

Unclassified

NEA/CNRA/R(2009)1

Organisation de Coopération et de Développement Économiques
Organisation for Economic Co-operation and Development

27-Jul-2009

English text only

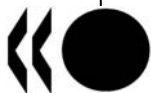
**NUCLEAR ENERGY AGENCY
COMMITTEE ON NUCLEAR REGULATORY ACTIVITIES**

WORKING GROUP ON INSPECTION PRACTICES

FIRE INSPECTION PROGRAMMES

JT03268259

Document complet disponible sur OLIS dans son format d'origine
Complete document available on OLIS in its original format



**NEA/CNRA/R(2009)1
Unclassified**

English text only

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

The OECD is a unique forum where the governments of 30 democracies work together to address the economic, social and environmental challenges of globalisation. The OECD is also at the forefront of efforts to understand and to help governments respond to new developments and concerns, such as corporate governance, the information economy and the challenges of an ageing population. The Organisation provides a setting where governments can compare policy experiences, seek answers to common problems, identify good practice and work to co-ordinate domestic and international policies.

The OECD member countries are: Australia, Austria, Belgium, Canada, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, the Slovak Republic, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. The Commission of the European Communities takes part in the work of the OECD.

OECD Publishing disseminates widely the results of the Organisation's statistics gathering and research on economic, social and environmental issues, as well as the conventions, guidelines and standards agreed by its members.

This work is published on the responsibility of the Secretary-General of the OECD. The opinions expressed and arguments employed herein do not necessarily reflect the official views of the Organisation or of the governments of its member countries.

NUCLEAR ENERGY AGENCY

The OECD Nuclear Energy Agency (NEA) was established on 1st February 1958 under the name of the OEEC European Nuclear Energy Agency. It received its present designation on 20th April 1972, when Japan became its first non-European full member. NEA membership today consists of 28 OECD member countries: Australia, Austria, Belgium, Canada, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Luxembourg, Mexico, the Netherlands, Norway, Portugal, Republic of Korea, the Slovak Republic, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. The Commission of the European Communities also takes part in the work of the Agency.

The mission of the NEA is:

- to assist its member countries in maintaining and further developing, through international co-operation, the scientific, technological and legal bases required for a safe, environmentally friendly and economical use of nuclear energy for peaceful purposes, as well as
- to provide authoritative assessments and to forge common understandings on key issues, as input to government decisions on nuclear energy policy and to broader OECD policy analyses in areas such as energy and sustainable development.

Specific areas of competence of the NEA include safety and regulation of nuclear activities, radioactive waste management, radiological protection, nuclear science, economic and technical analyses of the nuclear fuel cycle, nuclear law and liability, and public information.

The NEA Data Bank provides nuclear data and computer program services for participating countries. In these and related tasks, the NEA works in close collaboration with the International Atomic Energy Agency in Vienna, with which it has a Co-operation Agreement, as well as with other international organisations in the nuclear field.

© OECD 2009

You can copy, download or print OECD content for your own use, and you can include excerpts from OECD publications, databases and multimedia products in your own documents, presentations, blogs, websites and teaching materials, provided that suitable acknowledgment of OECD as source and copyright owner is given. All requests for public or commercial use and translation rights should be submitted to rights@oecd.org. Requests for permission to photocopy portions of this material for public or commercial use shall be addressed directly to the Copyright Clearance Center (CCC) at info@copyright.com or the Centre français d'exploitation du droit de copie (CFC) contact@cfcopies.com.

COMMITTEE ON NUCLEAR REGULATORY ACTIVITIES

The Committee on Nuclear Regulatory Activities (CNRA) of the OECD Nuclear Energy Agency (NEA) is an international committee made up primarily of senior nuclear regulators. It was set up in 1989 as a forum for the exchange of information and experience among regulatory organisations.

The committee is responsible for the programme of the NEA, concerning the regulation, licensing and inspection of nuclear installations with regard to safety. The committee's purpose is to promote cooperation among member countries to feedback the experience to safety improving measures, enhance efficiency and effectiveness in the regulatory process and to maintain adequate infrastructure and competence in the nuclear safety field. The CNRA's main tasks are to review developments which could affect regulatory requirements with the objective of providing members with an understanding of the motivation for new regulatory requirements under consideration and an opportunity to offer suggestions that might improve them or avoid disparities among member countries. In particular, the committee reviews current management strategies and safety management practices and operating experiences at nuclear facilities with a view to disseminating lessons learned.

The committee focuses primarily on existing power reactors and other nuclear installations; it may also consider the regulatory implications of new designs of power reactors and other types of nuclear installations.

In implementing its programme, the CNRA establishes cooperative mechanisms with the Committee on the Safety of Nuclear Installations (CSNI) responsible for the programme of the Agency concerning the technical aspects of the design, construction and operation of nuclear installations. The committee also co-operates with NEA's Committee on Radiation Protection and Public Health (CRPPH) and NEA's Radioactive Waste Management Committee (RWMC) on matters of common interest.

FOREWORD

Fire is a one of the hazards that is most commonly encountered in Nuclear Power Plants and could result in damages to safety related systems and to systems important to obtain and maintain safe shutdown of the plant as well as radioactive releases to the environment. One of the main conclusions from the Committee on the Safety of Nuclear Regulations Working Group on Risk Assessment (WGRisk) 2005 workshop is that fire, depending on the design and operational characteristics can be a significant, and possibly the dominant, risk contributor. In addition, the WGRisk SOAR noted the significance of fire spreading and the impact of smoke and heat on instrumentation and controls.

Inspections performed in this area are therefore of special interest. Based on initial discussions within the Committee on Nuclear Regulatory Activities (CNRA) Working Group on Inspection Practices (WGIP), there is no documented information shared among the members regarding specific fire protection programmes, including active and passive protection of safety significant structures, systems, and components (SSC).

Based on discussions within the WGIP, members proposed a task to prepare a report to provide information to the member countries and improve their own inspection programmes and practices. Additionally, it was noted that a comparison between the outcome of the inspection and actual failures from past experience would also be useful. WGIP noted that Working Group on Operating Experience (WGOE) and the Nuclear Energy Agency (NEA) Fire Project would be best suited to provide information on past experience and actual failures.

The CNRA approved setting up this task in conjunction with a parallel task by WGOE and in coordination with the work of the NEA Fire Project.

TABLE OF CONTENTS

FOREWORD	4
1. EXECUTIVE SUMMARY	6
2. INTRODUCTION.....	7
3. BACKGROUND.....	8
4. QUESTIONNAIRE.....	9
4.1 Final Questionnaire	9
5. ANALYSIS OF RESPONSES	11
5.1 Inspection Planning (Questions 1 and 2).....	11
5.2 Fire Brigade Capability Assessment (Questions 3 and 4)	11
5.3 Control of Combustibles (Question 5).....	12
5.4 Electrical Circuit Analyses (Questions 6 and 7).....	12
5.5 Shutdown Procedures (Questions 8 and 9).....	12
5.6 Fire Protection during Outages (Question 10).....	13
6. CONCLUSIONS	14
6.1 Key Conclusions.....	14
APPENDIX – QUESTIONNAIRE RESPONSES	21
Question 1	16
Question 2	20
Question 3	23
Question 4	30
Question 5	33
Question 6	37
Question 7	40
Question 8	43
Question 9	45
Question 10	47

1. EXECUTIVE SUMMARY

Fire is a one of the hazards that is most commonly encountered in NPPs and could result in damages to safety related systems and to systems important to obtain and maintain safe shutdown of the plant as well as radioactive releases to the environment. Fire, depending on the design and operational characteristics, can be a significant, and possibly the dominant, risk contributor. In addition, the significance of fire spreading and the impact of smoke and heat on instrumentation and controls.

Due to the significant risks to NPPs from fires, inspections performed in this area should receive special emphasis. Both routine and special inspections in the area of fire protection should be performed during all operational modes of the plant by appropriately trained inspectors.

2. INTRODUCTION

This task originated and evolved from member discussions related to the complexity of fire protection at nuclear power plants (NPPs). The members agreed that fires are a significant contributor to NPP risk and Nuclear Energy Agency (NEA) member countries are investing substantial resources in assessing licensee's fire protection capability with emphasis on the licensee's ability to bring the plant to a safe condition during and following a fire. Members were unanimous in recommending a proposal to Committee on Nuclear Regulatory Activities (CNRA) to examine and evaluate fire protection programs and capabilities of the member countries and identify areas of importance for the development of best inspection practices. CNRA approved the task request.

The main objective of the task was to compare the inspection activities related to fire protection programmes between the member countries. This will include the scope of inspections, bases and reference documents, frequency and duration of inspections, qualifications of the personnel performing these inspections, type of inspections (documentation/visit in the installations) and other related issues. Observations made and (possible recurring) problems identified during these inspections will also be traced. A further comparison between the outcome of the inspection and actual failures from past experience could be investigated.

Based on discussions in the Working Group on Inspection Practices (WGIP), members proposed a task to prepare a report in order to provide information to the member countries to help improve their inspection programmes and practices. WGIP noted that Working Group on Operating Experience (WGOE) and the NEA Fire Project would be best suited to provide information on past experience and actual failures. WGOE were asked to review information within the databases to identify information and data that either supported the current findings of the WGIP survey or that suggested areas for additional focus for fire inspections. WGOE's initial work identified that currently held international databases did not hold that type of information. It did however identify that relevant information was held in national databases. WGOE has embarked upon a task to glean information from national databases into its central repository. On completion of this work, WGIP and WGOE will review the data to answer the original request.

The CNRA approved setting up this task in conjunction with a parallel task by WGOE and in coordination with the work of the NEA Fire Project.

3. BACKGROUND

Fire is a one of the hazards that is most commonly encountered in NPPs and could result in damages to safety related systems and to systems important to obtain and maintain safe shutdown of the plant as well as radioactive releases to the environment. One of the main conclusions from the Committee on the Safety of Nuclear Regulations Working Group on Risk Assessment (WGRisk) 2005 workshop is that fire, depending on the design and operational characteristics can be a significant, and possibly the dominant, risk contributor. In addition, the WGRisk SOAR noted the significance of fire spreading and the impact of smoke and heat on instrumentation and controls.

