Longwall Visual Analysis

Information Sheet

Using the Cavity Risk Index (CRI)

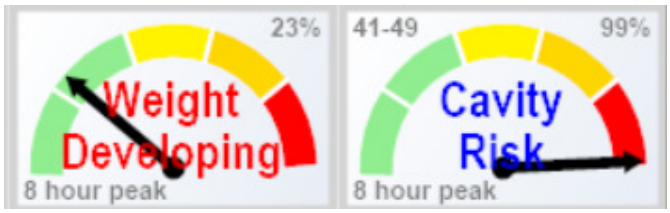
and Weight Developing Index (WDI)

Revision 2, 16/04/2020

1. Introduction

The “Cavity Risk Index” (CRI) feature in LVA is based on specific patterns of roof shields that have relatively high loading rates combined with significant yielding. A high CRI indicates that the risk of a roof cavity forming within the next few hours is higher than normal, and that it is worth considering taking extra steps to maintain roof integrity.

Associated with the CRI is a “Weight Developing Index” (WDI), for which a high value indicates that a weighting event is in progress on the face. The indexes are based on visual gauges that look like this..



2. How the CRI and WDI are calculated

Every few minutes each roof shield is analysed to see whether it had

a. a high loading rate when last set to the roof, and
b. significant yielding during the previous set-to-roof cycle.

Roof shields with both high loading and yielding are said to be in a “trigger” state for the purposes of CRI and WDI calculations. The user can configure the loading rate and yield values that would activate this trigger state.

The WDI is calculated from the proportion of adjacent shields that are in a trigger state. For example WDI may be set to display 80% (start of red zone) when there is an area somewhere across the longwall where at least 10 out of 20 adjacent shields are in a trigger

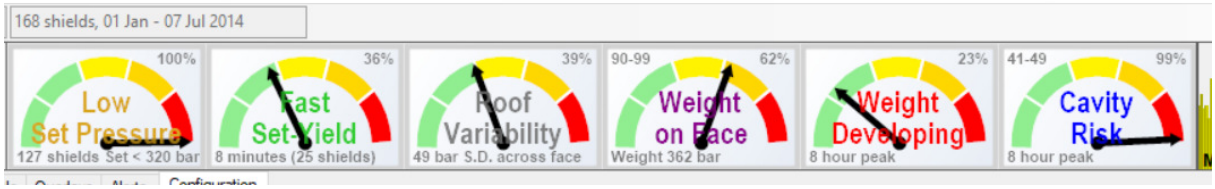
state. In this case, if there had been a maximum of only 5 shields in a trigger state out of any 20 adjacent shields then the WDI would be 40%.

The CRI calculations also use shields in a "trigger" state, but the pattern of triggered shields now needs to look like two separate areas straddling a trough of non-triggered shields. In other words we are looking for two separated areas of high loading and yielding on the face, bridging across an area of low loading and yielding.

The various configuration values can be tuned for specific longwall sites. The default values used and shown in this info sheet have been found to be quite good starting values across multiple sites and cavity events.

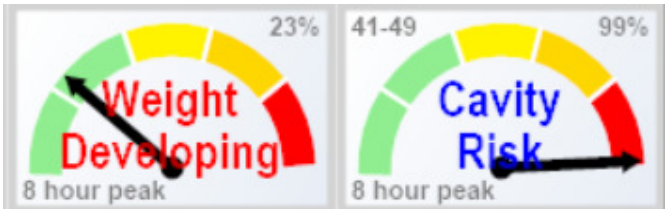
3. Viewing CRI and WDI in LVA

Access the CRI and WDI gauge displays from the main screen, the display may look like this:



a. The CRI and WDI gauges

Each gauge shows a black line with arrow. The black line is the peak value over the previous several hours as set in the configuration (see below). The gauge also shows the shield ranges and the CRI value as a percentage.

