



*Engineering Safety  
Management*

*Yellow Book 4*

***Checklist for  
Application Note 6  
Maintenance***

*Issue 1.0*

**Disclaimer**

We have taken the trouble to make sure that this document is accurate and useful, but it is only a guide. Its content does not supplement nor remove any duty or responsibility others owe. In issuing this document, we do not guarantee that following any documents we publish is enough to make sure there are safe systems of work or operation. Nor do we agree to be responsible for monitoring our recommendations or people who choose to follow them, or for any duties or responsibilities others owe. If you plan to follow the recommendations, you should ask for independent legal advice on the possible consequences before doing so.

## Contents

1	INTRODUCTION	1
2	MAINTENANCE ORGANISATION	3
2.1	Safety responsibility	3
2.2	Organisational goals	5
2.3	Safety culture	6
2.4	Competence and training	7
2.5	Working with suppliers	9
2.6	Communicating safety-related information	10
2.7	Co-ordination	12
2.8	Continuing safety management	13
3	MAINTENANCE PROCESS	14
3.1	Safety planning, systematic processes and good practice	14
3.2	Configuration management	18
3.3	Records	20
3.4	Independent professional review	22
4	RISK ASSESSMENT FOR MAINTENANCE	23
4.1	Defining your work	23
4.2	Identifying hazards and assessing risk	23
4.3	Monitoring risk	25
5	RISK CONTROL FOR MAINTENANCE	27
5.1	Reducing risk	27
5.2	Safety requirements	29
5.3	Evidence of safety	30
5.4	Acceptance and approval	31
6	REFERENCED DOCUMENTS AND FURTHER READING	32

## 1 INTRODUCTION

The Yellow Book Steering Group has developed a series of application notes to supplement the Yellow Book [1]. Each application note provides more detailed guidance on a particular aspect of the Yellow Book.

Application note number 6 [2] provides guidance on applying the engineering safety management fundamentals in Yellow Book volume 1 issue 4 to maintenance. This checklist is designed to help people who are using that application note. It is derived from the application note and contains no new guidance. It simply presents the main points of the existing guidance in a checklist format. You can use the checklist to assess existing maintenance arrangements or arrangements that you plan to put in place.

The checklists are set out in the same manner as the guidance in the application note, grouped under the fundamentals to which they relate.

Please note that when a checklist question asks “Do you do something?” it generally means “Does your maintenance organisation do something?”

Blind application of these checklists is unlikely to be helpful. You should read application note number 6 before using this checklist so that you understand the reasons behind the items in this checklist and can judge whether they are relevant to you or not.

This checklist is designed to support your judgement, not replace it. Being unable to answer “Yes” to a question in this checklist does not necessarily imply that you need to take action. The measure referred to in the question might be inappropriate in your situation or you might put the fundamental effectively into practice a different way.

You may also find that some questions ask about things that are beyond your control. In that case, if the question suggests that there is an issue to be resolved, you will need to bring the issue to someone else’s attention.

A fruitful way to use this checklist might be as follows:

1. Answer the questions truthfully based upon your maintenance arrangements as they are (rather than as you would wish them to be).
2. Review the questions to which you answered “No” and consider whether there is a clear, immediate reason why you should be able to answer “Yes”. Possible reasons include the following:
  - The measure referred to is a reasonably practicable step that you could take to reduce risk.
  - The measure referred to is required by legislation, regulation or relevant mandatory standards with which you do not currently comply.
  - The measure referred to is likely to save more money than it costs.
3. Take an overall look at the measures that you have in place to put the fundamental into practice, taking account of your specific situation and balancing the areas where you do not follow the guidance in the application note with additional steps that you take that are not mentioned in the application note.
4. Formulate an improvement plan and put it into action.

We are continually working to improve the Yellow Book and we welcome comments. Please contact us at the address below, if you have a suggestion for improvement.

ESM Administrator  
Rail Safety and Standards Board  
Evergreen House  
160 Euston Road  
London NW1 2DX

Phone: +44 (0)20 7904 7777

Fax: +44 (0)20 7557 9072

[info@yellowbook-rail.org.uk](mailto:info@yellowbook-rail.org.uk)

## 2 MAINTENANCE ORGANISATION

### 2.1 Safety responsibility

Your organisation must identify safety responsibilities and put them in writing. It must keep records of the transfer of safety responsibilities and must make sure that anyone taking on safety responsibilities understands and accepts these responsibilities. It must make sure that anyone who is transferring responsibility for safety, passes on any known assumptions and conditions that safety depends on.

