July 28, 2026 |

Briefs

Submission to the WCB on proposed changes to the OH&S Regulation Part 20 - Shotcrete

A pdf of the complete submission can be found here(476 KB).

Introduction

The BC Federation of Labour (“BCFED” “Federation”) appreciates the opportunity to provide our recommendations with respect to the proposed amendments to the *Occupational Health and Safety Regulation* (“OHSR” “Regulation”) Part 20 related to shotcrete.

The BCFED represents more than 500,000 members of our affiliated unions, from more than 1,100 locals working in every aspect of the BC economy.

The Federation is recognized by the Workers’ Compensation Board (“WCB” “Board”) and the government as a major stakeholder in advocating for the health and safety of all workers in BC.

Background

According to the American Concrete Institute (ACI), shotcrete is a method of applying concrete, projected at high velocity, primarily on to a vertical or overhead surface and the impact created by the application consolidates the concrete. The shotcrete process requires less formwork and can be more economical than conventionally placed concrete. Shotcrete is applied using a wet- or dry-mix process. The wet-mix shotcrete process mixes all ingredients, including water, before introduction into the delivery hose. The dry-mix shotcrete process adds water to the mix at the nozzle.[1]

Shotcrete can be used in many applications, including structural walls and columns, soil retention, retaining walls, tunnel linings, shafts, bridge repair, sewage treatment rehabilitation, mining, seawalls, underground parkades, domes, steep slope stabilization, landscaping, swimming pools, rockscapes, skateboard parks, shotcrete homes and foundation repair. In industrial settings, shotcrete is used in

kilns and blast furnaces as well as other applications at cement plants, smelters and incinerator installations.

Shotcreting requires significant skill and experience and is extremely hazardous work. To start, it is recognized in the OHSR as a silica process that is likely to result in exposures to respirable crystalline silica at levels above exposure limits. Workers involved in shotcreting are therefore at risk of serious and often fatal illnesses related to silica exposure, including silicosis, lung cancer, chronic obstructive pulmonary disease (COPD), kidney disease and other cancers.[2]

Other health hazards related to exposure to dust and cement include skin, eye and respiratory irritation. Workers' eyes and skin can be severely irritated and burned, and the ingestion of particles generated by shotcrete may irritate the gastrointestinal tract. Prolonged exposure to cement mixtures can cause dermatitis and eczema.

Shotcreting is difficult and physical work involving the use of heavy hoses, high pressure pumps and delivery systems, and often working at heights. For example, there have been fractures and head injuries as a result of workers trying to clear blockages or falling from scaffolding. Overall, both traumatic and other musculoskeletal injuries regularly impact shotcrete workers.

In recent decades in BC, there have been several major incidents where shotcrete shoring or form walls collapsed, including instances where workers were seriously injured. Just last month, there was a major collapse of a shotcrete shoring wall in Burnaby. Thankfully, the collapse occurred overnight and no workers were injured.[3] Similarly, no workers were injured in another major collapse in Coquitlam in 2023.[4] But for fortunate timing, these close calls could have resulted in multiple worker fatalities.

In 2023, a 2.4 m (8-foot) high form wall suddenly cracked and fell towards workers who were shooting shotcrete onto the wall. One worker was trapped under the inadequately supported wall and was seriously injured. In its investigation, the WCB concluded that inadequate planning and construction, a lack of hazard identification, risk assessment and safe work procedures and inadequate supervision contributed to the incident. The general contractor and the concrete forming firm did not engage an engineer to plan the construction of the wall. Instead, they relied on verbal discussions and rough drawings which in the end were inadequate to support the weight of the shotcrete.[5]

In relation to shotcrete, the structure of the construction industry in BC also intensifies the risk to workers' health and safety. High production demands and extensive subcontracting create both pressure and complexity, regularly resulting in gaps in communication and lapses in construction sector employers effectively meeting health and safety requirements.

Undeniably, shotcrete is a work process that poses significant risks to workers, in terms of traumatic injuries, musculoskeletal injuries and occupational disease. Given the wall collapses experienced in recent years in BC, it is clear the clock is ticking toward a major catastrophe. There is a pressing need for better planning, supervision, training and accountability for worker safety. It is critical to implement additional regulatory requirements to prevent serious injuries, illness and fatalities going forward.

