane	Operating shoulder box truck	None	0	414	BRL (4.8)	-	-	None	BRL (0.04)	-	-	None
						Leonard Sioch	Operating dump truck (windows closed)	None	0	387	BRL (5)	-	-	None	BRL (0.05)	-	-	None
						Craig Knight	Operating dump truck (windows open)	None	0	386	BRL (5)	-	-	None	BRL (0.05)	-	-	None
8/29/2017	**Big Moose Township**	3	No	None	Ditching with Excavator	Jeff Mace	Operating excavator	None	0	351	BRL (5.7)	-	-	None	BRL (0.06)	-	-	None
						Michael Mace	Operating dump truck (windows open)	None	0	352	BRL (5.6)	-	-	None	BRL (0.06)	-	-	None
						Kevin Goodrich	Operating dump truck (windows closed)	None	0	342	BRL (5.6)	-	-	None	BRL (0.06)	-	-	None
						Patrick Oconnor	Operating dump truck	None	0	343	BRL (5.7)	-	-	None	BRL (0.06)	-	-	None
						Allen Douglass	Miscellaneous labor	None	0	329	BRL (5.7)	-	-	None	BRL (0.06)	-	-	None
8/28/2017	**Alna**	2	No	Water applications on sweeper truck	Pavement Milling	Stuart Ryan	Miscellaneous labor	None	0	436	BRL (4.4)	-	-	None	0.11	0.10	0.10	None
						Arnold Bickford	Operating sweeper truck (windows open)	None	0	432	BRL (4.5)	-	-	None	0.07	0.06	0.06	None
						Mike Lagueux	Operating dump truck (windows open)	None	0	424	BRL (4.6)	-	-	None	0.48	0.42	0.42	None
						Brian Pollis	Operating dump truck (windows closed)	None	0	417	BRL (4.6)	-	-	None	BRL (0.05)	-	-	None
8/23/2017	**Augusta (Fleet Garage)**	2	No	Dust containment for sandblasting, ventilation hoods, sweeping compound	Fleet Garage	Corey Leclair	Cutting, grinding, welding	PAPR	40	429	BRL (4.6)	-	-	None	1.30	1.24	0.03	None
						Billy Cummins	Sandblasting	Bullard Helmet	1000	458	410	391.21	0.39	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	37.00	35.30	0.04	Exposure exceeds OSHA RP PEL (5 mg/m3); however, when APF associated with respirator is applied, the employee is within limits
						Aaron Ward	Garage maintenance (sweeping)	None	0	452	BRL (4.4)	-	-	None	0.10	0.09	0.09	None
						Tim Monroe	Changing tires, garage maintenance (sweeping)	None	0	454	BRL (4.4)	-	-	None	0.10	0.09	0.09	None
8/23/2017	**Dixfield (Fleet Garage)**	3	No	Ventilation hoods	Fleet Garage	Justin Coulombe	Changing tires	None	0	436	BRL (4.4)	-	-	None	0.11	0.10	0.10	None
						Dana Bradbury	Changing tires	None	0	432	BRL (4.5)	-	-	None	0.07	0.06	0.06	None
						Matthew Lloyd	Welding	Half-face APR APR	10	300	BRL (4.6)	-	-	None	0.48	0.30	0.30	None
						Dean Harlow	Garage maintenance (sweeping)	None	0	417	BRL (4.6)	-	-	None	BRL (0.05)	-	-	None
8/22/2017	**West Bath**	1	No	None	Pavement Grinding with Skid Steer	Sam Randall	Flagging	None	0	295	BRL (6.7)	-	-	None	BRL (0.07)	-	-	None
						Bob Henderson	Miscellaneous labor	None	0	301	BRL (6.5)	-	-	None	BRL (0.07)	-	-	None
						Rob Gagne	Miscellaneous labor	None	0	285	BRL (6.9)	-	-	None	0.08	0.04	0.04	None
						James Thigpen	Operating skid steer	None	0	280	13	7.58	7.58	None	0.11	0.06	0.06	None
8/17/2017	**Augusta**	2	No	None	Painting	Larry Beane	Operating paint gun, handling paint	None	0	556	BRL (3.6)	-		None	BRL (0.04)	-	-	None
						Tina Gilbert	Handling paint chips	None	0	561	BRL (3.5)	-		None	BRL (0.04)	-	-	None
						Peter Gagnon	Operating dump truck (windows open), handling paint	None	0	547	BRL (3.6)	-		None	BRL (0.04)	-	-	None
8/15/2017	**Lyman (Pug Mill)**	1	No	Calcium and water application to dirt road	Pug Mill	Brian Peters	Operating dump truck (windows open)	None	0	638	BRL (3.0)	-	-	None	0.06	0.08	0.08	None
						John Robinson	Operating dump truck (windows closed)	None	0	557	BRL (3.4)	-	-	None	0.04	0.05	0.05	None
						Ty Pooler	Operating Pug Mill	None	0	664	BRL (2.9)	-	-	None	0.08	0.11	0.11	None
						Jason Durrel	Miscellaneous labor	None	0	643	BRL (3.1)	-	-	None	0.05	0.07	0.07	None
8/9/2017	**Howland**	4	No	None	Ditching with Excavator	Kyle Nelson	Miscellanous labor	None	0	479	4.8	4.79	4.79	None	BRL (0.04)	-	-	None
						Jake Boobar	Miscellanous labor	None	0	479	BRL (3.8)	-	-	None	BRL (0.04)	-	-	None
						Jason Crosby	Operating excavator	None	0	439	BRL (4.3)	-	-	None	BRL (0.04)	-	-	None
8/8/2017	**Presque Isle**	5	No	None	Ditching with Excavator	Mike Ouelette	Operating excavator	None	0	475	BRL (4.1)	-	-	None	BRL (0.04)	-	-	None
						Joe Bourgoin	Miscellaneous labor	None	0	488	BRL (4.2)	-	-	None	BRL (0.04)	-	-	None
8/8/2017	**Bangor (Fleet Garage)**	3	No	Ventilation fans	Fleet Garage	Jake Clement	Garage maintenance (sweeping)	None	0	472	BRL (4.0)	-	-	None	0.11	0.11	0.11	None
						Bruce Davis	Changing tires, garage maintenance (sweeping)	None	0	468	7.8	7.61	7.61	None	0.14	0.14	0.14	None
8/7/2017	**Bancroft & Woodville**	5	No	Water application when using walk-behind saw	Cutting Pavement	Jared Albert	Cutting pavement with walk-behind saw	None	0	402	BRL (5.0)	-	-	None	BRL (0.05)	-	-	None
						Elise Coffin	Cutting pavement with walk-behind saw	None	0	407	5.2	4.41	4.41	None	0.05	0.04	0.04	None
						Mike Flemming	Cutting pavement with walk-behind saw	None	0	394	9.5	7.80	7.80	None	0.10	0.08	0.08	None
						Stan Hull	Cutting pavement with walk-behind saw	None	0	404	7.5	6.31	6.31	None	0.06	0.05	0.05	None
						Lauren Kimball	Cutting pavement with walk-behind saw	None	0	408	7.9	6.72	6.72	None	0.09	0.08	0.08	None
						Leon Markie	Cutting pavement with walk-behind saw	None	0	404	15	12.63	12.63	None	0.11	0.09	0.09	None
8/3/2017	**North Yarmouth**	1	No	Water application	Backing Up Pavement	John Caron	Miscellaneous labor	None	0	312	6.8	4.42	4.42	None	0.07	0.05	0.05	None
						Stuart Koretski	Miscellaneous labor	None	0	309	14	9.01	9.01	None	0.12	0.08	0.08	None
8/2/2017	**Searsmont**	2	No	None	Cleaning Guard Rails	Nate Peaslee	Sweeping, Cleaning Brush	None	0	387	BRL (5.4)	-	-	None	0.06	0.05	0.05	None
						Brad Peters	Operating Skid steer, Operating Chain Saw	None	0	385	BRL (5.3)	-	-	None	BRL (0.05)	-	-	None
						Nate Wright	Hay mulching	None	0	378	BRL (5.4)	-	-	None	BRL (0.05)	-	-	None
7/14/2017	**Augusta**	2	No	Water application	Stenciling	Daniel Wadleigh	Mixing paint, operating blower	None	0	405	BRL (4.9)	-	-	None	BRL (0.05)	-	-	None
						Matthew McKenna	Operating grinder, weed whacking	None	0	401	BRL (4.8)	-	-	None	0.05	0.04	0.04	None
						Steve Gilbert	Sweeping (hand broom)	None	0	398	BRL (5.1)	-	-	None	BRL (0.05)	-	-	None
						Mike Vallee	Sweeping (power broom)	None	0	396	BRL (5.1)	-	-	None	0.07	0.06	0.06	None
						Andy Dubay	Sweeping (power broom), leaf blower	None	0	394	BRL (5.1)	-	-	None	BRL (0.05)	-	-	None
						Zachary Work	Shoveling	None	0	392	BRL (5.2)	-	-	None	BRL (0.05)	-	-	None
7/11/2017	**Burnham**	2	No	Water application to windrows and before sweeping	Ditching with Grader & Athey Loader	Dwayne Campbell	Operating Truck-Mounted Broom (windows closed)	None	0	461	6.3	6.05	6.05	None	0.55	0.53	0.53	None
						Jason Ritenbirk	Operating Water Truck	None	0	450	BRL (4.3)	-	-	None	BRL (0.04)	-	-	None
						Glenn Rowe	Miscellaneous labor	None	0	490	BRL (3.9)	-	-	None	BRL (0.04)	-	-	None
						Joe Travis	Operating dump truck	None	0	460	BRL (4.3)	-	-	None	BRL (0.04)	-	-	None
						Josh Harwood	Operating Grader	None	0	481	4.9	4.91	4.91	None	0.04	0.04	0.04	None
						Danien Freberg	Operating Water Truck	None	0	467	BRL (3.9)	-	-	None	BRL (0.04)	-	-	None
						Stuart Ryan	Miscellaneous labor	None	0	442	BRL (4.3)	-	-	None	BRL (0.04)	-	-	None
6/23/2016	**Scarborough**	1	No	None	Mowing Lawn	Heather Margel	Mowing Lawn	None	0	273	12	6.83	6.83	None	BRL (0.07)	-	-	None
6/20/2016	**Bangor**	4	No	Ventilation fans	Materials Testing Lab	Jason Goodin	Proctor, moisture content of soil	None	0	455	11	10.43	10.43	None	0.06	0.05	0.05	None
						Arno Wirta	Bituminous sampling, fine sieve analysis	None	0	469	7.5	7.33	7.33	None	0.06	0.05	0.05	None
						Jessica MacDonald	Coarse aggregate sieve sampling	None	0	454	18	17.03	17.03	None	0.07	0.07	0.07	None
						Lamont Dutra	Pulverizing and crushing samples	None	0	453	27	25.48	25.48	Exposure exceeds OSHA AL (25 ug/m3)	0.18	0.17	0.17	None
						Joe Peasley	Mixing/ batching aggregate, pavement materials lab	None	0	471	6.3	6.18	6.18	None	0.05	0.05	0.05	None
						Bruce Burrell	Fine sieve analysis, hydrometer testing of soils	None	0	459	12	11.48	11.48	None	0.05	0.05	0.05	None
6/18/2016	**Freeport**	1	No	Ventilation fans	Materials Testing Lab	Gillaume Ishimwe	Coarse aggregate area, sorting aggregate	None	0	453	BRL (4.5)	-	-	None	BRL (0.05)	-	-	None
						Dimitri Maniatakos	Hot mix area, collecting and mixing asphalt samples	None	0	443	BRL (4.6)	-	-	None	BRL (0.05)	-	-	None
						Caroline Ngeumbu-Tagne	Fine sieve lab, sorting and testing aggregate	None	0	450	BRL (4.5)	-	-	None	BRL (0.05)	-	-	None
						Jacob Truman	Fine sieve lab, sorting and testing aggregate	None	0	448	7.2	6.72	6.72	None	BRL (0.046)	-	-	None

