



WorkSafe Services Division  
1 Portland Street, PO Box 160  
Saint John, NB E2L 3X9  
Toll-free 1 800 222-9775  
Fax 506 738-4050  
Web [www.worksafenb.ca](http://www.worksafenb.ca)

Division des services de travail sécuritaire  
1, rue Portland, case postale 160  
Saint John, NB E2L 3X9  
Sans frais 1 800 222-9775  
Télécopieur 506 738-4050  
Web [www.travailsecuritairenb.ca](http://www.travailsecuritairenb.ca)

October 21, 2008

"The Employer"

The Chief Compliance Officer is writing in response to the employer's letter of September 8, 2008, in which the employer requests a deviation from *Occupational Health and Safety Act* General Regulation 91-191 section 97 (1)(c) that states:

- 97(1)** *A guardrail shall be made of a material prescribed in subsection (2) and shall*  
...  
(c) *have vertical supporting posts not more than 2.4 m apart along its entire length,*

The employer indicates that the employer's request is required to support work that the contractor is performing for the employer.

In the employer's request the employer advises that this platform is not yet in place at the employer's premises but a mock up of the platform can be seen at a training facility.

The employer has provided the following background in relation to Fuel Channel Platform Handrails:

Refurbishment of the employer's premises requires a large number of custom engineered tools to remove the radioactive components from the calandria and replace them with the new components to extend employer's premises life.

The key working platform is the Fuel Channel Platform (FCP). This platform has the capacity to support personnel and a large, heavily shielded tools and flasks. The platform is elevated up to approximately 30 ft from the floor elevation. Standard drop-in style handrails, constructed from pipe are installed on the sides of the platform. However, due to the nature of the work and the tooling required, a custom designed cable handrail was required across the front and rear of the platform.

The employer has provided a description and diagram of the cable handrails and the standards and calculations applied to the cable handrail design. According to the diagrams, the handrails are a sub-assembly of the Fuel Channel Platform, and the FCP is a rectangular deck, fabricated from beams and covered in grating and diamond check aluminum plate (figure 1 and 2). A typical tool configuration (Figure 3 and 4) include some automated tools, mounted on a Heavy Worktable (HWT). The HWT is driven side-to-side, to move the tools to the various working locations. Multiple locations are required to access all the fuel channel sites, access the hatches, etc. The tools are long and extend off the rear of the FCP (Figures 3, 4 & 5). It is not practical for the operators to remove and install handrails as the HWT is moved, as in many cases the HWT movement is required to block a beam of radiation from the working site. Instead, a handrail frame is attached to the HWT that moves with the worktable. Cables, which provide the guarding, are fixed to posts at the ends of the FCP. Pulleys on the handrail frame re-route the cable under the overhanging tool. In this way, the HWT can move to any position and the handrail cables are always in place providing the handrail function. The cables are sufficiently pre-tensioned using turn buckles to minimize deflection (Figures 6 and 7).

The employer has provided a description of the general design approach for the handrails. All design and manufacture activities for the handrails are subject to quality assurance, governed by the contractor's overall Quality Assurance Program. The job specific QA program document is Quality Assurance Plan, Retube Systems, Tooling and Equipment.

The Fuel Channel Platform design requirements (Fuel Channel Platform Design Requirements) were defined early in the design stage, and updated as the work proceeded. The requirements applicable to handrails are as follows:

- S. 4.1(g) – The need for handrails identified;
- S. 4.1(h) – The requirements for the handrails to accommodate the tool side-to-side movement;
- S. 5.2 – General requirements for the platform in general to meet the requirements of the NB OHS Act and Regulations;
- S. 14.1(4) – Handrails to meet the requirements of CSA B354.1, Elevating Rolling Work Platforms.

A key general requirement is to design with ALARA features - so that all radiation doses are kept As Low As Reasonably Achievable. During many operations, the HWTs required to index between two tools, during which time an open radiation beam exists near the centre of the HWT. If drop in handrails were used, every time the HWT indexed the operators would need to remove and install handrail sections to close the unguarded areas, and also work near the radiation beam. The cable handrails address both these issues by maintaining a constant rail and preventing the need to work at the rear of the HWT during the HWT indexing.

The handrail design was subject to a formal design review, as part of the Fuel Channel Platform Design Review (Detail Design Review, Fuel Channel Platforms). The reviewers included experts from the contractor in the areas of occupational health and safety, and human factors design. The owner was also present as an observer.

All welding for the handrails was done in accordance with CSA W59. The employer advises that there is a detailed listing of the contractor's catalogue of drawings available.

A series of simple measurements were taken with a representative cable to determine the horizontal cable deflection under side loads, with varying cable tension and have provided photos Labeled 1 and 2.

The results of the measures are:

Cable diameter: ½ inch

Cable material: Wire rope, 6 x 37 fiber core

Cable length: 197.75 inch

Cable Tension: Three tensions tested: 750lbf, 1024 lbf and 1250 lbf

Cable tension under load: A graph was included in your request and indicated the following:

- a) under 1024 lbf cable pre-tension, with an applied side load of 200lbf, the cable deflected approx. 3.7 inches;
- b) under 1024 lbf cable pre-tension, with an applied side load of 400 lbf applied, the cable deflected approx. 5.2 inches and resulted in a peak cable tension of 1,750 lbf.

The employer has provided sections of the OHS Act and Regulation 91-191 that apply to handrails from the NB OHS Act and Regulation 91-191 and provided photographs that were taken of the mock up at the contractor's facility.

The employer indicates that the handrails have been designed to provide features equivalent to or greater than those required by the Regulations.

As a follow up to the employer's request an Engineer met with the contractor and the owner on September 29, 2008 to review the installation of the toeboard and guardrail on the work platform. During the site visit the following observations were made:

- There is the possibility to adjust the tension of both the top rail and the mid rail.
- The height of the top rail and mid rail does not vary with the position of the HWT along the FCP
- The wire rope top rail and mid rail are attached to the FCP using a crosby clip eyebolt.
- The vertical support post for the top rail and mid rail exceed the requirements set out in section 97(2)(d).
- The toeboard is fastened directly to the FCP.

Based on these observations the following document was requested:

1. Approval by an Engineer of the design drawings;
2. Measurements or comments on the vertical deflection of the top rail and mid rail;
3. The safety factor of the crosby clip eyebolt.

On September 29<sup>th</sup> the employer provided the requested information by email for points 2 and 3 above and the information requested in point 1 above, was delivered to the Chief Compliance Officer's office by the contractor.

Based on the information provided a deviation is granted.

By copy of this letter, the Chief Compliance Officer has advised WHSCC staff of the decision.

Yours truly,

Chief Compliance Officer