

**SUBMISSION  
TO  
WORKSAFBC**

**BUILDING TRADES RESPONSE  
ON  
REGULATION AND POLICY PROPOSALS FOR PART 22:  
UNDERGROUND WORKINGS**

SUBMITTED MAY 26, 2008 AT THE  
PUBLIC HEARINGS  
EXECUTIVE AIRPORT PLAZA HOTEL AND CONFERENCE CENTRE  
RICHMOND, BC

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## Introduction

The increasing use of Tunnel Boring Machines (TBMs) does not mean that it is now safer to excavate and build tunnels. TBMs have introduced new risks to tunnel construction. In fact there are even some OH & S advantages to the drilling and blasting that are being lost as TBMs move in to do the work.

While some of the amendments proposed to Part 22 (especially related to cut and cover) do not increase safety risks most of the proposals would enable exceptions that will increase the chance of fatalities and injuries in tunnel construction. We oppose the exceptions proposed under the designation of "Limited Hazard Underground Workings." If there were exceptions or variances that we supported we would classify them as "Different Hazards for Underground Workings." Limiting the hazards of underground workings remains an elusive goal. A precise understanding of geological conditions is not available until the full perimeter of the tunnel is excavated. In spite of pre-cast concrete liners the head of tunnel excavation will always be exposed.

While we oppose any move to define "limited hazards for underground workings" this response does deal with the specific exceptions contained in the proposed 22.51. We have kept to this format so that we could respond specifically to each proposal. We are asking that the Board not accept the proposed amendments as now contained in 22.51 (.1 through to .9). The explanatory notes following each proposed amendment are missing references to the unique hazards of TBM projects and the complex geological considerations in underground workings. Changing geological formations loose rock behind seemingly hard rock, fissures, new gasses that can be created as a reaction to the exposure of the oxygen catalyst, water (underground rivers and even oceans) are hazards that will never be eliminated by using TBMs. Instead we ask the Policy and Regulation department to continue consultations with all stakeholders, specifically the workers with experience in underground workings. Tunnel workers have intimate knowledge about the construction hazards and how best to reduce the risk. The workers will be able to inform research and policy staff with many details regarding this hazardous work.

### Exception for Limited Hazard Underground Workings – Definition – 22.57.1

We begin with a response to the observation that drilling and blasting is more hazardous than TBM operations. One advantage of drilling and blasting is that it exposes a complete view of the back (ceiling) and spring line (wall of the tunnel at the point where it begins the curve to the back) of the tunnel. Many slips aren't exposed by TBM clean cuts through the earth. Mother Nature didn't form geology in nice round perimeters like those excavated by TBMs. Core sample preparations will only predict slips in the zone where they were taken. Until the full perimeter of the tunnel is excavated slips are unknown. The traditional drilling and blasting method provides workers a full view of rock formations which allows for an accurate determination of the need for bolting and the type of bolts required (stabilizing, safety or prescription).

WorkSafe must also acknowledge the variety of Tunnel Boring Machines and the uniqueness of each TBM project. Double Shield machines do not have the sophisticated support mechanisms of the Earth Pressure Balance (EPB) machines. Both types of TBMs can become stuck inside the tunnel. In this eventuality workers must dig a separate tunnel around to the cutter head. The new tunnel around to the cutter head is excavated with traditional methods (Jumbos, Blasting and Pick-Axes). Every TBM project is different. Different bore diameters (from 12 feet to 45 feet). With TBMs the hazards are different but remain constant until there is light at both ends of the tunnel. We oppose the definition of “Limited Hazard Underground Workings” with regard to TBMs. We will accept the inclusion of cut and cover techniques where the back is engineered and ventilation is provided according to current regulations.

### **Hours of Work – 22.57.2**

We support the amendment to extend the hours a person may work to 10 hours per 24 hours. This is not because ventilation and air quality is better in TBM operations; see our response to 22.57.4. We support the 10 hour shift as long as air quality and all the other safety measures have been taken at the jobsite.

### **Self-Rescuers – 22.57.3**

We liken the self rescuer to a tie-off for a worker at elevation. Before safety lines became a part of the culture both workers and industry complained that the lanyons would interfere with worker mobility. It’s the same with the self rescuer.

The newer round self rescuers can fit on a worker’s belt. It is completely unacceptable to claim “little likelihood of an unexpected intrusion of gas, cave-in .....” black-out, water hazard or other emergency event on a TBM project. In TBM excavations workers move around. They are cleaning the work space or they are called to assist others, especially during the frequent to mechanical stoppages. For these workers “readily available” or .... “a few steps away” may be too far in the event of a fire and/or black-out.

