





**IAEA**

International Atomic Energy Agency

**REPORT  
of the  
OPERATIONAL SAFETY REVIEW TEAM  
(OSART)**

**MISSION  
to the  
NOGENT  
NUCLEAR POWER PLANT**

**FRANCE**

**20 January – 6 February 2003**

**AND**

**FOLLOW-UP VISIT**

**15-19 November 2004**

**DIVISION OF NUCLEAR INSTALLATION SAFETY**

**OPERATIONAL SAFETY REVIEW MISSION  
IAEA-NSNI/OSART/04/117F**

## **PREAMBLE**

This report presents the results of the IAEA Operational Safety Review Team (OSART) review of Nogent 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 23 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**

**by the**

**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 eight operational areas: management, organization and administration; training and qualification; operations; maintenance; technical support; 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 Nuclear Safety Standards (NUSS) programme 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 infer judgements that were not intended 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 Nogent-sur-Seine Nuclear Power Plant, from 20 January to 6 February 2003. The purpose of the mission was to review operating practices in the areas of Management Organization and Administration, Training and Qualification, Operations, Maintenance, Technical Support, Radiation Protection, Chemistry and Emergency Planning and Preparedness. 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 Nogent-sur-Seine OSART mission was the 117<sup>th</sup> in the programme, which began in 1982. The team was composed of experts from Brazil, Germany, Japan, Slovakia, Slovenia, Spain, Sweden and the United Kingdom, together with IAEA staff members and observers from China and Iran. The collective nuclear power experience of the team was more than 250 man-years.

Before visiting the plant, the team studied information provided by the IAEA and the Nogent-sur-Seine plant to familiarise 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 works in progress, and held in-depth discussions with plant personnel and off-site authorities.

One unit was in full power operation and the other unit in start-up during the mission. The team was able to observe many start-up and normal activities.

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 IAEA standards and international practice.

At the request of the Government of the France, the IAEA carried out a follow-up to the Nogent OSART mission from 15 to 19 November 2004. The team comprised of four members, one from Germany, one from UK and two from the IAEA. All four reviewers in the team had been members of the original OSART team. The purpose of the visit was to discuss the action taken in response to the findings of the OSART mission.

During the five days visit, team members met with senior managers of the Nogent Nuclear Power Plant and their staff to assess the effectiveness of their responses to recommendations and suggestions given in the official report of the Nogent OSART mission. The team provided comments on the responses, provided some additional suggestions for improving response actions and categorized the status of response actions. Definition of categories of response status and a summary of the results in a quantitative manner are provided at the end of this report.

## MAIN CONCLUSIONS

The OSART team concluded that the managers and workers of Nogent-sur-Seine NPP have initiated many new programs to enhance operational safety and reliability at their plant. In concept, these programs appear beneficial but they will require continued effort before they are fully effective at the plant. In particular, the new matrix management system will promote managers and workers to hold a broader view of activities performed at the plant.

The team found good areas of performance, including the following:

- The management and plant staff are professional, dedicated and energetic. They are open to discussion and new ways to improve performance.
- The plant has developed a simple deterministic method of risk analysis that is widely used throughout the plant.
- The plant has the benefit of strong technical support at the corporate level.

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

- Following recent outages on both units, material condition and cleanliness have improved. However, housekeeping and material condition in both units are below IAEA standards.
- The team observed many places where materials and waste are temporarily stored inside and outside the radiological area. This material increases the fire loading. And unnecessary material introduced into the radiological area contributes to the amount of radioactive waste.
- The plant should take advantage of opportunities to enhance the self-assessment programme by increasing the amount of monitoring done in the field. Managers, operators and other workers should do more self-critical monitoring of actual plant conditions.

## SAFETY CULTURE REVIEW CONCLUSION

An important element of the OSART review is the identification of those findings that exhibit positive and negative aspect of safety culture. The OSART team used the guidance provided in INSAG-4, INSAG-13, INSAG-15, IAEA Safety Reports Series No.11, IAEA-TECDOC-1321 and 1329 and draft SCART Guideline to assess various aspects of safety culture at the Nogent-sur-Seine nuclear power plant. A safety culture review was integrated in the OSART review of Nogent-sur-Seine NPP, which included the following steps:

- Safety culture training for mission experts, based on IAEA safety standards.
- Safety culture observations were part of daily review reported during team meetings.
- During the OSART, 57 interviews on safety culture were performed with Nogent staff from different organizational levels.
- A questionnaire was filled out by all team members.



- The safety culture programme evaluation was part of Management, Organization and Administration review.
- The IAEA assistant team leader was responsible for co-ordination and evaluation of observations and interviews.

### **Interviews Evaluation:**

Interviews were conducted with various levels of workers, including senior managers, middle managers, line managers, control room staff, technicians and field workers.

All interviewed consider safety a high priority which is most visible in; the risk assessment activities, safety assessments and safety decision making, safety policies, organizational aspects of the plant and various safety committees, behavior and attitude of workers and their adherence to procedures, and training and qualification of staff. These were the responses of 90% of interviewed workers.

As to the question, “what are the major strengths of Nogent-sur-Seine plant”, the following answers were given: Management policies, including the corporate EDF level, safety committees and safety meetings, training of staff, skill development and integration of the younger generation, risk assessment and safety analysis, safety culture and attitude of workers, management supervision and control, role of the shifts and shift managers, adherence to procedures and use of operational experience feedback. These were also the responses of 90% of interviewed workers. Nearly all workers felt personal responsibility for safety.

The team members were very impressed with a number of positive safety culture aspects observed in Nogent-sur-Seine plant mainly with:

- everybody feels that safety is first priority
- good team work
- risk analyses is done prior to work

The team also identified several areas where management and staff of the plant are encouraged to enhance safety culture:

- development of a greater understanding of corporate instructions
- consideration of near misses and low-level events as potential precursors
- enhancing ownership of the plant and plant processes

During the review, the team observed that while safety culture requirements are incorporated in several guidelines; a systematic programme for safety culture evaluation and enhancement needs to be developed. In general, senior managers are encouraged to continue with the initiative to develop safety culture in accordance with developments identified in this area by IAEA and other organizations.

In conclusion, there is a commitment to nuclear safety at Nogent as well as a willingness to make improvements. The implementation of the OSART recommendations and suggestions will contribute to management’s intention to improve safe operation of the plant.

### **FOLLOW-UP MAIN CONCLUSIONS**

The team received excellent cooperation from the Nogent NPP staff and the team was impressed with the actions taken to resolve the findings of the original OSART mission. The

positive attitude of the management and staff in addressing these issues is a good indication of the commitment to enhancing operational safety at the plant.

Since the end of the OSART mission in February 2003, the plant has completed the construction of the simulator, embarked on a significant program to improve housekeeping, and successfully reduced the amount of radioactive waste stored at the plant site. The reduction of waste stored in the Waste Treatment Building and the general improvement of housekeeping within the building is notable. These beneficial developments have been brought about by the commitment of management and staff to closely monitor conditions in the plant and benchmark these observations against other plants.

The improvements in housekeeping, cleanliness and material condition are striking. During the OSART this was one of the significant proposals for improvement. The plant has introduced a broad scope of measures to deal with these points. Most areas of the plant have been cleaned and the plant has put in place a strategy to maintain cleanliness. The strategy includes 12 reference areas that model the standards to be achieved through the improvement program. The management team coaches these standards through weekly tours and inspections of job sites and plant areas. The team did observe some deficiencies in the plant, however the number of deficiencies is trending downward. The team also commented that there is not yet a management goal for when the remaining areas of the plant will correspond to the standards of the reference areas.

For temporary storage the plant has developed and implemented a significant improvement program. This program includes; identification of areas where materials may be temporarily stored, proper marking of the stored materials, identification of the responsible person, dates by which the material should be removed and classification of the type of material regarding fire load, chemical hazard or contamination. Monthly monitoring tours of all areas are done by the ancillary services section (SG-Logistics and waste) management to ensure that plant expectations are being met.

The team observed that for the most part the temporary storage areas appeared orderly, and well marked and controlled.

The overall impression of the team is that the plant has aggressively moved forward to address the issues raised in the initial report. The team found many of the issues fully resolved.

The final statistical analysis of the status of the recommendations and suggestions identified during the OSART mission in January and February 2003 showed that 48% were resolved and 52% were making satisfactory progress.

## 1. MANAGEMENT, ORGANIZATION AND ADMINISTRATION

### 1.1. CORPORATE ORGANIZATION AND MANAGEMENT

Nogent is a two unit 1300MW(e) PWR plant operated by Electricité de France (EDF) located at the bank of the Seine about 100 km southeast of Paris, commissioned in 1987 and 1988. The plant operating organization is part of the Nuclear Power Division (DPN) of EDF.

The central departments of EDF provide for the plant services in areas of engineering, design modification, contracting, procurement and training.

The corporate management principles are defined at the corporate level for the whole EDF organization. The principles include 'values and actions' for:

- customer orientation
- results orientation
- leadership and constancy of vision
- continuous learning, innovation and improvement process
- personnel development and involvement
- partnership development
- partnership with respect to the community
- management through process and facts

These principles are a basis for corporate policies, goals and objectives, including safety policy. However among these principles, the commitment to the safety and the demonstration of emphasis on safety culture is not explicit enough. This fact could make external and internal communication of corporate policies, goals and objectives more difficult, because the opportunity to emphasize commitment of the safe operation of nuclear power plants is missed.

The EDF president completed the 'values and actions' document by means of a policy document regarding nuclear safety and radiation protection.

With the aim to improve the management processes, the president of EDF launched a policy in the end of 1990's. The policy is focused on the direct contact of managers with managing processes. One of the requirements of the policy is to spend 20% of working time in the field for all levels of managers which is a very desirable goal.

Within the nuclear division of EDF, policies are established that target all aspects of safe plant operation and set high expectations for safety performance.

### 1.2. PLANT ORGANIZATION AND MANAGEMENT

The Nogent NPP operating organization represents 703 EDF employees. The senior plant management consists of the plant director, deputy plant director, the safety and quality director and directors of the domains. The management system is process-oriented; the management documentation corresponds to ISO 9000 / 2000 edition Standard. The teamwork principles are led by the top management of Nogent NPP. A good practice has been noted in this area.

In the management system of Nogent NPP, a number of basic processes are defined:

- strategy and management
- physical protection
- nuclear and fire safety
- environment
- budget and financial resources
- human resources
- production (units operation and outage)
- industrial and radiological safety
- communication
- informatics
- engineering and maintenance

Each process is coordinated by a person called the pilot of the process. The plant organizational structure is a kind of the matrix organizational structure and the departments provide services for the processes.

The environmental management system, based on ISO 14 000 Standard is a part of the management system and the plant is preparing for certification in October 2003.

The basic management tool is 'Medium-term Business Plan' (for three years). This plan covers all areas of the Nogent NPP operating organization. The plan is updated each year. The management objectives and goals are given to plant departments via the 'Manager Contracts'. The 'Manager Contracts' include also a set of performance indicators.

The safety and quality management is directly under the plant director and independent from the other departments. The Nogent NPP management system is process-oriented, the safety and quality director is in charge of nuclear and fire safety process. The process is clearly structured. As the basic output of the process, a general review of the plant operation and proposals for its improvement is defined. The plant identified indicators regarding nuclear safety. The safety culture is considered as an output of the process. An emphasis should be put upon the measurement of the aspects related to safety culture while developing the safety performance indicators, for example, a number of proposals related to safety improvements.

The team recommended that the plant should develop a long-term safety culture programme with periodic means for evaluating the level of safety culture in the plant.

The outage management was changed in 1999 with the purpose to establish more effective systems. A set of indicators was defined for both, safety and economical aspects of the outage activities. The outage management process pilot demonstrated a full understanding of his responsibilities and the process.

The operation department head presented high professional knowledge for all aspects of the safe plant operation and very good understanding for the new management system (in force from October 2002). The same was also recognized in the mechanical maintenance department. The new management system brought new ideas for improving the plant performance and has a potential for future improvement. It is understandable, that a new management system implementation creates difficulties. For example, some indicators are not treated adequately (the corrective maintenance actions indicator has been not updated since

June 2002) and some indicators should be replaced by more suitable measurement parameters. For example, in the evaluation of maintenance activity in relation to nuclear safety, only the number of license event report is used in the management contracts.

Generally, the indicators related to safety of all main processes are rather of a passive nature (numbers of events as reactor trips, nuclear and industrial safety related events), and are not sensitive enough for the safety culture evaluation. The behavioral, attitudinal and perceptual components of the culture are not sufficiently enhanced.

Following the corporate policies, the plant has developed policies for:

- management
- security (physical protection)
- Safety (nuclear and fire)
- environment
- industrial and radiological safety
- human resources
- control
- economy
- communication
- information system

The 'safety (nuclear and fire - dealing with nuclear safety and fire protection)' and 'industrial and radiological safety' (dealing with industrial and radiological safety) policies are focused on safe plant operation aspects.

The policy identifies 'challenges', 'goals' and 'principles'. Among those principles, the permanent safety culture enhancement is included.

The requirements of INSAG-4 are implemented into several guidelines, but the programme for safety culture enhancement and evaluation is difficult to identify. However the activities strongly supporting safety culture progress exist, especially in the industrial safety area ('The Industrial Safety Day', 'The Nuclear Safety Day' and 'The Industrial Safety Game'), but a systematic approach consolidated in a safety culture programme is not developed.

### 1.3. QUALITY ASSURANCE PROGRAMME

The QA programme is a new programme reflecting ISO 9000/2000 edition standard.

The Quality Manual consists of seven chapters and it also includes the Environmental Manual. The QA programme documentation is in the process of completion. The plant management expects to certificate it in 2004. For elaboration and management of the QA documents, a software application was developed. This is an excellent tool providing on-line information for all plant staff in real time.

The implementation of the QA programme is periodically verified by audits under the management of the Safety and Quality department. Basically, the areas of the QA programme are audited within a five year period. Programmes selected by the technical safety group from

areas such as nuclear and fire safety, industrial and radiological safety, units operation and outage, and maintenance are audited every year.

The efficiency of the QA programme could be evaluated from long-term point of view more systematically. The records of non-conformances identified during audits, corrective actions taken and their completion, are available in a computer database since 1996, but the trends are not evaluated.

#### 1.4. REGULATORY AND OTHER STATUTORY REQUIREMENTS

The organization of the regulatory arrangements is understood by the management of Nogent. Established links exist between the regulatory body at national level (DGSNR and EDF) and at local level (DRIRE and Nogent NPP). At local level the regulator also monitors environmental, radiological and industrial safety. At the local level improved communication with the regulator could be pursued.

The regulator performs between 15 and 20 formal inspections per year and additionally a number of special inspection following safety related events, as for example after reactor scram in December 2002. Overall evaluation of the plant operation is consolidated in the yearly report at the national level of the regulatory body.

#### 1.5. INDUSTRIAL SAFETY PROGRAMME

The industrial safety aspects and their importance for the safe plant operation are clearly understood by the plant management. Following the corporate policy, the plant has developed the 'Industrial and radiological safety policy'. To minimize risks of incidents, the risk analysis method is used. This method is consistently used across the departments and is noted as a good practice.

For the assessment of the safe work condition, several types of inspection by experts and managers are conducted, including the 'Hierarchical Field Tour', obligatory for all level of managers.

Despite the industrial safety policy, the team found that plant industrial safety practices are not always followed by plant staff or enforced by plant supervisors. The team also found deficiencies at many temporary storage areas through the plant. The team made recommendations in these areas.

#### 1.6. DOCUMENT AND RECORDS MANAGEMENT

The documentation department provides documents for all other departments via local (satellite) archives. The check of documentation (completeness, physical status, using of latest version) is carried out every year, except the control room, where the check is carried out monthly. The modification of the documentation is managed according QA programme.

The validity verification of the documentation is carried out every 5 years. However technical documentation (operating and maintenance procedures, etc.) is not formally verified on this frequency (most of the technical documentation is updated after each outage). The plant is proposing to apply the formal verification process to all technical documentation and this is supported.

## **STATUS AT THE OSART FOLLOW-UP VISIT**

Nogent is making satisfactory progress in responding to the three issues raised in the area of Management Organization and Administration.

The plant has taken a number of actions to formalize and enhance their approach to safety culture. At the outset a survey on safety culture was prepared and responses were received from about 200 people from all levels of the organization. Results of the survey indicated that workers have a high regard for safety at Nogent. The survey also indicated some specific concerns related to organization and documentation and the plant is taking steps to address these concerns.

Detailed safety indicators which include radiological and environmental aspects, state of safety barriers, fire safety and rigorous approach to operations have been developed. The indicators are part of the "IQE", Operational Quality Indicator program. This program does an excellent job of mapping important aspects of safety performance. Plant performance against these indicators are tracked and the results discussed with management. Following the management meetings the results are communicated throughout the organization.

In a November 2003 decision, the plant decided on practical measures to be applied by all and monitored by line management in order to significantly reduce the number of industrial safety events. These actions include; investigation of every injury, specific actions to prevent reoccurrence of the same type of injury, briefing other workers on the injury, more active monitoring by managers in the field, and publicizing industrial safety by game type tools.

Because of the injury rate among contractors in 2003, the plant developed the Five "M" method (investigation of precursors) and they held direct discussions with contractors on the need to improve industrial safety. All of the plant actions have resulted in a significant decrease in the accident rate within the contract organizations.

In the last two months the plant has detected an unexpected increase in the accident rate of EDF employees. Corrective actions are being pursued to promptly reduce this rate.

For temporary storage the plant has developed and implemented a significant improvement program. This program includes; identification of areas where materials may be temporarily stored, proper marking of the stored materials, identification of the responsible person, dates by which the material should be removed and classification of the type of material regarding fire load, chemical hazard or contamination. During a tour of the radiological area of unit 2, the team observed that for the most part the temporary storage areas appeared orderly, and well marked and controlled.

Monthly monitoring tours of all areas are done by department management to ensure that plant expectations are being met.



## DETAILED MANAGEMENT, ORGANIZATION AND ADMINISTRATION FINDINGS

### 1.2. PLANT ORGANIZATION AND MANAGEMENT

**1.2(1) Issue:** The plant has not developed and implemented the safety culture programme evaluating the safety culture level, targeting short and long term goals and consolidating necessary actions for permanent progress, that ensure the overall assessment of the safety culture level and its progress.

The plant policies include safety culture enhancement principles but there is no programme for the promotion of safety culture as part of this policy.

The plant operational performance indicators related to the safe plant operation evaluation are rather of the passive nature such as numbers of safety related events. The type and threshold of the indicators are not sensitive enough for the aspects of safety culture.

Near-miss events are not systematically analysed and the symptoms of weakened safety culture could be more emphasized.

The means for evaluation of behavioural, attitudinal and perceptual components of the plant safety culture are not systematically developed and the assessment of progress or symptoms of a weakened safety culture are not measured.

During the OSART mission, some deficiencies were observed in plant staff behaviour, foreign material exclusion problems, industrial safety, plant house keeping and material conditions. These indicate a need to improve the safety culture.

Without implementation of a long term safety culture programme, opportunities to improve attitudes toward safety and safety performance could be missed.

**Recommendation:** The plant should develop and implement a long-term safety culture programme, defining means for the evaluation of the safety culture level (including indicators of a more positive nature, behavioural observations and attitudinal surveys), goals and actions for its permanent enhancement.

#### **Plant response/action:**

During the international OSART evaluation in January and February 2003, the plant showed IAEA assessors its good safety results based on a certain number of indicators overly focused on quantitative aspects (for example, number of significant events, automatic reactor shutdowns etc.) and providing too negative a vision of safety, which could lead to the belief that we are subject to safety results rather than controlling them. Without denying the nationally monitored parameters, we have proposed other indicators that focus more on the culture and behaviour of the technicians and managers as regards safety.