- a. Does your organisation set out what responsibilities it has for safety, including: 
  - o the parts of the railway it has to maintain;
  - o the maintenance work it will do;
  - o the people whose actions it is responsible for; and
  - o the people whose safety it is responsible for?
- b. Do you agree responsibilities with any other organisation that the work will involve?
- c. Are you clear how the work that you do interfaces with work done by other organisations?
- d. Do you understand the relationship between the safety of the parts of the railway that you maintain and the overall safety of the railway?
- e. Does everyone within your organisation that is given safety responsibility clearly understand the extent of that safety responsibility?
- f. Has someone been given and accepted responsibility for managing the safety of each part of the railway?
- g. Do you match resources and authorities to the safety responsibilities that each person has?
- h. Do you have contingency plans that make sure that safety continues to be managed when safety-critical staff and support staff are not available?
- i. Is someone responsible for collecting and managing up-to-date information about how each part of the railway that you maintain is built, how it is maintained, how safe and reliable it is, how it was designed and why it was designed that way?
- j. Do you find out and record how the part of the railway that you are responsible for interfaces with passengers, neighbours, the rest of the railway and the work done by other organisations?
- k. Do you record the railway system boundaries that describe the limits of your maintenance responsibility?
- l. Do you record the limits of your work activities?

- m. Where the part of the railway or the work you do has a boundary with another part of the railway or organisation, if there could be any doubt about where safety responsibilities begin and end, do you agree in writing where the boundary is?
- n. Do you write down the safety responsibilities that each person has?
- o. Do you make sure that personnel are formally advised of their responsibilities and understand what they must do, particularly whenever there is a change in safety responsibility?

## 2.2 Organisational goals

Your organisation must have safety as a primary goal.

- a. Do you demonstrate a top-level commitment to deliver safety?
- b. Do you provide organisational leadership by communicating your safety policy throughout your organisation and motivate your personnel to follow it in full?
- c. Do you identify what legislation applies to your organisation and set your goals to make sure you will comply?
- d. Do you set targets to manage safety and provide the necessary resources to meet those targets?
- e. Do you set targets to reduce the number of failures that occur?
- f. Do you set targets for responding to failures?
- g. Do you set targets for reducing staff safety incidents and near misses (or near hits)?
- h. Do you have the correct attributes (such as structure, management systems, tools, facilities, equipment, staff motivation and competence) to achieve your targets?

### 2.3 Safety culture

Your organisation must make sure that all staff understand and respect the risk related to their activities and their responsibilities, and work effectively with each other and with others to control it.

- a. Do you promote your safety culture throughout your organisation so that it is felt and observed throughout your organisation?
- b. Do you promote a culture of:
- **'compliance'** with standards and procedures;
  - **'right first time'**;
  - **'not accepting poor standards of work'**;
  - **'understanding'** risks and objectives;
  - **'learning'** from incidents and near misses to improve the safety of work and overall safety of the railway;
  - **'sharing information'** so that your maintenance staff become the eyes and ears necessary to detect things that are wrong; and
  - **'action'** where something is found to be wrong?
- c. Do you put measures in place that minimise the potential for complacency?

## 2.4 Competence and training

Your organisation must make sure that all staff who are responsible for activities which affect safety are competent to carry them out. It must give them enough resources and authority to carry out their responsibilities. It must monitor their performance.

- a. Do you make sure that all personnel are competent to fulfil their safety responsibility and that all of the people can work effectively together to deliver safety?
- b. Do you select people who have the basic abilities to do the job?
- c. Do you continue to develop people's competence through their careers using training, mentoring and workplace experience?
- d. When considering whether a person is competent, do you consider: 
  - o technical skills, knowledge and experience;
  - o leadership and managerial skills;
  - o attitude and integrity;
  - o fitness; and
  - o confidence?
- e. Do you take into account a person's ability to work under pressure, particularly where they will be expected to respond to incidents or failures that affect train running?
- f. Do you make sure that the overall capability of your maintenance teams includes the right balance of technical abilities and leadership qualities and that team members understand and can use the information and resources they need?
- g. When deciding on the number and location of your personnel, do you take into account the need to respond to unforeseen events and the location of the assets that they are responsible for?
- h. Do you formally assess personnel to verify that they are competent and then give them authority to work?