Sampling Date	Town	Region	Containment (yes, no)	Engineering Controls	Job (project, e.g. wear surface replacement)	Employee	Employee Task	Respiratory Protection (RP) Worn?	RP Assigned Protection Factor (APF)	Sample Time (minutes)	Total Respirable Crystalline Silica (RCS) (ug/m3)	RCS 8-hour Time Weighted Average (TWA) Without RP APF (ug/m3)	RCS 8-hour TWA With RP APF (ug/m3)	RCS Notes	Total Respirable Particulates (mg/m3)	Respirable Particulates 8-Hour TWA Without RP APF (mg/m3)	Respirable Particulates 8-hour TWA With RP APF (mg/m3)	Respirable Particulates Notes
2/9/2016	**Fort Fairfield**	5	Yes, Full Containment, closed	Ventilation fans	Concrete Demolition	Art Berkoski	Concrete demolition with jackhammer inside containment	Half-face APR APR	10	295	BRL (6.8)	-	-	None	24.00	14.75	1.48	Exposure exceeds OSHA RP PEL (5 mg/m3); however, when APF associated with respirator is applied, the employee is within limits
						Adam McNally	Concrete demolition with jackhammer inside containment	Full-face APR APR	50	152	29	9.18	0.18	None	14.00	4.43	0.09	None
						James Rowbotham	Concrete demolition with jackhammer inside containment	Full-face APR APR	50	147	640	196.00	3.92	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	17.00	5.21	0.10	Exposure exceeds OSHA RP PEL (5 mg/m3); however, when APF associated with respirator is applied, the employee is within limits
						Charlie Bermard	Concrete demolition with jackhammer inside containment	Half-face APR APR	10	283	730	430.40	43.04	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, exposure exceeds the OSHA AL.	39.00	22.99	2.30	Exposure exceeds OSHA RP PEL (5 mg/m3); however, when APF associated with respirator is applied, the employee is within limits
						Larry Pulcifer	Cleaning, support tasks (outside of Zone 3)	None	0	276	BRL (7.2)	-	-	None	BRL (0.07)	-	-	None
6/11/2015	**Sidney**	2	No	Controlled concrete delivery, covering concrete conveyor, water application	Pug Mill	Tim Jandreau	Operating front end loader (windows open), adding reclaim product to hopper	None	0	491	NS	-	-	None	ND	-	-	None
						Barry Breton	Oversight of the pugmill operations, conducting burn tests, and back-up for pugmill operator	None	0	419	NS	-	-	None	0.08	0.07	0.07	None
						Steve Moore	Pugmill operator, works in central location between concrete silo and conveyors	None	0	484	NS	-	-	None	0.05	0.05	0.05	None
						Richard Harriman	laborer, raking, shoveling, driving loader to remove product on the ground, site housekeeping	None	0	482	NS	-	-	None	0.03	0.03	0.03	None
4/1/2015	**Gray**	1	No	Water application when using concrete demo saw	Chipping	David MacDonald	Removing concrete with chipping hammer and rivet buster; shoveling, transporting, and dumping concrete debris.	Full-face APR APR	50	260	200	108.33	2.17	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	NS	-	-	None
						Ashley Work	Removing concrete with chipping hammer and rivet buster; shoveling, transporting, and dumping concrete debris.	Full-face APR APR	50	213	117	51.92	1.04	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	NS	-	-	None
						Tiffany Tinkham	Removing concrete with chipping hammer and rivet buster; shoveling, transporting, and dumping concrete debris.	Full-face APR APR	50	195	209	84.91	1.70	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	NS	-	-	None
05/21/2014	**Oakland**	2	No	Water application	Bridge Cleaning/ Sweeping	Steve Gilbert	Operating the power broom, shoveling	None	0	322	BRL (6.1)	-	-	None	BRL (0.06)	-	-	None
						Justin Dowling	Operating the power broom, shoveling	None	0	250	BRL (7.9)	-	-	None	BRL (0.08)	-	-	None
						Brandon Keene	Flagging	None	0	320	8.7	5.80	5.80	None	BRL (0.06)	-	-	None
						Levi Violette	Operating the power broom, shoveling, operating the water truck	None	0	305	BRL (6.6)	-	-	None	BRL (0.07)	-	-	None
05/20/2014	**North Yarmouth**	1	No	Water application	Street sweeping	Jim Perkins	Operating Water Truck	None	0	368	BRL (5.4)	-	-	None	BRL (<0.05)	-	-	None
						Chris Strout	sweeping with power broom, shoveling debris	None	0	360	BRL (5.5)	-	-	None	BRL (<0.06)	-	-	None
						Jack Mosier	sweeping with hand and power broom, shoveling debris	None	0	370	BRL (5.4)	-	-	None	BRL (<0.05)	-	-	None
						Rob Costello (Seabreeze Employee)	Operating street sweeper	None	0	349	60	43.63	43.60	Exposure exceeds OSHA AL.	0.42	0.31	0.31	None
08/07/2013	**Richmond**	2	No	None	Wearing Surface	Ben Barry	Chipping with chipping hammer, saw cutting	Half-face APR APR	10	135	310	107.77	10.78	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	1.50	0.53	0.05	None
						Ben Barry	Operating Skid steer with chipping attachment (windows closed)			76	BRL (130)			Because the reporting limit is higher than the OSHA AL we have assumed that the exposure concentration is the RL (worst case scenario)	BRL (0.66)			
						Randy Perry	Chipping with chipping hammer	Half-face APR APR	10	134	260	93.17	9.32	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	1.30	0.47	0.05	None
						Randy Perry	Operating rebar saw adjacent to skid steer			76	BRL (130)			Because the reporting limit is higher than the OSHA AL we have assumed that the exposure concentration is the RL (worst case scenario)	BRL (0.66)			
07/11/2013	**Hudson**	4	No	Ventilation fans	Bridge Rail and Wing Wall Repair	Mike Pitcher	Chipping with jackhammer, operating skid steer	Half-face APR	10	163	70	36.06	3.61	Exposure exceeds the OSHA AL; however, when APF associated with respirator is applied, the employee is within limits.	0.20	0.07	0.01	None
										118	BRL (50)			Because the reporting limit is higher than the OSHA AL we have assumed that the exposure concentration is the RL (worst case scenario)	BRL (0.25)	-	-	None
						Dan Philbrick	Chipping with jackhammer, operating excavator	Half-face APR	10	160	160	92.67	9.27	Exposure exceeds the OSHA RCS PEL; however, when APF associated with respirator is applied, the employee is within limits.	0.68	0.23	0.02	None
										118	160				0.58	0.14	0.01	None
						Craig Rines	Chipping with jackhammer, shoveling	Half-face APR	10	160	65	76.77	7.68	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	0.27	0.09	0.01	None
										115	230				0.77	0.18	0.02	None
						Benji Wheaton	Chipping with jackhammer, shoveling	Half-face APR	10	138	240	69.00	6.90	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	0.94	0.27	0.03	None
						Justin Ford	Chipping with jackhammer, shoveling	Half-face APR	10	158	100	139.79	13.98	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	0.43	0.14	0.01	None
										114	450				1.40	0.33	0.03	None
06/20/2013	**North Berwick**	1	No	Ventilation fans	Bridge Rail Repair	Josh Bodinet	Chipping with chipping hammer and rivet buster, shoveling concrete debris	Full-face APR	50	343	650	464.48	9.29	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	4.10	2.93	0.06	None
						John Frenette	Chipping with chipping hammer and rivet buster, shoveling concrete debris	Half-face APR	10	314	500	327.08	32.71	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, exposure exceeds the OSHA AL.	3.10	2.03	0.20	None
						Frank Hallzick	Chipping with chipping hammer and rivet buster, shoveling concrete debris	Half-face APR	10	204	680	289.00	28.90	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, exposure exceeds the OSHA AL.	3.90	1.66	0.17	None
05/13/2013	**Enfield**	4	No	None	Bridge/Roadway Sweeping	Dale Wotton	sweeping with hand broom, shoveling	Half-face APR	10	286	BRL (20)	-	-	None	BRL (0.10)	-	-	None
						Mark Boobar	Operating skid steer (windows closed)	Half-face APR	10	276	BRL (21)	-	-	None	BRL (0.11)	-	-	None
						Chandler Seavey	Flagging, chipping	Half-face APR	10	293	BRL (20)	-	-	None	BRL (0.10)	-	-	None
						Dave Stone	sweeping with hand broom, flagging	Half-face APR	10	212	BRL (27)	11.93	1.19	Because the reporting limit is higher than the OSHA AL we have assumed that the exposure concentration is the RL (worst case scenario)	BRL (0.14)	-	-	None
						Jonathan Perkins	sweeping with hand broom, shoveling, and setting signage	Half-face APR	10	321	26	17.39	1.74	None	BRL (0.092)	-	-	None
04/17/2013	**Fryeburg**	1	No	Water application (on 2 of 5 bridges)	Bridge/Roadway Sweeping	Troy Adkins	Power broom and hand sweeping, shoveling, flagging	None	0	186	50	19.38	19.38	None	BRL (0.16)	-	-	None
						Doug Kimball	Skid steeer sweeping, hand sweeping	None	0	187	35	13.64	13.64	None	0.17	0.07	0.07	None
						Mark Merrill	sweeping with hand broom, shoveling	None	0	152	BRL (37)	11.72	11.72	Because the reporting limit is higher than the OSHA AL we have assumed that the exposure concentration is the RL (worst case scenario)	BRL (0.19)	-	-	None
						Josh Wells	sweeping with hand broom, flagging	None	0	156	BRL (36)	11.70	11.70	Because the reporting limit is higher than the OSHA AL we have assumed that the exposure concentration is the RL (worst case scenario)	BRL (0.18)	-	-	None
						Brian Meserve	sweeping with hand broom, shoveling	None	0	171	BRL (35)	12.47	12.47	Because the reporting limit is higher than the OSHA AL we have assumed that the exposure concentration is the RL (worst case scenario)	BRL (0.17)	-	-	None

Sampling Date	Town	Region	Containment (yes, no)	Engineering Controls	Job (project, e.g. wear surface replacement)	Employee	Employee Task	Respiratory Protection (RP) Worn?	RP Assigned Protection Factor (APF)	Sample Time (minutes)	Total Respirable Crystalline Silica (RCS) (ug/m3)	RCS 8-hour Time Weighted Average (TWA) Without RP APF (ug/m3)	RCS 8-hour TWA With RP APF (ug/m3)	RCS Notes	Total Respirable Particulates (mg/m3)	Respirable Particulates 8-Hour TWA Without RP APF (mg/m3)	Respirable Particulates 8-hour TWA With RP APF (mg/m3)	Respirable Particulates Notes
09/26/2012	**Chester**	5	No	Water application (am), rain (pm)	Wearing Surface Repair	Larry Oliver	sweeping with Skid steer, grinding concrete	Half-face APR	10	185	560	264.17	26.42	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, exposure exceeds the OSHA AL.	3.10	1.44	0.14	None
										116	200				1.00			
						Kevin Duff	Jack hammering, cutting, grinding, and shoveling concrete	Half-face APR	10	181	220	95.18	9.52	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	1.20	0.57	0.06	None
										115	BRL (51)			Because the reporting limit is higher than the OSHA AL we have assumed that the exposure concentration is the RL (worst case scenario)	BRL (0.51)			
						Martin Wheeler	Jack hammering, cutting, grinding, and shoveling concrete	Half-face APR	10	167	130	57.55	5.76	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	0.72	0.37	0.04	None
										116	BRL (51)			Because the reporting limit is higher than the OSHA AL we have assumed that the exposure concentration is the RL (worst case scenario)	BRL (0.51)			
09/11/2012	**Baldwin**	1	No	Water application and LEV fans	Bridge Rail Repair	Ray Bernier	Chipping concrete	Full-face APR	50	114	830	267.13	5.34	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	4.40	1.45	0.03	None
										96	350				2.00			
						Doug Kimball	Chipping concrete	Full-face APR	50	128	340	173.17	3.46	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	1.70	0.88	0.02	None
										120	330				1.70			
						Kevin Rudman	Chipping concrete	Full-face APR	50	135	180	87.67	1.75	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	0.84	0.42	0.01	None
										127	140				0.70			
05/24/2012	**Wayne**	2	No	No	Bridge Rail Repair	Joe Dubois	Chipping concrete with W-4 chipping hammer	Half-face APR	10	137	1100	313.96	31.40	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, exposure exceeds the OSHA AL.	5.70	1.63	0.16	None
						Tim Clements	Chipping concrete with W-4 chipping hammer	Half-face APR	10	133	550	152.40	15.24	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	2.70	0.75	0.07	None
						Kevin Wing	Chipping concrete with W-4 chipping hammer	Half-face APR	10	134	420	117.25	11.73	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	2.20	0.61	0.06	None
						Andy Dubay	Chipping concrete with W-4 chipping hammer	Half-face APR	10	131	320	87.33	8.73	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	2.90	0.79	0.08	None
04/25/2012	**Waltham**	4	No	No	Wing Wall Repair	Derek Lovejoy	Chipping concrete with W-4 chipping hammer	Half-face APR	10	138	1400	697.71	69.77	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, the exposure exceeds the OSHA PEL.	6.20	2.90	0.29	None
										109	1300				4.90			
						Tim Watson	Chipping concrete with W-4 chipping hammer	Half-face APR	10	135	820	339.85	33.99	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, exposure exceeds the OSHA AL.	2.80	1.28	0.13	None
										107	490				2.20			
						John Herlihy	Chipping concrete with W-4 chipping hammer	Half-face APR	10	140	810	351.00	35.10	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, exposure exceeds the OSHA AL.	3.30	1.35	0.13	None
										108	510				1.70			
03/27/2012	**Harmony**	3	No	No	Wing Wall Repair	Steve Kent	Chipping concrete with W-4 chipping hammer	Half-face APR	10	106	420	137.91	13.79	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	1.50	0.40	0.04	None
							Shoveling debris			109	BRL (53)			Because the reporting limit is higher than the OSHA AL we have assumed that the exposure concentration is the RL (worst case scenario)	BRL (0.27)			
							Chippping concrete with W-4 chipping hammer			53	300				BRL (0.06)			
						Gary Ritter	Chipping concrete with W-4 chipping hammer	Half-face APR	10	103	340	124.97	12.50	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	1.10	0.30	0.03	None
							Shoveling debris			107	BRL (55)			Because the reporting limit is higher than the OSHA AL we have assumed that the exposure concentration is the RL (worst case scenario)	BRL (0.28)			
							Chippping concrete with W-4 chipping hammer			53	360				BRL (0.56)			
						Chad Huggins	Chipping concrete with W-4 chipping hammer	Half-face APR	10	105	320	102.18	10.22	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	0.52	0.18	0.02	None
							Shoveling debris			106	BRL (54)			Because the reporting limit is higher than the OSHA AL we have assumed that the exposure concentration is the RL (worst case scenario)	BRL (0.27)			
							Chippping concrete with W-4 chipping hammer			54	180				BRL (0.53)			
02/14/2012	**Washington**	2	No	Exhaust fan	Wing Wall Repair	Jason Campbell	Chipping concrete with W-4 chipping hammer	Half-face APR	10	276	820	471.50	47.15	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, exposure exceeds the OSHA AL.	3.60	2.07	0.21	None
						Jeremy Grover	Chipping concrete with W-4 chipping hammer	Half-face APR	10	205	840	358.75	35.88	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, exposure exceeds the OSHA AL.	2.60	1.11	0.11	None
						Brian Sylvester	Chipping concrete with W-4 chipping hammer	Half-face APR	10	272	1900	1076.67	107.67	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, the exposure exceeds the OSHA PEL.	9.50	5.38	0.54	Exposure exceeds OSHA RP PEL (5 mg/m3); however, when APF associated with respirator is applied, the employee is within limits
						Dan Mihalek	Cutting rebar	None	0	35	BRL (170)	33.06	33.06	Exposure exceeds the OSHA AL (25 ug/m3); however, when APF associated with respirator is applied, the employee is within limits	BRL (0.83)	0.21	0.21	None
							Drilling and making forms	Half-face APR	10	160	62			Because the reporting limit is higher than the OSHA AL we have assumed that the exposure concentration is the RL (worst case scenario)	0.44			
11/3/2011	**Cornith**	4	No	Exhaust fan	Bridge Curb, Wear Surface, and Post/rail Replacement	Mike Pitcher	Operating Skid steer with chipping hammer	Half-face APR	10	341	52	36.94	3.69	Exposure exceeds the OSHA AL; however, when APF associated with respirator is applied, the employee is within limits.	0.29	0.21	0.02	None
						Ben Wheaton	Rubbing concrete with rubbing stone, removing rebar	Half-face APR	10	333	230	159.56	15.96	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	0.23	0.16	0.02	None
						Dan Philbrick	Rubbing concrete with rubbing stone	Half-face APR	10	323	23	15.48	1.55	None	0.20	0.13	0.01	None
						Cameron Smith	Rubbing concrete with rubbing stone	Half-face APR	10	91	BRL (40)	29.93	2.99	Exposure exceeds the OSHA AL; however, when APF associated with respirator is applied, the employee is within limits.	BRL (0.20)	0.19	0.02	None
							Removing rebar			325	BRL (33)			Because the reporting limit is higher than the OSHA AL we have assumed that the exposure concentration is the RL (worst case scenario)	0.23			
02/10/2011	**Bucksport**	4	Wood with polyethylene sheeting 75' x 10'	Passive ventilation, intermittent LEV	Bridge Curb (Sidewalk and Abutment) repairs	John Herlihey	Concrete demo w/ pavement breaker	Half-face APR	10	221	490	225.60	22.56	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	2.40	1.11	0.11	None
						Clifford Colsen	Concrete & asphalt demo w/ chipping hammer	Half-face APR	10	221	320	147.33	14.73	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	1.10	0.51	0.05	None

