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REPORT

OF THE

OPERATIONAL SAFETY REVIEW TEAM (OSART)

MISSION

TO THE

CATTENOM

NUCLEAR POWER PLANT

FRANCE

14 NOVEMBER – 1 DECEMBER 2011

AND

FOLLOW UP VISIT

3 – 7 JUNE 2013

DIVISION OF NUCLEAR INSTALLATION SAFETY
OPERATIONAL SAFETY REVIEW MISSION
IAEA-NSNI/OSART/2013/166F

PREAMBLE

This report presents the results of the IAEA Operational Safety Review Team (OSART) review of Cattenom Nuclear Power Plant, France. It includes recommendations for improvements affecting operational safety for consideration by the responsible French authorities and identifies good practices for consideration by other nuclear power plants. Each recommendation, suggestion, and good practice is identified by a unique number to facilitate communication and tracking.

This report also includes the results of the IAEA's OSART follow-up visit which took place 18 months later. The purpose of the follow-up visit was to determine the status of all proposals for improvement, to comment on the appropriateness of the actions taken and to make judgements on the degree of progress achieved.

Any use of or reference to this report that may be made by the competent French organizations is solely their responsibility.

FOREWORD

Director General

The IAEA Operational Safety Review Team (OSART) programme assists Member States to enhance safe operation of nuclear power plants. Although good design, manufacture and construction are prerequisites, safety also depends on the ability of operating personnel and their conscientiousness in discharging their responsibilities. Through the OSART programme, the IAEA facilitates the exchange of knowledge and experience between team members who are drawn from different Member States, and plant personnel. It is intended that such advice and assistance should be used to enhance nuclear safety in all countries that operate nuclear power plants.

An OSART mission, carried out only at the request of the relevant Member State, is directed towards a review of items essential to operational safety. The mission can be tailored to the particular needs of a plant. A full scope review would cover nine operational areas: management, organization and administration; training and qualification; operations; maintenance; technical support; operating experience feedback; radiation protection; chemistry; and emergency planning and preparedness. Depending on individual needs, the OSART review can be directed to a few areas of special interest or cover the full range of review topics.

Essential features of the work of the OSART team members and their plant counterparts are the comparison of a plant's operational practices with best international practices and the joint search for ways in which operational safety can be enhanced. The IAEA Safety Series documents, including the Safety Standards and the Basic Safety Standards for Radiation Protection, and the expertise of the OSART team members form the bases for the evaluation. The OSART methods involve not only the examination of documents and the interviewing of staff but also reviewing the quality of performance. It is recognized that different approaches are available to an operating organization for achieving its safety objectives. Proposals for further enhancement of operational safety may reflect good practices observed at other nuclear power plants.

An important aspect of the OSART review is the identification of areas that should be improved and the formulation of corresponding proposals. In developing its view, the OSART team discusses its findings with the operating organization and considers additional comments made by plant counterparts. Implementation of any recommendations or suggestions, after consideration by the operating organization and adaptation to particular conditions, is entirely discretionary.

An OSART mission is not a regulatory inspection to determine compliance with national safety requirements nor is it a substitute for an exhaustive assessment of a plant's overall safety status, a requirement normally placed on the respective power plant or utility by the regulatory body. Each review starts with the expectation that the plant meets the safety requirements of the country concerned. An OSART mission attempts neither to evaluate the overall safety of the plant nor to rank its safety performance against that of other plants reviewed. The review represents a `snapshot in time'; at any time after the completion of the mission care must be exercised when considering the conclusions drawn since programmes at nuclear power plants are constantly evolving and being enhanced; to unintentionally judge would be a misinterpretation of this report.

The report that follows presents the conclusions of the OSART review, including good practices and proposals for enhanced operational safety, for consideration by the Member State and its competent authorities.

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INTRODUCTION AND MAIN CONCLUSIONS

INTRODUCTION

At the request of the government of France, an IAEA Operational Safety Review Team (OSART) of international experts visited Cattenom Nuclear Power Plant from 14 November to 01 December 2011. The purpose of the mission was to review operating practices in the areas of Management Organization and Administration; Training and Qualifications, Operations; Maintenance; Technical Support; Radiation Protection; Operating Experience; Chemistry; Emergency Planning and Preparedness and Severe Accident Management. In addition, an exchange of technical experience and knowledge took place between the experts and their plant counterparts on how the common goal of excellence in operational safety could be further pursued.

The Cattenom OSART mission was the 166th in the programme, which began in 1982. The team was composed of experts from Belgium, Czech Republic, Germany, Hungary, Russian Federation, Slovakia, South Africa, Sweden and United Kingdom together with the IAEA staff members and one observer from Finland and one IAEA observer. The collective nuclear power experience of the team was approximately 380 years.

The four units on the site are operated by EDF and are 1300MWe. Unit 1 was put into commercial operation in 1986, Unit 2 in 1987, Unit 3 in 1990 and Unit 4 in 1991. There are approximately 1500 permanent workers on the site, including 300 permanent contractors.

Before visiting the plant, the team studied information provided by the IAEA and the Cattenom plant to familiarize themselves with the plant's main features and operating performance, staff organization and responsibilities, and important programmes and procedures. During the mission, the team reviewed many of the plant's programmes and procedures in depth, examined indicators of the plant's performance, observed work in progress, and held in-depth discussions with plant personnel.

Throughout the review, the exchange of information between the OSART experts and plant personnel was very open, professional and productive. Emphasis was placed on assessing the effectiveness of operational safety rather than simply the content of programmes. The conclusions of the OSART team were based on the plant's performance compared with good international practices.

MAIN CONCLUSIONS

The OSART team concluded that the managers of Cattenom NPP are committed to improving the operational safety and reliability of their plant. The team found good areas of performance, including the following:

- Sheets displayed in storage areas where the fire load is updated readily and accurately by the area owner to ensure that the fire loading limits are complied with
- Neutron source handling technique whereby a simple container is attached to the device to ensure ease and safety of remote handling and reduce possible radiation exposure during use, transport and storage of the source.
- Redundant and diversified telecommunication means deployed in the various on-site emergency response facilities
- With respect to Severe Accident Management, the extent of support provided by a wide range of expertise and analytical tools

A number of proposals for improvements in operational safety were offered by the team. The most significant proposals include the following:

- Ensuring that all important management information, directives and expectations are clearly communicated, fed back to all staff and fully applied
- Enhancing the training programme in the area of assessment, objectives and competencies
- Improving the control of the plant surveillance test programme regarding scheduling and acceptance criteria
- Improving the effectiveness of the plant's root cause analysis process

Cattenom management expressed a determination to address the areas identified for improvement and indicated a willingness to accept a follow up visit in about eighteen months.

CATTENOM FOLLOW-UP MAIN CONCLUSIONS (Self Assessment)

Preparations for the OSART mission galvanised the station's entire workforce, EDF employees and contractors alike. They prompted us to take a fresh look at our reference standards and reinforce all our expectations. From the very day that preparations started, the OSART review had a positive effect on the station.

The Cattenom OSART review took place in special circumstances as it came in the wake of the Fukushima events that occurred in March. Citizens of France and its neighbouring countries were very interested in this assessment of the station's operational standards. Furthermore, this particular OSART was the first in Europe to include an additional review area focusing on severe accident management. The OSART played a significant role in confirming that Cattenom NPP is a safe plant run by a professional workforce, without overlooking the absolute necessity to constantly seek continuous improvement.

The station business plan, which sets out Cattenom NPP's strategic goals for the 5 years to come, was approved at the beginning of 2011. The second contribution of the OSART review was to corroborate the adequacy of the station's self-evaluation and its planned strategies, while also informing and honing the content of these strategies. The conclusions of the OSART review have thus been incorporated into the station's annual business plans for years 2012 and 2013, which set out the station's annual guiding principles designed to fulfil its objectives and which have been transposed into concrete actions. For nearly a year and a half now, the station has been deploying its road map in the form of tangible measures, incorporating the outcome of the OSART review. The insights and advice provided by the OSART reviewers in their different areas have been extremely helpful in this endeavour.

There are several examples which illustrate the way in which the station has addressed the OSART conclusions:

- The OSART review identified that important management information and expectations are not always clearly communicated or explained to personnel, nor fully applied. At the beginning of 2012, the station started taking measures to document its decisions and convey these decisions to every single team. On a weekly basis, a specific expectation is highlighted via a senior management message. This management message is discussed at the extended senior management meeting. It is then disseminated throughout the management organisation, displayed within the department and teams, and conveyed by managers to their work teams.

- Several recommendations and suggestions delivered at the OSART mission in 2011 identified a number of cross-functional issues. For instance, the work management organisation has continued making significant changes, including the establishment of a modular planning system. The main advantages of this method are greater timeliness, improved efficiency and enhanced synergy. It has the attributes required to address the issues of planning and work execution identified during the OSART mission.

In addition to the work done on its annual business plan, the station has set up a committee to oversee the completion of all actions being deployed to address each recommendation/suggestion, devise and implement solutions, and help the owners of these actions to properly manage change.

In conclusion, the results of the OSART mission and of the forthcoming OSART follow-up will also help us to prepare for our next in-house EDF inspection. In this way, the OSART mission will have had a lasting and positive influence on the way our station is run.

OSART TEAM FOLLOW UP MAIN CONCLUSIONS

An IAEA Operational Safety Review Follow-up Team visited the Cattenom NPP from 3 to 7 June 2013. There is clear evidence that NPP management has gained benefit from the OSART process. Benchmarking activities with other nuclear power plants abroad and experience from OSART FU missons at EDF NPPs, were used during the preparation and implementation of the corrective action programme.

The plant analyzed thoroughly the OSART recommendations and suggestions and developed appropriate corrective action plans. These corrective actions, in some cases, cover a much broader scope than was intended with the OSART recommendations and suggestions. The willingness and motivation of plant management to use benchmarking, consider new ideas and implement a comprehensive safety improvement programme was evident and is a clear indicator of the potential for further improvement of the operational safety of the Cattenom NPP.

The plant resolved issues regarding Communication of management expectations, Archive rooms, deficiency recognition, and reporting, Preparation for maintenance and testing activities, Root cause analyses, Treatment of low level events and Labeling and storage of chemicals.

The following provides an overview of the issues which have reached satisfactory progress of resolution but where some degree of further work is necessary.

The senior management reinforced its expectations regarding staff adherence to industrial safety. These management expectations were broadly communicated to plant staff and contractors on several levels. The plant issued an action plan to improve industrial safety. The industrial and safety committee is in charge to monitor and track implementation of this action plan. Targeted safety walk-downs are regularly scheduled and performed regarding industrial safety. Deviations are corrected or incorporated into the corrective action programme. Contractors are part of these walk-downs. The plant is also regularly publishing "Safety messages" and they are widely distributed and communicated to the plant staff and contractors the plant already achieved improvements in industrial safety with the frequency rate of events showing a positive trend since January 2013. However, further actions are planned e.g. self-assessment of industrial safety management, coaching of managers in field observation techniques and construction of industrial safety mock-up facilities.

An action plan has been worked out on the national level for adequate training, competence of individuals and a regulated manner for ensuring training of instructors. This extensive project, according to the international methods such as SAT (systematic approach to training), has been incorporated gradually as the most important project of development and upkeep of pedagogical skills and systematic training of instructors, as well as shadow trainers and managers.
A new project guarantees quality assurance of training materials, mainly by incorporating training objectives and a series of indicators for measuring of training effectiveness. For the full improvement of training, it is expected to use several means that will enhance the effectiveness of this process such as participation of the manager in course feedback sessions, classroom observation by the manager as part of the skills development programme and post-course trainee feedback.

The plant decided that a two-pronged approach was necessary to address the issue of procedures review. Initially, there was a prioritised review undertaken to identify all procedures which had not undergone a review in the past seven years. First priority was given to alarm procedures. From September 2012, a further similar review was undertaken for procedures which had not been reviewed in the past five years. As a priority, all alarm sheets and operator instructions were reviewed. Operations work packages (DAC), surveillance tests and exceptional test permits remain to be reviewed. Secondly, to ensure continuity in the organisation of procedure review, documents were produced to ensure that all procedures were continuously reviewed on a five-yearly basis. The system will be IT-driven and overall runs will be conducted on a six-monthly basis.

The plant reviewed the last four years of Surveillance Testing and determined the root causes of the past facts associated with the issue. A 'Fiche de Position' was authorised to remind Operations on plant expectations regarding pump bearing temperature evolutions during pump Surveillance Testing. A Senior Management Message was produced regarding expected procedure use during, inter alia, Surveillance Testing. This included the expectation to complete the checklists concurrent with conducting the test. The trending of some Surveillance Testing parameters is still not fully done on some operational equipment and more work is still needed with respect to informing Control Room operators on the need to report any Surveillance Test deficiencies which they discover during implementation.

The plant evaluated the issue operability and hazard assessment and this resulted in the decision that each defect/work request should have an improved diagnosis of risk and the overall cumulative risk increase should be evaluated. A tool is now in place to allow the field operator to evaluate, in conjunction with the control room staff, the risk associated with the observed defect. Additionally, the safety engineer reviews all work requests to determine any perceived increase in risk and also mainly maintenance and design defects, although no written guidance exists for this evaluation. To assess cumulative risk, the plant has introduced an approach based on the Equipment Reliability Index. This is a sophisticated tool and all indicators will be available for input by the end of 2013. Further development will take place over the next three years and it is anticipated that the fully functional cumulative risk tool will be available 2015/16.

In response to the recommendation of identification and storage of contaminated materials and waste, the plant provided an analysis and an action plan was drawn up. Clear application documents have improved staff knowledge and have supported plant expectations in the area of identification and storage of contaminated equipment and waste. Also the plant has set up a "hot spot" database which gives a comprehensive list of hot spots in all controlled areas. In

order for each worker to fulfil radiation protection expectations in the field, the plant initiated actions in the following main areas: clarification of reference standards, guidance and coaching of workers, monitoring of implementation in the field and rectification of deficiencies.
However, some actions are still not fully implemented such as, during an outage. Implementation of the temporary storage arrangements of radioactive material and reducing the number of temporary storages of radioactive material and waste to avoid the possible risk of contamination, are incomplete.

The chemistry specifications policy-maker has updated the current chemistry requirements for plant systems regarding organic compounds and additional precautions against the risk of inadvertent contamination of reagents. Enhanced control is performed for lithium, morpholine, hydrazine and ammonia concentrations, and also for aggressive inorganic impurities in the plant systems. The plant now monitors total organic carbon (TOC) in demineralised water regularly. For the primary circuit the TOC analysis method has been tested and verified. However, this method is not fully implemented.

A revised version of the severe accident operating guide (GIAG) with extension to reactor coolant system (RCS) open states (version 5) was developed by EDF Corporate level for the EDF 1300 MWe NPP including:

- The knowledge transfer from the corporate engineering centre (SEPTEN) (presentation of the background material, instructions…).
- The operating document GIAG V5 was delivered to the plant.
- The training of the concerned roles and functions started in May 2013 and is expected to be fully realised before the end of 2013.
- In order to avoid 2 successive versions in a short period, the official implementation at the plant of the revised GIAG V5 is delayed waiting for the achievement of a modification concerning the pressurizer discharge valves (adding batteries) at the 4 units planned for end of August 2013. At that moment, an official instruction from the corporate level will be issued with an implementation requirement of a maximum of 6 months. Therefore, the revised GIAG V5 should be fully implemented before the end of June 2014.

While the GIAG V5 is not yet effectively deployed at the plant, the actions of the GIAG V5 would however be applied in such circumstances through the support of the EDF corporate support emergency staff.

The following issue was evaluated with insufficient progress of resolution where further work is necessary.

According to the plant response, new on-site emergency preparedness and response (EP&R) arrangements were implemented in the plant on 15/11/2012, based on generic EDF fleet EP&R arrangements. These new arrangements include explicit delegation to the PCL1 (CE-Shift Manager) to trigger the on-site plan and on-site response if the plant emergency director (PCD1) cannot be reached. According to the new EP&R arrangements, the PCL1 (CE-Shift Manager) has also an explicit delegation to initiate the alert to the population using the off-site sirens and the population phone calling system (SAPPRE-system) in the specific case of "reflex"-phase if a criterion to trigger the reflex response mode is met and if PCD1 cannot be reached. It should be underlined that these reflex response actions do not include, for PCL1 (CE-Shift Manager), the notification of off-site authorities and bodies (Prefecture, French nuclear safety authority ASN…). Based on the above plant response, the plant EP&P arrangements are however not fully compliant with the current IAEA safety standard requirements regarding the ability to initiate, in all cases, promptly and without consultation, the on-site emergency plan and the off-site notification process as there is no delegation to PCL1 (CE-Shift Manager) to notify the off-site authorities and bodies and as PCD1 has still to be contacted before to initiate the emergency response actions.

The original OSART team in November 2011 developed six recommendations and ten suggestions to further improve operational safety of the plant. As of the date of the follow-up mission, some 18 months after the OSART mission, 44% of issues were fully resolved and a further 50% of issues were progressing satisfactorily. There was one issue which was considered as having made insufficient progress.

The team received full cooperation from the Cattenom NPP management and staff and was impressed with the actions taken to analyze and resolve the findings of the original mission. The team was allowed to verify all information that was considered relevant to its review. In addition, the team concluded that the managers and staff were very open and frank in their discussions on all issues. This open discussion made a huge contribution to the success of the review and the quality of the report.

1. MANAGEMENT, ORGANIZATION AND ADMINISTRATION

1.1 ORGANIZATION AND ADMINISTRATION

A set of procedures, available to all staff through an intranet database, clearly describes the organisation at the plant. The plant organizes the activities in processes; the roles and responsibilities of process owners are written in procedures and are clearly different from those of the managerial line.

1.2 MANAGEMENT OF ACTIVITIES

In 2009, the plant developed an Integrated Management System ("Système de Management Intégré" – SMI), with 11 main processes and 40 sub processes.

Strategic and operational process owners were appointed. Approximately 300 indicators were created, and committees and commissions were set up to follow-up the work of the processes and sub processes. However, the plant did not create high level, aggregated indicators to follow-up the work of the processes at plant management level. In addition, there is no indicator to trend and check, at plant level, if there is any backlog within the actions launched by the committees or commissions. The team encourages the plant to create aggregate indicators at plant level to ensure that the processes and sub processes are working efficiently and there is no action backlog.

Important management information, directives and expectations are discussed during the weekly plant management meeting and communicated to staff via the weekly department or service meetings. A booklet containing the general management expectations was published in 2011 and distributed to staff during the weekly department or service meetings. However, there is generally no feedback requested by the plant management to ensure that all important information, directives or expectations are communicated to all staff and contractors. The team also observed that some management expectations were not fully applied. The team recommends the plant to ensure and get feedback to confirm that important management information, directives and expectations have been clearly communicated to all staff and fully applied.

1.3 MANAGEMENT OF SAFETY

Safety is managed as a process with its own policy and indicators. Regular operational and strategic committees follow up the process and safety related items. There are also clear and precise delegation letters, regarding safety, from the plant manager to each shift supervisor.

During the review the team noted several work practices, situations and conditions which can be considered as an indication of safety culture at the plant.

The positive safety culture features include the following:

- Throughout the mission the team noted that the plant staff was open and receptive to the deficiencies pointed out. Such deficiencies were readily accepted and, where feasible, immediately corrected. The management and staff of the plant were found to be informative and willing to pick up new ideas and practices.
- At the plant, error prevention tools are widely used while performing various safety related activities. Operating experience is regularly and extensively fed into

pre-job briefs (one of these key tools), to maintain and update them, thus ensuring a high level of human performance.

- An elaborate mechanism for management of outages exists at the plant. During the preparation of outages, nuclear safety is emphasized as a major priority.

At the same time some other features indicate that additional efforts could result in the further improvement of safety culture:

- Expectations are not always clearly communicated by management and respected at the worker level. Examples of this can be found in poor FME practices, cigarette butts in the areas where smoking is prohibited and the presence of industrial safety hazards in certain areas of the plant. During field visits, the team also observed instances where use of personnel protection equipment was not enforced.

- The safety policy is not widely displayed at the plant. This policy is posted in the meeting room but not in various workplaces around the plant. The policy document also treats safety as one of the priorities and not as an overriding priority.

- In several areas like Training, Technical support, Operating Experience, Maintenance, Chemistry and Emergency Planning and Preparedness the plant relies heavily on support from the EDF Corporate office. While such an arrangement has a number of advantages, this could also lead to decreased initiatives and questioning attitudes among plant staff in the resolution of various issues. It should be noted that this is not, as yet, evident at Cattenom.

1.5 INDUSTRIAL SAFETY PROGRAMME

Management expectations, including those on industrial safety, were gathered in a booklet, distributed and communicated to all staff and permanent contractors in 2011.

