

Investigators' Handbook

Part 8 – Useful contacts, tools, etc.



Part 8 – Useful contacts/ information sources

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This section of the handbook provides details of websites, publications, etc., useful tools and other sources of information that may be used to assist the investigation.

Websites

OPSWEB

<http://www.opsweb.co.uk>

This website contains useful information and initiatives concerning operational safety issues, including SPADs, level crossings and irregular working. It provides information on industry groups such as OPSRAM and Operations Focus Group and a list of multiple SPAD signals.

It also provides online access to publications such as *Red Alert* (see below) and RSSB special topic reports. Included within the 'Tools' are links to the following online SPAD management tools:

- **SPAD Mitigations** site is a searchable database that is intended to replace the Anti-SPAD Toolkit. It retains much of the Toolkit content but has been updated in light of recent research and current best practice.
- **SPAD Hazard Checklist** allows you to identify the human factors issues that may have contributed to a SPAD.
- **SPAD Risk Management Support Tool** enables you to identify the tools and standards that can be used to support SPAD risk management.
- **Common Factors in SPADs** site is a research tool containing over 1000 articles relating to the underlying causal factors and methods of mitigating against SPADs.

First-time users need to register and obtain a password before OPSWEB can be accessed.

<p>RAIB website</p> <p>www.raib.gov.uk</p>	<p>This site provides useful information as to what is happening in relation to the organisation's own responsibilities within the industry in relation to accident investigation.</p> <p>The site also provides:</p> <ul style="list-style-type: none">• investigation reports published and in progress by RAIB;• guidance relating to RAIR 2005 and the role of the RAIB.
<p>ORR website</p> <p>www.rail-reg.gov.uk</p>	<p>Responsibility for health and safety policy and enforcement on the railways transferred from Health & Safety Executive to the Office of Rail Regulation (ORR) in April 2006.</p> <p>This site provides useful information as to what is happening in relation to the organisation's own responsibilities within the industry in relation to accident reporting and investigation and rail safety enforcement (i.e. improvement and prohibition notices and prosecutions).</p> <p>The site also provides:</p> <ul style="list-style-type: none">• details of rail safety research;• rail safety statistics;• Railway Safety Principles and Guidance.
<p>HSE website</p> <p>http://www.hse.gov.uk/</p>	<p>The HSE is the national regulatory body responsible for promoting the cause of better health and safety at work.</p> <p>Its website provides information related to general health and safety at work issues and their regulation/enforcement, including human factors in the rail industry.</p>

<p>RSSB</p> <p>http://www.rssb.co.uk/</p>	<p>RSSB provides knowledge, analysis, and a substantial level of technical expertise, powerful information and risk management tools for the benefit of the rail industry.</p> <p>Its website provides useful information about its role within the industry and:</p> <ul style="list-style-type: none"> • access to current (and withdrawn) Railway Group standards (via RGS online), codes of practice and guidance notes; • SPAD reports; • safety performance reports – monthly summaries and annual/half-yearly reports; • special topic reports.
<p>Asset Knowledge Online</p> <p>http://akonline/</p>	<p>This website is a useful source of information relating to engineering and maintenance systems.</p>
<p>GI Portal</p> <p>http://giportal</p>	<p>This site provides geospatial information (i.e. maps) on the location of Network Rail's assets, structures, the extent of property boundaries, etc. In the future, it will include, for example, the extent of possessions, and the details of line speeds, traffic volumes or planned renewals.</p> <p>It is possible to use this system to download maps for inclusion in investigation reports.</p> <p>First-time users need to register and obtain a password before the system can be accessed.</p>
<p>Connect / Portal (or Knowledge Hub)</p>	<p><i>Connect</i> is Network Rail's own Intranet site and contains useful information on matters related to performance, operations, maintenance and engineering.</p> <p>From within <i>Connect</i> access can be gained to the Portal which contains some historical information, for example:</p> <ul style="list-style-type: none"> • National Operations Centre control logs; • Weekly Operating Notices.