Sampling Date	Town	Region	Containment (yes, no)	Engineering Controls	Job (project, e.g. wear surface replacement)	Employee	Employee Task	Respiratory Protection (RP) Worn?	RP Assigned Protection Factor (APF)	Sample Time (minutes)	Total Respirable Crystalline Silica (RCS) (ug/m3)	RCS 8-hour Time Weighted Average (TWA) Without RP APF (ug/m3)	RCS 8-hour TWA With RP APF (ug/m3)	RCS Notes	Total Respirable Particulates (mg/m3)	Respirable Particulates 8-Hour TWA Without RP APF (mg/m3)	Respirable Particulates 8-hour TWA With RP APF (mg/m3)	Respirable Particulates Notes
02/11/2011	**Bucksport**	4	Wood with polyethylene sheeting 75' x 10'	LEV fans, negative pressure containment	Fascia Repairs	John Wood	Concrete sawing	Full-face APR	50	94	7620	2437.56	48.75	Exposure exceeds OSHA PEL (50 ug/m3). Even when APF associated with respirator is applied, the exposure exceeds the OSHA AL (25 ug/m3). It should be noted that cristobalite detections (included in total RCS calculations) may be elevated due to interferences.	54.00	13.84	0.28	Exposure exceeds OSHA RP PEL (5 mg/m3); however, when APF associated with respirator is applied, the employee is within limits
							Concrete chipping (W-4 chipping hammer)			165	2750				9.50			
						Robert Garland	Concrete chipping (W-4 chipping hammer)	Full-face APR	50	248	1910	986.83	19.74	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	14.00	7.23	0.14	Exposure exceeds OSHA RP PEL (5 mg/m3); however, when APF associated with respirator is applied, the employee is within limits
						Tom Brenton	Concrete drilling	Full-face APR	50	91	6860	1426.19	28.52	Exposure exceeds OSHA PEL (50 ug/m3). Even when APF associated with respirator is applied, the exposure exceeds the OSHA AL (25 ug/m3). It should be noted that cristobalite detections (included in total RCS calculations) may be elevated due to interferences.	45.00	9.89	0.20	Exposure exceeds OSHA RP PEL (5 mg/m3); however, when APF associated with respirator is applied, the employee is within limits
							Concrete chipping (W-4 chipping hammer)			163	370				4.00			
02/01/2011	**Oakland**	2	Wood with polyethylene sheeting	16" fan, negative pressure containment	Bridge Abutment Demolition	Ryan Frederick	Chipping (W-4 chipping hammer)	Full-face APR	50	214	5100	2273.75	45.48	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, exposure exceeds the OSHA AL.	25.00	11.15	0.22	Exposure exceeds OSHA RP PEL (5 mg/m3); however, when APF associated with respirator is applied, the employee is within limits
						Mike Landry	Chipping (W-4 chipping hammer)	Full-face APR	50	215	1100	492.71	9.85	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	6.00	2.69	0.05	None
						Andy Dubay	Chipping (W-4 chipping hammer)	Full-face APR	50	213	3400	1508.75	30.18	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, exposure exceeds the OSHA AL.	19.00	8.43	0.17	Exposure exceeds OSHA RP PEL (5 mg/m3); however, when APF associated with respirator is applied, the employee is within limits
01/05/2011	**Seboeis**	4	No	No	Wing Wall Repair	Mark Boobar	Chipping (60-pound hammer)	Half-face APR	10	122	260	468.58	46.86	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, exposure exceeds the OSHA AL.	1.3	2.00	0.20	None
							Chipping (Rivet Buster)			138	1400				5.8			
						Dan Smith	Chipping (60-pound hammer)	Half-face APR	10	151	300	94.38	9.44	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	1.20	0.38	0.04	None
						Ben Curtis	Chipping (Rivet Buster)	Half-face APR	10	301	140	87.79	8.78	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	0.82	0.51	0.05	None
						Dale Wooten	Chipping (Rivet Buster)	Half-face APR	10	145	160	118.83	11.88	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	0.77	0.59	0.06	None
							Chipping (60-pound hammer)			141	240				1.20			
12/14/2010	**Casco**	1	No	No	Wing Wall Repair	Mike LaPointe	Support activities during chipping, drilling, and debris clean-up.	Half-face APR	10	143	BRL (41)	24.86	2.49	Because the reporting limit is higher than the OSHA AL we have assumed that the exposure concentration is the RL (worst case scenario)	0.66	0.32	0.03	None
										88	BRL (69)				BRL (0.65)			
						Kevin Rudman	Demolition using a Pavement Breaker chipping hammer.	Full-face APR	50	163	51	47.63	0.95	Exposure exceeds the OSHA AL; however, when APF associated with respirator is applied, the employee is within limits.	0.56	0.47	0.01	None
							Drilling holes in concrete and debris clean-up			97	150				1.40			
						G. Scott Huff	Demolition using a W-4 chipping hammer.	Full-face APR	50	161	63	119.13	2.38	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	0.83	0.91	0.02	None
							Drilling holes in concrete and debris clean-up	Full-face APR	50	98	480				3.1			
						Doug Kimball	Demolition using a W-4 chipping hammer.	Full-face APR	50	124	97	39.02	0.78	Exposure exceeds the OSHA AL; however, when APF associated with respirator is applied, the employee is within limits.	0.90	0.41	0.01	None
							Drilling holes in concrete and debris clean-up	Full-face APR	50	67	100				1.30			
12/13/2010	**Detroit**	4	No	No	Bridge Wall and Abutment Demolition	Eric Valcourt	Chipping using large (pavement breaker) hammer.	Half-face APR	10	101	140	29.46	2.95	Exposure exceeds the OSHA AL; however, when APF associated with respirator is applied, the employee is within limits.	1.10	0.23	0.02	None
						Gordon Cameron	Chipping using W-4 hammer.	Half-face APR	10	171	800	285.00	28.50	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, exposure exceeds the OSHA AL.	6.50	2.32	0.23	None
						Brian Philbrick	Chipping using W-4 hammer.	Half-face APR	10	166	430	148.71	14.87	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	2.60	0.90	0.09	None
						Cameron Smith	Chipping using W-4 hammer.	Half-face APR	10	243	160	81.00	8.10	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	0.97	0.49	0.05	None
						Gil Townsend	Chipping using W-4 hammer.	Full-face APR	50	230	140	67.08	1.34	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	0.98	0.47	0.01	None
10/22/2010	**Starks**	3	No	Enclosed skidsteer, intake air filtration	Bridge Concrete Rail System Demolition	Gary Ritter	Operating Skid steer with demo hammer	Half-face APR	10	205	39	29.59	2.96	Exposure exceeds the OSHA AL; however, when APF associated with respirator is applied, the employee is within limits.	BRL (0.28)	-	-	None
							Operating Skid steer with bucket			27	BRL (230)			Because the reporting limit is higher than the OSHA AL we have assumed that the exposure concentration is the RL (worst case scenario)	BRL (2.10)			
				No		Chad Huggins	Chipping, birdge concrete deck & rail system (W-4 chipper)	Half-face APR	10	195	BRL (55)	35.03	3.50	Exposure exceeds the OSHA AL; however, when APF associated with respirator is applied, the employee is within limits.	0.36	0.27	0.03	None
							Cleanup, sweeping	None	0	29	BRL (210)			Because the reporting limit is higher than the OSHA AL we have assumed that the exposure concentration is the RL (worst case scenario)	BRL (2.00)			
						Dave Ferland	Chipping, birdge concrete deck & rail system (W-4 chipper)	Half-face APR	10	187	BRL (34)	13.25	1.32	Because the reporting limit is higher than the OSHA AL we have assumed that the exposure concentration is the RL (worst case scenario)	BRL (0.31)	-	-	None
07/29/2009	**Sumner**	3	No	Water application	Bridge Wear Surface Demolition	Eugene Rickards	General site work	Half-face APR	10	59	BRL (100)	27.09	2.71	Exposure exceeds the OSHA AL; however, when APF associated with respirator is applied, the employee is within limits.	BRL (0.99)	-	-	None
							Skid steer demolition hammer			192	37			Because the reporting limit is higher than the OSHA AL we have assumed that the exposure concentration is the RL (worst case scenario)	BRL (0.30)			
						Robert Mecham	Skid steer support and general site work	Half-face APR	10	289	BRL (36)	21.68	2.17	Because the reporting limit is higher than the OSHA AL we have assumed that the exposure concentration is the RL (worst case scenario)	BRL (0.35)	-	-	None
						Mike Oliver	Skid steer support, Skid steer bucket operation, and general site work	Half-face APR	10	250	BRL (24)	-	-	None	BRL (0.23)	-	-	None
04/28/2009	**Fairfield**	2	No	Water application, shrouded skid steer sweep assembly	Bridge Cleaning	Tony Pelotte	Shovel, sweeping, water spraying	None	0	316	BRL (18)	-	-	None	BRL (0.18)	-	-	None
						Chad King	Shovel, sweeping, water spraying	None	0	331	BRL (18)	-	-	None	BRL (0.18)	-	-	None
						Paul French	Skid steer broom & bucket loader operation	None	0	329	BRL (18)	-	-	None	BRL (0.18)	-	-	None
						Craig Nickerson	Shoveling, sweeping, water spraying, flagging	None	0	318	BRL (18)	-	-	None	BRL (0.18)	-	-	None

Sampling Date	Town	Region	Containment (yes, no)	Engineering Controls	Job (project, e.g. wear surface replacement)	Employee	Employee Task	Respiratory Protection (RP) Worn?	RP Assigned Protection Factor (APF)	Sample Time (minutes)	Total Respirable Crystalline Silica (RCS) (ug/m3)	RCS 8-hour Time Weighted Average (TWA) Without RP APF (ug/m3)	RCS 8-hour TWA With RP APF (ug/m3)	RCS Notes	Total Respirable Particulates (mg/m3)	Respirable Particulates 8-Hour TWA Without RP APF (mg/m3)	Respirable Particulates 8-hour TWA With RP APF (mg/m3)	Respirable Particulates Notes
04/26/2009	**Bangor**	4	No	Fan	Wear Surface Replacement	Sean Townsend	Skid steer cleanup: sweep/bucket	Half-face APR	10	524	120	131.00	13.10	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	0.98	1.07	0.11	None
						Adam Prescott	Skid steer grinding	Half-face APR	10	209	240	378.58	37.86	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, exposure exceeds the OSHA AL.	0.85	2.04	0.20	None
							Skid steer grinding, blow-down			286	460				2.80			
						Derek Williams	Skid steer demo hammer	Half-face APR	10	230	350	291.96	29.20	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, exposure exceeds the OSHA AL.	1.90	1.98	0.20	None
							Skid steer grinding			284	210				1.80			
						Gilbert Townsend	Skid steer demo hammer	Half-face APR	10	196	120	137.67	13.77	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	0.65	0.76	0.08	None
							Skid steer demo hammer, shoveling			266	160				0.90			
						Craig Rine	Skid steer demo hammer, concrete saw	Half-face APR	10	192	170	152.38	15.24	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	0.90	0.92	0.09	None
							Shoveling, blow-down			270	150				0.99			
04/23/2009	**Houlton**	5	No	No	Bridge Cleaning	Steve Nason	Sweeping/ shoveling and skid steer operation	None	0	311	BRL (19)	-	-	None	BRL (0.18)	-	-	None
						Tim Donahue	Sweeping and shoveling	None	0	312	BRL (19)	-	-	None	BRL (0.18)	-	-	None
						Tom Rouse	Sweep/ shovel and flagging	None	0	246	BRL (16)	-	-	None	BRL (0.18)	-	-	None
						Larry Oliver	Sweeping and shoveling	None	0	385	BRL (16)	-	-	None	BRL (0.18)	-	-	None
04/22/2009	**Houlton**	5	No	No	Bridge Cleaning	Tim Donahue	Sweeping and shoveling	None	0	536	BRL (11)	-	-	None	BRL (0.11)	-	-	None
						Larry Oliver	Sweeping and shoveling	None	0	537	BRL (11)	-	-	None	BRL (0.11)	-	-	None
						Steve Nason	Sweeping/ shoveling and skid steer operation	None	0	538	BRL (11)	-	-	None	BRL (0.10)	-	-	None
						Tom Rouse	Sweep/ shovel and flagging	None	0	533	BRL (11)	-	-	None	0.31	0.34	0.34	None
04/15/2009	**Whiting**	4	Wood & poly sheeting	Electric fans, west & east side	Pier Cap Repair	Jerry Lingley	Chipping	Full-face APR	50	293	821	501.15	10.02	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	3.50	2.13	0.04	None
						Jack Nicholas	Chipping	Full-face APR	50	297	3663	2266.48	45.33	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, exposure exceeds the OSHA AL.	10.89	6.74	0.13	Exposure exceeds OSHA RP PEL (5 mg/m3); however, when APF associated with respirator is applied, the employee is within limits
						Harold Preston	Chipping	Full-face APR	50	285	241	143.09	2.86	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	1.51	0.90	0.02	None
03/17/2009	**Lisbon**	3	Wood & poly sheeting	LEV/2 exhaust fans and 1 blower	Chipping and Texturizing Headwall	Brian Maxham	Texturizing	Half-face APR	10	160	207	90.67	9.07	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	1.42	0.70	0.07	None
							General site work			101	103				1.09			
						Jon Paul Hutchson	Chipping	Half-face APR	10	169	970	382.08	38.21	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, exposure exceeds the OSHA AL.	4.12	1.62	0.16	None
							Chipping			110	177				0.74			
						Redmond Pinkham	Texturizing	Half-face APR	10	172	125	50.89	5.09	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	1.25	0.59	0.06	None
							General site work			117	BRL (25)				0.57			
02/25/2009	**Fairfield**	2	Scaffolding covered in thick plastic sheeting	Dust collector	Chipping Pier Cap	Ryan Frederick	Chipping	Half-face APR	10	144	2911	879.65	87.97	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, the exposure exceeds the OSHA PEL.	12.37	5.86	0.59	Exposure exceeds OSHA RP PEL (5 mg/m3); however, when APF associated with respirator is applied, the employee is within limits
							Chipping	Full-face APR	50	122	2280				8.47			
						Michael Landry	Chipping	Full-face APR	50	125	854	222.40	4.45	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	4.18	1.09	0.02	
						Daryl Domeny	Chipping	Half-face APR	10	165	2699	934.14	93.41	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, the exposure exceeds the OSHA PEL.	11.68	8.16	0.82	Exposure exceeds OSHA RP PEL (5 mg/m3); however, when APF associated with respirator is applied, the employee is within limits
							Chipping	Full-face APR	50	122	4667				16.32			
02/06/2009	**Blue Hill**	4	Wood & poly sheeting	LEV/fan	Replacing Breast Wall	Jon Wood	Shoveling	Full-face APR	50	74	360	1484.67	29.69	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, exposure exceeds the OSHA AL.	2.00	7.02	0.14	Exposure exceeds OSHA RP PEL (5 mg/m3); however, when APF associated with respirator is applied, the employee is within limits
							Chipping			140	4900				23.00			
						Bob Snow	Chipping	Full-face APR	50	141	11000	3231.25	64.63	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, the exposure exceeds the OSHA PEL.	30.00	8.81	0.18	Exposure exceeds OSHA RP PEL (5 mg/m3); however, when APF associated with respirator is applied, the employee is within limits
						Damon Bell	Shoveling	Full-face APR	50	78	1100	3410.00	68.20	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, the exposure exceeds the OSHA PEL.	5.00	12.27	0.25	Exposure exceeds OSHA RP PEL (5 mg/m3); however, when APF associated with respirator is applied, the employee is within limits
							Chipping			141	11000				39.00			
						Isaiah Hangge	Chipping	Full-face APR	50	139	4200	1216.25	24.33	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	22.00	6.37	0.13	Exposure exceeds OSHA RP PEL (5 mg/m3); however, when APF associated with respirator is applied, the employee is within limits
02/05/2009	**Atkinson**	4	3 separate containments	Gas-powered blowers	Reparing Pier Cap	Mark Voovar	Chipping (jack hammer)	Full-face APR	50	309	570	366.94	7.34	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	2.60	1.67	0.03	None
						Micke Pitcher	Chipping (rivet buster)	Full-face APR	50	206	1700	729.58	14.59	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	7.60	3.26	0.07	None
						Bob Kearns	Chipping (rivet buster)	Full-face APR	50	288	1400	840.00	16.80	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	9.20	5.52	0.11	Exposure exceeds OSHA RP PEL (5 mg/m3); however, when APF associated with respirator is applied, the employee is within limits
01/27/2009	**Fairfield**	2	Wood & poly sheeting	Dust collector	Sandblasting Corroded Rebar w/in Pier Cap	Michael Landry	Sandblasting	Bullard	1000	123	4100	1062.11	1.06	Because the reporting limit is higher than the OSHA AL we have assumed that the exposure concentration is the RL (worst case scenario)	94.00	24.20	0.02	Exposure exceeds OSHA RP PEL (5 mg/m3); however, when APF associated with respirator is applied, the employee is within limits
							Pot-tending	Full-face APR	50	149	BRL (37)			Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	BRL (0.36)			
						Joe Dubois	Pot-tending	Half-face APR	10	123	BRL (47)	1435.17	1.44	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	BRL (0.46)	20.39	0.02	Exposure exceeds OSHA RP PEL (5 mg/m3); however, when APF associated with respirator is applied, the employee is within limits
							Sandblasting	Bullard	1000	207	3300			Because the reporting limit is higher than the OSHA AL we have assumed that the exposure concentration is the RL (worst case scenario)	47.00			