This is why in the first quarter of 2003, a thought-process was undertaken in a safety review and then in the Wide Management College in order to establish a Safety Culture Deployment

Program (PDCS) shared at the Wide Management Committee level and official since October 1, 2003, that will form one of our priorities for the coming years.

Recorded by the Deputy Director responsible for Operational Departments and by the Quality Safety Director, responsible for the verification line, the safety culture deployment program comprises five main areas:

- \_\_organisation
- \_\_verification
- \_\_training and skills
- \_\_improvement of the ‘‘produce’’ process
- \_\_opening to other sites.

← Mise en forme : Puces et numéros

**At the organisation level**, the fields of action concern the following key points:

- Use the results of the Safety Perception Questionnaire (QPS) to create a debate in the departments. The Safety Quality structure is in charge of leading this debate based on the analysis of questionnaire results and reporting items (that of the NPP, the Nuclear Generation Division, General Inspectorate of Nuclear Safety) concerning the concerned professional sector. These debates will lead to a review of the safety process and will be included in the Medium Term Plan reporting.
- Develop the weak signals approach for the detection and handling phases with the support of the Operations Quality Committee. This will yield a diagnosis of certain organisational malfunctions and a proposal to management of handling solutions.
- Enhance and improve the operation of operational bodies in which safety has a priority, recognised and stated role. For example in the Operational Management College, the weekly safety point built on the basis of the Weekly Safety Report (RHS) including the elements from the Safety Engineer and those of the Quality Centre (main verification and audit reports) is enriched by the full report of the Operations Shift Managers. Likewise, the half-yearly safety bulletin is also discussed by the Operational Management College with insistence on the key safety points and the management levers for the deployment of safety on the site.
- Maintain and reinforce the level of requirements by implementing the different Department and Site inspection plans.
- Reinforce the impact of the new event detection and notification process by the systematic demand for a full analysis by each entity concerned and the finalisation of the decision made (confrontation dossier and supported message of On-Call Decision Management on-call duty officer to all impacted players and decision makers).

**As regards verification**, special attention is paid to the following levers:

- Translate the Safety Quality Department audit and verification product into a recommendation and suggestion based on the method of the Nuclear Inspectorate (IN).
- Meet the management of the Department or process concerned, compare opinions and translate the whole into corrective actions with an implementation schedule (recommendations will be monitored in the action monitoring application).

- Check that verifications are applied during the management contract reporting managed by the Deputy Director or Safety Quality Director that benefit from the intersecting vision of the Safety Quality Department.

**For training - skills**, the objective includes the following levers:

- Ensure the presence of management in the summary of "safety quality" courses;
- Use the arrival of the simulator to better prepare sensitive operating activities (link with a recommendation of the training theme).

Mise en forme : Puces et numéros

**For the "producing at market pace" process**, the objective includes the following levers:

- Reinforce the Outage Safety Commissions (COMSAT) with more clearly stated positioning of operational personnel creating a role with more perspective and control over the outage staff and notably the Outage Safety Engineer.
- Check by surveying the Operations Shift Manager-Safety Engineer confrontation in order to improve further the level of quality and to decide on the expected role of both players.
- In addition to process indicators, set up the Operations Quality Indicator (IQE) initiated by the Safety Quality Director. Based on monthly results, analyse the trends in the Management College and decide on the progress actions to set up in the categories of the Operations Quality Indicator ( state of barriers, radiological cleanliness, fire, daily rigor, deviation handling capacity).

Mise en forme : Puces et numéros

**As regards opening up to other sites**, the objective includes:

- Intensifying the benchmarking to seek out the good practices of other NPPs for quick implementation.

Mise en forme : Puces et numéros

**Monitoring the Safety Culture Deployment Program:**

In order to ensure a rigorous follow-up of the safety culture deployment program, a progress report using simple indicators has been proposed (see next page). Weekly reporting is provided to the Operational Management College each Monday by the Safety Quality Department Manager during its safety point, each department regularly presenting concrete action contributing to the success of the program.

**Progress Report – Indicators monitoring the 2004 Safety Culture Deployment Plan, given every week in the Operational Management College**

**Organisation:**

- \_\_ Safety Perception Questionnaire:
  - \_\_Presentation of results and debates in the Department Management Teams with support from the Safety Quality Management: number and population impacted
- \_\_Weak signals: number of problems studied in the Operations Quality Committee
- \_\_Operational bodies:
  - \_\_presentation of Operations Shift Managers' reports: 1/CDO
  - \_\_presentation Safety Quality Dept. Hierarchical Safety Report (with verification and audit reports): 1/CDO
  - \_\_presentation of the Safety Bulletin: each issue
- \_\_Number of inspection plans set up (site and departments)
- \_\_Event process: (monitored in the confrontation dossier)
  - \_\_Safety Technical Committee event systematic before notification
  - \_\_Full analyses of players and On-Call Decision Management presentation
  - \_\_Number of cause trees planned within 10 days
  - \_\_Notification (48 hours) and report distribution (2 months) deadlines
  - \_\_Achievement rate of actions validated by the Safety Technical Committee

Mise en forme : Puces et numéros

**Verification:**

- \_\_Number of recommendations and suggestions
- \_\_Application rate by departments after managerial sharing

Mise en forme : Puces et numéros

**Training- Skills:**

- \_\_Participation rate of managers in course summaries
- \_\_Number of new courses developed on the simulator

Mise en forme : Puces et numéros

**Producing at market pace:**

- \_\_Monitoring the operations quality indicator

Mise en forme : Puces et numéros

**Opening to the outside:**

- Number of good practices and innovations resulting from the process reviews.

**IAEA Comments:**

The plant has taken a number of actions to formalize and enhance their approach to safety culture. At the outset a survey on safety culture was prepared and responses were received from about 200 people from all levels of the organization. Results of the survey indicated that workers have a high regard for safety at Nogent. The survey also indicated some specific concerns related to organization and documentation and the plant is taking steps to address these concerns.

Detailed safety indicators which include radiological and environmental aspects, state of safety barriers, fire safety and rigorous approach to operations have been developed. The indicators are part of the "IQE", Operational Quality Indicator program. This program does an excellent job of mapping important aspects of safety performance. Plant performance against these indicators is tracked and the results discussed with management. Following the management meetings the results are communicated throughout the organization.

Line managers are also encouraged to attend the wrap-up sessions held at the end of training classes. Although their attendance has shown improvement, it does not yet meet the goals of the station.

Nogent was one of the leaders in an EDF wide program to develop better techniques for the analysis of low-level events. The resulting program includes investigation of specific trends within the CQE (Operational Quality Committee) departments and the investigation of cross-functional trends by a cross functional committee. This approach holds much promise.

**Conclusion:** Issue resolved.

**1.2(a) Good practice:** The Nogent NPP Management launched an action generalizing the supervisory inspection programme to improve management process in compliance of with ISO 9000/2000 Standard in May 2001. The inspection policy and programme have been implemented by all managers and directors. This approach provides a record of the delegations granted in technical and non-technical field and constructive input to in-house experience feedback.

An action plan is established for all subjects – responsible personnel and activities that are important for all the departments. This provides a record of the delegations granted in technical and non-technical areas-activities. Standard charts dedicated to each type of activity check are available for easy comparisons. Fast feedback information for correction is available in real time. Inspection activities are scheduled and followed-up on a monthly basis. A global yearly status review is conducted by the communication department at the end of the year to provide experience feedback for the following year. It is supplemented by the department performance indicator charts. The whole process provides a constructive input to in-house experience feedback.

## 1.5. INDUSTRIAL SAFETY PROGRAMME

**1.5(1) Issue:** Plant industrial safety practices are not always followed by the plant staff or enforced by plant supervisors and managers and uncorrected safety deficiencies exists in some areas of the plant. Some examples were as follows:

- While performing the battery LD0809 discharge test at Unit 1 workers were not properly protected (risk analysis had been performed), they were not wearing the required protecting equipment – gloves, goggles, helmet.
- H2 storage area at Unit 2 is without doors (doors have been removed for maintenance repair) area is not protected and marked.
- The ladder in the ECCS tank room was damaged by corrosion, the defect could pose an industrial safety incident
- Potential risk on the electrical connection of auxiliary feedwater motor-heater on unit 2 train A.
- Doors of electrical equipment in turbine building of Unit 1 were opened, tape used as a barrier without any mark or deficiency tag.
- Unsecured fire extinguisher.
- Oil on the floor due to maintenance of the charging pump in the room NA 0405 (Unit 2), potential for slipping
- Next to the door WA 0511, the icon for the emergency exit is broken. The escape route is not indicated.
- The rooms of the ECCS high-pressure pump and the ECCS tank (Train A) have discarded materials used during maintenance (wires, pieces of plastic, welding rod).
- Evidence of smoking was found in the industrial area – workers were observed without hard hats.
- Poor lighting in the turbine buildings on ground floor on both units, in diesel generator-rooms, and in stairwell 0448.

Without enforcing and following industrial safety practices and correcting safety deficiencies the probability of personal injury is increased.

**Recommendation:** The plant management should ensure that industrial safety rules are fully observed and deficiencies are identified and corrected.

### **Plant response/action:**

#### **Main deviations observed**

##### a) Failure to meet and/or insufficient knowledge of jobsite requirements

When the battery discharge test was run, the technicians were not sufficiently protected. They were not wearing the required equipment.

b) Failure to meet jobsite tear-down requirements and insufficient control of facility condition

The H2 storage area has no doors. The Fuel Pool Cooling system ladder was damaged by corrosion. Potential risk on the electrical connection of an Auxiliary Feedwater system pump heater. The doors to the electrical cabinets were open. Unsecured extinguisher. Risk of slipping due to oil on the floor following maintenance action. The HP SIS pump room contained rubbish. Proof that the rules prohibiting smoking were violated was found.

**Actions defined**

The NPP management structures its progress actions in the framework of two decisions. Decision DD-03.14 describes the industrial safety management program (in response to deviations in ‘a’); decision DD-03.08 explains the hierarchical control actions in the field (in response to deviations in ‘b’).

1. Industrial Safety management

Decision DD-03.14 includes:

- the prevention of accidents and situations presenting a risk through continuous management within the professional sectors and active presence in the field;
- the systematic analysis of events (from near accidents to serious accidents) accompanied by expanded sharing within the NPP.

The NPP has developed a field safety booklet; the purpose is to reinforce the appropriation of requirements on the jobsites and have a single reference for inspection. This booklet was individually distributed to each field technician (service providers and agents).

2. Organisation of inspection

Decision DD-03.08 defines the inspections performed by the Wide Management Committee (CDE) in the field. Two types of inspection are defined: those targeting jobsites and those relating to facility condition.

The Hierarchical Industrial Safety Inspections (VHS) target compliance with requirements by jobsite field technicians: the NPP schedules one VHS per week for the Unit Operating process and five VHS per week during an outage.

The Cleanliness Inspections (VPROP) focus on the condition of the facility. During an outage, the VPROPs are coupled with the VHS and focus in particular on the jobsite teardown phases.

The operational monitoring of the process is ensured by the Operational Management College and during the Unit Operating Steering Committee meetings (outside outage periods). Developments are discussed and decided on during the Industrial Safety-Radiation Protection and Environment management reviews.

To these management-level inspections are added the department inspection plans and the Risk Protection Section and the Safety Quality Department audits and verifications. The Safety Quality Department actions are specified in the Quality Assurance Program (PAQ).

3. Application of Experience Feedback

Experience feedback is taken into consideration during Risk Prevention recycling in order to provide a response to the routine concerns of field technicians. Sorting waste near the jobsites and chemical risks will be part of a reinforced presentation.

4. Industrial Safety at the NPP

In addition to the management actions performed by the professional sectors on a daily basis, each year the NPP organises a industrial safety day coupled with the contest. In 2003, this contest took the form of a comic strip quiz. The questions focused on the NPP's priorities: chemical, road, handling and fire risks. The goal was to favour the appropriation of requirements by pushing participants to doing team research and thinking on industrial safety matters encountered in their routine activities. The NPP organised the contest in cooperation with the NPP at Saint Alban. This formula is reiterated in 2004. The themes were selected according to the difficulties encountered during the outage period.

In parallel to the contest, the management organised an innovation log and committed to undertaking the two winning proposals in 2004.

5. Partnership and dialogue with stakeholders

The NPP explained its industrial safety requirements when the service contracts were renewed (site initiative to modify the CCAP (Service Provider Specifications) explaining its performance requirements for the outages).

In the framework of its "Service Provider Action Plan", the NPP is developing new levers for the recognition of the most high performing service providers the most involved in the result improvement approaches of the NPP.

Furthermore, in order to more actively associate the service providers in our industrial safety debates, the NPP has undertaken the implementation of the CIESCT (Inter-company Commission on Industrial Safety and Work Conditions).

Decision DD-03.14

**Nogent sur Seine NPP Industrial Safety Management Program**

Action Priorities for 2004: A known, understood and applied program

Even if the accidents observed on the NPP are fortunately not very serious, they are still too numerous and continue to have the same causes: inattention, unjustified haste, lack of awareness of risks during routine or ordinary activities.

The handling of field technicians after an accident is still insufficient, as is the assistance regarding our industrial safety requirements provided up to the service providers, a principal that is fundamental in a partnership relationship.

The management review of September 2, 2003 identified our action levers. Decision DD 03.14 reinforces these levers by adding indicators measuring our involvement in improving industrial safety results on the site. These indicators are regularly monitored by the Operational Management College.



### 1. A Single Requirements Reference

The ‘‘Field Industrial Safety Booklet’’ is available. It is used during inspections and checks. It is communicated to work foremen by the Departments. It simply includes the requirements already present in the safety instructions and the Log of Recommendations for Personnel.

It will be inserted in the Outage field service operators guide.

### 2. Managing Industrial Safety at the NPP and relaying requirements in the field by explaining their meaning

Managing safety is a important vector for mobilising field technicians in the field, the leading actors of industrial safety and foremost their own safety.

This management is ensured by the industrial safety branch (industrial safety forum, contest, drawing up the monthly Industrial Safety Radiation Protection balance sheet) and the professional sectors (1/4 hour section meeting, coordination point with the service provider). Professional sector management is directly based on (weekly and monthly) reporting drawn by Industrial Safety Radiation Protection.

As regards the activities entrusted to outside companies, the Industrial Safety Radiation Protection Director meets with regional managers to comment on the site’s industrial safety results and share, in a partnership, the difficulties and levers that must be relayed in the field. The concerned EDF contractors participate in these meetings.

The industrial safety engineer organises an annual situation meeting with the site’s Industrial Policy Manager.

### 3. Analyse all the events (from near accident to accident with shutdown)

The NPP analyses all safety events. The analysis is conducted jointly by Industrial Safety Radiation Protection in the 3 days that follow the event in the presence of the field technician involved.

It is validated by a work group composed of the Labour Physician, the Industrial Safety Engineer, the Industrial Safety Radiation Protection Director and the Industrial Safety Radiation Protection Engineering Manager. The field technician concerned, his/her superior and their EDF contractor in the event of an activity entrusted to an outside company are imperatively present when the accident analyses are validated.

These analyses are transmitted to the Health, Industrial Safety and Work Conditions Committee and the Labour Inspectorate within one month.

### 4. Handling the field technicians involved in an accident

For all safety events involving the Medical Department, the field technicians are handled systematically by the EDF manager responsible for the operator or the service. At this time, the manager evaluates the pertinence of a job adaptation. Regarding service providers, the NPP reminds the company’s representative of the facilities granted for job adaptations, notably the temporary alleviation of contractual expectations.

A field operator who is the victim of an industrial safety-related event is seen by the Management to complete the professional sector vision. In the event of an accident with medical leave, the field operator is seen once he/she returns to the site.

Decision DD-03.08

Organisation of the inspection of the cleanliness and industrial safety of jobsites and installations

The many reports made during the OSART evaluation, the various audits and inspections of premises and jobsite (industrial Safety inspections, Operations "facility condition" periodic tests) led the NPP management to reinforce the steering and hierarchical inspection of:

- The safety and cleanliness of jobsites;
- The conventional and radiation cleanliness of installations.

The cleanliness and tidiness of the plant guarantee the proper execution of field service operations and performance of equipment and contribute directly to the safety of people and the plant.

The decision was made to conduct:

- Hierarchical Safety Inspections (VHS) focusing on the cleanliness and industrial safety of jobsites (these VHS are led by a member of the Wide Management College);
- Cleanliness Inspections (VPROP) focusing on the condition of the plant (these VPROP are led a member of the Wide Management College).

### **1. Identifying the reports**

The VHS yield "industrial safety/fire" and "cleanliness/tidiness" reports. These reports respectively supply the "industrial safety" and "cleanliness" data bases of the site.

The VPROP yield "cleanliness/tidiness" reports. They also supply the site's "cleanliness" data base.

The "industrial safety" and "cleanliness" data bases are unique and managed by the NPP's cleanliness manager.

Reminder: each room of the NPP has an "owner" charged with maintaining the level of cleanliness in compliance with the site reference.

### **2. Processing the reports**

The NPP cleanliness manager transmits:

- The "industrial safety" and "cleanliness" reports resulting from the VHS to the contractors and managers of the jobsites;
- The "cleanliness/tidiness" reports resulting from the VPROP to the room owners.

The NPP cleanliness manager sets a deadline for processing the reports.

### **3. Checking the process**

The processing of the reports is checked as follows:

- For the “industrial safety” reports, during the monthly Unit Operating process meeting;
- For the “cleanliness” reports during the monthly cleanliness correspondents meetings.

The manager of the Unit Operating process in the Operational Management College presents the summary of the deviations detected during the VHS. For the VPROP, a monthly summary is made during the Operational Management College environment point.

### **4. Organizing the inspections**

The VHS focus on the jobsites under way selected on the basis of the Unit Operating Schedule.

The VPROP focus on cleanliness and tidiness of all NPP premises.

The schedule of VHS and VPROP is managed by the Unit Director’s administrative assistant.

#### **IAEA Comments:**

In a November 2003 decision, the plant decided on practical measures to be applied by all and monitored by line management in order to significantly reduce the number of industrial safety events. These actions include; investigation of every injury, specific actions to prevent reoccurrence of the same type of injury, briefing other workers on the injury, more active monitoring by managers in the field, and publicizing industrial safety by game type tools.

Because of the injury rate among contractors in 2003, the plant developed the Five “M” method (investigation of precursors) and they held direct discussions with contractors on the need to improve industrial safety. All of the plant actions have resulted in a significant decrease in the accident rate within the contract organizations.

In the last two months the plant has detected an unexpected increase in the accident rate of EDF employees. Corrective actions are being pursued to promptly reduce this rate.

The plant recognizes that the personal injury rate remains above the average of nuclear plants throughout the world. They have established a goal to reduce the personal injury rate by a factor of four over the next three years to a point that it will be in line with that experienced elsewhere in the world.

**Conclusion:** Satisfactory progress to date.

**1.5(2) Issue:** The policy and programme to control temporary storage areas are not defined. Many areas in both Units exist where different equipment and materials are temporarily stored including a large amount of combustible material.

- The temporary storages areas are not clearly designated.
- Responsibility for storage area is not always defined.
- Provision for security, storage duration and fire protection conditions are not clearly identified.
- The team have had a problem finding the responsible authority for fire load control.

Inadequate control of temporary storage areas, handling of stored material and equipment could lead to uncontrolled use of equipment and material and deteriorating safety equipment reliability, fire hazards and/or result in injury to the personnel.

**Recommendation:** The plant should establish and implement plant temporary storage control programme and clearly communicate responsibility for areas upkeep and control.

### **Plant response/action:**

#### Main deviations observed

The temporary storage areas are insufficiently identified, uncontrollable, the risks they add are not analysed (waste bags but also equipment, pumps, containers, cables etc.).