However, the team noted some inconsistencies between the use of Personal Protective Equipment (PPE) and the management expectations. The team also observed some unsafe behaviours or deviations. The team suggests the plant to consider strengthening staff adherence to industrial safety rules regarding PPE and to correct deviations in this area.

1.6 DOCUMENT AND RECORDS MANAGEMENT

The team observed deviations with storage conditions of unique safety documents in the archive rooms of the maintenance building. The team suggests the plant to improve the storage conditions of those unique safety documents.

DETAILED MANAGEMENT, ORGANIZATION AND ADMINISTRATION FINDINGS

1.2. MANAGEMENT ACTIVITIES

1.2(1) Issue: Important management information, directives and expectations are not always clearly communicated, fed back to all staff and fully applied.

The following observations were made:

- A site management meeting is held every Monday. The site manager's information and expectations expressed during this meeting are assumed to be transmitted to all staff via the Services meetings held on Tuesday. However,
- There is no prescription for the agenda of the Services meetings
  - The agenda for the meetings are different for each Service, even for "brother" services like Operations 1-2 and Operations 3-4, or Electrical and Mechanical Maintenance. For example, some Services systematically include a paragraph "Information coming from site management" and other Services do not.
  - A safety related message was released during the site management meeting on 26 September 2011, asking that all "sensitive" material like hard disks, instrumentation and cameras to be key-locked. This message was not given in several Services or Section meetings (OPS1-2, Mechanical, Auto) and in one Service they were only asked to "be careful".
- There is generally no feedback requested to ensure that important messages from the site management are delivered and explained to all staff.
- The booklet containing the management expectations was published in 2011. Heads of services were asked to present this booklet to their staff but no feedback to the site management was requested.
- The management expectations booklet was distributed to contractors via a contractors association, called GIMEST. The site management has not ensured that all "permanent" contractor staff on site have received the booklet and an explanation on it.
- The 11 plant policies and the 5 main goals for 2011 are posted in the meeting rooms, but not always in workshops and other work places and so cannot be seen easily and "permanently" by all staff and contractors.
- In the auxiliary building of unit 4, in the 6.6 m store, a person was seen not wearing Everest "approved" clothing while waiting at the Stores Counter.
- Many cigarette butts were found in areas where smoking is not allowed.
- Poor practices regarding FME were noticed:
  - Debris (paper, sealing rubber, metal strap, dirt) around fuel pool and high risk FME area on Unit 2

- Inconsistency in the posting and delimitation of FME areas was observed between different worksites of the condenser cleaning works on unit 4

- No FME covers on open ends near 3SED311.314.317VD on condensate extraction pump and motor 4CEX001PO/MO.

Without ensuring that important management information, directives and expectations are clearly communicated, these may be misunderstood or not applied.

Recommendation: The plant should ensure and get feedback that important management information, directives and expectations are clearly communicated to all staff and fully applied.

IAEA Basis:

GS-R-3; 3.3: "Management at all levels shall communicate to individuals the need to adopt these individual values, institutional values and behavioral expectations as well as to comply with the requirements of the management system"

GS-R-3; 5.26: "Information relevant to safety, health, environmental, security, quality and economic goals shall be communicated to individuals in the organization"

NS-G-2-4; 5.9: "management expectations should be clearly communicated to ensure that they are understood by all those involved in their implementation"

Plant response/Action:

COMMUNICATION ON DECISIONS TAKEN BY SENIOR MANAGEMENT

Further to discussions held at the senior management meeting on 16 April 2012, an ODM memorandum (ref.
RDD-PIL-2012-02) was signed by the station director. The following points were agreed:

- A senior management ODM memorandum shall be prepared in order to communicate on site-wide decisions made by the senior management team.
- The senior management ODM memorandum may be signed by the station director or an associate director acting on the station director's authority.
- The memorandum shall state exactly how the decision is to be transposed into station procedures.
- It is referred to in the minutes of the senior management/extended senior management meeting and appended to these minutes.
- The director's personal assistant shall circulate the memorandum together with the meeting minutes by email.
- The memorandum shall be reviewed by team leaders and may be displayed if required.
- It shall be stored in the Lotus Notes database under CAT-01-PILOTER/STR-Stratégie-STR-03- Mener les revues de performances (Conduct of performance reviews).

This decision is now being applied at Cattenom NPP and has resulted in the signature and circulation of 25 decision-making reports.

COMMUNICATION OF MESSAGES CONVEYED BY SENIOR MANAGEMENT

Further to discussions held at the senior management meeting on 16 April 2012, an ODM memorandum (ref. RDD-PIL-2012-02) was signed by the station director. The following points were agreed:

- A senior management message shall be prepared in order to reinforce implementation of a rule (Safety Message), either as a preventive measure or in response to a significant deficiency having occurred on the plant or elsewhere in the fleet.
- At the proposal of any leader or on his own initiative, the station director may decide to prepare a senior management message and designate a signatory.
- The senior management message shall be systematically discussed at the extended senior management meeting, and shall be referred to and appended to the meeting minutes.
- The director's personal assistant shall circulate the meeting minutes to members of management (extended senior management team – department deputy managers and administrators – first-line managers – front-line managers) by email.
- Managers shall verbally convey the message to their work teams; the message shall be posted in department and team offices (see senior management memorandum ref. RDD-PIL-2012-03).
- Furthermore, the communication team shall post the message at the site entrance and exit.
- The director's personal assistant shall also post the latest senior management message in the yellow room, the blue room and in front of the station director's office.

This decision is now being applied at Cattenom NPP and has resulted in the signature and circulation of 19 senior management messages.

COMMUNICATION ON STATION PERFORMANCE

Further to discussions held at the extended senior management meeting on 11 June 2012, an ODM memorandum (ref. RDD-PIL -2012-03) was signed by the station director. The decision was taken to:

- Prepare a monthly management communication document outlining the station's key results:
  one visual to be displayed and one comment page for managers, added to the document of performance indicators.

A document displaying monthly results together with comments has been in use at the station since September 2012. The document is entitled "aéro" (see appended template).

REVIEW BY THE EXTENDED SENIOR MANAGEMENT TEAM OF DECISIONS TAKEN BY STRATEGIC COMMITTEES, OPERATING REVIEW COMMITTEES OR STEERING COMMITTEES

Further to discussions held at the extended senior management meeting on 29/05/2012 and at the senior management meeting on 08/10/2012, an ODM memorandum (ref. RDD-PIL -2012-05) was signed by the station director. The following points were agreed:

- Every week, the minutes of the senior management/extended senior management meeting shall incorporate decisions taken the previous week by the station's strategic committees, operating review committees and steering committees attached to the various projects.

- For this purpose, process owners (operational managers) and steering committee leaders shall convey information concerning operational review committees and steering committees to their respective department managers.
  The latter shall incorporate this information into the department's weekly feedback report, in a specific column entitled "decisions taken further to committee meetings, sub-committee meetings or steering committee meetings", in the "alert" and "achievement" sections.
  This information shall then be processed by the director's personal assistant. If the process owner is a senior advisor or deputy director, the information shall be directly relayed to the director's personal assistant.
- The same applies to strategic managers with regard to decisions taken by strategic committees.
- The director's personal assistant shall incorporate the information into the minutes of the senior management/extended senior management meeting.
- If decisions give rise to new actions or have an effect on processes and resources, the process owner or steering committee leader may bring them to the extended senior management operational focus meeting for information or discussion.
- Any person attending the extended senior management meeting may ask for a decision to be discussed or reviewed at the meeting.

The conclusions of this memorandum are now being applied at Cattenom NPP and decisions are being reported by department managers via their weekly reports as well as being incorporated into the minutes of senior management/extended senior management meetings.

MANAGEMENT COMMUNICATION: WEEKLY MEETINGS, COMMUNICATION AREAS AND BULLETIN BOARDS SPECIFIC TO EACH WORK TEAM

Further to discussions held at the extended senior management meeting on 11 June 2012, an ODM memorandum (ref. RDD-PIL -2012-03)
was signed by the station director. The following points were agreed:

- Each department manager, deputy department manager or first-line manager shall designate a specific communication area to be equipped with a bulletin board for the posting of information. This board shall comprise at least 4 parts: station results (Aéro + comments), senior management messages, department performance and one section reserved for team information.
  Each respective manager shall be responsible for this area and for updating the bulletin board.
  For first-line managers working on shift, arrangements shall be made by their department manager/deputy department manager.
- Under the responsibility of department managers, weekly department and team meetings (first-line managers) shall be made compulsory in accordance with arrangements still to be defined (Tuesday is preferable for department senior management meetings; Thursday is preferable for team meetings).
- Within a week of being reviewed at the extended senior management meeting and upon the first-line manager's return to shift, monthly station results and senior management safety messages shall be orally discussed at department and team meetings.

All these decisions were disseminated in 2012 and are known to all station leaders. An inventory of areas in which to signpost these decisions was also drawn up in 2012.

Each department has designated a space and has specified its need for bulletin boards within each work team. These boards are now being purchased and installed (40 in total). The "Aéro" document and senior management messages are sent to departments on a monthly basis to be displayed and discussed by the workforce.

MANAGEMENT COMMUNICATION: MEETINGS AND MANGEMENT ALIGNMENT

Conclusions of the management project steering committee meeting held on 04/09/2012 were reviewed and approved by station senior management.
Two clear objectives were clarified:

<u>Management meetings and points of contact:</u>

- First-line manager/front-line manager network: 4 to 5 meetings a year. The aim is for leaders to get to know each other better and to discuss common or cross-cutting issues, to find solutions collectively, to express leader-specific needs (knowledge, understanding, coaching, professional enhancement training). Introduction and wrap-up sessions are led by one or more members of senior management, depending on topic or need.
- Department manager network: The aim of this network is to achieve department alignment.

<u>Management alignment</u>:

- Weekly senior management/extended senior management meetings and annual seminars.
- Weekly department management meetings.
- Section and team meetings.
- Coffee get-togethers (substituting management coffee meetings) on Tuesdays from 13.15 to 14.15, ten times a year. These involve all levels of leadership and are an opportunity for all to share information (clarification of decision-making mechanisms, senior management messages, purpose of different long-term strategies, organisational arrangements, etc.).
- Middle-management get-togethers (substituting executive meetings), held about 3 or 4 times a year. These involve middle-managers and all front-line managers, and cover general points of interest.
- Annual focus meeting (one full day).

IAEA comments: The plant performed intense and broad investigations on how to resolve the OSART suggestion regarding communication of management expectations.

The first important action was to review and change various management meetings to include a stronger operational focus. In addition, all department heads and all project managers are also participating in operational focus meetings.

The plant implemented and/or strengthened several means of communication:

- Senior management decision statements signed by the plant manager
- Senior management messages signed by the plant manager
- Plant monthly performance
- Decisions of plant’s strategic committees, operating review committees and steering committees of the various projects
- Specific communication areas with a bulletin board for the posting of performance results with comments (Résultats CNPE Cattenom), senior management messages, department performance and information for the particular team.

– Initiating different types of meetings

A very important part of these activities is the systematic cascading of management expectations to all levels of workforce and contractors.

28 senior management decision statements and 32 senior management decisions have been issued since April 2012when the activity was launched.

The plant tours confirmed that specific communication areas were established with appropriate information posted. In addition the team observed a project management meeting and confirmed that senior management decision statements, senior management messages and plant performance indicators were the first part of the agenda.

The plant tours confirmed application of management expectations. The plant is in very good level of housekeeping and material conditions, no cigarette butts were found and no deficiencies regarding FME were noticed.

Conclusion: Issue resolved

1.5. INDUSTRIAL SAFETY

1.5(1) Issue: Staff does not always respect the plant industrial safety rules regarding PPE, or remedy potential industrial safety hazards.

Management expectations exist with respect to industrial safety. However the following were observed which are not in accordance with these expectations:

- A field operator was testing a pipe, from which steam was leaking, with an unprotected hand. It was stated that the expectation is to check such a pipe with gloves.
- While performing periodic vibration testing of pumps 4ABP001/002/003PO one technician demonstrated how he carefully fastens his badge in his pocket when working near rotating parts. However he left his jacket and coat open, presenting a hazard near the rotating equipment.
- Gloves were not used by technicians performing periodic vibration testing and leakage checking of pumps 4ABP001/002/003PO.
- Workers observed without using hearing protection in an area requiring it (LC0310.LC0513.LC0506, NB0463 on unit 1 and NA0804 in unit 4).
- Two persons seen without eye protection on the ground floor of the turbine hall in unit 4, where this protection is required to be used.
- One technician was not always wearing his face shield in the right position to fully cover his face while working in battery room LC0805.
- In room WA0714 of unit 1, the guillotine for cutting plastic has a steel blade exposed with no blade protection.
- Outside OB0832 on unit 1-2, a cover is not placed correctly thus creating a tripping hazard.
- In the auxiliary building on unit 4, steam generator blow-down room, floor drain covers, both inside and outside of the room are not properly seated, thus presenting a tripping hazard.

Without respecting industrial safety rules or correcting deviations, risks of injury increases and industrial safety performance decreases.

Suggestion: The plant should consider strengthening staff adherence to industrial safety rules regarding PPE and correct deviations in this area.

IAEA Basis:
GS-R-3; 3.3 : "Management at all levels shall communicate to individuals the need to adopt these individual values, institutional values and behavioural expectations as well as to comply with the requirements of the management system"

GS-G-3.5; Appendix I.3(c) : "There is a high level of compliance with regulations and procedures; personnel should adhere to regulations and procedures and instances of non-compliance should be avoided"

NS-G-2.4; 6.56. : "An industrial safety programme should be established and implemented to ensure that all risks to personnel involved in plant activities … The operating organization should provide support, guidance and assistance for plant personnel in the area of industrial safety"

Plant response/Action:

Elements of response:

Management meeting on the subject of industrial safety held on 26/06/2012.

Two management fundamentals focus on the use of PPE (no. 1 and no. 5); managers in the field must challenge deviations from rules.

Targeted safety walk-downs regularly address expectations regarding the use of PPE, puddles of water on the ground, obstacles obstructing transit routes, jutting and unprotected objects.

Senior management messages reinforce expectations and explain their purpose.

Decision-making reports which specify context, keep track of agreed actions, and identify procedures needing to be amended to reflect these decisions.

Findings incorporated into the corrective action programme.

Disciplinary action by management reinforces management expectations and provides consistent solutions.
The subject of industrial safety is routinely discussed at management meetings.

Remaining actions:

- Self-assessment on industrial safety management by the end of June 2013, with coaching provided to managers to improve their field observations,
- Provision of industrial safety coaching for managers,
- Coaching of managers in field observation techniques, focusing on industrial safety, with the support of the risk prevention department,
- Construction of an industrial safety mock-up facility to reinforce industrial safety observations.

Schedule manager-in-field sessions during normal operations and outage, to increase management presence in the field and to report industrial safety deficiencies.

Evidence:

Senior management messages

- Use of PPE : First sign of individual accountability for risk prevention (13/04/2012),
- Why should eye protection be worn in industrial buildings? (14/01/2013),

Letters sent to contract companies (24/05/2011 and 29/02/2012) reinforcing station expectations with regard to the use of eye protection.

Senior management decisions

- Hard hat to be worn with compulsory eye protection during any work performed close to the reactor cavity and spent fuel pool (12/04/2012),
- Definition of industrial safety requirements for preventing slips, trips and falls (20/06/2012),
- Initiative to improve industrial safety performance following management meeting held on 26/06/2012 (28/06/2012),

Introduction of safety message (the first one was issued at the extended senior management meeting on 14/01/2013),

- Why should eye protection be worn in industrial buildings? (14/01/13),

Industrial safety instruction ref. 22/3 : Use of gloves, hard hat and safety shoes

Joint industrial safety walk-downs focusing on use of PPE: 08/02/11, 03/05/11, 14/06/11, 26/07/11, 23/08/11, 15/11/11, 14/02/12, 09/05/12, 23/10/12,

Management field observations: 310 negative findings in 2012, 78 relating to eye protection,

Management disciplinary action: on 27/04/2012, one person was found smoking next to gas cylinders; on 08/06, one person was found to be endangering personal safety; on 19/06, deviations were reported during an industrial safety walk-down; on 14/08/2012 on 30/08/2012, violation of speed limit; on 30/08/2012, EDF employee found not wearing PPE.
A site induction video that is produced by the station director displays safety fundamentals.

IAEA comments: Following the OSART mission, an in depth analysis was performed as regards to the industrial safety suggestion raised by the team.

The senior management reinforced its expectations regarding staff adherence to industrial safety. An important management meeting on industrial safety in June 2012 developed several actions with clear top management expectations and commitments regarding industrial safety. These management expectations were broadly communicated to plant staff and contractors on several levels. The target is zero serious industrial safety events and to reach frequency rate of events 1 (3.5 during the OSART mission).

The plant issued an action plan to improve industrial safety. The industrial and safety committee is in charge to monitor and track implementation of this action plan. Top 10 priorities (management industrial safety fundamentals) were developed. Two of them related to the use of PPE.

Targeted safety walk-downs are regularly scheduled and performed regarding industrial safety. Deviations are corrected or incorporated into the corrective action programme. Contractors are part of these walk-downs.

There are regular Tuesday morning meetings with a focus to industrial safety and monthly meetings devoted to industrial safety and yearly meetings with all staff. Plant management expectations are communicated during this yearly meeting. The plant is also regularly publishing “Safety messages” and they are widely distributed and communicated to the plant staff and contractors. Use of PPE was one the published “Safety message” in April 2012. The plant already achieved improvements in industrial safety with the frequency rate of events showing a positive trend since January 2013. However, further actions are planned e.g. self-assessment of industrial safety management, coaching of managers in field observation techniques and construction of industrial safety mock-up facilities.

In May 2013 the CEO of EDF issued an order regarding improvements in industrial safety, root cause analysis of industrial safety events and responsibilities of department heads. Implemented and planned actions will improve industrial safety and reduce the risk of personnel injury.

Conclusion: Satisfactory progress to date

1.6. DOCUMENT AND RECORDS MANAGEMENT

1.6(1) Issue: Archive rooms in the maintenance building are not fully suitable for the storage of unique safety documents.

The following was observed:

- In two archive rooms, containing unique documents like records of safety system tests and controls, some racks were open due to the storage of oversized documents. Because of this, the roof protection of the racks which should prevent water ingress in case of fire was unavailable. It was not possible to close the racks immediately.
- No hygrometric system or temperature measurements were available in the archive rooms.
- The temperature in two archive rooms, containing unique documents and X-ray plates, was high. The climate control system was not functional.
- In a new archive room, already full of documents,
  - the air-conditioning system has not yet been installed;
  - no fire protection system is present; and,
  - a drain to evacuate water from the archive rooms in case of fire and sprinkler actuation or other water intrusion is not present.

Without correct storage conditions, the safety documents may degrade and become illegible during the life of the plant, impairing the knowledge management of the plant.

Suggestion: The plant should consider improving the storage conditions of unique safety documents

IAEA Basis:

SSR- 2/2 4.52: The operating organization shall identify the types of records and reports, as specified by the regulatory body that are relevant for the safe operation of the plant. Records of operation, including maintenance and surveillance, shall be kept available from initial testing during the startup of each plant system important to safety, including relevant off-site tests. The records of operation shall be retained in proper archives for periods as required by the regulatory body. All records shall be kept readable, complete, identifiable and easily retrievable [2]. Retention times for records and reports shall be commensurate with their level of importance for the purposes of operation and plant licensing and for future decommissioning.

GS-G-3.1 Sec 5.40: "Storage facilities for records should be maintained to prevent damage from causes such as fire, water, air, rodents, insects, etc."

GS-G-3.1 Annex III.8: "Record storage facilities will need to protect the contents from possible damage or destruction by such causes as fire, flooding, insects and rodents, and from possible deterioration under adverse environmental conditions of light, temperature and humidity"

Plant response/Action:

Elements of response:

Work completed:

- Removal of existing and non-operational ducts
- Demolition of walls (BDA)
- Installation of steel sheeting above pipes with water drainage in the event of leakage, in all locations
- Installation of an air-conditioning unit and dehumidifier in rooms of the BDA building (BG0529) and maintenance building (BT0436, BT0435, BT0422 and BT0423)

Installation of a humidity and temperature monitoring system in all locations containing statutory archives

- Purchase of sensors
- Annual calibration programme
- Monthly temperature and humidity readings

IAEA comments:

The plant implemented all necessary actions to resolve the issue.

In the maintenance building the plant installed an air conditioning system, and dehumidifiers in all four archive rooms. A fire detection system is available in all rooms. The plant also installed a humidity and temperature monitoring system and set up the values for allowed temperature and humidity. Sensors are regularly calibrated and the results of measurements are evaluated monthly. The plant also installed steel sheets above the racks and below elevated pipes to drain the water in the event of leakage.