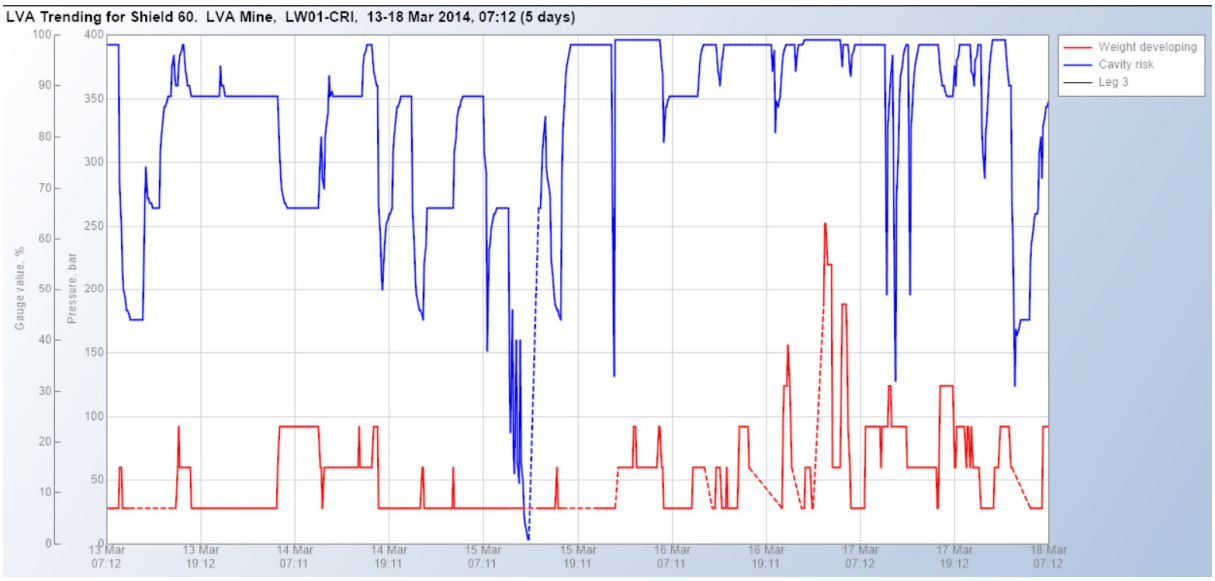


b. Trending Screen Display of the WDI and/or CRI

The Trending graph shows the values of CRI and WDI over the previous time period as selected at the top of the LVA screen. Depending on the Configuration settings, it may show the following:

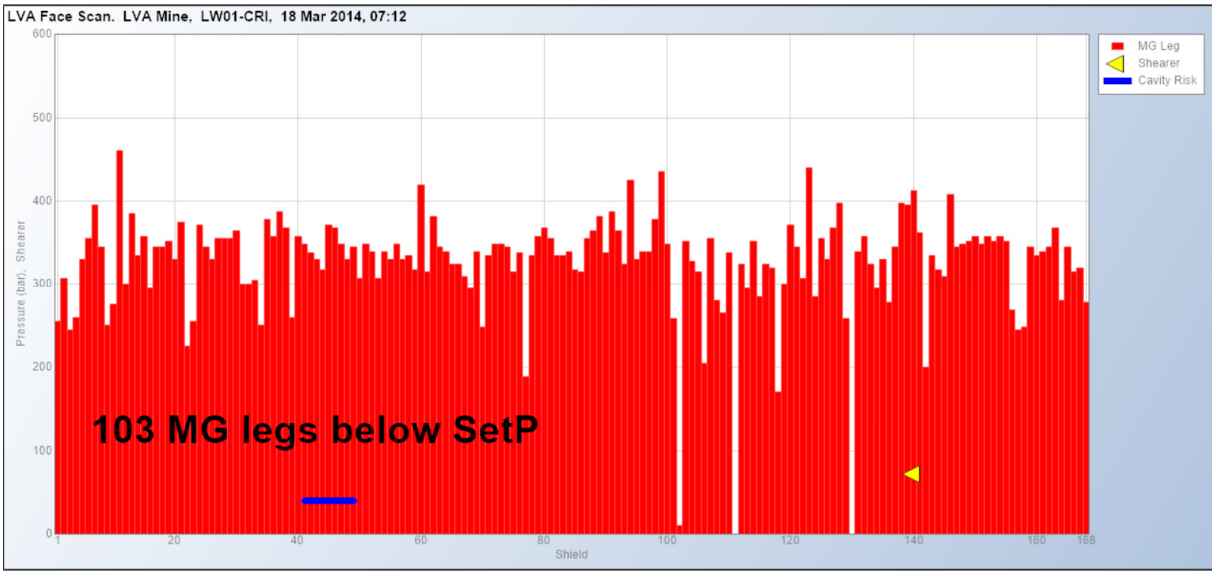
i. Blue line – CRI

ii. Red line – WDI



c. Face Scan Screen Display of CRI & WDI

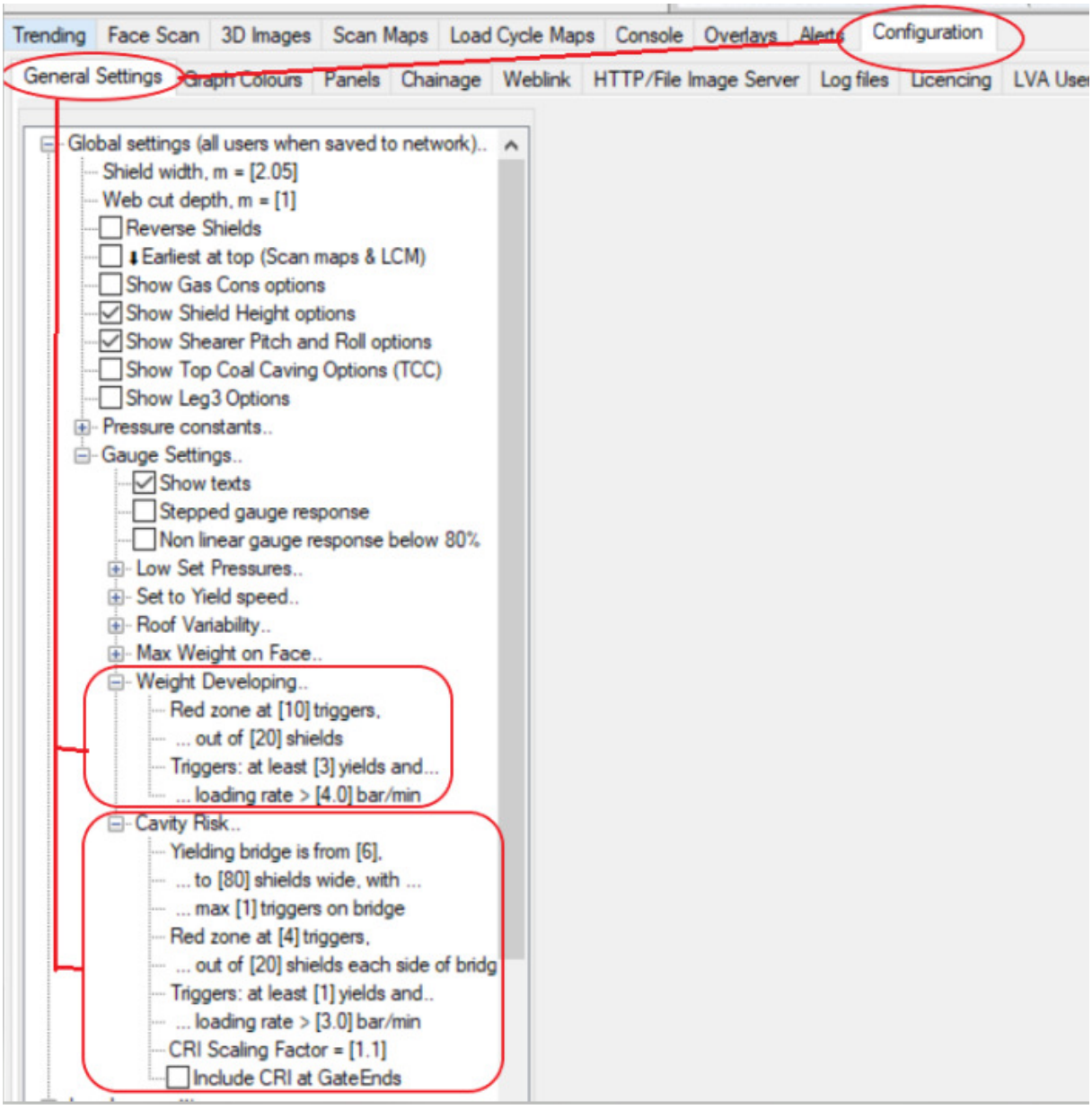
You can display the shields currently indicated in the CRI or WDI gauges on the Face Scan screen. CRI – Blue Bar, WDI – Red Bar.



4. Configuring parameters for WDI and CR

   The configuration of the CRI & WDI values can be accessed by Configuration – General Settings – Gauge Settings – Weighting Developing & Cavity Risk

   The default values are shown in the screenshot below; these have worked for many situations checked by LVA during the development of the CRI and WDI.



5. Alerts based on WDI and CR

Two additional Alert rules have been added to LVA, as shown in the screenshot below.