- i. Do your scope and methods of assessment consider: 
  - o the maintenance processes that need to be followed;
  - o the systems, components and equipment that they need to work with;
  - o the underpinning knowledge needed to take decisions;
  - o the attitude and experience of the person being assessed;
  - o the required working environment (including situations that they may face); and
  - o the activities that they are required to do, including use of tools, materials and test equipment?
- j. Do you fully understand the job profile and health requirements for jobs and then screen people for pre-existing conditions as part of the selection process?
- k. Do you assess people by observing them doing the required work, either at the workplace or by setting simulated exercises?
- l. When you assess people who have to take safety decisions, do you look for evidence that they have the breadth and depth of competence necessary to take correct decisions?
- m. Do you look for good practice assessment techniques that are used elsewhere in the industry?
- n. Do you make sure that people's competence continues to match the requirements of their job?
- o. Do you regularly review competence records and work allocation to make sure that an authority to work does not lapse through certification expiry or lack of application?
- p. Do you continue to monitor the integrity of work that is done, look for any lapses in competence and implement remedial work where lapses may have introduced a safety risk?
- q. Do you keep records, regularly review competencies, work requirements and standards and decide whether any additional training is required?
- r. Where you identify training needs, do you make sure that the training is provided to all those who need it?
- s. When you authorise people to do work, do you also give them responsibilities for putting things right?
- t. Are your people given sufficient resources to carry out their responsibilities?

## 2.5 Working with suppliers

Whenever your organisation contracts out the performance of activities that affect safety, it must make sure that the supplier is competent to do the work and can put these fundamentals (including this one) into practice. It must check that they do put them into practice effectively.

- a. Do you assess your potential suppliers and the resources you obtain before you use them?
- b. Where possible, do you use preferred accredited suppliers, who are regularly assessed against accepted railway industry supplier standards?
- c. Do you work with your suppliers to improve safety and cover any irresolvable safety gaps?
- d. Do you make sure that each supplier is fully aware of the risks it is exposed to, and fully accepts its safety responsibilities?
- e. If you do decide to use a supplier, do you make clear which safety responsibilities you are sharing and agree with it how you are going to work together to manage safety?
- f. Do you make sure that your suppliers have processes in place that fulfil the safety, quality and performance standards that you require and deliver the things that you need from them?
- g. Do you make sure that your suppliers know which records they have to keep and when they must be made available to you?
- h. Do you agree methods of communication and procedures with suppliers to make sure that your requirements are both properly specified and understood?
- i. Do you monitor the safety and quality of work done by suppliers and implement the necessary measures where uncontrolled risk is found?
- j. Do you continually inspect suppliers' products to check that the quality is maintained over time?
- k. Where responsibility for work is to be shared with a supplier, do you agree your plans with them?
- l. Do you make sure that your suppliers understand the division of responsibilities?

## 2.6 Communicating safety-related information

If someone tells you or your organisation something that suggests that risk is too high, you must take prompt and effective action. If you have information that someone else needs to control risk, you must pass it on to them and take reasonable steps to make sure that they understand it.

- a. Do you have methods to communicate up-to-date information about safety of the railway to all those who need to know, at the time and place that they need it?
- b. Do you make sure that everyone in your organisation knows who to tell if they find out information that there is an unacceptable safety risk?
- c. When you communicate information, do you make sure that the information has been correctly received and is understood by the recipient?
- d. Where information about safety risk could have wider implications, do you have communication systems in place that allow you to pass the information to someone who has the authority to decide what action to take?
- e. Are decisions taken by management communicated to those at the front line who have to implement the decision?
- f. Do you communicate information throughout your organisation to make sure that your standards and procedures are properly implemented, particularly when work requirements change?
- g. Are decisions taken at the front line communicated to management?
- h. Have you established communication systems that are capable of use in normal, degraded and emergency situations?
- i. Do you co-ordinate the flow of safety-related and time-critical information using a dedicated reporting facility?
- j. If so, do you make sure that people have the contact details?
- k. Are the resources you provide sufficient to manage and prioritise all of the information types that you need to deal with?
- l. Do you identify and select best practice where it exists within the railway industry?
- m. Do you implement anonymous or independent reporting facilities?
- n. If so, do you make sure that these are only used where appropriate?
- o. If you are using written documents to communicate your requirements, do you make sure that all of your personnel have access to the correct, up-to-date version?
- p. Do you make sure that the document hierarchy is clearly understood and that front line specifications and organisational policy documents are consistent with each other?

- q. Do you use agreed technical vocabulary and standard English in verbal communications and avoid informal jargon or colloquialisms?
- r. Do you use a structured message notation for communicating safety information verbally?
- s. Do message recipients repeat verbal messages back to the sender to confirm their understanding?
- t. Do you record and store safety-related verbal messages using backed up information technology systems?
- u. Do you make sure that processes are in place to maintain communication integrity (including coverage and back-up systems)?
- v. Do you avoid sending out too much information?
- w. Do you have a fall back method to maintain communication in the event of an IT failure?

