From: Tom Harman
To: zzMSHA-Standards - Comments to Fed Reg Group
Cc: Tom Harman
Subject: RIN 1219-AB36
Date: Monday, September 11, 2023 10:55:23 AM
Attachments: RIN 1219-AB36 Portland Cement Association.pdf

PCA Since 1916
America's Cement Manufacturers™

Portland Cement Association
200 Massachusetts Ave NW, Suite 200
Washington, DC 20001
202.408.9494
www.cement.org

September 11, 2023

Ms. S. Aromie Noe, Director
Office of Standards, Regulations, and Variances
Mine Safety and Health Administration
201 12th Street South
Arlington, Virginia 22202-5452

Electronic submission *zzMSHA-comments@dol.gov*

Re: Comment from Portland Cement Association to Proposed Rule *Lowering Miners' Exposure to Respirable Crystalline Silica and Improving Respiratory Protection,* RIN 1219-AB36, Fed. Reg. Vol. 88, No. 133, July 13, 2023, 44852 – 45019

Dear Ms. Noe:

The Portland Cement Association (PCA) and its members appreciate the opportunity to respond to the Mine Safety and Health Administration (MSHA, the agency) on its proposed rule (PR), "Lowering Miners' Exposure to Respirable Crystalline Silica and Improving Respiratory Protection." PCA's members have a direct interest in the rule due to their operation of cement manufacturing plants, stone quarries, and aggregate operations. Protecting safety and health is first and foremost to PCA and our members to ensure all miners go home safe and healthy to their families every day.

Founded in 1916, PCA is the premier policy, research, education, and market intelligence organization serving American's cement manufacturers.[1] PCA represents companies that operate cement manufacturing and storage facilities in all fifty states and Puerto Rico. Membership also includes businesses that provide equipment, machinery, and services to manufacturers. PCA's members represent more than seventy percent of clinker[2] production in the U.S. cement industry.

PCA supports MSHA's proposal to set the permissible exposure limit (PEL) for miners' exposure to respirable crystalline silica (RCS) at 50 micrograms per cubic meter of air[3] (50 µg/m³) as a time-weighted average (TWA). The proposed PEL will protect

[1] See https://www.cement.org/
[2] Bhatty, J.I., Miller, F.M., Kosmatka, S.H., Bohan, R.P., Innovations in Portland Cement Manufacturing, 2nd ed., Clinker. The partially fused product of a kiln which is ground to make cement, Skokie, IL, Portland Cement Association, 2011, p 1576
[3] Federal Register, Lowering Miners' Exposure to Respirable Crystalline Silica and Improving Respiratory Protection, Vol. 83, No. 133, July 13, 2023, p 44852

miners' respiratory health in the same way (RCS) standards[4] from the Occupational Safety and Health Administration (OSHA) safeguard pulmonary health among workers in the general industry, maritime, and construction sectors.

PCA's comments are divided into two sections. The first section addresses seven principal concerns members have with the proposed rule, and section two provides answers to specific questions MSHA asked for input from the public. This document will focus on several issues central to implementing the proposed regulation. Revising specific provisions in the proposal will facilitate and streamline its implementation in the mining industry. In PCA's discussion, there are topics in the PR that raise concerns.

- The amount of time a mine operator must monitor exposures is insufficient to complete baseline sampling. For example, the proposal becomes effective 120 days after the final rule is published[5] in the Federal Register (FR), and baseline sampling must be completed 180 days after the effective date of the final regulation.[6]

- In addition to air-purifying respirators classified as series 100 and high efficiency (HE) air-powered respirators in Title 42 Code of Federal Regulations Part 84[7], (42 CFR 84) the proposed rule (PR) must include air-purifying respirators approved and classified as N95 and N99 by the National Institute for Occupational Safety and Health (NIOSH).

- The RCS standard from OSHA includes a provision that allows construction employers to be flexible in baseline monitoring when they employ engineering controls specified in Table 1.[8] MSHA should include a similar provision for mine operators in the final RCS standard.

- Proposed sampling requirements allow mine operators to sample a fraction (at least two) of several miners who perform the same tasks on the same shift in the same work area of the mine. The provision should remove the language, "on the same shift"[9] and pluralize "area" to "area(s)."

- A long-standing tenet of accident prevention principles is the concept and use of the "hierarchy of controls."[10] The final rule should remove

[4] Title 29 Code of Federal Regulations Parts 1910.1053, 1926.1153, and 1915.1053 (29 CFR § 1910.1053, 1926.1153, and 1915.1053)
[5] Federal Register, Vol. 88, No. 133, July 13, 2023, p 45012, § 60.11 Scope; effective date
[6] Federal Register, Vol. 88, No. 133, July 13, 2023, p 45012, § 60.12(a) Exposure monitoring
[7] 42 CFR 84 Approval of Respirator Protection Devices https://www.ecfr.gov/current/title-42/chapter-I/subchapter-G/part-84
[8] 29 CFR 1926.1153 (c)(1) Table 1 – Specified Exposure Control Methods When Working With Materials Containing Crystalline Silica. See here https://www.osha.gov/laws-regs/regulations/standardnumber/1926/1926.1153
[9] Federal Register, Vol.88, No. 133, July 13, 2023, p 45013, § 60.12(f)(3) Exposure Monitoring
[10] Various authors, National Safety Council, 1950 - 2023. "The hierarchy of controls represents a systematic approach to eliminating or minimizing workplace hazards. The concept has evolved over time and has been widely

subparagraph § 60.11 (b), "Rotation of miners shall not be considered an acceptable administrative control used for compliance with this part."

- For the metal and nonmetal (MNM) mining sector, PCA recommends that the medical surveillance program align with risk assessment based on a miner's reasonable expectation of exposure to RCS, largely the same way that the OSHA silica standard requires the employer to make medical surveillance available at no cost to the employee who is occupationally exposed the RCS above the action level (AL) for 30 or more days per year.[11]

- MSHA should model its periodic and corrective action sampling requirements on OSHA's standard in its RCS rule.

To begin, one should understand that there is a negligible amount of free silica in clinker and finished cement. The reason is that silica becomes chemically bound in the clinker as reactions occur in the thermal manufacturing process where temperatures range from 2,700 – 3,000 degrees Fahrenheit.[12] The safety data sheet attached as an addendum to this comment illustrates there is less than 0.2% quartz in cement.[13]

I. Operators Need More Time to Conduct the Required Baseline Sampling in the Proposed Rule.

There are two final rules closely related to the silica rule that MSHA proposes to establish for mine operators and miners to follow: the respirable coal dust rule that became final on August 1, 2014,[14] and the final RCS rule from OSHA on June 23, 2016.[15] MSHA published a proposed rule, "Lowering Miners' Exposure to Respirable

---

used in the field of safety engineering. The earliest mentions of the concept date back to the 1930s – 1940s when industrial hygienists and safety engineers began to focus on controlling workplace hazards. The concept gained prominence in subsequent decades. The modern interpretation is often attributed to the National Institute of Occupational Safety and Health (NIOSH) and the Centers for Disease Control. NIOSH focused on the concept in the 1980s and developed a 5-level ranking that measures most to least effective: elimination, substitution, engineering, administrative, and personal protective equipment."

[11] 29 CFR § 1910.1053(i)(1)(i) The employers shall make medical surveillance available at no cost to the employee, and at a reasonable time and place, for each employee who will be occupationally exposed to respirable crystalline silica at or above the action level for 30 or more days per year.

[12] Portland Cement Association, Cement and Concrete Basics FAQs, How is portland cement made? See here https://www.cement.org/cement-concrete/cement-and-concrete-basics-faqs/lists/cement-concrete-basics-faqs/how-is-portland-cement-made-

[13] Portland Cement Association, Safety Data Sheet, Portland Cement, Section 15. Regulatory Information, 2012, p 10

[14] Federal Register, Vol. 79, No. 103, May 1, 2014, p 24814 See here https://www.federalregister.gov/documents/2014/05/01/2014-09084/lowering-miners-exposure-to-respirable-coal-mine-dust-including-continuous-personal-dust-monitors

[15] Federal Register, Vol. 81, No. 59, March 25, 2016, p 16286 See here https://www.federalregister.gov/documents/2016/03/25/2016-04800/occupational-exposure-to-respirable-crystalline-silica

Coal Dust, Including Continuous Personal Dust Monitors," (the Coal Dust Rule) on October 19, 2010[16] with comments due to MSHA on February 28, 2011. After several extensions,[17] MSHA finalized the rule, and it became effective on August 1, 2014.

However, the agency gave surface coal mines more time "to identify additional work positions to be sampled for respirable dust at surface mines . . . *[T]he increased sampling will start October 1."*[18] In addition to increased surface coal mine dust sampling, the Coal Dust Rule allowed mine operators an additional eighteen months to comply with the use of the continuous personal dust monitor,[19] to increase the frequency of dust sampling,[20] and to post the results of dust sampling on the mine bulletin board.[21] Finally, the lowered coal dust exposure limit did not become effective until August 1, 2016,[22] which was twenty- four months after the effective date of the rule.

Similarly, OSHA's final RCS rule was published in the Federal Register on March 25, 2016, and became effective approximately 90 days later, June 23, 2016. OSHA allowed additional time for employers to comply with specific provisions of the rule. For example, employers were required to comply with all obligations of the standard, with exceptions for medical surveillance, by June 23, 2018.[23] The OSHA standard required medical surveillance of employees exposed to RCS above the PEL for 30 or more days per year beginning on June 23, 2018,[24] and for employees exposed above the action level (AL) beginning on June 23, 2020.[25]

In contrast to both the Coal Dust Rule and OSHA's RCS standard, MSHA proposes that mine operators must comply with baseline sampling within approximately 300 days after the final rule is published in the Federal Register and with the medical surveillance provision within 120 days after publication. (See footnotes 5 and 6).

---

[16] Federal Register, Vol. 75, No. 201, Lowering Miners' Exposure to Respirable Coal Dust, Including Continuous Personal Dust Monitors, October 19, 2010, p 64412 See here https://www.federalregister.gov/documents/2010/10/19/2010-25249/lowering-miners-exposure-to-respirable-coal-mine-dust-including-continuous-personal-dust-monitors

[17] Federal Register, Vol. 76, No. 103, May 27, 2011, p 30878 See here https://www.federalregister.gov/documents/2011/05/27/2011-13238/lowering-miners-exposure-to-respirable-coal-mine-dust-including-continuous-personal-dust-monitors and Federal Register, Vol. 76, No. 86, May 4, 2011, p 25277, See here https://www.federalregister.gov/documents/2011/05/04/2011-10780/lowering-miners-exposure-to-respirable-coal-mine-dust-including-continuous-personal-dust-monitors

[18] Major Provisions and Effective Date, MSHA's Final Rule to Lower Miner's Exposure to Respirable Coal Mine Dust, see "Summary of Major Provisions and Effective Dates" here https://www.msha.gov/safety-and-health/safety-and-health-materials/safety-topics/respirable-dust-rule-historic-step-forward-effort-end

[19] 30 CFR § 70.201(a)

[20] 30 CFR § 70.208(a)(1)

[21] 30 CFR § 70.211(c)

[22] 30 CFR § 70.100(a)

[23] 29 CFR § 1910.1053(l)(1)

[24] 29 CFR § 1910.1053(l)(4)

[25] Ibid

"Technological Feasibility – Proposed Respirable Crystalline Silica Rule" is a Member Survey Questionnaire Which Is Attached To This Comment.

PCA conducted a member survey to collect 20 data points about the availability of sampling devices, laboratories, and medical surveillance facilities to member companies of the association. Members completed the survey, titled "Member Survey 1" and shown as an addendum to this comment, and submitted responses to PCA between July 25 – August 14, 2023. Members responses showed the following:

- 10 member companies operating 56 cement plants responded to the survey.[26]
- 30% of respondents own dust sampling devices, and 70% rent them.
- In total, companies own 35 sampling devices.
- Companies have the capability of renting 216 sampling devices from industrial hygiene consultants and contractors. (All rental devices may not be available at the same time because companies rent devices from the same company).
- Members use 12 analytical laboratories to weigh dust filter cassettes. (Some respondents use the same labs as other respondents; the number of available testing laboratories is less than 12).
- 12% of respondents receive lab results in 2 weeks or less; 63% receive results in 2 weeks – 1 month; and 25% receive results in 1 – 2 months.
- 10% of respondents sent the filter cassettes by U.S. postal service; 60% used carriers such as FedEx or UPS; and 30% used another option such as hiring contract carriers (presumably due to rural location).
- 100% of respondents conduct either a pre-employment or post-offer employment physical examination.
- 67% of respondents reported applicants, and employees travel 25 miles or less to have the medical examination; 33% reported applicants and employees travel 25 – 50 miles for the exam.
- 67% of respondents reported that medical facilities have the capabilities of performing chest x-rays and spirometry (pulmonary function tests, or PFT) while 33% are not capable of performing these types of exams. (PCA did not ask members to ascertain whether B-reader certification was available at the facilities).
- For respondents who reported medical facilities they normally use did not have x-ray and PFT capabilities, applicants and employees at the companies traveled 25 – 50 miles in 80% of cases while 20% traveled 50 – 100 miles.
- 100% of company respondents use mobile testing vans to perform medical examinations.

[26] As of September 1, 2023, there were 97 active cement manufacturing and clinker grinding plants operating in the United States. Survey respondents represent 57.5% of all domestic cement and clinker production, and plants represented in the survey are in all geographic regions of the U.S. Therefore, the results of the survey can be extrapolated to other cement operations that are not identified in PCA member responses.

- For mobile testing vans used by companies, 100% could conduct hearing and vision tests; 56% performed PFT; and 33% could take chest x-rays.

The data from PCA's members accurately indicate that there are not enough sampling devices either owned or available for rent by members to conduct baseline RCS sampling among the approximately 12,620 miners employed in the cement manufacturing industry.[27] Some fraction of 12,620 will be sampled. If 10% of employees are sampled, then 1,262 devices must be available at alternating times during the proposed 300-day period, but only 251 dust pumps are available through ownership or rental, as indicated in the member survey.