<p>clyx.net®</p> <p>https://www.clyx.net</p>	<p>This site provides access to:</p> <ul style="list-style-type: none"> Control Centre Incident Log (CCIL) – this is used by Network Rail and TOC/FOC Incident Controllers to help manage and record incident details on a daily basis; and enables access to the National Operations Centre (NOC) and Route Operations Control logs. NIR-Online – provides access to Urgent Safety Related Defect reports issued in accordance with Railway Group standard GE/RT8250 <i>Reporting High Risk Defects</i> (this document defines requirements for recording, analysing and reporting safety-related defects on rail vehicles). Rail Notices – used for the dissemination of Urgent Operating Advice notices that need to be issued under Railway Group Standard GO/RT3350; also provides access to changes to signal box instructions and requests for items in sections C and D of the Weekly Operating Notices (WONs). <p>First-time users need to register and obtain a password before the system can be accessed.</p>
<p>Safety Central</p> <p>http://www.safety.networkrail.co.uk</p>	<p>This site provides access to Network Rail's Safety Central website; it provides:</p> <ul style="list-style-type: none"> details of recently issued Infrastructure Group Safety Bulletins; access to Safety films; information related to Occupational health and workforce and operational safety; animated reconstructions of recent accidents. <p>First-time users need to register and obtain a password before the system can be accessed.</p>

Level Crossing Risk Management Toolkit

www.lxrmtk.com

The toolkit has been developed by the RSSB and provides useful information on human factors type issues at all types of level crossing and possible mitigation measures.

It has a range of applications, from being an information resource for anyone with an interest in public behaviour at level crossings, to being used to support various more specific activities, including design, inspection and accident investigation.

There is no need to register and obtain a password before the system can be accessed.

Publications, DVDs, etc.

<p>Reducing error and influencing behaviour</p>	<p>HSE publication HSG48.</p> <p>This HSE publication examines human factors and how they can affect workplace health and safety. It looks at:</p> <ul style="list-style-type: none">• the general impact of human error and behaviour;• how workers' physical and mental health can be affected by these and other factors;• practical ideas on how to identify, assess and control risks arising from such issues. <p>Case studies detail how various organisations have approached these challenges.</p> <p>HSG48 can be downloaded from the HSE website.</p>
<p>Investigating accidents and incidents: A workbook for employers, unions, safety representatives and safety professionals</p>	<p>HSE publication HSG245.</p> <p>This HSE publication provides stark statistics that hundreds of people are killed at work every year, thousands suffer serious occupational injuries and, furthermore, the health of millions is damaged, or worsened, by employment activities.</p> <p>The HSE highlights the fact that some 40 million annual working days are lost through work-related accidents and illnesses especially demonstrates the continuing need for increased health and safety awareness. A critical driver in achieving this goal concerns thorough incident investigation.</p> <p>HSG245 can be downloaded from the HSE website.</p>

RSSB Guidance and examples of good practices in accident investigation in Britain's railway industry

Published by RSSB in three parts:

- **Part 1: The role of the senior manager**
This makes the case for the need and benefits of good accident investigation together with the important role senior managers play in achieving this.
- **Part 2: Development of policy and management arrangements**
This is aimed at managers who are responsible for developing and implementing accident investigation procedures and processes and other individuals who are required to implement recommendations and review accidents to learn lessons.
- **Part 3: Practical support for accident investigators**
This provides user friendly guidance and examples of good practice to support the investigation process and is aimed primarily at those individuals who actually conduct accident /incident investigations.

The three parts are available from the RSSB website (see above).

Red Alert

A bi-monthly magazine published by Halcrow for its rail industry clients (which includes Network Rail) to share *"information to help prevent SPADs and operational risk."*

It includes details of case studies, initiatives and other useful information relating to SPADs and other issues relating to the safe operation of the railway.

RED DVDs	<p>A series of topical and informative DVDs covering issues related to SPADs and wider operational risks. The DVDs often recreate events that have occurred to highlight specific safety topics, offering suggestions as to how they could have been prevented.</p> <p>The DVDs are particularly useful for staff briefings and promoting debate.</p> <p>RED is sponsored by the Operations Focus Group (OFG) which is facilitated by RSSB.</p>
Anti-SPAD Toolkit	See OPSWEB above and the link to the SPAD Mitigations site.