Sampling Date	Town	Region	Containment (yes, no)	Engineering Controls	Job (project, e.g. wear surface replacement)	Employee	Employee Task	Respiratory Protection (RP) Worn?	RP Assigned Protection Factor (APF)	Sample Time (minutes)	Total Respirable Crystalline Silica (RCS) (ug/m3)	RCS 8-hour Time Weighted Average (TWA) Without RP APF (ug/m3)	RCS 8-hour TWA With RP APF (ug/m3)	RCS Notes	Total Respirable Particulates (mg/m3)	Respirable Particulates 8-Hour TWA Without RP APF (mg/m3)	Respirable Particulates 8-hour TWA With RP APF (mg/m3)	Respirable Particulates Notes
12/30/2008	**Fairfield**	2	None	None	Chipping Pier Cap	Jim Hall	Chipping	Half-face APR	10	177	870	320.81	32.08	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, exposure exceeds the OSHA AL.	5.40	1.99	0.20	None
						Michael Landry	Chipping	Half-face APR	10	235	400	195.83	19.58	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	2.10	1.03	0.10	None
						Joe Dubois	Chipping	Half-face APR	10	179	9600	3580.00	358.00	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, the exposure exceeds the OSHA PEL.	51.00	19.02	1.90	Exposure exceeds OSHA RP PEL (5 mg/m3); however, when APF associated with respirator is applied, the employee is within limits
09/23/2008	**Livermore Falls**	3	None	Water application	Wear Surface Replacement	Claude Castonguay	Skid steer Grinding	Full-face APR	50	195	530	227.78	4.56	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	3.00	1.34	0.03	None
							Cleaning	None	0	193	BRL (31)			Because the reporting limit is higher than the OSHA AL we have assumed that the exposure concentration is the RL (worst case scenario)	BRL (0.31)			
						Ray Campbell	Watering Grinder	Full-face APR	50	203	300	138.94	2.78	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	1.60	0.80	0.02	None
							Cleaning	None	0	193	BRL (30)			Because the reporting limit is higher than the OSHA AL we have assumed that the exposure concentration is the RL (worst case scenario)	BRL (0.30)			
						Steve Kent	Cleaning	None	0	189	BRL (30)	11.81	11.81	Because the reporting limit is higher than the OSHA AL we have assumed that the exposure concentration is the RL (worst case scenario)	BRL (0.30)	-	-	None
						Chad Huggins	sweeping behind Skid steer grinder	Full-face APR	50	207	42	30.13	0.60	Exposure exceeds the OSHA AL; however, when APF associated with respirator is applied, the employee is within limits.	0.55	0.36	0.01	None
							Cleaning	None	0	186	BRL (31)			Because the reporting limit is higher than the OSHA AL we have assumed that the exposure concentration is the RL (worst case scenario)	BRL (0.31)			
06/24/2008	**Bangor**	4	None	Water application	Wear Surface Replacement	Jeremy Lord	Rivet Busting, Jack Hammering, Cleaning, Shoveling Debris	Half-face APR	10	437	16	14.57	1.46	None	0.29	0.26	0.03	None
						Jeremy Schobel	Excavating with Demo Hammer	Half-face APR	10	459	34	32.51	3.25	Exposure exceeds the OSHA AL; however, when APF associated with respirator is applied, the employee is within limits.	0.19	0.18	0.02	None
06/25/2008	**Bangor**	4	None	2 gas powered fans - LEV water application	Bridge Wear Surface Replacement	Joe Prescott	Chipping and shoveling	Half-face APR	10	432	200	180.00	18.00	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	0.98	0.88	0.09	None
						Eric Valcourt	Skid steer demolition hammer	Half-face APR	10	401	69	57.64	5.76	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	0.42	0.35	0.04	None
						Gordon Cameron	Chipping, shoveling, compressed air blow down	Half-face APR	10	428	82	73.12	7.31	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	0.54	0.48	0.05	None
						Cameron Smith	Chipping and shoveling	Half-face APR	10	457	80	76.17	7.62	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	0.60	0.57	0.06	None
04/30/2008	**Bridgton**	1	None	Water application	Bridge Wear Surface Replacement	Mike LaPointe	Skid steer operation and chipping	Full-face APR	50	430	51	45.69	0.91	Exposure exceeds the OSHA AL; however, when APF associated with respirator is applied, the employee is within limits.	0.28	0.25	0.01	None
						Kevin Rudman	Chipping	Half-face APR	10	212	160	70.67	7.07	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	0.88	0.39	0.04	None
03/12/2008	**Appleton**	2	None	LEV/Fan	Removing degraded concrete	John Baehr	Chipping	Half-face APR	10	301	800	501.67	50.17	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, the exposure exceeds the OSHA PEL.	4.30	2.70	0.27	None
03/10/2008	**Princeton**	4	4 walls, no neg. pressure	LEV/Fan	Removing Concrete from Sidewall	Jerry Lingley	Shoveling and Chipping	Full-face APR	50	309	970	624.44	12.49	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	5.30	3.41	0.07	None
						Harold Preston	Boom truck and chipping	Full-face APR	50	293	790	482.23	9.64	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	6.30	3.85	0.08	None
						John Nicholas	Flagging and chipping	Full-face APR	50	189	1100	433.13	8.66	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	7.30	2.87	0.06	None
01/28/2008	**Bar Harbor**	4	4 walls, no neg. pressure	LEV/Fan	Removing Graded Concrete from Sidewalls	Bob Snow	Chipping and shoveling	Half-face APR	10	301	680	426.42	42.64	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, exposure exceeds the OSHA AL.	4.10	2.57	0.26	None
						Jai Ashmore	Skid steer Operation	Half-face APR	10	226	99	46.61	4.66	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	0.87	0.41	0.04	None
						Damon Bell	Chipping and shoveling	Full-face APR	50	293	260	158.71	3.17	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	2.20	1.34	0.03	None
						Isaiah Hangge	Chipping and shoveling	Full-face APR	50	244	170	86.42	1.73	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	1.80	0.92	0.02	None
07/12/2007	**Howland**	4	None	Water application	Wear Surface Replacement	Ryan Thayer	Jackhammering bridge deck	None	0	241	85	42.68	42.68	Exposure exceeds the OSHA AL (25 ug/m3)	0.38	0.19	0.19	None
						Melissa Pontello	Jackhammering bridge deck	None	0	157	68	22.24	22.24	None	BRL (0.38)	-	-	None
						Derek Williams	Skid steer hammering bridge deck	None	0	326	180	122.25	122.25	Exposure exceeds the OSHA PEL (50 ug/m3)	1.10	0.75	0.75	None
						George Allen	Compressed air blowdown	None	0	91	80	15.17	15.17	None	0.66	0.13	0.13	None
						Jeremy Schovels	Compressed air blowdown	None	0	88	BRL (65)	11.92	11.92	Because the reporting limit is higher than the OSHA AL we have assumed that the exposure concentration is the RL (worst case scenario)	BRL (0.65)	-	-	None

Sampling Date	Town	Region	Containment (yes, no)	Engineering Controls	Job (project, e.g. wear surface replacement)	Employee	Employee Task	Respiratory Protection (RP) Worn?	RP Assigned Protection Factor (APF)	Sample Time (minutes)	Total Respirable Crystalline Silica (RCS) (ug/m3)	RCS 8-hour Time Weighted Average (TWA) Without RP APF (ug/m3)	RCS 8-hour TWA With RP APF (ug/m3)	RCS Notes	Total Respirable Particulates (mg/m3)	Respirable Particulates 8-Hour TWA Without RP APF (mg/m3)	Respirable Particulates 8-hour TWA With RP APF (mg/m3)	Respirable Particulates Notes
07/03/2007	**Solon**	3	None	None	Replacing Degraded T-beams	Gary Ritter	Chipping	Half-face APR	10	358	920	686.17	68.62	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, the exposure exceeds the OSHA PEL.	6.30	4.70	0.47	None
						Chad Huggins	Chipping	Half-face APR	10	357	1400	1041.25	104.13	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, the exposure exceeds the OSHA PEL.	8.10	6.02	0.60	Exposure exceeds OSHA RP PEL (5 mg/m3); however, when APF associated with respirator is applied, the employee is within limits
						Ray Campbell	sweeping	Half-face APR	10	270	300	168.75	16.88	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	1.80	1.01	0.10	None
						Steve Kent	Chipping	Half-face APR	10	353	1700	1250.21	125.02	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, the exposure exceeds the OSHA PEL.	11.00	8.09	0.81	Exposure exceeds OSHA RP PEL (5 mg/m3); however, when APF associated with respirator is applied, the employee is within limits
06/22/2007	**Cumberland**	2	None	None	Wear Surface Replacement	Chris Pester 2C2D	Sand blasting, sweeping	Half-face APR	10	167	150	52.19	5.22	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	4.60	1.60	0.16	None
						Kyle Thomas	Aiding Chris with sand blasting	Full-face APR	50	132	BRL (49)	13.48	0.27	Because the reporting limit is higher than the OSHA AL we have assumed that the exposure concentration is the RL (worst case scenario)	0.69	0.19	0.00	None
06/21/2007	**Cumberland**	2	None	Water application	Wear Surface Replacement	Mark Jordan	Jackhammering and aiding with the chipping hammer	Half-face APR	10	267	111	61.74	6.17	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	0.68	0.38	0.04	None
						Chris Pester 2A2B	Skid steer Grinding. Shoveling grinding debris	Half-face APR	10	153	BRL (111)	35.38	3.54	Because the reporting limit is higher than the OSHA AL we have assumed that the exposure concentration is the RL (worst case scenario); Exposure exceeds the OSHA AL; however, when APF associated with respirator is applied, the employee is within limits.	BRL (1.1)	-	-	None
						Gorham Lilly	Watering grinder during Skid steer grinding. Cleaning and sweeping grinding debris	Half-face APR	10	284	200	118.33	11.83	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	0.68	0.40	0.04	None
05/22/2007	**Waterville**	2			Wear Surface Replacement	Jeremy Lord	Removing concrete with a chipping hammer and compressed air	Half-face APR	10	484	103	103.86	10.39	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	1.57	1.58	0.16	None
01/04/2007	**Fairfield**	2	None	None	Bridge Column Repair	Ryan Peolotte	Removing concrete with a chipping hammer, concrete cutting saw, and shovel	Half-face APR	10	224	250	116.67	11.67	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	1.50	0.70	0.07	None
						Mike Landry	Removing concrete with a chipping hammer, concrete cutting saw, and shovel	Half-face APR	10	223	410	190.48	19.05	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	1.90	0.88	0.09	None
08/15/2006	**Medway**	4	None	Water application	Demolition	Luke Moir	Chipping, Skid steer cleanup	Half-face APR	10	233	BRL (130)	63.10	6.31	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	BRL (1.3)	-	-	None
						Larry Pulcifur	Chipping, cleanup	Half-face APR	10	255	BRL (73)	38.78	3.88	Because the reporting limit is higher than the OSHA AL we have assumed that the exposure concentration is the RL (worst case scenario); Exposure exceeds the OSHA AL; however, when APF associated with respirator is applied, the employee is within limits.	BRL (0.73)	-	-	None
						Kevin Tarbox	Chipping, cleanup	Half-face APR	10	270	BRL (73)	41.06	4.11	Because the reporting limit is higher than the OSHA AL we have assumed that the exposure concentration is the RL (worst case scenario); Exposure exceeds the OSHA AL; however, when APF associated with respirator is applied, the employee is within limits.	BRL (0.73)	-	-	None
						Peter Lunney	Chipping, cleanup	Half-face APR	10	216	49	22.05	2.21	None	0.35	0.16	0.02	None
						Mark Kearly	Chipping, cleanup	Half-face APR	10	145	130	39.27	3.93	Exposure exceeds the OSHA AL; however, when APF associated with respirator is applied, the employee is within limits.	BRL (0.92)	-	-	None
						Kevin Coughlin	Chipping, cleanup	Half-face APR	10	248	BRL (74)	38.23	3.82	Because the reporting limit is higher than the OSHA AL we have assumed that the exposure concentration is the RL (worst case scenario); Exposure exceeds the OSHA AL; however, when APF associated with respirator is applied, the employee is within limits.	BRL (0.74)	-	-	None
						Martin Wheeler	Chipping, cleanup	Half-face APR	10	256	BRL (73)	38.93	3.89	Because the reporting limit is higher than the OSHA AL we have assumed that the exposure concentration is the RL (worst case scenario); Exposure exceeds the OSHA AL; however, when APF associated with respirator is applied, the employee is within limits.	BRL (0.73)	-	-	None
07/25/2006	**Dover-Foxcroft**	4	None	None	Chipping	Jeremy Lord	Chipping, shovelling	Half-face APR	10	408	790	62.05	6.21	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	3.30	2.81	0.28	None
						Randy Shaw	Chipping, shovelling	Half-face APR	10	403	510	61.29	6.13	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	2.70	2.27	0.23	None
						Mark Wiseman	Skid steer cleanup	None	0	390	18	59.31	59.31	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, the exposure exceeds the OSHA PEL.	0.23	0.19	0.19	None
07/20/2006	**Waterford**	2	None	1 exhaust fan, water misting	Wear surface replacement	Rick Richards	Skid steer chipping hammer	Half-face APR	10	234	BRL (25)	12.19	1.22	Because the reporting limit is higher than the OSHA AL we have assumed that the exposure concentration is the RL (worst case scenario)	BRL (0.25)	-	-	None
						Eric Titcomb	Support, cleanup	Half-face APR	10	226	197	92.75	9.28	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	0.35	0.16	0.02	None
						Mike Oliver	Support, cutting rebar (saw)	Half-face APR	10	226	52	24.48	2.45	None	0.46	0.22	0.02	None
05/18/2006	**Bath**	1	None	None	Bridge Cleaning	Tom Roberts	Shovelling	Half-face APR	10	274	BRL (21)	-	-	None	BRL (0.21)	-	-	None
						Elwin Page	Sweeping	Half-face APR	10	274	BRL (22)	-	-	None	BRL (0.22)	-	-	None
						Matt Dix	Skid steer cleanup	Half-face APR	10	290	25	15.10	1.51	None	BRL (0.20)	-	-	None