In addition to the archive rooms in the maintenance building, the plant improved the archive under the administrative building. All measures as in the in maintenance building were implemented.

Conclusion: Issue resolved

2. TRAINING AND QUALIFICATIONS

2.1. TRAINING POLICY AND ORGANIZATION

The plant uses an integrated training approach for different stakeholders that provide training services for the plant staff. However, the effectiveness and efficiency of the training process is not well defined. The team has found that the pedagogical skills of plant personnel involved in training on a temporary basis have not been systematically developed through periodic refresher training. It was also observed that the existing training on site access is not comprehensive.

The team made a recommendation in the enhancement of training programmes in the area assessment, training objectives and competency.

2.2 TRAINING FACILITIES, EQUIPMENT AND MATERIAL

The plant uses a facility for maintenance and RP training belonging to a Contractor. Such training on real equipment provides an opportunity to foster safety awareness before performing work at the plant. A similar approach is used for both plant and contractor personnel. The team considers this to be a good performance.

DETAILED TRAINING AND QUALIFICATIONS FINDINGS

2.1 TRAINING POLICY AND ORGANIZATION

2.1(1) Issue: The plant training programme is not comprehensive with respect to aspects of assessment, objectives and competencies.

The team found that:

- Regarding systematic assessment of some training activities with respect to their effectiveness and efficiency:
  - In the plant procedure for evaluation of training performance (UFPI/OP5/NOT/10-0074), there is no guidance on evaluating effectiveness and efficiency of the training.
  - Key performance indicators for the training process do not include an assessment of training effectiveness and efficiency and are not a part of the plant quality assurance programme.
  - The effectiveness of the management training programme has not been evaluated in terms of the adequacy of the training content.
  - No assessment of field training effectiveness is undertaken i.e. no training guides and hand-outs with training objectives to train field operators from the Operations department and lack of training materials for maintenance personnel.
- Regarding training objectives for some training programmes:
  - The technical specification for training courses (Academie des Metiers Savoirs Communs, Code stage: 9574 AKSC) includes the training objectives. However, there are no references to required knowledge, skills and attitudes (KSAs) for relevant tasks, duties and/or competencies.
  - The technical specification on Risk Prevention (D4550.35-11/3635) has training objectives. However, the training objectives do not correspond to relevant KSAs, tasks and/or competencies.
  - Initial and continuous training objectives and the training content of management training programme do not correspond to the competencies of the managers (i.e. programme for managers MPL, MDL). For instance, the programme does not include training objectives on leadership for safety.
  - The training objectives stated in Training specification 4385/02/9295 COSN-CESN/CC used for Main Control Room (MCR) staff training are not associated with pre-defined job duties.
  - The re-qualification training of Operations staff has a list of fundamentals for different positions (D4550.19-11/2443). However, it does not correspond to the job position competency lists.
- Regarding the training of plant personnel, who participate as part-time instructors, for pedagogical skills:
  - The plant does not have a procedure to maintain pedagogical

qualification of the part-time instructors.

- Instructors providing shadow training to MCR personnel do not pass periodical refresher training on pedagogical instructor skills.
- Maintenance plant personnel acting as part time instructors did not pass any pedagogical training as instructors.

- Regarding the training on site access topics:
  - Training provided for newcomers and contractors is awareness information only; the teaching style and approach applied does not support effective learning of plant specific safety and industrial hazards.
  - Training objectives were not defined at the beginning of the training session.
  - The training video used does not include the main focus points to be followed by learners.
  - Important plant specific information such as an explanation of the safety signs to be followed while on the plant, the procedure to go through security gates, how to use personal dosimeters, on dose limits, evacuation routes, siren audio signals, what to do in case of fire, and location of smoking areas were not included in the presentation.
  - There is a lack of precise safety instructions in addition to the written information placed on the back of the site access badge.

Without a rigorous approach in implementing effective and efficient training, there is a risk of decreased quality of training for plant personnel.

Recommendation: The plant should enhance its training programme in the area of assessment, objectives and competencies.

IAEA Basis:

SSR-2/2

4.20. Performance based programmes for initial and continuing training shall be developed and put in place for each major group of personnel (including, if necessary, external support organizations, including contractors). The content of each programme shall be based on a systematic approach. Training programmes shall promote attitudes that help to ensure that safety issues receive the attention that they warrant.

4.23. All training positions shall be held by adequately qualified and experienced persons, who provide the requisite technical knowledge and skills and have credibility with the trainees. Instructors shall be technically competent in their assigned areas of responsibility, shall have the necessary instructional skills and shall also be familiar with routines and work practices at the workplace. Qualification requirements shall be established for the training instructors.

NS-G-2.8

4.13. “A systematic approach to training should be used for the training of plant personnel…The systematic approach provides a logical progression, from identification of the competences required for performing a job, to the development and implementation of training towards achieving these competences”.

5.35. “The review should cover the adequacy and effectiveness of the training with respect to the actual performance of employees in their jobs…”

5.36. “The review should cover all stages of the training system, the analysis of training needs, and the design, development and implementation of the training programmes”.

5.2. “Training programmes for most positions at a nuclear power plant should include on the job training, etc., on the job training does not simply mean working in a job and/or position under the supervision of a qualified individual; it also involves the use of training objectives, qualification guidelines and trainee assessment…”.

5.31 “Training instructors, on and off the site, should have the appropriate knowledge, skills and attitudes in their assigned areas of responsibility, etc., should have adequate instructional and assessment skills”.

4.43. “A general training programme should ... be provided for on-site staff that have no emergency duties, to familiarize them with the procedures for alerting personnel to emergency conditions. Similar training should be provided to contractor personnel or other temporary personnel”.

Plant response/Action:

<u>Elements of response</u>

1-Set up pedagogical training (initial and refresher training of part-time instructors and participants);

2-Guarantee quality assurance of training materials, mainly by incorporating training objectives;

3-Set up a system to measure training effectiveness;

4-Check that the training objectives match the skills expected.

Elements of visibility: (remaining actions)

1-Set up pedagogical training (initial and refresher training) of part-time instructors and participants: identify the needs and propose and implement a professional development system.

2-Align the documents used for the new recruit training programmes with the corporate training specifications and materials and incorporate training objectives in all the site new recruit training programme materials.

3-Skills development programme

Elements of proof:

1-Full-time instructors are part of the Corporate Training Entity (UFPI). Within the framework of their professional development, initial pedagogical training is implemented (2 weeks).

The incubator of part-time instructors has been set up and is mainly composed of participants in the new recruit training programme. In January 2013, a pedagogical training course was held, split into parts: the first part took place on Tuesday 15 January 2013 (i.e. 1 day) and the second part took place on Tuesday 29, Wednesday 30 and Thursday 31 2013 (i.e. 3 days). The first part was theory training. After that, the trainees had two weeks to prepare a 20 minute presentation on an individual basis. The presentation was then given to the other trainees in sub-groups during the second part of the training. This group gave feedback to each participant with support from the instructor. Appendix 1 presents the list of trainees attending this training course.

This training was derived from pedagogical training courses for full-time UFPI instructors and was delivered by one of UFPI pedagogical cascade trainers. The course content was highly appreciated even if the theory part seemed disconcerting at first. The trainees were satisfied and think that they can implement the lessons learned in their training interventions and during more general presentations.

This training will be proposed as part of the professional development of participants in the core knowledge and job-specific training programmes. The next session at Cattenom is planned for October 2013. Refresher training is every 5 years.

The list of the participants in the experimental session in January 2013 is provided in Appendix 1.

2-The training objectives of every training course are presented.

A document recaps all the training objectives of the modules specifically for the new recruit training programmes and is used at the start of each training module.

3-Training effectiveness is identified at several levels. The following table recaps the different levels and proposes a series of indicators enabling training effectiveness to be assessed:

Levels	Indicators
1. Training satisfaction	- Satisfaction form (see Appendix 4) - Absenteeism - Participation of the manager in the course feedback session (see Appendix 5)
2. Acquisition of knowledge	- On the spot written and oral assessment - Authorisation - On-the-job evaluation - Classroom observation - Participation of the manager in course feedback sessions - Achievement of training objectives, etc
3. Impacts on the trainee's activity	- On-the-job evaluation - Delayed written and oral assessment - Post-job review - Activity carried out in compliance with expectations - Maintenance work duration complied with - Quality of maintenance work compliant (no operating and maintenance quality deficiencies or technical deviations, sequence of work practices compliant, etc),
4. Ease	- On-the-job evaluation - Classroom observation - Post-job review, etc.

The assessment mode is defined during the compiling of the training specifications.

The system for measuring training effectiveness is based on the skills development programme: identification of the needs at training committee meetings, development of training courses decided upon by the manager, implemented by specialisation subject mater experts or instructors, assessment of effectiveness at training committee meetings and incorporation in dynamic skills mapping.
Post-job review, assessment results and on-the-job evaluation constitute management tools to record effectiveness.

4-At corporate level, working groups by specialisation compile the baselines ensuring that training matches job-specific skills, according to the SAT method. Thus on site the units 1 & 2 I & C specialization compiled I&C baseline along with the PCC. The units 1 & 2 Chemistry Section validates the chemistry baselines and the units 3 & 4 Operations Department is working on validation of the field personnel baseline.
Adequacy of the training objectives for the skills baseline is checked by the PCC and the UFPI.
Adequacy of training for the expected skills is identified using several means:

- Participation of the manager in course feedback sessions: 25% by the end of 2013
- Classroom observation by the manager: planned for 2014 as part of the skills development programme
- Post-course trainee feedback, post-job review and training committee meetings

These elements are discussed at the training committees and tracked in the minutes of the meetings, authorisations and dynamic skills mapping.

IAEA comments:

An action plan has been worked out on the national level for adequate training, competence of individuals and a regulated manner for ensuring training of instructors. This extensive project, according to the international methods such as SAT (systematic approach to training) method, has been incorporated gradually as the most important project of development and upkeep of pedagogical skills and systematic training of instructors, as well as shadow trainers and managers. Also, the project includes choice of instructors based on judgement of their skills ability and communication ability.

There are local discussions workshops led by a specialized instructor who are part of the Corporate Training Entity (UFPI). These started to be organised to share the experience among tutors and instructors within the plant departments and plants of EDF.

A new project guarantees quality assurance of training materials, mainly by incorporating training objectives and a series of indicators for measuring of training effectiveness.

For the full improvement of training, it is expected to use several means that will enhance the effectiveness of this process such as participation of the manager in course feedback sessions, classroom observation by the manager as part of the skills development programme and post-course trainee feedback.

Conclusion: Satisfactory progress to date.

3. OPERATIONS

3.3. OPERATING RULES AND PROCEDURES

The plant uses operating procedures for start up, normal operation and shutdown. Alarm response procedures are used as a guide to respond to alarms in the main control rooms (MCR). However, several examples showed that the alarm response procedures did not detail all actions necessary. The plant does not have a formal regular review process that ensures technically correct procedures. The team suggests that the plant should consider establishing a formal regular review process to ensure that technical procedures are correct.

3.4. CONDUCT OF OPERATIONS

The team made observations of control room activities during the review. These observations showed that the MCR operators did not announce unexpected alarms which were displayed on the control room panels. The corporate requirements do not expect announcement of unexpected alarms in the MCR. The team encourages the plant to modify their expectations to ensure that unexpected alarms are announced in the MCR.

Field operators perform periodic rounds and the relevant areas are covered within specified intervals. Efforts have recently been made to improve these rounds. However, some deficiencies are not always recognized and reported according to the expectations. The team suggests that the plant should consider reinforcing observations and reporting skills to identify and report deficiencies.

3.6. FIRE PREVENTION AND PROTECTION PROGRAMME

The plant has a system to display the fire load on the back of a temporary warning sign (Entreposage) which is displayed on materials and equipment stored in dedicated temporary storage areas. This system enables workers in the field to calculate fire loading, based on the type and quantity of the stored materials. The team recognizes this as a good practice.

The plant has developed drawings to manage fire zone deviations. These drawings show the contours of the fire zones and the elements in the fire zone. They are used as a basis to draw plans indicating how modifications or deviations may affect fire safety. The drawings are also available to the plant’s Fire Team Leaders who takes them to the field in case of a fire alarm. The marking of fire zoning deviations increases the operational efficiency of fire safety. The team recognizes this as a good practice.

DETAILED OPERATIONS FINDINGS

3.3 OPERATING RULES AND PROCEDURES

3.3(1) Issue: There is an absence of a formal regular review process that ensures technical correctness of operating procedures.

The plant uses operating procedures for start up, normal operation and shutdown. Alarm response procedures are used as a guide to respond to alarms in the main control rooms (MCR). However, the following observations indicate that alarm response procedures do not detail all corrective actions that need to be taken.

- Procedure ARE901AA was issued on 08/06/2001, and procedure AHP510AA was issued on 10/09/2004 - these procedures have not been reviewed since those dates.
- The plant does not have a formal regular review process that ensures that procedures are technically correct.
- The plant procedure ARE901AA for alarm response to low Steam Generator (SG) level does not detail all of the corrective actions that are possible depending on whether the fault affects one SG or all SGs.
- Alarm response procedure AHP510AA for high condensate level in the feed-water re-heater does not support the MCR operator to successfully manage the evolutions associated with rapid feed-water re-heater tube rupture.

Failure to periodically review plant operating procedures could negatively affect operational safety owing to the lack of incorporation of the latest relevant operating experience.

Suggestion: The plant should consider establishing a formal regular review process for its operating procedures.

IAEA Basis:

SSR-2/2

7.4. Operating procedures …shall be subject to approval and periodically reviewed and revised as necessary to ensure their adequacy and effectiveness……

NS-G-2.14

4.22. Such documentation should be controlled, regularly reviewed and updated promptly if updating is necessary, …

Plant response/Action:

Elements of response:

1) A base line has been established to review all procedures that have not been amended for 5 years.

- March 2012: a review campaign has been launched (documents dating back more than 7 years)
- In a first stage priority has been given to the Alarm Files (AA)
- In a second stage focus on the F procedures (line-ups and operation of the plant systems) and the C procedures (I&C relay systems)
- September 2012: beginning of the review of documents dating back more than 5 years in 2012)

Update results:

All procedures and alarm files have been reviewed. I.e.:

- 67 Alarm files
- 97 F systems procedures
- 47 C procedures (I&C relay systems

March 2013, review launched on:

- Exceptional test permits (RET: doc. attached to the permits and including a risk analysis) and Operations work packages (DAC). This review is mainly in the hands of the Bureau Technique Conduite (BTC: operations planners from the production organisation) and the outage shift supervisors (operations engineering). 64 RET to be updated (34 for the production organisation, 30 for the outage organisation).
- 35 DAC to be updated (11 for the production organisation, 24 for the outage organisation).
- Review of all the documents has been launched.

2) Implementation of a permanent system, whereby the author can be questioned every 5 years regarding the need to revise the procedure. This review will be documented and subject to audits.

- Update of the policy procedure ref. NA 2/1/1 aiming at integrating the operation documents review procedure (completed)
- Creation of a specific procedure (KSC 99 R) aiming at checking the periodic review of operations-related documents (completed).
- This checking procedure has been entered into the PRV module and a prompt will be triggered twice a year (completed).
- Prompting approach aimed at ensuring that the review will actually take place prior to the end of the 5 years deadline (implemented).
- Date of the review integrated in the procedure in compliance with the document modification process (completed).

- Triggering of the prompt pertaining to the checking procedure tested for the first time on 01/04/2013 (completed).

Remaining actions:

- Completion of the ongoing updating of the documents (DAC and RET) expected by the 31/12/2013.
- Remains to be done: local surveillance tests (Cattenom-specific equipment, heat sink for example), requalification tests and event-related procedures.

Evidence:

- 100% of procedures and alarm files reviewed in less than 5 years.
- Amendment of policy procedure ref. NA/2/1/1.
- Creation of review procedure ref. KSC 99 R, incorporated into the PRV database.

IAEA comments:

The plant decided that a two-pronged approach was necessary to address this issue. Initially, there was a prioritized review undertaken to identify all procedures which had not undergone a review in the past seven years. First priority was given to alarm procedures. From September 2012, a further similar review was undertaken for procedures which had not been reviewed in the past five years. As a priority, all alarm sheets and operator instructions were reviewed and this was completed in December 2012. Operations work packages (DAC), surveillance tests and exceptional test permits remain to be reviewed. It is intended that this will be completed by December 2013.

Secondly, to ensure continuity in the organization of procedure review, documents were produced to ensure that all procedures were continuously reviewed on a five-yearly basis. The system will be IT-driven and overall runs will be conducted on a six-monthly basis, the first of which was performed in April 2013 with a second run programmed for September 2013.

Conclusion: Satisfactory progress to date.

3.4 CONDUCT OF OPERATIONS

3.4(1) Issue: Plant deficiencies are not always recognized and reported.

This is supported by the following facts:

- During the field round in the essential service water intake facility, the operator identified 5 leaks which had not been previously identified. (1SEC001PO, 1SEC002PO, pipe elbow 9SEB101VE, 1SEN001PO and 1SFI101PO). The corrosion and pollution impact of these leakages indicated that they had existed for a long period.
- During the field round, the operator tested the alarm operability on the panel 9DVO001CR. The test showed 3 of 10 alarms inoperable. When the operator opened the alarm device, he noticed that the alarm light bulb was missing.
- Cable coming out from a wall near cabinet 4MZZ050CR was found to be cut off with a loose end. No label to identify this deficiency existed nor was any work request/deviation report was made.
- Soft plastic was wrapped around a cast iron pipe to direct leakage to the sump tank in room WA0403; there was no visible signage to indicate that the fault had been reported.
- The team found approximately 30 places where labels were either missing or broken.
    - Unit 3 diesel building; several broken, missing or illegible labels e.g. 3ASG236YP, two valves by 3JSK005WF not labeled, missing label at valve 3ASG035VD, broken labels on 3JPV005VE and JPV001DI.
    - Unit 3 Fuel building; handwritten labels on 3ASG37VA, 3ASG037, 3ASG33RA
- In Unit 3 LE0504 corridor, a fire penetration was not intact and this deficiency was not labeled.
- Unit 4 auxiliary building level -6.8 m; A temporary label, dated 24/05/2008, was attached to the containment spray pump 4EAS052PO.

Without identifying and reporting deviations in a timely manner, the operability of the plant systems can be affected.

Suggestion: The plant should consider reinforcing observations and reporting skills to identify and report deficiencies in a timely manner.

IAEA Basis:

SSR- 2/2

7.10. Administrative controls shall be established to ensure that operational premises and equipment are maintained, well lit and accessible, and that temporary storage is controlled and limited. Equipment that is degraded (owing to leaks, corrosion spots, loose parts or damaged thermal insulation, for example) shall be identified, reported and corrected in a timely manner.

7.12. The operating organization shall be responsible for ensuring that the identification and labeling of safety equipment and safety related equipment, rooms, piping and instruments are accurate, legible and well maintained, and that they do not introduce any degradation.

NS-G-2.14

4.35 Personnel assigned the task of carrying out rounds should be made responsible for verifying that operating equipment and standby equipment operate within normal parameters. They should take note of equipment that is deteriorating and of factors affecting environmental conditions, such as water and oil leaks, burned out light bulbs… Any problems noted with equipment should be promptly communicated to the control room personnel and corrective action should be initiated.

4.36 Factors that should typically be noted by shift personnel include deterioration in material conditions of any kind, corrosion, leakage from components, accumulation of boric acid…inadequate labeling…the operability…alarms on local panels throughout the plant, and their readiness for actuating…deviations in fire protection, such as… accumulations of materials posing fire hazards such as wood, paper or refuse and oil leakages… hazardous equipment and trip hazards.

Plant response/Action:

Elements of response*:* A review of our current weaknesses has identified 3 key focus areas:

1) Reinforcement of skills and management coaching
- Coaching of field operators by management.

- Additional staff recruited as substitute for the shift managers and shift supervisors so that the management can spend more time in the field with field operators (76 substituted shifts in 2012).

- Expectation for 2013: Every field operator will be task-observed during a round.
- 1/3 of the department’s field observations will focus on field operators (excluding main control room) captured in the field tour database “Visite Terrain” of the operations department 580 field tours recorded in 2012.
- Pre-defined schedule of joint maintenance/operations rounds to improve leak management.
- Pre-defined schedule of joint housekeeping/operations rounds to improve detection of material condition defects.
- Pre-defined schedule of joint engineering (DEFI) /operations rounds, focusing on specific plant systems. 69 joint engineering/operations rounds carried out since the beginning of 2012.

- Training on Winservir data logger system provided in 2012 for 10 field operators.
- In 2013, establishment of crew and department training committees as part of the skills plan to identify training needs and deliver the appropriate training response. The first crew training committee was held on the 03/06.