Overall comments

The BCFED strongly supports the addition of specific, detailed requirements within the OHSR related to shotcrete. We believe the proposed amendments to the OHSR go a long way to update and strengthen the existing requirements.

In our submission, we will address those sections of the Regulation we believe require further amendments.

We urge the Board of Directors to seriously consider our recommendations, so we meet our shared goal to ensure that BC health and safety regulations set high standards for the prevention of injury and death for workers.

We are particularly concerned that setting the height for which additional design and inspection requirements kick in at 13 feet is too high. In the past, shotcrete walls lower than 6 feet high have failed and injured workers, and we believe greater caution is needed at lower heights to better protect workers. A second major concern is the need to ensure that shotcreters, supervisors and pump operators are well trained and competent.

In the following, we provide detailed comments on specific sections of the proposed language, and we urge the Board to consider our additional amendments.

Specific Comments

Section 20.1 Definitions

The proposed amendments define “specified shotcrete backing” as *“all temporary shotcrete backing other than vertical shotcrete backing with a height of 4 m (13ft) or less.”*

The explanatory notes say that the 4 m (13 ft) threshold is consistent with the falsework and formwork regulations and the risks involved with taller structures. As such, engineering requirements would be the same whether an employer chose to use shotcrete or cast-in-place concrete.

While this consistency may seem attractive, we are seriously concerned that the 4 m threshold is too high. We have heard from workers about past incidents where shotcrete backing under 4 m failed, and in some cases, workers were seriously injured as a result. The reality is that walls below the proposed threshold still pose a serious risk to workers. Establishing the threshold for additional engineering requirements at a lower height offers greater protection for workers. We submit that the threshold for specified shotcrete backing be established at 2 m (6.5ft).

In addition to our central concern about the proposed 4 m height threshold, the proposed wording of the definition is confusing. Rather than clearly defining what *is* considered to be “specified shotcrete backing,” the definition says what it *is not*. The explanatory notes define “specified shotcrete backing” in a much more straightforward way, saying:

> *“Specified shotcrete backing” refers to a subcategory of temporary backing that is either:*
>
> *(a) of a height exceeding 4 m (13 ft), or*
>
> *(b) non-vertical (this includes horizontal, slanted and curved backing regardless of height).*

Recommendations

The BCFED strongly recommends that the definition of “specified shotcrete backing” be amended to reduce the height threshold to 2 m (6.5ft).

The BCFED also recommends that the definition of “specified shotcrete backing” be amended for greater clarity, following the example from the explanatory notes.

Section 20.54.3 Supervision for temporary shotcrete backing and Section 20.54.19 Supervision of shotcrete application

The proposed Section 20.54.3 requires a qualified supervisor for the erection and dismantling of temporary shotcrete backing, and that workers are made aware of hazards and how to manage them. It says:

> *The employer must ensure that*
>
> *(a) the erection and dismantling of temporary shotcrete backing is supervised by a qualified supervisor, and*
>
> *(b) workers are instructed in the hazards that the workers may be exposed to, and the precautions to be taken, while around or on temporary shotcrete backing.*

Given the complexity and risk associated with this work, we strongly support the proposed requirement for it to be supervised by a qualified supervisor. However, it is important to be specific about what minimum qualifications are needed. The explanatory notes say that at a minimum, the supervisor should have some experience with the work and is expected to be knowledgeable of the work activities involved, including how to interpret backing drawings, assemble backing and install it in place. Including these and other specific minimum requirements within the Regulation would offer more clarity for workers and employers and improve enforceability.

The BCFED also strongly supports the proposed requirement for providing instruction to workers. However, this language can be improved by specifying that the instruction for workers should be site specific, completed before work begins and documented by the employer.

The above comments also apply to Section 20.54.19 which sets out almost identical requirements for a qualified supervisor and the instruction of workers for shotcrete application.

Recommendations

The BCFED recommends that Section 20.54.3 (a) and Section 20.54.19(a) be amended to outline specific qualifications required for supervisors of work on temporary shotcrete backing and shotcrete application.

The BCFED also recommends that Section 20.54.3 (b) and 20.54.19(b) be amended to require the instruction of workers to be site specific, completed before work begins, and documented by the employer.