There is an insufficient number of respirable dust sampling devices available to cement plant operators to conduct baseline sampling in the time MSHA's proposed rule would require. In consideration of the extended timelines for exposure monitoring and medical surveillance in both the Coal Dust Rule and OSHA's RCS rule, PCA recommends MSHA revise the proposed rule to read as:

> *§ 60.12(a) Exposure monitoring. The mine operator shall perform baseline sampling within the first 18 months after [120 days after publication of the final rule] to assess the full shift, 8-hour TWA exposure of respirable crystalline silica for each miner who is or may be reasonably be expected to be exposed to respirable crystalline silica.*

II. MSHA Must Allow N95 and N99 Air-purifying Respirators To Be Used as Respiratory Protection.

MSHA transferred authority to approve air-purifying respirators in a final rule promulgated on June 8, 1995, effective on July 10, 1995, to NIOSH.[28] As part of the transfer, MSHA retained [its], "existing provisions related to selection, use, and maintenance of respirators for coal and metal and nonmetal mines."[29] With the transfer, MSHA removed Part 11 from Title 30, Code of Federal Regulations, which contained guidelines for testing and approving all types of respirators in mining operations, including those used in mine rescue operations. To facilitate the transfer and future approval and testing, MSHA and NIOSH signed a memorandum of understanding.[30]

Title 42 CFR Part 84 then became the governing standard containing the application process and additional protocol for approving and certifying respiratory devices used in mining operations. As detailed in *§ 84.170 Air-purifying respirators;*

---

[27] 2021 Labor – Energy Input Survey, Portland Cement Association, 2021, see here reports - pca - OneDrive (sharepoint.com)

[28] Federal Register, Vol.60, No. 110, June 8, 1995, p 30398 See Supplementary Information. Background here https://www.govinfo.gov/content/pkg/FR-1995-06-08/html/95-13286.htm

[29] Ibid

[30] PCA was unable to locate the memorandum of understanding on MSHA' website here https://www.msha.gov/about/memoranda-understanding.

description N95, N99, and N100 devices must demonstrate a minimum efficiency level of 95%, 99%, and 99.97% respectively. [31]

The NIOSH Pocket Guide to Chemical Hazards[32] (the Guide) is the expert's reference source for chemical and physical hazards used by industrial hygienists and other practitioners in occupational health services. The current edition of the Guide recommends N95, R95 and P95 respirators to lower exposure levels for miners working in an environment with sources of crystalline silica (dust).[33] The Guide shows that a respirator with an assigned protection factor (APF) of 10[34] provides protection to individuals exposed to RCS level of 0.5 milligrams per cubic meter of air TWA (50 micrograms per cubic meter); the N95 is classified as 10 APF. Mine operators and miners have a long history of consistent and effective use of N95 air-purifying respirators (APR) to protect miners' respiratory health. PCA recommends MSHA revise the proposed rule as follows:

> *§ 60.14(c)(1)(i) Respiratory protection requirements. (1) Affected miners shall be provided with a NIOSH-approved atmosphere-supplying respirator or NIOSH-approved air-purifying respirator equipped with the following: (i) Particulate protection classified as 100, 99, or 95 series under 42 CFR 84.*

The diameter of SARS-CoV-2 virus ranges from 0.34 – 8.1 micrometers.[35] NIOSH continues to recommend wearing N95 masks to stop transmission of COVID-19.[36] Because CDC recommends wearing N95 respirators to prevent inhalation of viral particles as small as 0.34 micrometers on the lower size range, MSHA must reasonably and rationally accept N95s as protective for miners working in environments with RCS particles present with a diameter of less than 10 micrometers.

Dr. Brandon Crum operates a black lung clinic in Pikeville, Kentucky, and he spoke at the hearing in Denver, Colorado. As part of his statement, he recommended that miners wear respirator masks.[37] Although Crum did not recommend a specific respirator device, NIOSH recommends N95 APRs to prevent COVID-19 transmission and inhalation of RCS particles. MSHA should adopt the recommendations of Crum and NIOSH.

---

[31] 42 CFR 84.170(a)(3)(iii) See here https://www.ecfr.gov/current/title-42/chapter-I/subchapter-G/part-84

[32] See here https://www.cdc.gov/niosh/npg/npgd0684.html

[33] Ibid

[34] An APF of 10 means that a respirator is designed, tested, approved, and certified to reduce an airborne contaminant to one-tenth of the ambient concentration of the contaminant, which is a significant reduction in the surface nonmetal mining environment.

[35] Alsved, Malin *et al.*, Size distribution of exhaled aerosol particles containing SARS-CoV-2 RNA, National Library of Medicine, NIH, Nov 4, 2022, Abstract see here https://pubmed.ncbi.nlm.nih.gov/36331347/#:~:text=Samples%20were%20analyzed%20by%20RT,in%200.94%2D2.8%20%C2%B5m%20particles.

[36] Centers for Disease Control and Prevention, Types of Masks and Respirators, Updates as of May 11, 2023, see here https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/types-of-masks.html

[37] Transcript of Public Hearing, Denver, Colorado, August 21, 1023, p 117, lines 17 – 25, p 118, lines1 – 3

Cement manufacturers follow NIOSH recommendations and use N95 APRs for respiratory protection. MNM mine operators likely do the same. If MSHA changes the requirement for which type of APR the agency accepts in the final RCS rule, mine operators will be required to conduct new fit tests for every miner who wears an APR at work while doing certain jobs. Stated another way, MNM mine operators make N95 APRs available for miners to use; if MSHA will require N100s in its final RCS rule, operators will be required to conduct new fit tests for all miners who have already fit-tested for N95 APRs.

III. MSHA Should Include a Provision Like Table 1 in OSHA's RCS Rule to Encourage Mine Operators to Install Engineering Controls.

OSHA's Table 1 in the construction RCS standard allows employers to use engineering controls in combination with administrative and personal protection equipment (PPE). Employers using Table 1 are not required to assess employee exposures or separately ensure compliance with the PEL.[38] MSHA should adopt a similar approach that encourages mine operators to install engineering controls and remove the operator's obligation to assess exposures in work environments where individual employee RCS exposures are controlled by engineered devices to ensure compliance with the AL and PEL.

On August 15, 2018, OSHA issued a request for information (RFI) asking for input from the public about the effectiveness of Table 1, tasks, equipment, and work practice control methods to limit employee exposures, and whether Table 1 should be revised.[39] The RFI remains on the Spring 2023 Unified Agenda with a to-be-determined date to release a notice of proposed rulemaking.[40] OSHA's RFI is a clear indication that Table 1 is effective in lowering employee RCS exposures and encouraging employers to adopt engineering controls supplemented by administrative and PPE control measures.

The cement industry has a long history of using engineered mechanics to control dust at cement operations. For example, baghouse dust collectors are part of a dust collection system that captures airborne dust such as RCS.[41] Belt transfer points and conveyors are often enclosed with commercially produced skirtboards, rubber skirts, shrouds, and rubber edging to confine and direct dust back onto conveyors.[42] Cement producers install mechanical cyclones, fabric filters, and sometimes electrostatic

---

[38] 29 CFR 1926.1153 (c)(1) Table 1 – Specified Exposure Control Methods When Working With Materials Containing Crystalline Silica. See here https://www.osha.gov/laws-regs/regulations/standardnumber/1926/1926.1153

[39] Federal Register, Vol. 84, No. 158, August 15, 2018, p 41167

[40] Spring 2023 Unified Agenda, DOL/OSHA, RIN 1218-AD18, see here https://www.reginfo.gov/public/do/eAgendaViewRule?pubId=202304&RIN=1218-AD18

[41] Bhatty, Javed I., Miller, F. MacGregor, Kosmatka, Steven H., Innovations in Portland Cement Manufacturing, Portland Cement Association, 2004, pp 548 – 549

[42] Ibid

precipitators in the raw mill and raw mix storage areas.[43] Air emissions at cement manufacturing plants include particles measured as small as 3.5 microns in diameter, and preventing dust generation by collecting dust particles are always included in a plant's air emissions control plan under the Clean Air Act and its Amendments.[44]

PCA drafted a table like OSHA's Table 1 for engineering controls. (See attachment 4). The table shows control measures in widespread use in the cement manufacturing industry, and PCA believes that some MNM mine operators use these types of controls in mining operations.

PCA members operate quarries onsite to supply stone for cement manufacturing. As such, PCA is aware of Table 1 created by the National Stone, Sand & Gravel Association (NSSGA) and agrees that the engineering control methods shown in the NSSGA document will minimize miners' exposures to RCS.

IV. MSHA Should Add Similar Exposure Groups (SEGs) to the Standard for Employer Guidance in Choosing Personal Occupations to Sample as Required in Proposed § 60.12(f)(3).

PCA collected RCS exposure results from members and extracted cement industry employees' exposures from MSHA's database containing exposures collected by authorized representatives (AR) of the Secretary of Labor during inspections. Results are organized into 3 categories, each presented in attachments 1, 2, and 3 to this document. Attachment 1 shows results of RCS monitoring taken by an MSHA ARs; attachment 2 contains results from PCA members' surveys; and attachment 3 combines member and MSHA survey results into one table. The dataset represents samples collected from 2020 – 2022 inclusively. In addition, PCA plans to enlist an objective third-party contractor that will conduct an industry-wide survey to collect 60 samples from three cement manufacturing plants to meet the objective data provision in the proposed standard's subparagraph for exposure monitoring.[45]

Except for large-scale maintenance projects that independent contractors complete, the cement manufacturing industry produces material 24 hours a day and performs equipment maintenance on a planned, regular schedule. There are personnel assigned maintenance tasks throughout all work shifts, but there are no separate shifts for production and maintenance. Production of clinker and cement is maintained at a consistent level throughout the process. When an equipment breakdown occurs, maintenance crews "lock, tag, and try" the energy source, then repair the machinery and restart. An individual miner's potential RCS exposure is not dependent on which shift is assigned; rather, the employee's exposure is a function of tasks and areas to

[43] Ibid., p 657
[44] Clean Air Act, Section 109, National Primary and Secondary Ambient Air Quality Standards, 1990
[45] § 60.12(a)(2)(ii) The mine operator is not required to conduct periodic sampling if baseline sampling indicates exposure levels below the AL and objective data from an industry-wide survey if the survey is conducted within 3 months after baseline sampling

which the individual is assigned. Consequently, PCA recommends MSHA amend the language in § 60.12(f)(3) as:

> *§ 60.12(f)(3) Sampling requirements. (3) Where several miners perform the same tasks in the same work area, the mine operator may sample a representative fraction (at least two) of these miners to meet the requirements in paragraphs (a) through (e) of this section. In sampling a representative fraction of miners, the mine operator shall select the miners who are expected to have the highest exposure to respirable crystalline silica.*

V. The Final Rule Should Allow Job Rotation as an Administrative Control by Removing § 60.11(b).

Safety and health professionals and especially workers have relied to the hierarchy of controls (the Hierarchy) since the 1930s when members of the National Safety Council formulated the concept and implemented it on a small scale before broadly expanding the practice due to its success in reducing the time to which workers were exposed to workplace physical and chemical sources with negative health effects.[46] When employing the Hierarchy, companies began to experience lowered costs from worker health issues.[47]

To be sure, use of engineering controls was employed by only a handful of companies, and the first such method was guarding pulleys, conveyors, and moving machine parts.[48] Safeguarding machines from employee contact led to a steep drop in workplace fatalities, and in 1933, the rate of worker death was reduced by half.[49] Because engineering controls take a long time to develop, administrative and personal protective equipment were and are routinely used to protect employee health and safety.[50]

Job rotation has long been used to lower the exposure time and dose from an irritant an employee receives by effectively reducing the amount of time the exposure occurs. According to the Hierarchy, engineering controls combined with work practice and personal protective equipment can eliminate a majority of the health risk associated with jobs.[51] Because job rotation is an effective method to lower exposure risk, PCA recommends that MSHA remove subparagraph (b) from § 60.11 Exposure monitoring.

VI. If the Medical Surveillance Provision is Retained in the Final Rule, PCA Recommends Adoption of a Medical Surveillance Program for

[46] Fuller, Colin, Vassie, Luise, Health and Safety Management: Principles and Best Practices, January 2004, p 257
[47] Ibid, p 88
[48] Ibid, p 135
[49] Ibid, p 199
[50] Ibid, p 342
[51] Ibid, p 275

the MNM Mining Sector that Uses OSHA's Framework for Medical as Detailed in § 1910.1053(i)(1)(i)[52] and Addressed Below.

In a public hearing conducted by the U.S. House of Representatives Subcommittee on Workforce Protections, Committee on Education and Labor on June 20, 2019, a witness testified, "I think the standard that was promulgated by OSHA would be the standard that I would encourage this committee to take into consideration as they deliberate this issue." [53] Rather than adopting OSHA's risk-based approach to medical surveillance for MNM mining, MSHA's proposal tries to fuse components of OSHA's program with MSHA's Subpart B Medical Surveillance for coal miners.[54] This creates a cumbersome and unworkable approach. PCA encourages MSHA to adopt specific medical surveillance provisions as contained in OSHA's rule. However, OSHA's standard requires B-reader interpretation.[55] Given that NIOSH B-readers already interpret coal miner and general industry/construction employees' chest x-rays, increasing the number of these types of x-ray assessments to include MNM miners by some presently unknown number may burden the system currently in place.

The coal surveillance program was developed for a very specific purpose that is not applicable to MNM mines. Inhalation of excessive amounts of coal mine dust can cause coal miner pneumoconiosis, or black lung disease, a progressively debilitating illness for which the Department of Labor (DOL) administers a federal entitlement program to compensate coal miners who have been diagnosed with the illness.[56] There is a belief that a recent increase in coal miners diagnosed with black lung breathed higher levels of silica dust at work, and not wearing respirators, when mining thinner seams of coal, which requires extracting more rock form the coalbed's roof.[57] Throughout 20 CFR Chapter VI, Subchapter B (Federal Coal Mine Health and Safety Act of 1969, as Amended), all references are to coal mines and coal miners, and there are no references to other miners in the MNM sector.