2) Awareness, reinforcement and review of expectations.
- Field operator monitoring reports periodically discussed by the operations senior management.
- Every field operator and new recruit provided with a handbook during field operator training (initial training session). This is an aid for the field operator. The sheets of the booklet can be replaced to reflect the guidelines updates and keep up to date the field operators.
- At the joint department management meeting held on 29/01/2013, the decision was made to carry on the working group on field operator rounds in order to address plant monitoring issues.
- Department audit programme to focus on monitoring in the field.
- Three-monthly review of information recorded in the electronic shift log (more specifically section S10); crews to be issued with reminders if necessary.
- Owner-specific rounds to be performed on Thursday mornings in the presence of senior management and other leaders.

3) Efforts to focus on issues associated with defect resolution, in order to avoid tolerance of low standards (recurring defects, cancelled work requests).
- Completion of the labelling backlog (3000 labels installed on the 4 units in 2012).
- Clarification of the diagnosis on rounds thanks to the joint rounds and the resolution of easy to solve defects.
- More capital expenditure on plant and material condition.

Remaining actions:
- Maintain the sustainable organisation set up via the monitoring and sharing approach with the field operators

Evidence:
- In December 2012, the EDF nuclear inspection department noted improvements with regard to leaks, labelling and abandoned padlocks.
- 3000 labels replaced on all 4 units in 2012.
- 69 round observations performed in 2012, as part of the department's audit programme. Since the OSART mission, each field operator has been coached at least once on monitoring in the field.
- 8 audits performed on the completion of shift logs in 2012.
- 580 field operator observation reports raised in 2012.
- 69 joint walk-downs conducted with members of the engineering department in 2012.
- In the last quarter of 2012, 10 joint walk-downs conducted with the housekeeping team in order to evaluate the standard of specific plant areas.
- Crew training committees implemented in 2013.

IAEA comments:

The plant identified three root causes with respect to this issue. These were:

1)Observation skills development required improvement
2)The staff required to be reminded of specific expectations regarding plant deficiencies
3)Not acting on long-standing deficiencies

There is now an increased presence of management in the field. There is also one additional Shift Supervisor and Shift Manager on shift, allowing increased managerial time to spend coaching field operators. It is now the case that each field operator is expected to be accompanied by a Shift Manager/Shift Supervisor at least once per year. The latter are expected to produce observation records of their field tours. Teams of Operators with Maintenance, MEEI or system engineers jointly conduct field rounds and this has been found to be mutually beneficial.

A booklet (memory aid) has been produced for the field operators which contains information such as management expectations, plant tour routes, leak definitions and prioritization etc. The backlog on labeling has been completed.

A plant walk-down with a field operator confirmed that the above is reflected in the field.

Conclusion: Issue resolved.

3.6 FIRE PREVENTION AND PROTECTION PROGRAMME

3.6(a) **Good Practice:** Fire load displayed on the back of an “Entreposage” temporary warning sign, based on the type of materials stored.

The plant has a system to display the fire load on the back of a temporary warning sign which enables workers in the field to calculate fire loading, based on the type and quantity of the stored materials.

The sign is displayed on materials and equipment stored in dedicated temporary storage areas. It is used to identify the owner of stored materials and to indicate fire load with related risks.

The advantage is easy and accurate calculation of total fire load of stored materials and equipment. It is easy to check whether maximum limits are complied with and to provide for easy monitoring and control of the fire loading.

3.6(b) Good Practice: Drawings to manage fire zone deviations

The plant has developed drawings to manage fire zone deviations.

These drawings show the contours of the fire zones and the elements in the fire zone (doors, bushings, check-valves, siphons…) and are used as a basis to draw plans indicating how modifications or deviations may affect fire safety.

Identification of each deviation in the fire zone are marked on a drawing of the room which enables quick and precise location of the element.

The drawings are working documents which reduces the risk of error when needing to identify a certain element in the fire zone during maintenance.

The drawings are also available to the plants Fire Team Leaders who takes them with him/her in the field in case of a fire alarm. The marking of fire zoning deviations on a graphic support document increases operational efficiency of fire safety as this document is easily usable by the plant Fire team and the off-site fire fighters.

Field operators, as well as contractors working on the walls of fire zones, receive training from the fire zoning drawings to raise the awareness and to identify deviations.

4. MAINTENANCE

4.1 ORGANIZATION AND FUNCTIONS

A “Top-10” team weekly review meeting is held to assess the most important plant topics presenting threats to nuclear safety and production. Since the start of the “Top-10” weekly review team activity in 2007, the plant has had no unplanned shutdowns due to unidentified threats. The team recognizes this as a good performance.

4.7 WORK CONTROL

At the plant, the work control system (SYGMA) is used to issue maintenance work documents, and pre-job briefings are held on a regular basis at the plant. However the team witnessed deficiencies in interfacing with operations, in the provision of spare parts and in the preparation of the worksite and work equipment which caused work delays. The team has made a suggestion in this area.

4.9 OUTAGE MANAGEMENT

Qualified Contractor Supervisors (CSi) are seconded between French NPPs for supervising outage mechanical maintenance work. This was beneficial to the plant enabling permanent supervision of major activities during the ten-year outage on unit 3 in 2011. The team recognizes this as a good performance.

DETAILED MAINTENANCE FINDINGS

4.7 WORK CONTROL

4.7(1) Issue: Some maintenance and testing preparation activities are not effectively performed.

Generally the work control system (SYGMA) is effectively used, material resources are available, there is good communication between plant personnel and pre-job briefings are held. However, weaknesses in work documentation and pre-job briefings have been encountered, and deficiencies in spare parts, worksite and work equipment preparation were witnessed. Examples include:

- Delay of Reactor Protection System emergency breaker testing (work with scram risk) was due to:
    - The name and stamp of the work coordinator missing from the work permit.
    - The technician was not fully instructed at the pre-job brief about the tagging office priority for scram-risk works.
- Workers had to stop the maintenance work on 3SAP071RF to fetch tools (e.g. mobile lighting and wrenches) on more than one occasion.
- 3SFI011PO shaft gland leak was planned to be repaired by replacement of the gland packing. On their arrival at the pump, maintenance personnel realized that the replacement packing diameter should be smaller than originally specified. They also realized that even the gland needed to be replaced, since it was heavily corroded. Finally, it was decided by engineering and maintenance departments to replace the whole pump because of its corroded state.
- 1RCV212FI chemical and volume control system filter change began, but the area had not been prepared, and so the workers had to wait for it to be set up. The filter machine which was requested for the work could not be installed as there was scaffold in the way.
- Periodic vibration testing of component cooling pump 1RRI022PO required 1 hour running of the pump. The operations did not notify the maintenance group who were ready to perform the job that the operational conditions could not be provided as the pump could not be started at the earlier agreed time.

Equipment and system unavailability caused by work delays could have safety implications.

Suggestion: The plant should consider enhancing its maintenance and testing preparation activities.

IAEA Basis:

SSR-2/2

8.8. A comprehensive work planning and control system shall be implemented to ensure that work for purposes of maintenance, testing, surveillance and inspection is properly authorized, is carried out safely and is documented in accordance with established procedures.

NS-G-2.6

4.11: The ultimate responsibility for preparing and executing an adequate MS&I Programme rests with the operating organization. ... It should ensure the timely conduct of work activities, their documentation and reporting, and the evaluation of results.

Plant response/Action:

Elements of response

The causes of failure to carry out maintenance activities mainly lie in the lack of job planning and use of error reduction tools in the field of logistics (ancillary services, scaffolding and tools), completeness of work packages, the issue of work permits and availability of spare parts.

In order to resolve these issues, several actions have been undertaken:

- Adaptation of the daily specialisation schedule progress meeting where the activities scheduled on D-1 and D-2 are reviewed to check that everything is ready (spare parts, work package and worksite logistics)
- Setting up of contractor stores for activities outside the RCA so that the contractors have their own tools.
- Standardisation and validation of work packages between maintenance and operations so that work permits are not refused
- Provision of spare parts in W-1 for scheduled mechanical activities.
- Standardization of work permits
- Grouping together of the tools and the RP store in the RCA
- Daily reports between the Mechanical Maintenance Department (SME) and operations on the work permits approved
- Experimental walk-down during power operations
- Implementation of Epsilon 2 during outage (request from logistics)

Elements of visibility: (remaining actions)

- Continued standardisation of work packages and work permits
- Grouping together of the tools and RP stores in the RCA
- Changeover to Epsilon 2 during power operations: software used to express logistical needs during outage.
- Continued experimental walk-down during power operation

IAEA comments:

The plant performed comprehensive analysis to find the causes of the maintenance issue including benchmarking with other NPPs. The following main causes were identified:

- Lack of support services planning, scaffolding and tools
- Deficiencies in work permits
- Incomplete work packages
- Unavailability of spare parts

This led to a comprehensive set of corrective actions. These corrective actions cover much broader scope than was intended with the OSART suggestion.

The most important implemented actions are as follow:

- Establishment of contractor stores for tools used during maintenance work outside of the radiation control area
- Improvements of the software tool Epsilon 2, mainly for scaffolding activities during outages
- Merging of the radiation protection equipment store with the tools store inside the radiation control area
- Establishment of daily afternoon meetings with an agenda to update the schedule of activities and evaluation of activities for the next two days including spare parts availability, work packages and logistic.
- Production of daily reports between the mechanical maintenance department and operations on the approved work permits.
- Production of monthly evaluation reports regarding work activities and reasons for postponing or changing the schedule (work permits, work packages, support services, spare parts, tools and human resources).
- Standardization of work packages including all documents related to the job (work procedures including necessary tools, post maintenance testing, risk assessment and spare parts).
- Standardization of work permits.
- Delivering of spare parts one week before planned activity.
- Walk-downs with some contractors to check the status before any planned activity. These walk-downs will be expanded to all contractors.
- Development of a performance indicator – weekly schedule adherence rate.
- Refresher training on human error prevention tools.

The plant already achieved good results and improved its maintenance and testing preparation and resolved the issue. In addition, the plant has further plans to improve the related performance indicator, standardize more work packages and work permits and fully implement walk-downs before conducting planned activities. However these activities are out of the scope of the original issue.

Improvements already implemented and planned will help the plant during the preparation and implementation of planned major reconstruction projects.

Conclusion: Issue resolved

5. TECHNICAL SUPPORT

5.1 ORGANIZATION AND FUNCTIONS.

The plant has developed a long term programme (up to 2046) for plant assets management. All modifications, modernizations and replacement of components, foreseen both at national and plant levels, are identified in a single document to allow long term prospective planning relating to plant changes until the end of the design lifetime. The programme has been proposed for promotion at national level, to all EDF power plants. The team acknowledges this programme as a good performance.

The plant has created a start up team to learn the lessons from situations arising during the unit start up phase. This team documents and analyzes these situations with the main target to improve quality and scheduling during the following cycle and to clear technical problems caused by work implementation during the outage. The team considers this as a good performance.

5.2. SURVEILLANCE PROGRAMME

During the performance of surveillance tests, the team has observed examples of inadequate control of the test schedule, unclear or incomplete acceptance criteria in operating procedures and the inadequate use of test procedures by some operational and maintenance personnel. The team has made a recommendation in this area.

The plant has a comprehensive programme to assess system health status. Nevertheless, the team found some cases when equipment operability and hazard assessment was based on an expert's judgment and did not reflect all potential hazards and the necessary corrective actions. The team has made a suggestion in this area.

DETAILED TECHNICAL SUPPORT FINDINGS

5.2 SURVEILLANCE PROGRAMME

5.2 (1) Issue: The plant surveillance testing programme is not robust regarding the control of test scheduling, establishing test acceptance criteria and the use of test procedures.

- During Unit 1 RRI023PO pump surveillance test the following was noted:
  - The acceptance criteria for the test only specified the bearing temperature. There is no acceptance criteria regarding the pump status (e.g. oil level, status of seals), nor for the main parameters such as pressure, vibration, motor current (Procedure EP RRI 113).
  - The vibration test of the pump has to be performed when the bearing temperatures are stabilized, but there are no stated formal criteria for "stabilized" temperature and this is left to the discretion of the operator.
  - The field operator, while performing the pump test, did not use a test programme or check list.
- During a Diesel Generator-A test at Unit 4, no checklists or procedures were used for monitoring and taking measurements. The personnel only filled in the check lists later, based on memory. Place keeping and step by step implementation of the procedure was not used.
- During 2011 up to October, 10 events were caused by the misuse of procedures.
- The routine monthly periodic test of LHT81 and 82 gas turbines were carried out in March 2009 and after completion of the test, the operator mistakenly marked the test as being performed in April. As a result, no periodic test was conducted in April. This error was detected in December 2009 during trouble-shooting of a turbine technical problem. To date, the surveillance test results are still assessed on a case-by-case basis and negative tendencies trending is not performed.
- In unit 2, periodic test RIC 001 (weekly in-core instrumentation test) was not conducted during a continuous period of 7 weeks (May – June 2009). The violation of the technical specification and test schedule was caused by a problem in the SYGMA Score Board, which initiates a reminder for conducting the test. The event report indicates total loss of control of core saturation margins and impact on execution of emergency procedures, as potential consequences.
- For regular calibration of neutron power channels in unit coast-down mode, the operator had to perform a surveillance test according to procedure RPN008 ("Safety significant OE report" dated 30.03.2011). At the planning stage of the test, a technician misinterpreted the reactor power level and replaced the procedure with RPN003. The technician's error was not corrected by the operator at the implementation stage, because the procedures had no information on entrance conditions.
- According to "Safety significant OE report" dated 18.03.2010, isolation valves testing was planned for 15.03.2010 and a paper copy of the test procedure was placed in the in-tray of the corresponding operation shift. The test was executed accordingly, but the procedure was left in the in-tray. An operator of the new shift

noticed the test procedure in the in-tray and unnecessarily executed the test for a second time.

Inadequate control, unclear acceptance criteria and inadequate use of surveillance procedures can have a negative impact on the assessment of safety equipment status.

Recommendation: The plant should improve the control of its surveillance test scheduling, and provide the operator with unambiguous acceptance criteria and reinforce the use of test procedures.

IAEA Basis:

SSR-2/2

8.2. The operating organization shall establish surveillance programmes for ensuring compliance with established operational limits and conditions and for detecting and correcting any abnormal condition before it can give rise to significant consequences for safety.

8.8. A comprehensive work planning and control system shall be implemented to ensure that work for purposes of maintenance, testing, surveillance and inspection is properly authorized, is carried out safely and is documented in accordance with established procedures.

NS-G-2.2

7.3. The surveillance requirements should be specified in procedures with clear acceptance criteria so that there are no doubts concerning system operability or component operability. The relationship between these criteria and the limit or condition being confirmed should be available in written form.

NS-G-2.6

6.5. The operating organization should ensure that the results of MS&I are evaluated in order to verify compliance with the acceptance criteria.

6.6. Acceptance criteria for MS&I can be based on the as-manufactured specific standards. They should be established before the start of the programme and should be submitted to the regulatory body for review when required.

6.7. Once an activity for MS&I has been completed, the results should be reviewed by a competent person other than the person who performed the activity. The review should establish whether the activity was appropriate and was properly completed, and should provide assurance that all results satisfy the acceptance criteria.

Plant response/Action:

<u>Elements of response:</u>

Focus on possible causes of surveillance test deficiencies and the implementation of a surveillance test action plan monitored by the COPEPS committee (safety performance steering committee), in order to drive improvement.

Implementation of a performance indicator regarding safety significant events related to surveillance testing and implementation of a monitoring indicator regarding significant events related to non-compliance with the procedures.

Scheduling:

Further to 4 scheduling-related safety-significant events in 2009/2010, scheduling arrangements as well as the related audits have been reinforced.

Conduct of an audit of the implementation of the actions decided upon following the safety-significant events, completed.

Conduct of a self-assessment against the corporate guide of good practices, focusing on surveillance test scheduling in 2012. The revision of an independent audit by the safety/quality department (work request DI122) was completed.

These self-assessments have enabled the implementation of new audits such as checking the absence in the IT tool of surveillance tests closed at a later date than the current date, completed.

Shift managers perform and record a daily audit in the electronic shift log, completed.

Procedures and criteria:

Surveillance test procedures are issued by the corporate function. The split in surveillance test criteria between maintenance and operations is also determined by the corporate function.

For each plant system, test criteria and their distribution are laid down in a review document.

As far as criteria belonging to the MTN department are concerned, the shift manager must be called in the event of a deviation. This requirement will be reinforced through a senior management message.

With regard to bearing temperature stability criteria prior to readings, the plant engineering department has prepared a memorandum. The operations engineering department complemented this document with the conduct of complementary vibration and movement measurements at the starting up of the equipment. This memorandum is provided to the operators together with the surveillance testing procedure, and is completed for the component cooling system (RRI).

Plant engineering has identified other equipment for which an analysis will be performed as well as the corresponding deadline.

Step-by-step schedule adherence and completion of procedures

Expectations governing traceability and completion of surveillance test procedures are laid down in guideline no.15.

The shift supervisor checks that each surveillance test procedure is filled out correctly.

A quality check of surveillance test results and compliance with the organisation has been defined, completed.

A senior management message was disseminated as a reminder of the requirement and which reinforced how important it is to comply with the procedures, completed.

Trending

A trending is performed by the operations engineering for safety related systems during outages.

As regard the Production organisation some safety related systems are being tested on trending. This work is carried out in collaboration with the corporate level, which is interested in Cattenom's practices.

Remaining actions:

- The craft coordination network will request from the operators to identify and bottom-up during the post-job brief the criteria, which are unclear. .
- Perform analysis on other equipment similar to the analysis performed on the component cooling system (RRI) and according to the suggested schedule.
- Expand the trending approach.

Evidence:

- Surveillance test performance tracked by the COPEPS committee.
- Investigation into causes of surveillance test deficiencies; implementation of an action plan overseen by the COPEPS committee.
- Surveillance test scheduling arrangements have been effective in improving performance. No audit scheduling deviation reported over the past 18 months.

Summary of controls and audits:

Scheduling:

> Dates of surveillance tests conduct and corresponding tolerances are delivered by the IT tool and known 12 weeks prior to their being conducted. Operations planners (BTC) from the production organisation and testing & post-maintenance coordinators (CER) meet up and plan the surveillance tests 4 weeks prior to the due date.

--> Review of returned surveillance test hard copies

Every morning on normal working days, the shift supervisors bring down the surveillance tests completed the previous day or over the weekend. We verify signatures and check test procedures against the list of scheduled tests (list of surveillance tests that we send the shift managers every week) to ascertain that they have been completed. Hard copy lists of returned surveillance test procedures are retained. Procedures are then sent to the document control section.

--> Daily check of surveillance tests

Shift managers review surveillance tests once a day.

The safety engineer also checks them as part of his independent verification.

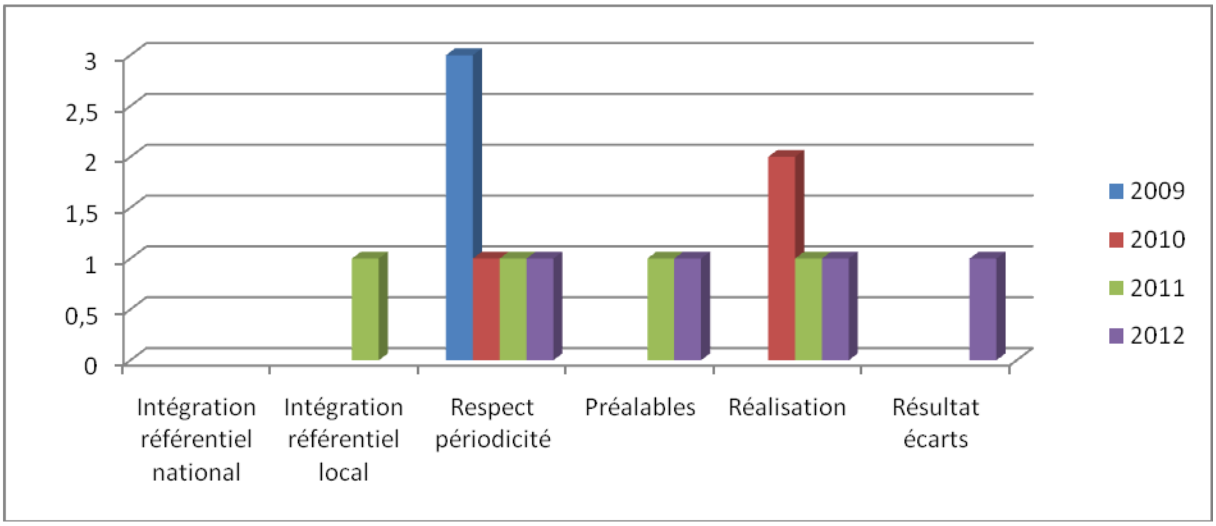
Once a day, the operations engineering group reviews surveillance tests in the SYGMA database which have exceeded their due date. An investigation is performed in the event of a deviation.