20.54.4 Worksite-specific plans required for specified shotcrete backing

The proposed Section 20.54.4 says that for specified shotcrete backing, the employer must prepare worksite-specific plans and have them certified by an engineer. Section 20.54.4(3) says the employer must ensure that the certified plans are available at the worksite during the erection, use and dismantling of specified shotcrete backing. Further, Section 20.54.4(4) says that any changes to the certified worksite-specific plans must also be available at the worksite.

The proposed language does not require that workers are informed that worksite specific plans have been prepared and certified by an engineer. Also, there is no specific reference about who the plans must be made available to. In the experience of BCFED affiliates, employers regularly refuse to provide workers and joint committees with access to safety-related documents. This runs counter to a worker's right to know and does not support an effective safety management system. Given this real-world experience, it is important to include a specific requirement for employers to make these kinds of records available to workers and their representatives.

Recommendation

The BCFED recommends that Section 20.54.4 be amended to:

- Require that before work begins, employers confirm with workers that worksite-specific plans have been prepared and certified by an engineer; and
- Specifically require that the certified worksite-specific plans be made available to workers, joint committee members and worker health and safety representatives upon request.

Section 20.54.9 – Inspection for specified shotcrete backing

The BCFED strongly supports the language in this section, which requires that before any shotcrete is applied to specified shotcrete backing, a professional engineer inspects the temporary backing and certifies that it has been erected in accordance with the engineer's worksite-specific plans. Further, the engineer's certificate must be available at the worksite.

Again, there is no specific reference in this section to ensure that workers and their representatives have access to this critical information. The proposed amendments would be significantly strengthened by requiring employers to communicate the results of the engineer's inspection to workers, and to specify that the certificate be available at the worksite to workers, joint committees and worker health and safety representatives.

Recommendation

The BCFED recommends that Section 20.54.9 be amended to:

- Require the employer to communicate the results of the inspection to workers before shotcrete is applied; and
- Require that the engineer's certificate from the inspection be available at the worksite to workers, joint committee members and worker health and safety representatives upon request.

20.54.11 Shotcrete safe work procedures

Section 20.54.11 requires written safe work procedures for the application of shotcrete and sets out a detailed list of the items that have to be addressed within the procedures. Shotcreting is identified as a silica process in Part 6 of the Regulation. As such, there are important additional requirements for employers to conduct a risk assessment for silica exposure, and to develop and implement an exposure control plan including specific safe work procedures. For indoor and other confined spaces, engineering controls like ventilation systems must be prioritized, and in some cases air monitoring is also required.

However, there is no reference to the Part 6 requirements for silica exposure in this section or any other section of the proposed language on shotcrete. For greater clarity and usability, this section should reference the Part 6 requirements related to silica exposure. In addition, respiratory protection is a critical part of preventing harm to workers from silica exposure, so including an explicit reference to this in the items that must be included in the safe work procedures is also warranted.

The proposed Section 20.54.11 (4) says:

> *(4) The employer must ensure that*
>
> > *(a) the procedures are suitable for the worksite at which shotcrete will be applied,*
> >
> > *(b) the procedures are available at the worksite,*
> >
> > *(c) workers are trained in, and follow, the procedures.*

In relation to Section 20.54.11(4)(a), the explanatory notes say that “Standard procedures are acceptable as long as the employer has reviewed the procedures and either determined them to be appropriate for that particular site or modified them accordingly.” The proposed language of ensuring that procedures are “suitable” for the worksite (versus “site-specific”) and the suggestion in the explanatory notes that the employer could conduct an ill-defined “review” of “standard procedures” allows wide latitude for employers to apply generic procedures to very different worksites.

Given the high-risk nature of this work and the unique circumstances that characterize different construction sites, it is our view that a higher standard must be established in the Regulation for safe work procedures. Employers should be required to plan ahead and to explicitly set out site-specific safe work procedures. These procedures may incorporate generic or “standard procedures” as suggested in the explanatory notes, but the unique demands and features of each site must be taken into account within the safe work procedures.

Section 20.54.11(c) says that workers must be trained in the procedures. We support this proposed requirement but urge the Board to include additional detail to say that the training must include practical and site-specific elements and be documented by the employer.