#### Actions defined

Design and specify an organisation allowing the identification of the storage, the added risks, the related parties, the manager and the storage time. Manage these storage areas and ensure their control.

#### Situation report

These storage areas are by definition provisional or temporary. They mainly correspond to hallways or access lobbies and to certain closed rooms for which the responsible departments are identified in the room allocation memo. It is thus necessary to assign a person responsible for each area and to identify the content with the ensuing requirements.

#### The main lines of work

The name of the person responsible, the expected duration, showing that fire and chemical hazards, radiation and potential contamination have been taken into account must appear at the storage area. Checking is ensured by the Professional Sectors and the Industrial Safety Radiation Protection Team.

#### Actions undertaken

In order to specify the storage requirements, the site has decided to create a cross-functional work group essentially composed of the concerned departments (Maintenance, General Services, Electricians, Active Installed Base Engineering (modification), Radiation protection and the Security/Radiological Cleanliness Director).

After several meetings, the decision was made to lay out in an application memo the decisions retained concerning the management of temporary storage areas.

The main topics concerned are:

- The domain of application (details, definitions, etc.)
- A reminder of general utilisation rules
- The definition of responsibilities of the various players
- Requirements in terms of posting and risk prevention
- Control
- Additionally, a standard posting sheet.

#### The deadlines

Following the conclusions of the work group set up following the recommendations of the OSART, the main steps and deadlines are spread out as follows:

- Memo before the Operational Management Committee on 03/01/04 (done, memo approved)
- Memo before the reading committee 03/17/04 (done, memo approved)
- Cascading down of the memo during an outage meeting on 04/01/04 (done)
- Effectively set up at the start of outage 1 early April

An experience feedback will occur after the two outage campaigns in order to consolidate and ensure the sustainability of the approach.

#### **IAEA Comments:**

For temporary storage, the plant has developed and implemented a significant improvement program. This program includes; identification of areas where materials may be temporarily stored, proper marking of the stored materials, identification of the responsible person, dates by which the material should be removed and classification of the type of material regarding fire load, chemical hazard or contamination. The team reviewed the list of temporarily stored materials and found it to be of high quality and well maintained.

Monthly monitoring tours of all areas are done by the ancillary services section (SG-Logistics and waste) management to ensure that plant expectations are being met.

During a tour of the radiological area of unit 2, the team observed that for the most part the temporary storage areas appeared orderly, and well marked and controlled. Some open containers of waste oil were found in one area; although the oil was stored within a retention barrier the fire hazard could have been reduced by use of a closed container. Plant personnel agreed to provide such a container. Another area was found to be located immediately adjacent to plant instrumentation. Storage material stacked in this area was at risk of falling against the equipment. Normally the plant avoids storage close to plant equipment and it was agreed that this storage area should be moved.

**Conclusion:** Satisfactory progress to date.

**1.5(a) Good Practice:** A global risk analysis method has been elaborated and implemented to improve performances related to nuclear safety, plant capacity, industrial safety, radiation protection, chemistry, housekeeping and the environment in the areas of maintenance and operations.

The method is applied during all operation, maintenance and technical support activities, ranging from basic operations to interfaced activities. It is divided up into two steps:

- Search for risk and related countermeasures.
- Possible formalization of risk analysis. A common support, available on-line, provides consistency through the site, regardless of the author and the area(s) involved. If no specific risk is identified, the work package will contain a note: “no formal risk analysis”.

A practical pocket manual was edited in order to help out risk analysis set-up and control. This manual buttons down some possible risks covering areas mentioned above. Risk analysis is performed when preparing the work package. Risk analysis data sheet includes all risk-related areas and various countermeasures to be implemented for a given risk associated with planned work and execution conditions. During performance of risk analysis procedure there are different levels and department representatives are involved. The method allows the analysis to be completed with additional items, from the preparatory phase of the work package up to the work on the field by taking into account possible context- related changes.

## 2. TRAINING AND QUALIFICATIONS

### 2.1. ORGANIZATION AND FUNCTIONS

Operational responsibility and policy responsibility for training is functionally split between two positions in the organizational structure. The human resources director is responsible for the definition of policy, strategic co-ordination, development of proposals and overall monitoring of performance and works closely with the heads of departments. The department head has operational responsibility. Overall staff numbers have been increased. This policy has been to counter the reduction in working hours to 35 per week and importantly there is a recognition that the work force is ageing and younger staffs are being employed to ensure the skills of the workforce are maintained.

The site is adopting the corporate programmes in order to improve the competence of the work force. A detailed document “Division Production Nucleaire” clearly specifies the corporate projects for the period 2002-2005. EDF corporate HR and training policy is being deployed:

- System Local Development of Competence. A project team with a departmental head assigned as manager exists to promote the local skills development system. The project manager is supported by a human resources consultant to promote and share good practices across the various site departments. The basic principles of skills development are not being changed by the project, the project is focused on promoting a consistent approach across the departments. The project has been operating for three months and is due to be completed in 2003.
- Line managers ownership of training with HR support. To reinforce the line managers responsibility for their staffs competence the staff training records were transferred to the managers after a comprehensive verification exercise was conducted in mid 2002.
- Procurement of a site based simulator due to be completed in the autumn of 2004.
- The clear split between training owner and provider which was finalized with a contract in December 2002. Nogent staff use the professional training service (SFP). Category A - training SFP provides, Category B - SFP or external (e.g. manufacturers course selected by SFP) provides, Category C - Nogent staff provided or external selected by Nogent. Total SFP staff supporting nuclear plants in EDF is 500 people.

The department head has the operational responsibility for the whole training system. A network of departmental training representatives support their department. They act as a liaison between the HR department and their own department. The HR section collect the training needs of the various departments and manage the setting up of new training arrangements along with the choice of training service provider. HR also support the departments with detailed quarterly records of the information essential for the management of authorization. HR are also responsible for sending out course notifications for the site training courses and for enrolment on corporate courses.

Currently the training representatives mainly participate in operational training matters and to a greater or lesser extent in the development of skills depending on the department. The intention of Nogent Human Resources Policy is to consolidate the role of these representatives making them responsible for skills development and not just training.

Every department has a standard training plan (PTF) per function that consists of courses identified at corporate level added to by the site in the site professional adaptation programme (PLAP). The line managers are responsible for the competence/training of their staff with the support of HR and training providers. During the review, managers and section heads interviewed demonstrated commitment to their staffs' qualification and competence. Every individual at Nogent has an annual interview with his or her line manager as part of the individual re-qualification process, (95% of staff hold authorizations). During the authorization/training interviews, the individual's competence is confirmed and an "expression" of training needs is recorded in order to improve or maintain individual competence. Following the interview the individual training plan (PIF) is then compiled, the training identified is recorded for the current, next and following year. The yearly training plan is then drawn up and adapted within each department and endorsed by the HR dept.

The training processes at Nogent are being monitored for improvement opportunities, however the detailed Key Performance Indicators necessary to ensure the improvements in process efficiency are not fully developed and a suggestion has been provided in this area.

## 2.2. TRAINING FACILITIES, EQUIPMENT AND MATERIAL

Classrooms observed were fit for purpose. Open learning "self learn" computer based training is limited to basic science training.

The radiologically controlled area (RCA) change room and equipment are simulated to conduct Health Physics access training. The training facility also has mock ups of tanks and pipe work installations to practice Health Physics monitoring activities. A dedicated First Aid training room is available to conduct First Aid training. Contract staff delivers fire fighting training.

A PC based simulator is available along with a SIPACT classroom based simulator is used to visualise physics phenomena. A basic computer training room for PC software application training is available. A basic library exists.

Nogent uses the SFP training centre at Cattenom for operation training on the simulator, the simulator is based on the Paluel NPP design and not on the Nogent NPP. Occasionally initial trainees are sent to the training centre at Paluel due to the limited availability of the simulator at Cattenom. There are plans to build a new simulator at Nogent. The team has made a recommendation in the area of simulator training to support Nogent in their drive for continuous improvement in the operational training programme.

Review of training materials is the responsibility of the site based SFP team, materials are comprehensive. A session had recently been developed to address the issues associated with mid loop operation and this had been delivered just in time prior to the outage.



### 2.3. CONTROL ROOM OPERATORS AND SHIFT SUPERVISORS

All control room operators at Nogent have been promoted through the field operator route and so have completed the field operator training programme prior to entry to the reactor operator programme. The plan details 6 months formal training in classrooms and 4x2 weeks on the simulator. The remaining 12 months is allocated to shadow training shift operators in the main control room. The classroom and simulator training are comprehensively assessed for technical knowledge based on recognized objective based processes. Throughout the initial training programme the trainee shadows an operator in the control room on site when not in formal training courses, however the period of shadow training is not formally documented and a recommendation associated with shadow training for several technical skill areas was provided by the team.

Individual trainee log books are being developed along with apprentice masters to support the trainees a good practice has been noted in this area and the station should continue the development of these processes in order to support the formalizing of the shadow training. At the end of the process the trainee is interviewed by the shift manager.

The continuing training programme includes two weeks on the simulator per year, three yearly radiation protection training sessions, yearly first aid and two yearly fire fighting. Each year the individuals are re authorized in line with the initial authorization process.

### 2.4. FIELD OPERATORS

Field operators are employed on the understanding that they will progress to reactor operator. The initial training programme is based on the corporate model and takes approximately one year to complete. The programme is a combination of seven one-week courses (SFP delivered and assessed), training on days on site systems supported by an experienced operator who is taken off shift to support the programme and finally shadow training during immersion on shifts. The initial shadow training is supported by detailed objectives and the use of the log book to allow trainees to record their training activities is to be encouraged. The field operator programme is also supported by a document titled “ Skills expected for field operators, this document supports the assessment of the trainees by line management and also serves as a self evaluation process for the trainee.

In common with the reactor operator training programme the field operators have refresher training associated with: radiation protection , first aid and fire fighting.

Each year the individuals are re authorized in line with the initial authorization programme. However, there is no structured continuing training programme associated with competencies to perform the many tasks necessary to be an operator technician.

### 2.5. MAINTENANCE PERSONNEL

The maintenance personnel initial training programmes were reviewed associated with mechanical, electrical and instrument and controls. The programmes are developed from corporate training requirements and contain a local element. The initial programmes are structured and contain elements of formal classroom training including attendance at training centres such as Gurcy to practice in fully equipped workshops. Each maintenance programme identifies shadow training as a component to assure an individual's competence is assured.

The initial programmes are culminated with a qualification interview which confirms the individual has the necessary skills to remain competent. Individual examples of quarterly interviews were reviewed and there is evidence that new trainees are comprehensively evaluated against the standard training plan and their individual skill shortages are identified and strategies put in place to fill the identified needs. In some instances the trainee may possess equivalent skills and a waiver process is available to the line manager.

The continuing training programme is standard across the maintenance disciplines; Nuclear Safety and Quality, Radiological Protection, Fire Fighting and First Aid are refreshed.

Good examples of the training interventions are to be found in the various departments based on the skills and learning development process (SLDC) rather than simply relying on more training courses. An example associated with use of procedures for standby staff was explained and the quality of the training material will assure a common understanding across a range of trainees. These skill shortage interventions will require embedding into the initial training programmes to ensure the information is not lost from the company.

## 2.6. TECHNICAL SUPPORT PERSONNEL

The management commitment to the training programmes for the testing, chemistry and support services was demonstrated during the review. The programmes are based on generic national plans supported by local elements. The training of individuals is supported by initial skills training guides for the testing and chemistry personnel which are utilized in the shadow training setting. This initial programme is supported by a co-ordinator who works in the department. These guides define the skills for individual roles within the department and are noted as a good practice in this report. Following the training programme the individuals are qualified following a detailed authorization interview, the structure of the interview is well defined and the manager has a selection of interview questions to assess the individuals. The rigour in the assessment process ensures a consistent standard is achieved from one trainee to the next.

The Safety and Quality and Risk Prevention departments training programmes were reviewed and, in common with other departments, the Management of Authorizations and Training is specified in a departmental document. The individuals training programme has periods of shadow training including “immersion” into the various Departments. The shadow training is not always fully defined to support the trainees structured learning. The Safety Engineers have a detailed training programme which is assessed using a detailed framework which covers knowledge, skills and behavioural/attitudes criteria.

The continuing training programme utilizes the same process as the initial authorization including the ability to use some of the questions from the initial training assessment process. Actual records of activities conducted through out the year by the individual also support the requalification interview.

## 2.7. MANAGEMENT PERSONNEL

Managers professional development is composed of two complementary processes. The national process, supervised by the corporate professional training services (SFP), addresses: change management, strategic integration and customized professionalism of managers in fundamentals via various modules based on individual interviews. A local process which includes: management days, six monthly management reviews, self assessment of managers in accordance with EDF's Management Charter, collective management aspects when team social problems are encountered and individual coaching by the HR Head of Department or HR Director regarding targeted training topics.

## 2.8. GENERAL EMPLOYEE TRAINING

The initial induction training for permanent staff is comprehensive, the plant director addresses all new trainees to set management expectations and reinforce safety culture messages. The trainees are then placed in the industrial safety and risk prevention departments to gain an appreciation of these functions. These two actions are in excess of the basic requirements. The formal training for all staff consists of a risk prevention level 1 course that lasts five days and addresses the topics of industrial safety and radiation protection. The programme is then dependant on an individuals role, courses attended may be a 2 day Nuclear Technology overview course or 10 day Technical Training course, the induction programme is completed by a 3 and then a 2 day course covering Nuclear Safety and Quality Assurance (FISQ). Following this induction programme the individual is then subject to a standard training plan depending on their function. SFP staff and subject matter experts from site support the courses.

The initial induction training was also reviewed for contractors. Training contractors who are approved by EDF deliver the programme. It is the responsibility of the contractor to ensure their staff are trained. The programme covers the same topics as the permanent staff in an EDF plant: Nuclear Safety, Quality Assurance, Industrial Safety and Radiological Protection. The training is assessed and allows the contractor access to the EDF sites for 3 years. EDF and an external organization (CEFRI) also formally audit the process. Prior to attending sites various meetings are conducted between the works co-ordinator of EDF with the contractors to ensure the training and qualification of the contractors staff to perform the tasks. Contractors also attend various safety forums to support improvements in ALARA and industrial safety principles.

## **STATUS AT OSART FOLLOW-UP VISIT**

In the area of Training, the OSART team made two recommendations and one suggestion. The follow-up OSART visit resulted in one recommendation and the suggestion being resolved and one recommendation having made satisfactory progress to date.

In order to improve the issues raised in the training area it is recognised by the team that the site HR department played a key role, however the support of the SFP and the line staff including senior management has greatly contributed to the overall improvements.

Since the OSART mission in 2003 a full scope replica simulator and associated support rooms have been built at Nogent. During discussions with the plant and SFP staff during the

OSART follow-up it became obvious that the staff are rightly proud of the new facility and recognise the full potential of having the Simulator at site.

The Nogent staff supported by the SFP has already realised and have plans in place to address the issues raised in the OSART report:

Increased continuing training, Operations managers have attended sessions to reinforce their expectations, Assessments during the continuing training programme are scheduled, The simulator has supported on site emergency exercise training, The panel differences between the real CCR and simulator are now minimal and the operating procedures are available in the simulator.

The staff that was interviewed recognised the improvement opportunity available to Nogent as a result of having a high quality onsite simulator and the OSART team have a high degree of confidence that the improvement opportunities available to the Nogent staff of having the simulator on site will continue to be realised.

In the area of shadow training the Nogent staff reviewed the previously identified good practice areas on site in chemistry and operations, other sites within EDF were consulted and the IAEA guidelines were referenced. A policy was issued and shadow training programmes were developed for each department taking into account the specific needs of the departments as specified by the department group heads. All departments have now adopted the process. This systematic approach to firstly specify the training in 2003 and secondly deploying the training in 2004 has resulted in an increase in the individual and management ownership and awareness of shadow trainings role in supporting the development of staff competence.

In the area of Training KPIs a full range have been developed.. This information is presented to site managers and section heads in concise reports that details department specific data. The report details trends and has realistic targets associated with each KPI, they are analysed by senior plant management and have been recognised as having provided Nogent managers with a fuller understanding of the issues associated with the training processes.

## DETAILED TRAINING AND QUALIFICATION FINDINGS

### 2.1. ORGANIZATION AND FUNCTIONS

**2.1(1) Issue:** There is a lack of up to date key performance indicators (KPI) to confirm and assess the efficiency of the training processes.

55000 hours of training were actually conducted in the year 2002 as oppose to the planned 70000. A process exists to record the reason for course cancellations, however, this information is not readily available to support improvements in trainee attendance at planned training sessions.

The attendance statistics for individual work groups was not available for the year 2002. The figures are to be calculated in the next month. The estimated withdrawal by trainees from training courses is approximately 20%.

During week 3 of 2003, 8 people did not attend planned training (across 4 sessions) and no excuse was given prior to the session.

Examples of a lack of communication between SFP and the site have resulted in lost training time for individuals; a specific example is a member of staff sent to the Paluel training centre only to find the course had been cancelled.

There are no standard KPIs issued by corporate EDF to assist the sites in improving the training process.

Without up to date information associated with the training process the opportunity to improve the process will be limited and both individual and group perception of the value of training will be degraded which may result in competences not being continually improved.

**Suggestion:** The plant should continue the development of the Training Key Performance Indicators to monitor the training process and thus regularly inform the management to ensure their commitment to high quality training services provided to the staff at Nogent NPP.

#### **Plant response/action:**

The NPP should add to and ensure the continuity of the training monitoring indicators. To do this, a number of monitoring indicators were improved or defined and implemented on the site:

#### Sessions attendance and absenteeism monitoring table for the site

This table already existed at the time of the OSART, but its content (distinction between justified and unjustified absence, plotting of reasons for absences from training) was revised in early 2003. This table is sent weekly to the site's complete managerial line and is reviewed in the Operational Management Committee by the Human Resources service in the event of drift.

These indicators enable the Human Resources Service and the Senior Management to make the managers aware of the impact of training absences, as compared with the reasons given, and to recall the importance that must be given to development of skills.

Each service was reminded of the particular attention that should be given to absenteeism in the Management Contracts for 2004 (Management Contract guideline letter).

#### Quarterly and annual training summaries

Since the beginning of 2003, a quarterly summary of training as a whole is produced. It is sent to the site's complete managerial line, to the training correspondents in the services and to the Senior Management.

It plots everything done in training, quarter by quarter. At the end of the year, it leads to an annual summary. This quarterly summary covers the following topics:

- monitoring of internal and external training volumes and costs
- monitoring of training discrepancy forms
- monitoring of the cost of managing replacements
- average number of training actions and hours per operator
- number of sessions added and number of sessions cancelled
- characteristics of the sessions performed on the site (with or without assessment, with or without course introduction and closure review, with or without issue of qualifications)
- attendance and absenteeism rates for the site and per service
- new training specifications or modifications to existing specifications
- latest training news.

This summary can be used to follow changes in the training field, to draw conclusions both in real time and at the end of the year and allow comparisons between services concerning training management.

#### Annual course introduction and closure review plan

This annual plan defines the site's requirements concerning managerial presence at course introduction and closure. It then quantitatively records the courses opened and closed by the site's management. It then allows a qualitative analysis of the course closure reviews and treatment of any discrepancies or difficulties encountered during the course.

This annual plan has been in place since 2003. It was improved in early 2004 (inclusion of 2003 feedback: nature of traceability, messages to be put across during the course introduction, etc.).

Improvement targets were set for the services for 2004 concerning managerial presence at course introduction and closure reviews, in particular in the Operation Department (Management Contract guideline letter).