## 2.7 Co-ordination

Whenever your organisation is working with others on activities that affect the railway, they must co-ordinate their safety management activities.

- a. Have you given someone responsibility for co-ordinating all of your plans?
- b. Does the co-ordination role encompass all activities that affect your work, including co-ordinating: 
  - o access to the railway and assets;
  - o use of available resources (such as plant, personnel and materials);
  - o different types of maintenance work;
  - o project work and maintenance work, including hand-over and hand-back;
  - o maintenance work with railway operations; and
  - o maintenance work associated with unplanned and emergency situations?
- c. Where conflicts arise between different plans, do you look for solutions that ensure that additional risk is managed?
- d. Do you plan work well in advance and adjust work programmes to allocate available resources to critical items?
- e. Where you are maintaining a range of assets spread over a wide area do you co-ordinate your plans?
- f. Do you co-operate with other organisations to agree and set down the arrangements for co-ordinating work by agreeing what needs to be done and planning together how it will be done safely?

## 2.8 Continuing safety management

If your organisation's activities and responsibilities affect safety and it is not yet putting all these fundamentals into practice, it must start as soon as it reasonably can. It must continue to put them into practice as long as its activities and responsibilities affect safety.

- a. Have you put all of the Yellow Book safety fundamentals into practice?
- b. Do you ensure that you become involved in the engineering safety management process of projects that could affect you?
- c. After an asset has been taken into use and operational experience is gained, do you challenge any assumptions the project has made about safety?

### 3 MAINTENANCE PROCESS

#### 3.1 Safety planning, systematic processes and good practice

Your organisation must plan all safety management activities before carrying them out.

Your organisation must carry out activities which affect safety by following systematic processes which use recognised good practice. It must write down the processes beforehand and review them regularly.

- a. If you are planning to make a significant change, do you refer to Yellow Book volume 2?
- b. Does your maintenance planning allow for the possibility of significant changes, for example an ability to respond to an imminent environmental effect?
- c. Does safety planning occur at all levels of your maintenance organisation?
- d. Do your maintenance plans make sure that standby and protection systems are fit for service as well as operational systems?
- e. Do your maintenance plans identify areas where you depend on others to do your work and where others depend on you?
- f. Are all of you co-ordinated?
- g. Do you develop a top-level plan that describes how you will fulfil your organisational goals and comply with legislation?
- h. Do you plan to collect information about safety and performance and select types and sources of information that help you to develop new targets for parts of the railway, personnel, passengers and neighbours?
- i. Do you plan: 
  - o **what** information you are going to collect to understand the risks you are responsible for controlling;
  - o **how** you are going to collect and report it;
  - o **where** you are going to collect it from;
  - o **when** you are going to collect it and how often you will collect it;
  - o **who** will be responsible for collecting it, who will review it and who will decide whether something needs to be changed;
  - o **with**: what mechanism are you going to use to collect and record the information;
  - o **why**: understand what the objective is for collecting the information?

- j. When collecting information, do you understand how accurate it is and how representative it is of the situation you are investigating?
- k. Do you review your safety and performance targets on a regular basis?
- l. Do you review the way you plan safety and performance after an incident and whenever a significant change takes place that could affect the work that you are responsible for?
- m. Do you communicate your top-level safety plans so that people understand what they have to do?
- n. Do you publish a yearly strategic plan that lists all of the safety and performance targets and identifies who is responsible for achieving each target?
- o. Do you plan how you are going to do your work to meet the safety and performance targets that you have set?
- p. Do you plan to monitor the progress of your work against your plans and key performance indicators?
- q. Do you plan how you are going to develop the control measures that your maintenance work will implement?
- r. Do you have a strategy to deal with unforeseen circumstances, including safety incidents?
- s. Do your maintenance specifications describe the maintenance work that needs to be done to each asset type and the periodicity with which it should be applied?
- t. Do you take account of the assumptions made in safety cases and manufacturers' documents?
- u. Do your specifications include information about safety tolerances?
- v. Where access constraints mean that limited time is available to maintain particular assets, do you identify priority tasks such as safety-critical tests, so that they will be completed first?
- w. Where it is not appropriate to prescribe the way work is done, do you look for, and publish, good practice?
- x. Do you supplement your maintenance specifications with method statements that describe how the work will be done, the resources that you are going to use, staff competence and the measures that are necessary to ensure safety at the interfaces?
- y. Do you communicate your method statements to personnel who do maintenance work in a way that meets their needs?
- z. Do you make up-to-date method statements available for reference at the workplace?
- aa. Do you use a standard structure and template for method statements?