Despite the distinctions between coal dust and silica, and the applicable regulatory frameworks in *§ 60.15 Medical surveillance for metal and nonmetal miners,*

---

[52] § 1910.1053(i)(1)(i) states, [T]he employer shall make medical surveillance available at no cost to the employee, and at a reasonable time and place, for each employee who will be occupationally exposed to respirable crystalline silica at or above the action level for 30 or more days per year.

[53] Hearing Transcript, Breathless and Betrayed: What is MSHA Doing to Protect Miners from the Resurgence of Black Lung Disease, Hearing before the Subcommittee on Workforce Protections, One Hundred Sixteenth Congress, First Session, Serial No. 116-30, Washington, DC, p 81, June 20, 2019, see here chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.govinfo.gov/content/pkg/CHRG-116hhrg36909/pdf/CHRG-116hhrg36909.pdf

[54] Title 30 Code of Federal Regulations, Chapter 1, Subchapter O, Part 72, Subpart B, Medical Surveillance

[55] 1910.1053(i)(2)(iii) states, "A chest X-ray (a single posteroanterior radiographic projection or radiograph of the chest at full inspiration recorded on either film (no less than 14 x 17 inches and no more than 16 x 17 inches) or digital radiography systems), interpreted and classified according to the International Labour Office (ILO) International Classification of Radiographs of Pneumoconioses by a NIOSH-certified B Reader"

[56] Title 20 Code of Federal Regulations, Chapter VI, Subchapter B, Part 718, Subpart C, Part 725

[57] Maher, Kris, Black Lung Resurgence Prompts New Mining Rules, Wall Street Journal, August 28, 2023, online edition. Phrase "and not wearing respirators" added by this author.

MSHA proposes a framework like the coal sector's *§ 72.100 Periodic examinations* requirements.[58]

MSHA's proposed provision for medical surveillance of MNM miners should reflect OSHA's requirement for medical surveillance in *29 CFR § 1910.1053* as it relates to initial (referred to as "mandatory examination" in § 72.100) and periodic (referred to as "voluntary examination" in*§ 72.100),* but with two exceptions. Exception 1: PCA believes testing for tuberculosis is unnecessary. Exception 2: A 5-year interval between chest x-rays is sufficient. PCA recommends revision to *§ 60.15 as follows*:

> *§ 60.15(b) Voluntary medical examinations. Each mine operator shall provide the opportunity to have the medical examinations specified in paragraph (a) of this section at least every 5 years.*

The recommendation on making the follow-up exams voluntary is based on evidence that coal miners do not take advantage of 5-year interval chest x-rays as outlined in an RFI from the Centers for Disease Control (CDC) published in 2018.[59] In the RFI, NIOSH asks for input from the public about how to increase participation in the coal workers' chest x-ray program because statistics show that only 35% of coal miners participate in the program.[60]

An additional key point for MSHA to consider in the medical surveillance provision is the number of certified "B-readers" actively working in the United States. As of September 1, 2023, there are 206 NIOSH certified B readers as shown on the website.[61] This number would seem to be a shortage of radiologists to accommodate a rapid increase in x-rays to be read if MSHA includes the B-reader requirement in the final regulation for MNM miners.

PCA is aware that 29 CFR 1910.1053 requires B-reader interpretation but believes the OSHA requirement added to the proposed MSHA requirements for B-readers could hamper the ability of the B-reader population to appropriately address and diagnose black lung disease among coal miners. PCA is not aware of any diagnosed silicosis cases among the cement worker population or any reportable illnesses in the same population due to silicosis to MSHA under Part 50 notification standards.[62]

VII. MSHA Should Model Its Periodic and Corrective Sampling Requirements On OSHA's Final RCS Rule.

---

[58] 30 CFR § 72.100 (a – c)

[59] CDC-2018-0110, NIOSH 224, Barriers to Participation in the NIOSH Coal Worker Health Surveillance Program, pp 53267, November 13, 2018, See here https://www.federalregister.gov/documents/2018/11/13/2018-24700/barriers-to-participation-in-the-niosh-coal-workers-health-surveillance-program

[60] Ibid., p 56328

[61] See here https://wwwn.cdc.gov/niosh-rhd/cwhsp/ReaderList.aspx

[62] See 30 CFR § 50.20(b)

PCA recommends that MSHA write the provisions for periodic and corrective actions sampling for the MNM mining sector like OSHA requires in its final RCS rule. Specifically, for exposures above the AL but below the PEL, OSHA requires employers to repeat such monitoring within six months.[63] Similarly, for exposures above the PEL, OSHA requires repeat sampling within three months.[64] The relevant subparagraphs for MSHA's RCS should be as follows:

> *§ 60.12 Exposure monitoring. (b) Periodic sampling. Where the most recent sampling indicates that miner exposures are at or above the action level but at or below the PEL, the mine operator shall repeat such monitoring within six months of the most recent monitoring and continue to sample until sampling indicates miner exposures below the action leve..*
>
> *§ 60.12 Exposure monitoring. (c) Corrective actions sampling. Where the most recent sampling indicates that miner exposures are at or above PEL, the mine operator shall sample after corrective actions pursuant to § 60.13 and repeat such monitoring within three months of the most recent monitoring until sampling indicates that miner exposures are at or below the PEL.*

This Section Responds to Questions MSHA Asked.

Question 4: PCA created a survey and asked members to respond. The survey is attached as an addendum to these comments. Responses to the survey are summarized on pages 5 – 6 of this document. The cement manufacturing industry employs 12,620 miners and respondents to the survey represent 57.5% of the total number of cement plants operating in the U.S. Responses show that our members own 35 gravimetric dust sampling devices and rent another 216 devices from consultants and contractors. Access to 251 dust sampling devices is insufficient to conduct the number of baseline samples in the timeframe MSHA outlines in the proposed rule. Although sampling would be performed on a fraction of the total miners in the cement industry, we today cannot determine how many samples would be required. We are certain that the combined number of company-owned and rented dust sampling is insufficient to conduct all baseline samples that will be required in a 300-day period.

Question 10: Please see section I of these comments beginning on page 3. Respondents provided more detail in answering the survey. For example, members provided additional detail in notes section, such as, "devices are difficult to obtain", "third-party sampling devices will become more difficult to schedule/obtain due to the anticipated demand if the regulation change is passed as currently written", "availability will become a serious issue if the RCS standard becomes a final rule as written." In

[63] See 29 CFR § 1910.1053(d)(3)(iii), which states, "Where the most recent exposure monitoring indicates that employee exposures are at or above the action level but at or below the PEL, the employer shall repeat such monitoring within six months of the most recent monitoring."

[64] See 29 CFR §1910.1053(d)(3)(iv), which states, "Where the most recent exposure monitoring indicates that employee exposures are above the PEL, the employer shall repeat such monitoring within three months of the most recent monitoring."

addition, Robin Markussen spoke at MSHA's public hearing in Arlington, Virginia, noting that Heidelberg Materials operates more than 300 sites that will be subject to the final rule.[65] Similarly, in formal remarks at the hearing in Denver, Colorado, Ryan Langton stated experience has shown when companies rent equipment (as many companies do), they must compete for the equipment, [sampling] media, professional resources and timely analysis from labs.[66]

Question 20: This question is answered at length in section I. In addition, public speakers at MSHA's public hearings provided details about the time OSHA allowed for a phased-in compliance schedule for the RCS rule and the coal dust rule.[67]

Question 22: PCA collected historical sampling data from its members and publicly available exposure results from samples taken by MSHA's inspectorate for the years 2020 – 2022 inclusively. The combined 411 samples to detect RCS exposures among cement employees show 35.3% are "0" or non-detectable and 49.1% are below the AL. Consequently, 84.4% of employees are not above or expected to be above the AL in the work environment. All results are shown in tables added to this comment. A summary of the results is shown in the table below.

µg/m³ Exposure	PCA Member Collected	MSHA Collected	Total
Non-detectable	48	97	145 (35.3%)
0 – 25	198	4	202 (49.1%)
26 – 50	9	27	36 (8.8%)
>51	12	16	28 (6.8%)
Total	267	144	411 (100%)

Attachments 1, 2, and 3 to this document detail individual miner exposures illustrated in the table above. The individual results show the job descriptions where overexposures are expected. For example, a similar exposure group for MSHA to consider in the cement manufacturing environment would include laborer and utility personnel. Based on the historical sampling, these occupations would be expected to have the highest exposures to RCS at cement plants.

In summary, the most noteworthy observation about the historical data is that 84.4% of cement employees are not reasonably expected to be exposed at or above the AL and therefore not subject to baseline sampling.

[65] Transcript of Proceedings, Mine Safety and Health Administration, Public Hearing, Arlington, Virginia, August 3, 2023, p 40, line 2

[66] Transcript of Public Hearing, Mine Safety and Health Administration, Docket No. MSHA-2023-0001, Denver, Colorado, August 21, 2023, p 87, lines 2 - 13

[67] Ibid., p 86, lines 9 – 22

Question 24: PCA recommends that MSHA follow OSHA's scheduled monitoring option as it relates to exposures above the AL but below the PEL, the corollary to MSHA's proposed periodic sampling requirement. In § 1910.1053(d)(3)(iii),[68] OSHA requires employer monitoring within 6 months when an employee exposure is above the AL and below the PEL. Based on PCA's historical sampling data that shows 84.4% of samples are below the AL, one sample taken within 6 months would be an appropriate response to satisfy the periodic sampling requirement.

Question 32: Medical surveillance provisions are unachievable in the MNM mine sector as proposed by MSHA for a variety of reasons. Described in section VI in detail herein, the mandatory examination is to detect and prevent black lung disease as coal miners move through their careers. Black lung is not a disease associated with MNM mining, and silicosis is unknown in the cement industry. Instead of adopting a broad approach to medical surveillance, MSHA should create a "scalpel-like" approach wherein newly hired miners, who know their work history, could voluntarily have a physical examination that includes a chest x-ray and PFT. PCA's member survey showed one-third of members use medical facilities that don't have the equipment to conduct chest x-rays and PFT. In addition, a speaker at the public hearing in Arlington, Virginia, apprised the MSHA panel of challenges with medical surveillance where he works in remote areas in southwest Wyoming. For example, DJ Schmutz contacted both (2) medical providers who stated it would take a 1 ½ years to conduct examinations on 2,500 miners, the number working in that region of the state.[69] In addition, Schmutz noted that only one of the two facilities is NIOSH-certified.

Question 33: As stated in section VI in this comment, PCA recommends that if MSHA adopts a provision for medical surveillance, the agency should not require NIOSH-approved facilities. The NIOSH framework was established and developed to address black lung disease, and requiring the same protocol in the MNM sector for its miners decreases the resources available to address that devastating illness. (See list of B-reader certified physicians in footnote 52).

PCA Asks MSHA to Accept These Recommendations in Writing the Final Rule.

- MSHA must extend the time to conduct exposure monitoring and allow for a phased-in approach to comply with the medical surveillance provisions.

- N-95 respirators provide excellent protection for MNM miners and must remain acceptable personal protective equipment to MSHA in the RCS final rule.

---

[68] The regulation states, "Where the most recent exposure monitoring indicates that employee exposures are at or above the action level but at or below the PEL, the employer shall repeat such monitoring within six months of the most recent monitoring."

[69] Transcript of Proceedings, Mine Safety and Health Administration, Public Hearing, Arlington, Virginia, August 3, 2023, p 121, lines 11t– 25, and p 122, lines 1 – 9

- MSHA should adopt Table 1 as an alternative to exposure monitoring when engineering controls specified in the table are in the mining work environment.

- Remove the requirement to take samples on the same shift – i.e., this applies to miners who do the same tasks in the same work areas of a facility.

- Remove the prohibition for using job rotation as a way to lower a miner's exposure to RCS.

- PCA recommends connecting medical surveillance of MNM miners to their risk of being exposed to RCS above the AL for more than 30 days per year – i.e., this is based on the OSHA framework as opposed to the coal sector's medical surveillance provision.

- PCA recommends that MSHA adopt OSHA's exposure monitoring model for periodic and corrective actions sampling.

Thank you for the opportunity to share PCA's perspectives on MSHA's proposed rule to revise the standard for respirable crystalline silica in the mining industry. Please do not hesitate to contact me at 202-719-1983 or email tharman@cement.org if you have questions.