#### **IAEA Comments:**

A full range of training processes KPIs have been developed; attendance and absenteeism rates, internal and external volume / costs, management attendance at course opening and closing sessions, changes to training plans including the reasons for the change reasons for, training hours and activities per employee. This information is presented to site managers and section heads in concise reports that details department specific data. The reports are analysed weekly, monthly and quarterly. The HR department also conduct a session each week with

one of the departments to reinforce any issues associated with the training of their staff. The report details trends and has realistic targets associated with each KPI, the traffic light system is used to highlight areas of concern. The process has been supported by senior plant management and is recognised as having provided Nogent managers with a fuller understanding of the issues associated with the training processes. It is worthy of note that the management attendance during training of their staff data is also analysed by the safety and quality department to support the stations efforts in improving the overall safety culture of the staff.

**Conclusion:** Issue Resolved.

## 2.2. TRAINING FACILITIES, EQUIPMENT AND MATERIAL

**2.2(1) Issue:** The current simulator training arrangements are not providing Nogent staff with sufficient opportunities to continually improve their performance.

**This issue is supported by four themes:**

### **Attendance theme;**

The current individual revision training consists of two 5 day courses per year. The initial training programmes consist of 8 weeks for each individual. Due to the workload on the simulator, the time available each day is limited.

The monitoring of the individuals attendance on the current revision programme does not ensure that individuals attend both the technical and behavioural aspects courses. Supervisors and Shift Managers are not required to attend the technical courses.

### **Assessment theme;**

The assessment process during simulator training is different between the initial and continuing training programmes. The initial programme has two formal assessments conducted by the instructors; these assessments have detailed assessment criteria. The instructor's complete detailed assessment sheets. No formal assessment is conducted during revision training. Neither assessment utilises the senior operations management during the assessment to provide independence or comprehensively addresses issues associated with human performance / team issues.

### **Personnel theme;**

There are a number of activities involving personnel which are not occurring for various reasons:

- The operations department management does not routinely attend simulator training sessions in order to set expectations or gain feedback on individuals / teams or training performance. There have not been any specific requests from Nogent operations staff to support the revision course which is in development with the first course due in week 8 of 2003. Shift managers do not routinely lead the debriefs following simulator exercises.
- Various workgroups such as; operator technicians, and other support staff do not attend the simulator to gain an appreciation of operational activities in order to develop operational focus (support safe and reliable operation).
- Although the instructors observed and interviewed were enthusiastic and well trained they do not visit the site on a regular basis, as a result they are not routinely observing activities during significant operations.
- Informal mechanisms exist to transfer student issues from one instructor to the next and Nogent staff if necessary, only individuals who are not achieving a satisfactory level of performance are systematically supported between the instructor and station staff. It was stated that some sites have software systems to support the monitoring of trainees during their initial training programme.



### **Simulator to Control Room differences theme;**

There are differences between the simulator and reference plant. The differences are listed in a national document, however the differences in control panels, furnishings and support paperwork are significant enough to prevent the creation of a realistic Nogent control room. Some differences included:

- The simulator room is smaller than the control room at Nogent
- The pressurizer control on the simulator is a single control, on site there are 2 controls, one for raise and one for lower.
- The safety injection panel has flow gauges and switches in different locations on the simulator panel versus the CCR panel.
- The effluent treatment panel is not present in the simulator.
- A limited suite of documentation (Approx 21 files) is maintained for Nogent training, the files are not stored in the same place on the simulator as in the CCR.

Routine station logs are not generally replicated on the simulator; a minimalistic shift handover is conducted.

- The simulator condenser cooling water system replicates a sea side station.

Without improvements to the current simulator training arrangements, opportunities to improve the operational and support staff competences to support safe and reliable operation will be restricted.

**Recommendation:** Simulator training arrangements should be enhanced to provide additional opportunities for the operations staff to experience a more realistic training environment more frequently in order to contribute to improvements in safe and reliable operational performance. It should be noted that a new simulator located at Nogent is planned to be in service in autumn 2004, these enhancements should be achievable following the completion of the new simulator.

### **Plant response/action:**

A number of discrepancies were identified during the OSART. The site defined and implemented the following plan of action:

#### Increase the training time the Operations staff spend on simulator.

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At present each operator in proficiency training carries out one week of retraining and one week of scenario training on the simulator per year (2 x 5 days).

As of September 2004, a few teams will have 2 extra training days using training exercises (one day of training exercise comprises preparation, performance of the exercise and debriefing). As of 2005, these 2 additional days will be extended to all the operation teams (3 x 4 days).

In addition, a simulator utilisation action plan is currently being validated. It defines the additional needs of the control teams and of the other site professions close to the process.

#### Planning of a yearly one week retraining course and one week situation scenario training should be guaranteed per Operation Department agent.

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Since 2000, the inclusion of training in the transition to the stabilised Status Based Approach and problems with providing instructor resources in the Professional Training Department and with planning the training exercises, disrupted the alternating retraining and training exercise programme which has to be followed for each operator. For 2004, these problems have been ironed out and the requirement is met, with each agent scheduled for one retraining course (individual operator or full team) and one training exercise. The same applies to planning for the coming years.

#### Increased presence of the Operation Department management during the course summary

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An annual course summary plan exists on the site for the in-house courses conducted. It sets the site's requirements concerning managerial presence at the course summary.

Simulator training has been incorporated into the annual summary plan for the 2<sup>nd</sup> half of 2004 (during which the simulator is to enter service). 17 summaries are to be performed by the Operation Department during this period (retraining, situation scenario training and training exercises).

During the 1<sup>st</sup> half of 2004, 2 summaries were carried out by the Operation Department management, on the simulators used by the Nogent staff.

#### No assessment is formalised for continuous training on simulator (continued proficiency training).

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Thought is currently being given by the Operation Department senior management to developing assessments for the end of continuous training on simulator. Installation of a simulator in Nogent gives us the opportunity to take action in this direction, jointly with the simulator instructors present on the site.

There are 3 types of continuous training on simulator: retraining courses (operator or full team courses), situation scenario training and training exercises. At present, only simulator

retraining leads to assessment. There is no assessment of the situation scenario training and training exercises.

This means that at present, each supervisor and operator is assessed at least once a year during his retraining course. Observable criteria were defined in the local amendment to the simulator retraining specifications for each scenario envisaged. This assessment has been operational since 2002 and is logged through a pedagogical targets attainment form filled out by the instructors and transmitted to the Operation Department management.

The site's aim is to move towards individual and team assessments involving test type situations.

Benchmarking is currently being conducted with the other sites to obtain their experience and best practices in this field. This work is done by the Operation Department in collaboration with the professional training department.

The operation teams must communicate and share their experience of this subject in order to prepare the agents for implementation of assessments for all their simulator training work.

Presence of management during the assessments is taken into account for simulator retraining courses and also needs to be considered in the ongoing work.

The goals set by the Operation Department senior management are as follows: in 2004 define the modalities for implementing assessments to allow application in 2005.

To encourage use of the simulator by the technicians in the Operation Department and by the other professional sectors close to the process

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A simulator utilisation action plan is currently being validated within the SLDC network (Local Skills Development System). It defines the additional needs of the operation teams and of the other site professions close to the process.

The aim is to define the professionalisation needs of the other professional sectors and together with the Professional Training Department produce simulator training specifications (On-site Emergency Plan, tests, automation, etc). The first sessions should be possible in 2005.

Encourage instructor immersion in the Unit's departments

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The new instructors who have arrived on the site are currently being integrated into the shift teams. This integration is defined by the head of the Professional Training Service according to the instructor's profile (former operations personnel or not) and depending on the availability of his training programme. This immersion is conducted on a site other than Nogent in order to ensure the independence of the assessment the instructors are required to perform on the Nogent staff. Each immersion leads to definition of learning goals during the course of the immersion.

Subsequently special contacts within the Unit's departments could be envisaged in accordance with the simulator utilisation action plan (to ensure better understanding of the needs of the departments). Proximity and analysis of the local requirements will facilitate comprehension and regular exchanges with the professional sectors other than operations.

## 1 Initial training

The "Operations Shift Manager", "Operator" and "Field Operator" initial training curricula, comprise several training modules.

### **"Operations Shift Manager" and "Operator" initial training curriculum:**

After performance of each "Operations Shift Manager" and "Operator" curriculum module, assessment is carried out and a pedagogical goals attainment form is filled out by the instructors and transmitted to the Operation Department management. A comments field enables the instructor to mention the points to be improved (even if the minimum level required has been attained).

In addition to this form, a trainee monitoring form will be employed in Nogent in 2005. It will trace the topics dealt with during the initial training modules. A copy of this form is kept by the Nogent Professional Training Service. Another copy is sent to the Operation Department management.

A folder will be held by the training department for each person in the Operation Department, containing all the pedagogical goal attainment forms and the trainee monitoring forms.

### **"Field operator" initial training form:**

This curriculum is transcribed in the trainee's monitoring file. At the end of each training module, a summary of the strong points and the points requiring improvement should be made by the instructor and transcribed in the trainee's monitoring file. This file is the link between the instructors of the Professional Training Department, the trainees and the tutors in the operation department. The Training Department was asked to fill out the trainee monitoring file correctly (at present there are traceability discrepancies).

The final assessment is filled out by the instructors and transmitted to the Operation Department management (this assessment is only made at the end of the curriculum).

## 2 Continued proficiency training

Simulator **retraining** courses lead to an end of course assessment. A course pedagogical goals attainment form is filled out by the instructor, one copy being given to the operator and another sent to the management. A comments field enables the instructor to describe the points that need improving concerning the trainee.

In addition to this form, a trainee monitoring form will be put in place in Nogent in 2005 (same as previous page). It will trace the topics dealt with during the retraining courses and the scenarios employed.

A folder will be held by the Professional Training Department for each person in the Operation Department, containing all the pedagogical goal attainment forms and the trainee monitoring forms.

The **situation scenario** training also leads to completion of a trainee monitoring form. However, for the time being, there is no assessment after this course, and thus no pedagogical goal attainment form.

In addition to this trainee monitoring form, 2 other forms are used for situation scenario training. A daily observation of the team is logged by the instructors and a summary form covering the transverse topics dealt with during the week is also completed. This form is used to record the strong points and the points requiring improvement concerning the shift team. This is not an individual form and assesses the team's collective work. These 2 forms are not sent to the Operation Department management and are kept by the site's Professional Training Service.

For the time being there is no traceability for the **training exercises**. This point will be improved with the use of additional training exercise days per shift in 2005. The content of the exercises will comply with the specifications drafted by the Unit's Operation Department. In response, the Professional Training Service will submit a proposal incorporating the particular points that the trainees need to look at in closer detail (example of training exercise for 2004, situation scenario training with field operators).

In short, for training with assessment, traceability is via pedagogical goal attainment forms. They enable the instructors in the professional training service and the Operation Department management to assess the extent to which the staff has acquired skills.

In addition, the trainee monitoring forms, daily observation forms and transverse topic summary forms enable the instructors to log the strong and weak points of the operators, year after year, to deal with any difficulties, to record the scenarios employed in order to fine-tune the choice of future exercises and guide the training content.

This traceability as a whole will be grouped in a folder for each Nogent Operation Department employee. This traceability will be consulted by the Professional Training Service instructors before performing any training courses on the Nogent simulator in order to diversify the scenarios and look in closer detail at the necessary points.

#### Explain the differences between the Nogent simulator and the Nogent control room

For the 1<sup>st</sup> half of 2004, most of the Nogent operating personnel will use the Belleville simulator. A memo was thus drafted identifying the differences between the Belleville simulator and the Nogent control room. This same memo will be corrected for the 2<sup>nd</sup> half of 2004 and this time will identify the differences between the Nogent simulator and the Nogent control room.

This note is sent to the Operation Department management for information of the shift teams.

During simulator training, the instructors use this memo and throughout the training process specify the differences between the simulator and the control room.

It should be noted that as soon as the simulator enters service, the simulator and the training rooms will be equipped with the site's documentation.

#### **IAEA Comment:**

Since the OSART mission in 2003, a full scope replica simulator and associated support rooms have been built at Nogent. During discussions with the plant and SFP staff during the OSART follow-up it became obvious that the staff are rightly proud of the new facility and recognise the full potential of having the Simulator at site. The simulator is currently

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supporting Cattenom staff training until the end of 2005, when a new simulator will be available at Cattenom.

The Nogent staff, supported by the SFP, has already realised and have plans in place to address the issues raised in the OSART report:

- Increased continuing training for existing operators (3x4 days per year)
- “Open access slots” for operators (Control room and Field) have been delivered and are planned to satisfy the operators training needs / requests
- Operations managers have attended the end of course reviews to reinforce their expectations and a plan exists for their attendance through out the year.
- Assessments during the continuing training programme are scheduled.
- The simulator has supported on site emergency exercise training.
- The panel differences between the real CCR and simulator are now minimal and the operating procedures are available in the simulator control room and associated support classrooms
- A specification has been produced to support the training needs of non ops personnel using the simulator and plans are in progress. (The SLDC has supported this process.
- A process to monitor and record individual student performance has also been developed to support individual learning.

There has been significant progress in the area of simulator training facilities and training approach. The staff that was interviewed recognised the improvement opportunity available to Nogent as a result of having a high quality onsite simulator.

**Conclusion:** Issue Resolved.

### 2.3. CONTROL ROOM OPERATORS AND SHIFT SUPERVISORS

**2.3(1) Issue:** There are weaknesses in some departments on job training programmes (shadow training). Although some departments have detailed shadow training programmes others are not formally structured and well defined.

Throughout the initial reactor operator training programme the trainee shadows an operator in the control room on site when not attending formal training courses. The period of shadow training is not formally structured and well defined to support the trainees training.

Each maintenance programme, (mechanical, electrical and instrument and control) identifies shadow training as a component, variable support material and frame works exist in the departments to support this shadow training.

The safety engineers training programme has periods of “immersion” into the various departments including the Operations Department, these periods of time are shadow training. Plans are developed on an individual level, however there is no model programme, the training periods are not formally structured with well-defined objectives.

The radiological protection training programme for technicians has periods of shadow training, the shadow training is not fully specified for the current trainees who have been redeployed.

It was stated that the shadow training relies on the experience of the current workforce and the formalization of the process would ensure a more consistent approach from one individual to the next.

Without a consistent and systematic approach across departments to support shadow training the competence of the individuals may not be guaranteed.

**Recommendation:** The plant should promote the sharing of information associated with the shadow training in order to raise the standards associated with this process across departments.

#### **Plant response/action:**

The NPP should encourage a transverse shared approach, based on good practices, to develop shadow training programmes.

For information, the NPP obtained 2 good practices in this field: the chemistry and test sections, with use of skill development guides and the operation department, through use of skills logs filled out by the personnel.

The site first of all drafted its reference framework in terms of tutoring and the shadow system:

- Drafting of a relevant implementation note. This note defines the roles and hierarchical responsibilities of the tutors and shadows in the "tutor" mission. It sets the site's levels of requirements, tackles the question of tutor professionalisation and assessment.

- Definition of requirements and content of a shadow training programme (explanation of tasks required for the operator, definition of shadow training learning goals and evaluation of operators against each goal). Each site programme meets these commitments.

The NPP then carried out benchmarking of existing good practices on and off the site. These good practices were shared with and between the professional sectors (including those which were not targeted during the OSART). Various shadow training professionalisation approaches were thus presented and shared: professionalisation log filled out by the operators, immersion shadow programme, shadow pairing. The Unit's departments then defined their shadow training programmes, choosing the professionalisation approaches which most closely suited their shadow training goals and exercise of the profession.



The professional sectors are currently working on writing and implementing shadow training programmes. The situation per department is as follows:

#### Automation and Electricity

The shadow training programme concerns new arrivals for initial qualification. The department opted to use a shadow training log, filled out by the new arrivals, to record all their actions and assess the degree to which they have learned the skills.

This programme is based on basic knowledge learning goals (in addition to the training leading to qualification) and further development of more complex topics according to individual needs (topics felt to be essential for learning more skills).

3 professionalisation procedures are envisaged:

- Specific individual and collective "professional sector" professionalisation.
- *An operator fully familiar with a subject presents it to one or more other operators. This is basic knowledge aimed at new arrivals.*
- Shadow training for maintenance activities.
- This shadow training is recorded in the work orders as well as in the employee's shadow training log. The main aim of this shadow training is individual training during real maintenance work.
- Observations in a work situation.

A few "core business" maintenance activities are to be defined and will lead to assessment of an activity, in a working situation, before initial qualification of new arrivals.

Progress goal: determining professional sector professionalisation actions, activity shadow training and working situation observations will be completed in June 2004. During the second half of 2004, the learning goals of each professional sector professionalisation action, each activity shadow training and each working situation observation will be defined and implemented. Application of this shadow training programme is planned for early 2005.

#### Operation

The "field professional sector" training curricula comprise periods of training and periods in the department, over about 1 year, with a view to initial qualification. The field operators have a trainee monitoring file supplied by the Professional Training Services for the "field professional sector" training curriculum.

This file comprises 2 parts: a theory part taught by the Professional Training Service and a practical part handled by the operator's specific department. This practical part corresponds to the operator's shadow training programme during his actual shift work.

Each part, whether theory or practical, consists of professionalisation modules and each professionalisation module is made up of learning goals. The trainee is given a methodological guide to help him work towards each learning goal.

Traceability of the work and learning done in each practical module needs to be improved.

We propose presenting each module in the following way:

- each learning module is signed by the trainee and the tutor, but also leads to associated comments about the assessment (strong points, points needing improvement, additional goals),
- in addition to the learning goals set by the Professional Training Service for each module, the tutor must be left room to add other extra goals. These may be particular goals linked to the difficulties encountered,
- a free space must be left so that the trainee can record what else he has done during his immersion work (special maintenance, personal work done),
- a free space should be left for the tutor and the training supervisor at the end of each module to record the skills acquired, the assessments made in the field and the other overall assessment justifications in the module.

Traceability of the learning acquired in each theory module needs to be improved by the Professional Training Service. A free space for assessment comments should be added to the end of each module to enable the instructor to record any areas of progress, detailing the trainee's strong points and points needing improvement. A formal request to fill out this part is submitted to the Professional Training Service.

The practical and theory modules are traced in the trainee's monitoring file. At the end of the shadow training period, this file will be archived in the operator's individual training log.

The "operator" training curriculum will be reviewed by the Professional Training Service during the course of 2004. We will make the same changes once the curriculum and the trainee monitoring file are finalised.

Progress goal: this trainee monitoring file is used and implemented as of February 2004 for operators beginning their training programme.

### Safety Quality

The "Safety Engineer" training curriculum consists of periods of training and immersion in the Operation and Safety Quality Departments, with a view to initial qualification.

The department decides to use the shadow training log filled out by the operators and validated by the tutor.

2 professionalisation methods are envisaged:

- immersions.

The shadow training log thus describes each immersion period, these periods being split into detailed learning goals. For each of these goals, the log comprises an "activity report" column in which the operator records everything he has done in this field (courses, immersion work, personal work). It also comprises a learning goals assessment part.

- activity shadow training.

At the end of the training and immersion curriculum, activity shadow training must be performed prior to initial qualification. This shadow training log therefore specifies the

shadow training activities to be carried out. Each activity is described with learning goals and there is a part for assessment of this shadow training.

At the end of the shadow training period, this shadow training log will be filed in the operator's individual training log.

Progress goal: this shadow training programme has been implemented since February 2004 for all new operators entering the department.

– Safety Protection

The shadow training programmes for the risk prevention and site protection sections are methodologically constructed in the same way. They can be broken down into various professionalisation topics. Each topic specifies the learning goal and is developed through the knowledge and skills to be acquired. Each topic leads to assessment by the tutor and traceability in a summary form.

The learning procedures are freely chosen by the tutor. They can take the form of courses, activity shadow training, personal research. They are chosen according to the current situation of the section and the courses scheduled in the operator's training plan. If activity shadow training is used, it is recorded.

This traceability as a whole takes place in an individual professionalisation log filled out by the operator. There is no predetermined order in implementation of all these topics. Once all the topics have been covered, the individual professionalisation log will be filed in the operator's individual training log.