- bb. Do you plan how you are going to collect safety and performance information so that you can decide whether your work is doing enough to control risk, and plan to change the way you specify and programme your maintenance work?
- cc. Do you develop a maintenance programme that makes sure that your maintenance strategy can be implemented effectively?
- dd. Does your maintenance programme identify when each asset is to be maintained and what needs to be done?
- ee. Do you include some flexibility to allow time for additional work and failure response, whilst not exceeding maximum maintenance periodicities?
- ff. Do you allocate your competent personnel to a wide range of tasks so that they develop and retain a broad range of competence and an ability to work with a variety of asset types?
- gg. Do you frequently review and update your maintenance programmes so that they reflect the status of work?
- hh. If your planned work cannot be completed on time, do you adjust and re-issue your maintenance programmes to reallocate your resources to tasks with a high priority?
- ii. Do you make clear what planning responsibilities people have for all levels and types of plans and give them the planning resources they need?
- jj. Do you give responsibility for planning to the people who have responsibility for implementing your plans?
- kk. Are your planners competent, do they understand the maintenance work that needs to be done and do they have information about the constraints that could affect the way it is done?
- ll. Do you make sure that planners have information about the railway and other work that could impact on maintenance work delivery?
- mm. Do you have a planning procedure to provide consistency in process and output?
- nn. Do you communicate your plans so that people understand what maintenance work they have to do?
- oo. Do you manage your maintenance programmes using an IT system, which will allow individual jobs to be related to work teams and enable maintenance reports to be entered to monitor progress of work against the programme?
- pp. Does the information contained on the work orders meet the needs of those who have to do the work and consider the environment in which it will be used?

- qq. Do you decide how you are going to manage changes to your plans to reflect changes to the railway and changing work priorities?
- rr. Whenever you change your plans, do you re-issue them and communicate the changes to all those who need to know?
- ss. Do you plan to check that safety of the railway, safety of personnel and safety of passengers and neighbours is being properly addressed by the maintenance work, covering both:
- o Supervision of personnel doing work; and
  - o Inspection of work done?
- tt. When you have decided how you are going to check the safety of your maintenance work, do you build the capability into your organisation?
- uu. If safety could be affected elsewhere, do you tell others about it so that risk can be reduced?
- vv. Do you plan your supervision to make sure that the full range of personnel are observed working within their range of tasks over a certain period of time?
- ww. Does the extent and frequency of supervision reflect the experience of your personnel and the risk associated with different types of work?
- xx. Do you retain some flexibility in your plan so that supervision can be timed to coincide with significant work activities?
- yy. Do you plan your equipment inspections to make sure that asset populations are sampled to take into account a range of locations, ages, conditions and usage?
- zz. Do you give higher priority to assets that have a higher safety risk attached to them?
- aaa. Do you visit equipment at different times in the maintenance cycle to understand the full effect of your maintenance?
- bbb. Do you seek out and use good maintenance practices?
- ccc. If you do choose to use a new technology, do you consider all of the hazards that the method introduces, as well as the existing hazards that it mitigates?
- ddd. Do you continue to review the way you maintain the railway to make sure that it is still good practice and that changes to parts of the railway have not reduced safety?
- eee. Whenever you decide to change the way you maintain a part of the railway, do you make sure that what you are going to do will comply with railway standards and legislation?
- fff. Do you make sure that you do not change the way you do things if it could reduce safety?

### 3.2 Configuration management

Your organisation must have configuration management arrangements that cover everything which is needed to achieve safety or to demonstrate it.

- a. Do you store up-to-date configuration information so that it is easily retrievable?
- b. Do you have a pro-active, systematic configuration management system?
- c. Is the type of information and the amount of detail that you keep sufficient for the safety decisions you have to take and the length of time that you have to respond to situations that arise?
- d. Do you have up-to-date information about how the part of the railway that you maintain is configured?
- e. Do you keep information about the way components and systems connect with each other to ensure safety?
- f. Do you record the modification status of components, where compatibility with other parts of the railway is required to ensure safety?
- g. Do you keep information about adjustments and settings where they can affect other parts of the railway?
- h. Do you understand: 
  - o asset types;
  - o modification states (for example, EPROMs, hydraulic valves, relay units);
  - o the location and population of assets;
  - o the status of temporary alterations and adjustments;
  - o the service duty and condition of strategic assets;
  - o how each asset is used, particularly where the number of operations is related to an asset servicing or replacement regime;
  - o the configuration status of spare parts to make sure that when they are used, they are the correct type and modification state; and
  - o the availability, location shelf life of spare parts (including strategic spares managed by your suppliers)?
- i. Where the risk associated with connecting incompatible components is too high, do you do something to prevent this from happening?
- j. Do you make sure that the modification status of components is clearly identifiable?
- k. Do you make sure that technical records are up-to-date and available to personnel who need to use them?