Recommendation

The BCFED recommends:

- Section 20.54.11 be amended to include a clear reference to the Part 6 requirements to protect workers from silica exposure during shotcreting;

- Section 20.54.11(4)(a) be amended to require employers to develop written *site-specific* safe work procedures for the application of shotcrete; and

- Section 20.52.11(4)(c) be amended to require that training for workers in safe work procedures must include practical and site-specific elements and be documented by the employer.

20.54.13 Shotcrete delivery system requirements

Subsection (9) says:

> *(9) Elbows, reducers and any other component of a shotcrete delivery system must be guarded if the failure or inadvertent disconnection of that component could result in the injury of a worker by any component of the shotcrete delivery system or by the shotcrete.*

Here, we are concerned about the reference to components being “guarded.” It is not clear whether the term refers to physical barriers or if means posting a worker to ensure the components of the delivery system are monitored.

Recommendation

The BCFED recommends Section 20.54.13(9) be revised to clarify what is meant by “guarded.”

Section 20.54.16 Pre-use inspection and testing and Section 20.54.17 Pre-shoot inspection of shotcrete backing

The proposed amendments in Section 20.54.16 require that before equipment is used on a shift, the shotcrete pump, delivery system and any other related equipment must be inspected and safety devices tested by a qualified person. If safety-relevant defects are found, the equipment is not to be used until the issue(s) is resolved. The inspection, inspection results and the plan of action in response to identified deficiencies all have to be documented. These requirements are welcome and have the potential to go a long way to improving safety in the application of shotcrete.

Similarly, Section 20.54.17 requires that immediately before shotcrete is applied to shotcrete backing, the employer must ensure a qualified person inspects any reinforcing steel or any other material that will be embedded within the shotcrete and the shotcrete backing. Any defects identified must be remedied before shotcrete is applied to the affected area, and the inspection and its results must be documented.

The BCFED welcomes the addition of clear requirements for pre-work inspections. However, the proposed amendments don’t mention the need to communicate the results of the inspection or the resolution of deficiencies to workers. As a matter of course, workers deserve to receive this information before beginning work.

Recommendation

The BCFED recommends that Sections 20.54.16 and 20.54.17 be amended to require that the employer communicate the results of pre-work inspections to workers, as well as information about

the resolution of deficiencies identified during the inspections.

20.54.18 Duty to ensure competence of shotcreter

In this section, the proposed amendments establish an obligation for the employer to ensure that shotcreters are qualified for the work:

> *The employer must ensure that a shotcreter is qualified and able to apply shotcrete at the workplace in a competent and safe manner.*

The explanatory notes attached to the proposed amendments say that the Board is developing an OHS Guideline to assist employers in determining whether a shotcreter meets the proposed requirements, and the notes include a draft list of competencies shotcreters should be able to demonstrate.

Shotcreting is skilled, high-risk work and the BCFED strongly agrees that shotcreters need to be well trained and qualified. Competence is not only important for an individual worker's safety, but it also supports overall site safety both during application and in the longer term by ensuring that shotcrete is placed reliably and to the project's specifications.

However, in our view, the Board's proposed approach of establishing a vague, general requirement for competency within the Regulation and a general description of shotcreter competencies within a supporting – but unenforceable - guideline is seriously inadequate.

As far as we are aware, shotcreting is not included within any Red Seal Occupational Standard (RSOS). However, longstanding and well-developed training and certification programs for shotcreters are available, and a number of other jurisdictions require specific certifications for shotcrete application, including for nozzlemen, crew leaders and foremen.[6] Without any specific training or certification for shotcreting currently being required within BC, the training and experience level of these workers is highly variable, and many shotcreters have not received any formal training or pursued a specific certification. Leaving employers to assess a shotcreter's competency according to a vague list within a WCB guideline will only serve to maintain the unacceptable status quo where some shotcreters are grossly under-prepared for the work.

We believe there is a pressing need for the Board to instead establish clear province-wide training and certification requirements for shotcreters in order to protect workers' safety, provide greater clarity for both employers and workers, and ensure enforceability.