A hard copy of the check is retained.

--> Weekly check of surveillance tests

The shift manager performs a weekly check to ensure that scheduled tests have been performed.

Once a week, the operations engineering group reviews surveillance tests having exceeded their tolerance limit. As with daily checks, an investigation is performed in the event of a deviation. A hard copy of the check is retained.



- 30 audits carried out on the quality of the filling in of the surveillance testing in 2012.

- Expectations regarding the ticking of surveillance test prerequisites and integration in the guidelines presented during the crafts coordination network.

IAEA comments:

The plant reviewed the last four years of Surveillance Testing and determined that the following were the root causes of the past facts associated with the issue:-

1)Non-observance of periodicity
2)Poor procedures or poor understanding of procedures
3)Lack of attention to Surveillance Testing pre-requisites.

It was observed by the plant that some corporate-suggested good practices had not been implemented and this has now been remedied. Units 3&4 had had their schedule adherence checked by the Shift Manager and Shift Engineer but this was not taking place for Units 1&2 – this has now been corrected. A 'Fiche de Position' was authorized to remind Operations on plant expectations regarding pump bearing temperature evolutions during pump Surveillance Testing. A Senior Management Message was produced regarding expected procedure use during, inter alia, Surveillance Testing. This included the expectation to complete the checklists concurrent with conducting the test. A field review of a Surveillance Test during the Follow-up confirmed good progress in the above areas.

The trending of some Surveillance Testing parameters is still not fully done on some operational equipment and more work is still needed with respect to informing Control Room operators on the need to report any Surveillance Test deficiencies which they discover during implementation.

Conclusion: Satisfactory progress to date.

5.2(2) Issue: Some equipment operability and hazard assessments are not comprehensive.

- 3LHP670VF (Unit 3 Diesel Generator A) – presently leaking fuel oil. Operability and hazard assessment of the diesel generator (DG) was made on expert judgment. It is stated that the diesel was considered operable and risk of fire has to be addressed during the operator's daily rounds by frequent emptying of the collection tray. There was no established fire watch and no leak rate assessment was made.

- 4RCV171PO (unit 4 primary chemical and volume control pump) - leaking oil over a period of at least one week. The bed plate was completely covered and leaking across the floor. Operability and hazard assessment of the pump was made on expert judgment. No specific requirements in the assessment regarding the frequency of the operator observations were found.

- In Unit 3 Turbine Building, at elevation +7.02 m, a large steam leak was observed and the leak collection vessel was overflowing. Operability and hazard assessment was made on expert judgment and states only the risk for personnel. No risk of steam leak impact to nearby equipment was made in the assessment and there is no requirement for the frequency of operator's observations.

- Despite the presence of above observed leaks, a cumulative risk assessment has not been considered at the plant.

Incomplete assessments of hazards and operability status could unnecessarily lead to inoperable safety equipment and hazardous work conditions.

Suggestion: The plant should consider taking measures to establish a more comprehensive assessment of operability and cumulative risk.

IAEA Basis

SSR-2/2

8.12. A management system for managing and correcting deficiencies shall be established and shall be used to ensure that operating personnel are not overly burdened. This system shall also ensure that safety at the plant is not compromised by the cumulative effects of these deficiencies.

NS-G-2.14

4.35. Personnel assigned the task of carrying out rounds should be made responsible for verifying that operating equipment and standby equipment operate within normal parameters. They should take note of equipment that is deteriorating and of factors affecting environmental conditions, such as water and oil leaks, burned out light bulbs and changes in building temperature or the cleanness of the air. Any problems noted with equipment should be promptly communicated to the control room personnel and corrective action should be initiated.

5.49. All deviations in the status of the plant or its systems and equipment should be reported and evaluated properly and in a timely manner. A system for documenting such deviations that includes evaluation of their impact on the operability of the plant, system or item of equipment should be clearly established. A system should be put in place to control the total number of deficiencies at the plant for which operator action is required, to ensure that operating crews are not overly burdened and to ensure that safety is not significantly affected by the cumulative effect of such deficiencies.

GS-G-3.5**:**

5.1. Reference [1] states in paragraphs 5.1–5.5 that:

— Hazards and risks are identified, together with any necessary mitigating actions.

5.64. Work planning:

(f)Should identify any workplace hazards and specify how they are to be mitigated;

(l)Should specify any reviews required upon completion of the work;

(m)Should identify the required records, such as records of work completion, spare parts used and equipment used;

(o)Should take account of lessons learned from previous experience.

5.71 Communication of the workplace risk assessment should be such as to ensure that anyone involved directly or incidentally in a job is made aware of any hazards and risks to their health and safety, and knows and understands the procedures that are in place to control or reduce those hazards and risks.

Plant response/Action:

Elements of response:

1 – Equipment defects are reported in the form of work requests

2 – These work requests are based on an analytical template (DI 1000) stipulating the minimum information required by maintenance for effective resolution.

3 – Work requests giving rise to condition reports are analyzed in greater depth in order to identify compensatory measures

4 – Compensatory measures identified to ensure equipment operability stem from:
- An analysis of compliance deviations and their effect on the plant;
- Tech specs, which reflect the cumulative aspect of operating limit conditions;
- Temporary operating instructions or workarounds, which include compensatory measures not covered by tech specs.

Cumulative risk is covered by:
- A cumulative analysis of compliance deviations, which will be conducted as of April 2013;
- A review of tech specs, which reflect the cumulative effect of operating limit conditions;
- The ERI (equipment reliability index), which is circulated to project managers, sub-project managers and shift managers, in order to take account of the most sensitive components and where necessary, adjust maintenance priorities.

Remaining actions:

1 – Identify examples of temporary operating instructions established to monitor equipment operability more closely, without compromising tech specs;

2 – Clarify use of the ERI at Cattenom in order to take account of cumulative weaknesses in the daily management of work priorities (slotting of maintenance into work windows and arbitration when the refuelling outage scope is frozen).

Evidence:

1 Examples of temporary operating instructions established to monitor equipment operability more closely, excluding tech specs

2 – ERI examples with interviews of project managers, sub-project managers and shift managers, to explain the use of this indicator in the daily management of work priorities and arbitrations.

IAEA comments: The plant evaluated the issue and this resulted in the decision that:

a) Each defect/work request should have an improved diagnosis of risk
b) The overall cumulative risk increase should be evaluated.

A tool is now in place to allow the field operator to evaluate, in conjunction with the control room staff, the risk associated with the observed defect. Additionally, the safety engineer reviews all work requests to determine any perceived increase in risk and also mainly maintenance and design defects, although no written guidance exists for this evaluation.

To assess cumulative risk, the plant has introduced an approach based on the Equipment Reliability Index (ERI) associated with AP913. The ERI is made up of nineteen indicators in areas such as maintenance, operations, chemistry etc. This is a sophisticated tool and all indicators will be available for input by the end of 2013. Further development will take place over the next three years and it is anticipated that the fully functional cumulative risk tool will be available 2015/16.

Conclusion: Satisfactory progress to date.

6. OPERATING EXPERIENCE FEEDBACK

6.5 ANALYSIS

The cause analysis of significant events is performed according to a written process. The team identified instances where events were not investigated in-depth. The team recommends an improvement of the effectiveness of the root cause analysis process.

The follow-up of corrective actions derived from low level events (Plan d'Action Corrective - PAC) is not yet fully established at the plant level. Currently, there are some departments that perform their own overview on the corrective actions from low level events. The review also revealed, *inter alia*, some significant delays in the implementation of corrective actions of low level events. A comprehensive retrieval of information on low level events from all respective departments cannot be performed. The team suggests the plant to proceed with the full integration of the various databases to allow a consistent monitoring of the implementation of follow-up actions due to low level events.

DETAILED OPERATING EXPERIENCE FINDINGS

6.5. ANALYSIS

6.5(1) Issue: Weaknesses exist in the root cause analyses process at the plant.

The following facts relate to this issue:

- The root cause analysis report of the event (D5320/ESS/2/046/2011) involving a feed-water re-heater tube leak and resulting in a unit 2 scram on steam generator (SG) high level on 29 August 2011 did not address the following issues:
- One of the corrective actions identified was the modification of a feed-water re-heater high level alarm response procedure which is expected to be completed by April 2012. However, no interim temporary measures were identified in the root cause analysis report to prevent similar consequences from a repeat event during the interim period of eight months.
- During this event, a feed-water re-heater high level alarm was announced in the control room followed approximately four hours later by a SG low level and finally a reactor scram after one more hour. The operator took various actions including speed manipulation of the pump but the reactor scram could not be prevented. The plant has treated this event purely as an equipment related issue and a human factor expert was not involved with the analysis of this event.
- The existing alarm response procedure for decreasing SG level does not differentiate between decrease in the level in one or more SGs. In the root cause analysis, this issue has not been addressed.
  - Three reportable events of 2009–2010, regarding missed surveillance test/repetition of same test, on safety systems were reviewed by the team. While the cause of the problem in each test has been individually analyzed and corrective actions taken, no common cause analysis in scheduling/planning of such safety system tests has been carried out.
  - The root cause analysis process for significant events does not contain any formal requirement of checking and recording if a similar event had taken place earlier in the plant/fleet. Absence of such a requirement can result in lack of learning from previous similar events and the possibility of recurrence of events.
  - No requirement for retraining of the event investigators for root cause analysis exists at the plant. Some of these investigators have been trained as far back as 10 years.

Without proper identification and analysis of the causes of an event and subsequent development of the appropriate corrective actions the plant will miss opportunities to prevent, for example, recurrence of events.

Recommendation: The plant should improve the effectiveness of its root cause analysis process.

IAEA Basis:

SSR-2/2

5.28. Events with safety implications shall be investigated in accordance with their actual or potential significance. Events with significant implications for safety shall be investigated to identify their direct and root causes, including causes relating to equipment design, operation and maintenance, or to human and organizational factors. The results of such analyses shall be included, as appropriate, in relevant training programmes and shall be used in reviewing procedures and instructions. Plant event reports and non-radiation-related accident reports shall identify tasks for which inadequate training may be contributing to equipment damage, excessive unavailability of equipment, the need for unscheduled maintenance work, the need for repetition of work, unsafe practices or lack of adherence to approved procedures.

NS-G-2.11

4.3. The level of the investigation carried out should be commensurate with the consequences of an event and the frequency of recurring events. Significant factors that would influence the magnitude of an investigation may include the following: …….

—Whether a similar occurrence has taken place earlier at the same installation or at an installation of a similar type; etc.

Appendix III.3.: Training (both initial and refresher) should be provided for the staff who might take part in an investigation. This should include training in investigation techniques, documentation needs, witness interviews, conflict resolution and dealing with confidentiality issues……..Whereas all investigators should receive some basic training in event investigation, including root cause analysis, for more difficult and complex investigations there may need to be at least one expert facilitator who is familiar with such methods of investigation.

Plant response/Action:

<u>Elements of response:</u>

1 – The station has volunteered to pilot a new event investigation method advocated by WANO, starting at the beginning of 2012.

2 – Training provided to seven volunteers: Senior advisor for safety and quality, two safety engineers, one shift manager, one member of the engineering department, one member of the risk prevention department, one human factors advisor, and one PACMAN contractor

3 – Pilot investigations into two safety-significant events in week two of 2012: identification of additional prerequisites for the successful implementation of the new root-cause investigation method.

4 – On 08/04/2013, decision taken to apply the method to all safety-significant event investigations, using the skills of those trained for the pilot initiative

5 – As of 01/09/2013, decision to apply the method to all significant events

<u>Remaining actions:</u>

1 – Training of seven pilot investigators in April 2012

1 – Two safety-significant event reports written with the new method in week two of 2012

2 – On 08/04/2013, decision by the safety review committee to adopt the new method for all investigations

3 – Group of significant event report authors trained to use the new method

Evidence:

1 – 2 safety-significant event reports written using the new method

2 – Safety committee decision of 8 April 2013

3 – Any significant event report written with the new method after 08/04/2013

IAEA comments:

The plant indicated that the recommendation made by the OSART team was strengthened after the mission by identification of other events with identified root cause analysis deficiencies allowing to an improved awareness of the necessity to resolve the issue.

To improve the root cause analysis, a new analysis method based on a WANO-method adapted to EDF was developed at corporate level and the plant took part in this project.

In addition to the revised root cause analysis method, the associated organization, including a systematic involvement of a human factors expert, a manager and an analyst (so called *Pilotes stratégique et opérationnel*) in charge of the root cause analysis was decided and implemented.

In view of the implementation of the new revised root cause analysis method and organization, the requested training was delivered to the designated pool of analysts/experts and the needed support material developed (root cause analysis guidance…).

The revised root cause analysis method was tested successfully for some safety significant events and it is planned to apply the revised root cause analysis method from mid-June 2013 for any safety significant event and from September 2013 for significant events other than safety related (radiation protection, transport, environment…).

The expected improvement (added value) from the revised root cause analysis method were presented and discussed based on two analyzed events.

Moreover, the revised root cause analysis method could also be used on a simplified manner to cover other simpler/less significant events (in connection with the suggestion 6.5(2), see below) using the same basis, principles and method.

Conclusion: Issue resolved.

6.5(2)Issue: The systematic overall assessment of low level events is impeded by the use of separate databases in different NPP departments.

- The performance departments for units 1/2 and for units 3/4 (PERF 1/2; PERF 3/4) use independent databases FURACS and LISA, respectively; only about 5 persons have access to these databases for low level events.
- There is no systematic follow-up of corrective actions on low level events in the SEA department (automated systems and electricity) - delays of more than six months detected in some cases.
- Work request database (SYGMA) is not connected to other databases.
- The Corrective Action Plan database PAC does not include low level events from all departments.
- The input in the TERRAIN database is restricted to managers (about 250 persons). There is no current input by other personnel and contractors.

Without an integration of the various databases, the efficiency of the generic follow-up of low level operating experience and the analysis of common aspects of low level events at different departments are degraded and thus the barriers for event prevention are weakened.

Suggestion: The plant should consider enhancing its database storage of low level events to a fully integrated database system.

IAEA Basis

SSR-2/2

5.27. The operating organization shall establish and implement a programme to report, collect and screen, analyze, trend, document and communicate operating experience at the plant in a systematic way. It shall obtain and evaluate information on relevant operating experience at other nuclear installations to draw lessons for its own operations. It shall also encourage the exchange of experience within national and international systems for the feedback of operating experience. Relevant lessons from other industries shall also be taken into consideration, as necessary.

5.31. The operating organization shall be responsible for instilling an attitude among plant personnel that encourages the reporting of all events, including low level events and near misses, potential problems relating to equipment failures, shortcomings in human performance, procedural deficiencies or inconsistencies in documentation that are relevant to safety.

NS-G-2.11

ANNEX 1 - DATA MANAGEMENT FOR THE FEEDBACK OF OPERATING EXPERIENCE - LOW LEVEL EVENTS

I–2.: Owing to the large number of low level events that may occur and the difficulties in determining the useful elements of such information, it is generally accepted that low level events are dealt with by the operating organization, perhaps with the aid of computerized systems (databases) that can effectively sort and manage the large quantities of data accumulated.

I–5.: It is useful to develop a standard data input sheet for gathering information from the narrative report to facilitate computerized storage and retrieval. ...

I–7.: Linkage of the database on feedback from operational experience with programmes for other applications, such as programmes for technical information on plant design and construction, plant reliability databases, performance indicators and other analytical programmes, can enhance overall nuclear safety assessment.

NS-G-2.4

6.64. The operating experience at the plant should be evaluated in a systematic way, primarily to make certain that no safety relevant event goes undetected. Low level events and near misses should be reported and reviewed thoroughly as potential precursors to degraded safety performance. …

Plant response/Action:

Elements of response

Fact 4

The site approach is integrated based on two complementary prongs:

- Equipment findings are collected in the Sygma application and are trended in equipment and system health reports managed by AP913.
- Organisational and human performance findings are collected by the corrective action programme.

The new nuclear information system (SDIN) to be deployed at Cattenom by the end of 2014 provides a connection between the two approaches.

Facts 1 to 3:

The site carried out diagnostics in February 2011, resulting in the site launching a corrective action programme project whose roadmap was approved by senior management in May 2011. This roadmap, whose deployment started in September 2011, was presented to corporate level and approved in December 2012. It stipulates complete deployment of the corrective action programme in summer 2014 and especially:

- Progressive integration of the different low level events detected in the Terrain application in the corrective action programme.
- Tracking and coordination of the corrective actions and analyses covering the low level events in the corrective action programme with setting up of weekly meetings (RMPAC-H).
- Opening up to all EDF site personnel in August 2013.

The organisation currently set up is as follows:

- Findings review meeting
  - Frequency: every day from Monday to Friday from 13.30 to 14.00 (since 20 September 2012 – held on a weekly basis between November 2011 and September 2012)
    - Participants: departmental corrective action programme representatives + the corrective action programme project manager
    - Objective: classify the findings and propose processing for every finding detected 2 days before.
- Daily managerial corrective action programme meeting (RMPAC-J)

  - Frequency: every day from Monday to Friday from 8.05 to 8.10 (since 21 September 2012 – held on a weekly basis between November 2011 and September 2012)
  - Participants: department heads + the corrective action programme project manager + a representative of senior management
  - Objective: validate the proposals made by the findings review meeting the day before
- Weekly managerial corrective action programme meeting (RMPAC-H)
  - Frequency: every Monday from 15.15 to 15.45 (since January 2013)
  - Participants: the members of the extended management team
  - Objective: present and discuss the analyses carried out with the managerial line
- Quarterly managerial corrective action programme meeting (RMPAC-M)
  - Frequency: once a quarter (Monday afternoon) (since March 2012)
  - Participants: the members of the extended management team
  - Objective: present the corrective action programme performance indicators and trending of the quarterly findings.
- Process and sub-process reviews the corrective action programme findings concerning the different processes and sub-processes are provided to the coordinators upstream of the reviews so as to provide the facts on the problems encountered in the field and define the improvement actions for the coming year.

The minutes of the meetings are available for each of thee committees

The scope of the corrective action programme currently corresponds to the findings derived from:

- manager field walkabouts (since September 2011)
- internal checking plan (since January 2012)
- joint industrial safety walkabouts (since March 2012)
- outage operating experience (since March 2013)
- checking carried out by the independent safety branch (since March 2013)

A handwritten collection sheet is provided for the issuers of the findings for prompt and easy data entry. These paper findings are then entered in the database by a third person.

In 2012, 75% of the findings incorporated in the corrective action programme were issued by managers and 25% were issued by personnel with other functions.

Principles of finding classification:

Every finding analysed by the corrective action programme is defined by:

- the related process, sub-process and basic process
- the department coordinating the processing
- its importance (category 4 to 1 in order of importance)
- causes of the finding (for category 2 and 1 findings)

Figures for 2012 Number of negative findings analysed by the corrective action programme	2901
Number of negative findings that cannot be used	134
Number of negative findings in category 4 for trending	2348
Number of negative findings in category 3 for corrective actions	326
Number of negative findings in category 2 for simplified analysis	90
Number of negative findings in category 1 for in-depth analysis	3

Number of corrective actions decided upon in 2012: 372

Trending

It is carried out on a quarterly basis. The findings are analysed quantitatively on two fronts:

- Process, sub-process and basic process
- Reason model (organisation, job planning, implementation and checking).

These analyses are compared to determine emergent adverse trends and assess the drifts in each sub-process.

Elements of visibility: *(remaining actions)*

The corrective action programme is deployed in compliance with the roadmap.

During the coming months, the other types of findings (post-job review and triggering of C2 alarms) will be incorporated in the scope of the corrective action programme.

Opening up of the issue of findings to all EDF personnel and then to all maintenance workers

These two stages are planned in the roadmap for summer 2013 and February 2014 respectively.

Evidence:

- Minutes of the different committee meetings available in the Goliath database Coordinate
- Performance indicators and trending of the corrective action programme on a quarterly basis
- Terrain database of findings, analyses and corrective actions.
- Organisation memo NO 9/4 describing deployment of the corrective action programme project

IAEA comments: An action plan and associated roadmap were developed to incorporate systematically all the organizational and human findings in an integrated database (called PAC for Corrective Actions Program). This project was launched before the OSART mission

(2011) and the developed action plan and roadmap, approved at corporate level at the end of 2012, is expected to be fully realized in September 2013 for all EDF personnel and in February 2014 for all other personnel.