- l. Do you make sure that your maintenance documentation is controlled and distributed so that your personnel have the correct, up-to-date version?
- m. If so, do you use an IT tool to help you to manage this?
- n. Do you give someone responsibility for managing the controlled distribution of documents and technical information?
- o. Do you keep information about what documents are current, their version and the locations to which they are issued?
- p. Do you maintain a master (source document) so that changes to documents can be safely controlled?
- q. Before you take a safety decision about the railway that requires information from technical records, do you make sure that the records you are going to use are up-to-date and the correct version?

### 3.3 Records

Your organisation must keep full and auditable records of all activities which affect safety.

- a. Do you keep records of:
- the risks you have to control;
  - asset operations;
  - incidents and failures;
  - your maintenance organisation;
  - your maintenance process, including the types of maintenance you are going to do; the maintenance work that you have done; the resources you have used; and the decisions that you take about maintenance and the justification for the decisions (for instance decisions to defer maintenance or repairs); and
  - your communications?
- b. Are your records clear, simple and appropriate to the decisions that may be required in the future?
- c. Do you know what you are going to do with the records?
- d. Do you avoid keeping records that are not needed?
- e. Do you review records to decide whether risk is being controlled to a low enough level?
- f. Do you record the decisions you take and the basis on which they were taken?
- g. Do you keep records:
- about the way you have set up your organisation, particularly the scope and allocation of safety responsibilities, your organisational goals, your safety culture and your competence;
  - about your suppliers;
  - of all the hazards that your maintenance work is designed to mitigate;
  - of decisions about what maintenance you are going to do, you should keep a record of the decision, traceable to the risk that your maintenance is designed to control;
  - of safety-related communications;
  - of equipment operations;
  - of safety-related incidents and near misses;
  - of what you have done;
  - of what resources you have used?

- h. Do you make sure that records are available at the locations and in a format so that those who need to use or communicate information about them can do so?
- i. If people working on equipment need to refer to records, do you make sure that the records are available at the place that the work is being done?
- j. Do you protect records against loss?

### 3.4 Independent professional review

Safety management activities that your organisation carries out must be reviewed by professionals who are not involved in the activities concerned.

- a. Do you plan a hierarchy of independent professional review activities to make sure that all of your maintenance plans and the way they are implemented and reviewed are achieving the required level of safety?
- b. Do you include your suppliers in your safety audit hierarchy?
- c. Are the type, frequency and extent of the independent professional review activities that you carry out proportionate to the risk you are managing?
- d. Do you include a level of independence within these activities?
- e. Are the people you use sufficiently competent, familiar with the risk being managed and have the authority to recommend changes where they are required?
- f. Do they understand the risk that is being controlled and are they competent to decide whether your maintenance is sufficiently controlling it?
- g. Do you ensure consistency by using checklists?
- h. If so, do you develop these so that they prompt the checker to ask questions around process and meeting requirements rather than just prescribing what should be checked?
- i. Are all findings formally recorded?
- j. If you find a safety or compliance problem, do you issue a written instruction to the person responsible for putting it right, specifying the actions that you need to put into place to fulfil immediate, short-term and longer-term safety plans?
- k. Do you communicate the results of independent professional review activities to people responsible for work planning and implementation so that they can take decisions about whether things need to be changed elsewhere?
- l. Do you change the scope and frequency of independent professional review activities to reflect what you find?
- m. Do you use the findings of independent professional review activities as input to the activities that you carry out to implement the monitoring risk fundamental?

## 4 RISK ASSESSMENT FOR MAINTENANCE

### 4.1 Defining your work

Your organisation must define the extent and context of its activities.

- a. If you are maintaining a part of the railway for someone else, do you have an asset register and then agree it with them?
- b. Do you understand and record the context in which your maintenance will be done and any assumptions that could affect how you will do it?
- c. If you are maintaining a part of the railway for someone else's organisation, have you found out how they will approve your safety plans and what work your organisation can approve?
- d. Where your work interfaces with other parts of the railway or organisations, do you consider what work they do when you identify hazards and assess risk?