The inspections performed in this area are therefore of special interest. Based on initial discussions within WGIP, there is no documented information shared among the members regarding specific fire protection programmes, including active and passive protection of safety significant structures, systems, and components (SSC). The outcome of this comparison will form a good basis for the member countries to improve their inspection programmes and practices.

Some countries are in the process of introducing significant changes to their inspection process of fire protection programs. Risk-informed inspections are being implemented to better assess the impact of fire on safety significant SSCs. There is little information on inspection activities in the international community related to fire protection. Specifically, in the areas of:

- protection of electrical circuits of safe shutdown equipment,
- evaluation of fire brigade capability,
- reactor operators; actions and their interactions with the fire brigade during and post fire periods,
- availability and use of appropriate procedures during reactor shutdown due to a significant fire,
- compensatory measures put in place by the licensee for out-of-service degraded or inoperable fire protection SSCs,
- controls for combustibles and ignition sources within the plant, and
- manual actions.

A task group was established of WGIP members and/or regulatory inspection experts in this issue. The group prepared a questionnaire, collected responses, exchanged information, and prepared a draft report. The draft report was shared with members of the WGOE and the NEA Fire Project in order to incorporate their insights.

4. QUESTIONNAIRE

The questions were based on members' discussion at the autumn 2005 meeting and were categorised in five areas, Inspection Planning, Fire Brigade Capability Assessment, Control of Combustible Materials, Electrical Circuit Analyses, and Shutdown Procedures.

Thirteen member countries responded; Belgium, Czech Republic, Finland, France, Hungary, Japan, Korea, Mexico, Netherlands, Slovak Republic, Spain, United Kingdom, and United States. The NRC response was prepared by the fire protection specialists in the Region I field office. Results of the analysis are described in the following section of the report. Recommended Best Inspection Practices and individual country responses are attached as an Appendix to this report.

4.1 Final Questionnaire

Introduction

In the questionnaire the WGIP members were requested to elaborate on the details of the inspection process as implemented by their regulatory body. The questionnaire noted that the responses should be formulated to identify examples of best inspection practices. Ten questions were asked in six categories as follows:

Inspection Planning

1. How do you plan and prepare for an inspection?
2. Where and for how long do you prepare for the inspection (in the regulator's office, at the site or both places) and how much time is devoted to preparation?

Fire Brigade Capability Assessment

3. How do the inspectors evaluate the capability of the fire brigade? Here are some attributes that may assist you in answering: dedicated members; required clothing available; breathing apparatus (SCBA) gear availability and training on use; time calculations to get to the fire; effective use of all equipment; smoke removal; drill critique.
4. How do you determine the responsibility of the local township fire brigades for fires at the plant and assess their capability to interact with the plant fire brigade? For example, how do the brigades train together; how does the town fire brigade become familiar with the plant; how do they deal with plant security issues for town fire brigade members when responding to a fire in safety related plant areas; is the town fire brigade equipment compatible with the plant equipment etc..

Control of Combustible Materials in the Plant

5. How do you evaluate the effectiveness of the licensee's combustible control efforts? Some attributes: procedures; postings/signs in the plant.

Electrical Circuit Analyses

6. How do you assess the potential for a fire in areas where power and control cables for redundant equipment required for the safe shutdown of the plant can be exposed to the same fire? For example, oil filled transformers in a cable spreading room; or a motor such as a ventilation fan that may over heat and start a fire; or circuit breaker arcing; or electrical cable over heating etc. exposes redundant safe shutdown equipment.
7. How do you determine the potential effects of a fire, in areas identified in responding to Question 5, on cables (causing short-circuits of power and/or control cables) that could result in the failure of redundant equipment needed for the safe shutdown?

Shutdown Procedures

8. How do you evaluate the shutdown procedure designed to tell the operators how to shutdown the plant during/following a fire? For example, simulated demonstration in the plant; or as part of a table top exercise to discuss activities with the plant operators.
9. If a fire disrupts normal shutdown process, (loss of automatic functions, and loss of control functions in the control room) how do you evaluate the reactor operators' manual actions to properly align or re-align equipment to achieve safe shutdown of the plant?

Outage Procedures

10. How do you verify that the licensee maintains adequate fire protection capability during outages?

5. ANALYSIS OF RESPONSES

5.1 Inspection Planning (Questions 1 and 2)

This two part question focused on determining how much time is spent on preparing for inspections and where the preparation work takes place. Eight of the ten responders implement formal fire protection specific inspections programs on a 1 to 2 year frequency with time dedicated for collection and review of applicable documentation. The others incorporate the fire protection inspection into routine plant walk-downs, which also include other inspection areas, with no preparation time assigned specifically to the fire protection portions.

Good Practices

Inspections should be scheduled at regular intervals appropriate preparation time (1-3 weeks) should be allocated at the regulator's office or at the licensee's facility or a combination of the two.

The inspection should be accomplished in accordance with an inspection plan based on an inspection procedure.

5.2 Fire Brigade Capability Assessment (Questions 3 and 4)

The two questions in this area focused on fire brigade capability, training, and cooperation with local township fire departments and fire brigades. Four respondents indicated that the evaluation of the fire brigade and/or actual coordination of fire fighting are responsibility of authorities outside the regulatory body. However, at least one of these four respondents requires that performance of both onsite and local jurisdiction (offsite) fire brigades demonstrate capability through a yearly excise. Half the responders conduct evaluations of the fire brigade performance and equipment and implementation of fire fighting strategies on a regular basis.

Good Practices

Verify that at least one member of the fire brigade is very familiar with location and operational requirements of equipment required for the safe operation and/or shutdown of the NPP.

Determine that fire fighting activities would not interfere with NPP operator's capability to maintain the NPP in a safe condition.

Verify that onsite fire fighting features and equipment are compatible with those of the local jurisdictions.

5.3 Control of Combustibles (Question 5)

All respondents emphasised the importance licensee controls in this area. Plant conditions are verified at frequencies which vary from daily walk downs to quarterly and biennial assessments of licensee programs.

Good Practices

Verify that licensees' programs for the control of combustible materials also include controls of temporary ignition sources such as cutting and welding operations.

Inspectors in the plant for any reason should always be on the lookout for potential violations of the combustible control program.

5.4 Electrical Circuit Analyses (Questions 6 and 7)

Two respondents indicated that some level of inspection of electrical circuits and the verification of licensee circuit analyses takes place by a biennial inspection team in one and a triennial inspection team in the other. Five respondents rely on the results of a Fire Hazards Analyses (FHA) while four respondents utilise the 10 year Periodic Safety Review (PSR) for assessing electrical cable separation criteria and potential failure of redundant safety equipment due to fire as the common cause. Two of the respondents with FHA also use the PSA for reassessment following changes to the plant configuration.

NOTE: In responding to Question 6, only the two countries conducting inspections in this area assess licensee compliance on a 2 or 3 year frequency. All other respondents rely on the licensees' FHA and/or on the PSA to determine that the licensee has addressed this issue. This is acceptable and perhaps preferable if the regulator is assured that licensees maintain their design and licensing bases originally approved by the regulator. Any changes to the licensing and design basis are appropriately evaluated addressing fire as the potential root cause affecting redundant shutdown systems or equipment.

Good Practices

Re-assess the potential for common cause failure due to fire following any modification in areas containing equipment designated as important to reach and maintain a safe shutdown condition.

5.5 Shutdown Procedures (Questions 8 and 9)

Nine of the ten responders use emergency operating procedures (EOPs) and/or specific fire protection shutdown procedures to shutdown the plant during a fire. All responders simulate the implementation of the procedures by either of the plant simulator, or validation by in-plant walk downs. Four utilise remote shutdown panels to simulate the evacuation of the main control room. For question 9, operator manual actions to counter loss of automatic functions, all respondents referenced the use of the procedures discussed in question 8.

Good Practices

Evaluate the operators' in-plant movements to determine if their activities to shutdown the plant could be impaired by the fire. This would include safe passage, free of smoke and fire, to the areas where activities are to be conducted; adequate communication equipment and capability to communicate and coordinate actions.

5.6 Fire Protection during Outages (Question 10)

One responder emphasised that more fires occur during outages than under normal operations. Nine responders specifically noted that during outages regular inspections are performed to verify the safe conduct of the movement of transient combustibles, the safe performance of hot work, and the appropriate compensatory measures are in place. Two responders stated during outages certain technical specifications apply and that they verify compliance with them.

Good Practices

Perform routine inspections during outages to verify the safe conduct of transient materials, the safe performance of hot work, that appropriate compensatory measures, and compliance with technical specifications.

6. CONCLUSIONS

This section summarises the key conclusions from the report and feedback provided by WGIP members.

6.1 Key Conclusions

- Inspections should be performed at regular intervals and using inspection plans/procedures.
- Firefighting activities should be compatible with equipment used by local jurisdictions and not interfere with maintaining the plant in a safe condition.
- Inspections should assess whether the operators maintain control of combustible materials.
- Inspections should assess the potential of common mode failure of safe shutdown equipment.
- Inspections should evaluate the operator's ability to shutdown the plant in the event of a fire (e.g., smoke, communications, safe passage to safe shutdown equipment).
- Routine inspections should be performed during outages.

APPENDIX – QUESTIONNAIRE RESPONSES

INSPECTION PLANNING

Question 1

How do you plan and prepare for an inspection?

Belgium

The overall inspection on the fire protection program happens once a year for each power plant (each site). Therefore preparation is required through reading of inspection reports (collection of information and events regarding fire protection), contacts with resident inspectors and with the licensee. Return of experience, both national and international is also considered in this preparation.