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05/08/2006	**Dedham**	4	None	Exhaust fan while scabbling	Bridge Deck Demolition and Drilling holes	Jai Ashmore	Skid steer grinding, drilling holes	Half-face APR	10	329	810	555.19	55.52	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, the exposure exceeds the OSHA PEL.	4.40	3.02	0.30	None
						Joe Seavy	Sweeping behind grinder, chipping	Half-face APR	10	473	159	156.68	15.67	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	0.77	0.76	0.08	None
						Isaiah Hangge	Scabbling, cleanup, hammer drill	Half-face APR	10	396	370	305.25	30.53	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, exposure exceeds the OSHA AL.	2.28	1.88	0.19	None
05/01/2006	**Searsmont**	2	None	LEV/exhaust fans	Wing Wall Repair	Matt Dix	Chipping and shoveling debris	N100 Half-face APR	10	75	160	25.00	2.50	Exposure exceeds the OSHA AL; however, when APF associated with respirator is applied, the employee is within limits.	0.81	0.13	0.01	None
						Alan Ladd	Chipping, shoveling debris, and cleanup	N100 Half-face APR	10	224	1200	560.00	56.00	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, the exposure exceeds the OSHA PEL.	5.00	2.33	0.23	None
						Tom Roberts	Chipping and cleanup	N100 Half-face APR	10	221	2340	1077.38	107.74	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, the exposure exceeds the OSHA PEL.	9.90	4.56	0.46	None
04/12/2006	**Bangor**	4	None	None	Bridge Cleaning	Cameron Smith	Sweeping shovelling	Half-face APR	10	305	260	165.21	16.52	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	1.10	0.70	0.07	None
						Sean Townsend	Sweeping shovelling	Half-face APR	10	303	140	88.38	8.84	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	0.74	0.47	0.05	None
						Gilly Townsend	Sweeping shovelling and Skid steer bucket loading debris	Half-face APR	10	306	290	184.88	18.49	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	1.50	0.96	0.10	None
02/09/2006	**West Bath**	2	Volume (56' x 8' x 12')	LEV/exhaust fans	Wing Wall Repair	Kyle Thomas	Chipping	Half-face APR	10	321	3980	2661.63	266.16	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, the exposure exceeds the OSHA PEL.	20.20	13.51	1.35	Exposure exceeds OSHA RP PEL (5 mg/m3); however, when APF associated with respirator is applied, the employee is within limits
						Chris Pester	Chipping	Half-face APR	10	315	3000	1968.75	196.88	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, the exposure exceeds the OSHA PEL.	16.90	11.09	1.11	Exposure exceeds OSHA RP PEL (5 mg/m3); however, when APF associated with respirator is applied, the employee is within limits
						Elwin Page	Chipping	Half-face APR	10	308	2800	1796.67	179.67	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, the exposure exceeds the OSHA PEL.	15.70	10.07	1.01	Exposure exceeds OSHA RP PEL (5 mg/m3); however, when APF associated with respirator is applied, the employee is within limits
01/20/2006	**Jonesport**	4	Volume (56' x 8' x 12')	LEV/exhaust fans	Fascia Repairs	John Ashby	Chipping	Full-face APR	50	207	3700	1595.63	31.91	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, exposure exceeds the OSHA AL.	24.20	10.44	0.21	Exposure exceeds OSHA RP PEL (5 mg/m3); however, when APF associated with respirator is applied, the employee is within limits
						Jack Nicholas	Chipping	Full-face APR	50	212	3770	1665.08	33.30	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, exposure exceeds the OSHA AL.	27.60	12.19	0.24	Exposure exceeds OSHA RP PEL (5 mg/m3); however, when APF associated with respirator is applied, the employee is within limits
01/19/2006	**Columbia Falls**	4	Area (14' x 56')	2 exhaust fans	Railing Repair	Jon Wood	Shoveling debris	Half-face APR	10	60	BRL (98)	150.38	15.04	Because the reporting limit is higher than the OSHA AL we have assumed that the exposure concentration is the RL (worst case scenario)	BRL (0.98)	0.69	0.07	None
							Chipping			195	340			Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	1.40			
						Isaiah Hangge	Shoveling debris	Full-face APR	50	59	230	166.40	3.33	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	1.40	0.94	0.02	None
							Chipping			195	340				1.90			
						Jai Ashmore	Operating boom truck	Half-face APR	10	56	BRL (110)	74.81	7.48	Because the reporting limit is higher than the OSHA AL we have assumed that the exposure concentration is the RL (worst case scenario)	BRL (1.1)	0.48	0.05	None
							Shoveling debris			85	350			Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	2.00			
01/12/2006	**Scarborough**	1	None	2 exhaust fans	Column Repair	Del Boston	Chipping	Half-face APR	10	233	740	359.21	35.92	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, exposure exceeds the OSHA AL.	3.70	1.80	0.18	None
						Bryan Ferren	Chipping	Half-face APR	10	233	1650	800.94	80.09	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, the exposure exceeds the OSHA PEL.	7.50	3.64	0.36	None
						Frank Hallczuk	Chipping	Half-face APR	10	283	890	524.73	52.47	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, the exposure exceeds the OSHA PEL.	3.80	2.24	0.22	None
01/05/2006	**Rome**	2	None	1 exhaust fan	Wear Surface Replacement	Ryan Peoltte	Chipping	Half-face APR	10	253	60	31.63	3.16	Exposure exceeds the OSHA AL; however, when APF associated with respirator is applied, the employee is within limits.	0.48	0.25	0.03	None
						Brendan French	Concrete debris removal with shovel & Skid steer	Half-face APR	10	252	38	19.95	2.00	None	0.25	0.13	0.01	None
						Dave Peoltte	Chipping	Half-face APR	10	249	48	24.90	2.49	None	0.29	0.15	0.02	None
11/01/2005	**West Bath**	2	None	None	Wear Surface Replacement	Willis Cross	Chipping/Shoveling	Half-face APR	10	313	1170	762.94	76.29	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, the exposure exceeds the OSHA PEL.	6.70	4.37	0.44	None
						Allen Ladd	Chipping/Shoveling	Half-face APR	10	310	1040	671.67	67.17	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, the exposure exceeds the OSHA PEL.	5.90	3.81	0.38	None
						Jim Pinette	Chipping/Shoveling	Half-face APR	10	120	1300	325.00	32.50	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, exposure exceeds the OSHA AL.	6.80	1.70	0.17	None
09/29/2005	**Monroe**	2	None	2 exhaust fans with water application	Wing Wall Replacement	David Cunningham	Chipping	Half-face APR	10	182	170	76.42	7.64	Because the reporting limit is higher than the OSHA AL we have assumed that the exposure concentration is the RL (worst case scenario)	0.84	0.44	0.04	None
							Removing concrete debris in buckets			41	BRL (140)			Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	BRL (1.4)			
						Jody Furrow	Assisting with concrete drilling/shoveling and removing debris	Half-face APR	10	249	61	31.64	3.16	Exposure exceeds the OSHA AL; however, when APF associated with respirator is applied, the employee is within limits.	0.30	0.16	0.02	None
						Judy Cooper	Drilling holes in concrete	Half-face APR	10	216	110	49.50	4.95	Exposure exceeds the OSHA AL; however, when APF associated with respirator is applied, the employee is within limits.	0.48	0.22	0.02	None

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08/24/2005	**Milford**	4	None	None	Wear Surface Replacement	Mike Pitcher	Skid steer with demo hammer, shoveling/blowdown aid	Half-face APR	10	435	690	625.31	62.53	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, the exposure exceeds the OSHA PEL.	3.86	3.50	0.35	None
						Jaremiah Lary	Chipping with jackhammer, shoveling	Half-face APR	10	418	195	169.81	16.98	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	0.45	0.39	0.04	None
08/08/2005	**Lewiston**	3	None	Water application	Wear Surface Replacement	Brian Maxham	Sweeping, operating tractor	Half-face APR	10	411	260	222.63	22.26	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	1.61	1.38	0.14	None
						Rodney Titcomb	Skid steer grinding, shoveling	Half-face APR	10	407	700	593.54	59.35	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, the exposure exceeds the OSHA PEL.	4.30	3.65	0.36	None
						Skip Forbes	Applying water during grinding, shoveling, sweeping	Half-face APR	10	407	280	237.42	23.74	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	1.43	1.21	0.12	None
07/21/2005	**Scarborough**	1	None	Water application attached to jackhammer	Bridge Sidewalk Repair	Del Boston	Shoveling/chipping	Half-face APR	10	195	71	28.84	2.88	Exposure exceeds the OSHA AL; however, when APF associated with respirator is applied, the employee is within limits.	0.73	0.30	0.03	None
						Darren Norton	Shoveling/chipping	Half-face APR	10	211	120	52.75	5.28	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	0.92	0.40	0.04	None
						Brian Perkins	Shoveling/chipping	Half-face APR	10	209	93	40.49	4.05	Exposure exceeds the OSHA AL; however, when APF associated with respirator is applied, the employee is within limits.	0.60	0.26	0.03	None
07/20/2005	**Stonington**	4	None	1 exhaust fan (LEV), HEPA vacuum - jackhammer equipped with hose attachment	Bridge Rail Replacement	Jai Ashmore	Operating boom truck, operating skid steer with demo hammer attachment	Half-face APR	10	120	BRL (48)	12.00	1.20	Because the reporting limit is higher than the OSHA AL we have assumed that the exposure concentration is the RL (worst case scenario)	BRL (0.48)	-	-	None
						John Wood	Shoveling/chipping	Half-face APR	10	240	450	225.00	22.50	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	2.00	1.00	0.10	None
						Isaiah Hangge	Shoveling/chipping	Half-face APR	10	242	1350	680.63	68.06	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, the exposure exceeds the OSHA PEL.	7.50	3.78	0.38	None
07/20/2005	**Stonington**	4	None	1 exhaust fan (LEV), HEPA vacuum - jackhammer equipped with hose attachment	Bridge Rail Replacement	Jai Ashmore	Operating boom truck, operating skid steer with demo hammer attachment	Half-face APR	10	120	BRL (48)	12.00	1.20	Because the reporting limit is higher than the OSHA AL we have assumed that the exposure concentration is the RL (worst case scenario)	BRL (0.48)	-	-	None
						John Wood	Shoveling/chipping	Half-face APR	10	240	450	225.00	22.50	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	2.00	1.00	0.10	None
						Isaiah Hangge	Shoveling/chipping	Half-face APR	10	242	1350	680.63	68.06	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, the exposure exceeds the OSHA PEL.	7.50	3.78	0.38	None
07/15/2005	**Lewiston**	3	None	1 exhaust fan (LEV), HEPA vacuum - jackhammer equipped with hose attachment	Wear Surface Replacement	Brian Maxham	Chipping with pavement breaker, shoveling debris	Half-face APR	10	321	160	107.00	10.70	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	1.20	0.80	0.08	None
						Rodney Titcomb	Chipping with chipping hammer, vacuuming debris	Half-face APR	10	325	250	169.27	16.93	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	1.60	1.08	0.11	None
						Kevin Murphy	Hoeing and shoveling debris	Half-face APR	10	322	180	120.75	12.08	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	1.40	0.94	0.09	None
06/28/2005	**South Thomaston**	2	None	Water application	Wear Surface Replacement	Judy Cooper	Sweeping, shoveling, chipping	Half-face APR	10	279	220	127.88	12.79	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	0.60	0.35	0.03	None
						Gary Grant	Applying water during skid steer grinding	Half-face APR	10	290	454	274.29	27.43	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, exposure exceeds the OSHA AL.	1.57	0.95	0.09	None
04/07/2005	**Lewiston**	1	None	None	Bridge Cleaning	Rodney Titcomb	Sweeping and shoveling	Half-face APR	10	315	178	116.81	11.68	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	0.41	0.27	0.03	None
						Danny Bradbury	Sweeping and shoveling	Half-face APR	10	331	94	64.82	6.48	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	BRL (0.37)	-	-	None
						Skip Forbes	Sweeping and shoveling	Half-face APR	10	329	230	157.65	15.76	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	0.49	0.34	0.03	None
03/17/2005	**Columbia Falls**	4	15ftx50ftx10ft	1 3ft in diameter exhaust fan	Fascia Repair	Jon Wood	Chipping concrete/ shoveling	Full-face APR	50	197	3660	1502.13	30.04	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, exposure exceeds the OSHA AL.	19.60	8.04	0.16	Exposure exceeds OSHA RP PEL (5 mg/m3); however, when APF associated with respirator is applied, the employee is within limits
						Jai Ashmore	Chipping concrete/ shoveling	Full-face APR	50	178	1070	396.79	7.94	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	5.70	2.11	0.04	None
03/16/2005	**Otisfield**	1	30ftx15ftx10ft adjoined to 10ftx15ftx10ft	None	Bridge Wing Wall Replacement	Ken Littlefield	Chipping concrete/ shoveling	Full-face APR	50	212	358	158.12	3.16	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	1.70	0.75	0.02	None
						Mike Lapointe	Chipping concrete/ shoveling	Full-face APR	50	220	63	28.88	0.58	Exposure exceeds the OSHA AL; however, when APF associated with respirator is applied, the employee is within limits.	BRL (0.70)	-	-	None
						Scott Huff	Chipping concrete/ shoveling	Full-face APR	50	190	527	208.60	4.17	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	1.30	0.51	0.01	None
02/23/2005	**Caribou**	5	15ftx50ftx8ft	2- 7,000CFM exhaust fans	Bridge Pier Replacement	Larry Pulcifur	Chipping concrete/ shoveling	Full-face APR	50	298	2480	1539.67	30.79	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, exposure exceeds the OSHA AL.	23.40	14.53	0.29	Exposure exceeds OSHA RP PEL (5 mg/m3); however, when APF associated with respirator is applied, the employee is within limits
						Luke Moir	Chipping concrete/ shoveling	Full-face APR	50	301	2800	1755.83	35.12	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, exposure exceeds the OSHA AL.	25.30	15.87	0.32	Exposure exceeds OSHA RP PEL (5 mg/m3); however, when APF associated with respirator is applied, the employee is within limits
02/16/2005	**Greene**	2	4ftx28ftx8ft	1 exhaust fan	Bridge Breast Wall Repairs	Robert Garber	Chipping concrete	Half-face APR	10	314	4100	2682.08	268.21	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, the exposure exceeds the OSHA PEL.	22.30	14.59	1.46	Exposure exceeds OSHA RP PEL (5 mg/m3); however, when APF associated with respirator is applied, the employee is within limits
						Willis Cross	Chipping concrete	Half-face APR	10	181	1100	414.79	41.48	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, the exposure exceeds the OSHA PEL.	6.30	2.38	0.24	None
						Elwin Page	Shoveling/removing conrete debris	Half-face APR	10	310	1370	884.79	88.48	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, the exposure exceeds the OSHA PEL.	9.50	6.14	0.61	Exposure exceeds OSHA RP PEL (5 mg/m3); however, when APF associated with respirator is applied, the employee is within limits

Sampling Date	Town	Region	Containment (yes, no)	Engineering Controls	Job (project, e.g. wear surface replacement)	Employee	Employee Task	Respiratory Protection (RP) Worn?	RP Assigned Protection Factor (APF)	Sample Time (minutes)	Total Respirable Crystalline Silica (RCS) (ug/m3)	RCS 8-hour Time Weighted Average (TWA) Without RP APF (ug/m3)	RCS 8-hour TWA With RP APF (ug/m3)	RCS Notes	Total Respirable Particulates (mg/m3)	Respirable Particulates 8-Hour TWA Without RP APF (mg/m3)	Respirable Particulates 8-hour TWA With RP APF (mg/m3)	Respirable Particulates Notes
02/03/2005	**Bangor**	4	30ftx70ft	Dust Collector	Repair to Degraded Concrete of Underside Columns	Derek Williams	Chipping concrete using rivet buster	Half-face APR	10	404	770	648.08	64.81	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, the exposure exceeds the OSHA PEL.	4.20	3.54	0.35	None
						Jeremey Schobel	Chipping concrete using rivet buster	Half-face APR	10	408	1250	1062.50	106.25	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, the exposure exceeds the OSHA PEL.	7.00	5.95	0.60	Exposure exceeds OSHA RP PEL (5 mg/m3); however, when APF associated with respirator is applied, the employee is within limits
						Joe Prescott	Chipping concrete using rivet buster	Half-face APR	10	412	1220	1047.17	104.72	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, the exposure exceeds the OSHA PEL.	7.50	6.44	0.64	Exposure exceeds OSHA RP PEL (5 mg/m3); however, when APF associated with respirator is applied, the employee is within limits
02/02/2005	**Waldo**	2	12ftx38ft	1 30-inch exhaust fan	Bridge Curb Repairs	Brendan French	Chipping concrete	Full-face APR	50	248	2200	1136.67	22.73	Exposure exceeds the OSHA PEL; however, when APF associated with respirator is applied, the employee is within limits.	9.30	4.81	0.10	None
						Ryan Peolotte	Chipping concrete	Full-face APR	50	248	5900	3048.33	60.97	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, the exposure exceeds the OSHA PEL.	25.60	13.23	0.26	Exposure exceeds OSHA RP PEL (5 mg/m3); however, when APF associated with respirator is applied, the employee is within limits
01/19/2005	**Bangor**	4	30ftx70ft	2 12inch exhaust fans	Repair to Degraded Concrete of Underside Columns	Derek Williams	Chipping concrete	Half-face APR	10	409	1560	1329.25	132.93	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, the exposure exceeds the OSHA PEL.	9.70	8.27	0.83	Exposure exceeds OSHA RP PEL (5 mg/m3); however, when APF associated with respirator is applied, the employee is within limits
						Jeremey Schobel	Chipping concrete	Half-face APR	10	404	2350	1977.92	197.79	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, the exposure exceeds the OSHA PEL.	13.70	11.53	1.15	Exposure exceeds OSHA RP PEL (5 mg/m3); however, when APF associated with respirator is applied, the employee is within limits
						Joe Prescott	Chipping concrete	Half-face APR	10	404	1590	1338.25	133.83	Exposure exceeds the OSHA PEL. Even when APF associated with respirator is applied, the exposure exceeds the OSHA PEL.	10.80	9.09	0.91	Exposure exceeds OSHA RP PEL (5 mg/m3); however, when APF associated with respirator is applied, the employee is within limits

Appendix B

Proposed Edits to Silica in Construction Compliance Plan

MAINE DEPARTMENT OF TRANSPORTATION

SILICA IN CONSTRUCTION COMPLIANCE PLAN

Revision 7
December 2017

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Deleted: April

Prepared for:

MaineDOT

Maine Department of Transportation
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TABLE OF CONTENTS

APPENDICES

Appendix A OSHA Silica in Construction Standard

Appendix B Site-Specific Checklist & Compliance Monitoring Form for Projects Generating Silica Dust

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1.0 INTRODUCTION

1.1 Overview and Purpose

The Maine Department of Transportation (MaineDOT) maintains thousands of bridges and roadways throughout the State. The numerous repairs and maintenance activities associated with these facilities generates airborne, respirable crystalline silica-containing dust. Silica can be found in many common construction materials including: brick and mortar, concrete, slate, stone aggregate, tile, and blasting sand. Occupational exposures to respirable crystalline silica are associated with the potential development of silicosis, lung cancer, pulmonary tuberculosis, and other airway diseases.

