LVA - Longwall Visual Analysis

Information Sheet

Hydraulic Health

for LVA versions 7.35 and later

Summary

LVA calculates a Hydraulic Health rating or score for each leg or shield across the face, and displays this in various ways to help understand where there may be areas for improvement in hydraulic performance.

The Hydraulic Health algorithm includes factors such as low set pressures, leaking issues, frequency of hi-sets, legs that are not yielding when they should be, legs that are not achieving good pressures or that have a significant difference from their neighbours, and slow LAS (lower-advance-set) times. Each of these factors is given a value of 0, 1 or 2 (good to bad), and then the values are added together for a final score. A low score is good, and higher scores indicate several significant issues that may be affecting the shield's performance.

Hydraulic Health results can be displayed...

- In LVA Gauges as a summary across the face.
- In Trending as a trend of Hydraulic Health gauge value against time.
- In the 3D images for every shield across the face and back in time.
- In Load Cycle Maps and Histograms as averages per shear for every leg across the face and back in time for a whole panel.
- Alert messages relating to poor Hydraulic Health gauge values can be generated and emailed along with other alert messages.

Hydraulic Health

Hydraulic Health is calculated initially as a rating for each leg at a specific time, based on seven parameters. Each parameter returns a result of 0, 1 or 2 (0 = good, 2 = poor). Then the seven results are added together for an overall score between 0 and 14. A low score means the leg is performing well at that time. Consistent higher scores indicate several significant issues that may be affecting the shield's performance.

The seven factors used to calculate Hydraulic Health are...

- <u>Low set pressure</u> could indicate either difficult roof conditions or a poorly performing leg.
- 2. <u>Leaking leas</u> are unable to perform at optimum capacity.
- 3. <u>*Hi-sets*</u> a high frequency of hi-sets indicates a leg may not be able to hold sufficient pressure.
- 4. <u>Not vielding</u> above yield pressure indicates possible mechanical problems with yield valves, or incorrect pressure sensor calibration.
- 5. <u>Low pressure</u> relative to neighbouring shields indicates a leg is underperforming.
- <u>MG vs TG</u> scores high when there is a significant difference between MG and TG leg pressures on the same shield, which may indicate a sensor calibration error.
- 7. <u>LAS</u> scores high when then LAS (lower-advance-set) time is high, which may indicate pump capacity issues.

See the last section below for details on how to configure these Hydraulic Health settings.

Gauges

The Hydraulic Health gauge is the third one along in the image below. Top left text shows the gauge value is currently 30% (needle in the green), and bottom left text shows "6 shields > 8". Hovering the mouse over the gauge shows the pop-up additional info at the mouse position, shown below the gauge in the image. In this case it shows "6 shields with Hydraulic Health > 8" and lists the relevant shield numbers.



See the last section below for details on how to configure the gauge settings.

Trending

The Hydraulic Health Gauge value can be plotted as a trend for each shield, as shown in the image below...



3D Images

Hydraulic Health images can be plotted for each shield, across the face and back in time in "3D Images".

Graph 1 in the image below shows the overall Hydraulic Health index for each shield (the "sub-items" checkbox is unchecked).

Graph 2 below shows how to select and display one of the 7 sub-items that make up the overall Hydraulic Health score – double-click or roll the mouse wheel over the subitem (shown below as "[7. LAS]") to bring up a selection list of the 7 sub-items [Low Set pressure, Leaking, Hisets, Not yielding, Low pressure, MG vs TG pressure, LAS].



Load Cycle Maps

Displaying the Hydraulic Health Load Cycle Maps is very similar to the 3D images, as shown in the image below...



Histograms

And similarly for Histograms of the Load Cycle Maps...



Alert messages

The image below shows how to configure LVA to log Alert messages when the Hydraulic Health gauge value exceeds a set value, such as 80% as shown below. Edit any value in [square brackets] by double-clicking or right-clicking it.

rending Face Scan 3D Images Scan Maps Load Cycle Maps Time of Day	Maps	Console	Overlays	Alerts	Reports & Utilitie		S Configuration
Alert rules Email groups Email settings			Time		Age	Details	
Alert Rules. Right-click to edit [values]	Þ	1					
Ignore similar alerts In previous [12] hours		2					
Include Age column In table		3					
⊡ · Latest Readings		4					
		5	-				
Gauges		6	-				
□ V Low Set Pressure > [80] %	Ŀ	7	-				
	Ŀ	0	-				
	Ŀ	0	-				
··· ── Weight on Face > [80] %		9	-				
Weight Developing > [80] %		10					
Cavity Risk > [80] %		11					
Block detachment risk (under construction)		10					
		12	-				
Standoff report		13	12 12			1.1	

Configuration of Hydraulic Health settings

The image below shows how to configure Hydraulic Health settings for calculating the individual and overall scores, and for how the gauge should be displayed.