Czech Republic

The Fire protection (hereinafter “the FP”) is a part of the routine year long inspection programmes. Each specific inspection has its own procedure. The FP inspections are generally done yearly on each NPP reactor unit (together six), although it is possible more often according to circumstances. Inspections take up tens of hours. The FP inspections are usually focused to automatic fire detection and alarm systems, fire extinction equipment and the fire brigade performance, fire protection documentation and so on.

Finland

STUK has a thorough inspection of overall fire protection arrangements of NPP once a year. STUK prepares a detailed inspection plan and it is sent to the utility some weeks before the inspection.

France

The fire inspections are planned at the end of the year for the following year. An inspection is scheduled at least for each site, with a monitoring reinforced for certain sites according to the results of the previous inspections. The agendas are defined starting from the guide for fire inspection (reference 4-SD-GI-20 “Fire inspection Guide applicable to PWR”) and of the topics to be re-examined on the site, either by sampling, or systematically (taking into account the replies brought by the site to the previous inspection).

Hungary

Planning and preparation is depending of the type of inspection:

- Overall inspections in HAEA Yearly Inspection Plan are made by the assignment of the concrete themes with responsible inspectors. In the inspection plan there are the following determined documentations for preparation in the scope of fire protection:
 - chapters of General Operational Action Plan concerning to Fire Protection, including fire-service plans,
 - concerning chapters of plant Final Safety Review,
 - concerning law environment (assigned by name),
 - concerning on site regulation documents of the plant,
 - actual handling procedures of the fire-extinguisher equipments of the plant.

- For objective inspections in HAEA Yearly Inspection Plan there are one or two specific fields (like: organisation, inside regulation, fire-alarm or extinguisher system, etc.) in the theme of fire protection assigned by regulator, naming the concerning documentations as well.
- Casual inspections are related to an operational event, or to the reconstruction of fire protection system, so that cannot be planned and named in HAEA Yearly Inspection Plan. Documentations for preparing can be the operational report from the operational event with it's concerning documentations, and in case of reconstruction the concerning documentations can be the final construction and realisation drawings.

Japan

Japanese Nuclear regulatory body does not have inspection rules on the for protection systems of operating nuclear power plants. Nuclear regulatory inspectors do not inspect fire protection matters. Fire protection systems inspections are inspected by Fire Defence Department under the Fire Defence Law in Japan. This legal framework includes nuclear power plants.

Korea

Firstly, inspectors review the whole maintenance schedule and test schedule for fire protection facility. Secondly, they review the applicable FSAR requirements, applicable code and standards, and procedures. Thirdly, they check the design change items, procedure revisions, and findings during the previous inspection.

Mexico

The Mexican Regulatory Body assigns resident inspectors to each Mexican Nuclear Power Plant. Resident inspectors are stationed at the nuclear plant full-time and conduct inspections of operations and equipment daily, providing close surveillance of the plant. In addition, specialists at CNSNS offices review plant security, emergency planning, radiation protection, environmental monitoring, periodic testing of plant equipment and systems, fire protection, construction activities, and other specialised areas. They may conduct 10 to 25 routine inspections a year. Finally, special team inspections, conducted by CNSNS staff, may focus on a specific plant activity, like maintenance or security, or an operating problem or event. From the latter, the Mexican Regulatory Body plans their inspections.

In order to prepare an inspection, the inspector gathers and study the documents related to the topic selected, by example, for Fire Protection Program:

- 10CFR50.48 “Fire Protection”,
- 10CFR50 Ap. R,
- 10CFR50 Ap. A General Design Criteria 3,
- NUREG-0800 9.5.1 “Fire Protection Program”,
- NUREG-0800, Appendix A to Branch Technical Position (BTP) APCS 9.5-1,
- NFPA Standard’s,
- Laguna Verde NPP FSAR,

- Laguna Verde NPP Technical Specification's,
- ANSI/ANS-15.17-1981 "Fire Protection Program Criteria for Research Reactors," 1981,
- NOM-002-STPS-2000 "Condiciones de Seguridad, Prevención, Protección y Combate de Incendios en los Centros de Trabajo" México.

At this time we have an Inspection Guide's related with Fire Protection, based on the NRC IE-Manual inspection procedure No. 64704 "Fire Protection Inspection Program".

In short term the PRA insights will be use to give priority at components under inspection, (The inspection manual chapter IMC-0609, Appendix "F", will be analysed later).

After the study, the inspector develops a checklist which uses during inspection considering previous inspection reports of the past, new events, performance indicators and residents inspectors recommendations.

Netherlands

Fire protection is part of routine walk down inspection especially during outages.

Specific fire inspection is part of the periodic safety review process. During this review process plant walk-downs are carried out by the experts based on exchange of operating experience.

Fire protection is part of the review process during design and implementation of modifications.

Slovak Republic

Inspection of fire protection is the routine inspection "check of operation and fire protection" which is planned by inspection plan and the summary protocols are made on quarterly basis. The inspectors don't prepare for fire protection inspection specially; the stress is on the plant walk down and in observation of non-compliances with the fire protection plans, procedures and with plan of placement of fire-extinguishers.

Spain

CSN follows the biennial Fire Protection inspection procedure PT.IV.204. Every two years a multidisciplinary inspection team that includes two experts on fire inspection, one expert on nuclear systems, one expert on I&C and one electrical expert, taking advice from PRA experts, selects three to five fire areas, and carry out a four days site inspection based on the specific plant design and risk informed, on the DID elements used to mitigate the consequences of a fire. The chosen areas will be the most significant risk determined by the fire PRA.

United Kingdom

The planning for the inspections is done on a three yearly cycle with knowledge of upcoming safety cases, intelligence gained from site inspections, as well as the duration since the last inspection.

The preparation for the inspection involves a request for the existing safety case for internal hazards which includes nuclear fire safety. Detailed plans are requested that illustrate the location of safety significant equipment as well as fire compartmentation and segregated routes. This information is then reviewed as an office based task undertaken by the specialist internal hazards inspector. From this, a list of areas of

significance both internal and external to the reactor building is drawn up and submitted to the Station for comment. This is then produced as a plan for the inspection to facilitate access and health physics requirements. Within the inspection there is a common topic area that is inspected across all the nuclear power stations as a means to benchmark in a clear and transparent way; the common topic area is currently fire dampers and the integrity of nuclear significant compartmentation.

United States

Planning for a Triennial Fire Protection Inspection (TFPI) includes the scheduling, the notification letter with the request list, review of previous TFPI reports, review of risk information by the NRC Senior Reactor Analyst, information gathering visit and the preparation week. The main activity of the information gathering visit is selection of three to five fire areas or zones which will be the focus of the inspection. Zones are selected through a consideration of a number of factors. Zones selected in previous inspections are normally excluded from consideration for the current inspection. The relative risk ranking of the zones is an important, but not overriding, consideration. The selected zone must have ignition sources. The amount and nature of combustibles in a zone is a factor. Normally, one of the areas selected is an area designated as an alternate shutdown area.

The entire inspection team, which consists of five or six inspectors, plus the Senior Reactor Analyst, goes to the information gathering visit. The information gathering visit is a three-day event which includes travel time. The first day is often taken up by administrative matters including badging, dosimetry acquisition, and presentations by the licensee. Also, the Senior Reactor Analyst meets with his licensee counterpart to go over the risk insights. The walkdown to select the fire areas starts early the second day, and usually lasts most of the day. Sometimes the entire plant is walked down. The NRC has developed some special forms whereon the team records all the ignition sources in a fire zone which appears to be a prime candidate for the inspection. The fire areas selection is made at the end of the second day. The licensee then completes the information gathering, and loads the information onto a disc.

Question 2

Where and for how long do you prepare for the inspection (in the regulator's office, at the site or both places) and how much time is devoted to preparation?

Belgium

Preparation takes place at the authorised licensing body's office mainly. A total of approximately one man-week/site-year is needed.

Czech Republic

See response to question 1.

Finland

STUK prepares inspection in the regulators office. The total preparation time is about two working days.

France

The agendas of the inspections are in general prepared in the buildings of divisions of the ASN for the unscheduled inspections (day before) or more than fifteen days before the inspection within the framework of a programmed inspection. The average duration of an inspection is 1 day and half.

For particular cases, like the application of the operating rules in case of fire, inspections are prepared on site (approximately two hours).

Hungary

For an overall inspection inspectors preparing 2-3 weeks in regulator's office, elaborating the available documentations, on site spend 1-2 days with on site preparation.

For an objective inspection, inspectors prepare 2-3 days on site or in regulator's office, depending on the scope of inspection.

Japan

See response to question 1.

Korea

For each periodic inspection that is conducted every 18 months, inspectors usually visit twice the site. Before the inspection, they prepare for about 12 hours in the office for each visit. Therefore, they devote about 24 hours of preparation for one unit.

Mexico

In the regulator's office the preparation of inspection at least begins 2 weeks before and is devoted 4 hours diary. Additionally the resident inspector during his weekly inspection checks the pressure in the portable extinguishers, pipes and fire hose at the different buildings for these inspections is devoted 1 hour weekly.

Netherlands

Reviews are prepared at the regulators office by experts. The main preparation time is keeping up to date with current information from (inter) national exchange opportunities. Time spent on fire protection for 2006 is 15 days. The municipal and regional fire departments (brigades) under supervision of the Home Office may perform fire inspections based on the Dutch Fire Act.

Slovak Republic

Only site inspectors exclusively perform these inspections. They prepare for inspection at the site and the time devoted to preparation for routine inspection “check of operation and fire protection” is about 280 hours quarterly.

Spain

The inspection team will review all the needed information to assess the capacity of the NPP for the post fire safe-shutdown and the preventive, active and passive protection features required to prevent fire and to maintain the safe-shutdown. The inspection is prepared in the central office and it is estimated that the team experts will need two to three weeks to prepare the inspection.

United Kingdom

A great deal of work is done in the office prior to the inspection. A review of the current safety case along with the associated layouts is done in the office and takes of the order of 3-4 weeks. The outcome of this review is then rolled into the inspection plan and the amount of time spent inspecting on the station is approximately three days with some further visits depending on the findings. The outcome of the inspection is then documented within visit reports and the requests sent to Station to rectify any deficiencies identified as a result of the sampling inspection that has been undertaken.