In other parts of the Regulation relating to specialized work, workers are required to be trained or certified in a manner "acceptable to the Board."[7] This language allows the Board to review, assess and approve training and certification programs, or to develop its own. We believe this would be an appropriate and much stronger approach for ensuring shotcreters are qualified. In addition, we believe it is important to specify that any program for becoming a fully qualified shotcreter requires multiple elements - including formal technical training, practical instruction and assessment and on-the-job experience supervised by qualified personnel.

Certainly, a transition period would likely be required to further assess needs, engage with stakeholders and determine the right approach to training and certification requirements for shotcreters. But revising the proposed amendments to create a path to establish clearer requirements with the leadership of the Board offers a higher level of protection for workers, better enforceability

and more clarity and certainty for employers.

Recommendations

The BCFED recommends that Section 20.54.18 be amended to require that employers ensure shotcreters are trained and certified in a manner acceptable to the Board.

Further, the BCFED recommends that this section specify that the training and certification will include a combination of formal technical training, practical training and assessment and on-the-job experience.

Conclusion

We appreciate the efforts of the WCB's Policy, Regulation and Research Department in developing the proposed amendments to the OHSR. We strongly support the addition of detailed regulatory requirements for shotcrete in the OHSR.

However, the BCFED urges the WCB Board of Directors to seriously consider our proposed amendments.

While the inclusion of these new requirements for shotcrete in the OHSR is welcome, we know that ensuring they are translated into action and real safety improvements in BC workplaces will be a significant challenge.

We encourage the WCB to develop an effective implementation strategy ensuring that all workers and employers are properly informed and supported to effectively practice these new requirements. Outreach to workplaces – including connecting with both employers and workers – will be critical.

In addition, the implementation strategy must be designed to take into consideration the diversity of the community of workers.

We urge the WCB Board of Directors to provide the necessary resources to ensure effective implementation, ongoing inspections and enforcement.

Again, we appreciate the opportunity to provide these recommendations.

List of shotcrete-related serious injuries reported to WCB

Below is a list of serious injuries reported to WCB related to shotcrete and posted on the Board's website. While it is not a complete or exhaustive list, these examples serve to illustrate the serious risks of shotcreting for workers.[8]

Injury: Close call

Industry: Construction

Core Activity: Structural concrete forming / Industrial, commercial, institutional or highrise residential contracting or construction

Location: Lower Mainland

Date of Incident: 2025-Dec

During preparation of a shotcrete mock-up panel (10 by 10 feet), bracing components were removed and a worker placed an extension ladder against the panel. As the worker climbed the ladder, the panel shifted and fell over, striking and damaging a concrete bucket. No injuries were reported.

Injury: Injury to head

Industry: Construction

Core Activity: Blasting

Location: Interior B.C.

Date of Incident: 2025-Feb

Workers were clearing shotcrete from a material delivery hose. A blockage in the hose resulted in violent ejection of material and caused the unrestrained hose to strike one of the workers.

Injury: Undetermined injuries

Industry: Construction

Core Activity: Concrete placing, finishing, surfacing, or repair

Location: Vancouver Island/Coastal B.C.

Date of Incident: 2023-Aug

A worker was preparing to apply shotcrete (sprayed concrete) to a vertical form from a scaffold raised about 6 feet above grade. A section of the scaffold system collapsed, and the worker fell to grade.

Injury: Fracture, abrasion

Industry: Construction

Core Activity: Excavation, or private landfill or transfer station operation

Location: Lower Mainland

Date of Incident: 2023-Mar

A worker was trying to clear a blockage of shotcrete slurry in a pressurized flexible concrete hose. The worker was using a knife to remove a protective abrasion cover to gain access to the hose when they inadvertently cut into the hose. The hose ruptured, spraying the worker with the pressurized slurry.

Injury: Injuries to arm

Industry: Construction

Core Activity: Concrete placing, finishing, surfacing, or repair

Location: Lower Mainland

Date of Incident: 2021-Mar

While shooting shotcrete, the worker at the nozzle end was trying to control the shotcrete hose when an inconsistent burst of shotcrete came out and the worker fell backward onto wire mesh.

Injury: Undetermined injuries

Industry: Services (NES)

Core Activity: Materials testing for the construction industry

Location: Lower Mainland

Date of Incident: 2020-Oct

A worker climbed the exterior of an access scaffold system to monitor the application of shotcrete onto concrete formwork. The worker was inadvertently sprayed with shotcrete and fell from the scaffold, past a guardrail system, and through a floor opening, landing on the concrete parkade floor below.