The tutor and the operator conduct a monthly review of progress in coverage of the topics and acquisition of skills. The hierarchical superior checks the content of the individual professionalisation log on a quarterly basis and in the event of discrepancies interviews the operator and the tutor.

Progress goal: the shadow training programme has been in use since January 2004 for all new arrivals.

Support Services

During the OSART, the Laboratory and Test sections were found to have good shadow training programme practices.

For the Support Services section (belonging to the same service as the Laboratory and Test sections), the same methodology is adopted. The initial training guides and continued proficiency guides are currently being validated. They will be used before the end of 2004.

– Maintenance-Mechanics-Boilerwork-Valves

A shadow training programme is being written for this service. It concerns all new arrivals in the shop for the mechanical, boilerwork and valves activities.

The aim of this shadow training programme is acquisition of professional skills and performance of maintenance as a whole. It is implemented in parallel with the operator training plan (classroom training) with a view to initial qualification of the operator.

2 professionalisation methods are envisaged:

- Specific individual and collective "professional sector" professionalisation actions.

An operator fully familiar with a subject presents it to one or more other operators. This could be basic knowledge aimed at new arrivals, or could be a closer look at a complex topic for experienced operators. These assessments will be recorded in the operators' individual training logs.

- Shadow training for maintenance work.

The "core business" maintenance activities are to be defined for each speciality. Each activity will be broken down into learning goals and these goals will be evaluated by the shadow partners. These assessments will be recorded in the operators' individual training logs.

Progress goal: the shadow training programme will be finalised for each speciality before the end of October 2004. It will be applied to all new arrivals in the service as of this date.

#### **IAEA Comments:**

Following the OSART mission the station conducted a review of the shadow training process adopted at Nogent. The previously identified good practice areas were reviewed (chemistry and operations), other sites within EDF were consulted and the IAEA guidelines were referenced. Following the review a policy was issued and shadow training programmes were developed for each department taking into account the specific needs of the departments coupled with a consistent approach. Each department has a training coordinator and with the section head support individual shadow training programmes have been developed and integrated into the overall initial training programmes. The specific framework for the shadow training covers; topic areas, objectives, reference to authorisations, expected time period the training should be complete, the method to support the training, a section for the trainee to record their actions in satisfying the objectives, date completed and signature of the trainer / assessor. An experienced individual from within the department is nominated as the trainer and this individual can assign the trainee to members of the team to support individual training modules, however the trainer maintains an overview of the learning process to support the trainee. All departments have now adopted the process all be it the last two departments (Mech. and I&C) still have to demonstrate use of the process for the next recruitment of trainees.

This systematic approach to firstly specify the training in 2003 and secondly deploying the training in 2004 has resulted in an increase in the individual and management ownership and awareness of shadow trainings role in supporting the development of staff competence.

**Conclusion:** Satisfactory progress to date.

**2.3(a) Good practice:** Setting up of a professionalism programme specific to trainees supplemented by the use of expertise follow-up logs in the operations department.

A member of the shift staff is seconded onto days and assigned as a shadow trainer to support the training of new recruits.

The operations department training manager acts as a tutor for trainees. Meetings are organized periodically between the trainee and the shadow trainer and tutor to take stock of the experience the trainee has acquired in terms of professionalism. To enable the trainee to take ownership of their training a logbook has also been developed.

The log contains three sections:

- A list of infrequently performed activities due to be carried out at fixed intervals.
- A less restricted part in which the trainee keeps a record of the activities carried out that he considers as “noteworthy” or “significant”.
- A section containing generic performance based objectives.

The manager then validates the trainees completion of these activities. The log is also being incorporated into the qualified staffs continuing training programme and may form the basis for dialogue between the staff member and his manager during annual authorization interviews.

## 2.6. TECHNICAL SUPPORT PERSONNEL

**2.6(a) Good practice:** The use of initial training guides to support shadow training in the technical department, testing and chemistry sections.

The initial training guides used in the sections provide a record of the steps taken to issue authorizations to the staff.

These guides list all the skills that must be acquired for each work activities with a view to authorization:

- Situational and professional training based on shadow training. A shadow training programme is established for the department. Each shadow training activity is defined with its expected training objectives, which are given in the operating documents necessary for carrying out the activity. The tutor or shadow trainer assesses each shadow training activity. A staff member responsible for the project supports the programme.
- Individual know-how acquired from training, publications, observations in the field.

This structured approach allows work to be delegated in a traceable way and is supported by the daily assessment by foremen in the field. For authorizations to be issued, management confirms all these skills have been acquired.

### 3. OPERATIONS

#### 3.1. ORGANIZATION AND FUNCTIONS

The operations department of Nogent Nuclear Power Plant is responsible for the conduct of operation of the two 1300 MWe units located at the site. The operations department has established clear goals and objectives in the form of an agreement letter for the plant's deputy manager, which provides clarification of how the operation department will tangibly support the plant goals that are tracked by an internal action plan. There are also agreement letters from each shift team members, which support the operations contract agreement.

The department is well managed and staffed by well-qualified engineers and professionals. Procedures establish the department mission and roles for every position inside its organization.

There is a seven-shift rotation within operation, which provides adequate training and rest periods for all shift personnel. Following the scheduled extended break from shift duties, the operators systematically review the operational data the day before returning to shift. The staffing levels for each shift are adequate and the minimum required by the plant procedures is above the minimum requirements of the technical specifications. The department management is well supported by an engineering support group, a power operation group and an outage group.

The policies and programmes of the operation department are well established in a set of documents. The head of the operation's department commitments on safety culture can be seen in the risk analysis process, the daily meeting with the safety engineer and the safety self assessment process of the shift manager.

The administrative tasks to the shift are reduced by staff support of the operation division. The decision-making process for technical problems is well developed, involving the management and the shift manager. Each problem has a responsible person for the solution and an action plan. Feed back is provided for the shift personnel after the implementation of the solution.

In the morning and the end of the day meetings, it was possible to see that the interfaces and responsibilities between the operation and other departments are well understood even under the new matrix management system. Also, it can be seen that the authorities of the shift supervisor and shift manager are adequate for their responsibilities. The qualification of the field operators is well defined and approved, however the retraining programme is not usually monitored by the operation department management.

The head of operation department receive reports from training centre of the results of the simulator training and based on this, he takes the corrective actions. Management does not monitor the simulator training in person.

Since 1999, shift operators have been assigned as apprentice masters to newly recruited employees. The team considers this as a good practice in the Training and Qualifications section of this report.

### 3.2. OPERATIONS FACILITIES AND OPERATOR AIDS

A main control room (MCR) and two emergency shutdown panels exist for each unit. The control room panels are well laid out and system and equipment status is adequately displayed with the help of mimics and annunciators. The number of standing alarming annunciators is relatively low and tracked at shift turnover by the control room operators and the shift manager.

A number of labeling deficiencies were identified in the plant. These deficiencies include missing labels, broken labels and hand written labels. The team suggested the plant improve the labeling policy for plant equipment.

The operations department has a process to control the drawings and fire fighting rules posted in various areas of the plant. These help the field operators in their duties. However some other operator aids were found by the team inside the plant units without control. The team recommended the plant identify, authorize and control operator aids in the field.

### 3.3. OPERATING RULES AND PROCEDURES

Technical Specifications (STE), which are one chapter in the General Operation Rules are written for each unit, based on standard STE made for this type of plant.

A board is used to keep track of equipment affecting safety. This is a good and easy way of visualizing the current situation. It is also noted in the operator logbook. The logbook is used to document any safety related issue, or main problem in the units.

The total surveillance test programme is summarized in an instruction with criteria, frequency and responsible department, etc., governed by the operation department. Normal operating procedures give adequate support for safe performance. To start-up and shutdown the plant, master instructions are used to point out more detailed instructions. Five master instructions for start-up and shutdown are used, these reference to more detailed instructions. Alarm response sheets for the hardware alarms and process computer alarms are used.

Procedures that are classified as regularly in use do not have a time limit for revision. When a procedure is used, the first page is sent to the Document Control, which has the responsibility to replace the used one. The efficiency of this process is considered good.

Procedures are processed by an administrative control, with a programme available in the Intranet, to track the revision proposal until it is formalized and communicated to the overall shift personnel. There is a system to handle operator procedure errors that seems to be well organized. Operational procedures are not considered to need regular reviews since they are used on a daily basis.

Emergency operation procedures (EOP) are drafted by corporate level. The plant then produces unit specific procedures. They were found clearly written, built up like a flow chart and they have graphic descriptions of defined plant parameters. They are locked with plastic so it can be clearly seen what emergency procedures were used after the event is over.

Emergency procedures are symptom based. A new set of EOP was released in July 2002 after an extensive training programme.

In the operation department they have a procedure that clearly defines how to process and control the procedure modifications (called temporary modification). The modifications are

communicated to all shifts and included in the shift turnover log. Because they have procedures that are standardized there are a very low number of procedure temporary modifications.

#### 3.4. OPERATING HISTORY

The plant has a clear process to handle events, from identifying an event, reporting, evaluating root causes and actions, including follow up of actions. The safety and quality department handles performance Indicators for SER's, as well as other follow up. Every three months, the senior management gets a report of current status of these actions. In the operation department the immediate incident/event-feedback is done to the shifts within 48 hours by a simple hand written report.

Events are classified according to two corporate directives (DI19 and DI30) in different categories. The safety & quality department has one "human factor engineer" who is involved in reviewing all event reports. They also do 2-3 man/machine interaction analyses each year. Analyses of all events during 2000 showed that human factors were the main contributor to the events, but actions were addressed more to documentation and organization changes. In 2001 the plant carried out a number of actions in the Human factor field and this has reduced the impact from human factors since then.

The off shift group is responsible for screening of events from all NPPs in France on a regular basis. Feedback is given to a committee of one "feed backer" from each shift, often the tagging officer. He then informs the shift. Each shift has the possibility to define their own needs in 1 out of 5 day's simulator training. This is a good opportunity to get plant-specific training and feedback of events. However the team found that only a few shifts use this opportunity.

#### 3.5. CONDUCT OF OPERATIONS

The control room gives the impression of professionalism. Operating procedures are available in the control room and are used. Shift turnovers were observed to be detailed, professional and of high quality. The briefings following the turnovers are adequate to assure the information exchange within each shift crew is of high quality. The shift managers safety assessment tasks are supported by a strong set of tools and methods for carrying out a complete, traceable safety assessment. The team considers this as a good practice.

Field operator rounds are supported by special portable computers, which are good to record, compare and submit important plant parameters. The operation department developed a procedure for field tours by the shift managers with the field operators with a checklist to support the tour. However the field operators are not identifying and reporting all deficiencies in the plant. The team recommends that the plant improve the field operator's tours, including criteria for reporting and plant management personal monitoring.

The surveillance programme adequately verifies the availability of safety related equipment. The team suggests that the plant include restriction on the use of correction fluid in the procedures and instruct the operators how to make traceable corrections in the data sheets.

The team considers a good practice the specific follow-up procedure and programme for certain safety criteria parameters on the basis of the periodic tests, developed by the operation



department, to detect malfunctions before reaching the critical threshold defined in the normal operating range or in the general operating rules even during outage period.

The plant has developed some barriers to support operations and work in the safety related equipment and rooms. Nevertheless there is no locking system or additional administrative control to provide a barrier to control access to many safety related areas in the plant. The team suggests the plant to enhance the control access to rooms with safety related equipment as one more barrier to inadvertent operation.

The plant has programmes and procedures to control the systems alignment prior to start-up the plant, during power operation and also to locking the valves using approved tags for safety-related alignments and power operation conditions. However the team found some valves locked and tags in the field not properly identified. Also the keys for the access to I&C cubicles have an instruction for control, but some deviations were observed. The team suggests that the plant improve and reinforce the control of keys and locks.

### 3.6. WORK AUTHORIZATIONS

The plant uses a strong corporate computer-system for work-request management called SYGMA. Work permits are handled in a separate system.

To have a schedule in advance that covers both maintenance work and surveillance tests, a planning system is used. All the scheduled activities are planned by the Scheduling sector of the Service Means Department.

Four daily meetings are held to plan and prioritize work:

- 8:45 Preparation of work request (internal operation)
- 9:15 Work request meeting
- 11:00 Shift manager and safety engineer meeting
- 15.00 Follow up of work conducted

In the computer-system there is a function for “equipment unavailability” as a control not to jeopardize the safety line-up.

Tagging office is situated close to main control room (MCR) and each shift has an experienced tagging operator in charge. Work-permits are well organised and under control. About 25 work-permits/day during operation and 100/day during outage. When a permit had been handed out. In certain cases, the technician has to go to the MCR and inform the operator prior to starting the job.

Operations department is responsible to validate the risk analyses of work in the plant. The team considers the risk analysis approach in the operation department to be a good practice in the MOA section of this report.

Non-routine tests are first analyzed by the shift supervisor that completed the test. On the same shift, the shift manager analyses the test. When the test result arrives at the operation division support staff, they make an independent verification.

Post maintenance requalification tests are performed in two stages: component-test and system-test. The system test is carried out by operation department and approved by the shift manager.

An outage process manager is designated to handle the process to perform the outage period. An operations outage team is set up and coordinates interface questions between maintenance and operation departments. A similar team is set up for the power operation period.

### 3.7. FIRE PROTECTION PROGRAMME

The plant follows the EDF corporate fire prevention doctrine. The plant has a dedicated fire officer that provides advice and support on fire prevention and fire fighting. An annual training- and drill-plan provides necessarily knowledge to the staff.

The plant is divided into fire zones. An alarm in the unit will go to the MCR, and an alarm in the administrative buildings will go to site security department. Three levels of response teams are provided:

1st line, a field-operator is sent to confirm and evaluate if the alarm is an actual fire. He also isolates the fire zone to prevent the fire from affecting more than one fire zone.

2nd line is sent to start fire fighting. The tagging officer is in charge of the team of two field-operators from each unit, in total five people. Those 2+2 field-operators are also used in case of a fire in the area where site security is responsible. In charge of that team is the site security officer.

At least one of the field-operators must be trained for first aid.

3rd line is the fire brigade from Nogent. The time from call until being on site is supposed to be within 20 minutes.

The team noted several areas in the plant with uncontrolled combustible material. Additionally plant personnel smoke in unauthorized areas. The team has made a recommendation in this area in the MOA section of this report.

No major problems were noted related to firefighter equipment such as extinguishers, fire hoses etc. However some portable extinguishers were found with no visible place for normal storage. The weekly surveillance test on portable extinguishers, done by operation department would be easier if the normal storage is marked on the wall or floor.

Equipment for the 2nd line personnel is available close to the MCR and for the administrative buildings, there is a truck to pick up the field-operators, dedicated for fire fighting, bringing the equipment in the truck.

2nd line fire fighters are trained every three years in a national training centre that provides realistic training of fire fighting conditions in both industrial and radiological environment. Once every seven weeks the shift has a drill. The tagging officer is in charge of this on a random basis for the whole shift. Once a year the Nogent fire brigade is also drilled on the plant.

A survey in May 2002 showed a high number of false fire alarms. The team considered this number to be higher than international standards and has made a recommendation about this.

### 3.8 ACCIDENT MANAGEMENT

Accident management is well organized and provides a good response. The roles and responsibilities during emergencies are clearly defined within the operation department. The plant units have emergency operation procedures developed by EDF Corporation.

The operation staff, as well as the safety engineer's initial training to respond to an accident, is three weeks simulator training and 15 days of classroom training, which includes special emergency training.

#### **STATUS AT OSART FOLLOW-UP VISIT**

In the area of Operations, the OSART team made two recommendations and four suggestions. The follow-up OSART visit resulted in two suggestions being resolved and both recommendations and the further two suggestions having made satisfactory progress to date.

All operational personnel interviewed, from field operators to the operations manager were extremely receptive to the issues in the OSART report and demonstrated a genuine concern for improving the safety and operational performance of the plant.

The plant has made noticeable improvement with regard to material condition and housekeeping. Most areas of the plant are considerably cleaner. And, while the progress has been considerable the OSART team support the continuing efforts

Following the OSART mission Nogent Operations Management have produced a policy document "Organisational Arrangements to specify the requirements of the computer recorded operator rounds". The computer software associated with operator rounds has been updated, which has enhanced the ability to reduce the number of deviations, found. The improvements in the process were supported by training delivered by an experienced field operator (System Administrator). Also the "control plan" for the shift managers calls for audits of the quality of field operator rounds the results from these audits are due in December 2004.

With regard to the issue of locking plant rooms to prevent inadvertent operation, Nogent staff had analyzed the issue, they had consulted corporate EDF and referenced plant design information from both the 900Mw and 1300Mw plants. The staff at Nogent presented a logical analysis of the process barriers which they believe are sufficient to prevent inadvertent operation of the plant by both operational and maintenance staff.

The process for the control of the security keys associated with; Reactor protection, Radiation monitoring, and permissive keys for the control desk has been much improved. With regard to locking essential plant during the follow up mission it was confirmed that Nogent do operate a locking system (the administrative system) for essential plant to ensure it is fully available to satisfy its safety function, however the system is limited.

Following the OSART a policy and process was developed at Nogent to address the issues associated with labelling. A field operator (on days) has been assigned the responsibility for ensuring the process is efficient and enacted; surveillance tests are analysed to identify recorded labelling shortfalls. Since April 2003 1600 label have been installed on the plant.

The site have progressed the issues associated with uncontrolled operator aids and signage :

In the specific area of control room operators the chemistry computer system (Merlin) has been upgraded to allow operators access to the current target values as specified by chemistry and remove the reliance for “informal notes” as aide memoirs. All technical notes should be authorised by the manager responsible and contain a validity date. (2 such aids were observed in Unit 2 control room). However there is still no formal process to record and monitor the posting of operator aids in the field, various plant tours are conducted by the operational personnel and management which do address many in field issues including plant labelling.

With regard to the use of correction fluid on surveillance test records, standards were issued in October 2003 prohibiting the use of correction fluid on surveillance test records, supported by procedure detailing the correct method for correcting errors on test records.. The process is also supported by a 2<sup>nd</sup> level analysis / audit by a control room operator on days

## DETAILED OPERATIONS FINDINGS

### 3.2. OPERATIONS FACILITIES AND OPERATOR AIDS

**3.2 (1) Issue :** Although the plant has a formal process to control posted drawings in the field, the policy does not address hand written instructions and the team found unauthorized operator aids in the field. During the plant tour the following weaknesses were observed:

- Unauthorized warning found in the access door of the main generator.
- Hand written instructions for the injection of lithium into the primary system.
- Hand written instructions in the RCV 001 AR panel – unit 2 - about sample of test points.
- Hand written instructions found in 1 GFR 003 AR
- Hand written identifications in the unit 1 turbine building front standard.
- Unit 1 airlock access at the 6,6m level has tape labels indicating do not operate the switches as the light will go out in the airlock, tape is dated 22/10/02.
- Warning of danger due to a leakage in the train B Noah storage tank (room LAD 0507) in the unit 2 auxiliary building made by a hand written piece of paper.

Use of unauthorized operator aids can lead to human errors and improper system operation.

**Recommendation:** The plant should enhance its policy and instructions concerning operators' aids in the field. The plant should also identify and approve all the operator aids in the field.

#### **Plant response/action:**

##### Field signage:

In 2003, following the Osart inspection, the Operations Department conducted a (non-exhaustive) inventory of signage in the field. "Unofficial" signs were identified by the operations technicians. This inventory was transmitted to all departments and led the NPP to overhaul its signage charter. It was re-indexed in November 2003 in order to clarify and complete the requirements.

It specifies all the requirements concerning signs in the field: unofficial signs are prohibited in industrial and administrative premises. Regulatory and technical information is currently being displayed by means of poster holders. The document must mention the validity expiry date, the name of the department responsible for the sign and must be signed by the Department hierarchy.