When a significant project has been undertaken e.g. a periodic safety review then the extent of the review is more detailed and requires a more extensive review of not just the safety case but the supporting references to the safety case to confirm that the case remains adequate (in light of changes to the plant or to standards) to permit operation for an extended period of time (normally 10 years).

United States

The preparation week lasts Monday through Friday. It takes place in the respective NRC regional office one or two weeks before start of the inspection. The team leader schedules about three meetings during the week. The remainder of the time persons work alone or in pairs. At the beginning of the preparation week, the team leader assigns team members to broad areas of inspection, such as operations, electrical and fire protection. During the week, the operations inspectors become familiar with the system diagrams and the shutdown procedures. The electrical inspectors study the system diagrams and the circuit analysis with a view to selecting about six to ten components for thorough review. Selected components always include valves and instrumentation. The component selections are discussed among the electrical and operations inspectors before the list is finalised. The licensee is advised of the components selected during the preparation week. The licensee is requested to provide elementary diagrams, loop diagrams, block diagrams and routing information for these components to be ready at the start of the inspection. It is recognised that additional components may be added to this list as the inspection progresses. Electrical inspectors may also select power flow paths in the electrical distribution system for the protective device co-ordination portion of the inspection.

By the end of the preparation week, the team leader publishes a detailed inspection plan wherein all the line items of the inspection procedure are assigned to one or more inspectors. Any outstanding open items in the fire protection area are also assigned to someone. A review is also made of industry operating experience, and interesting items included in the plan. The team leader also confers with the resident inspectors and cognisant NRC managers to get their insights on the licensee's fire protection program. All the information received during the information gathering visit is reviewed to some extent during the preparation week. Finally, the latest thinking is to rigorously apply the principles of statistics in selecting the sample size for inspectable items and analysing the significance of any identified problems.

FIRE BRIGADE CAPABILITY ASSESSMENT

Question 3

How do the inspectors evaluate the capability of the fire brigade? Here are some attributes that may assist you in answering: dedicated members; required clothing available; breathing apparatus (SCBA) gear availability and training on use; time calculations to get to the fire; effective use of all equipment; smoke removal; drill critique.

Belgium

The capability of the fire brigade is evaluated beforehand by:

- A check of the good housekeeping, availability and correct use of the material (breathing apparatus, protective clothing, personal dosimeters, portable communication means...) and the check of the procedures/instructions reported hereby. This is performed by examination of available documents and inspection on the site.
- A check of the document defining the composition of fire brigades (minimal number, chief, ...)
- A check of the theoretical, practical and recycling training program of the members of the fire brigades: it should at least include the different types of potential fires in the plant and the adequate fire suppression means, practical fire suppression trainings with the available fire suppression means in the plant and potential fire arising in a plant, including the wearing of personal protective means in confined and low visibility places. The training has to be given by a specialised organism.
- A check that all the members of the fire brigade have received a minimal training concerning radioactive risks, working of NPP's, fire-fighting strategies in use at the NPP and radioprotection.
- A check that, at least the leader, has adequate knowledge of safety related systems.
- A check that a training file exists for each fire brigade member, including the detail of followed trainings.

The capability of the fire brigade is evaluated during drills through the monitoring of the items listed below. The observation of these drills happens at least once every five years.

- Intervention time (corresponding to the time between the alert and the time of arrival of the minimal number of fire brigade members on site with complete personal equipment).
- The number of fire brigade members and their familiarity with their individual protective means, breathing apparatus, manual extinction means, communication means, and areas important to safety.
- Their level in fire protection knowledge and their skills (it includes leadership of the fire brigade responsible, following of the fire fighting strategies).

Czech Republic

The evaluation of the fire brigade capability is under authority of the Ministry of Interior - Directorate of Fire Rescue Corps Czech Republic (hereinafter DFRC). Ministry of Interior of the Czech Republic (hereinafter CR) is a central body of state administration for the fire fighting and rescuing corps among others. Fire fighting and rescue corps is one of component part Integrated Rescue System in CR (hereinafter IRS).

The FP is controlled by The Fire Protection Law No: 133/1985 Coll. of 2002 year version and code of practice Regulation No: 246/2001 Coll. on Statement of Fire Protection Conditions and State Fire Inspections Performance (Regulation on Fire Prevention).

Dedicated members, required clothing available, breathing apparatus gear availability and training on use, time calculations to get to the fire, effective use of all equipment, smoke removal, drill critique are determine within of RFS and evaluate in Fire Hazard Analysis Report (hereinafter FHAR) which is periodically updated. FHA is a part of FSAR.

Observation of a fire drill including ensuring the minimum fire brigade staffing shows up at the fire scene, ensuring that the fire brigade is appropriately dressed to fight a fire, ensuring that the fire brigade responds in a timely fashion, the fire brigade leader shows appropriate leadership and control of the fire scene, communication between the leader and brigade members are appropriate, the fire brigade applies appropriate fire fighting strategies during the drill and that the fire brigade uses their pre-fire plans to fight a fire in a given area of the plant is under control DFRC. To observe a fire drill there are used specific procedures.

Review of the fire brigade equipment state, review of the equipment ability to transport equipment to all areas of the plant is performed regularly. Review and verify special training and qualification for brigade leaders is held according with a training plan.

The nuclear safety inspector evaluates licensee fire brigade during their NPP inspection activities.

Finland

All of the aspects mentioned are normally covered by an inspection plan. Accomplished training and drills are reviewed as well as changes of personnel, equipment and procedures.

France

Although the intervention for the fire control does not form part of the demonstration of safety (which rests on a dimensioning of the division into sectors for an estimated duration of self-extinguishing of fire), it must be effective. The intervention is a key element of in-depth defence.

The inspectors check the following points:

- the enabling (training and the medical aptitude) of the agents assigned to the missions of fire protection;
- the frequency and contents of the training and exercises carried out by the teams;
- relationships with the external fire brigade;
- the quality and the relevance of the cards of actions in case of fire (reflex actions).

One or more exercises are organised by the inspectors, enabling them to judge the performance of the organisation, motivation and competence of the teams (in particular the aptitude for the command of the leader of the team of second intervention), and application of the reference frames of EDF.

For the team of first intervention, whose mission is:

- to validate, if necessary the fire alarm to confirm the fire alert;
- to help the casualties;
- if possible (without taking ill-considered risks) to try a first extinction with the local extinguishing means;
- in every cases, to apply reflex actions in particularly to check an restore the division into sectors.

The inspectors check:

- the time of arrival on the spot;
- it is imperative not to start fire extinction before giving a confirmation for the fire alert;
- the delay of implementation reflex actions;
- the effective division into sectors.

For the team of second intervention, made up of agents especially formed for fire control which, on order of mobilisation, is equipped (gloves, boots, helmets, bottles of oxygen's,...) before going on the spot of the fire, and whose missions are centred on a fast and effective intervention while waiting for the arrival of the external helps (Sappers Firemen), the inspectors check:

- the time of arrival on the spot (from immediate departure of the team of 2nd intervention on call or alarm and arrival on the fire spot –within in 25 minutes maximum-, ready for intervention);
- the direction of the command of the team leader, his capacity to appreciate the situation quickly and to engage the adapted intervention of its team;
- the time from which the team of second intervention is ready to intervene;
- the competence of team-members;
- the port of dosimetric film and operational dosimetry;
- the port of the Breathing apparatus Insulating;
- the installation of a life line;
- preparation of the opening of the door firebreak;
- aptitudes to set up and to use the agents of extinction adapted to fire, and in particular the establishment of fire hoses;
- dynamism and the motivation of the agents.

Hungary

According to the actual legal regulations in Hungary, the evaluation of capability of the fire brigades is not charge of the regulatory body (HAEA). Evaluation of capability of the fire brigades is the task of the regional directorate of Co-operation Against Domestic Violence of Ministry of Justice and Law Enforcement.

Japan

Japanese nuclear regulatory inspectors do not evaluate the capability of the fire brigade. This answer is the same to survey questions 4 and 5. The Fire Defence Law requires that House Fire Brigade (HFB) should assign the fire prevention manager, formulate the fire defence plan, etc. Regional Fire Defence Department (RFDD) assesses the implementation of the fire defence plan, training, etc. of the plants.

Korea

In order to evaluate the capability of the fire brigade, the inspectors check the adequacy of the fire brigade's organisation, equipment control, document development, education and training, fire alarm, measured time ready to attack the fire, selection of the proper equipment and fire suppression strategy, role of the fire brigade, procedure and handling of the equipment inspection in accordance with the fire protection program (FPP) and applicable procedures. They also review the records of the training and self-evaluation, equipment maintenance to confirm the compliance with the FPP and applicable procedures. Sometimes the licensee's fire suppression training could be observed as part of inspection activities.

Mexico

Under a CNSNS inspection guide based on the NRC IE-Manual inspection procedure No. 64704 "Fire Protection Inspection Program" and NUREG-0800, Appendix A to Branch Technical Position (BTP) APCS 9.5-1. These documents provide guidance to inspectors on observing fire brigade drills. It is verified the minimum fire brigade staffing, ensuring that the fire brigade responds in a timely form, if the leader shows appropriate leadership and control of the fire scene, communication between the leader and brigade members are appropriate, the fire brigade applies appropriate fire fighting strategies during the drill, and that the fire brigade uses their pre-fire plans to fight a fire in a given area of the plant.

In addition, the technician qualifications and training are reviewed.

Netherlands

The licensee is required to fulfil requirements laid out in the Fire Act supplemented by requirements by the regulatory body (KFD), of which the implementation is under supervision of the municipal fire brigade. The standard Dutch fire fighting training program with exams and tests is used to train the plant's fire fighters. No inspection time by the regulatory body is devoted to this aspect.