Thank you,

Thomas Harman

Attachment 1 - MSHA DATAe Respirable Crystalline Silica Exposures by Job Classification - 2020, 2021 and 2022

Location Description	Job Description	Silica Concentration ($\mu g/m^3$)	Protection Used
M - Bagging	Bagging Operator	0.00	
M - Bagging	Bagging Operator	0.00	X
M - Bagging	Bagging Operator	35.83	
M - Bagging	Bagging Operator	0.00	X
M - Bagging	Bagging Operator	0.00	
M - Bagging	Bagging Operator	27.04	X
M - Bagging	Bagging Operator	43.07	X
M - Bagging	Bagging Operator	0.00	X
M - Bagging	Bagging Operator	56.29	X
M - Bagging	Bagging Operator	0.00	X
M - Bagging	Bagging Operator	0.00	X
M - Crushing	Crusher Oper/Worker	70.87	
M - Crushing	Crusher Oper/Worker	44.06	X
M - Crushing	Crusher Oper/Worker	0.00	X
M - Crushing	Laborer, Bullgang	59.84	X
M - Crushing	Laborer, Bullgang	29.63	X
M - Crushing	Laborer, Bullgang	37.13	X
M - Drying & Roasting	Building Repair/Maint.	0.00	
M - General	Ball Mill Operator	0.00	X
M - General	Ball Mill Operator	30.68	X
M - General	Building Repair/Maint.	41.75	
M - General	Building Repair/Maint.	0.00	
M - General	Building Repair/Maint.	0.00	
M - General	Building Repair/Maint.	0.00	
M - General	Building Repair/Maint.	0.00	X
M - General	Building Repair/Maint.	0.00	X
M - General	Cleanup Man	0.00	X
M - General	Cleanup Man	0.00	X
M - General	Cleanup Man	63.31	X
M - General	Cleanup Man	31.48	X
M - General	Cleanup Man	35.94	X
M - General	Cleanup Man	36.22	X
M - General	Cleanup Man	0.00	X
M - General	Cleanup Man	70.63	X
M - General	Cleanup Man	0.00	X

Attachment 1 - MSHA DATA - Respirable Crystalline Silica Exposures by Job Classification - 2020, 2021 and 2022

Location Description	Job Description	Silica Concentration ($\mu g/m^3$)	Protection Used
M - General	Electrician	0.00	X
M - General	Laborer, Bullgang	0.00	X
M - General	Laborer, Bullgang	0.00	X
M - General	Laborer, Bullgang	0.00	X
M - General	Laborer, Bullgang	0.00	
M - General	Laborer, Bullgang	47.76	X
M - General	Utility Man	0.00	
M - General	Utility Man	0.00	
M - General	Utility Man	S0.0S	
M - General	Utility Man	81.54	
M - General	Utility Man	0.00	X
M - General	Utility Man	108.60	X
M - Grinding	Ball Mill Operator	0.00	
M - Grinding	Cleanup Man	83.52	
M - Grinding	Cleanup Man	0.00	
M - Grinding	Cleanup Man	0.00	
M - Grinding	Laborer, Bullgang	44.57	
M - Grinding	Pipe Fitter/Millright/Plumber	0.00	X
M - Grinding	Pipe Fitter/Millright/Plumber	0.00	
M - Grinding	Pipe Fitter/Millright/Plumber	0.00	
S - Active Production	Bagging Operator	0.00	X
S - Active Production	Ball Mill Operator	26.35	
S - Active Production	Ball Mill Operator	0.00	
S - Active Production	Building Repair/Maint.	0.00	X
S - Active Production	Building Repair/Maint.	26.70	X
S - Active Production	Building Repair/Maint.	0.00	X
S - Active Production	Bulldozer Operator	0.00	
S - Active Production	Cleanup Man	26.96	X
S - Active Production	Cleanup Man	0.00	
S - Active Production	Cleanup Man	0.00	
S - Active Production	Crusher Oper/Worker	0.00	
S - Active Production	Crusher Oper/Worker	0.00	
S - Active Production	Electrician	0.00	
S - Active Production	Front-end Loader Operator	0.00	
S - Active Production	Front-end Loader Operator	101.91	X

Attachment 1 - MSHA DATA - Respirable Crystalline Silica Exposures by Job Classification - 2020, 2021 and 2022

Location Description	Job Description	Silica Concentration ($\mu g/m^3$)	Protection Used
S - Active Production	Front-end Loader Operator	0.00	
S - Active Production	Front-end Loader Operator	0.00	
S - Active Production	Front-end Loader Operator	0.00	X
S - Active Production	Front-end Loader Operator	0.00	
S - Active Production	Laborer, Bullgang	0.00	X
S - Active Production	Laborer, Bullgang	0.00	
S - Active Production	Laborer, Bullgang	37.80	
S - Active Production	Laborer, Bullgang	0.00	
S - Active Production	Laborer, Bullgang	0.00	
S - Active Production	Laborer, Bullgang	34.35	X
S - Active Production	Laborer, Bullgang	45.61	X
S - Active Production	Laborer, Bullgang	0.00	X
S - Active Production	Laborer, Bullgang	79.24	X
S - Active Production	Laborer, Bullgang	0.00	X
S - Active Production	Laborer, Bullgang	28.40	
S - Active Production	Laborer, Bullgang	0.00	
S - Active Production	Laborer, Bullgang	67.04	
S - Active Production	Laborer, Bullgang	0.00	
S - Active Production	Mechanic	24.59	
S - Active Production	Mechanic	31.02	
S - Active Production	Mechanic	32.79	
S - Active Production	Mechanic	20.73	X
S - Active Production	Mechanic	24.00	X
S - Active Production	Mechanic	0.00	
S - Active Production	Oiler, Greaser	0.00	
S - Active Production	Scraper Operator	0.00	
S - Active Production	Truck Driver	0.00	
S - Active Production	Truck Driver	0.00	X
S - Active Production	Utility Man	0.00	
S - Active Production	Welder, etc.	0.00	X
S - General	Bagging Operator	85.88	X
S - General	Bagging Operator	53.53	X
S - General	Ball Mill Operator	0.00	
S - General	Cleanup Man	0.00	
S - General	Cleanup Man	32.97	

Attachment 1 - MSHA DATA - Respirable Crystalline Silica Exposures by Job Classification - 2020, 2021 and 2022

Location Description	Job Description	Silica Concentration ($\mu g/m^3$)	Protection Used
S - General	Electrician	0.00	
S - General	Electrician	0.00	
S - General	Forklift Operator	0.00	X
S - General	Laborer, Bullgang	38.02	X
S - General	Laborer, Bullgang	0.00	X
S - General	Laborer, Bullgang	0.00	X
S - General	Laborer, Bullgang	0.00	X
S - General	Laborer, Bullgang	39.16	X
S - General	Laborer, Bullgang	0.00	
S - General	Laborer, Bullgang	0.00	
S - General	Laborer, Bullgang	0.00	
S - General	Laborer, Bullgang	0.00	
S - General	Utility Man	0.00	X
S - General	Utility Man	0.00	
S - General	Utility Man	0.00	
S - General	Utility Man	0.00	
S - General	Utility Man	0.00	
S - General	Utility Man	0.00	
S - General	Utility Man	24.67	
S - General	Utility Man	0.00	
S - Ore Processing	Cleanup Man	0.00	X
S - Ore Processing	Cleanup Man	58.18	
S - Ore Processing	Cleanup Man	30.48	X
S - Ore Processing	Crusher Oper/Worker	0.00	
S - Ore Processing	Laborer, Bullgang	0.00	
S - Ore Processing	Laborer, Bullgang	0.00	
S - Ore Processing	Utility Man	0.00	
S - Ore Processing	Utility Man	0.00	
S - Ore Processing	Utility Man	0.00	
S - Ore Processing	Utility Man	0.00	X
S - Ore Processing	Utility Man	0.00	
S - Roads	Truck Driver	61.23	
S - Roads	Truck Driver	0.00	
UG - Active production	Drill Operator, Jumbo Perc.	0.00	
UG - Active production	Electrician	0.00	X

Attachment 1 - MSHA DATA - Respirable Crystalline Silica Exposures by Job Classification - 2020, 2021 and 2022

Location Description	Job Description	Silica Concentration ($\mu g/m^3$)	Protection Used
UG - Active production	Scaling (mechanical)	0.00	
UG - General	Utility Man	28.12	
UG - Travelways & Haulageways	Truck Driver	0.00	
W - Dredges & Barges	Dredge/Barge Operator	0.00	
Average of Above ($\mu g/m^3$) =		**15.20**	
		Number of Samples	**Number of Samples with Protection**
Total =		**144**	**64**
Samples equal to Zero (0) =		**97**	**36**
Samples greater than zero (0) and less than & equal to 25 $\mu g/m^3$ =		**4**	**2**
Samples greater than 25 and less than & equal to 50 $\mu g/m^3$ =		**27**	**17**
Samples greater than 50 $\mu g/m^3$ =		**16**	**9**

Attachment 2 - PCA DATAe Respirable Crystalline Silica Exposures by Job Classification

Location Description	Job Description	Silica Concentration ($\mu g/m^3$)	Protection Used
Mill Room	21 Shift	< 4.2	
Coal Pile/Pfister room	Bobcat Operator	9.6	
Packing House	Bulk	< 4.6	
Kiln	Burner Helper	< 4.2	N95 Dust Mask
Kiln	Burner Helper	< 4.2	
Kiln	Burner Helper	< 6.1	
River Plant	Clinker Operator	10	
PLANT WIDE	CRA/TA	44	
PLANT WIDE	CRA/TA	68	
N/A	Crane Operator	8.9	
Raw Materials	Crusher Attendant	< 4.3	
Raw Materials	Crusher Op.	15	N95 Dust Mask
River Plant	Dust Collector	6.2	
All Areas	Dust Collector	350	N-95 dust mask
Various Areas	Elec.	5	Cloth Mask
Kiln	Electrician	< 4.8	
Various Areas	Electrician	5	N95 Dust Mask
Various Areas	Electrician	< 4.7	N95 Dust Mask
Various Areas	Electrician	< 4.5	
Various Areas	Electrician	< 4.6	
2nd Floor Sub-station/Shop/Garage	Electrician	4.9	
510-B-1/ Finisher#6	Electrician	5.9	
Additive Tunnel/ CKD System	Electrician	6.3	
All Areas	Electrician	< 4.6	
Bypass Stacker/Shed/ Chalk Stacker/ Kiman Stack/ Cement Shelter	Electrician	4.2	
Compressor Room/Mill Room/ Stairwell	Electrician	18	
Kiln Analyzer	Electrician	5.9	
Line 1 Silo	Electrician	4.4	
River Plant	Electrician	5.3	
Variety of areas	Electrician	4.5	
Various Areas	Equipment Op.	< 4.6	
Finishing Mill	Field Operator	4.4	
Finishing Mill	Field Operator	4.5	
Raw Mill, Preheater tower, Kiln	Field Operator	4.7	

Attachment 2 - PCA DATAl- Respirable Crystalline Silica Exposures by Job Classification

Location Description	Job Description	Silica Concentration ($\mu g/m^3$)	Protection Used
Packing House	Forklift Op.	6	
	Forklift Op.	9	
	Forklift Op.	< 4.4	
Fuel Storage	Fuel Tech.	< 4.3	
Fuel Storage	Fuel Tech.	< 4.3	Full Face OVAG Hepa
Quarry	Grader Operator	3.6	
Preheater & Catamax Baghouse	Heavy Equipment Operator	4.5	
Finish Mill 3	Housekeeping	5.4	
PLANT WIDE	INSIDE UTILITY	9.7	
Raw Mills	Kiln Burner	21	N95 Dust Mask
Laboratory	Lab Comp.	< 4.5	
River Plant	Labor	5.4	
Laboratory	Laboratory Technician	5.1	
Laboratory	Laboratory Technician	5.2	
Laboratory and outside areas for sampling	Laboratory Technician	4.3	
Laboratory and outside areas for sampling	Laboratory Technician	4.8	
Throughout the plant	Laboratory Technician	4.1	
Throughout the plant	Laboratory Technician	4.5	
All Areas	Laborer	6.1	
All Areas	Laborer	49	
All Areas	Laborer	< 4.4	
Cleaning Vac. Truck	Laborer	< 5	
Coal Unloading Bldg	Laborer	8.4	
Coal Unloading Bldg	Laborer	12	
Finish Mill	Laborer	18	
Finish Mill / Clay Basement	Laborer	12	N95 Dust Mask
Finish Mill / Clay Basement	Laborer	20	N95 Dust Mask
Finish Mill / Clay Basement	Laborer	26	N95 Dust Mask
Finish Mill / Clay Basement	Laborer	36	N95 Dust Mask
Mill	Laborer	11	
Mill Bldg	Laborer	4.8	
Mill building	Laborer	5.6	
Mill Building	Laborer	5.7	
Mill Building	Laborer	4.7	
Mill building floors	Laborer	5.9	

Attachment 2 - PCA DATA - Respirable Crystalline Silica Exposures by Job Classification

Location Description	Job Description	Silica Concentration ($\mu g/m^3$)	Protection Used
Mill Room	Laborer	7	N95 Dust Mask
Mill Room	Laborer	24	N95 Dust Mask
N/A	Laborer	5.9	
N/A	Laborer	6.9	
N/A	Laborer	8.9	
RawMill	Laborer	17	
Raw Mills	Laborer	18	N95 Dust Mask
Silo Cleaning	Laborer	< 8.9	
Various Areas	Laborer	8	N95 Dust Mask
Various Areas	Laborer	22	N95 Dust Mask
Various Areas	Laborer	26	N95 Dust Mask
Various Areas	Laborer	< 5.2	N95 Dust Mask
Various Areas	Laborer	< 5.4	N95 Dust Mask
	Laborer	39	N95 Dust Mask
All Areas	Laborer	< 4.6	
Diester Building	Laborer	< 5	
Clean Up	Laborer - Clean Up	8.3	Respiratory protection
Kilne Cooler	Laborer - Clean Up	10	Respiratory protection
Finish Mill	Laborer/Serviceman	5.7	
Throughout the plant	Lead	14	
Quarry	Lead Man	7.3	
Yard	Lead Man Yard Crew	40	
Various Areas	Loader Op.	< 4.5	
Various Areas	Loader Op.	< 4.7	
Loader	Loader Operator	4.1	
Loader	Loader Operator	5.1	
Quarry/Tunnel/Barn/Pan Conveyors	Loader Operator	37	
River Plant	Loader Operator	5.9	
	Loader Operator	7.7	
CKD bypass	Loadout	4.3	
Quarry	Loadout	5.6	
Silo Bay 5	Loadout	5.5	
Dust Collector	Maint.	12	N95 Dust Mask
Dust Collector	Maint.	82	N95 Dust Mask - Occasional Task
Mill Room	Maint.	< 5.2	N95 Dust Mask
Raw Materials	Maint.	7	N95 Dust Mask

Attachment 2 - PCA DATA - Respirable Crystalline Silica Exposures by Job Classification

Location Description	Job Description	Silica Concentration ($\mu g/m^3$)	Protection Used
Raw Materials	Maint.	9	N95 Dust Mask
Various Areas	Maint.	6	
Various Areas	Maint.	7	
Various Areas	Maint.	11	
Various Areas	Maint.	< 4.3	
A Frame Building	Maintenance	6	
Baghouse	Maintenance	4.3	
Baghouse	Maintenance	9	
Blending Silos/Maintenance shop	Maintenance	8.8	
Bucket Elevator	Maintenance	10	
Coal, Silo, Cooler, Mill	Maintenance	5.2	
Dust Collectors	Maintenance	4.9	
Dust Collectors	Maintenance	5.1	
Finish Mill 2	Maintenance	23	
Mill	Maintenance	5.5	
Mill Bldg/ Shed	Maintenance	6.4	
Mill Gate 10	Maintenance	14	
N. Clinker Tower	Maintenance	4.3	
N/A	Maintenance	8.9	
N/A	Maintenance	8.98	
N/A	Maintenance	9.05	
Preheater & Catamax Baghouse	Maintenance	4.7	
Quarry	Maintenance	9.8	
River Plant	Maintenance	5.3	
Silo	Maintenance	4.5	
Silo 3	Maintenance	4.5	
Throughout the plant	Maintenance	4.9	
Truck Work Ramp	Maintenance	4.7	
Sensor Maintenance	Maintenance - Electrician	5.8	Respiratory protection
Various Areas	Mechanic	< 4.6	
510-B-1/ Finisher #6	Mechanic	5.8	
Compressor Rooms	Mechanic	5.8	
Dust Collectors/Finish mill 3	Mechanic	5.9	
Finisher Mill Area	Mechanic	5.8	
Mills	Mechanic	4.5	
RawMill 1	Mechanic	5.4	