Useful tools

Conversion Tables	<p>An Excel-based tool for:</p> <ul style="list-style-type: none"> converting imperial measurements to metric, and vice versa, for length, area, volume, weights and liquids; converting temperatures measured in °C to °F, and vice versa; calculating speeds, distances and time taken. <p>This tool is available to Network Rail users from the Investigators' Handbook page on Connect.</p>
Speed/distance calculator	<p>An Excel-based tool for calculating speed and distance for a specified time taken. It also includes a length/distance converter.</p> <p>This tool is available to Network Rail users from the Investigators' Handbook page on Connect.</p>
OTDR Analysis (metric and imperial versions)	<p>An Excel-based tool for calculating the cumulative and relative distances based on readings taken from the tabular output of OTDR recordings.</p> <p>This tool is available to Network Rail users from the Investigators' Handbook page on Connect.</p>

<p>TPWS effectiveness calculator</p>	<p>An Excel-based tool for estimating the effectiveness of the TPWS equipment taking into account different %g braking rates of trains. It takes account of the effect of gradient on braking rates, based on certain assumptions. More details are provided in Network Rail's Operations Manual Procedure 5-15.</p> <p>This tool may only be used by trained users. Seek advice from the relevant Area/Route Operations Risk Advisor or Operations Risk Control Coordinator.</p>
<p>Train brake rate calculator</p>	<p>An Excel-based tool for calculating stopping distances and time depending on gradient, speed and brake force.</p> <p>This tool is available to Network Rail users from the Investigators' Handbook page on Connect.</p>
<p>SPAD Hazard Checklist</p> <p>Available via OPSWEB (see above)</p>	<p>An Excel-based tool developed by the RSSB that enables assessment of the human factors issues that may have contributed to a SPAD and identification of the possible risk reduction/mitigation measures for each hazard.</p> <p>It encourages the consideration of the wider human factors issues associated with SPADs, such as poor infrastructure and management failures.</p> <p>The checklist can be used as part of the investigation process to identify appropriate risk mitigation measures or by train operators to generate driver action plans post-SPAD.</p> <p>It is in a questionnaire format, divided into 8 parts according to the stages of the driving activity. Questions relate to the presence or absence of hazards, and have been worded to enable a simple yes/no answer.</p>

Solarsig	<p>This is a computer-based tool that was developed by former British Rail S&T Technical Centre, Crewe. Solarsig assists in the investigation of sunlight as it affects a driver's view of colour-light signals. Use is made of celestial mechanics to calculate the position of the sun in the sky for any date, time and geographical site.</p> <p>No particular specialist input into the tool is required, but data accuracy in latitude/longitude and bearing is essential. The output is a percentage of potential severity for the signal being sunlight affected at various times through the day and links to the 'Equipment' incident factor.</p> <p>The tool is available from the Senior Investigator.</p>
Route drivability tool	<p>The Route Drivability Tool (RDT) is a computer-based tool which provides a method of objectively evaluating the 'drivability' of a route by analysing the time pressure and demand that a route places on a driver.</p> <p>It can be very useful in understanding less obvious causal factors at multi-SPAD signals.</p> <p>The RDT provides a framework for examining the behavioural aspects of train driving incidents that is not available to SPAD investigators through any other tool or technique. Specifically, the RDT offers a:</p> <ul style="list-style-type: none">• means for modelling the train's approach to a signal and the activities that a driver would have to complete;• framework for tracing and identifying driver error in the approach to the signal under investigation. <p>A set of behavioural models that will help to identify if workload may be excessive in the approach to a signal under investigation.</p> <p>The RDT is available from Network Rail's Ergonomics National Specialist Team (contact emma.lowe@networkrail.co.uk). The RDT should only be used with specialist ergonomics support.</p>

Fatigue and Risk Index

The **Fatigue and Risk Index** Calculator (FRI) is an Excel-based tool that was developed by the HSE to provide an assessment of fatigue risks associated with shift work.

The FRI looks at factors including:

- Shift start times;
- Shift length;
- Number of consecutive shifts;
- Number of rest days/breaks;
- Travelling time;
- Workload.

The FRI enables calculation of the build up of cumulative levels of fatigue and associated risk over a number of shifts and can be used by investigators to help assess whether fatigue related to the shift pattern may have played a role in the accident or incident.

Determining which workload tool or combination of tools is appropriate will be dependent on the investigation and the nature of the problem. Most of the workload tools will involve talking to the signallers and their managers and observing what they do.

For a simple and quick first analysis of the potential workload issues with a work system, a structured and weighted Workload Principles Checklist is useful.

The FRI is available from Network Rail's Ergonomics Team (contact emma.lowe@networkrail.co.uk).

Guidance on using the FRI is provided at Appendix A of this Part 8 of the handbook but specialist ergonomics support is available, if needed, to interpret the results.

Network Rail Signaller Workload Toolkit

The toolkit consists of seven workload tools designed to be used to assess different dimensions of workload and build up a workload profile.