A licence requirement is to submit regular reports on fire protection and fire protection is covered in the PSR (2 yearly and 10 yearly). The capability of the plant fire brigade is reviewed by the municipal fire brigade. Reports are discussed during quarterly meetings between KFD, municipal fire brigade and representation of the utility.

The municipal fire brigade inspects compliance with the Fire Act. A conventional notified body inspects the status of the fire protection equipment.

Slovak Republic

The atomic act does not entitle the regulatory body to inspect the capability of the fire brigade. The special body of ministry of interior has the mandate for such inspections.

Spain

The resident inspectors have the responsibility for evaluate the fire brigade capability during their inspection activities, under inspection procedure PT.IV.205 on Fire Protection, to be performed by resident inspectors. This procedure provides guidance to resident inspectors for the evaluation of fire brigade yearly drills.

The main attributes included in the procedures are:

- The scenario for the fire drill has been adequately written.
- The members of the fire brigade know the fire scenario.
- The aim and criteria of success for the fire drill are adequate and have been clearly added to the scenario.
- The resident inspectors evaluate whether the fire brigade responds are in time during the drill.
- Verify that the Emergency Plan has been timely and correctly activated.
- Verify that the control operators have in the control room appropriate information to evaluate the potential impact of the fire on the structures systems and components of the plant.
- Ensure that the fire brigade properly uses and wears breathing apparatus and protective clothing for a fire.
- Fire hose lines are capable of reaching all necessary fire hazards locations, are laid out without flow constrictions and the hose is simulated as being charged with water. It is mandatory to verify the configuration for the nozzle before entering in a fire area.
- Where it is applicable, it must be verified that members of fire brigade enter the fire area in a control manner, staying low to the floor and feel the door for heat prior entry into the fire area.
- Fire brigade leader exhibits appropriate leadership and have received effective, clear and meticulous instructions that he transmit adequately to the fire brigade members.
- Radio communications between the plant operators, control room operators and fire brigade members remain effective and efficient. The resident inspector must verify that the shift supervisor is adequately informed of the development of the fire.
- Effective smoke removal operations are simulated.
- Fire-fighting pre-fire strategies were utilised.
- All the acceptance criteria were met.
- All the incidents that can happen during the fire drill must be documented and promptly corrected as well as the study of weaknesses associated in order to put in place the lessons learned.

During conduct of the biennial fire protection inspections conducted under inspection the biennial team may or may not observe a fire drill. If it is happened to be a fire drill, the resident inspectors will also

assess the fire brigade organisation and its coherency with the final safety report and the applicable standards.

It must be also reviewed all the quality assurance records concerning the evaluation about the response of the fire brigade facing the fire drills, the training and formation of the fire brigade, and the corrective actions applied after previous fire drills.

United Kingdom

It is not the UK regulators responsibility to assess the capability of the fire service, it is for the UK regulator to assess the interactions of the Licensee with the fire service to determine the adequacy of their arrangements.

The capability of both the site and local fire brigades is assessed by the need and response time required for action to be taken. Generally, within the UK the response time for the fire brigade is not the most significant factor as the immediate post operational shutdown and post trip cooling is undertaken by plant personnel. There is an allowance in most cases for a fire to burn out due to control of combustibles and the degree of fire segregation of redundant lines of protection.

The performance of both the site and local fire brigades is demonstrated to the Regulator annually by means of a demonstration exercise.

United States

The resident inspectors have the responsibility of evaluating fire brigade capability during their inspection activities under inspection procedure 7111105A/Q. This procedure provides guidance to resident inspectors on observing fire brigade drills. It provides many attributes the resident inspectors can use during their observation of a fire drill. These attributes include, ensuring the minimum fire brigade staffing shows up at the fire scene, ensuring that the fire brigade is appropriately dressed to fight a fire, ensuring that the fire brigade responds in a timely fashion, the fire brigade leader shows appropriate leadership and control of the fire scene, communication between the leader and brigade members are appropriate, the fire brigade applies appropriate fire fighting strategies during the drill, and that the fire brigade uses their pre-fire plans to fight a fire in a given area of the plant.

During conduct of the triennial fire protection inspections conducted under inspection procedures 7111105T and 7111105TTP the triennial team may or may not observe a fire drill. If we observe a fire drill, we will use the guidance/attributes provided in the 7111105A/Q inspection procedure. The triennial inspection team will review fire brigade qualifications (including medical records, training records, SCBA qualifications, etc.), lesson plans, pre-fire plans, fire brigade turn-out-gear and equipment, communications equipment, and a sample of recent fire brigade critiques. If a drill critique indicates a drill failure, the triennial team will verify the remedial training was given and that particular fire brigade was re-drilled. Reviewing these documents will usually provide the triennial team reasonable assurance that the fire brigade is ready to perform its intended function.

Qualifications: Are the members up-to-date in licensee-established requirements to include classroom training, field training and drills? Review the last respirator qualification and the last physical. Review and verify special training and qualification for brigade leaders.

Equipment: Review the condition and ability to transport equipment to all areas of the plant. Understand the expectations for equipment transport and what in actuality occurs. Review the smoke removal equipment availability.

Response: What is the brigade's ability to get to the fire in the self-imposed time requirements? Did any drill failures occur? Why did they fail? Ensure that there is consistent application of pass/fail criteria. Review the annual drill with the offsite fire department record.

Question 4

How do you determine the responsibility of the local township fire brigades for fires at the plant and assess their capability to interact with the plant fire brigade? For example, how do the brigades train together; how does the town fire brigade become familiar with the plant; how do they deal with plant security issues for town fire brigade members when responding to a fire in safety related plant areas; is the town fire brigade equipment compatible with the plant equipment etc.

Belgium

The responsibilities shared between the fire brigade and the local township fire brigades are defined in a document, together with the access of the local township fire brigades to the unit, their reception and the availability and accessibility of dosimeters.

It is ensured that local township fire brigades have received a minimal training concerning radioactive risks, working of NPP's, the different postulated fires scenarios in a unit, the fire fighting strategies in use in the unit and in radioprotection.

It is also ensured that the local township fire brigades have a minimal knowledge of the installation and that visits are organised in order to allow them to get acquainted with the area. They must also regularly follow practical fire suppression (and progression) drills in confined and in low visibility places.

As described above, the capability of the local township fire brigades is evaluated during drills (if they participate) by means of the characteristics listed below.

- intervention time, time of arrival to the access entrance and the elapsed time between the access entrance and the operational arrival at the fireplace;
- the number of equipped members and the adequacy and state of the material they bring;
- the use of personal dosimeters and the use of radioactivity monitoring equipment;
- the level of familiarity with the place, with the safety-related equipments and with the radioactive risk;
- the level of co-ordination between fire brigades and local township fire brigades during the drills (it includes liaison between the two groups, defined and respected leadership, efficient use of the available means, compatibility of the equipments and procedures).

Czech Republic

The responsibility of the "local" fire brigades for fires at the plant and assessment of their capability to interact with the plant fire brigade is in line with conception of functioning of Integrated Rescue System. The brigades train together regularly. Local fire brigades are generally familiar with the plant but they have auxiliary role. Main fire brigade is licensee's fire brigade. Equipment of the offsite fire brigade is compatible with the onsite fire brigade's one.

Finland

Joint fire and rescue drills with NPP and local rescue organisations (rescue centres, fire fighting organisations and brigades) are arranged regularly. Responsibilities are based on national law and

regulatory requirements. Exercises are focused on fire fighting strategies and familiarisation of plant site, plant lay out (as access routes), co-operation with plant operators and plant fire brigade.

France

These points are checked during inspection on the base of the:

- realisation of the visits, exercises and training carried out on site with the sappers firemen;
- reports of exercises and effective implementation of the axes of improvement identified following exercises;
- scenarios identified between the sappers firemen and the site;
- conventions of interface between the site and the sappers firemen.

Hungary

In the ministry decree, prepared in 2006 IV quarter by HAEA and Cooperation Against Domestic Violence, and expectedly given out in 2007. I. quarter by supervising minister, the concerning training requirements of the Township Fire Brigade is determined as well. Actually there is more emphasis on the technical level and training level of the Plant Fire Brigade, so that participation of Township Fire Brigade in a plant fire case actually co-ordinated by Plant Fire Brigade.

Japan

RFDD and HFB execute joint training about twice a year. Through the joint training they get a common understanding about each role and the compatibility of equipment. When RFDD fighters begin to operate at the nuclear power plants, HFB follows the RFDD commander. Radiation protection management is applied to HFB and RFDD fighters.

Korea

The inspectors do not have the authority to determine the responsibility and assess the capability of the local township fire brigade because it belongs to another governmental organisation.

Joint training of local township fire brigade and plant fire brigade are not often done but sometimes they received lectures together about the physical radiology and site layout for familiarity with the plant.

In case of severe fires, there is the liaison system between the local township fire brigade and plant fire brigade. And the local township fire brigade can get into the safety related plant areas as the temporary workers.

The local township fire brigade equipments are compatible with the plant equipments because they are designed and installed in accordance with the Korean fire protection law.

Mexico

In Mexico the local township fire brigades don't have the training or the equipment required for the installation, so to fulfil the requirements the licensee has a private fire brigade which is organised trained and drilled at regular intervals in accordance with requirements outlined in USNRC Appendix A to BTP APCS 9.5-1. The CNSNS inspectors review the records of the technician training, qualifications and drills.

Netherlands

The aspect of compatibility between plant fire brigade and the municipal fire brigade is inspected by the municipal fire brigade, which reviews the capabilities of the plant.

The fire protection specialist co-ordinates inspections with the municipal fire brigade. In case of fire the responsibility of fire fighting rests with the Chief of the municipal fire brigade once the municipal fire brigade is on site. The local (municipal and regional) fire brigade receive information on fire protection of the NPP in the same way as other high risk objects.

Slovak Republic

The Slovak regulatory body does not have any mandate to inspect the township fire brigade. The responsible organisation is ministry of interior and its specialised body for fire protection.