### 4.2 Identifying hazards and assessing risk

Your organisation must make a systematic and vigorous attempt to identify all possible hazards related to its activities and responsibilities.

Your organisation must assess the effect of its activities and responsibilities on overall risk on the railway.

- a. Do you do your best to predict and identify all of the hazards associated with the parts of the railway that you are responsible for?
- b. Do you have an up-to-date register of risks and understand the nature of the risks you are managing?
- c. Do you identify hazards that may exist: 
  - o within the equipment that makes up part of the railway (for instance failure modes);
  - o as a result of the way equipment is used;
  - o as a result of the way equipment connects to other parts of the railway;
  - o at the place the equipment is located (for example within a confined space or adjacent to exposed electrical conductors); and
  - o as a result of the way the part of the railway is maintained?

- d. Do you keep looking for new situations that are not addressed by your existing maintenance plans and programmes?
- e. When you find such a situation, do you identify all of the hazards that arise from the change of use and then look at the risk level associated with each hazard?
- f. Before you identify hazards, do you decide what information you need and gather it from dependable sources?
- g. Do you gather information about:
- o how the part of the railway works and what it is supposed to do;
  - o how it is going to be used;
  - o where it is going to be used;
  - o possible failure modes;
  - o how other parts of the railway affect it when they operate normally and when they fail;
  - o how it will affect other parts of the railway when it operates normally and when it fails; and
  - o how it has to be maintained?
- h. Do you identify additional hazards that arise from doing maintenance?
- i. Do you understand:
- o the hazards that affect your maintenance personnel; and
  - o the hazards that affect other parts of the railway, including railway operations?
- j. Do you record the assumptions on which the hazards are based so that you can reassess risk as part of a future risk review?
- k. If hazards associated with part of the railway have already been identified as part of a project, do you make sure that you know what they are before accepting safety responsibility for the asset?
- l. Do you work out the risk that arises from each hazard?

### 4.3 Monitoring risk

Your organisation must take all reasonable steps to check and improve its management of risk. It must look for, collect and analyse data that it could use to improve its management of risk. It must continue to do this as long as it has responsibilities for safety, in case circumstances change and this affects the risk. It must act where new information shows that this is necessary.

- a. Have you decided what things you need to monitor?
- b. Do you change the way you monitor these things and change what you monitor as parts of the railway change?
- c. Do you decide which other parts of the railway you need to monitor for changes as well?
- d. Are the types of monitoring that you do and the parts of the railway that you monitor appropriate to the risk that your maintenance is designed to control?
- e. When you decide what you are going to monitor, do you consider risk to personnel, risk to the public and risk to parts of the railway?
- f. When you have decided what you are going to monitor, do you make sure that you do it and communicate the information you gather to those who need it?
- g. Do you take account of the condition of equipment?
- h. Do you decide what data you are going to collect, how you are going to collect it and store it, and how you are going to analyse it to decide whether your maintenance work continues to control all of the risk?
- i. Do you decide who is going to collect and analyse the data and make sure that they do it correctly?
- j. Do you share data with other organisations and your suppliers where it is needed to monitor risk?
- k. Do you decide how you are going to use the results of your analysis and who will decide whether to change your maintenance work or keep things as they are?
- l. Do you also collect data so that you can check that the assumptions that you originally made are still valid?
- m. Do you pro-actively review your safety record against your safety targets on a regular basis?
- n. Do you review your safety record when you receive information about an incident to look for any additional safety measures that might improve safety further?
- o. Do you use the data you collect to develop key safety and performance indicators?

- p. Do you use key safety and performance indicators as part of the way you review your work and communicate how well you are doing to your personnel, your suppliers and your customers?

## 5 RISK CONTROL FOR MAINTENANCE

### 5.1 Reducing risk

Your organisation must carry out a thorough search for measures which control overall risk on the railway, within its area of responsibility. It must decide whether it is reasonable to take each measure. It must take all the measures which are reasonable or required by law. If it finds that the risk is still too high after it has taken all the measures, it must not accept it.