Some are designed to measure subjective workload, such as the Integrated Workload Scale (IWS). This is used for job holders to record perceptions of workload at frequent intervals over a period of time. Other tools are designed to make more objective assessments, such as the Operational Demand Evaluation Checklist (ODEC) which produces a complete scored assessment of the factors and entities in a system which might influence workload.

The toolkit is available from Network Rail's Ergonomics National Specialist Team (contact fiona.kenvyn@networkrail.co.uk). It should only be used with specialist ergonomics support.

Other sources of information

Investigation report archive	<p>A report archive is maintained on CCMS2 and provides copies of previously published Network Rail and TOC and contractor led investigation reports. These can be requested from the relevant Senior Investigator or Safety Reporting Specialist (SRS).</p> <p>Reviewing a report into a previous similar accident/incident can provide:</p> <ul style="list-style-type: none"> • an insight into how a particular accident or incident was investigated; • details of previously made recommendations; • pointers and best practice to sometimes save you “re-inventing the wheel”!
Accident Investigation team, HQ.	<p>Always willing to help with queries with regard to content of reports, formulating recommendations, previous investigation reports.</p> <p>See the Accident Investigation page on Connect.</p>
DCP / Safety Reporting Specialist (SRS) / Senior Investigator	<p>The DCP should be the first point of contact for investigators seeking advice and guidance on the investigation process and problem resolution.</p> <p>The SRS may be able to provide information on previous accidents and incidents, i.e.:</p> <ul style="list-style-type: none"> • previous investigation reports (see ‘Investigation report archive’ above and • data/information available within SMIS (see the ‘SMIS’ section of Part 7 of the handbook). <p>See the Safety Reporting page on Connect.</p> <p>The Senior Investigator will be able to assist with queries with regard to content of reports, identifying causes, formulating recommendations, previous investigation reports, and provide general guidance on the investigation process.</p>

Standard templates and forms

The Accident Investigation page on *Connect* has links to Network Rail's:

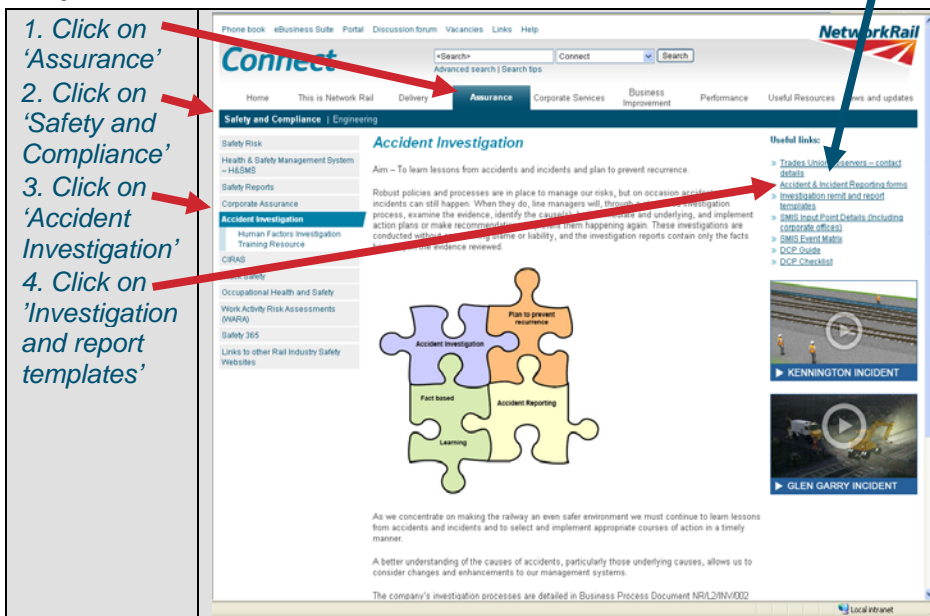
- investigation remit and report templates (click here [Templates](#)); and
- standard accident/incident report forms (see [Reporting forms](#)).

The current version of the relevant remit or report template must always be used.

Electronic versions of SPAD data collection forms RT3119A and RT3119B are available from RSSB's railway group standards website:

www.rgsonline.co.uk.