In the meantime, the performance of the PAC has been demonstrated: the responsibilities and resources are defined and allocated, the working and management methods are in place (daily, weekly, and quarterly meetings…) and the outcomes are already used to feed the yearly review of the plant (sub)processes in the framework of the integrated management system (continuous improvement).

Discussion and interviews with PAC users confirmed the performance of the PAC.

Therefore, low level events are now collected by all plant departments and services in a structured way using an integrated and unique database.

Conclusion: Issue resolved.

7. RADIATION PROTECTION

7.3 CONTROL OF OCCUPATIONAL EXPOSURE

Innovations in dose saving techniques are an essential part of the continuous improvement process to reduce occupational exposure. The team identified that the plant has developed a technique for the handling, movement and storage of neutron calibration sources and the team considers this to be a good practice.

7.4. RADIATION PROTECTION INSTRUMENTATION, PROTECTIVE CLOTHING, AND FACILITIES

The availability of tools, instrumentation and equipment in the Radiological Controlled Area is controlled by a store positioned at the entrance to each of the Units. However, during the plant tours, the team noted deficiencies in the arrangements for the temporary storage and identification of contaminated tools and waste. The team developed a recommendation in this area.

DETAILED RADIATION PROTECTION FINDINGS

7.3 CONTROL OF OCCUPATIONAL EXPOSURE

7.3(a) Good Practice: Dose reduction techniques for the storage, transport and handling of a high activity neutron source.

The plant has developed a technique to reduce radiation exposure during calibration work when using a high activity neutron calibration source.

The source itself is secured within a shrink wrapped colored plastic net. This is applied by the plant. It has two advantages allowing it to be instantly seen and also enabling it to be easily picked up with remote tongs without any fear of slippage or loss. This enables a quick transfer to a shielded container for movement. Radiation exposure during the visual identification, handling and transfer of the source are minimized.

The movement container has wheels, allowing it to be easily moved to any area on the plant for the calibration of the installed nuclear neutron instrumentation. At the point of work, the source can easily be removed with the remote tongs on the netting to reduce the operator's exposure time during the calibration of the instrumentation.

This practice reduces the neutron radiation exposure to the operator during the use, transport and storage of a high activity neutron source.

7.4 RADIATION PROTECTION INSTRUMENTATION, PROTECTIVE CLOTHING AND FACILITIES

7.4 (1) Issue: The identification and storage of contaminated material and waste is not fully controlled.

The team observed the following:

UNIT 4 AUXILIARY BUILDING, +10.0 M and 0.00 M LEVELS

- Temporary storage of contaminated equipment wrapped in black vinyl. Signs are attached to the temporary barrier indicating that there is no radiological hazard. However, on contact, radiation reading measured by the team indicated 0.080mSv/h.
- Temporary storage area of equipment. The sign attached to the barrier indicates that there is no radiological hazard. Inspection revealed it contained an item wrapped in black vinyl which is specified for contaminated equipment.
- Temporary storage area has contaminated materials in black vinyl which are not securely wrapped and the contents are exposed to the environment.

UNIT 3 AUXILIARY BUILDING, +6.60 M and 0.00 M LEVELS

- Items are stored in the corridor awaiting removal from the building. One large contaminated item wrapped in black vinyl is stored here; it has no signage to identify the potential risk, nor the bordered area.
- Further contaminated equipment is stored wrapped in black vinyl. The vinyl wrapping is damaged exposing the contaminated contents.
- In another storage area on the opposite side of the corridor there are two waste containers. Although the signage identifies the radiological risk, both containers have radiation hotspots signs on them but there are no access restrictions to the area.

Inadequate control of containment, identification and storage of contaminated equipment and waste can result in an increased radiological risk to plant workers.

Recommendation: The plant should enhance its controls for the identification and temporary storage of radioactive material and waste.

IAEA Basis:

SSR-2/2

5.10. The operating organization shall ensure that the radiation protection programme is in compliance with the requirements of the International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources [6]. The operating organization shall verify, by means of surveillance, inspections and audits, that the radiation protection programme is being correctly implemented and that its objectives are being met. The radiation protection programme shall be reviewed on a regular basis and updated if necessary.

NS-G-2.7

3.13. 'Before items are removed from any contamination zone, and in any case before they are removed from controlled areas, they are required to be monitored as appropriate (Ref. [2], para. I.23) and suitable measures should be taken to avoid undue radiation hazards'.

4.21. 'Containers for the storage of radioactive waste should be suitable for their contents and for the conditions likely to be encountered in storage in order that the integrity of the container can be maintained over the necessary storage period'.

Plant response/Action:

Elements of response

Further to the OSART mission, the site has decided to manage recommendation 7.4 by setting up strict storage arrangements. Based on the corporate baseline (D4008/27-01/07-59) and the labour code derived from the inter-ministerial orders of 5/08/92 and 31/12/99, Cattenom has set up new storage arrangements (application document 15/2/295).

These new storage arrangements have been deployed on the site since 01/01/2013.

In addition, since June 2011, the SPR has carried out monthly radiological surveys of the hot spots with the results recorded in CARTORAD (site reference database).

Elements of visibility*: (remaining actions)*

At present the first phase of the storage arrangements is operational during power operations. The departments and sections have aligned the existing temporary storage areas. For outage complete implementation is planned for unit 1 refuelling-only outage in July 2013.

Temporary arrangements have been set up for unit 4 second ten-yearly outage Storage is coordinated in the RCA by the contractor in charge of DI82 handling and monitoring.

Evidence:

Storage deviations are currently reported in field walkabouts (maintaining improved plant material condition, owners, joint industrial safety walkabouts and managerial), simple deviation findings and the round carried out by the storage supervisor. All the deviations detected are then processed with the corrective action programme process.

During the start of unit 4 ten-yearly outage, field findings concerning storage of waste in the RCA were entered into the database. An action plan was applied by the Fuel and Environment Department (SKE) to be able return to the normal situation.

If the deviation persists, the equipment has to be removed and scrapped (the costs incurred are borne by the owner).

A storage administrator was recruited for unit 4 ten-yearly outage so as to guarantee storage compliance.

A senior management message focused on storage during power operations was drafted on 18/02/2013 and sent to all the site maintenance workers.

Conduct of the monthly surveys recorded in CARTORAD complies with corporate risk prevention procedure (PNP00017).

IAEA comments:

In response to the recommendation, the plant provided an analysis and an action plan was drawn up. This action plan includes the setting up of strict storage arrangements of radioactive material and waste.

Clear application documents have improved staff knowledge and have supported plant expectations in the area of identification and storage of contaminated equipment and waste.
All radiation protection deficiencies are systematically investigated and processed with the corrective action programme process and feed-back is provided for all employees. Also the plant has set up a "hot spot" database which gives a comprehensive list of hot spots in all controlled areas. Workers can then be informed of any hot spots and their positions. In order for each worker to fulfil radiation protection expectations in the field, the plant initiated actions in the following main areas: clarification of reference standards, guidance and coaching of workers, monitoring of implementation in the field and rectification of deficiencies.

However, some actions are still not fully implemented such as, during an outage. Implementation of the temporary storage arrangements of radioactive material and the reduction of the number of temporary storages of radioactive material and waste to avoid the possible risk of contamination, are incomplete.

Conclusion: Satisfactory progress to date.

8. CHEMISTRY

8.2. CHEMISTRY CONTROL IN PLANT SYSTEMS

The plant provides extensive sampling and analysis of the steam generator blow-down system during each planned reactor shutdown. The results of the analysis are evaluated to decrease corrosion of the secondary circuit and deposits in the steam generators (SGs). Knowledge of the chemical compound structure in the crevices of the SGs helps to evaluate their integrity. This approach is recognized by the team as a good practice.

The plant has set up a programme for chemistry control. However, the team observed that the programme is not sufficiently comprehensive to cover all the activities required for effective chemistry control in the plant. Specifically, the plant has not set up a system for the detection of organic compounds in the primary circuit and the detection of impurities such as chlorides, sulfates and others in reagents such as lithium hydroxide, hydrazine and morpholine when they are dissolved for injection to the primary and the secondary circuits. Chemistry specifications do not include the expected values for concentrations of aggressive organic anions such as acetates and formates in the secondary circuit. The team suggests an improvement in this area.

8.3. CHEMISTRY SURVEILLANCE PROGRAMME

The validation of laboratory analysis methods ensures reproducibility of results irrespective of who performs the analysis and thus enhances the confidence in the laboratory results. It also ensures efficient evaluation of the instability in the analysis and its timely correction. The team recognizes the validation system at the plant as a good practice.

8.6. QUALITY CONTROL OF OPERATIONAL CHEMICALS AND OTHER SUBSTANCES

The plant has implemented a system, PMUC (Products and Materials for Use in Power Plants), and has set up a plant working group to improve the control of chemicals. Although every chemical product used and stored in the plant should be verified, registered and labeled, the team observed examples where chemicals labeling and storage practices were not followed in the field. The team suggests that the plant improves the actual chemical control programme and practices used by all plant groups including contractors.

DETAILED CHEMISTRY FINDINGS

8.2. CHEMISTRY CONTROL IN PLANT SYSTEMS

8.2(a) Good Practice: Chemistry control of the secondary side of the steam generators during shutdown reactor modes.

During each planned reactor shutdown, the plant provides extensive sampling and analysis of the steam generator blow-down system. The results of the analysis are evaluated to decrease corrosion of the secondary circuit and deposits in the steam generators (SGs). Evaluation of the quantity and identity is focused on freely bound and fixed bound compounds of the deposits.

The benefits of this control are as follows:

- Determination of the efficiency of eliminated sludge during shutdown.
- Study of the relationship between chemistry measures and steam generator blow-down during operation.
- Estimation of the chemistry characteristics of the liquid contained in the crevices and deposits on the steam generator tubes during operation.
- Support preventive maintenance of the SGs by removing freely bound deposits by high pressure water, thus extending the period before chemical re cleaning of the SGs, is required.
- Knowledge of the chemical compound structure in the crevices of the SGs helps to evaluate the life of the SGs for long term operation.
- Ensuring a stoichiometric balance of impurities that concentrate into the crevice thus minimizing the likelihood of formation of highly alkaline or acidic environment in the SGs. Plant personnel are encouraged to pursue a plant-specific approach, such as cation-to-anion ratio control, to minimize the bulk water impurities on the crevice environment.

8.2(1) Issue: The plant chemistry control programme is not sufficiently comprehensive to deal with all chemistry aspects of safety related systems.

The team found the following:

- The plant does not analyze impurities such as chlorides and sulfates in reagents (e.g. hydrazine, LiOH, morpholine) that are added, following dissolution, to the primary and secondary circuit.
- The plant does not carry out measurement of organic compounds that assists in revealing potential intrusion of resin into the reactor cooling water and thus provide control on fuel deposits.
- The plant does not carry out measurement of organic compounds that assists in revealing potential intrusion of resin to the demineralized water. Chemistry specifications for these measurements have not yet been set up.
- Chemistry specifications do not include the required values (action level or expected value) for concentrations of aggressive organic anions such as acetates and formates in the secondary circuit in full power operation.
- Written chemistry specifications for oils are not available in the oil warehouse.

Without an adequate chemistry control programme, the plant may not be able to deal with all chemistry aspects of safety related systems which may have an adverse impact on these systems.

Suggestion: The plant should consider enhancing the chemistry control program to deal with all chemistry aspects of safety related systems to avoid the potential adverse impact on these systems.

IAEA Basis

SSR- 2/2

7.17. The use of chemicals in the plant, including chemicals brought in by contractors, shall be kept under close control. The appropriate control measures shall be put in place to ensure that the use of chemical substances and reagents does not adversely affect equipment or lead to its degradation.

SSG - 13

3.3. The chemistry programme should include procedures for selection, monitoring and analysis of the chemistry regime, instructions for operations involving chemistry processes and evaluation of operating results, the operation and reference limits for chemistry parameters and action levels and possible feedback from operating experience.

3.4. The chemistry programme should ensure that:

n) Sources of impurities in the water systems are known and actions for minimizing these sources are implemented.

4.6. The chemistry control programme should be used to confirm, from records, that chemistry control parameters and diagnostic parameters remain within thein specified ranges.

Records from the chemistry control programme should be controlled and reviewed and any deviations should be analysed in conformance with the management system of the operating organization.

4.13 The concentration of the chemical inhibitors that are added to cooling systems should adequately be controlled and monitored. The chemistry parameters to keep the proper treatment and the impurities should be controlled to minimize corrosion of the system and loss of integrity

4.30. The concentration of chemical compounds with a low solubility (that may deposit on the fuel surface and cause a temperature increase and consequently a fuel cladding failure)should be kept at minimum. Such chemical compounds include calcium, magnesium,aluminium and potentially silica (considered as potentially zeolite forming elements) andorganic compounds.

9.1. A policy should be established to prevent the use of chemicals or other substances that could introduce potentially harmful impurities into plant areas or circuits, thereby affecting the coolant, auxiliary and safety systems, or other external surfaces.

9.5. The reagents and ion exchange resins used for any safety related systém should be within the required specifications with regard to impurities and this should be verified before their use.

Plant response/Action:

Elements of response:

The request for analysis depends on the contamination risk associated with conditioning products. We do have analysis certificates for conditioning products. Furthermore, in order to avoid contamination risks, we take additional precautions against the risk of inadvertent contamination.

1. The station has acquired a TOC monitoring instrument. TOC analysis in the primary circuit has been incorporated into AP 11-05 objectives**.** In the meanwhile, we are carrying out two measurements in the primary circuit on a trial basis.
2. The station has been carrying out TOC measurements in its demineralised water since July 2012.
3. As part of the AP11-05 initiative, the station plans to address these issues but owing to the time frames required for completing the necessary studies, this cannot be done in the short term. We then have to complete the document revision process before the new arrangements are deployed across the fleet, which explains why an implementation deadline has been set for the end of 2016. In addition, CEIDRE might not define action or limit values for all parameters. Guidelines do not define values for all parameters, specifically in the case of "diagnostic" parameters which are used for trending purposes or as performance indicators. Nevertheless, the plant chemical engineering section is determining a station-specific investigation threshold beyond which chemists will have to start investigating the causes of unusual conditions.

4. The mechanical/electrical maintenance department now receives a copy of analysis certificates for oil and grease drums coming from the store. The original certificates are kept in the general store.

Remaining actions:

1. Ensuring that the chemistry sections possess a copy of analysis certificates for conditioning products which are directly ordered, such as oxygenated water. In order to avoid contamination risks, we will have to control access to conditioning products. The unit 1&2 chemistry section is examining the possibility of purchasing plugs or seals in order to prevent pre-prepared containers (lithium) or decanted products (hydrazine) from being opened. Our procedure for the preparation of lithium hydroxide, which includes precautions against the risk of inadvertent contamination, has not yet been entered into the electronic document database (as at 20/03/2013).
2. The unit 1&2 chemistry section will take a second TOC measurement in the primary circuit on a trial basis. Results of the first measurement still need to be entered into the MERLIN database.
3. Although the instrument is in service, the measuring procedure ref. GA7221 (D5320GAPF512157) and technical guide ref. GT6231 (D5320GTPF512083) have not yet been entered into the electronic document database (as at 20/03/2013).
4. On 06/03/2013, we asked the chemical engineering function to provided us with reference values for acetate and formiate measurements (in the feed-water flow control system), which we would use as investigation thresholds. We have not yet received a response as at 20/03/2013.
5. Organisational procedure ref. 6.7 (management of nuclear-grade substances and materials) has been amended in order for the solution to rely on organisational arrangements rather than on people, but the document is still not in the electronic document database (as at 20/03/2013).

Evidence:

1. Morpholine and hydrazine drums are fitted with a seal that prevents inadvertent contamination incidents. Similarly, we have installed an FME cover to protect trisodium phosphate preparations. Lockable cabinets for conditioning products have been installed in auxiliary buildings 3 and 4 in order to control access to conditioning products in terms of contamination risk. There is no evidence for conditioning products in auxiliary buildings 1 and 2 as at 20/03/2013.
2. An initial analysis has been performed on the unit-2 reactor coolant system, but as the data has not been recorded in MERLIN, there is no available evidence as at 20/03/20213.
3. Monthly TOC measurements in demineralised water have been recorded in the MERLIN database since July 2012.
4. There is no evidence as the response provided by the corporate organisation (CEIDRE) does not lead us to believe that we will be able to respond positively to the reviewer's request; moreover, no reply has yet been received from the station's chemical engineering section as at 20/03/2013.
5. There is no evidence as organisational procedure no. NO6-7 rev. 5 has not yet been entered into the electronic document database (as at 20/03/2013).

IAEA comments:

The chemistry specifications policy-maker has updated the current chemistry requirements for plant systems regarding organic compounds and additional precautions against the risk of inadvertent contamination of reagents.

Enhanced control is performed for lithium, morpholine, hydrazine and ammonia concentrations, and also for aggressive inorganic impurities in the plant systems. For this control the plan uses FME tools too. The plant now monitors total organic carbon (TOC) in demineralised water regularly. For the primary circuit the TOC analysis method has been tested and verified. However, this method is not fully implemented.

The plant has set up the reference values for acetate and formate measurements (in the feed-water flow control system), which they now use as investigation thresholds.

Conclusion: Satisfactory progress to date.

8.3. CHEMISTRY SURVEILLANCE PROGRAMME

8.3(a) Good Practice: The validation system for laboratory analysis methods.

The validation process of the analytical methods, including sampling, allows evaluation of the measurement method of chemical, radiochemical and eco-toxicological parameters in real time. Extensive tests are performed independently by five technicians for statistical evaluation of linearity, repeatability, reliability, reproducibility and accuracy, detection limit of test method and limit of determination of methods used. This allows them to calculate an uncertainty of determination including the sampling and the so-called Z-score (tool used for inter comparison). These tests are carried out every year.

The benefits of this control are as follows:

- The validation of laboratory analysis ensures reproducibility of results irrespective of who performs the analysis and thus enhances the confidence in the laboratory results.
- Published measurement results from the laboratories are therefore irrefutable in the chemistry, radiochemistry and eco-toxicological areas.
- Maintenance of technical skills is a part of the validation method.
- The efficient evaluation of the instability in the analysis and its timely correction.
- The validation method ensures and proves that the measuring devices in the chemical laboratory consistently achieve the precision necessary to carry out tests to a specified level.

8.6. QUALITY CONTROL OF OPERATIONAL CHEMICALS AND OTHER SUBSTANCES

8.6(1) Issue: Labeling and storage of chemicals does not adequately support their effective control and usage in the plant.

During the review the team noted:

- In the warehouse, some chemicals were not labeled with an expiry date: e.g. Coolelf Supra GF NP for conditioning of diesel generator cooling water, Lewatit resins for the purification systems, boric acid and a number of other chemicals.
- In the storage area of the BET laboratory of units 1 and 3, lithium hydroxide was not labeled with an expiry date.
- In an auxiliary building inside the BAN laboratory of unit 1, hydrazine was not stored in a locked box. PMUC (Products and Materials for Use in Power Plants) pictogram was damaged and no expiry date was displayed on this chemical.
- In the auxiliary building inside the hot workshop of unit 3:
  1. Detergent NG 2001 N, which is under PMUC control was stored open and without an expiry date.
  2. Drum containing what seemed to be oil was not labeled.
  3. Drum containing Amberlite resin was labeled as toxic instead of irritate and drum containing a liquid was found without any label.
- Triaxol which is under PMUC control was found without an expiry date inside the warehouse of auxiliary building of unit 3.

Deficiencies in labeling and storage of chemicals could lead to their inappropriate usage and personnel injury.

Suggestion: Consideration should be given to improving the labeling and storage of chemicals in order to avoid inappropriate chemical usage and personnel injury.

IAEA Basis:

SSR-2/2

7.17. The use of chemicals in the plant, including chemicals brought in by contractors, shall be kept under close control. The appropriate control measures shall be put in place to ensure that the use of chemical substances and reagents does not adversely affect equipment or lead to its degradation.

SSG-13

9.3. The intrusion of non-conforming chemicals or other substances into plant systems can result in chemistry excursions leading to component and system damage or increase of dose rate.

9.9. Chemicals and substances should be labeled according to the area where they can be used, so that they can be clearly identified. The label should indicate the shelf life of the material.

9.16. The storage of chemicals should take into account the reduced shelf life of opened containers. Unsealed and partly emptied containers should be stored in such a manner that the quality of the remaining product is kept in a satisfactory condition.

