Fireman

Knowledge Checklist

(Generic Version)

Version 1

June, 2011

IMPORTANT NOTICE

This booklet is one of a series of generic training and assessment templates developed by the Association of Tourist & Heritage Rail Australia Inc (ATHRA) as guides for heritage railway operators seeking to develop or upgrade their local training and assessment resources.

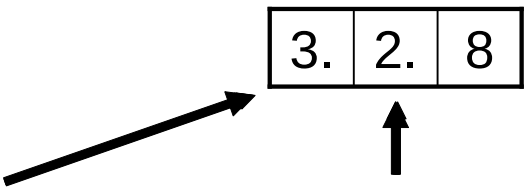
This booklet and others in the series are not intended to be training resources in their own right but rather to be suitably customised, embellished and adapted by railway operators to match the specific context of their own railway, e.g. types of locomotives, rollingstock and associated equipment, the track layout and infrastructure, the local standard procedures and rules, the safety management and safeworking systems, the railway organisational structure, and the roles and functions of personnel in the railway, etc.

Railway operators seeking to use this booklet and others in the series should initially refer to the ***ATHRA Customisation Guidelines Booklet*** which provides important information on how the generic templates should be used.

NOTES

CODING SCHEME FOR THE ATHRA RESOURCES

The coding scheme for the ATHRA Resources is as follows:



Code for occupational focus of the resource i.e.

1.-- steam locomotive driver
2.-- diesel locomotive driver
3.-- fireman
4.-- 2nd person
5.-- guard
6.-- tram driver
7.-- safeworking
8.-- train examination addendum

Code for the set of questions in the resource

(in this case the 2nd set of questions for the fireman)

Code for number of the question in the set.

(in this case the eighth question in the 2nd set of questions for the fireman)

CUSTOMISATION OF QUESTIONS IN THE *'KNOWLEDGE CHECKLIST'*

As explained in the ATHRA Customisation Guidelines, this ***Knowledge Checklist*** is a generic document designed to be customized and adapted, if necessary, by local heritage railways to match their own railway configuration, equipment, procedures, safety management systems, etc. Questions in the booklet and related sample responses in the ***Mentor's Q&A Booklet*** may be modified by updating the content of the existing templates to incorporate appropriate information about the railway's own operating system, equipment, road, procedures, safety management system, etc. This may involve appropriate alteration to existing questions or the insertion of additional suitable questions.

To aid in the addition of questions, if needed, a blank row has been provided at the end of each set of questions in the generic checklist. The following is a step-by-step process to incorporate any additional questions:

1. Using the mouse, select the blank row
2. In the **'TABLE'** drop down menu at the top of the document select **'Insert'**
3. Click on **'Insert rows below'**
4. Repeat as many times as necessary until you have sufficient rows for the additional questions (including the original blank row in the generic document)
5. Insert the text for each of the additional questions
6. Insert the codes of the additional questions as per the coding scheme for the ATHRA training and assessment resources
7. Make sure there are matching questions and sample responses in the ***Mentor's Q&A Booklet*** with the same code

Question Set 3.1 Role and responsibilities of a fireman on a steam locomotive

Q3.1.1	What are the **key tasks** performed by a fireman?	☐
Q3.1.2	What is the **relationship** between the fireman and the driver?	☐
Q3.1.3	Is the fireman responsible for **observing** fixed trackside signals, point stand indicators, check points, trackside signs and level crossings and **confirming** these sightings with the driver?	☐
Q3.1.4	Is the fireman responsible for the **water levels** and **steam pressure** in the boiler?	☐
Q3.1.5	Who **directs** the fireman's work on the locomotive?	☐
Q3.1.6	Describe the processes involved in interpreting and applying **'authority'** to move a train'	☐
Q3.1.7	Describe the **key safeworking rules** that apply to you as a fireman?	☐
Q3.1.8	What are the **potential consequences** of not following safeworking rules and other regulations applicable to the fireman's role on your railway?	☐
Q3.1.9	What are the fireman's **initial duties** after signing on?	☐
Q3.1.10	What **action** must you take if you find a defect during a shift as a fireman on a steam locomotive?	☐
Q3.1.11	What **action** must you take if you are involved in a safety incident during a shift as a fireman on a steam locomotive?	☐
Q3.1.12	What **action** must you in the case of a limit of authority overrun during a shift as a fireman on a steam locomotive?	☐
Q3.1.13	What are the fireman's duties when **stabling**?	☐
Q3.1.14	Where can you obtain a **copy** of the duties of a fireman, the safeworking rules applicable to firemen and other key reference documents a fireman needs on your railway?	☐
Q3.1.15	What is the location and purpose of instruction plates outlining headways and limits of authority?	☐
Q3.1.16	For your railway, describe the yard limits, commencement of yard limits and end of yard limits associated with train running.	☐
Q3.1.17	Give three examples of **hazards** that exist when working as a fireman on a steam locomotive.	☐
Q3.1.18	What personal protective equipment (PPE) must be used by firemen when carrying out their duties and functions?	☐
Q3.1.19	Give two examples of **risk management strategies** to control hazards when working as a fireman on a steam locomotive.	☐
Q3.1.20	What are the procedures for **handing over** a steam locomotive to a replacement crew?	☐

Q3.1.21 *Blank for additional question*.....