Attachment 2 - PCA DATAe Respirable Crystalline Silica Exposures by Job Classification

Location Description	Job Description	Silica Concentration (µg/m³)	Protection Used
All Areas	Mill Laborer	<5	
Mill Room	Mill Op.	< 3.7	Dust Mask 8514
MILL ROOM	MILL OPERATOR	10.3	
Finish Mill	Mill Pup	12	N95 Dust Mask
All Areas	Mill Repairmen	< 5.3	
All Areas	Mill Repairmen	9.7	
River Plant	Mill Utility	5.4	
Various Areas	Mill Utility	79	N95 Dust Mask
Raw Mills	Miller	19	N95 Dust Mask
Raw Mills	Miller	64	N95 Dust Mask
Raw Mills	Miller Helper	10	N95 Dust Mask
Raw Mills	Miller Helper	12	N95 Dust Mask
Raw Mills	Miller Helper	14	N95 Dust Mask
Raw Mills	Miller Helper	21	N95 Dust Mask
Raw Mills	Miller Helper	190	N95 Dust Mask
Mill Room	Millwright	<4.2	N95 Dust Mask
Various Areas	Millwright	64	
Various Areas	Millwright	< 4.8	
Various Areas	Millwright	< 5.5	N95 Dust Mask
Various Areas	Millwright	<4.3	N95 Dust Mask
Yard	Mobile Equipment Operator	4.7	
Coal Mill2	Mobile Mechanic	4.1	
Pug Mill	N/A	4.4	
Conveyors around plant	Oiler	5	
RawMill	Oiler	< 4.7	
Shed/Raw Mill/Finish Mill/ Coal Mill	Oiler	12	
Various Areas	Oiler	14	
Control Room	OP Center	8.5	
Packhouse	Operator - Forklift	6.5	
Raw Mills	Overhead Crane Op. / Laborer	5	N95 Dust Mask
Raw Mills	Overhead Crane Op. / Laborer	170	N95 Dust Mask
Packing House	Packer	10	
Packing House	Packer	15	N95 Dust Mask
Packing House	Packer	15	N95 Dust Mask
Packing House	Packer	37	N95 Dust Mask
Packing House	Packer - Material Handler	6	Respiratory protection

Attachment 2 - PCA DATAe Respirable Crystalline Silica Exposures by Job Classification

Location Description	Job Description	Silica Concentration (µg/m³)	Protection Used
Packhouse/Loadout area	Packer Utility	4.7	
	Packer/Loader	4.8	
	Packer/Loader	6.2	
	Packer/Loader	12	
N/A	Packhouse Maintenance	8.6	
N/A	Packhouse Operator	8.3	
Packout East Machine	Packout	5.6	
Chalk Shed Mill Bldg	PEA	6.3	
Chalk Shed Mill Bldg	PEA	13	
Clinker Shed	PEA	7.2	
Clinker Shed	PEA	10	
Cold Mill	PEA	4.7	
Mill Bldg	PEA	4.3	
Mill Bldg/ Clinker shed	PEA	8.2	
Mill Bldg/ Clinker shed	PEA	9.5	
Pre-heater Tower	PEA	7.2	
Pre-heater Tower	PEA	13	
Shed/ Mill Bldg	PEA	1.7	
Shed/ Mill Bldg	PEA	7	
Throughout the plant	Plant Foreman	4.4	
Finishing Mill / Kiln	Process Attendant	4.2	
Mill/ Kiln	Process Attendant	4.2	
N/A	Process Attendant	8.9	
N/A	Process Attendant	8.9	
Around Plant	Production	9.3	
Around Plant	Production	12	
Mill Room	Production	4.5	
Packaging Department	Production	4.8	
Tower	Production	4.5	
Packaging Department	Production	4.8	
	Production	5.3	
Raw Storage and Clinker Shed / Pre-Heater	Production - Process Attendant (Loader Operator)	5.8	Respiratory protection
Clinker Silos/ Raw Mill	Production - Process Attendant (Operations / Utilities)	6	Respiratory protection
Cement Silos/ K1	Production Assistant	16	
	Production Assistant	5.5	

Attachment 2 - PCA DATA - Respirable Crystalline Silica Exposures by Job Classification

Location Description	Job Description	Silica Concentration ($\mu g/m^3$)	Protection Used
Compressor Room/Kiln pier/ burner floor	Production Attendant	13	
Shed/ Mill Bldg	Production Attendant	4.4	
Coal Mill/K3&K2 line/Pan area	Production Utility	10	
Kiln	Pup	68	N95 Dust Mask
Raw Mills	Pup	< 4.3	
Laboratory and outside areas for sampling	QC Laboratory Technician	4.2	
Mill Room/ Sun Roof/ over tracks	Quarry	12	
Preheater Tower	Quarry	9.8	
Stockpile	Quarry Scraper/ Loader	4.3	
Various Areas	Raw Tapper	< 4.3	Dust Mask 8511
Raw Mill	Repairmen	< 5	
Dust Truck Outdoors	Service Dust Truck	4.7	
Cooler	Serviceman	< 4.5	3 hrs. PPE: PAPR w/ HEPA. 4 hrs. PPE: 1/2
Cooler	Serviceman	< 4.6	3 hrs. PPE: PAPR w/ HEPA. 4 hrs. PPE: 1/2
Finish Mill	Serviceman	< 4.3	N95 Dust Mask.
Raw Materials / Cooler	Serviceman	21	N95 Dust Mask
Various Areas	Serviceman	15	PAPR with HEPA filter
Various Areas	Serviceman	< 4.0	
Various Areas	Serviceman	< 4.3	N95 Dust Mask
	Serviceman	8	PAPR HEPA
Shale Storage	Shale Dock/Material Handling	6	
	Shift	15	N95 Dust Mask
PLANTWIDE	SHIFT REPAIRMAN	10.1	
Various Areas	Shift Tech.	20	
Packing House	Shipping	5	
Railcars	Shipping	5.5	
Railcars	Shipping	5.6	
	Shipping	6	
Railcars	Shipping Switchman	3.6	
All Areas	Silo Tender	6	
All Areas	Silo Tender	<5	
River Plant	Sweeper Operator	7.9	
N/A	Tower Operator	8.8	
Tower	Tower Tender	11	PAPR
Quarry	Truck Driver	8.4	

Attachment 2 - PCA DATA - Respirable Crystalline Silica Exposures by Job Classification

Location Description	Job Description	Silica Concentration ($\mu g/m^3$)	Protection Used
Various Areas	Truck Driver	< 4.0	
N/A	Truck Sweeper	1.9	
Packing House	Unit 14	5	
Coal Bldg	Unloading Railcars	5.9	
All Areas	Utility	8.5	
Various Areas	Utility	6	N95 Dust Mask
Various Areas	Utility	< 4.5	
All Areas	Utility	4.7	
Finish Mill	Vac Truck Op.	7	1/2 Face HEPA
Raw Materials / Cooler	Vac Truck Op.	18	N95 Dust Mask
Various Areas	Vac. Truck Op.	< 4.4	PAPR with HEPA filter
River Plant	Vactor Operator	17	
Crusher	Welder	<5	
Quarry	Worker/ helper	3.5	
Blending Silos/ additive pit	Yard Laborer	17	
Clinker tower/ reclaim tower/clinker pit	Yard Laborer	4.3	
Sun roof	Yard Laborer	20	
Sun Roof/S. Clinker/ Mill room	Yard Laborer	64	
Wagon Train	Yard Laborer	6.7	
PLANT WIDE	YARD/CLEANUP	70	
PLANT WIDE	YARD/CLEANUP	85	
Average of Above ($\mu g/m^3$) =		**15.15**	
		Number of Samples	**Number of Samples with Protection**
Totals=		**267**	**65**
Non-Detect Samples=		**48**	**16**
Samples greater than zero (0) and less than & equal to 25 $\mu g/m^3$ =		**198**	**37**
Samples greater than 25 and less than & equal to 50 $\mu g/m^3$ =		**9**	**5**
Samples greater than 50 $\mu g/m^3$ =		**12**	**7**

Attachment 3 - PCA and MSHA DATA - Respirable Crystalline Silica Exposures by Job Classification

Location Description	Job Description	Silica Concentration (µg/m³)	Protection Used
Mill Room	21 Shift	< 4.2	
M - Bagging	Bagging Operator	0.00	
M - Bagging	Bagging Operator	0.00	X
M - Bagging	Bagging Operator	35.83	
M - Bagging	Bagging Operator	0.00	X
M - Bagging	Bagging Operator	0.00	
M - Bagging	Bagging Operator	27.04	X
M - Bagging	Bagging Operator	43.07	X
M - Bagging	Bagging Operator	0.00	X
M - Bagging	Bagging Operator	56.29	X
M - Bagging	Bagging Operator	0.00	X
M - Bagging	Bagging Operator	0.00	X
S - Active Production	Bagging Operator	0.00	X
S - General	Bagging Operator	85.88	X
S - General	Bagging Operator	53.53	X
M - General	Ball Mill Operator	0.00	X
M - General	Ball Mill Operator	30.68	X
M - Grinding	Ball Mill Operator	0.00	
S - Active Production	Ball Mill Operator	26.35	
S - Active Production	Ball Mill Operator	0.00	
S - General	Ball Mill Operator	0.00	
Coal Pile/Pfister room	Bobcat Operator	9.6	
M - Drying & Roasting	Building Repair/Maint.	0.00	
M - General	Building Repair/Maint.	41.75	
M - General	Building Repair/Maint.	0.00	
M - General	Building Repair/Maint.	0.00	
M - General	Building Repair/Maint.	0.00	
M - General	Building Repair/Maint.	0.00	X
M - General	Building Repair/Maint.	0.00	X
S - Active Production	Building Repair/Maint.	0.00	X
S - Active Production	Building Repair/Maint.	26.70	X
S - Active Production	Building Repair/Maint.	0.00	X
Packing House	Bulk	< 4.6	
S - Active Production	Bulldozer Operator	0.00	
Kiln	Burner Helper	< 4.2	X
Kiln	Burner Helper	< 4.2	
Kiln	Burner Helper	< 6.1	
M - General	Cleanup Man	0.00	X
M - General	Cleanup Man	0.00	X
M - General	Cleanup Man	63.31	X
M - General	Cleanup Man	31.48	X
M - General	Cleanup Man	35.94	X
M - General	Cleanup Man	36.22	X
M - General	Cleanup Man	0.00	X
M - General	Cleanup Man	70.63	X
M - General	Cleanup Man	0.00	X
M - Grinding	Cleanup Man	83.52	
M - Grinding	Cleanup Man	0.00	
M - Grinding	Cleanup Man	0.00	
S - Active Production	Cleanup Man	26.96	X

Attachment 3 - PCA and MSHA DATA - Respirable Crystalline Silica Exposures by Job Classification

Location Description	Job Description	Silica Concentration ($\mu g/m^3$)	Protection Used
S - Active Production	Cleanup Man	0.00	
S - Active Production	Cleanup Man	0.00	
S - General	Cleanup Man	0.00	
S - General	Cleanup Man	32.97	
S - Ore Processing	Cleanup Man	0.00	X
S - Ore Processing	Cleanup Man	58.18	
S - Ore Processing	Cleanup Man	30.48	X
River Plant	Clinker Operator	10	
PLANT WIDE	CRA/TA	44	
PLANT WIDE	CRA/TA	68	
N/A	Crane Operator	8.9	
Raw Materials	Crusher Attendant	< 4.3	
Raw Materials	Crusher Op.	15	X
M - Crushing	Crusher Oper/Worker	70.87	
M - Crushing	Crusher Oper/Worker	44.06	X
M - Crushing	Crusher Oper/Worker	0.00	X
S - Active Production	Crusher Oper/Worker	0.00	
S - Active Production	Crusher Oper/Worker	0.00	
S - Ore Processing	Crusher Oper/Worker	0.00	
W - Dredges & Barges	Dredge/Barge Operator	0.00	
UG - Active production	Drill Operator, Jumbo Perc.	0.00	
River Plant	Dust Collector	6.2	
All Areas	Dust Collector	350	X
Various Areas	Elec.	5	X
Kiln	Electrician	< 4.8	
M - General	Electrician	0.00	X
S - Active Production	Electrician	0.00	
S - General	Electrician	0.00	
S - General	Electrician	0.00	
UG - Active production	Electrician	0.00	X
Various Areas	Electrician	5	X
Various Areas	Electrician	< 4.5	
Various Areas	Electrician	< 4.6	
Various Areas	Electrician	< .4.7	X
2nd Floor Sub-station/Shop/Garage	Electrician	4.9	
510-B-1/ Finisher #6	Electrician	5.9	
Additive Tunnel/ CKD System	Electrician	6.3	
All Areas	Electrician	< 4.6	
Bypass Stacker/Shed/ Chalk Stacker/ Kiman Stack/ Cement Shelter	Electrician	4.2	
Compressor Room/Mill Room/ Stairwell	Electrician	18	
Kiln Analyzer	Electrician	5.9	
Line 1 Silo	Electrician	4.4	
River Plant	Electrician	5.3	
Variety of areas	Electrician	4.5	
Various Areas	Equipment Op.	< 4.6	
Finishing Mill	Field Operator	4.4	
Finishing Mill	Field Operator	4.5	

Attachment 3 - PCA and MSHA DATAl- Respirable Crystalline Silica Exposures by Job Classification