Plant response/Action:

<u>Elements of response</u>

1./ Updating of application document NA151325: Hazardous and toxic products and materials – packaging, labelling, storage and compatibility rules (D5320/NA/15/PR/603064)

2./ Response of the specialisations (chemistry and ARE) to application of this document for their activities ➔ the new elements of this document have been incorporated by the specialisations

3./ Setting up of the hazardous products working group (October 2012):

Objectives:

- eliminate the products not on the corporate list (before the OSART mission: 120 products not on the corporate list and as at 13/02/2013: 110 products not on the corporate list 20 of which were the subject of a request for integration in the corporate reference list). For these 20 products, corporate is in charge of integrating 11 of them in the corporate list (CEIDRE Purchasing Division) and the site is in charge of the other 9 (request for integration made).
- At present, the site has 90 products not on the corporate list to be handled (actions of the chemicals working group and integration in the corporate reference list).
- Check labelling and storage of chemicals (presence of safety datasheets and site instruction sheets)

4. Progressive updating of Olimp for management of the chemicals used by EDF (integrate the recent safety datasheets from 2010: factoring in the new classification, labelling and packaging (CLP) regulation and new labelling). Since the OSART mission, 59 products (requests for integration) have been created in Olimp.

5. Field walkabouts shall be carried out to check application of NA151325 for the checking of labelling, storage and compatibility of chemicals:

- 4 field walkabouts have been carried out (ARE, Units 1 & 2 Performance Department, units 3 & 4 Performance Department and the Mechanical Maintenance Department): the processing of the deviations shall be closed out by the end of March 2013.

- 3 field walkabouts shall be scheduled for the general warehouse, the mechanical maintenance and I & C and electricity workshops and the maintenance building workshop.

Elements of visibility: (remaining actions)

1./ Continue the work of the working group After drawing up a list of chemicals used by each of the specialisations (chemistry and maintenance), it should be considered for each product whether it can be replaced with a product from the corporate list, it can be used by 4 sites and therefore can be integrated in the corporate list and then the actions should be carried out for each product.

Evidence:

- Document NA151325 rev 03 (updated: labelling, pictogram, storage and compatibility of chemicals)
- A chemicals working group sheet in A4 format (context, scope, expected composition, role of each member and frequency of the meetings)
- Minutes of the chemical working group meetings (October 2012. January 2013 and March 2013)
- E-mails exchanged with the Performance Departments concerning updating of NA151325 (storage, labelling and new pictograms and annual checking of the chemicals cabinets.
- E-mails in response (the Performance Departments and ARE) concerning incorporation of the new revision of NA151325 and these new elements
- Olimp database and the latest site highlights (integration of the recent safety datasheets)
- A table containing the action plan and processing of deviations further to checking carried out in the field (Units 1 & 2 Performance Department, units 3 & 4 Performance Department, Mechanical Maintenance Department and ARE).

IAEA comments:

The plant has revised the whole process of procurement and quality control of chemicals and other substances, clearly defining the responsibilities and authority of different departments within this process. Through the OLIMP electronic system (Safety sheets), criteria for quality and safety as well as the extent of declared parameters verification with regard to the purpose of particular use was implemented ensuring that only chemicals meeting defined criteria are being procured. For new, unused chemicals and substances, approval of the national entity CEIDRE is necessary before starting the procurement process. The chemicals and other substances have been jointly designated by their expiry date, number of their batch, date of their opening etc. The plant has provided extensive professional retraining focused on handling chemicals and other substances.

Conclusion: Issue resolved.

9. EMERGENCY PLANNING AND PREPAREDNESS

9.2. RESPONSE FUNCTIONS

At the plant, a person with the authority to initiate, in all cases, the on-site emergency plan and the off-site notification process is not present on a 24-hour basis. This could, in unfavorable circumstances, impair the emergency response implementation. The team recommends that there is a permanent presence on-site of a person with the authority to initiate in all circumstances, promptly and without consultation, the on-site emergency plan and the off-site notification process.

The plant deploys a robust, diversified and redundant telecommunication system in the on-site emergency facilities associated with a specific sticker identification and a dedicated information booklet, called MEMOTEC ("*MEmento des MOyens de TElécommunication de Crise*", Memento of crisis communication means), which is available to all emergency response staff. The team recognizes this equipment and support tools as a good practice.

In case of activation of the on-site emergency plan, arrangements are implemented to ensure the protection of the individuals present on the site and the emergency response staff (assembly points, accounting, etc.). However, additional arrangements such as the installation of automatic continuous radiation monitoring in the emergency facilities (MCR, ELC, BDS, media centre…) and in the on-site assembly rooms (inside the buildings) could facilitate and improve the protection of the persons while simplifying the required actions for the radiation monitoring during emergency. The team encourages the plant to take the initiatives and steps to improve and optimize the protection of the persons present on the site during an emergency.

9.6. EMERGENCY EQUIPMENT AND RESOURCES

The group in charge of the radiological assessment (PCC) has efficient means of allowing it to have a comprehensive overview of the radiological situation outside the site in case the on-site emergency plan has been triggered. Indeed, the PCC room, located in the On-site Emergency Centre (BDS), has an online visualization system (on a map) of the ambient dose rates from the radiation monitoring vehicles deployed during an emergency connected with a GPS tracking system. The team acknowledges this system as a good practice.

9.7. TRAINING, DRILLS AND EXERCISES

The technical support emergency response staff (all ELC1 and ELC2 members) follows an intensive yearly refresher course of 4 days, during which an exercise (of about 2½ hours) is systematically done together with a shift training session on the simulator, allowing the exercising of interfaces between the technical support group (ELC) and the main control room. The team considers this intensive refresher training as a good performance.

DETAILED EMERGENCY PLANNING AND PREPAREDNESS FINDINGS

9.2. RESPONSE FUNCTIONS

9.2(1) Issue: There is no permanent presence at the plant of a person with the authority to initiate, in all cases, promptly and without consultation, the on-site emergency plan and the off-site notification process.

- The Emergency Director (PCD1) is the holder of the Management-on-duty position.
- PCD1 is responsible to activate the on-site emergency plan (OSEP) and to alert the off-site authorities.
- PCD1 is present at the plant during office hours only.
- By delegation, the shift supervisor (CE) could activate the local actions of the OSEP (activation of the on-site emergency sirens ‘CNA’ (for assembling people…) and calling on-duty Emergency Response staff) if PCD1 cannot be contacted.
  - In the context of a complete revision of the OSEP, to be implemented at all EDF NPPs for 15 November 2012, a further delegation of the shift supervisor in case of reaching the criteria for triggering the reflex response mode will be provided for, allowing him to activate the 2 off-site warning sirens and the population phone calling system SAPPRE (*Système d'Alerte de la Population en Phase Réflexe*, Alert system of the population in reflex response mode).

    However, this extended delegation to the shift supervisor does not cover the notification of the public authorities in case the OSEP has to be activated while PCD1 could not be contacted but while immediate protective actions for the population are still not required (i.e. if the criteria for triggering the reflex response mode are not reached).

The absence of a permanent presence at the plant of an authorized person to initiate in all circumstances and without consultation, the on-site emergency plan and to notify the off-site authorities could cause unnecessary delays in implementing the emergency response.

Recommendation: The plant should ensure the permanent presence at the plant of a person with the authority to initiate, in all cases, promptly and without consultation, the on-site emergency plan and the off-site notification process.

IAEA Basis:

GS-R-2
4.23 “Each facility….shall have a person on the site at all times with the authority and responsibilities….upon classification [of an emergency] promptly and without consultation to initiate an appropriate on-site response; to notify the appropriate off-site notification point; and to provide sufficient information for an effective off-site response”

SSR-2/2
5.2 “… Emergency preparedness arrangements shall include arrangements for the prompt declaration of an emergency, timely notification and alerting of response personnel … and the necessary provision of information to the authorities.”

Plant response/Action:

Treatment

The Shift Manager works shifts and is, in every case, the duty holder for safety in real time. He is the site representative for senior management and as such has delegation from the Plant Manager to take any immediate measures to protect personnel and operate plant. In particular, he can trigger the on-site emergency plan, especially outside office hours. However, as soon as the PCD1 is present on site, he takes over direction of emergency response management in all its facets.

If precise and pre-defined criteria are met, the Shift Manager calls the PCD1 and asks him to activate the on-site emergency plan. During office hours, the PCD1 present on site decides on activation of the on-site emergency plan. Outside office hours, the Shift Manager calls the PCD1 so that the latter can raise the alert by carrying out the first deployment actions before going to the site. If the PCD1 cannot be reached, the duty Shift Manager activates the on-site emergency plan (deployment of the site on-call teams and protection of personnel on site).

Further to the change in the emergency response baseline (15/11/2012), if a criterion for triggering the reflex response phase of the off-site emergency plan is met and if the PCD1 cannot be reached, the Shift Manager has delegation to activate the off-site sirens and the population phone calling system (SAPPRE). The Prefecture is integrated in the automatic calling system (SAPPRE – local alert system). The PDC1 contacts the Prefecture so as to leave the Shift Manger free to carry out his control room monitoring actions (TMI operating experience – fundamental safety point).The Shift Manager present on site round the clock therefore has the necessary authority to initiate the appropriate actions immediately without consultation.

A person with the authority to decide on activation of the on-site emergency plan and the reflex response phase of the off-site emergency plan is thus always present on site. This involves either the Emergency Response Director (PCD1) or the Shift Manager if the former cannot be reached.

With slower dynamics not requiring activation of the reflex response phase of the off-site emergency plan, all of the site PCD1 (numbering 5) are notified in the event of an emergency and a PCD1 can notify the Prefecture. The organisation is robust enough to respond in keeping with expectations.

Operating experience from the past few years demonstrates effectiveness of the notification phase and total availability of all the PCD1.

Evidence: (with photos)

- Action sheet of the PCL1 for the on-site emergency plan
- Letter of delegation issued to the Shift Manager for activation of the off-site emergency plan and SAPPRE

SAPPRE code used by the Shift Manager

IAEA comments:

According to the plant response, new on-site emergency preparedness and response (EP&R) arrangements were implemented in the plant on 15/11/2012, based on generic EDF fleet EP&R arrangements.

These new arrangements include explicit delegation to the PCL1 (CE-Shift Manager) to trigger the on-site plan and on-site response if the plant emergency director (PCD1) cannot be reached.

According to the new EP&R arrangements, the PCL1 (CE-Shift Manager) has also an explicit delegation to initiate the alert to the population using the off-site sirens and the population phone calling system (SAPPRE-system) in the specific case of “reflex”-phase if a criterion to trigger the reflex response mode is met and if PCD1 cannot be reached. It should be underlined that these reflex response actions do not include, for PCL1 (CE-Shift Manager), the notification of off-site authorities and bodies (Prefecture, French nuclear safety authority ASN…).

For other cases (outside the “reflex”-phase), records from drills and real emergencies (injuries, small fire…) confirm the ability to contact very quickly PCD1 (or alternate) in order to be able to proceed promptly with the notification of the off-site authorities and bodies.

Based on the above plant response, the plant EP&P arrangements are however not fully compliant with the current IAEA safety standard requirements regarding the ability to initiate, in all cases, promptly and without consultation, the on-site emergency plan and the off-site notification process as there is no delegation to PCL1 (CE-Shift Manager) to notify the off-site authorities and bodies and as PCD1 has still to be contacted before to initiate the emergency response actions.

Conclusion: Insufficient progress to date.

9.2 (a) Good Practice: Robust, diversified and redundant telecommunication means deployed in the various on-site emergency response facilities.

The on-site emergency response facilities are equipped with various telecommunication means. These are redundant and diversified in order to guarantee the availability of communication channels needed to communicate the required decisions or recommendations and to communicate with the off-site authorities.

These telecommunication means are:

- Wired channels
  - normal ("PUI Site") and secure ("PUI Sûreté") site networks
  - direct external lines ("PUI SATS" (*Services d'audioconférences et de télécopies sécurisés*, Audioconference and fax secured services) & "PUI Extérieur")
  - intercom between emergency facilities ("PUI Interphonie")
- Radio communications
  - wireless phones (Digital Enhanced Cordless Telephone, DECT)
  - TETRA radios (PUI TETRA)
  - Pagers
- Satellite (PUI Satellite)
  - INMARSAT
  - IRRIDIUM
  - SELCA (*Système d'Echanges Local Cattenom-Autorités,* local system for exchanges between Cattenom and authorities) used for alerting and information exchange with Luxembourg and Germany
  - VSAT
- These means are located in the different emergency facilities of the site:
- On-site Emergency Centre (BDS)
- On-site Technical Support Centre (ELC)
- Main Control Room
- Assembly points inside the buildings
- Gathering rooms for the rescuers (PRS)
- Fall-back centre
- Media centre

- Medical service
- Security post (PCP)

The VSAT satellite system installed at the Cattenom NPP forms a fully independent network between on-site emergency facilities and the EDF national support allowing communication among the emergency facilities even in the case of a total isolation of the site.

Each of these “PUI” telecommunication means is identified by a specific color sticker facilitating their identification and category. In addition, each emergency response function have at their disposal an information booklet, called MEMOTEC (MEmento des MOyens de Telécommunication de Crise, Memento of crisis communication means), giving practical indications on each telecommunication means (who am I?, identification/visualization of the connections…).

9.6. EMERGENCY EQUIPMENT AND RESOURCES

9.6 (a) Good Practice: Efficient follow-up by the Radiological Assessment Group (PCC) of the off-site radiological situation using real-time ambient dose rate data.

The Radiation Monitoring vehicles, to be deployed during an emergency, are equipped with a gamma dose rate system connected with a GPS system allowing the PCC staff to track their location continuously on a map. The ambient dose rates measured, every 10 seconds, by this system are displayed on the dashboard and transmitted by TETRA radio to the PCC. A colour code is applied to the transmitted data allowing a quick assessment of the radiological situation (green if dose rate is lower than 0.35 μSv/h, yellow for values between 0.35 μSv/h, and 1 mSv/h and red for ambient dose rates ≥ 1 mSv/h). This automatic transmission allows the accumulation of the environmental measurement data while avoiding misunderstanding or errors, improving the accuracy of the available environmental data.

Associated with online real-time ambient dose rate values from 29 off site gamma-tracer stations (*Genitron*) and with the colour coding used, this system may give a comprehensive overview of the environmental radiation situation.

The online display of the ambient dose rates on the dash board also participate in a better protection of the team members of the vehicles (driver and technician).

The system has been in place at Cattenom NPP since 2010.

Areas 10,11,12,13 are optional areas.

14. SEVERE ACCIDENT MANAGEMENT

14.1 DEVELOPMENT OF THE SEVERE ACCIDENT MANAGEMENT STRATEGIES

The aim of the Accident Management (AM) programme is to ensure that the likelihood of a severe accident and the magnitude of any associated radioactive releases are kept as low as reasonably achievable, economic and social factors being taken into account.

At the plant, the objective of the Severe Accident Management program, supported by effective training, communication and tools, is to obtain a significant reduction of the frequency of severe core damage and of the magnitude of large releases.

The development of the plant AM programme uses insights from severe accident phenomenology related Research and Development work carried out by the design organization and its numerous links into international nuclear accident related programmes.

14.2 DEVELOPMENT OF PROCEDURES AND GUIDELINES

The plant has a comprehensive severe accident management programme. The plant approach to the management of severe accident phenomena as outlined in their Severe Accident Management Guidelines (SAMG) is discussed below.

Hydrogen Management: There are 116 Hydrogen Passive Autocatalytic Recombiners (PARs) installed per unit which are spread around the containment building. Two of these recombiners that are installed near the top of the containment building are classified as “important to safety” leading to three different plates being tested in each of them every refueling outage. Visual inspections are performed on the other plates within these two recombiners each outage. Every ten years the other recombiners are visually inspected and 78 plates tested. There are no PARs in the containment interspace (EIE) or in the fuel building. If Containment Spray (EAS) is not initially operational, the operators are instructed not to use EAS for the first 6 hours from entering the SAMG. If EAS is initially operational, the operators are instructed to leave EAS in operation and assume any hydrogen burn will not increase containment pressure above the containment failure point. In either case, the operators limit for the first ninety minutes any primary circuit injection to a flow sufficient to quench and cover the core.

Molten Core Concrete Interaction (MCCI) Strategy: The base mat is 3.0 m thick at the plant. EAS is used to fill the Reactor Pit. With one train of EAS in operation, approximately 60 m3/h of water will enter the reactor pit down the sides of the vessel through the neutron detectors channels. However, EAS operation in the first 6 hours after entering the SAMG may be prevented due to hydrogen concerns. After vessel failure the operators will use the safety injection system to place water on top of the corium. Note that while the MAAP code predicts that this water overlying the corium will stop MCCI, the plant probabilistic safety assessment (PSA) acknowledges that this is uncertain. Investigations are on-going on the management of ground water contamination which may occur if the base mat fails.

Steam Explosion Strategy: In-vessel steam explosion leading to a significant breach in the containment integrity is deemed incredible based on international research and calculations. Because the risk of loss of containment integrity from Direct Containment Heating (DCH) is deemed much more significant, the primary system is deliberately depressurized during SAMG which marginally increases the possibility of a steam explosion. Ex-vessel steam explosion, leading to a significant breach in the containment integrity is also deemed incredible based on international research. Because MCCI is deemed the greater risk, the use of Containment Spray

(EAS) is encouraged during SAMG which will fill the reactor pit. This action marginally increases the possibility of an ex-vessel steam explosion.

Direct Containment Heating (DCH): High pressure melt ejection (HPME) is prevented through depressurizing the primary system. This is achieved through opening of all 3 Sebim valves on the primary system pressurzer and the use of the Steam Generators (SGs). No criteria are set in the SAMG used by the control room operators for the limit of when containment failure through DCH is no longer credible. However a 2 MPa limit appears in the objectives of the SAMG used by the Shift Supervisor. The SAMG users will endeavor to completely depressurize the primary system. The more unusual means of depressurizing the primary system would have to be approved by the Plant Emergency Director (PCD1).

Induced Steam Generator Tube Rupture (ISGTR): The actions in the SAMG to prevent Induced Steam Generator Tube Rupture are depressurizing the primary circuit and filling the secondary side. The more unusual means of adding water to the steam generators such as their depressurization and use of the Condenser Extraction Pumps (CEX) would have to be approved by PCD1.

Containment Over-pressurization: A containment filtered venting system has been installed and its use after 24 hours after entry into SAMG if the containment pressure exceeds 5 bar is proceduralized (U5) and would require the approval of PCD1. The best estimate failure pressure of the containment building is approximately 6.5 bar.

Containment Under-pressurization: There is no specific severe accident management guidance for containment under-pressure scenarios. This is because studies by SEPTEN have shown that this mode of failure is not credible.

Spent Fuel Pool Severe Accidents: A comprehensive accident prevention program is in place which ensures that spent fuel recovery is very unlikely. There are two seismically qualified cooling trains. There is training and a procedure (I PTR) for loss of spent fuel pool cooling. The mitigation is then to open a vent path from the Fuel Building and make-up to the pool. This make-up can be achieved by the Demineralized Water Distribution system (SED) or the Fire Fighting Water Distribution system (JPI). JPI is common to all units such that either of the two pumps on a unit can supply the make-up to any spent fuel pool. If JPI pumps are unavailable (such as in station blackout) then mobile diesel backed fire pumps can be used.

However, there is no severe accident mitigation program for fuel melt accidents occurring in the fuel building. Spent fuel recovery is not impossible and so the plant is encouraged to develop a Spent Fuel Pool Severe Accident Management Program.

The technical basis for the SAMG is included in various background documents. There are no deviations from generic 1300 MW SAMG in the French fleet which was confirmed through the plant review.

Accident management extends from the preventative part in the emergency operating procedure domain to mitigating one known as the SAMG domain. State based procedures are used for the preventative-domain. The criterion for entering the SAMG domain from the preventative domain (SPE) is either that the core exit temperature limit of 1100°C is exceeded or there are high containment radiation levels.

When the Shift Manager or Safety Engineer reaches the entry conditions for the SAMG, PCD1 is informed and he makes the decision to enter the SAMG. Once PCD1 makes this decision, personnel from the Plant Crisis Centre, Operations, Local Crisis Team and National Crisis Team open specific SAMG documentation. The team recognizes formal documentation provided to all these personnel as a good performance.

Effective plant modifications have been implemented such as extended containment pressure measurement (-1 to 9 bar), containment filtered venting and hydrogen recombiners. Formal guidance for using this equipment is provided and, where practical, the equipment is tested.

There is no documented hydrogen management strategy once the available oxygen inside the containment building has been used up by the PARs.

When the primary system is initially open there are no entry conditions from the preventative domain (SPE-O) into the SAMG.

Plant vulnerabilities have been identified through the PSA Level 2 to reduce the likelihood of significant radioactive releases although these insights have yet to be acted upon.

The team suggests updating the procedures in the preventative domain to facilitate entry into SAMG when the primary system is initially open and core damage occurs, updating the SAMG hydrogen management for when the PARs are no longer functional and also to apply the PSA Level 2 risk insights.

