

APPENDIX C-1: Portland Cement Inspection Procedures

Portland cement is one of the most widely-used formulations of cement in construction and the occupational health hazards are generally well known. These include inhalation, dermal, and eye hazards, some of which result from trace constituents generally found in portland cement, including hexavalent chromium (“Cr(VI)”). Cr(VI) is a trace constituent of portland cement not because it is an added ingredient but because it is a contaminant that enters the mixture during its manufacture. Generally there is less than 20 µg Cr(VI) per gram of cement, or 20 parts per million (ppm).

OSHA’s Cr(VI) standards do not apply to operations with portland cement because OSHA determined that compliance with pre-existing OSHA general standards provides adequate protection for employees exposed to the trace amounts of Cr(VI) found in portland cement. The applicable OSHA standards are those for air contaminants, personal protective equipment, sanitation, and hazard communication. This Appendix explains how these standards, and OSHA’s recordkeeping regulations, are to be enforced at workplaces, primarily construction workplaces, where employees are exposed to portland cement. A one-page checklist is also included to assist compliance officers in these inspections. For all OSHA inspections where compliance officers find employee exposures to portland cement, the OSHA-1 forms shall be marked with following coding for future tracking purposes:

OSHA-1Block 42: Type = N ID = 11 Value = Portland

Dermal and Eye Hazards: Exposure to dry portland cement may cause drying of the skin and mild irritation, or more significant effects from the aggravation of other conditions. Wet portland cement is caustic (pH > 12) and dermal exposure may cause more severe skin effects, including thickening, cracking or fissuring of the skin. Prolonged exposure can cause severe skin damage in the form of chemical (caustic) burns. Eye exposures to portland cement may cause immediate or delayed irritation or inflammation of the cornea. Eye contact with larger amounts of dry powder or splashes of wet portland cement may cause effects ranging from moderate eye irritation to chemical burns and blindness.

Some individuals who are exposed to portland cement may exhibit an allergic response, which can result in symptoms ranging from mild rashes to severe skin ulcers. Cement dermatitis may be irritant contact dermatitis induced by the alkaline, abrasive, and hygroscopic (water-absorbing) properties of portland cement, or it may be allergic contact dermatitis elicited by an immunological reaction to Cr(VI), or it may be a combination of the two.

PPE: OSHA’s general standards for personal protective equipment (PPE), 29 CFR 1910.132 for general industry, 29 CFR 1915.152 for shipyards, and 29 CFR 1926.95 for construction, require employers to ensure that appropriate PPE is provided, effectively used, and maintained.

Appropriate PPE should include boots and gloves, and may also include eye protection, such as safety glasses with side shields or goggles, in some circumstances. Such equipment must be maintained in a sanitary and reliable condition when not in use, and employees must be able to clean or exchange their equipment if it becomes ineffective or contaminated on the inside with cement. In addition to long-sleeved shirts and long pants, protective clothing such as coveralls may also be appropriate to prevent the skin from coming in contact with cement.

Because the general PPE standards provide protection essentially equivalent to the PPE provision in the Cr(VI) standards, compliance with them should provide adequate protection against the Cr(VI) hazards from portland cement. Compliance officers must confirm that appropriate PPE is provided, used, and maintained.

Sanitation: The requirements for washing facilities in OSHA's general sanitation standards are also comparable to the hygiene provisions found in the Cr(VI) standards. For example, OSHA's Sanitation standard for general industry explicitly requires that lavatories with running water, hand soap, and individual hand towels or air-blowers be available in all places of employment. See 29 CFR 1910.141(d)(2).

In construction operations where employees may be exposed to harmful contaminants, the sanitation standard requires employers to "provide adequate washing facilities . . . in near proximity to the worksite [that must] be so equipped as to enable employees to remove such substances." 29 CFR 1926.51(f)(1).¹ The shipyards sanitation standard similarly requires "adequate washing facilities for employees engaged in . . . operations where contaminants can, by ingestion or absorption, be detrimental to the health of the employees." 29 CFR 1915.97(b). In order to effectively remove portland cement, employers must provide washing facilities with clean water, non-alkaline soap and clean towels. This interpretation of 1926.51(f)(1) and 1915.97(b) is consistent with the evidence in the Cr(VI) rulemaking record and with OSHA's previous interpretations of these standards.

Inhalation Hazards / PELs: Inhalation of dry portland cement may cause irritation to the moist mucous membranes of the nose, throat and upper respiratory system, or may cause or aggravate certain lung diseases or conditions. Although portland cement is not recognized as a carcinogen by NTP, OSHA, or IARC, it generally contains small amounts of substances, such as crystalline silica and Cr(VI), which are recognized as carcinogens by these organizations.

OSHA's PELs for both portland cement and particulates not otherwise regulated (PNOR) are 15 mg/m³ as total dust, and 5 mg/m³ for the respirable fraction where listed. Because there are only trace amounts of Cr(VI) in portland cement, these PELs provide greater protection against Cr(VI) inhalation hazards than the new Cr(VI) PEL of 5 µg/m³; that is, an employee exposed to 15 mg/m³ of portland cement dust with a Cr(VI) concentration below 20 µg/g, will be exposed to less than 0.3 µg/m³ of Cr(VI).