Templates



- Click on 'Assurance'
- Click on 'Safety and Compliance'
- Click on 'Accident Investigation'
- Click on 'Investigation and report templates'

The screenshot shows the Network Rail Connect website. The left sidebar contains a navigation menu with the following items: Safety Risk, Health & Safety Management System (HMS), Safety Reports, Corporate Assurance, **Accident Investigation** (highlighted), Human Factors Investigation, Training Resource, CIRAS, and Links to other Rail Industry Safety Websites. The main content area is titled 'Accident Investigation' and includes the following text: 'Aim – To learn lessons from accidents and incidents and plan to prevent recurrence. Robust policies and processes are in place to manage our risks, but on occasion accidents and incidents can still happen. When they do, line managers will, through a structured investigation process, examine the evidence, identify the causes, determine the underlying, and implement action plans or make recommendations to prevent them happening again. These investigations are conducted with a view to understanding the cause or causes of an accident or incident, and the investigation reports contain only the facts that are relevant to the investigation. The investigation process is reviewed.' Below this text is a diagram of four interlocking puzzle pieces: 'Accident Investigation' (purple), 'Plan to prevent recurrence' (orange), 'Fact based' (green), and 'Accident Reporting' (yellow). At the bottom of the page, there is a section titled 'Useful links' with the following links: 'Trackside Unusual Occurrences – contact details', 'Investigation remit and report templates', 'SMS Incident Point Details (including corporate offices)', 'SMS Event Matrix', 'DCP Guide', and 'DCP Checklist'. There are also two video thumbnails: 'KENNINGTON INCIDENT' and 'GLEN GARRY INCIDENT'. The footer of the page includes the text: 'As we concentrate on making the railway an even safer environment we must continue to learn lessons from accidents and incidents and to select and implement appropriate courses of action in a timely manner. A better understanding of the causes of accidents, particularly those underlying causes, allows us to consider changes and enhancements to our management systems. The company's investigation processes are detailed in Business Process Document NR/L2/IN/002' and 'Local intranet'.

Network Rail's Reporting and Investigation Manual

The Reporting and Investigation Manual (RIM) contains Network Rail's standards for accident/incident report and investigation, including investigation report and recommendations management.

The RIM is available via the Home page on *Connect* and can be located as follows:

Click on the 'Network Rail Standards' link on the right of the Connect Home page

Corporate Services Business Improvement Performance Useful Resources News and updates

7 October 2010
Period 7, Day 19

 **HR Information centre**

 **IT Helpdesk**

 **Guide to purchasing**

 **Accounts payable**

 **Communication policies**

Organisation Structure

- » Organisation charts - Templated
- » Organisation charts - People
- » Job Descriptions

Organisation Restructuring

- » Maintenance Restructure (2b/c)

Reference links

- » Assessment in the Line
- » Commercial Manual
- » Driver Coaching Scheme
- » Employee Offers
- » Environment
- » Epay
- » FENS
- » Health & Safety Management System
- » Leadership Toolkit
- » Key Meetings Structure
- » Managers' Handbook
- » Maintenance Documentation
- » National Centre
- » National Records Group
- » Network Rail standards
- » National Hazard Directory
- » Performance and pay reviews
- » Project Management Information (and GRIP)
- » PPE order information
- » Short Term Vehicle Hire

News archive

6 October

4 October

30 September

drama

ier cycle 2work schemes during 2010

eday 10 November

Appendix A – Guidance on using the Fatigue & Risk Index

The Fatigue and Risk Index (FRI) is used to look at the degree to which a roster may have posed a risk of an individual becoming fatigued or causing error due to the way their shifts are scheduled.

It can be used for anyone who is doing shift work, though it is not suitable for people on permanent nights or days. Within Network Rail, it has been used mainly to assess signallers' rosters though it is regularly used by train operators for drivers, and Network Rail is starting to look at how it might work for Maintenance staff.

Using the tool

1. When you open it up, it will ask you whether you want to enable macros. Click on "enable macros" as otherwise a lot of the functionality will not work.
2. First thing you will see is the default page – these are the things considered outside of the hours actually worked that can all influence the degree to which an individual might become fatigued.

You can leave these as they are or alter them depending on the individual you are looking at and the work they are doing – you can either set these as an average (i.e. for all the people that a roster may cover), or as the "worst-case scenario" values, and then keep that in mind when interpreting the results. Once you are happy with the defaults, click on "OK" and it will take you to the main spreadsheet.

Fatigue / Risk Assessment

Commuting Time

What is the typical commuting time of employees to OR from work (to the nearest 10 minutes):

About hours mins
(Please specify the typical commuting time)

Breaks

How frequently (to the nearest 15 mins) are rest breaks typically provided OR taken?

