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HEALTH HAZARD ASSESSMENT

SILICA EXPOSURE

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ABSTRACT

**HEALTH HAZARD ASSESSMENT
FOR
SILICA EXPOSURE**

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I. PURPOSE

The purpose of the Silica Health Hazard Assessment is to:

1. Determine the levels of exposure for employees performing operations outlined in the scope of this assessment
2. Reduce the likelihood for overexposure to employees, from total particulate, total crystalline silica, and respirable crystalline silica, associated with operations outlined in the scope.
3. Comply with the following OSHA Standards:
 - a. 29 CFR 1926.55: Gases, vapors, fumes, dusts, and mists

Which incorporates by reference the American Conference of Governmental Industrial Hygienist's "Threshold Limit Values of Airborne Contaminates" as levels by which, inhalation, ingestion, skin absorption, or contact shall be avoided.

- b. 29 CFR 1910.134: Respiratory protection (if required)
- c. 29 CFR 1926.59: Hazard Communication

II. SCOPE

1. Scope of the Silica Exposure Assessment

The Exposure Assessment consists of the following:

Numerous personal samples for respirable crystalline silica will collect from the breathing zones of employees performing the following operations:

- a. Drilling poured concrete floors / walls
- b. Drilling on concrete products (i.e. manholes, vaults, etc.)
- c. Drilling masonry walls
- d. Grinding operations
- e. Scarifying concrete surfaces

Personal samples will be limited to the employees performing the actual operations outlined above, as R&M is unable to determine the amount or frequency of other trades that will be present during said operations.

2. Anticipated Contaminates to be Sampled

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To determine the exact contaminants to be sampled for, a review of the SDS for the specific products employees will be working with will be conducted, however, as a minimum, personal samples for the following contaminants will be sampled for:

- a. Respirable Crystalline Silica (Cristobalite)(CAS# 14464-46-1)
ACGIH TLV 0.05 mg/m³
- b. Respirable Quartz (CAS# 14808-60-7)
ACGIH TLV 0.05 mg/m³
- c. Portland Cement (CAS # 65997-15-1)
ACGIH TLV 10 mg/m³ - total dust
ACGIH TLV 3 mg.m³ - respirable fraction
- d. Inert or Nuisance Dust
ACGIH TLV 10 mg/m³ - total dust
ACGIH TLV 3 mg.m³ - respirable fraction

3. Method of Assessment

- a. Type of measurement equipment used: Personal samples will be collected using an SKC brand continuous flow personal air-sampling pump (#224-PCXR3) equipped with a cyclone pre-selector. The Cyclone will be equipped with a three piece open faced cassette with a 37-millimeter, polyvinyl chloride, low ash, low moisture pickup filter (5 micrometer pore size).
- b. Measurement data: The personal samples will be taken to indicate the 8-hour time weighted average (TWA) exposure values for the personal samples collected on the survey dates. These TWA values will be calculated using the total exposure time estimated during the survey. The sampling pumps will run for the full eight hours of the employee's workday, excluding lunchtime. Thus, the results should give an accurate indication of the employee's exposure, excluding the use of personal protective equipment.
- c. Standard/s that pertain to the hazard: The Occupational Safety and Health Administration standard 29 CFR 1926.55: Gasses, vapors, fumes, dusts, and mists which incorporated by reference the American Conference of Governmental Industrial Hygienist's "Threshold Limit Values of Airborne Contaminates" as the levels by which employee's exposure to any material listed not exceed the limits outlined. Therefore, the employee's eight-hour time weighted averages will be compared to the limits outlined by the ACGIH for compliance to the standard.

The Occupational Safety and Health Administration standard 29 CFR

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1910.134: Respiratory Protection outlines minimum requirements for a respiratory protection program in the event there is an overexposure to the substance being sampled for and engineering or administrative controls cannot effectively or feasibly reduce the exposure.