Location Description	Job Description	Silica Concentration (µg/m³)	Protection Used
Raw Mill, Preheater tower, Kiln	Field Operator	4.7	
Packing House	Forklift Op.	6	
	Forklift Op.	9	
	Forklift Op.	< 4.4	
S - General	Forklift Operator	0.00	X
S - Active Production	Front-end Loader Operator	0.00	
S - Active Production	Front-end Loader Operator	101.91	X
S - Active Production	Front-end Loader Operator	0.00	
S - Active Production	Front-end Loader Operator	0.00	
S - Active Production	Front-end Loader Operator	0.00	X
S - Active Production	Front-end Loader Operator	0.00	
Fuel Storage	Fuel Tech.	< 4.3	
Fuel Storage	Fuel Tech.	< 4.3	X
Quarry	Grader Operator	3.6	
Preheater & Catamax Baghouse	Heavy Equipment Operator	4.5	
Finish Mill 3	Housekeeping	5.4	
PLANT WIDE	INSIDE UTILITY	9.7	
Raw Mills	Kiln Burner	21	X
Laboratory	Lab Comp.	< 4.5	
River Plant	Labor	5.4	
Laboratory	Laboratory Technician	5.1	
Laboratory	Laboratory Technician	5.2	
Laboratory and outside areas for sampling	Laboratory Technician	4.3	
Laboratory and outside areas for sampling	Laboratory Technician	4.8	
Throughout the plant	Laboratory Technician	4.1	
Throughout the plant	Laboratory Technician	4.5	
All Areas	Laborer	6.1	
All Areas	Laborer	49	
All Areas	Laborer	< 4.4	
Cleaning Vac. Truck	Laborer	< 5	
Coal Unloading Bldg	Laborer	8.4	
Coal Unloading Bldg	Laborer	12	
Finish Mill	Laborer	18	
Finish Mill / Clay Basement	Laborer	12	X
Finish Mill / Clay Basement	Laborer	20	X
Finish Mill / Clay Basement	Laborer	26	X
Finish Mill / Clay Basement	Laborer	36	X
Mill	Laborer	11	
Mill Bldg	Laborer	4.8	
Mill building	Laborer	5.6	
Mill Building	Laborer	5.7	
Mill Building	Laborer	4.7	
Mill building floors	Laborer	5.9	
Mill Room	Laborer	7	X
Mill Room	Laborer	24	X
N/A	Laborer	5.9	
N/A	Laborer	6.9	
N/A	Laborer	8.9	

Attachment 3 - PCA and MSHA DATAe Respirable Crystalline Silica Exposures by Job Classification

Location Description	Job Description	Silica Concentration ($\mu g/m^3$)	Protection Used
Raw Mill	Laborer	17	
Raw Mills	Laborer	18	X
Silo Cleaning	Laborer	< 8.9	
Various Areas	Laborer	8	X
Various Areas	Laborer	22	X
Various Areas	Laborer	26	X
Various Areas	Laborer	< 5.2	X
Various Areas	Laborer	< 5.4	X
	Laborer	39	X
All Areas	Laborer	< 4.6	
Diester Building	Laborer	<l5	
Clean Up	Laborer - Clean Up	8.3	X
Kiln / Cooler	Laborer - Clean Up	10	X
M - Crushing	Laborer, Bullgang	59.84	X
M - Crushing	Laborer, Bullgang	29.63	X
M - Crushing	Laborer, Bullgang	37.13	X
M - General	Laborer, Bullgang	0.00	X
M - General	Laborer, Bullgang	0.00	X
M - General	Laborer, Bullgang	0.00	X
M - General	Laborer, Bullgang	0.00	
M - General	Laborer, Bullgang	47.76	X
M - Grinding	Laborer, Bullgang	44.57	
S - Active Production	Laborer, Bullgang	0.00	X
S - Active Production	Laborer, Bullgang	0.00	
S - Active Production	Laborer, Bullgang	37.80	
S - Active Production	Laborer, Bullgang	0.00	
S - Active Production	Laborer, Bullgang	0.00	
S - Active Production	Laborer, Bullgang	34.35	X
S - Active Production	Laborer, Bullgang	45.61	X
S - Active Production	Laborer, Bullgang	0.00	X
S - Active Production	Laborer, Bullgang	79.24	X
S - Active Production	Laborer, Bullgang	0.00	X
S - Active Production	Laborer, Bullgang	28.40	
S - Active Production	Laborer, Bullgang	0.00	
S - Active Production	Laborer, Bullgang	67.04	
S - Active Production	Laborer, Bullgang	0.00	
S - General	Laborer, Bullgang	38.02	X
S - General	Laborer, Bullgang	0.00	X
S - General	Laborer, Bullgang	0.00	X
S - General	Laborer, Bullgang	0.00	X
S - General	Laborer, Bullgang	39.16	X
5 - General	Laborer, Bullgang	0.00	
5 - General	Laborer, Bullgang	0.00	
S - General	Laborer, Bullgang	0.00	
S - General	Laborer, Bullgang	0.00	
5 - Ore Processing	Laborer, Bullgang	0.00	
5 - Ore Processing	Laborer, Bullgang	0.00	
Finish Mill	Laborer/Serviceman	5.7	
Throughout the plant	Lead	14	
Quarry	Lead Man	7.3	

Attachment 3 - PCA and MSHA DATAe Respirable Crystalline Silica Exposures by Job Classification

Location Description	Job Description	Silica Concentration ($\mu g/m^3$)	Protection Used
Yard	Lead Man Yard Crew	40	
Various Areas	Loader Op.	< 4.5	
Various Areas	Loader Op.	< 4.7	
Loader	Loader Operator	4.1	
Loader	Loader Operator	5.1	
Quarry/Tunnel/Barn/Pan Conveyors	Loader Operator	37	
River Plant	Loader Operator	5.9	
	Loader Operator	7.7	
CKD bypass	Loadout	4.3	
Quarry	Loadout	5.6	
Silo Bay 5	Loadout	5.5	
Dust Collector	Maint.	12	X
Dust Collector	Maint.	82	X
Mill Room	Maint.	< 5.2	X
Raw Materials	Maint.	7	X
Raw Materials	Maint.	9	X
Various Areas	Maint.	6	
Various Areas	Maint.	7	
Various Areas	Maint.	11	
Various Areas	Maint.	<4.3	
A Frame Building	Maintenance	6	
Baghouse	Maintenance	4.3	
Baghouse	Maintenance	9	
Blending Silos/Maintenance shop	Maintenance	8.8	
Bucket Elevator	Maintenance	10	
Coal, Silo, Cooler, Mill	Maintenance	5.2	
Dust Collectors	Maintenance	4.9	
Dust Collectors	Maintenance	5.1	
Finish Mill 2	Maintenance	23	
Mill	Maintenance	5.5	
Mill Bldg/ Shed	Maintenance	6.4	
Mill Gate 10	Maintenance	14	
N. Clinker Tower	Maintenance	4.3	
N/A	Maintenance	8.9	
N/A	Maintenance	8.98	
N/A	Maintenance	9.05	
Preheater & Catamax Baghouse	Maintenance	4.7	
Quarry	Maintenance	9.8	
River Plant	Maintenance	5.3	
Silo	Maintenance	4.5	
Silo8	Maintenance	4.5	
Throughout the plant	Maintenance	4.9	
Truck Work Ramp	Maintenance	4.7	
Sensor Maintenance	Maintenance - Electrician	5.8	X
S - Active Production	Mechanic	24.59	
S - Active Production	Mechanic	31.02	
S - Active Production	Mechanic	32.79	
S - Active Production	Mechanic	20.73	X
S - Active Production	Mechanic	24.00	X
S - Active Production	Mechanic	0.00	

Attachment 3 - PCA and MSHA DATAe Respirable Crystalline Silica Exposures by Job Classification

Location Description	Job Description	Silica Concentration ($\mu g/m^3$)	Protection Used
Various Areas	Mechanic	< 4.6	
510-B-1/ Finisher#6	Mechanic	5.8	
Compressor Rooms	Mechanic	5.8	
Dust Collectors/Finish mill 3	Mechanic	5.9	
Finisher Mill Area	Mechanic	5.8	
Mills	Mechanic	4.5	
Raw Mill 1	Mechanic	5.4	
All Areas	Mill Laborer	<5	
Mill Room	Mill Op.	< 3.7	X
MILL ROOM	MILL OPERATOR	10.3	
Finish Mill	Mill Pup	12	X
All Areas	Mill Repairmen	< 5.3	
All Areas	Mill Repairmen	9.7	
River Plant	Mill Utility	5.4	
Various Areas	Mill Utility	79	X
Raw Mills	Miller	19	X
Raw Mills	Miller	64	X
Raw Mills	Miller Helper	10	X
Raw Mills	Miller Helper	12	X
Raw Mills	Miller Helper	14	X
Raw Mills	Miller Helper	21	X
Raw Mills	Miller Helper	190	X
Mill Room	Millwright	< 4.2	X
Various Areas	Millwright	64	
Various Areas	Millwright	<4.3	X
Various Areas	Millwright	< 4.8	
Various Areas	Millwright	< 5.5	X
Yard	Mobile Equipment Operator	4.7	
Coal Mill 2	Mobile Mechanic	4.1	
Pug Mill	N/A	4.4	
Conveyors around plant	Oiler	5	
Raw Mill	Oiler	< 4.7	
Shed/Raw Mill/Finish Mill/ Coal Mill	Oiler	12	
Various Areas	Oiler	14	
S - Active Production	Oiler, Greaser	0.00	
Control Room	OP Center	8.5	
Packhouse	Operator - Forklift	6.5	
Raw Mills	Overhead Crane Op. / Laborer	5	X
Raw Mills	Overhead Crane Op. / Laborer	170	X
Packing House	Packer	10	
Packing House	Packer	15	X
Packing House	Packer	15	X
Packing House	Packer	37	X
Packing House	Packer - Material Handler	6	X
Packhouse/Loadout area	Packer Utility	4.7	
	Packer/Loader	4.8	
	Packer/Loader	6.2	
	Packer/Loader	12	
N/A	Packhouse Maintenance	8.6	
N/A	Packhouse Operator	8.3	

Attachment 3 - PCA and MSHA DATA - Respirable Crystalline Silica Exposures by Job Classification

Location Description	Job Description	Silica Concentration ($\mu g/m^3$)	Protection Used
Packout East Machine	Packout	5.6	
Chalk Shed Mill Bldg	PEA	6.3	
Chalk Shed Mill Bldg	PEA	13	
Clinker Shed	PEA	7.2	
Clinker Shed	PEA	10	
Cold Mill	PEA	4.7	
Mill Bldg	PEA	4.3	
Mill Bldg/ Clinker shed	PEA	8.2	
Mill Bldg/ Clinker shed	PEA	9.5	
Pre-heater Tower	PEA	7.2	
Pre-heater Tower	PEA	13	
Shed/ Mill Bldg	PEA	1.7	
Shed/ Mill Bldg	PEA	7	
M - Grinding	Pipe Fitter/Millright/Plumber	0.00	X
M - Grinding	Pipe Fitter/Millright/Plumber	0.00	
M - Grinding	Pipe Fitter/Millright/Plumber	0.00	
Throughout the plant	Plant Foreman	4.4	
Finishing Mill / Kiln	Process Attendant	4.2	
MillI/IKiln	Process Attendant	4.2	
N/A	Process Attendant	8.9	
N/A	Process Attendant	8.9	
Around Plant	Production	9.3	
Around Plant	Production	12	
Mill Room	Production	4.5	
Packaging Department	Production	4.8	
Tower	Production	4.5	
Packaging Department	Production	4.8	
	Production	5.3	
Raw Storage and Clinker Shed / Pre-Heater	Production - Process Attendant (Loader Operator)	5.8	X
Clinker Silo / Raw Mill	Production - Process Attendant (Operations / Utilities)	6	X
Cement Silos/ K1	Production Assistant	16	
	Production Assistant	5.5	
Compressor Room/Kiln pier/ burner floor	Production Attendant	13	
Shed/ Mill Bldg	Production Attendant	4.4	
Coal Mill/K3&K2 line/Pan area	Production Utility	10	
Kiln	Pup	68	X
Raw Mills	Pup	< 4.3	
Laboratory and outside areas for sampling	QC Laboratory Technician	4.2	
Mill Room/ Sun Roof/ over tracks	Quarry	12	
Preheater Tower	Quarry	9.8	
Stockpile	Quarry Scraper/ Loader	4.3	
Various Areas	Raw Tapper	< 4.3	X
Raw Mill	Repairmen	< 5	
UG - Active production	Scaling (mechanical)	0.00	
S - Active Production	Scraper Operator	0.00	
Dust Truck Outdoors	Service Dust Truck	4.7	

Attachment 3 - PCA and MSHA DATAe Respirable Crystalline Silica Exposures by Job Classification

Location Description	Job Description	Silica Concentration ($\mu g/m^3$)	Protection Used
Cooler	Serviceman	< 4.5	X
Cooler	Serviceman	< 4.6	X
Finish Mill	Serviceman	< 4.3	X
Raw Materials / Cooler	Serviceman	21	X
Various Areas	Serviceman	15	X
Various Areas	Serviceman	< 4	
Various Areas	Serviceman	< 4.3	X
	Serviceman	8	X
Shale Storage	Shale Dock/Material Handling	6	
	Shift	15	X
PLANT WIDE	SHIFT REPAIRMAN	10.1	
Various Areas	Shift Tech.	20	
Packing House	Shipping	5	
Railcars	Shipping	5.5	
Railcars	Shipping	5.6	
	Shipping	6	
Railcars	Shipping Switchman	3.6	
All Areas	Silo Tender	6	
All Areas	Silo Tender	<5	
River Plant	Sweeper Operator	7.9	
N/A	Tower Operator	8.8	
Tower	Tower Tender	11	X
Quarry	Truck Driver	8.4	
S - Active Production	Truck Driver	0.00	
S - Active Production	Truck Driver	0.00	X
S - Roads	Truck Driver	61.23	
S - Roads	Truck Driver	0.00	
UG - Travelways & Haulageways	Truck Driver	0.00	
Various Areas	Truck Driver	<4.0	
N/A	Truck Sweeper	1.9	
Packing House	Unit 14	5	
Coal Bldg	Unloading Railcars	5.9	
All Areas	Utility	8.5	
Various Areas	Utility	6	X
Various Areas	Utility	<4.5	
All Areas	Utility	4.7	
M - General	Utility Man	0.00	
M - General	Utility Man	0.00	
M - General	Utility Man	50.05	
M - General	Utility Man	81.54	
M - General	Utility Man	0.00	X
M - General	Utility Man	108.60	X
S - Active Production	Utility Man	0.00	
S - General	Utility Man	0.00	X
S - General	Utility Man	0.00	
S - General	Utility Man	0.00	
S - General	Utility Man	0.00	
S - General	Utility Man	0.00	
S - General	Utility Man	0.00	
S - General	Utility Man	24.67	