Compliance with this signage charter is ensured by:

- Daily monitoring of the installation by technicians from the Operations Department. Any document displayed on the installation and which does not comply with the requirements of this charter is removed.
- The cleanliness inspections organised by the NPP Management once a week ensures compliance with this charter in the field. Any deviation is immediately dealt with in conjunction with the Department likely to have put up the sign.

Mise en forme : Puces et numéros

#### Signage in the Control room (SdC)

The Operations Department has initiated work to look into the various signs in the control room which could assist the operators but which could lead to human error.

There are two types of signs displayed in the control room:

- Systems status real-time information brochures. This information makes a significant contribution, without compromising the safety of the installation (these are not STE data). It for example includes the status of the STR installation (on standby, in service, etc).
- REA tank and PTR system brochure: no Technical Operating Specification (STE) value should be mentioned on this brochure. The Operations Department operators wishing to obtain the results of the boron concentration analysis should log into the chemistry IT application (MERLIN); access is available from the control room. The laboratory section of the Technical Department agrees to ensure real time validation in the chemistry IT application of the boron analyses on the REA, PTR K, PTR 011 BA tanks.

Mise en forme : Puces et numéros

The organisation and requirements concerning signage in the control room are defined in an operations decision.

#### **IAEA Comments:**

The site have progressed some of the issues associated with uncontrolled operator aids and signage:

- A specific memo was issued in Sept 2003 to ensure the expectations with regard to the chemical operating limits are clearly understood by the operators. A new computer system (Merlin) has been installed to allow operators access to the current target values as specified by chemistry and remove the reliance for “informal notes” as aide memoirs.
- A charter for the display of notices was issued in Nov 2003, the charter reinforces that all technical notes should be authorised by the manager responsible and a validity date. (2 such aids were observed in Unit 2 control room). The charter also addresses the issue of other signage on the station, such as union notices, adverts or other miscellaneous information must be posted in an approved posting area.
- The operational personnel and management conduct various plant tours. These do address many in field issues including plant labelling and signage. (Tours vary from weekly to 6 monthly).

However there is still no formal process to record and monitor the posting of operator aids in the field. Other NPP site “operator aid processes” were discussed and it was acknowledged by the staff at Nogent that improvements may still be possible in this area of operator aids and the OSART team support this ongoing improvement.

**Conclusion:** Satisfactory progress to date.

**3.2(2) Issue:** There are several weaknesses in the label practices for equipment within the plant. For example:

- Hand-written identification in valve GCA 10 VA
- Temporary labelling in some valves of auxiliary system of Safety Injection Pump – unit 2 –train B (valves: 2RIS 816/820/821/822/836 )
- Two of the three fans motor in DVR LC 0910 without labelling
- 1 / 2 CFR 002 pumps / APG202 VL / GRE 380MM / GCA 10 VA, with hand written identification
- Auxiliary feed water pump KA 0541 – unit 2 – missing label
- Auxiliary feed water pump KA 0540 – unit 2 – hand written label / missing I&C label / damaged label
- Unit 1 – boric acid tanks and penetration room NA0591 with hand written and missing labels
- Primary circuit valves in NA07417R1 hand written identification on the valve actuator body

Poor labelling could lead to mistakes in system operation, line up and tag-out.

**Suggestion:** Consideration should be given to improve the labeling policy for plant equipment.

**Plant response/action:**

In a memo, the Operation Department described the "labelling" process for operations equipment.

This work for the first time identified the roles and responsibilities of everyone in this process (Operation Department, Maintenance Department and any employee encountering a labelling problem in the field).

During the course of 2003, a conformity alignment program was started on the basis of the discrepancies identified in the field-by-field inspections, DIV periodic tests, VHS checks and VPROP checks.

As regards attachment of labels in the Reactor Building, operations technicians cannot do this, given that they are unavailable for this activity during unit outages. Consequently, the Operations Department decided to organise attachment of the missing labels in collaboration with one of our industrial partners: an operator not currently on shift identifies the equipment on which a label is to be placed. The label is then put in place by an operator from an outside contractor.

**IAEA Comments:**

Following the OSART, a policy was developed at Nogent to address the issues associated with labelling. The policy assigns roles and responsibilities with regard to plant labelling, in



particular the role of maintenance in supporting the correct labelling of plant during and following maintenance activities.

A field operator (on days) has been assigned the responsibility for ensuring the process is efficient and enacted; surveillance tests are analysed to identify recorded labelling shortfalls, the shortfalls are entered in to a data base for monitoring through to completion, the field operator orders the new labels and distributes them to the shift team who are responsible for the particular system. Since April 2003 the following label improvements have been completed:- Unit 1 500, Unit 2 500, and other plant 600. The current budget to support these label improvements is 8000euro per year. The OSART team would encourage the plant to continue with its approach and systematically improve the labelling of the plant.

**Conclusion:** Satisfactory progress to date.

### 3.5. CONDUCT OF OPERATIONS

#### 3.5(a) **Good practice:** Shift manager safety assessment tasks.

Nogent NPP operational department has a shift organization with one supervisor on each unit and one shift manager for both units. The shift managers are dedicated to safety assessment tasks.

The set of tools and methods described below allow the shift manager to carrying out a complete, traceable safety assessment and are detailed in a department memorandum.

- A safety assessment charts adapted to power operation and outage conditions.
- A safety management chart filled in by the shift manager and networked with operational management committee reported and used in the weekly safety report from safety and quality department.
- An inspection plan integrated in the safety assessment via the shift manager shift log (temporary modification, fire areas, administrative lockouts, etc.)
- Use of the ORLI-system as a complement for assessment of safety-system within safety-margins

**3.5(b) Good practice:** Unit operating trend monitoring.

A specific follow-up procedure for certain safety criteria parameters on the basis of periodic tests has been developed. The aim is to detect malfunctions before reaching the critical thresholds defined in the normal operating range or in the general operating rules. Some criteria currently monitored during operations are for instance: primary leakage rate, opening time of automatic shutdown switches, clogging of IPS absolute filters, recirculation flow rates of SAG pumps and motor-driven pumps, actuating times of TPA steam valves. This monitoring is principally organized by the Unit operating off-shift structure, in the form of a read-only computer tool that can be accessed by teams. The outage off-shift structure has also implemented for several years the follow-up of safety criteria of periodic tests carried-out on outage.

**3.5(1) Issue:** Field operators are not identifying and reporting all deficiencies in the plant. The procedure for field tours has no criteria for reporting. Although there is a checklist, to support the tour that shift manager does together with field operators on a period controlled by the surveillance programme, the field operator tours have no checklist.

Examples of deficiencies missed are:

- a potential risk of electrical shock on connector of auxiliary feedwater motor-heater on unit 2 train A
- extensive boric acid in the flange PTR 043DI on unit 1
- leaks of oil over vessel 1GRE112VV, but no deficiency tag
- lots of oil on the floor of cubicle for hydraulic turbine control unit 1

If equipment with deficiencies are not properly reported it may result in safety systems unable to perform its safety-function. It can also be a risk for people working in the plant.

**Recommendation:** The procedure for field-tour should be up-dated with criteria for reporting. The effectiveness of plant field operators' tours should be improved. Management should monitor field-operators performance. Training in observation skill should be considered.

**Plant response/action:**

The Operation Department took advantage of installation of the new version of the WINSERVIR computer application in November 2003 to take another look at the pertinence of the roles of the field operators and the operators in the field inspections of the facility.

This allowed us to define the roles and expectations of all involved in the field inspections carried out by the field operators. In particular, checking of the anomalies encountered in the field must be the subject of a first level analysis by the operation technicians and then be validated by the operators.

The Operational Shift Managers, the Service management and the members of the Management Committee check the field inspection performance of the field operators during the DIV periodic tests (six-monthly), the Weekly safety inspections (weekly) and the cleanness checks (weekly).

As part of their professionalisation, field operator training enables them to acquire the observation techniques needed to perform their duties. The periods between training modules are devoted to work in the field with their buddy. Learning of field inspection requirements and observation techniques are dealt with by the technician during the training program, in the form of buddy work in the field for the first year of the training curriculum.

**IAEA Comments:**

Following the OSART mission, Nogent Operations Management has produced a policy document "Organisational Arrangements to specify the requirements of the computer recorded operator rounds". The roles, responsibilities and expectations are clearly specified. The computer software has been updated (Winservir version 6) which has enhanced the ability to modify the deviations allowable against predetermined expected values. A training

programme of 1 day duration was delivered by an experienced field operator (System Administrator) to nominated shift team members for cascade training to the remainder of the shift. The training addressed the policy changes and the specific improvements in the computer recording programme, as a result of these process improvements the number of deviations has reduced.

To support the policy clarification and the new computer programme enhancements to the “control plan” for the shift managers call for audits of the quality of field operator rounds, the first results from this analysis are due in December 2004. The OSART team encourage the continuing improvements in the area of operator rounds and their effectiveness and the subsequent follow up audit process to support the reduction in plant deviations / deficiencies.

**Conclusion:** Satisfactory progress to date.

**3.5(2) Issue:** Correction fluid is used to change data sheets for surveillance procedures.

The operation department has the process to plan, follow the execution, verify and to review the surveillance tests. This procedure does not restrict the use of correction fluid.

During the review, procedures with changes made with the use of correction fluid were founded (surveillance for verification of the field drawings and unit 2 diesel generator tests).

Use of correction fluid may allow test data to be improperly changed.

**Suggestion:** The operation department should consider to include restriction in using correction fluid in the procedure and instruct the operators how to make corrections in the data sheets.

**Plant response/action:**

As part of the EP (periodic test) action plan, one aspect of which concerned the definition of how to validate and rerun a Periodic Test, the Operations Department made official the ban on the use of correcting fluid in the operating procedures (EDC decisions n° 2003/05 and 2003/06).

The modalities for correcting occasional errors were defined and include:

- erroneous value cleanly crossed out by the author, so that the old value remains legible
- new value written alongside rather than over the top, with the author's initials

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The Operations Department Operating Methods Officer ensures exhaustive compliance with these decisions during the second level analysis of all periodic tests prior to their archiving.

**IAEA Comments:**

A decision sheet was issued in October 2003 prohibiting the use of correction fluid on surveillance test records; a method procedure was also issued listing the correct method for correcting errors on test records. Following the recent outages the regulator reviewed the records and no issues were raised. The process is also supported by a 2<sup>nd</sup> level analysis which is conducted by a seconded control room operator during the outages or an off shift control room operator during at power operation.

**Conclusion:** Issue Resolved.

**3.5(3) Issue:** The locking system does not contribute as a barrier to control access to many safety related areas in the plant. There is no locking system for locking electrical switchgears, I&C rooms, safety related equipment such as auxiliary feedwater equipment (AFW), charging pump rooms and other areas.

Without means to control access, equipment in these areas could be operated inadvertently causing a plant transient or causing personal injury.

**Suggestion:** The plant should consider the implementation of a system to control access to the rooms with safety related equipment as one more barrier to inadvertent operation.

**Plant response/action:**

This problem is linked to the design of the premises. The Installed Base Management reference framework does not include this requirement for a system preventing access to the back-up premises. The risk of physical confusion during a maintenance activity is managed on a case-by-case basis, through risk analyses.

No specific physical lockout measure will be implemented.

It should be noted that on the 900MW plant series, experiments were run on certain NPPs in order to prevent the risk of confusion in the electrical rooms and in the Nuclear Auxiliaries Building (these premises being common). This led to a difference in colour between the units and spoken announcements each time a door was opened. These experiments were needed on the 900MW series owing to the real risk of confusion in premises that were common to pairs of units.

The few significant events observed on the 2-unit plants in the 1300 MW series, serves to back up the stance adopted by the Nogent NPP.

**IAEA Comments:**

During the follow up mission, it became clear that Nogent staff had analyzed the issue of locking specific areas of the plant, they had consulted corporate EDF and referenced plant design information from both the 900Mw and 1300Mw plants. The staff at Nogent presented a logical analysis of the process barriers which they believe are sufficient to prevent inadvertent operation of the plant by both operational and maintenance staff.

In summary the claimed barriers are:

- Access restrictions via badges and 4-digit access codes apply to the emergency shutdown panel within the electrical building and to the spent fuel pool within the fuel building.
- Different colored labels for different equipment trains
- Separation doors and sills between electrical trains
- Interlocking keys for maneuvering and aligning circuit breakers on 6.6kV lines and feeds (including diesel generators and gas turbines)
- Separate keys for each item of equipment on reactor protection systems

- Placing Perspex covers on certain sensitive switches within the control room, e.g. those controlling RCS pumps, manual controls for protection and safety systems
- Issuing meetings for I&C activities, with a check to ensure suitable measures are taken by workers according to risks
- Pre-job briefings before starting work on sensitive systems (risk of reactor scram)
- In the event of a formalized risk assessment, systematic exchanges take place in the control room between the worker and the control-room operator
- Use of quality plan with hold points that need to be lifted by a supervisor independently of the worker before starting sensitive phases of the job
- Unit-specific schedules and work permits

**Conclusion:** Issue resolved

**3.5(4) Issue:** Keys for safety related panels and power operation valve locks are not properly controlled. There is an instruction on how to handle keys for mainly I&C-cubicles including reactor protection system.

For the valve key control there are very good computer programmes and procedures establishing the control (locking and tags) and the valves affected for the alignment of safety related valves, operational alignments and changes during outage.

Examples of weaknesses found:

- During a control room inspection was verified that the keys for I&C-cubicles were not properly controlled.
- Three keys out of 20 were missing and no record of their location was found.
- Two valves were found locked in turbine lube-oil system without an operational control tag and the shift supervisor did not know the reason.
- A valve was found locked with a blank administrative tag in the charging pump room.
- Valve 2DVN039VN locked, in an intermediate position without an operation control tag.
- Valve 2DVN115SVA locked, without an operation control tag.
- Valve 2SED317VD locked, without an operation control tag.
- All control rods breakers locked with two lockers without any administrative tag.

Without proper key control, access to important safety panels and system alignment is lost.

**Suggestion:** Consideration should be given to improve the control of keys and power operation locks. When keys are handed out, a log entry can be made. The shift supervisors can easily overview the key-situation in the beginning or end of every shift. The alignment procedures and programmes should be improved and reinforced.

#### **Plant response/action:**

##### Management of security keys:

The department has begun to give consideration to adapting the organisation of security key management in the control room. A draft decision was prepared by the Operations Department at the end of 2003. It was validated at the beginning of 2004, with the new security key management organisation being put in place. The aim of this organisation is strict management of the security keys designed to ensure the security of our installations and strengthen our lines of defence against malicious acts.

The guidelines are as follows:

- Assignment of responsibility

The operators are responsible for managing the security keys in each Control Room.

Mise en forme : Puces et numéros



Any maintenance operative (EDF or contractor) required to use a security key for his work must request it from the operators in the Control Room, specifying the purpose of the maintenance work. If possible, the need for use of a security key will be identified on the work permit.

No person is authorised to retrieve one of the security keys from the Control Room at his own initiative. The security keys must be handed over to the maintenance personnel by one of the operators.

#### — Security key management rules

Mise en forme : Puces et numéros

Whenever a security key is handed over to a maintenance worker, the operator fills out a key monitoring label (or has it filled out, ensuring that all the fields have been correctly completed) and puts it in the place of the missing key. In this way, anyone in the control room (operator, Shift Supervisor or Operations Shift Manager) can simply look at the key panel and identify which keys are missing and why. The label clearly states:

– the date and time of issue of the key

– the name of the person to whom the operator gave the key

Mise en forme : Puces et numéros

– the description of the work (and number of the work system associated with the activity)

Once he completes his work, the maintenance operative must return the security key to one of the operators in the Control Room (the keys may in no case simply be left on the reception desk in the Control Room).

The operator ensures that all the security keys are returned at the end of each shift. If the work requires that a security key be carried over for several shifts, the operator identifies the missing key in the shift log and informs his colleague in the relief shift.

This organisation was drafted in conjunction with the operators. It is satisfactorily accepted by those involved (operators, shift supervisor and shift operations manager) owing to its simplicity: no time-consuming monitoring required, the checking aspect is made easier by the "visual" nature of tracking (either a key or a label must be present in each location).

#### Lock management:

The analysis conducted by the Operations Department and the feedback from other NPPs on the subject shows that investment in a particular organisation to differentiate all the padlocks used on the facility is not justified by the expected gains. Furthermore, the site has never declared any significant event concerning the various locking systems used on the facility.

#### **IAEA Comments:**

A decision sheet was issued in Feb 2004 along with an organisational memo / process addressing the issue of control of the security keys associated with; Reactor protection, Radiation monitoring, and permissive keys for the control desk.

The process is extremely simple and concise, in order to obtain a key a label must be completed by the individual requesting the key, and the time and date is entered along with the work permit number. The control room operator has responsibility for the release of the keys and may monitor all the keys in a key press mounted on the reactor control

administrative desk. If a key has been issued a label detailing its whereabouts is attached to the hook.

During the follow up it became clear that the original finding did refer to plant system alignment issues, during the follow up mission it was confirmed that Nogent do operate a locking system (the administrative system) for essential plant to ensure it is fully available to satisfy its safety function, however the system is limited to a selection of the valves and electrical supplies on the post trip cooling systems rather than exhaustively locking every aspect of each system. The plant personnel recognise the issues and consideration is being given to enhancing the process.

**Conclusion:** Satisfactory progress to date

## 4. MAINTENANCE

### 4.1. ORGANIZATION AND FUNCTIONS

General maintenance policies are defined at EDF corporate level, deployed at NPP Nogent and further through internal plant organization. Maintenance responsibilities are divided between “Maintenance – Mechanics – Boilerwork – Valves” department – MMCR and a “Automation – Electricity – Data processing” department (AEI). Maintenance services such as warehousing, cleaning, scaffolding, painting are supported by other departments. Structure of the plant organization is in many cases line and matrix which requires good co-operation, communication and co-ordination. Maintenance departments and groups interface with operational and other departments in many areas such as: planning and scheduling, testing, work request analysis, risk analysis, work preparation etc. Co-operation in all areas is effective.

There are different goals and performance indicators used to measure effectiveness of each department against the established goals.

There is a clear link and defined relationship between Nogent NPP and corporate division departments. Organizational cross-functional responsibilities and authorities are clearly defined and understood. Maintenance department managers are committed to control and evaluate the performance of their departments. Implementation of hierarchy control/inspection as a management control system within AEI department can be used as a good example and the team regards this as a good practice (see the Management Organization Administration section 1). Implementation of outage working time follow-up and self-check system within MMCR department is also considered as a good practice.

Based on corporate level guidance, the plant is performing a comprehensive and detailed risk analysis for each activity. Based on the result appropriate actions are defined to lower the potential risk.

The plant makes an extensive use of contractors to perform many of the maintenance activities. Relationship with service contractors are defined by EDF corporate objectives. Service contractor companies contribute to improvement to quality, competitiveness of the NPP and also working and living conditions around the Nogent Site. A long term partnership approach is implemented.

Proficiency is demonstrated during work, however there is sometimes a lack of attention to detail which results in material conditions not being maintained at the best standards.

The plant has several databases serving maintenance. The most powerful SYGMA software is well accepted by all maintenance personnel.

### 4.2. MAINTENANCE FACILITIES AND EQUIPMENT

There are various maintenance workshops. The site “cold” shop, site “hot” shop, a decontamination shop, a unit “hot” shop in each unit for the MMCR and AEI department. All site shops are well organized, equipped and clean. Equipment needed to be decontaminated is well protected.

There is a steam generator (SG) mock-up available for training of personnel performing SG tube inspection and repair activities.

Tools and equipment are well maintained, organized and stored. All lifting and rigging devices are labeled with all data needed to confirm operability (load, inspection performed). Only serviced tools are available for use.