Injury: Close call

Industry: Construction

Core Activity: Industrial, commercial, institutional, or highrise residential contracting or construction

Location: Lower Mainland

Date of Incident: 2020-Jan

A shotcrete wall (30 feet long, 20 feet high) supporting one side of a bulk excavation collapsed without warning. No workers were on site when the wall collapsed.

Injury: Close call

Industry: Construction

Core Activity: Structural concrete forming

Location: Lower Mainland

Date of Incident: 2020-Jan

A shotcrete wall (70 feet long, 30 feet high) supporting one side of a bulk excavation collapsed into the excavation without warning. No workers were in the excavation at the time of the collapse.

Injury: Injuries to head

Industry: Construction

Core Activity: Earth and rock filled structure construction

Location: Northern B.C.

Date of Incident: 2020-Jan

During shotcrete application, material struck a worker. The worker was treated on site by the first aid attendant, then taken to hospital by ambulance.

Injury: Close call

Industry: Construction

Core Activity: Earth and rock filled structure construction

Location: Northern B.C.

Date of Incident: 2019-Jul

The shotcrete support lining of an underground working section of a diversion tunnel project failed.

Injury: Close call

Industry: Construction

Core Activity: Earth and rock filled structure construction

Location: Northern B.C.

Date of Incident: 2018-Dec

A shotcrete reinforced section of wall failed within a newly constructed drainage tunnel. No injuries were reported.

Injury: Close call

Industry: Construction

Core Activity: Industrial, commercial, institutional, or highrise residential general contracting or construction

Location: Lower Mainland

Date of Incident: 2014-Mar

During stage 3 of work on an engineer-designed excavation, a shotcrete section about 50 feet long and 20 feet deep collapsed.

Injury: Injury to eye

Industry: Construction

Core Activity: Applying shotcrete to forms

Location: Lower Mainland

Date of Incident: 2014-Feb

A worker was struck in the eye by shotcrete material (concrete) when a blockage in the hose/nozzle suddenly released. The worker was wearing safety glasses.

Injury: Close call

Industry: Construction

Core Activity: Concrete forming

Location: Vancouver Island/Coastal B.C.

Date of Incident: 2013-Jul

A section of an engineered shotcrete wall about 30 feet long by 5 feet high collapsed unwitnessed after normal working hours.

Injury: Undetermined injuries to leg

Industry: Construction

Core Activity: Application of shotcrete onto interior walls of excavation

Location: Lower Mainland

Date of Incident: 2013-Mar

A worker performing clean-up duties with a shovel was struck by about 1 cubic metre of wet shot-crete (concrete) that sloughed from the wall adjacent to where he was working.

Injury: Chest injury

Industry: Construction

Core Activity: Shotcrete finishing

Location: Lower Mainland

Date of Incident: 2011-Oct

A worker was cutting shotcrete in an excavation. A section of the shotcrete fell onto the worker.

[1] ACI, https://www.concrete.org/frequentlyaskedquestions.aspx?faqid=746.

[2]See for example - https://www.osha.gov/silica-crystalline/health-effects and https://www.specmix.com/wp-content/uploads/2019/04/SM6-Shotcrete.pdf.

[3] https://www.ctvnews.ca/vancouver/article/construction-site-retaining-wall-collapses-in-burnaby-work-halted/.

[4] https://tricitiesdispatch.com/shoring-wall-collapse-punched-anchor-void/.

[5] https://www.worksafebc.com/en/resources/health-safety/incident-investigation-report-summaries/form-wall-toppled-into-excavation-seriously-injuring-worker?lang=en.

[6] Loncaric, A., Larive, C. & Morgan, D. (2010) Sprayed concrete nozzle operator training and certification. Available at: https://stratacrete.com/wp-content/uploads/Sprayed-concrete-nozzle-operator-training-and-certification.pdf

[7] For example, see s.22.51(1) Rescue workers, s.19.41(a) General requirements for electrofishing, ands. 23.22 (a) Driver training for oil and gas work.

[8] WCB Recent Incidents, https://www.worksafebc.com/en/health-safety/create-manage/incident-investigations/reporting-incidents-worksafebc/recent-incidents