Every hours mins
(Please specify the typical interval between breaks)

What is the typical average length of these breaks (to the nearest 5 minutes) that are provided or taken?

hours mins
(Please specify the average length of breaks)

What is typically the longest (to the nearest 15mins) period of continuous work before a break?

hours mins
(Please specify the longest period between breaks)

What is typically the length of the break taken after this longest period of continuous work (to the nearest 5 minutes)?

hours mins
(Please specify the length of the break following the longest period between breaks)

Type of Job: Workload

The workload and/or work pace of the job is typically:

Extremely demanding, no spare capacity. ☐

Moderately demanding, little spare capacity. ☐

Moderately undemanding, some spare capacity. ☒

Extremely undemanding, lots of spare capacity. ☐

Type of Job: Attention

The job typically requires continuous attention:

All or nearly all the time ☐

Most of the time ☐

Some of the time ☒

Rarely or nearly none of the time ☐

3. When entering the roster data, the main columns to be used are the first three on the left, i.e. Day, On Duty and Off Duty. The rest of the columns will calculate automatically once data has been entered.

You need to input dates for all of the days worked in a period of time – in the case of investigations, traditionally people have looked at the last 14 days but this is not always helpful unless the first of those 14 days was actually preceded by a period of rest.

The index assumes that the individual is fully rested before the first day entered so it is recommended going back two weeks and then keep going back further until you hit the first day after a rest period.

4. You only need to enter data for the days worked, and not the rest days, but these also need to be included to make sure you account for the effect of rest in the roster. The way to do this is as follows:

Say an individual works four consecutive shifts, 06.00 to 14.00; and then has three days off; then works four 8-hour night shifts (22.00 to 06.00); then has two rest days; and then works an 8-hour late shift (14.00 to 22.00); the inputs to the FRI would look like this:

Day	On Duty	Off Duty
1	06:00	14:00
2	06:00	14:00
3	06:00	14:00
4	06:00	14:00
8	22:00	06:00
9	22:00	06:00
10	22:00	06:00
11	22:00	06:00
14	14:00	22:00

5. Once you are happy with the data input, click the "Calculate Index" button and it will work out your fatigue index scores for you, and all of the other boxes will be populated.
6. The defaults for individual shifts can be altered by right-clicking on the blue "Default" cell to the immediate right of the associated shift.

For example, workload might be less on weekends or on nights and so the default attention or workload values may be lower for these shifts, and so they can be altered.

If you make changes to the default values for individual shifts, you will need to recalculate the index so that the index values will be amended.

Fatigue Index Calculator

Company

Location

Shift ID

Date

Mode

Fatigue

Defaults

Reset Index

Calculate Index

Day	On Duty	Off Duty	Job type / breaks	Commuting Time	Duty Length	Rest Length	Average duty per day
1	06:00	08:00	Default	Default	2h	Fully Rested	2h
2	05:00	20:00	Default	Default	15h	21h	8h 30m
3	06:00	15:00	Default	Default	9h	10h	8h 40m
4	06:00	12:00	Default	Default	6h	15h	8h

Right click on default box to change individual shift default information

Interpretation

- For the Fatigue scores, the HSE have suggested the following 'cut-offs' or target values:

Day shift Scores of no more than about 35

Night shift Scores of no more than 45

Any higher, raises concerns at the potential fatigue and it be would necessary to see what had been put in place to mitigate against the risks, or to see changes to the way shifts are scheduled to minimise the risk.

To swap to the "Risk index", click on the "Fatigue" button at the left and it will change to the "Risk" mode. For the Risk scores, anything above 1.6 would start to be of concern.

2. The FRI is designed to highlight any 'Hidden' exceedances so these will show up in bold if they occur anywhere in the roster.
3. The data can also be displayed in chart or graph form. Click the "display schedule" or "display charts" boxes and click "Calculate Index", and these will appear.
4. Main things to look for with respect to interpretation are:
 - The fatigue and risk values, to be sure they are in the right range.
 - The number of consecutive shifts, especially if they are longer in length and have less opportunity for breaks within them.
 - The impact of things like travel time and workload.
 - Do not use the average values on the Summary page; it is suggested that the investigation team look at how often high values are occurring and whether there was variation over the roster (so lots of shifts with low values and few shifts with high values would be preferable).
 - The number of rest days, and how they are distributed across the roster – particularly following blocks of night shifts. Ideally you would not want a block of nights and then one rest day before the next working shift as it takes longer than that to reorient to day working.
 - The investigation team should consider whether the person (though away from work) took adequate rest before, for example, the first night turn of duty. The person may have been awake for a significant period before going to work and then working an 8-hour or longer night turn.