Spain

In some plants annual fire drills are carried out with the participation of offsite fire brigades from the local fire workers department. The offsite workers must always follow the applicable procedures and be under the command of the leader of the onsite fire brigade, and therefore the offsite brigade cannot perform any task of fire extinction without the permission of the leader of the onsite brigade.

United Kingdom

See response to question 3.

United States

During conduct of the Triennial Fire Protection inspections, the inspection team will request and review training lesson plans that the licensee provides to offsite responders. This will also include a roster of the offsite responders that attended the training. This training will also include site familiarisation, radiation training, and site access/security during emergency conditions. Most licensees conduct an annual fire drill with offsite responders. We will review the critique of that drill and the drill results to determine if problems existed. The triennial team will also verify that training provided to offsite responders include a command and control structure. This will ensure that when offsite responders enter the protected area, they understand that the onsite fire brigade has the leadership role and they should follow the guidance provided by the onsite fire brigade. We also question the onsite fire brigade/fire protection engineers on equipment compatibility issues. This provides reasonable assurance that offsite equipment will be compatible with the onsite fire brigades. In some instances, the triennial will conduct interviews of offsite fire departments to gain knowledge of how they would respond to the site.

Inspectors review Fire Hazard Analysis Report (FHAR) for relationship and expectations. They also review completed fire drill evaluations that were executed in co-ordination with offsite fire department. Quite often the brigade uses offsite fire department resources to supplement their training (e.g. fire trainers). In terms of security, if not indicated in the drill report, interviews determine whether security hinders the access of the offsite fire department. If the licensee says that extra dosimetry is stored at the RCA entrance, then personal verification is done.

CONTROL OF COMBUSTIBLE MATERIALS IN THE PLANT

Question 5

How do you evaluate the effectiveness of the licensee's combustible control efforts? Some attributes: procedures; postings/signs in the plant.

Belgium

In order to ensure effectiveness in the control of combustibles, the following points are checked:

- instruction to the personnel that only “safety” cans are used for storage and distribution of flammable liquids inside the buildings,
- new storage of flammable gases or liquids on the surface must be at a minimum of 50 ft far from buildings containing equipments important to safety (cf. §C.7.j from BTP 9.5.1 rev 2. July 1981),
- measures taken for the control and the use of chemical substances that pure or mixed, present an explosion or flammability risk (toxicity is also covered),
- measures taken by the licensee concerning the storage (forbidden in rooms important to safety) of scaffolding planks,
- combustibles radioactive materials are stored in closed metallic recipients that are placed in areas removed of every ignition sources or combustibles,
- a discussion about the following procedures and their implications: the commissioning of ventilation systems when working with pure flammable liquids or in solution (e.g. paints) and the control of transient combustible fire loads when working in areas important to safety.

Furthermore, the following points are covered and checked occasionally:

- the presence of unexpected, uncontrolled or unknown combustible materials (gas bottles included),
- the quantity of flammable liquids inside the buildings is limited to the daily quantities.

Czech Republic

During conduct of the fire protection inspections is verified fulfilment of the licensee's combustible control procedures.

Finland

STUK performs regular inspection during refuelling and maintenance outage and completes a special inspection of fire protection arrangements for permission of plant start up. Occasional inspections are performed during power operation. STUK's residential inspectors observe conditions at the site frequently. STUK controls records of the utility to verify, that it performs own inspections according to plant procedures.

France

The inspectors check locally the application of the reference frame of the operator concerning the calorific loads:

- no combustible load, must be stored in the axes of release (evacuation of the personnel, arrival of the teams of fight, access to the various systems and means of behaviour of the reactor); this point could be checked at the time of a visit of the places,
- no calorific load must be stored in space providing the geographical separation of a zone of fire,
- the authorised temporary storage must be identified, and checked according to the division into sectors rules,
- a research of “wild” storages can be carried out, in particular at the time of the reactor shuts down,
- the management of the Densities of Calorific Load (DCC) of buildings and of the latticed surfaces and working areas.

Hungary

HAEA inspects the operation of the plant fire protection organisation during the 3-4 years held overall inspections, or during the yearly held objective inspections by the followings:

- Human resources of fire protection organisation
- Actual state of the concerning procedures
- Escape routes and combustible postings/signs as necessary
- Ability of using edifications of fire cases may occur
- Condition of the Fire-alarm, and fire extinguisher equipments by the actual handling procedures

Differences are recorded in the reports made about the inspections. After evaluation of differences, if regulator considers necessary, declares the correction of the experienced differences in a decree.

Japan

Storage areas of hazardous material are registered and signs are placed. It is difficult to control temporary carry-in material.

Korea

Field survey is conducted by resident inspectors on daily basis and during the periodic inspection inspectors review the licensee’s temporary combustible control procedures and survey the several areas to verify and evaluate the effectiveness of the licensee’s combustible control in accordance with the FPP. They also review the Combustible Material Check Sheet (CCS), Transient Combustible Permit (TCP) and Ignition Source Work Permit (ISWP) in accordance with the FPP.

Mexico

During conduct of the fire protection inspections, the inspection team reviews the combustible control procedures. Also, previous inspection reports are reviewed; discussions are held with the resident inspectors to determine if the licensee has had combustible control issues. Additionally, we walk down the plant to determine if control of combustibles is effective. This effectiveness is determined in several ways, one of them is to keep close surveillance in areas used for transient storage of combustible material, especially during outages, and existence of adequate signalisation is verified. Inspectors also require records of control of combustible materials, such as “temporal storage permits for combustible materials” which content is reviewed, verifying that the thermal burden imposed for material stored don’t surpass the design thermal capacity of the area.

Such records must have information such as material description, quantity, location, extinction media, and duration of the storage.

Reviewing the Ignition Source Permit (PFI) procedures. Requesting copies of completed PFI’s. Ensuring that permits are correctly completed.

Netherlands

The aspect of fire load is part of the 10 year PSR and carried out by the licensee using IAEA standards and is part of standard walk down inspections.

Slovak Republic

During the plant walk down the site inspectors according to inspection manuals observe the posting of fire protection escape plans in the buildings, the fire- extinguishers placement plans, the presence of fire-extinguishers at labelled places and presence of combustible materials in vicinity of systems with the high risk of fire. The fire protection procedures we do not review.

Spain

Through the inspection procedure for the biennial inspection where it is the review of the administrative control procedures for the control of transient combustible as well as permits of works, etc., and more specifically following the procedure of fire inspection to be performed quarterly by the resident inspector, who take in charge the supervision of attributes as:

- effective control of the fire origins,
- control of combustibles and ignition sources,
- effective maintenance of the passive fire protection features installed in electrical conduits, ceramic blankets, thermolags and other materials,
- effective control of fire barriers as fire doors, fire dampers, seal penetrations (piping, electrical raceways), etc.,
- verification of the effectiveness and management of the compensatory measures, put in place by the Licensees in accordance with appendix R.

Also it must be mention that during the quarter and biennial inspections, the inspectors performs walk downs in order to assess the operational status of the plant. Specifically concerning the control of combustible materials transients, identification and control of areas dedicated to store combustibles, work permits, and its conformity with fire procedures and compensatory measures (fire watch patrols) mainly during hot works, welding, or cutting in fire areas.

United Kingdom

A great deal of emphasis is placed on control of combustibles, ignition sources and awareness training for staff. Safety Performance Indicators are used as a means to inform the regulator of trends in fire near misses and minor fires which are generally seen as pre-cursors to more significant fires. By closely monitoring these trends coupled with site inspection observations, it is possible to examine the effectiveness of the procedures/controls that are in place on the station. The written procedures and controls are also assessed during the site inspection as part of the nuclear fire assessment of the safety case.

United States

During conduct of the triennial fire protection inspections, the team will review the licensee's license condition and transient combustible control procedures. Also, we review past inspection reports and hold discussions with the resident inspectors to determine if the licensee has had combustible control issues. Additionally, we will tour the plant to determine if control of combustibles is a problem. It is also a good idea to tour areas of the plant that have combustible free zones and low traffic areas of the plant, as sometimes debris may be placed in those areas for storage (particularly during outages).

The team will review the Transient Combustible Permit (TCP) and Ignition Source Permit (ISP) procedures to ensure that permits are completed IAW procedures and credited times, if given, for fire watches are correctly annotated. This means that the record suggests a fire watch was present during and 30 minutes following hot work, for example. Inspectors also perform a walkdown of a sample of current TCPs and ISPs.

Question 6

How do you assess the potential for a fire in areas where power and control cables for redundant equipment required for the safe shutdown of the plant can be exposed to the same fire? For example, oil filled transformers in a cable spreading room; or a motor such as a ventilation fan that may over heat and start a fire; or circuit breaker arcing; or electrical cable over heating etc. exposing redundant safe shutdown equipment.

Belgium

The purpose of our inspection program is not to question the conception issues. This kind of concern is addressed in decennial safety reassessments.

Czech Republic

The assessment of the potential for a fire in areas where power and control cables for redundant equipment required for the safe shutdown of the plant is evaluated in FHAR. Each part of the important redundant system for example transformers, motors or generator sets, cable spreading rooms or switchgear rooms is in independent fire compartment with adequate fire resistant. No fire can be spread out of this compartment. Each important compartment is equipped with detection and suppression systems. During inspections it is controlled fulfilling of maintenance documentations of this systems.

Finland

The full scope fire PRA contains above mentioned aspects as estimates of fire frequencies in all safety related rooms as well as fire spreading scenarios taking into account also fire extinguishing measures (fixed fire extinguishing systems and operative fire fighting). Deterministic fire hazard analyses (fire simulations) are performed for the most important rooms and heavy fire loads such as big transformers and TGs, and cable tunnels and rooms.

France

See response to question 7.

Hungary

Under finishing the last 10 years expiration Periodical Safety Review, plant Fire Risk Analyse has been made as required. This analyse describe partly the effects of electrical cable overheating caused fire, and the effects of general fire cases on redundant safety systems. The problems, and faults arisen during performing fire risk analyse, has already been mostly eliminated.