Attachment 3 - PCA and MSHA DATA - Respirable Crystalline Silica Exposures by Job Classification

Location Description	Job Description	Silica Concentration ($\mu g/m^3$)	Protection Used
S - General	Utility Man	0.00	
S - Ore Processing	Utility Man	0.00	
S - Ore Processing	Utility Man	0.00	
S - Ore Processing	Utility Man	0.00	
S - Ore Processing	Utility Man	0.00	X
S - Ore Processing	Utility Man	0.00	
UG - General	Utility Man	28.12	
Finish Mill	Vac Truck Op.	7	X
Raw Materials / Cooler	Vac Truck Op.	18	X
Various Areas	Vac. Truck Op.	< 4.4	X
River Plant	Vactor Operator	17	
Crusher	Welder	<5	
S - Active Production	Welder, etc.	0.00	X
Quarry	Worker/ helper	3.5	
Blending Silos/ additive pit	Yard Laborer	17	
Clinker tower/ reclaim tower/clinker pit	Yard Laborer	4.3	
Sun roof	Yard Laborer	20	
Sun Roof/S. Clinker/ Mill room	Yard Laborer	64	
Wagon Train	Yard Laborer	6.7	
PLANT WIDE	YARD/CLEANUP	70	
PLANT WIDE	YARD/CLEANUP	85	
Average of Above ($\mu g/m^3$) =		**15.17**	
		Number of Samples	**Number of Samples with Protection**
Total =		**411**	**129**
Non-Detect Samples or Samples equal to Zero (0) =		**145**	**52**
Samples greater than zero (0) and less than & equal to 25 $\mu g/m^3$ =		**202**	**39**
Samples greater than 25 and less than & equal to 50 $\mu g/m^3$ =		**36**	**22**
Samples greater than 50 $\mu g/m^3$ =		**28**	**16**

Attachment 4

Table 1 – Specified Exposure Control Methods When Working With Materials Containing Crystalline Silica

Equipment/task	Engineering and Work Practice Control Methods	Required respiratory protection and minimum assigned protection factor
Mobile equipment operations such as haul truck, end loader, bulldozer, utility truck	All operations except equipment inspections occur inside an air-tight, enclosed cab equipped with filters for the air-conditioner and heater.	None
Material bagging operations including bagger operator	Point source dust collection system equipped with fan motors to power local exhaust ventilation systems and bag filters to capture airborne dust	None
Material transportation on belt conveyors to include laborer and utility miners	Skirtboards, rubber skirts, shroud enclosures, rubber edging, and covered conveyors to direct airborne dust back onto conveyors	Air-purifying respirator with assigned protection factor of 10 or greater if work period is greater than 50% the scheduled shift period
Control room and laboratory operations to include control room operator and quality control operator	Airtight, enclosed control rooms and laboratories equipped with air-conditioner and heater filters	None

Technological Feasibility - Proposed Respirable Crystalline Silica Rule

Sampling Device Accessibility

1. How many cement plants does your company operate?

2. Do plants have access to sampling device(s) owned by your company that will test for individual exposure to RCS?

- Yes
- No

3. How many sampling devices does your company own?

4. Do plants have access to sampling device(s) rented by your company or other entity such as your insurer or industrial hygiene contractor that will test for individual exposure to RCS?

- Yes
- No

5. How many sampling devices does your company rent?

6. In the space below, write additional information about sampling devices that PCA should communicate in its response to the RCS proposal.

Laboratory Analysis

7. Labratory Analysis

Please show the number of laboratories that your company uses to analyze RCS dust cassettes.

Please list the names, cities, and states of the laboratories (if you know them).

8. After sending a dust cassette for RCS analysis, how much time passes before the exposure result arrives?

- ○ Less than 2 weeks
- ○ 2 week – 1 month
- ○ 1 month – 2 months
- ○ More than 2 months

9. Please check the carrier(s) you use to send filter cassettes to a laboratory for RCS analysis.

- ☐ U.S. Postal Service
- ☐ Carrier(s) such as FedEx, UPS
- ☐ Other - Write In

10. In the space below, write additional information about laboratory analysis PCA should include in its response to the RCS proposal.

Medical Surveillance

11. Physical Examinations

Does your company conduct pre-employment physical examinations for all new employees at mining operations?

- Yes
- No

If you answered no, please explain below. (For example, if a miner has mining experience, a company may not require a physical).

12. If your company conducts physical examinations for all new employees at mining operations, what is the distance they must travel for the examination?

- Less than 25 miles
- 25 – 50 miles
- 50 – 100 miles
- More than 100 miles

13. Medical Facility

Does the medical facility where you send new or current employees have the capability of conducting chest x-rays and pulmonary function tests (PFT)?

- ○ Yes
- ○ No

If you answered no, approximately how far will the employee travel for a chest x-ray and PFT?

- ○ 25 – 50 miles
- ○ 50 – 100 miles
- ○ More than 100 miles

14. Mobile Testing Vans

Does your company use mobile testing vans to conduct any medical examinations for employees?

- ○ Yes
- ○ No

If you answered yes, what types of medical tests are conducted? Please select all that apply

- ☐ Hearing and/or visual tests
- ☐ PFT
- ☐ Chest x-rays
- ☐ Other tests (Please list below)

15. In the space below, write additional information about medical surveillance PCA should include in its response to the RCS proposal.

Safety Data Sheet Portland Cement

Section 1. Identification

GHS product identifier: Portland Cement

Chemical name: Calcium compounds, calcium silicate compounds, and other calcium compounds containing iron and aluminum make up the majority of this product.

Other means of identification: Cement, hydraulic cement, portland cement silicate.

Relevant identified uses of the substance or mixture and uses advised against: Building materials, construction, a basic ingredient in concrete.

Supplier's details: To be provided by the manufacturer.

Emergency telephone number (with hours of operation): To be provided by the manufacturer.

Section 2. Hazards Identification

DANGER! Overexposure to portland cement can cause serious, potentially irreversible skin or eye damage in the form of chemical (caustic) burns, including third degree burns. The same serious injury can occur if wet or moist skin has prolonged contact exposure to dry portland cement.

Portland cement is not classifiable as a human carcinogen.

OSHA/HCS status: This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture:

SKIN CORROSION/IRRITATION – Category 1

SERIOUS EYE DAMAGE/ EYE IRRITATION – Category 1

SKIN SENSITIZATION – Category 1

CARCINOGENICITY/INHALATION – Category 1

SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) [Respiratory tract irritation] – Category 3

GHS label elements

Hazard pictograms:

Signal word: Danger

Hazard statements:

Causes severe skin burns and eye damage.

May cause an allergic skin reaction.

May cause respiratory irritation.

May cause cancer.

Section 3. Composition/information on ingredients

Substance/mixture: Mixture

Chemical name: Calcium compounds, calcium silicate compounds, and other calcium compounds containing iron and aluminum make up the majority of this product.

Other means of identification: Cement, hydraulic cement, portland cement silicate

CAS number/other identifiers

CAS number: 65997-15-1

Product code: Not available.

Ingredient name	%	CAS number
Cement, portland, chemicals	100%	65997-15-1
The structure of Portland cement may contain the following in some concentration ranges:		
Calcium oxide	A-B	1305-78-8
Quartz	C-D	14808-60-7
Hexavalent chromium*	E-F	18450-29-9
Portland cement also contains gypsum, limestone and magnesium oxide in various concentrations. However, because these components are not classifiable as a hazard under Title 29 Code of Federal Regulations 1910.1200, they are not required to be listed in this section.		
Gypsum	G-H	13397-24-5
Limestone	I-J	1317-65-3
Magnesium oxide	K-L	1309-48-4

Any concentration shown as a range is to protect confidentiality or is due to process variation.

*Hexavalent chromium is included due to dermal sensitivity associated with the component.

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact: Get medical attention immediately. Call a poison center or physician. Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 20 minutes. Chemical burns must be treated promptly by a physician.

Inhalation: Seek medical help if coughing or other symptoms persist. Inhalation of large amounts of portland cement requires immediate medical attention. Call a poison center or physician. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If the individual is not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway.

Skin contact: Get medical attention immediately. Heavy exposure to portland cement dust, wet concrete or associated water requires prompt attention. Quickly remove contaminated clothing, shoes, and leather goods such as watchbands and belts. Quickly and gently blot or brush away excess portland cement. Immediately wash thoroughly with lukewarm, gently flowing water and non-abrasive pH neutral soap. Seek medical attention for rashes, burns, irritation, dermatitis and prolonged unprotected exposures to wet cement, cement mixtures or liquids from wet cement. Burns should be treated as caustic burns. Portland cement causes skin burns with little warning. Discomfort or pain cannot be relied upon to alert a person to a serious injury. You may not feel pain or the severity of the burn until hours after the exposure. Chemical burns must be treated promptly by a physician. In the event of any complaints or symptoms, avoid further exposure.

Ingestion: Get medical attention immediately. Call a poison center or physician. Have victim rinse mouth thoroughly with water. DO NOT INDUCE VOMITING unless directed to do so by medical personnel. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Have victim drink 60 to 240 mL (2 to 8 oz.) of water. Stop giving water if the exposed person feels sick as vomiting may be dangerous. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Chemical burns must be treated promptly by a physician. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway.

Most important symptoms/effects, acute and delayed potential acute health effects

Eye contact: Causes serious eye damage.

Inhalation: May cause respiratory irritation.

Skin contact: Causes severe burns. May cause an allergic skin reaction.

Ingestion: May cause burns to mouth, throat and stomach.

Over-exposure signs/symptoms

Eye contact: Adverse symptoms may include the following: pain, watering and redness

Inhalation: Adverse symptoms may include the following: respiratory tract irritation and coughing

Skin contact: Adverse symptoms may include the following: pain or irritation, redness and blistering may occur, skin burns, ulceration and necrosis may occur

Ingestion: Adverse symptoms may include the following: stomach pains

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician: Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

Specific treatments: Not applicable.

Protection of first-aiders: No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media: Use an extinguishing agent suitable for the surrounding fire.

Unsuitable extinguishing media: Do not use water jet or water-based fire extinguishers.

Specific hazards arising from the chemical: No specific fire or explosion hazard.

Hazardous thermal decomposition products: Decomposition products may include the following materials: carbon dioxide, carbon monoxide, sulfur oxides and metal oxide/oxides

Special protective actions for fire-fighters: Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

Special protective equipment for fire-fighters: Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel: No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Do not breathe dust. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders: For personal protective clothing requirements, please see Section 8.

Environmental precautions: Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has entered the environment, including waterways, soil or air. Materials can enter waterways through drainage systems.

Methods and materials for containment and cleaning up

Small spill: Move containers from spill area. Avoid dust generation. Do not dry sweep. Vacuum dust with equipment fitted with a HEPA filter and place in a closed, labeled waste container. Place spilled material in a designated, labeled waste container. Dispose of waste material by using a licensed waste disposal contractor.

Large spill: Move containers from spill area. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Avoid dust generation. Do not dry sweep. Vacuum dust with equipment fitted with a HEPA filter and place dust in a closed, labeled waste container. Avoid creating dusty conditions and prevent wind dispersal. Large spills to waterways may be hazardous due to alkalinity of the product. Dispose of waste material using a licensed waste disposal contractor. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Protective measures: Put on appropriate personal protective equipment (see Section 8). Persons with a history of skin sensitization problems should not be employed in any process in which this product is used. Avoid exposure by obtaining and following special instructions before use. Do not handle until all safety precautions have been read and understood. Do not get in eyes or on skin or clothing. Do not breathe dust. Do not ingest. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Keep in the original container or an approved alternative made from a compatible material and keep the container tightly closed when not in use. Empty containers retain product residue and can be hazardous. Do not reuse container.

Advice on general occupational hygiene: Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities: A key to using the product safely requires the user to recognize that portland cement reacts chemically with water to produce calcium hydroxide which can cause severe chemical burns. Every attempt should be made to avoid skin and eye contact with cement. Do not get portland cement inside boots, shoes or gloves. Do not allow wet, saturated clothing to remain against the skin. Promptly remove clothing and shoes that are dusty or wet with cement mixtures. Launder/clean clothing and shoes before reuse. Do not enter a confined space that stores or contains portland cement unless appropriate procedures and protection are available. Portland cement can build up or adhere to the walls of a confined space and then release or fall suddenly (engulfment).