In June of 2016, the Occupational Safety and Health Administration (OSHA) enacted regulations to curb lung cancer, silicosis, chronic obstructive pulmonary disease and kidney disease in America's workers by limiting their exposure to respirable crystalline silica. OSHA Standard 29 CFR 1926.1153 (the "OSHA Silica Standard") applies to construction workers where an employee may be occupationally exposed to silica, as is the case with MaineDOT employees. This standard reduces the permissible exposure limit (PEL) for respirable crystalline silica to 50 micrograms per cubic meter of air ($\mu g/m^3$), averaged over an 8-hour shift; and requires employers to use engineering controls to limit worker exposure, provide respirators when engineering controls cannot adequately limit exposure, limit worker access to high exposure areas, develop a written exposure control plan, offer medical exams to highly exposed workers, and train workers on silica risks and how to limit exposures.

One of the requirements of the OSHA Silica Standard is that employers prepare a written exposure control plan that includes (at a minimum): a description of potential occupational exposure tasks; a description of the engineering controls, work practices, and respiratory protection used to limit employee exposure to respirable silica; a description of the housekeeping measures used to limit employee exposure to respirable crystalline silica; and a description of the procedures used to restrict access to work areas to minimize silica exposure. This document (MaineDOT Silica in Construction Compliance Plan, Revision 6, dated April 2017) addressed and complies with these requirements. A copy of the OSHA Silica in Construction Standard is included as **Appendix A**, and key elements of the OSHA Silica in Construction Standard are included in the following sections.

1.2 OSHA Key Definitions

Select definitions from the OSHA Silica in Construction Standard are provided below.

Action Level

Employee exposure, without regard to use of respirators, to a concentration of airborne respirable crystalline silica of 25 $\mu g/m^3$ of air, calculated as an 8-hour time weighted average (TWA). The action level is used to trigger when employers must implement certain worker protection measures, and to permit planning to prevent worker exposures above the Permissible Exposure Limit (PEL) (defined below).

Assigned Protection Factor

The workplace level of respiratory protection that a respirator or class of respirators is expected to provide to employees when the employer implements a continuing, effective respiratory protection

program. For example, a NIOSH-approved half face air purifying respirator has a protection factor of ten which means that proper use and fit of this respirator would reduce your exposure ten times.

Breathing Zone

The area in which personal exposure air samples are collected. It is the area from which the employee draws air and has been defined as being as close as possible to the nose and mouth and a hemisphere forward of the shoulders with a radius of 6 to 9 inches.

Competent Person

A person who is capable of identifying existing and foreseeable respirable crystalline silica hazards in the workplace and who has authorization to take prompt corrective measures to eliminate or minimize them. A "competent person" must also conduct inspections of job sites, materials and equipment as required by the compliance program.

High Efficiency Particulate Air (HEPA) Filter

A HEPA filter is a disposable, extended-media, dry type filter exhibiting a minimum collection efficiency of 99.97% at a test aerosol (particle) diameter of 0.3 micrometer (µm). 0.3µm particles approximate the most difficult size range to capture; sizes above and below are easier to capture. As reference, a micrometer is one millionth of a meter (one thousandth of a millimeter). Particles less than 10µm are called “respirable” and small enough to be inhaled deeply into the lungs, in the alveolar or gas-exchange regions.

Occupational Exposure Limit (OEL)

Generic term referring to non-enforceable exposure limits set forth by various agencies such as the American Conference of Governmental Industrial Hygienist (ACGIH) Threshold Limit Values (TLVs), National Institute of Occupational Safety and Health (NIOSH) Recommended Exposure Limits (RELs), OSHA PELs, and American Industrial Hygienist Association (AIHA) Workplace Environmental Exposure Levels (WEELs).

Permissible Exposure Limit (PEL)

Employee exposure, without regard to use of respirators, to an airborne concentration of respirable crystalline silica of 50 µg/m^3, calculated as an eight-hour TWA. Employers must assure that no employee is exposed to airborne crystalline silica above the PEL.

Respirable Crystalline Silica

The three most common forms of silica encountered in industry and construction are quartz, cristobalite, and tridymite. Silica contained in airborne particles that are determined to be respirable by a sampling device designed to meet the characteristics for respirable-particle-size-selective samplers specified in the International Organization for Standardization (ISO) 7708:1995.

1.3 Regulated Tasks

The OSHA Silica Standard includes a table which lists 18 common construction tasks, along with acceptable exposure control methods and work practices that limit silica exposure for those tasks. If an employer is conducting of the specific tasks listed in this table AND is using exposure control methods exactly as specified in that table, then the employer is considered to be in compliance with the OSHA Silica Standard. A copy of the OSHA Silica Standard is included in Appendix A.

If an employer is conducting work tasks which are not specified in the aforementioned table; or if that employer is performing those tasks using modified or alternative exposure control methods, then the employer is responsible for determining if that particular task has the potential for employee exposure to respirable crystalline silica to exceed the OSHA AL of 25 µg/m^3. This determination is made through air monitoring and exposure assessments.

Deleted: In accordance with the OSHA Silica Standard, if employees are engaged in certain tasks (as outlined in **Appendix B**), an employer is responsible for implementing certain engineering controls, work practices and respiratory protection requirements. The table presented in **Appendix B** includes generic tasks which have been defined and characterized by OSHA, and are non-specific to MaineDOT. However, if a MaineDOT task matches the description of the work tasks, as defined by OSHA, the requirements outlined in **Appendix B** shall be followed.

2.0 CHARACTERISTICS OF RESPIRABLE SILICA

2.1 Health Effects

Occupational exposure to crystalline silica often occurs as part of or working alongside common workplace operations involving cutting, sawing, drilling, and crushing of concrete, brick, block, rock, and stone products. Operations using sand products can also result in worker inhalation of small (respirable) crystalline silica particles in the air. Health effects from silica exposures include:

- Silicosis, a disabling, non-reversible and sometimes fatal lung disease;
- Other non-malignant respiratory diseases, such as chronic bronchitis;
- Lung cancer; and
- Kidney disease, including nephritis and end-stage renal disease.

Silicosis is the illness most closely associated with occupational exposure to silica. Silicosis is a fibrotic (scar tissue formation) lung disease that is irreversible but completely preventable. Symptoms of silicosis include fatigue, severe cough, fever, loss of appetite, chest pain, and shortness of breath.

To a lesser extent, there is cause for concern that silica exposures may be associated with auto-immune disorders and cardiovascular disease. The International Agency for Research on Cancer (IARC) classifies crystalline silica as a Class 1 carcinogen (cancer-causing agent), signifying that there is "sufficient evidence of carcinogenicity in humans." [1]

2.2 Routes of Entry

Silica dust is hazardous when very small (respirable) particles are inhaled (<10 microns in diameter). These respirable dust particles can penetrate deep into the lungs and cause disabling and sometimes fatal lung diseases, including silicosis and lung cancer, as well as kidney disease. Inhalation of silica may be a result of improper use of a respirator, failing to use a respirator, proximity to silica-generating activities, smoking with dirty hands, or other reasons.

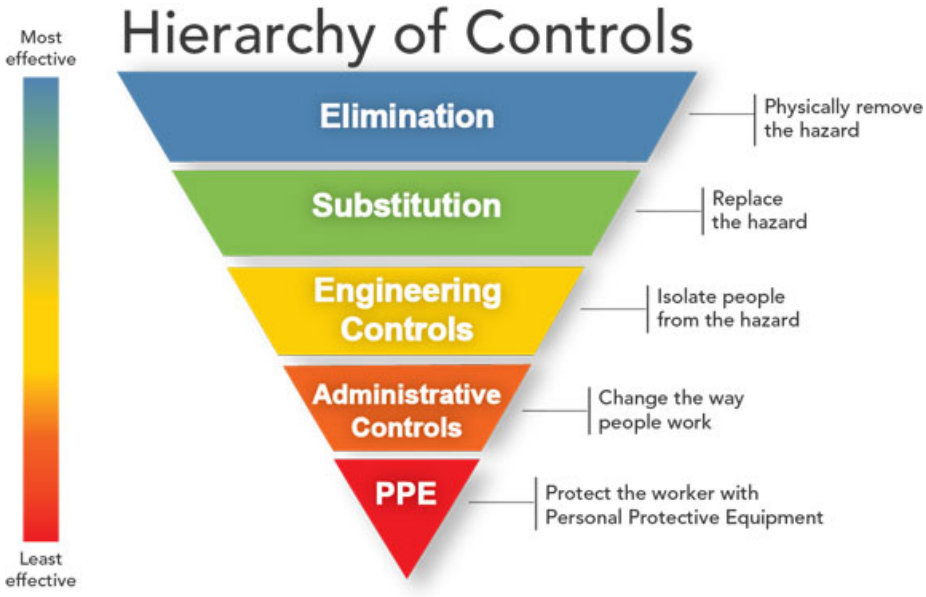
2.3 Methods of Employee Exposure

Occupational exposure to respirable crystalline silica occurs when cutting, sawing, drilling, and crushing of concrete, brick, ceramic tiles, rock, and stone products. Occupational exposure also occurs in operations that process or use large quantities of sand. Common activities conducted at MaineDOT that generate airborne crystalline silica include: wing wall, rails, and curb repairs; bridge deck resurfacing; seasonal bridge/road cleaning and sweeping; ditching; Pugmill operations; and surface preparation sand blasting (see Table 1).

[1] https://www.osha.gov/dsg/topics/silicacrystalline/health_effects_silica.html

3.0 PROTECTIVE MEASURES

The MaineDOT implements engineering and administrative controls to reduce and maintain employee exposure to respirable silica below the OSHA PEL. Wherever feasible engineering and administrative controls are not sufficient to reduce employee exposure below the OSHA PEL, the employer shall require the use of personal protective equipment and respiratory protection. The MaineDOT implements a hierarchy of controls, as shown below, as a means of determining how to implement feasible and effective control solutions. The idea behind this hierarchy is that the control methods at the top of graphic are potentially more effective and protective than those at the bottom.



It should be noted that silica-generating work tasks completed by MaineDOT personnel range from large scale, multi-day concrete repair tasks, to intersection sweeping tasks that may last less than one hour. The following sections outline exposure control methods which may or may not be applicable, based on task duration and potential exposure risks. If a worker is unclear of the level of control/protective measures to be used, they should contact the MaineDOT designated Transportation Operations Manager (TOM) or another approved competent person for clarifications. Workers may also refer to the Site-Specific Pre-Job Checklist (described in Section 4.1) which outlines the type of work to be conducted; a description of the tools and equipment which are necessary to complete the task; a description of the site setup (containment/enclosure type, hygiene facilities, zones/signage, etc.); a description of waste management components; and a description of required personal protective equipment and respiratory protection.

3.1 Elimination and Substitution

Elimination and substitution, while most effective at reducing hazards, also tend to be the most difficult to implement in an existing process. Because silica-generating work is required as part of day-to-day tasks, elimination and substitution of hazards may not be possible.

3.2 Engineering Controls

Engineering controls are designed to reduce the potential that the hazard will come in contact with a worker. Whenever feasible, MaineDOT will utilize engineering controls to reduce worker exposure to respirable silica. Such controls include dust suppression via water application, or dust suppression via mechanical methods (local exhaust ventilation, HEPA-filtered vacuum attached to a shrouded power tool, dilution ventilation, etc.).

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Engineering controls, if utilized, will be selected and approved by the MaineDOT designated TOM or another approved competent person. Table 1, below, provides a summary of the engineering controls which may be applicable for MaineDOT-specific job tasks. More than one engineering control technique may apply to a given job type, thus providing the MaineDOT designated TOM or another approved competent person with options depending on equipment availability, crew training and time. Based on historic MaineDOT exposure monitoring, the following table presents the tools/equipment, dust control options and minimum respiratory protection requirements for specific MaineDOT tasks. This table shall be considered supplemental to the OSHA-defined tasks identified in **Appendix B**.

Table 1: Silica Generating Tasks, Tools/Equipment, and Engineering Control Measures for MaineDOT-Specific Tasks

Operations & Maintenance Tasks	Example Tools/Equipment	Engineering Control Options [1]
WORK CONDUCTED INSIDE AN ENCLOSURE/CONTAINMENT		
Concrete Removal/Repair: Removal and repair of deteriorated concrete of bridge component structures; cleanup activities (e.g., shoveling, dumping concrete debris, etc.)	Concrete cutting saw, chipping hammer (W-4), rivet buster, pavement breaker, jackhammer, drill, shovel	• Dust suppression with water (ambient air above freezing temps) • Prohibit dry sweeping, empty concrete debris cautiously to limit generating airborne particulates. • Local exhaust ventilation • Vacuum shrouded tools [2] • General dilution ventilation (exhaust fans)
WORK CONDUCTED IN AMBIENT AIR		
Concrete Removal/Repair: Removal and repair of deteriorated concrete of bridge component structures; cleanup activities (e.g., shoveling, dumping concrete debris, etc.)	Concrete cutting saw, chipping hammer (W-4), rivet buster, shovel, pavement breaker, jackhammer, drill, skid steer (with demolition hammer, sweeper or bucket loader)	• Dust suppression with water (ambient air above freezing temps) • Prohibit dry sweeping, empty concrete debris cautiously to limit generating airborne particulates. • Local exhaust ventilation • Vacuum shrouded tools [2] • General dilution ventilation (exhaust fans)

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Operations & Maintenance Tasks	Example Tools/Equipment	Engineering Control Options [1]
Surface Preparation: Blasting with low silica content (<1% silica) media	Blaster	• Good work practices/handling procedures to minimize generating particulates • Efficiency in completing task to reduce exposure duration • Local exhaust ventilation
Surface Preparation: Compressed air blow down	Compressed air gun	• Efficiency in completing task to reduce exposure duration • Controlled access
Wear Surface Replacement: Concrete demolition, rebar cutting, and debris removal	Skid steer demolition hammer, grinder, bucket loader, concrete cutting saw, push broom, power broom, chipping hammer, jackhammer	• Dust suppression with water (ambient air above freezing temps) • Good work practices (e.g., appropriate positioning of equipment, standing upwind, emptying bucket cautiously to limit airborne particulates). • Local exhaust ventilation • General dilution ventilation (use of fans)
Wear Surface Replacement: Compressed air blow down	Compressed air gun	• Efficiency in completing task to reduce exposure duration • Controlled access
Wear Surface Replacement: Grinding with skid steer	Skid steer grinder attachment	• Concrete: dust suppression with water (ambient air above freezing temps) • Asphalt: good work practices/ handling procedures to minimize generating particulates and local exhaust ventilation
Blasting support / loading and maintaining the blasting media system	Blast pot	• Good work practices/handling procedures to minimize generating particulates • Local exhaust ventilation
Housekeeping/cleaning project site buildings (e.g., wash room, change room, work vehicles)	HEPA vacuum, mop, rags/towels	• HEPA vacuuming only (no dry sweeping) • Wet methods
Changing Tires (Fleet Services)	Air compressor wrench, tire iron, bead breaking wedge	• Good work practices and housekeeping to minimize airborne particulates
Cleaning interior spaces (e.g., garages, camps)	Broom, HEPA vacuum, mop	• Use of a HEPA vacuum or sweeping compounds • Wet methods • Sweeping compound
Seasonal bridge and road cleaning (laborers, flaggers, truck drivers, operators)	Power broom, push broom, shovel, front end loader	• Dust suppression with water (ambient air above freezing temps)
Pug mill operations	Pug mill, front end loader, dump trucks	• Partial enclosure of the conveyor belt carrying dry, powdered concrete. • Dust suppression with water (ambient air above freezing temps)
Ditching	Excavator	• Dust suppression with water, as necessary (ambient air above freezing temps)

NOTES:

(1) Engineering controls will be evaluated on a project by project basis to assess feasibility of implementation.

(2) Vacuum shrouded tools shall be connected to a HEPA vac with a minimum flow rate of 70 cubic feet per minute (CFM) and shall have a pre-filter or cyclone.

Commented [JLM1]: Work practices, efficiency, and controlled access are NOT engineering controls and should be removed from this table.