14.3 RESPONSIBILITY AND PLANT EMERGENCY ARRANGEMENT

PCD1 will declare a severe accident and instruct entry into the SAMG after the Shift Manager or the Safety Engineer informs him that they have reached the applicable step in the preventative domain (SPE). Once the immediate actions following declaration of the severe accident are complete, the Local Crisis Team (ELC), National Crisis Team (ETC-N) and the crisis team of the technical support organization of the safety authority (IRSN) will jointly recommend mitigation strategies. The Plant Emergency Director makes the final decision on what mitigation strategies are to be implemented.

The Local Crisis Team (ELC) is in contact with the National Crisis Team (ETC-N) who, in turn, is supported by EDF SEPTEN (the designer) and AREVA (the vendor). The Local and National Crisis Teams have available to them a wide range of resources and tools to support accident management at the plant. The team recognizes the wide ranging tools and expertise available to manage a severe accident as a good practice.

14.5 TRAINING NEEDS AND TRAINING PERFORMANCE

All plant personnel involved in the implementation of severe accident management undergo initial and requalification training at appropriate intervals commensurate with their function. This training is based on severe accident theory and a detailed explanation of the guide which will be implemented. However, the training does not include table-top and/or plant exercises.

The plant is encouraged to implement table-top and/or plant exercises in its severe accident training.

DETAILED SEVERE ACCIDENT MANAGEMENT FINDINGS

14.2 DEVELOPMENT OF PROCEDURES AND GUIDELINES

14.2(1) Issue: The plant Severe Accident Management Programme (SAMP) is not broad enough to cover all situations.

The team observed the following:

- There are no entry criteria into severe accident management guidelines for accidents occurring when the primary circuit is open.
- There is no documented hydrogen management strategy once the available oxygen inside containment has been used up.
- Insights from the Level 2 PSA, such as manual containment isolation in the event of station blackout prior to core damage, have not been addressed.

Without systematic documented strategies the SAM objectives will not be readily met.

Suggestion: The plant should consider improvements to its SAMP to cover all situations.

IAEA Basis:

SSR-2/2

5.8. An accident management programme shall be established that covers the preparatory measures and guidelines that are necessary for dealing with beyond design basis accidents. The accident management programme shall be documented and periodically reviewed and revised as necessary. It shall include instructions for utilization of the available equipment — safety related equipment as far as possible, but also conventional equipment — and the technical and administrative measures to mitigate the consequences of an accident. The accident management programme shall also include organizational arrangements or accident management, communication networks and training necessary for the implementation of the programme.

NS-G-2.15

2.6. At the top level, the objectives of accident management are defined as follows:

- Preventing significant core damage;
- Terminating the progress of core damage once it has started;
- Maintaining the integrity of the containment as long as possible;
- Minimizing releases of radioactive material;
- Achieving a long term stable state.

To achieve these objectives, a number of strategies should be developed.

2.16. Severe accidents may also occur when the plant is in the shutdown state. In the severe accident management guidance, consideration should be given to any specific challenges posed by shutdown plant configurations and large scale maintenance, such as an open containment equipment hatch. The potential damage of spent fuel both in the reactor vessel and in the spent fuel pool or in storage4 should also be considered in the accident management guidance. As large scale maintenance is frequently carried out during planned shutdown states, the first concern of accident management guidance should be the safety of the workforce.

2.17. Severe accident management should cover all modes of plant operation and also appropriately selected external events, such as fires, floods, seismic events and extreme weather conditions (e.g. high winds, extremely high or low temperatures, droughts) that could damage large parts of the plant. In the severe accident management guidance, consideration should be given to specific challenges posed by external events, such as loss of the power supply, loss of the control room or switchgear room and reduced access to systems and components.

3.3. The accident management guidance should address the full spectrum of credible challenges to fission product boundaries due to severe accidents, including those arising from multiple hardware failures, human errors and/or events from outside, and possible physical phenomena that may occur during the evolution of a severe accident (such as steam explosions, direct containment heating and hydrogen burns). In this process, issues should be taken into account that are frequently not considered in analyses, such as additional highly improbable failures and abnormal functioning of equipment.

3.22 In the mitigatory domain, strategies should be developed to enable:

- Terminating the progress of core damage once it has started;
- Maintaining the integrity of the containment as long as possible;
- Minimizing releases of radioactive material;
- Achieving a long term stable state.

Plant response/Action:

<u>Elements of response</u>

Severe accidents are managed with the severe accident operating guide (GIAG). This document covers severe accidents in unit states with the Reactor Coolant System closed. The OSART suggestion has been incorporated with the drafting of a new severe accident operating guide, which also covers the unit states with the Reactor Coolant System open.

- The operating document version 5 of the GIAG (extended to states with the Reactor Coolant System open) will arrive on the sites in April 2013.
- Knowledge was transferred from the SEPTEN (corporate engineering centre) to the UFPI (corporate training structure) on 9 November 2012.

- The training specifications for version 5 of the GIAG have been compiled.
- The first GIAG training courses have already been planned.

Elements of visibility: (remaining actions)

- The GIAG extended to the states with the Reactor Coolant System open (version 5) is currently being drafted and it will be distributed to the sites in April 2013.
- -The populations concerned by this training are: Shift Manager, Shift Supervisor, operator, Safety Engineer, PCD1, PCD2 and PCD2.1 representing around 160 persons split over around fifteen sessions.

Evidence:

- Knowledge was transferred between the SEPTEN and the UFPI on 09/11/2012.
- The training specifications for version 5 of the GIAG are available with ref: UFPI/OP2/ERQ/12-01673.
- The dates of the first GIAG V5 training sessions, APPUICIAG0, are scheduled for 28 and 29 May 2013.

IAEA comments:

In answering to the OSART suggestion, a revised version of the severe accident operating guide (GIAG) with extension to reactor coolant system (RCS) open states (version 5) was developed by EDF Corporate level for the EDF 1300 MWe NPP (P4/P'4).

The following steps are defined in that context:
1. The knowledge transfer from the corporate engineering centre (SEPTEN) to local UFPI (EDF dedicated training structure) took place in November 2012 (presentation of the background material, instructions…).
2. The operating document GIAG V5 was delivered to the plant on 24/04/2013.
3. The training of the concerned roles and functions (Technical support staff ELC1 & ELC2, safety engineer, Plant Emergency Management staff PCD1, PCD2 & PCD2.1, Operators) started in May 2013 and is expected to be fully realised before the end of 2013.
   The training for ELC1 & ELC 2 have a duration of three days including an application exercise at the end and a yearly refresher incorporated in the yearly refreshing program on accident management (not limited to the SAM).
   For the other roles & functions, the training has ½-day duration with recycling every 4 years. The objective of this training is to give an overview of the GIAG.
4. In order to avoid 2 successive versions in a short period, the official implementation at the plant of the revised GIAG V5 is delayed waiting for the achievement of a modification concerning the pressurizer discharge valves (adding batteries) at the 4 units planned for end of August 2013. At that moment, an official instruction from the corporate level will be issued with an implementation requirement of a maximum of 6 months. Therefore, the revised GIAG V5 should be fully implemented before the end of June 2014.

It is to be stressed that, in the situation addressed by the issue (RCS open), the plant emergency response staff is to be strongly supported by the EDF corporate support emergency staff (National Crisis Organization, ONC) to decide and implement actions/strategies from the GIAG V5.
While the GIAG V5 is not yet effectively deployed at the plant (see above), the actions of the GIAG V5 would however be applied in such circumstances through the support of the EDF corporate support emergency staff.

Conclusion: Satisfactory progress to date.

14.3 RESPONSIBILITY AND PLANT EMERGENCY ARRANGEMENT

14.3(a) Good practice: The plant severe accident management program is reliably supported by a wide range of expertise and analytical tools.

The ability to effectively manage a severe accident situation at the plant is significantly improved by having available a wide range of experts and tools. Examples of the analytical tools are:

- CRISALIDE (which can assess the size of the breach during a LOCA, the time before fuel uncovering, etc.)
- TOUTEC (which can assess the risk of hydrogen combustion and the time before fuel uncovering in the spent fuel pool) and
- PRACSITEL (which evaluates residual power in real time).

The ability to reliably determine accident details (such as break size and location) and the time to crucial events (such as time for fuel recovery or vessel failure), greatly improves the ability to manage the accident. Stress levels increase greatly when dealing with the unknown and so providing good information reduces the likelihood of operator error.

SUMMARY OF STATUS OF RECOMMENDATIONS AND SUGGESTIONS OF THE OSART FOLLOW-UP MISSION TO CATTENOM NPP

	RESOLVED	SATISFACTORY PROGRESS	INSUFFICIENT PROGRESS	WITH-DRAWN	TOTAL
Management, Organization & Administration	1R 1S	- 1S	- -	- -	1R 2S
Training and Qualification		1R			1R
Operations	1S	1S	-	-	2S
Maintenance	1S	-	-	-	1S
Technical Support	-	1R 1S	-	-	1R 1S
Operating Experience	1R 1S	-	-	-	1R 1S
Radiation Protection	-	1R	-	-	1R
Chemistry	1S	1S	-	-	2S
Emergency Planning and Preparedness	-	-	1R	-	1R
Severe Accident Management		1S			1S
TOTAL R (%)	2 33 (%)	3 50(%)	1 17(%)	-	6
TOTAL S (%)	5 50(%)	5 50(%)	-	-	10
TOTAL	7 44(%)	8 50(%)	1 6(%)	-	16

DEFINITIONS

DEFINITIONS – OSART MISSION

Recommendation

A recommendation is advice on what improvements in operational safety should be made in that activity or programme that has been evaluated. It is based on IAEA Safety Standards or proven, good international practices and addresses the root causes rather than the symptoms of the identified concern. It very often illustrates a proven method of striving for excellence, which reaches beyond minimum requirements. Recommendations are specific, realistic and designed to result in tangible improvements. Absence of recommendations can be interpreted as performance corresponding with proven international practices.

Suggestion

A suggestion is either an additional proposal in conjunction with a recommendation or may stand on its own following a discussion of the pertinent background. It may indirectly contribute to improvements in operational safety but is primarily intended to make a good performance more effective, to indicate useful expansions to existing programmes and to point out possible superior alternatives to ongoing work. In general, it is designed to stimulate the plant management and supporting staff to continue to consider ways and means for enhancing performance.

Note: if an item is not well based enough to meet the criteria of a 'suggestion', but the expert or the team feels that mentioning it is still desirable, the given topic may be described in the text of the report using the phrase 'encouragement' (e.g. The team encouraged the plant to…).

Good practice

A good practice is an outstanding and proven performance, programme, activity or equipment in use that contributes directly or indirectly to operational safety and sustained good performance. A good practice is markedly superior to that observed elsewhere, not just the fulfillment of current requirements or expectations. It should be superior enough and have broad application to be brought to the attention of other nuclear power plants and be worthy of their consideration in the general drive for excellence. A good practice has the following characteristics:

- Novel;
- Has a proven benefit;
- Replicable (it can be used at other plants);
- Does not contradict an issue.

The attributes of a given ‘good practice’ (e.g. whether it is well implemented, or cost effective, or creative, or it has good results) should be explicitly stated in the description of the ‘good practice’.

Note: An item may not meet all the criteria of a ‘good practice’, but still be worthy to take note of. In this case it may be referred as a ‘good performance’, and may be documented in the text of the report. A good performance is a superior objective that has been achieved or a good technique or programme that contributes directly or indirectly to operational safety and sustained good performance, that works well at the plant. However, it might not be necessary to recommend its adoption by other nuclear power plants, because of financial considerations, differences in design or other reasons.

DEFINITIONS - FOLLOW-UP MISSION

Issue resolved - Recommendation

All necessary actions have been taken to deal with the root causes of the issue rather than to just eliminate the examples identified by the team. Management review has been carried out to ensure that actions taken have eliminated the issue. Actions have also been taken to check that it does not recur. Alternatively, the issue is no longer valid due to, for example, changes in the plant organization.

Satisfactory progress to date - Recommendation

Actions have been taken, including root cause determination, which lead to a high level of confidence that the issue will be resolved in a reasonable time frame. These actions might include budget commitments, staffing, document preparation, increased or modified training, equipment purchase etc. This category implies that the recommendation could not reasonably have been resolved prior to the follow up visit, either due to its complexity or the need for long term actions to resolve it. This category also includes recommendations which have been resolved using temporary or informal methods, or when their resolution has only recently taken place and its effectiveness has not been fully assessed.

Insufficient progress to date - Recommendation

Actions taken or planned do not lead to the conclusion that the issue will be resolved in a reasonable time frame. This category includes recommendations on which no action has been taken, unless this recommendation has been withdrawn.

Withdrawn - Recommendation

The recommendation is not appropriate due, for example, to poor or incorrect definition of the original finding or its having minimal impact on safety.

Issue resolved - Suggestion

Consideration of the suggestion has been sufficiently thorough. Action plans for improvement have been fully implemented or the plant has rejected the suggestion for reasons acceptable to the follow-up team.

Satisfactory progress to date - Suggestion

Consideration of the suggestion has been sufficiently thorough. Action plans for improvement have been developed but not yet fully implemented.

Insufficient progress to date - Suggestion

Consideration of the suggestion has not been sufficiently thorough. Additional consideration of the suggestion or the strengthening of improvement plans is necessary, as described in the IAEA comment.

Withdrawn - Suggestion

The suggestion is not appropriate due, for example, to poor or incorrect definition of the original suggestion or its having minimal impact on safety.

ACKNOWLEDGEMENT

The Government of France and the plant staff provided valuable support to the OSART mission to Cattenom Nuclear Power Plant. Throughout preparation and conduct of the mission, the staff of the nuclear power plant provided support to the IAEA Operational Safety Section staff and the OSART team. Team members felt welcome and enjoyed good cooperation and productive dialogue with the managers of Cattenom NPP. This contributed significantly to the success of the mission. The managers, and especially the team's counterparts, engaged in frank, open discussions and joined with the team in seeking ways to strengthen the plant's performance. The personal contacts made during the mission should promote continuing dialogue between the team members and the plant staff. The support of the liaison officer, host plant peer, interpreters and administrative staff was outstanding. Their help was professional and appreciated by the team.

LIST OF IAEA REFERENCES (BASIS)

Safety Standards

- **SF-1**; Fundamental Safety Principles (Safety Fundamentals)
- **GSR Part 3;** Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards, Interim Edition
- **SSR-2/1**; Safety of Nuclear Power Plants: Design (Specific Safety Requirements)
- **SSR-2/2**; Safety of Nuclear Power Plants: Operation and Commissioning (Specific Safety Requirements)
- **NS-G-1.1**; Software for Computer Based Systems Important to Safety in Nuclear Power Plants (Safety Guide)
- **NS-G-2.1**; Fire Safety in the Operation of Nuclear Power Plans (Safety Guide)
- **NS-G-2.2**; Operational Limits and Conditions and Operating Procedures for Nuclear Power Plants (Safety Guide)
- **NS-G-2.3**; Modifications to Nuclear Power Plants (Safety Guide)
- **NS-G-2.4**; The Operating Organization for Nuclear Power Plants (Safety Guide)
- **NS-G-2.5**; Core Management and Fuel Handling for Nuclear Power Plants (Safety Guide)
- **NS-G-2.6**; Maintenance, Surveillance and In-service Inspection in Nuclear Power Plants (Safety Guide)
- **NS-G-2.7**; Radiation Protection and Radioactive Waste Management in the Operation of Nuclear Power Plants (Safety Guide)
- **NS-G-2.8**; Recruitment, Qualification and Training of Personnel for Nuclear Power Plants (Safety Guide)
- **NS-G-2.9**; Commissioning for Nuclear Power Plants (Safety Guide)
- **NS-G-2.10**; Periodic Safety Review of Nuclear Power Plants (Safety Guide)
- **NS-G-2.11**; A System for the Feedback of Experience from Events in Nuclear Installations (Safety Guide)
- **NS-G-2.12**; Ageing Management for Nuclear Power Plants (Safety Guide)
- **NS-G-2.13**; Evaluation of Seismic Safety for Existing Nuclear Installations (Safety Guide)
- **NS-G-2.14;** Conduct of Operations at Nuclear Power Plants (Safety Guide)

- **NS-G-2.15**; Severe Accident Management Programmes for Nuclear Power Plants Safety Guide (Safety Guide)
- **SSG-13**; Chemistry Programme for Water Cooled Nuclear Power Plants (Specific Safety Guide)
- **GSR**; Part 1 Governmental, Legal and Regulatory Framework for Safety (General Safety Requirements)
- **GS-R-2**; Preparedness and Response for a Nuclear or Radiological Emergency (Safety Requirements)
- **GS-R-3**; The Management System for Facilities and Activities (Safety Requirements)
- **GSR** Part 4; Safety Assessment for Facilities and Activities (General Safety Requirements 2009)
- **GS-G-4.1**; Format and Content of the Safety Analysis report for Nuclear Power Plants (Safety Guide 2004)
- **SSG-2**; Deterministic Safety Analysis for Nuclear Power Plants (Specific Safety Guide 2009)
- **SSG-3**; Development and Application of Level 1 Probabilistic Safety Assessment for Nuclear Power Plants (Specific Safety Guide 2010)
- **SSG-4**; Development and Application of Level 2 Probabilistic Safety Assessment for Nuclear Power Plants (Specific Safety Guide 2010)
- **GS-R Part 5**; Predisposal Management of Radioactive Waste (General Safety Requirements)
- **GS-G-2.1**; Arrangement for Preparedness for a Nuclear or Radiological Emergency (Safety Guide)
- **GSG-2**; Criteria for Use in Preparedness and Response for a Nuclear and Radiological Emergency
- **GS-G-3.1**; Application of the Management System for Facilities and Activities (Safety Guide)
- **GS-G-3.5**; The Management System for Nuclear Installations (Safety Guide)
- **RS-G-1.1**; Occupational Radiation Protection (Safety Guide)
- **RS-G-1.2**; Assessment of Occupational Exposure Due to Intakes of Radio-nuclides (Safety Guide)
- **RS-G-1.3**; Assessment of Occupational Exposure Due to External Sources of Radiation (Safety Guide)
- **RS-G-1.8**; Environmental and Source Monitoring for Purpose of Radiation Protection (Safety Guide)

- **SSR-5;** Disposal of Radioactive Waste (Specific Safety Requirements)
- **GSG-1** Classification of Radioactive Waste (Safety Guide 2009)
- **WS-G-6.1**; Storage of Radioactive Waste (Safety Guide)
- **WS-G-2.5**; Predisposal Management of Low and Intermediate Level Radioactive Waste (Safety Guide)

▪ ***INSAG, Safety Report Series***

INSAG-4; Safety Culture

INSAG-10; Defence in Depth in Nuclear Safety

INSAG-12; Basic Safety Principles for Nuclear Power Plants, 75-INSAG-3 Rev.1

INSAG-13; Management of Operational Safety in Nuclear Power Plants

INSAG-14; Safe Management of the Operating Lifetimes of Nuclear Power Plants

INSAG-15; Key Practical Issues In Strengthening Safety Culture

INSAG-16; Maintaining Knowledge, Training and Infrastructure for Research and Development in Nuclear Safety

INSAG-17; Independence in Regulatory Decision Making

INSAG-18; Managing Change in the Nuclear Industry: The Effects on Safety

INSAG-19; Maintaining the Design Integrity of Nuclear Installations Throughout Their Operating Life

INSAG-20; Stakeholder Involvement in Nuclear Issues

INSAG-23; Improving the International System for Operating Experience Feedback

INSAG-25; A Framework for an Integrated Risk Informed Decision Making Process

Safety Report Series No.11; Developing Safety Culture in Nuclear Activities Practical Suggestions to Assist Progress

Safety Report Series No.21; Optimization of Radiation Protection in the Control of Occupational Exposure

Safety Report Series No.48; Development and Review of Plant Specific Emergency Operating Procedures

Safety Report Series No. 57; Safe Long Term Operation of Nuclear Power Plants

▪ ***Other IAEA Publications***

- **IAEA Safety Glossary** Terminology used in nuclear safety and radiation protection 2007 Edition
- **Services series No.12**; OSART Guidelines
- **EPR-EXERCISE-2005**; Preparation, Conduct and Evaluation of Exercises to Test Preparedness for a Nuclear or Radiological Emergency, (Updating IAEA-TECDOC-953)
- **EPR-METHOD-2003**; Method for developing arrangements for response to a nuclear or radiological emergency, (Updating IAEA-TECDOC-953)
- **EPR-ENATOM-2002**; Emergency Notification and Assistance Technical Operations Manual

▪ ***International Labour Office publications on industrial safety***

- **ILO-OSH 2001;** Guidelines on occupational safety and health management systems (ILO guideline)
- Safety and health in construction (ILO code of practice)
- Safety in the use of chemicals at work (ILO code of practice)

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