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
Cement, portland, chemicals	**ACGIH TLV (United States, 3/2012).** TWA: 1 mg/m³ 8 hours. Form: Respirable fraction **NIOSH REL (United States, 6/2009).** TWA: 5 mg/m³ 10 hours. Form: Respirable fraction TWA: 10 mg/m³ 10 hours. Form: Total **OSHA PEL (United States, 6/2010).** TWA: 5 mg/m³ 8 hours. Form: Respirable fraction TWA: 15 mg/m³ 8 hours. Form: Total dust
Calcium oxide	**ACGIH TLV (United States, 3/2012).** TWA: 2 mg/m³ 8 hours. **NIOSH REL (United States, 6/2009).** TWA: 2 mg/m³ 10 hours. **OSHA PEL (United States, 6/2010).** TWA: 5 mg/m³ 8 hours.
Limestone	**NIOSH REL (United States, 6/2009).** TWA: 5 mg/m³ 10 hours. Form: Respirable fraction TWA: 10 mg/m³ 10 hours. Form: Total **OSHA PEL (United States, 6/2010).** TWA: 5 mg/m³ 8 hours. Form: Respirable fraction TWA: 15 mg/m³ 8 hours. Form: Total dust
Magnesium oxide	**ACGIH TLV (United States, 3/2012).** TWA: 10 mg/m³ 8 hours. Form: Inhalable fraction **OSHA PEL (United States, 6/2010).** TWA: 15 mg/m³ 8 hours. Form: Total particulates
Quartz	**ACGIH TLV (United States, 3/2012).** TWA: 0.025 mg/m³ 8 hours. Form: Respirable fraction **NIOSH REL (United States, 6/2009).** TWA: 0.05 mg/m³ 10 hours. Form: respirable dust **OSHA PEL Z-3 (United States, 9/2005).** TWA: 10mg/m³ divided by %SiO_2 + 2: Respirable TWA: 30mg/m³ divided by %SiO_2 + 2: Total
Calcium sulfate (gypsum)	**ACGIH TLV (United States, 3/2012)** TWA: 10 mg/m³ 8 hours. Form: Respirable fraction **NIOSH REL (United States, 6/2009)** TWA 5 mg/m³ 8 hours. Form: Respirable fraction TWA 10 mg/m³ 8 hours. Form: Total dust **OSHA PEL Z-1 (United States, 2/2006)** TWA 5 mg/m³ 8 hours. Form: Respirable fraction TWA 15 mg/m³ 8 hours. Form: Total dust

Appropriate engineering controls: Use only with adequate ventilation. If user operations generate dust, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

Environmental exposure controls: Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation.

Individual protection measures

Hygiene measures: Clean water should always be readily available for skin and (emergency) eye washing. Periodically wash areas contacted by portland cement with a pH neutral soap and clean, uncontaminated water. If clothing becomes saturated with portland cement, garments should be removed and replaced with clean, dry clothing.

Eye/face protection: To prevent eye contact, wear safety glasses with side shields, safety goggles or face shields when handling dust or wet cement. Wearing contact lenses when working with cement is not recommended.

Skin protection

Hand protection: Use impervious, waterproof, abrasion and alkali-resistant gloves. Do not rely on barrier creams in place of impervious gloves. Do not get portland cement inside gloves.

Body protection: Use impervious, waterproof, abrasion and alkali-resistant boots and protective long-sleeved and long-legged clothing to protect the skin from contact with wet portland cement. To reduce foot and ankle exposure, wear impervious boots that are high enough to prevent portland cement from getting inside them. Do not get portland cement inside boots, shoes, or gloves. Remove clothing and protective equipment that becomes saturated with cement and immediately wash exposed areas of the body.

Other skin protection: Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved. Footwear and other gear to protect the skin should be approved by a specialist before handling this product.

Respiratory protection: Use a properly fitted, particulate filter respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product, and assigned protection factor of the selected respirator.

Section 9. Physical and chemical properties

Appearance

Physical State: Solid. [Powder.]

Color: Gray or white.

Odor: Odorless.

Odor threshold: Not available.

pH: >11.5 [Conc.](% w/w): 1%]

Melting point: Not available.

Boiling point: >1000°C (>1832°F)

Flash point: Not flammable. Not combustible.

Burning time: Not available.

Burning rate: Not available.

Evaporation rate: Not applicable.

Flammability (solid, gas): Not applicable.

Lower and upper explosive (flammable) limits: Not applicable.

Vapor pressure: Not applicable.

Vapor density: Not applicable.

Relative density: 2.3 to 3.1

Solubility: Slightly soluble in water.

Solubility in water: 0.1 to 1%

Partition coefficient: n-octanol/water: Not applicable.

Auto-ignition temperature: Not applicable.

Decomposition temperature: Not available.

SADT: Not available.

Viscosity: Not applicable.

Section 10. Stability and reactivity

Reactivity: Reacts slowly with water forming hydrated compounds, releasing heat and producing a strong alkaline solution until reaction is substantially complete.

Chemical stability: The product is stable.

Possibility of hazardous reactions: Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to avoid: No specific data.

Incompatible materials: Reactive or incompatible with the following materials: oxidizing materials, acids, aluminum and ammonium salt. Portland cement is highly alkaline and will react with acids to produce a violent, heat-generating reaction. Toxic gases or vapors may be given off depending on the acid involved. Reacts with acids, aluminum metals and ammonium salts. Aluminum powder and other alkali and alkaline earth elements will react in wet mortar or concrete, liberating hydrogen gas. Limestone ignites on contact with fluorine and is incompatible with acids, alum, ammonium salts, and magnesium. Silica reacts violently with powerful oxidizing agents such as fluorine, boron trifluoride, chlorine trifluoride, manganese trifluoride, and oxygen difluoride yielding possible fire and/or explosions. Silicates dissolve readily in hydrofluoric acid producing a corrosive gas – silicon tetrafluoride.

Hazardous decomposition products: Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity: Portland Cement LD50/LC50 = Not available

Irritation/Corrosion: **Skin:** May cause skin irritation. May cause serious burns in the presence of moisture.
Eyes: Causes serious eye damage. May cause burns in the presence of moisture.
Respiratory: May cause respiratory tract irritation.

Sensitization: May cause sensitization due to the potential presence of trace amounts of hexavalent chromium.

Mutagenicity: There are no data available.

Carcinogenicity:

Classification

Product/ingredient name	OSHA	IARC	ACGIH	NTP
Cement, portland, chemicals	–	–	A4	–
Quartz	–	1	A2	Known to be a human carcinogen.

Reproductive toxicity: There are no data available.

Teratogenicity: There are no data available.

Specific target organ toxicity (single exposure)

Name	Category	Route of Exposure	Target Organs
Calcium oxide	Category 3	Inhalation and skin contact	Respiratory tract irritation, skin irritation
Cement, portland, chemicals	Category 3	Inhalation and skin contact	Respiratory tract irritation, skin irritation

Specific target organ toxicity (repeated exposure)

Name	Category	Route of Exposure	Target Organs
Quartz	Category 1	Inhalation	Respiratory tract and kidneys

Aspiration hazard: There are no data available.

Information on the likely routes of exposure

Dermal contact. Eye contact. Inhalation. Ingestion.

Potential acute health effects:

Eye contact: Causes serious eye damage.

Inhalation: May cause respiratory irritation.

Skin contact: Causes severe burns. May cause an allergic skin reaction.

Ingestion: May cause burns to mouth, throat and stomach.

Symptoms related to the physical, chemical and toxicological characteristics:

Eye contact: Adverse symptoms may include the following: pain, watering, redness

Inhalation: Adverse symptoms may include the following: respiratory tract irritation, coughing

Skin contact: Adverse symptoms may include the following: pain or irritation, redness, blistering may occur, skin burns, ulcerations and necrosis may occur

Ingestion: Adverse symptoms may include the following: stomach pains

Delayed and immediate effects and also chronic effects from short and long term exposure:

Short term exposure
Potential immediate effects: No known significant effects or critical hazards.
Potential delayed effects: No known significant effects or critical hazards.

Long term exposure
Potential immediate effects: No known significant effects or critical hazards.
Potential delayed effects: No known significant effects or critical hazards.

Potential chronic health effects:

General: Repeated or prolonged inhalation of dust may lead to chronic respiratory irritation. If sensitized to hexavalent chromium, a severe allergic dermal reaction may occur when subsequently exposed to very low levels.

Carcinogenicity: Portland cement is not classifiable as a human carcinogen. Crystalline silica is considered a hazard by inhalation. IARC has classified crystalline silica as a Group 1 substance, carcinogenic to humans. This classification is based on the findings of laboratory animal studies (inhalation and implantation) and epidemiology studies that were considered sufficient for carcinogenicity. Excessive exposure to crystalline silica can cause silicosis, a non-cancerous lung disease.

Mutagenicity: No known significant effects or critical hazards.

Teratogenicity: No known significant effects or critical hazards.

Developmental effects: No known significant effects or critical hazards.

Fertility effects: No known significant effects or critical hazards.

Numerical measures of toxicity: Acute toxicity estimates: There are no data available.

Section 12. Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
Calcium oxide	Chronic NOEC 100 mg/L Fresh water	Fish–Oreochromis niloticus–Juvenile (Fledgling, Hatchling, Weanling)	46 days

Persistence and degradability: There are no data available.

Bioaccumulative potential: There are no data available.

Mobility in soil: Soil/water partition coefficient (Koc): Not available.

Other adverse effects: No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods: The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Untreated waste should not be released to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe manner. Care should be taken when handling empty containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff, and contact with soil, waterways, drains and sewers.

Section 14. Transport information

	DOT Classification	IMDG	IATA
UN number	Not regulated.	Not regulated.	Not regulated.
UN proper shipping name	–	–	–
Transport hazard class(es)	–	–	–
Packing group	–	–	–
Environmental hazards	None.	None.	None.
Additional information	–	–	–

Special precautions for user: Transport within user's premises: always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code: Not available.

Section 15. Regulatory information

U.S. Federal regulations:

TSCA 6 final risk management: Chromium, ion (Cr6+)

United States inventory (TSCA 8b): Portland cements are considered to be statutory mixtures under TSCA. CAS 65997-15-1 is included on the TSCA inventory.

Clean Water Act (CWA) 307: Chromium, ion (Cr6+)

CERCLA: This product is not listed as a CERCLA substance.

Clean Air Act Section 112 (b): Hazardous Air Pollutants (HAPs) – Not listed

Clean Air Act Section 602: Class I Substances – Not listed

Clean Air Act Section 602: Class II Substances – Not listed

DEA List I Chemicals: (Precursor Chemicals) – Not listed

DEA List II Chemicals: (Essential Chemicals) – Not listed

SARA 311/312

Classification: Immediate (acute) health hazard
Delayed (chronic) health hazard

Composition/information on ingredients

Name	%	Fire hazard	Sudden release of pressure	Reactive	Immediate (acute) health hazard	Delayed (chronic) health hazard
Calcium oxide	A-B	No.	No.	No.	Yes.	No.
Quartz	< 0.2	No.	No.	No.	No.	Yes.
Chromium, ion (Cr6+)	< 0.1	No.	No.	No.	Yes.	Yes.
Nickel Compounds	< 0.1	No.	No.	No.	Yes.	Yes.
Lead (Organic & Inorganic)	< 0.1	No.	No.	No.	No.	Yes.

SARA 313

	Product name	CAS number	%
Form R–Reporting requirements	Chromium, ion (Cr6+) Lead (Organic or Inorganic) Nickel Compounds	8540-29-9 – –	< 0.1 < 0.1 < 0.1
Supplier notification	Alternatively, if any of the compounds are not present, state: This product does not contain any constituents listed under SARA Title III Section 313.		

State regulations

Massachusetts: The following components are listed: cement, portland, chemicals, limestone

New York: None of the components are listed.

New Jersey: The following components are listed: cement, portland, chemicals, gypsum, limestone

Pennsylvania: The following components are listed: cement, portland, chemicals, gypsum, limestone

California Prop. 65

WARNING: This product contains crystalline silica and chemicals (trace metals) known to the State of California to cause cancer, birth defects or other reproductive harm. California law requires the above warning in the absence of definitive testing to prove the defined risks do not exist.

Ingredient name	Cancer	Reproductive	No significant risk level	Maximum acceptable dosage level
Quartz	Yes.	No.	No.	No.
Chromium, ion (Cr6+)	Yes.	Yes.	0.001 µg/day (inhalation)	8.2 micrograms/day (ingestion)
Nickel Compounds	No.	No.	No.	No.
Lead	Yes.	Yes.	15 µg/day (ingestion)	0.5 micrograms/day (inhalation)

International regulations

International lists: **Canadian Domestic Substances List (DSL):** Portland cement is included on the DSL.
Mexico Inventory (INSQ): All components are listed or exempted.

Section 16. Other information

History

Date of issue mm/dd/yyyy: 06/15/2013

Version: 1

Revised Section(s): Not applicable.

Notice to reader

While the information provided in this safety data sheet is believed to provide a useful summary of the hazards of portland cement as it is commonly used, the sheet cannot anticipate and provide all of the information that might be needed in every situation. Inexperienced product users should obtain proper training before using this product. In particular, the data furnished in this sheet do not address hazards that may be posed by other materials mixed with portland cement to produce portland cement products. Users should review other relevant material safety data sheets before working with this portland cement or working on portland cement products, for example, portland cement concrete.

SELLER MAKES NO WARRANTY, EXPRESS OR IMPLIED, CONCERNING THE PRODUCT OR THE MERCHANTABILITY OR FITNESS THEREOF FOR ANY PURPOSE OR CONCERNING THE ACCURACY OF ANY INFORMATION PROVIDED BY **(Name of Company)**, except that the product shall conform to contracted specifications. The information provided herein was believed by the **(Name of Company)** to be accurate at the time of preparation or prepared from sources believed to be reliable, but it is the responsibility of the user to investigate and understand other pertinent sources of information to comply with all laws and procedures applicable to the safe handling and use of product and to determine the suitability of the product for its intended use. Buyer's exclusive remedy shall be for damages and no claim of any kind, whether as to product delivered or for non-delivery of product, and whether based on contract, breach of warranty, negligence, or otherwise shall be greater in amount than the purchase price of the quantity of product in respect of which damages are claimed. In no event shall Seller be liable for incidental or consequential damages, whether Buyer's claim is based on contract, breach of warranty, negligence or otherwise.

Abbreviations

ACGIH – American Conference of Governmental Industrial Hygienists

CAS – Chemical Abstract Service

CERCLA – Comprehensive Emergency Response and Comprehensive Liability Act

CFR – Code of Federal Regulations

DOT – Department of Transportation

GHS – Globally Harmonized System

HEPA – High Efficiency Particulate Air

IATAe– International Air Transport Association

IARC – International Agency for Research on Cancer

IMDG – International Maritime Dangerous Goods

NIOSH – National Institute of Occupational Safety and Health

NOEC – No Observed Effect Concentration

NTP – National Toxicology Program

OSHA – Occupational Safety and Health Administration

PEL – Permissible Exposure Limit

REL – Recommended Exposure Limit

RQ – Reportable Quantity

SARA – Superfund Amendments and Reauthorization Act

SDS – Safety Data Sheet

TLV – Threshold Limit Value

TPQ – Threshold Planning Quantity

TSCA – Toxic Substances Control Act

TWA – Time-Weighted Average

UN – United Nations