- d. Evaluation of control in use: During the time of the assessment employees performing operations referenced above and below (Description of Work Operations) will wear MSA brand half-mask air purifying respirators with high-efficiency particulate air (HEPA) filters which would be expected to reduce exposures by a factor of ten when worn properly as indicated by NIOSH guide to "Respiratory Protection Factors"

4. Description of Work Operations / Engineering-work practice controls

The operation to be conducted consists of but not limited to:

- Floor scarifying using an EDCO Electric Floor Scarifier Model # CPM-8 used in conjunction with an EDCO VAC-100 Self-purging, 100 CFM vacuum.
- Concrete drilling using various electric hammer drills – R&M will employ the use of wet drilling methods or HEPA vacuuming during drilling.

5. Personal Protective Equipment

During the exposure assessment an evaluation of the work operations will be conducted to determine the anticipated exposure given the work activities at hand, the engineering and work practice controls employed (referenced above in the description of work operations), and the employees will be protected accordingly.

After the results of the exposure assessment have been analyzed, recommendations for personal protective equipment including respiratory protection will be provided within the assessment. Additionally, if the exposure assessment determines employees are not overexposed given the engineering and work practice controls employed during the assessment, Robins & Morton reserves the right to conduct additional exposure assessments while changing either engineering controls or work practice controls to determine the acceptable levels of protection.

- The use of personal protective equipment will be defined on a project-by-project basis by the Health and Safety Officer based on the tasks and the results of air monitoring. The PPE shall include but not limited to:
 - i. Long-sleeved shirt and pants
 - ii. Disposable Tyvek or other similar type clothing

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iii. Respiratory protection

- Exposures up to 0.05 mg/m³ Single-use disposable N-95 dust masks
- 0.05 mg/m³ to 1.0 mg/m³ Half-face air-purifying respirator with P-100 filters
- 1.0 mg/m³ to 5.0-mg/m³ Full-face air purifying with P-100 filters or shrouded powered air-purifying respirator with P-100 cartridges.
- The use of all respirators will be performed in accordance with the Robins & Morton Repertory Protection program. Only authorized employees will be permitted to use respirators. Authorized employees will receive medical approval, training and fit-testing in accordance with the requirements of 1910.134.

6. Training and Information

Employees shall be advised of the potential hazards when performing work involving the potential for crystalline silica exposure. The training and information shall include but not limited to the following information:

- a. Health effects and toxicology
- b. Respiratory Protection
- c. Personal Protective equipment
- d. Work Practices to minimize exposure potential
- e. Ventilation and other engineering controls

7. General Work Practices

Every Robins & Morton employee will make every attempt to use engineering controls and alternate work practices to minimize the production of crystalline silica dust.

- a. Use wet methods to minimize generation of dust.
- b. Wet surfaces prior to and during dust generating activities
- c. Use dust recovery systems when practical.
- d. Use protective clothing to minimize the transport of dust.
- e. Wash hand s and face before eating, drinking or upon completion of task.

8. Responsibilities

- Safety:
 - i. Develop and implement air-monitoring program.
 - ii. Conduct employee training.
 - iii. Monitor operations for employee compliance with work procedures.

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- iv. Monitor sub-contractors for compliance with the requirements of this policy
- Supervisors:
 - i. Enforce employee compliance with work procedures.
 - ii. Advise employer of changes in operation that may result in an increase in employee exposure.
 - iii. Monitor operations for employee compliance with work procedures.
 - iv. Monitor sub-contractors for compliance with the requirements of this policy
- Employee:
 - i. Use work methods and protective equipment specified for a specific operation.
 - ii. Participate in air monitoring programs.
 - iii. Participate in training programs.

9. Assessment

- a. Type of Measurement equipment used: The three personal samples will be collected using an SKC brand continuous flow personal air sampling pump (#224-PCXR3) equipped with a cyclone pre-selector, with a flow rate of 1.9 or 1.7 liters per minute as recommended by SKC for use of the cyclone. The Cyclone will be equipped with a three piece open faced cassette with a 37- millimeter, polyvinyl chloride, low ash, low moisture pickup filter (5 micrometer pore size).