### **Alternative Air Flow – 22.57.4**

All tunnel excavations currently require reversibility of air flow. There’s nothing alternative about this regulation proposal. Ventilation needs to be no further than 18 meters from the face of the tunnel, be fabricated from rigid steel to guard against collapse and their must be strict requirements to ensure that while in blowing mode the air source is pure and uncontaminated at the source.

### **Radioactivity Survey – 22.57.5**

We’re not exactly sure what types of radiation WorkSafe is testing for. We believe that the requirement to have a safety miner position on all work crews would cover the testing requirements necessary to monitor for radioactivity. We call on

WorkSafe to conduct further consultations to investigate the role and responsibilities of the safety miner position.

### **Cap Lamps – 22.57.6**

In the event that water, fire, an unexpected encounter with gas or a cave-in; both the main power supply and TBM lighting system may fail. There is no darker place in the world than underground. Looking around for a “readily available” flashlight may be impossible. Cap lamps enable hands free movement in case of an emergency. Newly designed cap lamps are less intrusive than ever. We do not support the removal of this requirement because of a defined “limited hazard” tunnel construction.

### **Refuge Stations – 22.57.7**

Fire is much more likely a hazard than cave-ins. Both hazards are just as deadly. We believe that refuge stations must be provided for as in the previous regulations; 22.50. TBM workers are involved in various works throughout the tunnel (water pumping maintenance, re-grouting, clean-up), not only at the head of the machine.

We are in agreement with the proposed amendments for cut and cover projects, again, providing that the back is engineered and ventilation is up to current regulation requirements.

### **Rescue Workers – 22.57.8**

Every worker on a tunnel crew must have basic training as a rescue worker. In an emergency all uninjured workers become rescue workers. Just as orientation is provided to every worker on a regular construction site, specialized training and orientation must be provided to all underground workers. We do not accept that TBM operations are limited hazards. Fire, water, fissures that may allow the entrance of gases and unpredictable geological encounters are all part of the many hazards facing all tunnel workers, TBM or not.

### **Self-Contained Breathing Apparatus – 22.57.9**

We will agree for the proposed amendment to apply to cut and cover projects, as long as the amendment puts a requirement on SCBAs which are rated for 30 minutes. We oppose exceptions for tunnel projects, especially TBM excavations where toxic fumes from transformers or other machinery which may catch fire. Likewise from specialty oils (over 4,000 liters inside the TBM required to lubricate the main bearing). Access to SCBA rated for two hours must remain a necessity for tunnel workers as currently stipulated in 22.52.

## **Other Jurisdictions**

One of the few TBM manufacturers in the world is located in Ontario; LOVAT. As a result of the innovations by LOVAT and expertise in Ontario the provincial construction industry has extensive experience with TBMs.

In preparing for this submission we made contact with the Labourers International Union in Ontario. We were told that there are no special exemptions for TBM tunnel projects by the WCB in that province. Further, as has been stated throughout this submission that TBMs bring new challenges and hazards to tunnel construction. Since the introduction of TBMs tunnel construction has become more productive. Longer tunnels can be built. More material must be hauled out. One problem is that in the push for greater and faster production the longer muck cars found on TBM projects can hit the spring lines (the curving walls) and get stuck in the tunnel as the locomotives transport the material out.

In the course of preparing this submission we heard about a very recent cave-in on a TBM project in North York, outside of Toronto. Approximately three weeks ago a 3km sewer project was nearing completion; there were just 120 rings (about 120 meters of precast liner) left before the breakthrough. Workers at the head of the machine had been having trouble with water seepage throughout the recent excavations, but on this day they heard an unfamiliar rumble directly ahead of the machine. Workers quickly evacuated the tunnel. Shortly afterwards a slurry of mud and water completely inundated the TBM machine (extending back beyond the 400 feet length of the machine). Fortunately none of the workers were injured. The Ministry of Labour is currently investigating this accident. The TBM will have to be salvaged from the tunnel before work can begin again.

## **Conclusion**

There is too much missing information in the explanatory notes to proceed with the proposed amendments in 22.57.1 – 9. The Building Trades call on WorkSafe to carry out another round of consultations to review information from workers with first hand experience at underground workings. As tunnel construction projects increasingly rely on TBMs to carry out future projects we also call on WorkSafe to consult with neighbouring jurisdictions to learn from their experience monitoring TBM construction projects.