Japan

Nuclear and Industrial Safety Agency (NISA) assesses the adequacy of the fire defence design during the evaluation for the reactor construction permit. Japanese Safety Evaluation Guidelines for nuclear power plants requires the capability to bring the plant to cold shutdown at any fire in the plant.

Korea

All fire areas are typically evaluated in the Fire Hazard Analysis (FHA) and Safe Shutdown Analysis (SSA) that are conducted by the electric power utility and submitted to the authority. Especially in SSA, the fires preventing the plant from the safe shutdown are assessed in detail. The FHA report is reviewed

by inspectors to assess the likelihood of such fire events. For the last 5 years, the FHAs have been conducted for the plants which got the Operating Licenses (OL) without the FHA and SSA. As the results of FHA and SSA, many items which are needed for the improvement of fire safety were identified and they are under implementation. One of them is that the heavy combustibles such as oil filled transformers have been replaced with the fire-retardant combustibles in the safe-related fire areas.

Mexico

By an assessment of the physical condition, example, colour changes on electrical cables, electrical cables insulation damages, electrical cable overheating, etc. In addition, verifying the existence of fire extenuators, hose stations and manual station alarms.

Netherlands

The aspect of fire as common cause failure mode is part of the 10 year PSR, fire PSA and fire Hazard Analysis which are carried out by the licensee using international standards.

Fire protection is specifically evaluated during review of modifications, mainly based on experience and engineering judgement.

Slovak Republic

In the case of potential for fire e.g. safety systems cable crossings, which are not in accordance with safety analyse report, actual PSA or fire analyses, the inspector document the findings and make the judgement based on safety report analyses and actual PSA. If similar situation was not analysed by fire analyses, the regulatory body requires from operator to make them and eventually we can also order the particular analyses.

Spain

This assessment is carried out during the preparation for the biennial inspection, verifying the location and probability of ignition of the ignition sources and other possible targets (redundant cables needed for the safe shutdown) in the areas resulted of the Fire Risk Analysis and of the report of compliance with the Appendix R.

To mention some examples, it has been confirmed that in some cable rooms and circuit breakers rooms were found some motor control centres, motor-generators and electrical cables with high probability to be potential ignition sources. Any deviation of mandatory standards that can causes an increment in the core damage frequency is assess through the significance determination process, taking in account the transient combustibles in the fire areas as well as distances of targets to the fire sources

United Kingdom

A fire engineering assessment of the vulnerability of the lines of protection is undertaken as part of the nuclear fire assessment. This information is derived from the safety case as well as reference documentation and layouts. Where commonality exists or where there are deficiencies in the degree of fire segregation the potential for fire to affect more than one line of protection is assessed. In many cases this involves assessment of the protection systems and the potential for fire spread using radiant heat calculations and in some circumstances fire modelling applications. This applies to safety related plant and their associated power and control cabling.

United States

During selection of fire areas and fire zones for triennial fire protection inspections, inspectors review the IPEEE for risk significant target areas. Once potential target areas are identified, a review of the Fire Hazards Analysis is conducted to determine if credible fire sources could impact post-fire safe-shutdown equipment. The NRC has identified examples where transformers and other ignition sources are located in the same fire area as equipment needed for post-fire safe-shutdown. The examples include transformers or motor-generator sets in cable spreading rooms and switchgear rooms. There are also examples of 4160 VAC switchgear located below cables important to post-fire safe-shutdown. These areas are always rich targets because it is easy to postulate a fire from transformers, large motors and switchgear and the consequences could be severe if a fire occurs. This depends on the in-situ as well as transient combustibles in the fire area. This also depends on the Fire SDP and proximities of targets to fire sources.

Question 7

How do you determine the potential effects of a fire, in areas identified in responding to Question 5, on cables (causing short-circuits of power and/or control cables) that could result in the failure of redundant equipment needed for the safe shutdown?

Belgium

Not applicable.

Czech Republic

During conduct of fire protection inspections are verified FHAR criterion.

Finland

Power cables: loss of power supply is assumed when the temperature of cable exceeds specified temperature (depends on cable type).

I&C-cables: either loss of signal or spurious signals are assumed depending on the case to identify worst cases.

France

This point is assessed by the operator central services and controlled during inspections (by central services, and by local inspectors).

Hungary

See in details above, in Question 6.

Japan

This situation may be beyond current design basis. We should evaluate the potential effect of such situations by using probabilistic risk/safety assessment (PSA) methodology. We are currently developing the Fire PSA methodology.

Korea

FHA and SSA including PRA for all fire areas are the most effective method to determine the potential effects of a fire for the redundant equipment needed for the safe shutdown. As a tool of FHA and PRA, the FDT (Fire Dynamic Tools) as a fire modelling tools is used to calculate both the radiant heat flux on cable and flame height. The potential effects of fire were estimated based on these results.

Mexico

The potential effects of a fire, mean on cables, are determined by the licensee and documented on the Final Safety Analysis Report (FSAR). CNSNS inspect the physical conditions and verify the acceptance criteria.

Netherlands

The results of common cause failure mode are part of the 2-year and 10 year PSR and their severity is checked with PSA and engineering judgement by the licensee using international standards.

Slovak Republic

Regulator does not determine the potential of affect of a fire directly. This must be done by operator who has to demonstrate the nuclear safety to regulator also in cases of fire of system cables, which can lead to the common mode failures.

Spain

The inspectors must verify, in the fire areas defined in the above point five, that the Licensee have identify those circuits that could adversely affect the safe shutdown.

It must be confirmed that the circuit analysis has considered:

- Analysis of fire area features and their existent cables: specific frequency of fire in this area, location and size of the fire, heat transfer processes from the fire to the cable targets, features of that cables (thermoplastics, or thermostable, failure mode, multiconductor cables, etc), spurious actuations due to failures in AC control cables and cases involving electric valves for the interface high-low pressure,
- Analysis of consequences from malfunction or deficiencies: the Licensee must identify any possible deviation of flow, small LOCA or other scenarios that could avoid the licensee to maintain the safe shutdown,
- Power source: it must be verified in the selected fire areas that for the installed equipment and cables for the safe shutdown, it has been analysed the correct function between the circuit breakers and other electrical protection devices to protect the power source of the redundant or alternative equipment needed for the safe shutdown,

Finally it must be indicated that the CSN is waiting for the issue of GL 2005-XX “Post-fire safe shutdown circuit analysis spurious actuations”.

United Kingdom

The potential effects of a fire on common lines of protection/ redundant equipment needed for safe shutdown would be assessed in terms of the fire propagation, the capability of the fire suppression systems, the types of systems installed the degree of separation between the lines of protection and any other redundancy within the system. In some cases fire modelling has been used by Licensees to demonstrate the availability of a second train of protection within the area of commonality. In the example of cable routing, should cables be run from redundant trains of protection such that a single fire could result in loss of both trains there would be a need to relocate the cables in question for one of the trains or provide sufficient protection to the cables by means of a proprietary cable coating system. In cases where there is reliance on a suppression system, the Licensee would need to demonstrate that the system was effective prior to both lines of protection being involved in the fire – this would involve an argument for both the effectiveness of the suppression system and the separation distance between the lines of protection.

United States

During conduct of triennial fire protection inspections, the team will review requirements of Appendix R, III.G.2 and III.G.3 to verify that those requirements are maintained by the licensee or an exemption has been granted for deviations of Appendix R. Primarily inspectors verify that one train is free from fire damage to ensure post-fire safe-shutdown capability. Inspectors review train separation, alternative shutdown capability, required detection/suppression in the fire area and barrier (walls, floors, doors, fire wrap, penetration seals) qualification/maintenance.

The inspectors use the Safe Shutdown Analysis (SSA) to determine what SSD equipment is located in that fire area. This assists in determining what SSD functions and trains are potentially susceptible to fire effects.

SHUTDOWN PROCEDURES

Question 8

How do you evaluate the shutdown procedure designed to tell the operators how to shutdown the plant during/following a fire? For example, simulated demonstration in the plant; or as part of a table top exercise to discuss activities with the plant operators.

Belgium

There are no such post-fire procedures (with the exception of fire in main control room).

Czech Republic

Evaluation of the shutdown procedures are verified regularly by simulator training programme for control room operators in fully equipped training room. These shutdown procedures include hypothetical fire in conservatively determined fire compartments as well.

Finland

Emergency Operational Procedures cover the most important fire events. Annual simulator training comprises also fire events. Operator actions are covered and evaluated by fire PRA (PSA).

France

Simulated demonstration in the plant and as part of a table top exercise to discuss activities with the plant operators.

Hungary

See response to question 9

Japan

Each plant has emergency procedures that can safely shutdown the reactor and operators perform training. The evaluation procedure regarding the efficiency of communications during a fire is not yet clarified.

Korea

In our plant, the emergency operating procedures (EOP) including the post-fire shutdown procedure are verified and validated through the logical and operational experience by the licensee's simulated demonstration in the plant. When we decide that the evaluation is needed, the emergency operating procedures are also evaluated for the simulated demonstration by the regulatory inspectors.

Mexico

At the simulator is simulated the remote shutdown panel, at least ones each year there is a drill about control room abandonment and shutdown the plant from this panel.

Netherlands

No specific inspections are carried out.

In the training exercise programme simulated fire (including smoke generators) have been used in parallel to simulated fire on the full scope simulator. Part of the 10 year PSR is evaluation including the full-scope plant simulator. Scenario's are checked and implemented into training of the operators.

During the PSR enveloping scenarios and PIE's are defined, based on the design, operating experience and increased knowledge.

Slovak Republic

In the NPP procedures exist for plant shut down and also there is the emergency control room for control room staff in the case of fire or other foreseen hazards which can cause the uninhabitable the main control room. The operator has the commitment to exercise the reactor shut down also from the emergency control room with the procedures for fire emergency.