- a. When you have collected risk data, do you initiate the maintenance work you need to do to control risk in a timely fashion?
- b. Do you take action to correct safety problems that you find during maintenance and to restore optimum functionality?
- c. When you decide that you need to do something to control a hazard, do you identify all of the hazards that arise from doing the work and control them as well?
- d. Are you minimising the number of failures that occur?
- e. Do you look for hidden failures?
- f. When assets fail, do you make sure that you collect enough information about the circumstances of the failure so that you can identify the cause?
- g. When you decide what needs to be repaired, do you consider both the equipment that has failed and other parts of the railway that could have contributed to the failure?
- h. Do you classify failures based on the risk arising?
- i. Do you apply a hazard rating to failures to reflect the context of the failure?
- j. When you repair an asset, do you restore the defective components to working order within the safety tolerances that apply?
- k. Before you return an asset to service, do you make sure that it safely performs the function for which it is intended?
- l. If you have to make a temporary repair, do you look for additional risk and decide whether you need to make any changes to your maintenance programme or impose restrictions; and
- m. If you have to make a temporary repair, do you make sure that a permanent repair is completed or arrange for a permanent change to ensure safety?
- n. Do you plan your work to reduce risk exposure to staff to an acceptable level?

- o. Where safety incidents occur, do you collect enough information about the circumstances so that you can identify the cause?
- p. Do you encourage your staff and your suppliers to report all safety incidents and near misses that occur?
- q. Do you carry out workplace risk assessments and then review them regularly and whenever circumstances or conditions change?

## 5.2 Safety requirements

Your organisation must set and meet safety requirements to control the risk associated with the work to an acceptable level.

- a. Do you define what is acceptable in terms of condition, gauge and test values so that you can decide whether the assets for which you are responsible are safe when maintained and will remain safe until the next maintenance takes place?
- b. Do your maintenance specifications clearly describe the safety requirements for each asset that you maintain and include information about the absolute safety tolerances that equipment is designed to operate safely within and also the preferred safety tolerances to ensure performance?
- c. Do you set tolerances for your maintenance periodicities so that you can build some flexibility into your planning and anticipate a degree of late maintenance visits, without incurring additional risk?
- d. Do you determine absolute safety limits for each component and then decide how much tolerance you should build in to your maintenance specifications to allow for system degradation between each maintenance visit?
- e. If you are going to be responsible for maintaining new equipment, do you find out where these are specified?
- f. Do you apply risk based maintenance techniques to help you decide what to do and when to do it?
- g. If so, is the maintenance that you do and the frequency that you do it related to wear and the age of the asset?
- h. If you decide to set a single maintenance specification and maintenance periodicity for each different asset type, do you make sure that the worst-case degradation is taken into account?

**5.3 Evidence of safety**

Your organisation must convince itself that risk associated with its activities and responsibilities has been controlled to an acceptable level. It must support its arguments with objective evidence, including evidence that it has met all safety requirements.

- a. Is someone responsible for looking for evidence of safety?
- b. Does the evidence that you gather give a true representation of safety?

## 5.4 Acceptance and approval

Your organisation must obtain all necessary approvals before it does any work which may affect the safety of the railway.

- a. If you are already maintaining a part of the railway, do you understand what approvals you already have?
- b. If you find that you are doing something that is not approved, do you compare what you are doing with the standards that tell you what you should be doing?
- c. If so and if you find a difference, do you either change what you do to comply with the standard or look for approval to continue what you are doing?
- d. Before you start your maintenance work or implement a change, do you make sure that you have all the necessary approvals?
- e. Do you look for standards that tell you which approvals you need?
- f. If you have to produce any evidence of safety, do you consider all of the fundamentals in this application note and use the guidance to help you to put it together?
- g. Do you obtain approvals for: 
  - o your maintenance strategy; maintenance specifications and method statements;
  - o your maintenance programmes; and
  - o your organisation structure?
- h. Do you understand who is responsible for approving the work that you do?
- i. If your organisation approves some types of its own work, do you give someone the responsibility and authority necessary to do this and make sure that the maintenance programme is capable of fulfilling the maintenance strategy and addresses all of the required assets?
- j. Where you cannot meet the requirements set down in a standard, do you apply for a non-compliance or derogation and provide the evidence to show that you have alternative measures in place to manage risk to a low enough level?
- k. Do you make sure that necessary non-compliances and derogations are approved before you go ahead with the affected work?

**6 REFERENCED DOCUMENTS AND FURTHER READING**

1. Yellow Book volumes 1 & 2 and website, [www.yellowbook-rail.org.uk](http://www.yellowbook-rail.org.uk)
2. Yellow Book application note number 6, Maintenance, issue 1.0

Published in November 2005 by:  
Rail Safety and Standards Board  
Evergreen House  
160 Euston Road  
London NW1 2DX  
Phone: +44 (0)20 7904 7518  
[www.rssb.co.uk](http://www.rssb.co.uk)

You can download further copies from:  
[www.yellowbook-rail.org.uk](http://www.yellowbook-rail.org.uk)