Compliance officers must confirm that concentrations of portland cement dust are at or below the 15 mg/m³ PEL. If maintaining portland cement exposure levels below 15 mg/m³ is not feasible, exposed employees must wear respiratory protection in accordance with 29 CFR 1910.134. This would be most likely in construction operations such as terrazzo work, mixing mortar and jobsite mixing of concrete.

Training / Hazard Communication: Portland cement is considered a hazardous chemical under OSHA's Hazard Communication standard, 29 CFR 1910.1200 (HAZCOM), and should be included in the employer's hazard communication program. Employers whose employees are exposed to portland cement must provide appropriate training (discussed below), maintain labels

¹ Paragraph 29 CFR 1926.51(f)(3), which requires "hot and cold running water, or tepid running water," is only applicable to permanent places of employment where construction work is occurring; however, the general requirement in paragraph (f)(1) applies to all construction work.

and copies of MSDSs for portland cement in their workplaces, and ensure that these documents are readily accessible during each work shift.

HAZCOM also requires chemical manufacturers and importers to assess the hazards of chemicals that they produce or import and disseminate information regarding those hazards. Among other information, each MSDS must identify the hazardous chemicals it pertains to, and the health hazards presented by those chemicals, “including signs and symptoms of exposure,” as well as generally applicable precautions for safe handling and use and control measures. 29 CFR 1910.1200(g).

Because portland cement is a mixture, HAZCOM provides two ways in which the MSDS can list the hazardous chemicals it contains. If the mixture is tested as a whole to determine its hazards, the standard allows the MSDS to list only “the ingredients which contribute to these known hazards.” For a mixture that has not been tested as a whole, the MSDS must include the ingredient(s) present in a concentration below 1% (0.1% for a carcinogens) – as is likely for the Cr(VI) in portland cement – “if there is evidence that the ingredient(s) could be released from the mixture in concentrations which ... could present a health risk to employees” (as well as in other circumstances not relevant here).

MSDSs for portland cement are expected to indicate the dermal and inhalation hazards described above. Because there is evidence that exposure to the Cr(VI) in portland cement could cause sensitization and allergic dermatitis, MSDSs for portland cement that is contaminated by Cr(VI) are expected to indicate the presence of Cr(VI) and to address this hazard. Compliance officers are to address deficiencies in MSDSs in accordance with CPL 02-02-038, Inspection Procedures for the Hazard Communication Standard.

OSHA’s general construction training standard, 29 CFR 1926.21(b), and the HAZCOM training provision, 29 CFR 1910.1200(h), are applicable to operations with portland cement exposure. Compliance officers must verify that employers are complying with these provisions by instructing employees working with portland cement about the hazards of portland cement, including any hazards associated with the cement’s Cr(VI) content.

Inspection Checklist: At every inspection site where the OSHA compliance officer encounters employees working with portland cement, the officer shall determine, at a minimum, the employer’s compliance with the general standards described above. A checklist is provided on the following page to assist compliance officers in these worksite inspections. This checklist sets forth the specific provisions of these general standards that employers must follow in order to control the inhalation, dermal, and eye hazards associated with exposures to portland cement.

Further health and safety information on the concrete industry is available at the OSHA website’s Safety and Health Topic Page on [Concrete and Concrete Products - Manufacturing and Construction](#).

INSPECTION CHECKLIST FOR WORKSITES WITH PORTLAND CEMENT

- PPE [1910.132, 1915.152, 1926.95]:
 - Appropriate PPE, such as boots and gloves, is provided wherever necessary and appropriate for the job.
 - Employees can clean or exchange PPE if it becomes ineffective or contaminated on the inside with portland cement while in use.
 - Equipment is maintained in a sanitary and reliable condition when not in use.
- Sanitation [1910.141(d), 1915.97(b), 1926.51(f)(1)]:
 - Washing facilities provided with clean water, non-alkaline soap, and clean towels.
 - Washing facilities are in near proximity to the worksite and adequate for the number of exposed employee and the size of the job.
- Airborne exposures [1910.1000, 1915.1000, 1926.55, 1910.134]:
 - 8-hour TWA exposures to portland cement or particulates not otherwise regulated (PNOR) do not exceed 15 mg/m³ PEL as total dust.
 - Construction operations with potential inhalation exposures include, but are not limited to, terrazzo work, mixing mortar, and mixing concrete.
 - Where exposures exceed the PEL, employees are provided respirators.
- Hazard communication and training [1910.1200, 1926.21]:
 - MSDSs and labels for portland cement are maintained and made available to employees.
 - MSDSs indicate the hazards of portland cement, including hazards associated with the cement's hexavalent chromium content.
 - Employees are trained on:
 - Hazards associated with exposure to portland cement, including hazards associated with the cement's hexavalent chromium content.
 - Preventive measures, including proper use and care of PPE, and the importance of proper hygiene practice.
 - Access to hygiene facilities, PPE, and information (including MSDSs)
- Recordkeeping [1904]:
 - Employer records each case of occupational dermatitis that meets the recordability criteria in 1904.4 in illness and injury logs.
 - Employer informs employees of how to report their work-related illnesses and injuries.