Question Set 3.2 Conducting pre-operational checks on a steam locomotive boiler

Q3.2.1	What are the **principal components** of steam locomotive(s) on which you will be working? What is the purpose of each?	☐
Q3.2.2	What are the **initial tasks** completed by the fireman when commencing a shift?	☐
Q3.2.3	What **type of boiler** is used in a locomotive?	☐
Q3.2.4	How is the **efficiency** of a boiler measured?	☐
Q3.2.5	Describe the **firebox**?	☐
Q3.2.6	What is the purpose of a **brick arch** in a firebox?	☐
Q3.2.7	What is **contained** in the firebox to protect the boiler from overheating due to lack of sufficient water?	☐
Q3.2.8	What are **fusible plugs** and what is their purpose?	☐
Q3.2.9	What is the purpose of the **hole in the stay bolts**?	☐
Q3.2.10	What are the **grates**?	☐
Q3.2.11	Describe the **barrel**?	☐
Q3.2.12	What is the purpose of the **tubes**?	☐
Q3.2.13.	What is the **smokebox**?	☐
Q3.2.14	What is **located** inside the smoke-box?	☐
Q3.2.15	What is the **exhaust or blast pipe** and its use?	☐
Q3.2.16	What is the **blower** and its use?	☐
Q3.2.17	What is the purpose of **spark arresters**?	☐
Q3.2.18	What **checks** should be made on spark arrestors?	☐
Q3.2.19	Is any care needed with the smoke-box door?	☐

Q3.2.20	What is the **watergauge glass**?	☐
Q3.2.21	How are the watergauge glasses **tested**?	☐
Q3.2.22.	What should you do if a watergauge glass **bursts**?	☐
Q3.2.23	What are the **principal fittings** of the boiler?	☐
Q3.2.24	What is a **feedwater injector**?	☐
Q3.2.25	How many types of **feedwater injector** are used on a steam locomotive?	☐
Q3.2.26.	Describe the **method of operating** a lifting injector?	☐
Q3.2.27	Your **injector** fails to lift water, what could be the problem?	☐
Q3.2.28	What is the **firehole door**?	☐
Q3.2.29	What is the function of **safety valves**?	☐
Q3.2.30	Where are the **ash pans** and why are they fitted?	☐
Q3.2.31	What are the **dampers**?	☐
Q3.2.32	What is the **blow-off cock a**nd what is its purpose?	☐
Q3.2.33.	What causes the **scaling** inside a locomotive boiler?	☐
Q3.2.34	What is **priming**?	☐
Q3.2.35	What action should you take in the event of **priming**?	☐
Q3.2.36	What action should you take in the event of **foaming**?	☐
Q3.2.37	What is the cause of **corrosion** in a steam locomotive boiler?	☐
Q3.2.38	How can corrosion be prevented?	☐
Q3.2.39.	Name the parts of the gauge glass?	☐
Q3.2.40	There are two methods of blowing down a gauge glass, name them	☐
Q3.2.41	What does blowing down a gauge glass prove?	☐
Q3.2.42.	Why are boilers fitted with two gauge glasses?	☐

Q3.2.43.	What is a **gauge glass isolation cock** and what is its purpose?	☐
Q3.2.44.	What are the principal parts of a **Westinghouse Brake System** and what is their purpose? (Where it is used on the locomotives and rollingstock of the railway concerned)	☐
Q3.2.45	What are the principal parts of a **Vacuum Brake System** and what is their purpose? (Where it is used on the locomotives and rollingstock of the railway concerned)	☐
Q3.2.46	What is a **foundation ring** and what is its purpose?	☐
Q3.2.47	What is a **dome** and what is its purpose?	☐
Q3.2.48	What is a **regulator or throttle** and what is its purpose?	☐
Q3.2.49.	What is a **feed water non-return valves** and what is its purpose?	☐
Q3.2.50	What is a **feed water stop valve** and what is its purpose?	☐
Q3.2.51	What is a **blow down valve or cock** and what is its purpose?	☐
Q3.2.52.	What is a **blower valve** and what is its purpose?	☐
Q3.2.53.	What is **the vital part** of a locomotive boiler?	☐
Q3.2.54	What is **Primary Air**?	☐
Q3.2.55	What is **Secondary** Air	☐
Q3.2.56	What is the **registered boiler pressure**?	☐
Q3.2.57	Explain the following **terms:** *a) Saturated steam* *b) Superheated steam*	☐
Q3.2.58	What are the advantages and disadvantages of using **saturated steam** for driving reciprocating steam engines?	☐
Q3.2.59	What are the advantages and disadvantages of using **superheated steam** for driving reciprocating steam engines?	☐
Q3.2.60	*Blank for additional question*	☐

Question Set 3.3 Lighting fire and raising steam

Q3.3.1	What are the **pre-light up procedures** when preparing a steam locomotive for service?	☐