Method of calibrating the instrument:

Calibration of the personal sampling pump will be performed using an SKC (#712) Accuflow film calibrator/electronic bubble meter.

- b. Measurement data: The personal samples were collected using a three piece open face filter cassette consisting of a 37- millimeter diameter, PVC filter, and an SKC brand continuous flow personal air sampling pump equipped with a cyclone pre-selector.

Samples of total respirable crystalline silica, along with an appropriate number of blanks (identical collection media not subjected to actual sampling conditions) will be submitted to a laboratory accredited by the American Industrial Hygiene Association for analysis.

The analysis will be performed by X-Ray diffraction in accordance with the analytical method as described by the SKC Air Sampling Guide and NIOSH method 7500.

- Crystalline Silica (as Quartz Respirable Dust)

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Airborne crystalline silica/quartz respirable dust samples collected in the breathing zones of the employees, showed Time Weighted Average (TWA) concentration data, independent of respiratory protection of mg/m3.

- Crystalline Silica (as Cristobalite Respirable Dust) Airborne crystalline silica/cristobalite respirable dust samples, collected in the breathing zones of the three employees, showed TWA concentration data, independent of respiratory protection, of mg/m3.
- Portland Cement
- Inert or Nuisance Dust

Note: Please see Appendix A-3 for Sampling Data

10. Results compared to the standard: The Occupational Safety and Health Administration standard 29 CFR 1926.55: Gasses, vapors, fumes, dusts, and mists which incorporates by reference the American Conference of Governmental Industrial Hygienist's "Threshold Limit Values of Airborne Contaminates" as the levels by which employee's exposure to any material listed not exceed the limits outlined. Therefore, the employee eight-hour time weighted averages will be compared to the limits outlined by the ACGIH for compliance to the standard.

- Crystalline Silica (as Quartz Respirable Dust)

Airborne crystalline silica/quartz respirable dust samples collected in the breathing zones of the employees, showed Time Weighted Average (TWA) concentration data, independent of respiratory protection of mg/m3.

These data are the applicable ACGIH Permissible Exposure Limits for respirable quartz dust of 0.1 mg/m3.

- Crystalline Silica (as Cristobalite Respirable Dust)

Airborne crystalline silica/cristobalite respirable dust samples, collected in the breathing zones of the three employees, showed TWA concentration data, independent of respiratory protection, of mg/m3.

These data are the applicable ACGIH Permissible Exposure Limits for respirable cristobalite dust of 0.05 mg/m3.

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- Portland Cement
- Inert or Nuisance Dust

11. Evaluation of control in use: During the time of the assessment employees performing operations referenced above below (Description of Work Operations) will wear MSA brand half-mask air purifying respirators with high- efficiency particulate air (HEPA) filters which would be expected to reduce exposures by a factor of ten when worn properly as indicated by NIOSH guide to "Respiratory Protection Factors"

Based on the Personal exposure data, and as recommended by the National Institute for Occupational Safety and Health's Guide to Industrial Respiratory Protection, respiratory protection having a minimum protection factor of should be used by the employees performing the referenced operation.

III CONCLUSION / RECOMMENDATIONS (After Completed Exposure Assessment)

SAMPLE

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APPENDIX A-1

SDS

A. Unhardened Ready Mix Concrete – Boston Sand & Gravel (attached)

APPENDIX A-2

LOCATION OF OPERATION/S

Areas include but are not limited to the following:

1. Vent Building #1 - C09A3
 - a. All upper levels
2. Vent Building #3 - C17A3
 - a. Sub-grades 1 & 2
3. Vent Building #4 - C15A3
 - a. Sub-grades 2, 3, & 3 Mezzanine
4. Vent Building #5 - C01B1
 - a. All upper levels
5. Vent Building #8 - C19E4
 - a. All upper level

APPENDIX A-3

AIR MONITORING RESULTS

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