Measurement and test equipment -MTE (I&C, EL, ME, ) is well organized, maintained, managed and controlled. Calibration is provided by authorized certified contractors. Each MTE is calibrated at least once a year (before outage). Each maintenance department uses a data management computerized system for management and control. Traceability is provided by the use of SYGMA application. The I&C department uses different MTE for calibration activities performed on safety train A and B, to avoid common cause failure, this practice is considered good.

Hazardous material such as chemical and flammable materials are well managed and properly stored and controlled. Use of nationally managed intranet for management (procurement) of specific hazardous products used in NPPs (PMUC) is very effective. However, the team noted deficiencies at many temporary storage areas and recommended the plant to establish and implement an appropriate control programme (see MOA section 1).

#### 4.3. MAINTENANCE PROGRAMMES

Preventive maintenance programmes are very well defined. Scope and frequencies are based on basic preventive maintenance programs (PBMPs) provided by corporate organization (UNIPE), national regulatory and technical specifications requirements, vendor recommendations, maintenance history, internal and external operations experience, ALARA principles and cost/benefit evaluations.

Maintenance specialists responsible for final analysis of work execution and control are performing very comprehensive work, including analysis of the whole work package. All information is recorded on microfiche and archived. Data is also archived through the SYGMA computer software application.

In case of deviations, they are evaluated through experience feedback programme (Retour d' Experience - REX). Information is sent to the computer application called SAPHIR (where data are available to other EDF plants, corporate engineering organization and safety authority). Identified equipment degradation is reported promptly for correction.

Predictive maintenance techniques are used and support overall plant preventive maintenance (PM) programs implementation. Most programme requirements are defined by PBMPs. Predictive maintenance programmes (PdM) include vibration monitoring, oil analysis, thermographic monitoring, motor operated valve testing, air operated valve testing and Eddy Current testing. Results of predictive maintenance programs are used for PM programs optimization through revisions of PBMPs at EDF corporate level and then on the plant level.

The in-service inspection (ISI) programme is defined per corporate PBMP requirements which includes all regulatory and plant technical specifications requirements. ISI non-destructive examination (NDE) procedures and equipment are qualified in accordance with qualification requirements provided by EDF corporate Chemical and Metallurgical

Laboratories (GDL). Qualification and certification of contractor's NDE personnel is performed by the national certification organization COFREND.

ISI results are reviewed and analyzed by the contractor, plant and GDL personnel. All reports are provided to GDL and safety authority. In case of any deviations the responsible plant engineer must prepare a deviation report package with all necessary documentation which must be submitted to the safety authority. The contractor is required to prepare a comprehensive work report where all the work related items are presented to justify that all activities were performed in accordance with work technical specification requirements. All ISI documentation is easily retrievable and accessible.

Root causes for corrective maintenance are analyzed, effectiveness of PM programme associated with failed equipment reviewed and necessary corrective actions taken, if necessary to improve equipment performance.

By result analysis of various PM and inspection programmes, the degradation process of major susceptible equipment and components are identified and corrective actions taken if applicable.

A lifetime management programme exists supported by effective computer software. All information for susceptible components are compiled and analyzed.

#### 4.4. PROCEDURES, RECORDS AND HISTORIES

The content of maintenance implementation work procedures is generally defined by corporate IN 27 guidelines and includes general information, material and tools requirements, work instructions and close out requirements.

Procedures are simple and include the necessary technical details. The impact on other systems, operational activities, manpower needed, specific instructions for foreign material exclusion, guidelines to notify control room of maintenance, human factor consideration, etc., are mainly defined through risk analysis and associated quality plan and other work package documentation. The global risk analysis is considered by the team as good practice (see MOA section 1).

Temporary changes to procedures are controlled by use of a deviation reporting system defined by work package requirements.

By use of SYGMA computer application the records are easily retrievable and properly secured. All records are also recorded on microfiches and archived.

All deviation reports related to work are analyzed and corrective actions taken if necessary. Operation experience feedback programme is also implemented through REX system.

#### 4.5. CONDUCT OF MAINTENANCE WORK

Maintenance work is authorized based on scheduled work and prepared work package which includes all necessary items needed to be performed for effective and safe work. Work is normally controlled and reviewed by independent personnel. The final comprehensive documentation evaluation is performed by maintenance specialist who prepared work package.

Good safety practices are used to inform all personnel involved in the activity performance about the status of safety hazards and protective measures which are required to be followed by using special safety warning tag-sign.

Post maintenance testing is defined per work package requirement as a part of equipment requalification activities. Work order cannot be completed until requalification activities are finished and approved. Records are systematically updated by use of SYGMA computer application software.

The team noted that good foreign material exclusion practice are not properly established around the fuel storage pools and strengthened control is recommended. The team also observed weaknesses in some areas of housekeeping and material condition were below international standards and a recommendation was proposed in this are also.

#### 4.6. MATERIAL CONDITIONS

Standards for maintaining good material condition are specified. The team found evidence of larger number of low level defects, poor housekeeping, and other material condition problems.

Based on the status of material condition it can be concluded that system walkdowns are not performed frequently enough by management to provide positive incentive for raising plant standards. The team recommended that higher material conditions standards and practices should be established and implemented.

#### 4.7. WORK CONTROL

Work planning for On Line activities is managed through “TEF” (Tranches En Fonctionnement) structure and process. The overall control of activities related to the operating plant is the responsibility of Operations Department. All issued work requests are reviewed and discussed during daily morning meetings. Based on work request priorities the schedule is readjusted as needed. Work planning in most cases results in timely, safe and effective completion of work. Deviations are analyzed and corrective actions taken as applicable. On Line scheduling shows no more than 5% deviations from the plan due to different reasons. Outage planning and scheduling are integrated into work control system by use of SYGMA software application.

Work is clearly described by approved work package, which normally includes work procedure, risk analysis, quality plan and requalification requirements.

Different performance indicators are used to track performance. The most important are related to deviations, accidents, radiation exposure, activities duration – outage duration, etc.

Maintenance activities close-out includes realization of whole work package including deviation and work report. All information is reviewed analyzed and corrective actions taken if necessary to improve maintenance effectiveness.

#### 4.8. SPARE PARTS AND MATERIALS

Procurement of spare parts and material is defined by corporate practice. Due to corporate Operational Technical Unit (UTO) support, procurement of material and spare parts for safety related equipment (category 1) and large spare parts is very efficient and effective. Procurement of other spare parts (category 3) is managed through internal supply group. Control of receipt of spare parts is provided by technical specialist who ordered the spare part.

Well organized and managed spare parts warehouse storage areas exist to support appropriate storage conditions. The shelf life is adequately controlled by use of A39 computer application.

Storage level is optimized, Min-Max and Emergency stock levels are defined and appropriate actions taken as needed. Flammable and other hazardous materials are properly stored and controlled in accordance with regulation requirements. Due to very effective corporate organization the spare parts are always available when needed (they can be provided from other EDF NPPs, as well).

By use of computerized data management system SYGMA and A39 spare parts are traceable from supply to installation.

#### 4.9. OUTAGE MANAGEMENT

Outage organization is defined by cross-functional matrix organization. Outage project organization is normally set up for the two refueling outages of the same type for both units. All involved technical departments provide expert personnel needed to cope with outage scope activities. The permanent staff is defined 12 months before outage. All other project personnel dedicated to the project are defined two months later. Duties and responsibilities of all personnel are clearly defined.

The outage monitoring system is very effective and includes daily schedule control and update. All non-planned corrective work is well managed and communicated.

ALARA consideration is taken into account during preparation and controlled and tracked during execution phase. Detailed dosimetric estimation analyses are performed for all major radiological activities.

When the outage plan is prepared and frozen, the comprehensive shutdown safety analysis is performed and a formalized questioning and answering system implemented. All answers to the given questions must be answered. Answers are given and recorded by responsible outage staff. Shutdown safety is tracked and reviewed during entire outage. A very detailed review is performed when work due to unplanned activities is required.

Long term planning is based on 10 years corporate strategy. Yearly outage planning and scheduling activities are provided within outage project organization. Based on defined outage preparation activities and implementation of these activities, safe, timely and orderly work is implemented.

The outage review is comprehensive and allows effective follow-up of all phases and deviations.

## **STATUS AT THE OSART FOLLOW-UP VISIT**

The recommendation related to strengthen the control of foreign material in the spent fuel pool area has been resolved. Two recommendations related to improvement of material conditions and cleanliness standards by raising management expectations and strengthening management control and supervision in the field have been dealt with satisfactory progress to date.

Inventory logging system managed by contractors and verified by EDF is used for equipment entering the spent fuel pool. For equipment temporarily used in the spent fuel pool area, but not entering the spent fuel pool, limited storage area is defined. Entry of consumables to this room is limited to the minimum required amount; wrapping material is removed before entering the room. Other jobsite waste is collected and removed by completion of work.

The plant has introduced a broad scope of measures to improve material conditions and housekeeping standards. The management expectations about priorities of the improvement program are well defined. The surveillance in the field is achieved through the system of weekly safety inspections of jobsites and safety inspections of plant areas. However the management goal of the timeframe when this improvement program has to be completed has not been set. A walk down in the turbine building indicates that still there is room for improvement in material conditions and housekeeping practices.



## DETAILED MAINTENANCE FINDINGS

### 4.1. ORGANIZATION AND FUNCTIONS

**4.1(a) Good Practice:** Implementation of outage working time follow-up and self-check system within the MMCR department (maintenance-mechanics-boilerwork-valves department) designed to prevent any deviation from employment regulations.

During plant unit outage periods, work monitors are provided with a paper chart for logging their activity providing them with a simple means of ascertaining that they comply with employment regulations (daily and weekly working time, rest time). This is stand alone chart that provides a reminder of the rules to be followed and allows the working periods assigned to the work inspector to be formalized by the project manager at management level. System provides: rapid simple to use self-check, traceability provided between the worker and his functional supervisor and than his hierarchical manager, a remainder of employment regulations and system for anticipating the working time margins available for weekend on-call work.

### 4.5. CONDUCT OF MAINTENANCE WORK

**4.5(1) Issue:** Weaknesses exist in the controls to minimize foreign materials around the spent fuel storage pools.

- The plant does not utilize an inventory logging system to control material brought into the area adjacent to the spent fuel storage pool.
- Tool boxes containing numerous tool bits and other small tools were open at the edge of the pool.
- Clear plastic was used extensively to wrap materials and clothing in the area around the spent fuel pool of Unit 2.
- Small bits of clear plastic were found on the floor at the edge of the pool.
- In 1997 the plant had an event where a piece of foreign material interfered with placement of a fuel bundle.

Without proper controls of foreign material in the pool area, fuel could be damaged.

**Recommendation:** The plant should strengthen the controls to minimize foreign material in the areas around the fuel pools.

#### **Plant response/action:**

Following the various remarks concerning the potential presence of loose parts in the Fuel Building pool, several actions were undertaken:

- First, limit access to the FB of people with hard hats and install containers in front of the FB doors to collect them.
- The awareness of field technicians was raised as to the risk of loose parts in the pool, (EDF and service provider personnel).
- The statement of conclusion n° ST 2003/06 summarized all the actions planned and to be performed according to the different deadlines.

Several actions were quickly implemented:

- A storage area and servers were set up outside the FB 22 hall (next to the hat container and hand/foot monitor) to put away and store consumables in their packaging. Containers were installed to collect empty packaging before entering the FB with instructions posted at the entrance to each FB (22 and 17 meters).
- The internal organization memo decided on was written and validated and Instructions and Recommendation were posted.

The entrance of consumables in the FB pool hall is limited as much as possible (jobsite needs). The consumables used on jobsites are removed from their packaging before entering the FB and only the strict minimum is entered.

Stationary containers were installed in the FB for the temporary storage of waste during special operations (RCN, ECU etc). Due to unauthorized filling of these waste bags, the latter were removed and stored outside the FB.

Currently, there are no permanent waste containers in the FBs. They are carried in according to need and at the end of the day or for the weekend the containers are stored outside the FB.

Regarding work scheduling (maintenance or special field service), a ‘‘Warning: Risk of foreign material’’ warning appears on the Operating Condition requests for all work carried out in room KA 1000.

For equipment entering into the FBs, there is no particular management since it is only equipment specific to the fuel assemblies or to the various clusters. Operating service providers guarantee their equipment, integrity checks are performed before going into and leaving the pool and traced in their procedures. These checks are validated by EDF.

Whenever possible, equipment introduced in the pool is decontaminated in an airlock outside the FB.

As regards pool flyovers, these operations are carried out by certified personnel from General Services that is aware of the tracking and recovering of what can fall into the pool.

The application of requirements is regularly checked. This point is included in the themes of the Technical Department inspection plan.

#### **IAEA Comments:**

Temporary instructions to strengthen foreign material control in the spent fuel pool area were issued in 2003, final instructions in April 2004.

An inventory logging system managed by contractors and verified by EDF is used for equipment entering the spent fuel pool. For equipment temporarily used in the spent fuel pool area (room KA 1000), but not entering the spent fuel pool, limited storage area is defined. Entry of consumables to room KA 1000 is limited to minimum required amount. Wrapping material (including clear plastic) is removed before entering room KA 1000. Other waste produced at worksite is collected in pink plastic bags, which are removed from room KA 1000 by completion of work. All this measures were observed in practice during the installation of equipment to replace leaking fuel rods by Framatome.

Although the issue is resolved, the team noted that there is no requirement in place to secure glasses of personnel approaching the spent fuel pool. Such requirement could further reduce the risk of foreign material intrusion.

**Conclusion:** Issue resolved.

**4.5(2) Issue:** Some maintenance and support activities are not performed in accordance with high industry standards. Lack of management control and supervision and ineffective communication of standards is contributing to weaknesses not being identified and corrected.

- Motor cover of 1 ASG 160 VV steam supply valve of turbine driven auxiliary FW pump 1 ASG 032 PO (Unit 1) is not properly attached (fixed in position by tape).
- Cable of bearing temperature transducer 1 ASG 345 MT on AFW pump 1 ASG 031 PO is damaged and properly fixed in position. (WR should be written, status written in operator's log – status has to be checked!). The door-locker fastened by a tape against locking the room NB 0407 (Unit 2).
- More temporary cable routings without labelling, some of them not used for long time (rooms NA0544, NA0561 of the Unit 2, TG lubrication system room of the Unit 1).
- The temporary cable in the room NA 0561 was routed from a clean area into a contaminated area.
- Labelling of the cable trays labelled only by hand written labels in several cases.
- Back Up battery (LBA, LBC, LCA) near room 2JCF1381F had temporary leads holding the two doors open. Concern is twofold: fire doors being breached and possibility of doors damaging the cables.

Inadequate maintenance practice could lead to poor material condition and deteriorating safety equipment reliability and/or result in injury to personnel.

**Recommendation:** Plant management should enhance their field oversight and supervision of maintenance and support activities. Higher industry standards and practice should be established and implemented. Training and coaching should be strengthened for operation and maintenance personnel to meet these standards and expectations.

**Plant response/action:**

The many anomalies detected during the field inspections led the management of the unit to decide on the reinforcement of hierarchical management and control for the following aspects:

- safety, cleanliness and tidiness during field service execution,
- conventional and radiological cleanliness of the Plant.

The aim is to durably maintain a high level of cleanliness and tidiness to guarantee the safety of the plant and people and the good execution conditions of field service operations and equipment performance.

To reach this objective, 6 main actions were undertaken:

- formalising a plant cleanliness reference accompanied by a visual guide facilitating the awareness raising of operating and maintenance personnel and the application of requirements by field technicians;
- assigning all the rooms, facilities and equipment, indoors and out, to designated owners and the defining 12 specimen rooms representative of all site premises;
- accompanying the NPP management requirements in terms of plant cleanliness;
- reinforcing the Hierarchical Safety Inspections (VHS) focusing on jobsite cleanliness and safety and the working methods of field technicians;
- implementing hierarchical inspections of plant cleanliness (VPROP) in order to maintain the entire site in conditions complying with the established reference;
- Setting up rigorous monitoring with the aim of significantly reducing the number of deviations and anomalies.

The safety and cleanliness aspects of jobsites and the plant are regularly discussed during the weekly meeting of the Operational Management College (CDO) and are the subject of debate and decision, during the “Safety/Radiation Protection” and “Environment” management reviews.

**Formalizing a cleanliness reference, establishing a visual guide and taking over all the premises, facilities and equipment by an identified owner**

The NPP has established a reference of requirements formalised in an organisation memo titled "Organisation of Plant Cleanliness".

This memo, available to all the departments in their satellite documentation, describes:

- The NPP’s organisation for maintaining the cleanliness of the plant;
- The allocation of all the premises, facilities and equipment of the site to a department head owner;
- The list of specimen premises;
- The site’s cleanliness reference in the following six main domains:
  - Cleanliness, order and tidiness,
  - Identification, labelling and posting,
  - Fire prevention and fighting, sector breakdown and safety,
  - System integrity, control of leaks and containment,
  - Electricity and instrumentation,
  - Mechanics and general condition of equipment;
- The method for monitoring and handling deviations.

The index number of the memo was raised in early 2004 to apply the change in the number of specimen premises in the industrial and service buildings and to better specify the take-over of certain premises by the department heads.

The purpose of this reference is to help site managers to **reinforce the training and coaching of operations and maintenance personnel so as to achieve a level of cleanliness closer to the standards and practices of the nuclear industry.**

To make the reference more helpful, the site's cleanliness manager produced a visual guide. This guide allows all personnel, managers and field technicians to visualize the state of specimen premises and the good and bad practices in each of the domains of the cleanliness reference. It was presented to all the Department heads in the Operational Management College meeting and to all the cleanliness correspondents of the departments during the month of February 2004.

### **Accompanying the requirements of the NPP management relating to plant cleanliness in the departments**

The management's requirements were clearly reaffirmed by the Unit Director during several Wide Management College meetings. The objective is to reach plant cleanliness conditions that are as close as possible to those of the best operators with, as the first target, obtaining from the international experts of the IAEA a report of clear improvement during the June 2004 Post-OSART with no recommendation or remark.

Based on the existing cleanliness reference, several actions were undertaken:

- definition of specimen premises and maintenance of these premises in an irreproachable condition;
- periodic inspection of plant condition with the systematic participation of a member of the Management College (CD) ;
- establishing an annual strategy to maintain the cleanliness of the plant;
- participation of the Environment Director (DE) in the monthly "cleanliness" meetings with the priority objective of handling deviations.

Requirements are then cascaded down to the departments by the Department Heads and in the teams by the proximity managers. To help the managers, several "communicating" documents have been produced:

- the field "safety" booklet,
- the "Environment General Technical Regulation",
- the plant cleanliness visual guide,
- the posting charter updated to take into account the necessity of technical posting near certain equipment items; an inventory of the different types of posting was also conducted to formalize who does what to handle the deviations in this area.

To reinforce the awareness of field technicians to the stakes related to cleanliness, awareness-raising in the departments with the reference and visual guide is planned by the Department Heads and cleanliness correspondents with the support of the Site cleanliness manager.

All technicians must participate in this awareness-raising since they are the first players concerned:

- inspection of premises by the departments;

- operations on the jobsites;
- inspection of services.

Upstream, the cleanliness manager must lead training on the reference and visual guide for site correspondents so that they can cascade down the requirements in the department in support of department managers.

Contractors must also raise the awareness of industrial partners with which they work and ensure that requirements are applied through jobsite inspections. The NPP's Special Technical Specifications (CCTP) were updated to include the cleanliness requirements.

### **Reinforcement of hierarchical safety inspections (VHS) on jobsites**

In order to **reinforce surveillance in the field and the monitoring of maintenance and technical support activities**, the site uses the weekly hierarchical safety inspections based on a schedule updated by the Deputy Director's administrative assistant.