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3.2.1 Dust Suppression with Water

When temperatures are above freezing, specifically in the spring, summer, and fall months, water will be used as much as practicable to suppress dust generated by power tools and equipment such as the concrete cutting saw, jackhammer, and the skid steer demolition hammer attachment. Dust suppression is the preferred control method due to its cost, effectiveness, and accessibility. When using water to suppress dust, caution must be taken to apply an adequate flow without creating slurry or runoff.

3.2.2 Local Exhaust Ventilation / Vacuum Shrouded Tools

Local exhaust ventilation is used on handheld tools or equipment where dust is exhausted through a shroud at the point of generation. A handheld tool or piece of equipment is retrofitted with a shroud that captures and exhausts dust to a HEPA-filtered vacuum. A HEPA-filtered vacuum is required to limit particulates from becoming airborne and ultimately inhaled by the employee. A pre-filter or cyclone is recommended to increase the HEPA filter's service life, and installation of a pressure gauge can act as a filter replacement indicator.

3.2.3 Dilution Ventilation

Dilution ventilation is achieved by introducing air to dilute the contaminant before it reaches the breathing zone. Clean make-up air is brought into the space, and the contaminated air is exhausted outside of the work area. This is best achieved in an enclosed space where a negative pressure system is established such as during the use of a dust collector. However, in open air, dilution ventilation with the use of an industrial exhaust fan may be effective in moving contaminated air away from the worker's breathing zone. Exhaust fans may not be effective in high dust-generating activities, and contaminated air may be moved within the work zone and impact employees outside of the direct area. Furthermore, exhaust fans may not be feasible when environmental conditions are rainy and windy, for example.

3.3 Administrative Controls

Administrative controls are designed to change the way people work in order to reduce potential for exposure to respirable silica. Administrative controls that are applicable to MaineDOT's silica dust generating activities are described in the following sections.

3.3.1 Worker Training

OSHA requires that training be provided to any worker exposed to respirable silica at or above the Action Level on any day (regardless of job duration). Training shall be provided prior to an employee working on a job site which has the potential to contain silica dust, and shall be conducted on an annual basis for the duration of the employee's employment. The training program must include the following:

- The health hazards associated with exposure to respirable silica;
- The relevant symptoms of exposure to respirable silica and proper reporting procedures of such symptoms;

- Specific tasks in the workplace that could result in exposure to respirable silica;
- Specific measures the employer has implemented to protect employees from exposure to respirable crystalline silica, including engineering controls, housekeeping, work practices, emergency procedures, and respirators to be used;
- The purpose, selection, fitting, use, and limitations of respirators;
- The contents of the OSHA Silica Standard;
- The identity of the competent person designated by the employer; and
- The purpose and a description of the required medical surveillance program.

If requested by the worker, the MaineDOT shall provide copies of pertinent training materials, including a copy of the OSHA Silica Standard (**Appendix A**).

3.3.2 Hazard Communication

Workers must be provided information concerning silica hazards according to the requirements of OSHA's Hazard Communication Standard (29 CFR 1910.1200). This information includes, but is not limited to, warning signs, labels and safety data sheets (SDSs).

The MaineDOT Hazard Communication Policy is detailed in Hazard Communication H&S Policy 1330, Version 1, February 2013.

3.3.3 Equipment and Site Maintenance

Equipment, tools and engineering controls shall be maintained and repaired in accordance with the manufacturers recommendations. MaineDOT employees shall report any malfunctioning tools to his/her supervisor to facilitate repair.

The MaineDOT maintains several types of equipment and tools. The following paragraphs present a brief overview of representative tools/equipment, make/model, and standard O&M procedures. These tools are typical of those used on MaineDOT sites; comparable makes and models may be used.

<u>HEPA Vacuums</u>

- HEPA vacuums must be equipped with a HEPA filter exhibiting a minimum collection efficiency of 99.97% at a test aerosol (particle) diameter of 0.3 micrometer (µm).
- HEPA vacuums will be emptied and serviced in a manner and location that includes exposure controls including ventilation and personal protective

equipment; prevents contamination of clean surfaces and minimizes re-introduction of silica into the workplace; and maintains good vacuum function and follows manufacturer's recommendations.

Vacuum-Shrouded Power Tools

- The tools shall be attached to a vacuum hose which carries the captured dust to a vacuum with HEPA filter for subsequent proper management.
- Workers shall be trained on the proper operation of the vacuum-shrouded power tools. The training shall include instruction on the maintenance of tools and vacuums to assure efficient capture of dust on the job site.
- Vacuum cleaners shall be cleaned and maintained in Zone 2 of the job-site, by trained personnel wearing appropriate PPE and respiratory protection.

Respirators

- Although make and model may vary depending on fit testing results, most MaineDOT employees use North by Honeywell 7600 Series Full Facepiece respirators or 7700 Series Half Facepiece respirators. If a different make or model is required, it shall be approved by the regional MaineDOT Occupational Safety Specialist.
- Respirator use, and associated cleaning, maintenance and troubleshooting should be performed in accordance with the MaineDOT Respiratory Protection Program (most recent revision). This document is included as Section 4 of this Compliance Manual.
- Representative respirator specifications and manufacturer O&M Manuals are included as Appendix C of the of the MaineDOT Lead in Construction Compliance Plan (most recent revision, included as Section 1 of this Compliance Manual.

3.3.4 Worker Protection Zones/Signs and Postings

For silica-generating job tasks which last less than three days, site setup and zoning is likely not applicable. This determination shall be made by the MaineDOT designated TOM or another approved competent person.

For silica-generating work sites on which silica-generating activities last three days or longer and which have concentrations of silica in air which exceed the OSHA Action Level (mobilization, site setup and demobilization time does not count towards this three-day rule), a Competent Person shall establish worker protection zones and signage, as detailed below.

Zone 0: Public Zone

Zone 0 consists of off-site areas and areas which are adjacent to the site. These areas are not controlled by MaineDOT supervisors or employees, and are accessible to the public.

Signs must be placed at the boundary between Zone 0 and Zone 1 to demarcate the extent of the job site.

Zone 1: Support Zone

Zone 1 consists of areas on the job site where equipment and wastes are not handled or stored, and no silica-generating tasks are conducted. General industry safety measures are required in exterior portions of Zone 1 (i.e. standard MaineDOT personal protective equipment of hard hat, eye protection, steel-toe boots and high visibility vest); however, no respiratory protection is necessary. On a typical job site, Zone 1 would include work support areas, vehicle parking and designated smoking areas.

As stated previously, signs should be placed at the boundary between Zone 0 and Zone 1 to demarcate the extent of the appropriate zones. Signs must also be placed at the boundary between Zone 1 and Zone 2.

Zone 2: Contamination Reduction Zone

Zone 2 consists of areas on the job site that include storage and handling of equipment and wastes. Decontamination procedures also occur in Zone 2. No silica-generating tasks are conducted in this zone. General industry safety measures are required in this zone (i.e. standard MaineDOT personal protective equipment of hard hat, gloves, eye protection, steel-toe boots and high visibility vest). Respiratory protection may also be required, based on which tasks are being performed in Zone 2 (decontamination, vacuuming of coveralls, and handling of wastes). See Section 3.3.6 for a description of decontamination procedures.

On a typical job site, Zone 2 may include an equipment/waste storage shed, a wash station/decontamination station, changing facilities (including designated storage area for personal protective equipment and respirators), and a wash water collection system. Eating, drinking and smoking are prohibited in this zone.

As stated previously, signs should be placed at the boundary between Zone 1 and Zone 2 to demarcate the extent of the appropriate zones. Signs must also be placed at the boundary between Zone 2 and Zone 3.

Zone 3: Work Zone

Zone 3 consists of contained areas where respirable silica dust is generated. General industry safety measures are required in this zone (i.e. standard MaineDOT personal protective equipment of hard hat, gloves, eye protection, steel-toe boots and high visibility vest). Respiratory protection may also be required. Eating, drinking and smoking are prohibited in this zone.

As stated previously, signs should be placed at the boundary between Zone 2 and Zone 3 to demarcate the extent of the appropriate zones. Silica warning signs must also be posted in this zone. The Work Zone (Zone 3) will revert to Zone 2 following silica dust generating activities and cleanup.

3.3.5 Hygiene Practices

Change Areas

A designated change area will be used by workers who may be exposed to respirable silica at concentrations above the OSHA PEL (Zones 2 and 3). Personal items, such as street clothing, must be stored separately from work clothing to prevent cross-contamination with silica-containing dust. Workers are not allowed to leave the workplace wearing any protective clothing or equipment required to be worn during the work shift, unless adequate decontamination has occurred.

For short-term silica-generating job tasks (i.e. less than three days), a MaineDOT camp may be used for a change area, or a change area may not be necessary (refer to the MaineDOT designated TOM or another approved competent person for additional information).

Washing Facilities

Per MaineDOT policy, wash facilities with running water are provided to silica-generating work sites on which silica-generating activities last three days or longer and which have concentrations of silica in air which exceed the OSHA Action Level (mobilization, site setup and demobilization time does not count towards this three-day rule).

Deleted: If work tasks will be completed in less than three days, the MaineDOT designated TOM or another approved competent person has the option to forego wash facilities with running water and provide wipes to employees as a decontamination/wash method.

Wash areas shall be provided for cleaning hands, face and other exposed body areas. Washing (or wiping with pre-moistened wipes for short-term silica-generating job tasks) shall occur immediately upon leaving the silica work areas (Zones 2 and 3) before breaks, and at the end of the work shift. See Section 3.3.6 for decontamination procedures.

Management of wash water shall be arranged by the MaineDOT designated TOM or another approved competent person in accordance with the MaineDOT Hazardous Waste Management Plan (most recent revision), included as Section 3 in this Compliance Manual. Generally, soapy wash water that flows through a plumbing system must be captured and managed by disposal into a septic system or publicly owned treatment works. Silica waste water that is not plumbed can be discharged to the ground.

If work tasks will be completed in less than three days, the MaineDOT designated TOM or another approved competent person has the option to forego wash facilities with running water and provide wipes to employees as a decontamination/wash method. Wipes should be carried in MaineDOT work trucks and provided to workers so that they can wash their hands and face prior to leaving a job site, taking a break, or eating/drinking/smoking.

Eating Facilities

Clean lunchroom facilities or eating areas (such as a trailer) will be provided by MaineDOT. The eating area must be readily accessible and maintained as free from silica contamination as practicable. Workers must wash their hands and face prior to eating, drinking, smoking or applying cosmetics, and shall not enter lunchroom facilities or eating areas with protective work clothing or equipment unless proper decontamination has occurred.

For silica-generating job tasks which last less than three days a MaineDOT camp or vehicle may be used for an eating facility (refer to the MaineDOT designated TOM or another approved competent person for additional information).

3.3.6 Summary of Break Procedures / Decontamination

The following decontamination procedures shall be used every time an employee leaves a silica work area (Zone 3). During decontamination steps, the worker shall take extreme care to prevent inhalation of silica dust.

Zone 3

- Vacuum outer protective clothing in containment area, using an approved vacuum with HEPA filter. Take care to vacuum Tyvek/coveralls, hard hat, gloves, boots, wrists/ankles, and area around the employee's neck. Vacuuming may be done at the border or Zone 3/Zone 2.
- NO PPE OR RESPIRATORY PROTECTION DEVICES SHALL BE REMOVED IN ZONE 3.
- Once vacuuming is complete, the employee may enter Zone 2.

Zone 2

- Un-tape wrists and ankles, remove outer protective clothing (hard hats, boot covers, gloves, and Tyvek/coveralls). These items remain in Zone 2 (change room or exterior hangers). DO NOT REMOVE RESPIRATOR.
- At end of the day, dedicated/laundered coveralls shall be placed in closed, labeled container for off-site washing.
- Wash or wipe any exposed skin surfaces (neck, face, forehead, ears).
- Wipe exterior of respirator.
- Wash hands and forearms.
- Remove respirator.
- Respirator should be cleaned daily and stored in an area where it will not become re-contaminated with silica dust (i.e. it should not be placed with coveralls in the change room). See the MaineDOT Respiratory Protection Plan (most recent revision) included as Section 4 of this Compliance Manual for additional information on respirator maintenance, cleaning and repair.
- Wash any exposed skin surfaces thoroughly (hands, arms, face, neck and ears). Use wipes if no wash water station is present.

For short-term silica-generating job tasks (i.e. less than one day), decontamination procedures shall generally follow the steps outlined above however, pre-moistened wipes will be used in lieu of running water/washing facilities.

3.3.7 Housekeeping

Commented [JLM3]: Should we add a paragraph about short-term silica job sites?

To the extent practicable, surfaces must be maintained free of silica accumulations. MaineDOT housekeeping practices shall include the following, at a minimum:

Daily

- Use a vacuum equipped with HEPA filter to remove dust and debris from containment and silica work area (Zone 3).
- Shoveling, sweeping, or brushing to clean these areas is not permitted unless adequate dust collection/ventilation/negative-pressure containment is in use.
- Compressed air shall not be used to blow down/clean work areas under any circumstances.
- Wet-wipe tables, benches and heavily-used surfaces in the lunch/break room.
- Use the two-bucket method for cleaning surfaces.
    - Use two buckets: one with soapy water/cleansing agent; one with clean rinse water.
    - Step 1: Put rag/cloth into soapy water (bucket 1)
    - Step 2: Thoroughly clean surfaces
    - Step 3: Rinse rag/cloth in clean water (bucket 2)
    - Step 4: Wring out rag/cloth well into bucket 2
    - Repeat as necessary
- If buckets/water are not available, wet wipes are an adequate substitution
- Rags used for wet-wiping surfaces shall be placed in closed, labeled container for off-site washing; or shall be disposed in accordance with the MaineDOT Hazardous Waste Management Plan (most recent revision) included as Section 3 of this Compliance Manual.
- Management, disposal or treatment of wash water and other wastes shall be arranged by the MaineDOT designated TOM or another approved competent person.

- Clean and properly store respirators (information provided in the MaineDOT Respiratory Protection Program (most recent revision) included as Section 4 of this Compliance Manual).

Weekly

- Use a vacuum equipped with HEPA filter to clean surfaces of site buildings (floors, tables, benches, chairs, desks, window sills, etc.). Shoveling, sweeping, or brushing to clean these areas is not permitted. Compressed air shall not be used to blow down/clean these areas under any circumstances.

- Wet-wipe surfaces of site buildings (floors, tables, benches, chairs, desks, window sills, etc.). Use the two-bucket method for cleaning surfaces, or wet wipes if water/buckets are not available.

Use a vacuum equipped with HEPA filter to clean the interior of MaineDOT work trucks on a regular basis (i.e. when dust is visible on surfaces). Wet-wipe surfaces of vehicle interior (dashboard, arm rests, floor mats, etc.) using the two-bucket method or wet wipes, as applicable.

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3.4 Personal Protective Equipment

3.4.1 Protective Clothing

Commented [JLM4]: Should we add a paragraph about short term silica job sites?

The OSHA Silica Standard prohibits a worker from wearing "street clothes" in work areas where concentrations of silica exceed the Action Level. Accordingly, guidelines for protective clothing are detailed below and summarized in Table 2. Protective clothing will be provided by MaineDOT at no cost to the workers.

- Each worker exposed to silica shall wear protective outer coveralls (over street clothes) consisting of either a disposable hooded Tyvek suit (or equivalent), or washable cloth coveralls.

- Both Tyvek suits and washable coveralls shall be replaced daily, at a minimum. Immediate replacement should occur if outer coveralls/Tyvek are damaged or torn, if significant wear is observed (i.e. threadbare elbows/knees), or if the interior of the suit comes into contact with silica dust.

- Coveralls and other articles to be laundered shall be placed in a closed container (such as a plastic bag) in the change area. Coveralls shall be laundered by a commercial facility. The laundry shall be notified in writing of the potentially harmful effects of exposure to silica. The containers of silica-contaminated clothing will be labeled: “Caution: Clothing contaminated with silica-containing dust. Do not remove dust by blowing or shaking.”

- Tyvek suits shall be disposed in a closed container in the change area, as appropriate. Waste shall be managed and labeled in accordance with

provisions outlined in the MaineDOT Hazardous Waste Management Plan (most recent revision) included as Section 3 of this Compliance Manual.