- The Hydraulic Health Gauge response settings are defined in Configuration | General Settings | Global settings | Gauge settings | Hydraulic Health.
- Hydraulic Health TARP settings for calculating the individual and overall scores are defined in Configuration | General Settings | Global settings | Hydraulic health TARP settings, for the 7 categories.

Note that after changing any Global settings, you should copy them to the network so that other LVA users will have the same settings – see next section for details.

Trending Face Scan 3D Images Scan Maps Load Cycle Maps Time of Day Maps Console Overlays Alerts Re	ports & Utilities Configuration
General Settings Graph Colours Panels Chainage Weblink HTTP/File Image Server Log files Licencing LVA Us	er Modes
	-
Global settings (all users when saved to network)	
Shield width, m = [1.75]	
Web cut depth, m = [1]	
Reverse shields (MG on right)	
Reverse Face Scan shields relative to 3D/Scan/LCM	
Reverse shearer roll effect on floor profiles	
LCM)	
Show gas cons options	
Show too cool coving Options	
Show Lead antions	
Show when 'I an pressure not obtaine'	
Onow when Leg pressures not changing	
Show texts	
Stepped gauge response	
The Low set pressures	
H - Rapid Set to Yield	
- Hydraulic Health	
Red zone starts at [20] shields	
Max Weight on Face	
Weight Developing	
I → Cavity Risk	
Hydraulic health TARP settings	
···· Scoring: 0 = Good. Add 1 or 2 for each poor response	
1. Low Set pressure: add 1 if < [400] bar, or 2 if < [350]	
6. MG vs TG pressure: add 1 if > [10] bar difference, or 2 if > [20]	
2. Leaking: add 1 if > [1] bar/min, or 2 if > [3]	
5. Low pressure: Max Pr in cycle < [430] bar and also < neighbour TWAP by: add 1 if > [20] bar, or or 2 if > [40]	
4. Not yielding at: add 1 if > [490] bar, or 2 if > [520]	
3. Hisets: add 1 if > [2] hi-sets, or 2 if > [4]	
7. LAS: add 1 if > [12] sec, or 2 if > [20]	

After changing Global settings

After changing any Global settings, if you would like to roll them out to other LVA users then you need to copy them to the network folder.

Go to Configuration | LVA User Modes and click "Save settings to network". You need to be in either Server or Technical User Mode to do this.

Trending	Face So	can 3D Ima	ges Scan M	laps Load	Cycle Map	s Time o	of Day Map	s Consol	e Overlay	s Alerts	Reports & Utilities	s Configuratio
General	l Settings	Graph Colou	ırs Panels	Chainage	Weblink	HTTP/Fil	le Image Se	erver Log	files Lic	encing L	VA User Modes	
V N	etwork fold	LVA ca der	n read from a	remote Net	work folder	which cor	ntains the "	'LVA_Data	"folder	Browse to	Network folder	
	Local fold	This is t der C:\Data	the folder LV. a\LVA\VB.No	A.exe is cum et\LVA Solut	ently runnin tion\LVA7\	g from (no bin	t editable)					
Select	t an LVA n	node	⇒[Save settin	igs to netwo	rk	Retrieve	network s	ettings			
O S	erver Mod	le	Full access t Save setting	o all settings s to network	s including L for propog	ayouts, A ation to all	lerts, emails lusers.	s, graph co	lours and l	ongwall se	ttings.	
>0 T	echnical (Jser Mode	Like Server	Mode, but n	o calculatin	g live Alert	ts or sendin	ig emails, v	veblink or h	nttp server		
OT	ypical Use	ar <mark>Mode</mark>	Recommend	ed for most	users. Edit I	ocal settin	ngs and Lay	vouts only.	No emails,	weblink e	tc.	
OV	/iewer Use	r Mode	Like User M	ode but can	not edit Lay	outs.						
	✓ Update ✓ Load n Always Revert	Live images etwork colour start LVA in L and in [Tech to startup scr	every [30] se s and other <u>c</u> ive mode at nical User Mo een and mod	c lobal setting [3D Images] ode] e if inactive	is on startup for [10] min	(recomm	ended)					