Q3.3.2	What are the **steps** when lighting fire on a steam locomotive?	☐
Q3.3.3	How do you **raise steam** once the fire is lit?	☐
Q3.3.4	When do you use the **blower**?	☐
Q3.3.5	Why should **smoke generation be minimised** when raising steam?	☐
Q3.3.6	How do you **test** the water gauge glass?	☐
Q3.3.7	How can you **minimise black smoke** when raising steam?	☐
Q3.3.8	Why is it important to have **adequate ventilation** in the locomotive shed while lighting fire? How can you achieve this?	☐
Q3.3.9	What are the steps in testing the **feedwater injectors**?	☐
Q3.3.10	*Blank for additional question*	☐

Question Set 3.4 Operating the boiler during a train journey

Q3.4.1	What is **combustion**?	☐
Q3.4.2	Why is a **high pressure** steam required in a steam locomotive boiler?	☐
Q3.4.3	Describe the **passage of steam** from the time it leaves the boiler of a steam locomotive until it reaches the atmosphere.	☐
Q3.4.4	How is **coal burned** in a locomotive fire-box?	☐
Q3.4.5	What conditions must prevail to obtain the **best results** from coal?	☐
Q3.4.6	How are optimum fire conditions **maintained**?	☐
Q3.4.7	How is the **air** supplied to the fire?	☐
Q3.4.8	Do the **gases continue to burn** after they enter the tubes?	☐
Q3.4.9	How should the fire be **managed** when preparing for a trip?	☐
Q3.4.10	How should the fire be **managed** on the road?	☐
Q3.4.11	What should be the **depth** of the fire?	☐
Q3.4.12	What should you manage your fire when **approaching a station**?	☐

Q3.4.13.	How do you **read a fire** on a steam locomotive?	☐
Q3.4.14	How do you **read smoke** from a steam locomotive?	☐
Q3.4.15	How is **black smoke** prevented when the locomotive is running with steam shut off?	☐
Q3.4.16	What should be the condition of the fire when **stopping at a station** with a passenger train?	☐
Q3.4.17	What should be the condition of the fire when the **top of a heavy upgrade** is reached?	☐
Q3.4.18	How should you **manage the boiler** throughout a train journey?	☐
Q3.4.19.	Describe **Total Dissolved Solids** or TDS.	☐
Q3.4.20	What are **Suspended Solids**?	☐
Q3.4.21	How should the fire be managed when **running down a grade**?	☐
Q3.4.22	What **level of water** must be carried in the boiler?	☐
Q3.4.23	What is the **result if too much water** is carried in the boiler?	☐
Q3.4.24	Why is it important to regularly check the **water level** in the boiler during a journey?	☐
Q3.4.25	How must you check the water level when the locomotive is **traversing steep rising or falling grades**?	☐
Q3.4.26.	What would happen if the water level is **too low** in the boiler?	☐
Q3.4.27	What are the symptoms of **fusible plug failure**?	☐
Q3.4.28	Does the failure of a plug provide a **warning** that the water level is low?	☐
Q3.4.29	Will the escaping steam from a failed fusible plug **put the fire out**?	☐
Q1.4.30	What **should be done** in the event that a fusible plug melts?	☐
Q3.4.31	Why is it important for the fireman to remain **vigilant** at all times during a train journey?	☐
Q3.4.32	What is the role of a fireman concerning **speed limits** along a train's route?	☐
Q3.4.33	Describe the precautions and procedures a fireman should follow when **approaching and stopping** at stations along a train's route?	☐
Q3.4.34	What are five examples of **abnormal situations** that may occur during a train journey and what is the role of the fireman in responding to these abnormal situations?	☐

Q3.4.35	Why is it important that a fireman can give and interpret **hand signals**?	☐
Q3.4.36	What is the fireman's role during a **locomotive run around** at a terminus or siding? ...	☐
Q3.4.37	Describe the method of safe working on your railway and what actions you as fireman need to take in relation to the authority to enter a section	☐
Q3.4.38	*Blank for additional question*.....	☐

Question Set 3.5 Cleaning and checking the boiler after operations

Q3.5.1	How do you secure the locomotive prior to **post-operational cleaning and checking**?	☐
Q3.5.2	Why is it important to remove all **grime and grease** and to **clean** the locomotive's paintwork and brassware?	☐
Q3.5.3	What steps are involved in **cleaning the smokebox**?.....	☐
Q3.5.4	What should you do if you find a **defect or other problem** during a post-operational check of a locomotive after service?	☐
Q3.5.5	How do you **clean** the firebox and ashpan?.....	☐
Q3.5.6	What is **clinker**?.....	☐
Q3.5.7	What post operational **lubrication and greasing tasks** need to be completed as part of stabling activities?	☐
Q3.5.8	What action should you take concerning the **water level** of the boiler when stabling a locomotive?	☐
Q3.5.9	What **other tasks** might a fireman undertake as part of securing a steam locomotive after service?.....	☐
Q3.5.10	How should the boiler and associated equipment be left **after service**?	☐
Q3.5.11	What **paperwork** must be completed after cleaning and shutting down a boiler on a steam locomotive after service?.....	☐
Q3.5.12	*Blank for additional question*	☐