- The wrists and ankles of the outer protective suits shall be taped to the outer gloves and/or boots, as appropriate.
- Workers shall wear a hard hat, outer work/protective gloves, steel toe boots (or boot covers), high visibility vest, and safety glasses in accordance with MaineDOT's safety policy. As necessary for job conditions, workers may also wear hearing protection, safety harnesses, or other safety measures.
- Respiratory protection must be utilized as outlined in Section 3.4.2, below, and the MaineDOT Respiratory Protection Plan (most recent revision) included as Section 4 of this Compliance Manual.

Table 2: Silica Generating Tasks, Required PPE and Respiratory Protection

Operations & Maintenance Tasks	Minimum Respiratory Protection	Standard MaineDOT PPE (1)	Outer Work Gloves (Abrasion Resistant)	Coveralls(2)
WORK CONDUCTED INSIDE AN ENCLOSURE/CONTAINMENT				
Concrete Removal/Repair: Removal and repair of deteriorated concrete of bridge component structures; cleanup activities (e.g., shoveling, dumping concrete debris, etc.)	Full-face APR with HEPA filter, filter cartridge changes daily	X	X	X
WORK CONDUCTED IN AMBIENT AIR				
Concrete Removal/Repair: Removal and repair of deteriorated concrete of bridge component structures; cleanup activities (e.g., shoveling, dumping concrete debris, etc.)	Half-face APR with HEPA filter, filter cartridge changes daily	X	X	X
Surface Preparation: Blasting with low silica content (<1% silica) media	Supplied air respirator – Bullard-style with an APF of 1,000	X	X	X
Surface Preparation: Compressed air blow down	Half-face APR with HEPA filter, filter cartridge changes daily	X	X	X
Wear Surface Replacement: Concrete demolition, rebar cutting, and debris removal	Half-face APR with HEPA filter, filter cartridge changes daily	X	X	X
Wear Surface Replacement: Compressed air blow down	Half-face APR with HEPA filter, filter cartridge changes daily	X	X	X
Wear Surface Replacement: Grinding with skid steer	Concrete: Half-face APR with HEPA filter, filter cartridge changes daily	X	X	X
	Asphalt: None	X	X	X
Blasting Support: Loading and maintaining the blasting media system	Half-face APR with HEPA filter, filter cartridge changes daily	X	X	X
Housekeeping/cleaning project site buildings (e.g., wash room, change room, vehicles)	None	X		
Changing Tires (Fleet Services)	None	X		
Cleaning dirt/debris from floor in interior space (e.g., garages, camps)	None	X		
Seasonal bridge and road cleaning, including push and power broom operator, flagger and water truck driver, skid steer operator with power broom attachment and front end loader	None (provided dust suppression with water)	X		
Pug mill operations	None	X		
Short-Term Silica Job Sites (Road Work)	None	X		
Ditching	None	X		

Commented [JLM5]: See recommendation section of text for recommendations regarding haymulching

NOTES:

(1) Standard MaineDOT PPE (exterior locations) includes hard hat, work gloves, steel toe boots, high-visibility vest, and eye protection. If required by Site conditions, hearing protection and fall protection may also be required.

(2) Hooded Tyvek suits or washable fabric coveralls, taped at the wrists and ankles.

3.4.2 Respiratory Protection

The MaineDOT has developed a respiratory protection program in accordance with §1910.134, which outlines procedures for respirator use and fit testing, respirator and filter cartridge selection, and specific medical monitoring procedures for use of a respirator. The MaineDOT Respiratory Protection Plan (most recent revision) is included in Section 4 of this Compliance Plan. The MaineDOT Respiratory Protection Plan provides guidance for the type of respiratory protection required for specific job functions at silica sites.

Respiratory protection has been assigned based on initial and periodic monitoring data obtained during monitoring of numerous projects from 2002 until the present. The MaineDOT Occupational Safety Specialist should be consulted for additional information, if necessary.

Deleted: Based on this data, two types of respirators were found to provide adequate protection and are therefore permitted for use by MaineDOT workers on silica-generating sites. Employees may select more protective respiratory protection as long as requirements outlined in the Respiratory Protection Program (e.g., fit testing, medical clearance) have been met.

Half-Face Air Purifying Respirator (APF=10)

- To be used when performing the following tasks outdoors (without containment): Removal and repair of deteriorated concrete (jack hammering, chipping, drilling concrete, concrete cutting with masonry saw, sweeping and shoveling concrete debris); and wear surface replacement (concrete demolition with jackhammer, chipper, using Bobcat attachment hammer and grinder, rebar cutting, and debris removal).
- See Section 3.3.3 for typical makes and models of half-face respirators used by MaineDOT employees, as well as a discussion on respirator maintenance.

Full-Face Air Purifying Respirator (APF=50)

- To be used when performing the following tasks inside containment: Any concrete demolition work (jack hammering, chipping, drilling concrete, concrete cutting with masonry saw)
- See Section 3.3.3 for typical makes and models of full-face respirators used by MaineDOT employees, as well as a discussion on respirator maintenance.

Supplied-Air Respirator (APF = 1,000)

Commented [JLM6]: Add Powered Air Purifying Respirator and Bullard Hood (Fleet Garages?)

- To be used when performing surface preparation blasting.
- See Section 3.3.3 for typical makes and models of supplied-air respirators used by MaineDOT employees, as well as a discussion on respirator maintenance.

Control measures outlined in Table 1 must be implemented accordingly prior to the consideration of respiratory protection; respirators with higher assigned protection factors may be required if control measures are not implemented as outlined in Table 1. Should MaineDOT workers perform job tasks for which silica personal exposure monitoring data is not yet collected or available, then, per OSHA requirements, the highest level of respiratory protection will be used until monitoring data demonstrates that the level of respiratory protection can be reduced.

4.0 SITE SPECIFIC SILICA COMPLIANCE PROGRAM

4.1 Site-Specific Pre-Job Checklist

A Site-Specific Checklist shall be completed by the MaineDOT designated TOM or another approved competent person prior to starting any work task/job which may cause a MaineDOT employee to be exposed to respirable silica dust above the Action Level. This checklist outlines several items, including: the type of work to be conducted; a description of the tools and equipment which are necessary to complete the task; a description of the site setup (containment/enclosure type, hygiene facilities, zones/signage, etc.); a description of waste management components; and a description of required personal protective equipment and respiratory protection. A copy of this checklist is contained in **Appendix C**.

The Site-Specific Checklist shall also be reviewed and signed by the job supervisor. No work shall be performed at any job-site until the Site-Specific Checklist for that job-site has been prepared and approved. The information in this form shall be presented to MaineDOT employees are part of a pre-job site meeting.

A copy of the completed Site-Specific Checklist shall be kept at the job-site at all times work is being conducted. Personnel shall be familiar with the contents and requirements of the completed Site-Specific Checklist and this Compliance Program.

4.2 Job-Site Inspection

The MaineDOT designated TOM or another approved competent person shall be responsible for surveillance and monitoring of activities at each job site to ensure compliance with the requirements the OSHA Silica Standard and this Compliance Manual. The MaineDOT designated TOM or another approved competent person shall visit each job-site periodically to ensure compliance and shall complete a Job-Site Inspection Form. Additional inspections may be conducted by health and safety officers and subcontractors conducting periodic site monitoring. Weekly job reports are also prepared by the supervisor updating progress of the project and any worker health and safety concerns.

The MaineDOT designated TOM or another approved competent person shall use the Compliance Monitoring Form included in **Appendix C.** A copy of the inspection form shall be provided to the Augusta office for review.

5.0 EMPLOYEE EXPOSURE MONITORING

Worker exposure monitoring is conducted when employees are exposed to respirable silica at concentrations which exceed the Action Level. An air monitoring program is the foundation for the silica compliance program and offers pertinent information regarding the efficacy of dust control, the appropriate selection of respiratory protection, and inclusion of employees in the medical monitoring program. Beginning in 2002, MaineDOT workers have been regularly monitored for exposure to silica during the following job tasks and activities in which silica containing particulate is generated:

- Concrete cutting wing walls, guardrails, curbing, rebar, and wearing surfaces;
- Jack hammering deteriorated wearing surfaces;
- Chipping concrete from wing walls, fascia, and curbs using a pneumatic chipping hammer;
- Drilling concrete;
- Grinding and concrete demolition with a skid steer grinder and hammer;
- Seasonal bridge and road cleaning;
- Sweeping and shoveling concrete debris;
- Mowing;
- Surface preparation blasting using silica-containing media
- Blasting support activities (outside containment);
- Ditching; and
- Pugmill operations.

Table 1 outlines the tasks monitored, tools used, required control measures, and minimum level of respiratory protections required. It should be noted that tasks described are not meant to imply the exclusive undertaking of that specific task, but rather to emphasize the task which was primarily undertaken by the monitored worker over the course of the work shift. As such, data may be skewed high or low due to the mixing of actual tasks and the brevity of some tasks which typically produce high concentrations of respirable silica dust. In addition, in instances where little data is currently available for presentation, the level of respiratory protection recommended may be conservative (i.e., higher level of protection required) until additional data becomes available.

5.1 Personal Exposure Monitoring

Monitoring data is maintained to ensure that the initial assessment and identified control measures (including engineering and personal protective equipment) are adequate. Results are reviewed with Managers and Supervisors annually.

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Commented [JLM7]: Add 2017 Monitoring Period Tasks?

Personal exposure monitoring will be conducted to evaluate workers exposure to silica over the course of a specific job task. Air samples are obtained from the workers' breathing zones (within six to nine inches to the nose and mouth) using calibrated sampling pumps and pre-weighed polyvinyl chloride (PVC) filter cassettes. Each cassette is attached to a cyclone for capture and collection of respirable particulates per the requirements of OSHA Method ID-142. The sampling pumps will be calibrated to a flow rate of approximately 2.5 liters per minute (lpm). The cartridge will be located outside of any respiratory protection, so sampling results will be representative of a "worst-case" scenario (what employee exposure would be if no respiratory protection was provided). Samples are to be analyzed by an OSHA certified laboratory and tested for respirable dust per the National Institute for Occupational Safety and Health (NIOSH) modified Method 0600; and silica (crystalline quartz) per NIOSH modified Method 7603 (Grav/IR).

Monitoring will include workers likely to be exposed to the greatest concentrations of airborne silica. Monitoring will be biased towards tasks that have not previously been evaluated, or those with limited historic sampling data.

5.2 Frequency

Whenever possible, exposure monitoring will be conducted at the commencement of a new project/task (or upon changes to procedures, equipment used, or methods), or on projects/task which have not been evaluated in recent history. If data gaps exist (due to infrequency of conducting the project/tasks), those tasks will be evaluated whenever possible. Projects/tasks with silica generating tasks which have silica concentrations which are expected to exceed the PEL will be monitored every three months at a minimum, when feasible. Due to the non-routine silica removal work conducted by the MaineDOT, a specific monitoring frequency may not be feasible. Therefore, the most practical protocol is to conduct periodic exposure monitoring whenever possible to ensure employees' exposures are within the limits outlined herein.

5.3 Reporting

Per OSHA 1926.62(d)(8), workers must receive written notice of monitoring results within 5 working days following receipt of the results. Each affected employee will be notified of the results in writing. If the results indicate an overexposure, the written notice will include a statement that the employees' exposure was at or above the PEL and a description of the corrective action taken or to be taken to reduce exposure to an acceptable level.

6.0 MEDICAL SURVEILLANCE

Each worker who is or may be exposed to respirable silica at concentrations above the Action Level will undergo medical surveillance, as well as those employees required to wear a respirator for 30 or more days per year. Medical examinations and procedures must be performed by or under the supervision of a licensed physician, and must be paid by the MaineDOT. Medical sampling analysis must be performed by an OSHA-approved laboratory.

6.1 Initial Medical Surveillance

MaineDOT employees shall undergo an initial (baseline) medical examination within 30 days after initial assignment, unless the employee has received a medical examination that meets the requirements of this section within the last three years. The examination shall consist of the following, at a minimum:

- A medical and work history, with emphasis on: past, present, and anticipated exposure to respirable silica, dust, and other agents affecting the respiratory system; any history of respiratory system dysfunction, including signs and symptoms of respiratory disease (e.g., shortness of breath, cough, wheezing); history of tuberculosis; and smoking status and history;
- A physical examination with special emphasis on the respiratory system;
- A chest X-ray, interpreted and classified according to the International Labour Office (ILO) International Classification of Radiographs of Pneumoconioses by a NIOSH-certified B Reader;
- A pulmonary function test to include forced vital capacity (FVC) and forced expiratory volume in one second (FEV1) and FEV1/FVC ratio, administered by a spirometry technician with a current certificate from a NIOSH-approved spirometry course (if deemed necessary by a physician);
- Testing for latent tuberculosis infection; and
- Any other tests deemed appropriate by the PLHCP.

6.2 Periodic Examinations

MaineDOT employees shall undergo periodic medical examinations (typically every three years for silica exposure) that include the components described in Section 6.1, above.

If a MaineDOT employee exhibits signs or symptoms consistent with silica exposure, a medical exam must be scheduled immediately.

6.3 Worker Notification

The MaineDOT shall ensure that the employee understands the results of the medical examination, and that each employee is provided with a written medical report within 30 days of the medical exam. The written report shall contain:

- The results of the medical examination, including any identified medical condition(s) that would place the employee at increased risk of material impairment to health from exposure to respirable crystalline silica;
- Any medical conditions that require further evaluation or treatment;
- Any recommended limitations on the employee's use of respirators;
- Any recommended limitations on the employee's exposure to respirable silica; and
- A statement that the employee should be examined by a specialist if the chest X-ray is classified as 1/0 or higher by the B Reader, or if referral to a specialist is otherwise deemed appropriate.

If the results from the initial or periodic examinations indicate that an employee should be examined by a specialist, the employer shall make available a medical examination by a specialist within 30 days after receiving these results.

7.0 RECORD KEEPING

7.1 Exposure Assessments

MaineDOT will establish and maintain an accurate record of monitoring and other data used in conducting worker exposure assessments, as required in paragraph (d)(2) of the OSHA Silica Standard. Exposure monitoring records will include:

- The date(s), number, duration, location, and results of each of the samples taken if any, including a description of the sampling procedure used to determine representative employee exposure where applicable, and the laboratory and methods used for analysis;
- A description of the task that was being performed by the employee, and the duration, at the time the exposure assessment was conducted;
- A description of the sampling and analytical methods used and evidence of their accuracy;
- The type of respiratory protective devices worn, if any;
- Name and job classification of the employee monitored; and
- The environmental variables that could affect the measurement of worker exposure.

MaineDOT will maintain and make available monitoring and other exposure assessment records for at least 30 years (refer to 29 CFR 1910.1020/1926.33).

7.2 Medical Surveillance

MaineDOT will establish and maintain an accurate record for each worker subject to medical surveillance. This record will include:

- The name and description of the duties of the worker;
- A copy of the physician's written opinions;
- Results of any airborne exposure monitoring conducted for that employee and provided to the physician; and
- Any worker medical complaints related to exposure to silica.

MaineDOT will keep, or assure that the examining physician keeps, the following medical records: a copy of the medical examination results including medical and work history; a description of the laboratory procedures and a copy of any standards or guidelines used to interpret the test results or references to that information; and a copy of the results of pulmonary function test and x-ray films in their original state.

MaineDOT will maintain each medical record for the duration of an employee's employment plus 30 years (1910.1020/1926.33).

7.3 Availability

MaineDOT will make available upon request medical and exposure records to affected workers, former workers, and their designated representatives for examination and copying within 30 days of the request. The employer will make readily available to affected workers a copy of the OSHA regulations applicable to silica exposure. In addition, the employer will provide, upon request, any materials relating to the worker information and training program to affected workers, their representatives, the Assistant Secretary of Labor, or the Director of NIOSH.

7.4 Transfer of Records

Should MaineDOT cease operations, the successor agency shall receive and retain records required by the OSHA Silica Standard. If no successor agency is available to receive and retain the records, these records shall be transmitted to the Director of NIOSH.

At the expiration of the retention period for the records required to be maintained by this section, the employer shall notify the Director of NIOSH at least 3 months prior to the disposal of such records and shall transmit those records to the Director of NIOSH if requested.

Ransom Consulting, Inc
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