Spain

In general there are not specific fire procedures for the safe shutdown, in these cases are used the EOPs, emergency operating procedures. There are also available some "fire instruction cards" that explain how to react in case of a fire. These cards give help not only to the fire brigade but also allow the operators to know the equipments and cables related to the safe shutdown that can be lost during the fire giving the opportunity to get ahead of potential effects of the fire in specific areas of the plant.

These procedures are evaluated in simulator verifying actions and time and confirm, step by step, that the proposed actions are feasible and well known by the operators.

United Kingdom

Demonstrations of simulated plant shutdowns are undertaken as part of the annual demonstration of adequacy of the Licensees emergency procedures to the Regulator. Fire has been used as a specific example across all the reactor sites. This tests the Licensees decision making processes and tests their command and control of the emergency services deployed to the site to attend the demonstration. The scenarios are played out to all intents and purposes as real events and fire crews are deployed with all the necessary equipment and casualties are placed on the stations for rescue.

United States

Typically, inspectors review the normal shutdown from inside the control room and alternative safe shutdown procedures. For alternative safe shutdown, inspectors review the thermo-hydraulic calculation to determine if it is consistent with the post-fire shut-down analysis regarding time critical actions. Once this is verified, inspectors typically perform a walkdown of the alternative shutdown procedure to determine if the procedural actions can be accomplished within the times necessary to accomplish post-fire safe-shutdown within the appropriate time limits. Additionally, inspectors verify that the operator is not sent through the fire area of concern to perform their actions. We also verify that the operator does not have to perform their actions in a hostile or extreme environment.

This involves review of SSD procedures both in the Main Control Room (MCR) as well as use of the remote SSD panel(s). Additionally, Inspectors verify that those manual operator actions are feasible considering environmental conditions, other tasks, time constraints, etc.

Question 9

If a fire disrupts normal shutdown process, (loss of automatic functions, and loss of control functions in the control room) how do you evaluate the reactor operators' manual actions to properly align or re-align equipment to achieve safe shutdown of the plant?

Belgium

No, the usual fire procedures are used by the operators as a response to equipment failures.

Czech Republic

See response to question 8.

Finland

Special procedures are included in EOPs to control equipment locally or at the emergency control panels.

France

See response to question 8

Hungary

Emergency Operational Procedure is concerned with handling of fire cases as above. Practicing of the activities, mentioned in Emergency Operational Procedure are the part of the yearly simulator trainings of plant operational personnel. Fire cases like above - in case of occur have to be reported by the actual Nuclear Safety Regulations. In this case activities, carried out by operational personnel are evaluated after on, under the in site inspection by plant operation, and under the independent inspection by regulator as well.

Japan

Each plant has an Evacuation Panel to safely shutdown in case of evacuation from the main control room. But the evaluation procedure for the case mentioned is not yet clarified.

Korea

The reactor operators' manual actions are also evaluated by inspectors through the simulated demonstration.

Mexico

By direct visual inspection during drills or during the licensing examinations for nuclear power plant reactor operators and senior reactor operators.

Netherlands

See response to question 8.

Slovak Republic

If the fire disrupts main control room and its devices, the main control room staff automatically over takes the control over the reactor protection and safety systems at the emergency control room which is about 30m from the main control room. The emergency control room was designed for the safe shut down and reactor cooling also in the case of fire.

Spain

Answer 8 would respond to the case where the manual actions are required in the control room. The compliance with appendix R do not permit operators any manual action out of the control room with the exception that be required the implementation of the alternative shutdown in the event of a fire in either the control room or cable spreading room where it is necessary to use the plant procedures to abandon the control room and the use of the remote panel.

In this case it must also be verified the correct application of the procedures for the alternative shutdown taking into consideration human factors and verifying that the operators can do the requested actions in the time expected by the procedures. Verify also that the transfer of control from the control room to the alternative location has been periodically tested by the licensee and that the capacity for the alternative shutdown will be functional after this transfer.

It is obligated that the inspectors review the adequacy of those procedures verifying that the procedural actions can be accomplished inside the appropriate time limits. It must be also checked how the licensee carry out periodic tests to demonstrate the capacity of success in case of need an alternative shutdown.

United Kingdom

The human factors element is dealt with by specialist human factors inspectors, however, should a control room become untenable due to fire or monitoring equipment be lost, there are Alternative Indication Centres on all the power station sites as well as local control of shutdown systems. Although the Control Room has control of the reactor shutdown systems, the automated shutdown systems are not routed through or near to the control rooms and as such loss of the control or monitoring equipment has very little effect on the safe shutdown of the reactor(s).

United States

See response to question 8.

OUTAGE PROCEDURES

Question 10

How do you verify that the licensee maintains adequate fire protection capability during outages?

Belgium

The Technical Specifications of the plant define the required availability of fire protection during the outages. The inspectors verify that these minimal requirements are met.

Czech Republic

We regularly perform fire protection inspections during outages. We do not rely on resident inspectors to monitor and observe fire protection activities during outages. The licensee has to ensure that adequate fire protection capability is held (transient combustibles are under control, hot work activities are in line with specific procedures, and it is known where fire protection features are taken out of service for maintenance).

Finland

The utility has detailed plans and procedures (including conditions and limitations described in Technical Specification) for controlling fire protection measures during outages. Fireworks are supervised by special fire work orders and permits. Work plans include also fire protection arrangements of fireworks. Plant fire brigade and additional fire guards control all fireworks. Only licensed personnel are allowed to complete fireworks. Control of transient fire loads (substances, locations, amounts) is based on detailed procedures. All tools are checked and approved (and tagged) before taking into use. STUK's residential inspector observes conditions at the site frequently.

France

The behaviour of the division into sector is at the base of the demonstration of safety for the operator. This point is systematically at the agenda of inspections.

The inspectors check:

- the provisions taken by the operator to identify and detect the losses of integrity of the division into sectors, as well volunteers (for repair, implementation of modification...) that fortuitous (degradation...),
- in case of loss of integrity, the respect of the delay of repair and the implementation of adapted compensatory measures,
- that the information on the state of the division into sectors is well made and available (for the aspects related to operation) and of the team of second intervention (for the aspects related to fire control).

The inspectors check the following points exposed in the reference frame of the operator:

- the management of the division into sectors with the software SIGMA,
- visual monitoring of the state of the division into sectors before reactor start-up,

- in the case of non respect of the times of repair of an element of division into sectors, the declaration of an incident concerning safety in a database and the implementation of adapted compensatory measures.

Lastly, the inspectors check by sampling the state of the division into sectors locally, in particular in the electric buildings, buildings of the nuclear auxiliaries

Hungary

The Fire Risk Analyses mentioned above, and the inbuilt fire-alarm and fire extinguisher equipments operating from safety electrical or diesel power guarantee the appropriate fire protection capability during outages as well.

Japan

We do not have special consideration about outage duration.

Korea

The fire related statistics in the NPPs show that more fire occurred during outages than normal operation periods. We have similar trend since many combustible materials are carried in and several hazardous works accompanying the fire source (welding, cutting, heat treatment etc.) are conducted. The inspectors confirmed whether the Fire Protection Program (FPP) is properly implemented and reviewed the records of the Combustible Material Check Sheet (CCS), Temporary Combustible Permit (TCP) and Ignition Source Work Permit (ISWP).

Mexico

In coordination with Resident Inspector the inspectors perform fire protection inspections during outages; the best method is to conduct walk downs during the outage. In this phase, transient combustibles are in abundance, hot work activities are most probable, and fire protection features may be taken out of service for maintenance. Then, it is important to monitor and observe fire protection activities during outages and ensure that the licensee is maintaining adequate fire protection capability.

Netherlands

Fire protection is part of routine walk down inspection especially during outages. In work orders fire protection measures are included. The inspectors check if fire protection is sufficiently covered and if the instructions are followed, e.g. necessity of extra fire guards and other fire protection measures.

Slovak Republic

During the outages inspectors also provide the plant walk down and look for the non-compliances with the fire documentation e.g. evacuation plan or fire extinguishers placing at the labelled places. Inspectors have also inspection manual for outages and that manual comprise also requirements to inspect the maintenance staff adherence to fire protection principles.

Spain

Fire protection capacity is not verified by the biennial inspection during outages. The resident inspectors are in charge of verifying the compliance of all the requirements of fire protection and the use of compensatory measures that in accordance with the technical specifications are needed to face the increment of risk due to the great augmentation of hot works, transient combustibles, and barriers out of operation.

United Kingdom

Outage inspections are undertaken by the various site inspectors and more recently, due to the increased occurrences of minor fire events and fire near misses during outage periods (as identified through the Safety Performance Indicators), the specialist inspector for internal hazards has undertaken outage fire inspections across a number of the power stations. Within an outage, the Licensee has additional controls and procedures in place for the control of combustibles, hot work and minimising possible sources of ignition which include increased use of fire watches, use of fire retardant scaffolding systems, and strict control on the introduction of combustibles into the facility. The teams involved in the outage are given detailed training and briefs on fire prevention and disciplinary procedures are in place for individuals that do not follow the procedures in the correct manner. These are all aspects of the inspections undertaken at the site during the outage.

United States

The NRC does not perform triennial fire protection inspections during outages. However, outages are when significant classical fire protection programs are challenged. Transient combustibles are in abundance, hot work activities are most probable, and fire protection features may be taken out of service for maintenance. The NRC relies on resident inspectors to monitor and observe fire protection activities during outages and ensure that the licensee is maintaining adequate fire protection capability.

Resident inspectors review of completed TCPs and ISPs. The best method is to conduct walkdowns during the outage. We do not perform triennial fire protection inspections during outages. However, outages are when significant classical fire protection programs are challenged. Transient combustibles are in abundance, hot work activities are most probable, and fire protection features may be taken out of service for maintenance. The NRC relies on resident inspectors to monitor and observe fire protection activities during outages and ensure that the licensee is maintaining adequate fire protection capability.

Resident inspectors review completed TCPs and ISPs. The best method is to conduct walkdowns during the outage.