The purpose of these inspections is to durably improve the cleanliness and safety of jobsites by ensuring an evolution of field technician behaviour. These inspections also provide the opportunity for the hierarchy to explain and provide assistance regarding requirements in the field. They concern:

- compliance with safety rules,
- knowledge of the risks related to the operation (exchanges based on the risk analysis),
- the cleanliness of the jobsite and neighbouring facilities,
- waste management,
- the quality of the documentation,
- the technical and organisational problems encountered by field technicians on their jobsites.

Inspected jobsites are identified and selected by the Unit Operating process in a weekly meeting.

Participants in these inspections are the following:

- a department head,
- the head of the Unit Operating process or an Operations Department staff member,
- a manager of the professional sector concerned by the jobsite,
- an agent from the safety – risk prevention section,
- the site's cleanliness manager.

A field "safety" booklet was designed to serve as a guide to field technicians to the people performing the Hierarchical Safety Inspections. This guide was distributed to all EDF and service provider company field technicians.

All deviations observed during an inspection are recorded in one of two data bases according to their characteristics:

- deviations relating to safety are recorded in the "SAFETY – VHS" base or in the "SYGMA" IT application in the form of a "Safety" Intervention Request,

- deviations relating to cleanliness are recorded in the "CLEANLINESS" base.

The progress of deviation handling is checked during the monthly monitoring meetings relating to the safety and cleanliness of the jobsites attended by the Safety/Radiation Protection Director.

Finally, each Hierarchical Safety Inspection is:

- written up in a report used by the Unit Operating manager to determine progress actions,
- reported to the Operational Management College if required by the problems encountered.

#### **Setting up Hierarchical Plant Cleanliness Inspections (VPROP) and Operations Periodic Tests dedicated to the cleanliness of the Plant (EP DIV)**

In order to **reduce the number of minor anomalies related to the condition of the plant**, and thus durably improve the general state of cleanliness of the site, the NPP management has decided to implement hierarchical plant cleanliness inspections (VPROP).

The purpose of these inspections is to check the state of cleanliness of the premises under the responsibility of each department or section. They allow the hierarchy to periodically assess the general condition of the plant as regards compliance with requirements and the cleanliness reference. The schedule for these inspections is updated by the Deputy Director's administrative assistant.

To better monitor the state of cleanliness of the premises, the industrial partner (OMS) provides the cleanliness manager with the monthly schedule of the premises to be cleaned by its teams so that inspections can be planned for these cleaned premises. It is on the basis of this schedule that the cleanliness manager, in concert with the member of the Management College participating in the VPROP, determines which premises will be inspected each week.

Participants in these inspections are:

- a member of the unit Management College,
- the site cleanliness manager,
- a shift operations agent if industrial premises are concerned,
- a shift Site Protection agent if service premises are concerned,
- the cleanliness correspondent of the Department responsible for the premises inspected.

The inspections are performed using an inspection booklet in which are found the deviations from the last VPROP in the same premises that have not yet been closed out and the visual cleanliness guide. All the deviations observed during a VPROP are recorded in the site's "CLEANLINESS" data base.



An initial overall inspection was conducted end 2002; it included many minor but omnipresent deviations corresponding to damaged paint, cable trays, insulation, coverings, sensor tubing, labels, cleanliness, dripping of various products, inoperative indicator lamps etc. As at January 1, 2003, 1,500 cleanliness deviations were identified.

In addition to the VPROP, once every six months, the Operations Department runs Periodic Tests called EP DIV that focus on the cleanliness and tidiness of industrial premises. The deviations detected are included in the "CLEANLINESS" deviation data base. .

During outages, several inspections (VHS and VPROP) are performed by management members accompanied by the cleanliness manager on the jobsites at the end of a field operation in order to inspect jobsite teardown (cleanliness, waste, order and tidiness) and check that no equipment has been damaged on the plant in the work area (for example: broken label, crushed raceways etc.). At the end of the outage, a general cleanliness inspection of the unit is conducted by all Management College members.

The progress of deviation handling is checked during the monthly monitoring meetings relating to cleanliness attended by the Environment Director. Monthly reporting to the Operational Management College for the environment point is also provided.

### **Reducing the number of anomalies and handling deviations**

At end 2002, a situation report of deviations identified roughly 1,500 deviations relating to plant cleanliness.

Since the Hierarchical Plant Cleanliness Inspections (VPROP) were set up in July 2003, we have performed about thirty inspections.

Initially, the inspections focused on the specimen premises in order to restore these premises to top condition to be used as a guideline for the departments in ensuring the cleanliness of the premises for which they are responsible. The first six specimen premises were restored to top condition for November 30, 2003 and the following six for February 29, 2004.

At 01/15/2004, the involvement of all the departments enabled over 800 deviations to be closed out; the "CLEANLINESS" data base still counts 825 deviations distributed as follows:

– cleanliness:	359
– posting:	48
– leaks:	88
– safety:	27
– electric:	268
– mechanical:	35

In light of the number of deviations closed out, it is evident that a significant effort has been made by the departments and by our partner OMS responsible for cleaning industrial premises.

During the second quarter of 2004, after the specimen premises were readied, the Environment Director and the site Cleanliness Manager met with the department cleanliness correspondents, accompanied by their department heads, to analyse the method for reducing

the remaining deviations. This action should enable the plant to pursue its dynamic action undertaken and to determine realistic deadlines for closing out the deviations.

**IAEA Comments:**

The plant has introduced a broad scope of measures to improve material conditions and housekeeping standards. The management expectations about priorities of the improvement program to maintain cleanliness of the plant are outlined in the annual strategy, issued first time in 2004. Examples of good and bad practices are specified in appropriate visual aids, and 12 reference areas comprising a representative sample of different plant areas are available to indicate in practice the level of standards to be achieved at the end of the improvement program. A charter specifying requirements for any posting at plant premises has been issued. This charter sets the requirements for authorisation and control of posted operator aids.

The surveillance in the field is achieved through the system of weekly safety inspections of jobsites and safety inspections of plant areas. Members of the operational management team and department heads also participate in these inspections. Results of the inspections are tracked in the “Cleanliness” database or in the “SYGMA” IT application, depending on the nature of the deficiency. A cleanliness manager has been assigned to coordinate and support the related activities, and the environment director has the responsibility to provide management oversight of the improvement program.

However the management goal of the timeframe when this improvement program has to be completed, that is when the entire plant territory is expected to correspond to the standards represented by the reference area has not been set. The number of open deficiencies in the “Cleanliness” database is trended, and a general decreasing tendency can be observed, the target rate of eliminating deficiencies has not been defined yet. The annual strategy for 2004 calls for inspections of the unit after the annual refuelling and maintenance outage, but due to different reasons these inspections have not been done.

During a walk down in the turbine building examples of deficiencies of material condition (minor leak of a manhole, dispositioned cable tray due to missing support) were observed without proper identification. Missing or illegible labelling, dust on some equipment, different type of waste in the container for metal scrap indicate that still there is room for improvement in housekeeping practices.

**Conclusion:** Satisfactory progress to date

#### 4.6. MATERIAL CONDITIONS

**4.6(1) Issue:** A large number of low level defects, poor housekeeping and other material condition problems exist. The material conditions are not consistent with IAEA safety standards and good international practice. Some findings are:

- Extensive boric acid in the flange PTR 043D1 on unit 1.
- Leaks of oil over vessel 1GGR112VV, but no deficiency tag.
- Oil leak on containment spray pump 1 EAS 051 PO coupling's housing.
- EAS 011 BA (UNIT 1) Containment Spray System NaOH Tank and tank recirculation area is untidy - due to leakage of sodium hydroxide. Leakage has been stopped but the area remained unclean.
- Oil spot on gear box of MD AFW pump 1 ASG 022 PO (Unit 1). (It is not the plant's policy to clean immediately after testing is completed – overflow through venting hole).
- Oil leak on the floor due to maintenance of the charging pump in the room NA 0405 (Unit 2).
- Two barrels of solid radioactive waste with unauthorized hand-written labels in the room NA 0481 (Unit 2).

The combined effect of a large number of low level deficiency can influence or deteriorate the availability of important equipment for the plant availability or safety

**Recommendation:** The number of low level defects associated with material condition should be reduced. Higher standard should be established and implemented. Management expectation for the identification and correction of deficiencies should be established and clearly communicated to the appropriate staff.

**IAEA Comments:** see comments on 4.5(2)

**Conclusion:** Satisfactory progress to date.

## 5. TECHNICAL SUPPORT

### 5.1. ORGANIZATION AND FUNCTIONS

In establishing the organizational structure of the plant, special consideration has been given to implementing arrangements which allow an effective management of all technical support activities related to surveillance test programme; evaluation of operational experience feedback; implementation of plant modifications; reactor engineering; fuel handling and safety related computer applications.

Supprimé :

The organization and administration of technical support functions on site does not lie within one line management structure, but rather is distributed across several departments and sections. There is an engineering maintenance director who coordinates and reports directly to the deputy plant director and plant director on matters related to the technical support, however the actual engineering support is embedded in each of the technical departments. There are engineering sections in all of the departments that provide technical support in the daily activities and co-operate actively with the other departments in the field of their competence.

The engineering maintenance director chairs three stand-by plant committees which have been assembled to provide cross-departmental analysis and assessment on technical support matters. While the REX and Saphir committees are charged with responsibility for assessing the operational experience feedback and contributing to the EDF national computerized system (SAPHIR) for reporting of operational events, the engineering technical committee ensures that adequate safety and technical consideration is given to any critical engineering issue that has to be addressed at the plant.

Although the plant organization results in a rather fragmented structure as concerns the technical support, the responsibilities and interrelationship between all of those involved in these activities appeared well understood by the staff interviewed during the mission. Very good arrangements have been recently put in place to promote better understanding and addressing of human factor related issues in the technical support activities. This was regarded as a good practice by the team.

Of particular importance to the success of plant technical support effort is the liaison with corporate departments, which impacts all areas of activity. The plant benefits from the support of various EDF entities, including the Active Installed Base Support Centre (CAPE) of the Nuclear Generation Division (DPN), the Engineering and Services Division (DIS), National NPP Operational Engineering Department (UNIPE) and the designer (FRAMATOME). Corporate staff contributed to the review in operational experience feedback and modification implementation areas and the team considers the level of liaison between the various departments and the plant a strength in the overall management of technical support.

### 5.2. SURVEILLANCE PROGRAMME

The corporate staff develops general surveillance testing programmes and issues system specific testing rules. The overall responsibility for transferring the corporate testing rules into specific plant test surveillance procedures is charged to the Safety Quality Department, however each technical department is responsible for drafting and reviewing its own

procedures. These activities seem to be well managed by highly professional and dedicated staff. The team was impressed by the accuracy and good condition of the documentation relevant to the surveillance activities, maintained by the Safety Quality Department.

During the mission the periodic surveillance test programme for the operational department was briefly reviewed. The results from the periodic tests in 2002 for emergency core cooling (RIS) and auxiliary feedwater (ASG) systems were found to be well recorded and documented. The operational department has established good practices for tracking the values of the periodic test quantitative results. A special software application has been developed to aid the periodic test results analyses, which should facilitate an early detection of negative trends in the equipment performance, before any acceptance criteria are breached. This was regarded by the review team as a good practice and referred to in "Operation" area. All of the staff involved in the development of surveillance test procedures and assessment of the test result trends seems to be highly motivated and professionally competent.

Although the general impression from the implementation of the plant surveillance test programme was positive, there were some cases of deviations from the good international practices in the field, which were noted by the team and discussed with the plant. One surveillance test procedure (RIS 81) requires both trains of emergency core cooling system to be tested one after another during an outage. This is usually done by the same plant personnel, which could increase the probability of the system being unavailable due to common cause failures. Section I – Chapter IX of the plant general operating rules and EDF directive DI55 are supposed to direct operators' actions in cases of deviations of acceptance criteria observed during the surveillance tests. Some examples, however, were found at plant which showed that the operators' interpretation of these directives is sometimes different from one operator to next. Further more some inadequate operator actions took place following the detection of equipment malfunction.

The review team has proposed some suggestion, which might help the plant to further improve the performance of their surveillance test activities.

### 5.3. OPERATIONAL EXPERIENCE FEEDBACK (OEF) SYSTEM

The plant has an extensive and effective OEF system on site that is focused through the Experience Feedback (REX) and SAPHIR committees that comprise the Engineering and Maintenance Director, who acts as chairman for both committees, and representatives from each department. These groups play a key role in both the arrangements for dealing with events on-site and the interface with corporate OEF activities. The effectiveness of REX committee to ensure prompt dissemination of lessons learned from the operational experience was regarded as a good practice by the team.

EDF has a hierarchical approach to event grading and reporting, that provides criteria and/or guidance to plants through three corporate directives, DI's 19, 30 and 55. These address safety significant events, safety relevant events, and deviations respectively. Reporting, recording and information transfer are supported by corporate SAPHIR software application. Recently the corporate staff has issued DT 178 and DT 164 instructions to report on events related to radiological or other environmental hazards respectively.

A principle on-site is that departments analyze events that occur in their areas of activity, following EDF "Event Analyses Guide". This document seems to provide a good base for a

systematic and consistent evaluation of the event scenarios, causes, actual and potential consequences of the events, as well as helps to identify the needed corrective actions.

The timely implementation of the corrective actions is closely followed by the Safety Quality Department, but the plant has experienced difficulties in meeting some of the deadlines. It was not apparent that plant specific OEF is taken into account in the preparation of the staff refreshing training at the simulator.

During the mission it was noted that Probabilistic Safety Assessment (PSA) model is not available at the plant. It is common practice nowadays to have plant specific PSA models as part of the software applications to support operational event analyses, as well as some other safety analyses, performed by the plant staff.

Through the REX committee the plant has established an effective system for communication and trend analyses of safety significant and important events. Lower level and “near misses” events at the plant, however have not been subject to systematic analyses: what is apparent is that diverse plant information sources provide a large and significant volume of data that so far is not being fully used to maximize the benefits from studying low level and precursor events. The team suggested that information should be reviewed from all available reporting sources to improve the analysis and level of use of the available data.

#### 5.4. PLANT MODIFICATION SYSTEM

The so-called “Joint Team” department is formally responsible for co-coordinating the plant activities related to the implementation of plant permanent and temporary modifications. The plant modifications are in general categorized as safety related or non-safety related. The decisions for implementation of permanent safety related modifications are always addressed at a corporate level. The plant is responsible for implementing and monitoring of the safety related temporary modifications (so called DMPs) and designing and implementing some local non-safety related modifications.

The joint team department works in close co-operation with EDF National NPP Operational Engineering Department (UNIPE), which provide all the support needed with respect to design, review, control, implementation and documentation of Corporate modifications. All the safety justifications and obtaining an approval from the regulatory body, if appropriate, is completed by the corporate staff. The modification dossier, is transmitted to the plant and the joint team is responsible to control each modification file so it is properly closed after the modification is implemented. This procedure is followed both for permanent as well as for temporary corporate modifications. In some cases temporary modifications remain for a long time in the field before being replaced by permanent ones. It appears that UNIPE does not make formal categorization of the safety related modifications by their safety significance as recommended by IAEA safety guide NS-G-2.3, para. 4.5. The team was told that important (urgent) modifications are treated with higher importance, however the need for such a treatment is not based on clear formal criteria. The team suggested that implementing a systematic approach towards categorization of plant modifications by their safety significance would further help the plant to optimize the use of available resources and implement safety significant modifications in a timely manner.

In the past the plant has implemented a number of non-safety related local modifications, many of which have been regarded as temporary (MTI) for years and there are no written analyses available to confirm that they do not impact plant safety. Some of these modifications are performed on safety related equipment and it may not always be evident that they are not safety related. The plant has recently taken a decision to review the status of implementation of all MTI, however it will take some time before the MTI files are properly addressed.

During the mission the team members have noted several temporary changes to the plant normal configuration, which have not been properly marked or indicated. It appears that some changes at the plant, which would be normally considered as temporary modifications at other plants, are implemented without adequate analyses confirming their compatibility with the design intent and characteristic. It was not evident that plant has adequately assessed the risks and hazards associated with such circumstances. The team provided a recommendation in this area.

## 5.5. REACTOR ENGINEERING

The plant reactor engineering activities have strong corporate support in the area of establishing core burn up requirements, core design, safety evaluations, start-up, surveillance, fuel design and engineering support. Core loading, unloading, start-up tests and surveillance testing is performed on plant. There are clear guidance for responsibilities of the corporate level and plant departments involved in this process. Engineers have a clear understanding and feel responsible for the safety importance of their work. Special reactor engineering training courses are conducted at the corporate level for the engineers involved in fuel management and core testing. Reactor engineering start-up tests are carried out according to detailed procedures and quality assurance programmes. The testing section with co-operation with operation and other plant departments execute them. These procedures are of high quality and are reviewed at the corporate organization. However corrections during the execution of these procedures are not required to be individually corrected, signed and dated. Sometimes, representatives of the corporate engineering organization are present throughout these start-up tests to act as consultants and technical advisors. This practice ensures independent quality assurance of the testing process. Reactor core and associated safety parameters are adequately monitored and trended. Original documents are stored in the testing section office during the entire fuel cycle. Then they are moved to the central archive. The plant has developed very comprehensive action plan “optimization of fuel processes” with five groups of detailed objectives. An important part of this policy is the interface between testing section and operation. The team considered this action plan as a good practice. Operating technical specifications and procedures provide the necessary instructions and actions to be taken in the case of leaking fuel. Fuel cladding integrity is controlled effectively. Fission product activity of the reactor coolant is monitored continuously to detect any failure of the fuel cladding. The plant is emphasizing the importance of the foreign material exclusion in the primary circuit. An appropriate detection system is installed and instructions on this matter are provided in the operating procedures.



## 5.6. FUEL HANDLING

EDF corporate staff is responsible for quality control and verification that the fresh fuel is produced by the fuel manufacturer according to the technical specification. The management and handling of the receipt, transfer, inspection and storage of fresh nuclear fuel is executed by Fuel Branch of the plant Technical Department. There are clearly defined written procedures for implementation of each of the fresh fuel handling activities and distribution of personal responsibility of those involved in the fuel handling are well established. The fuel receipt procedure includes checking transport containers for labeling and cleanness, fuel assemblies for damage, correct identification of fuel and correlation of manufacturing and delivery documents. Any damage identification is based on visual control and the plant has in place a procedure describing the contingency actions for damaged fuel. The plants records showed that there were very few cases when some deviations have been observed. Some damaged fuel assemblies were repaired at the plant by the vendor organization, but those were exceptional cases and plant had good fresh fuel receipt records. In order to ensure that fuel integrity and sub-criticality are maintained, the irradiated fuel is handled, stored and inspected in approved facilities with qualified equipment and in accordance with written procedures. The plant has in place well defined procedures for monitoring fuel performance, which allows reliable detection of irradiated fuel assemblies with leak tightness deviations. During the last reactor core fuel unloading all fuel assemblies had to be inspected for unit 2, due to unusually high fission product activity in the primary coolant. Several fuel assemblies were found to have leak tightness problems. The failed fuel has been dispatched from the plant site and the corporate staff will further investigate the reasons for such fuel performance. All activities related to handling this particular situation at the site, were found to be well managed and performed adequately by the responsible plant staff.

The handling of the fresh and irradiated fuel is administratively controlled very strictly and each action is always double-checked. A software application GCN is used to record and store information about the location of each fuel assembly at any time. The access to this software is limited and the control of the data input is also subject to second person verification. After the Tokai Mura accident in 1999 the plant has undertaken extra analyses to review its measures in place to prevent any criticality events.

The plant appears to have well established programmes and procedures to handle fresh and irradiated fuel in accordance with good international practices.

## 5.7. COMPUTER APPLICATIONS IMPORTANT SAFETY

As part of the plant quality manual a policy note on utilization of the plant computerized information system was developed which clearly defines the main principles for use of software applications. Those are related to the use of the plant information system as a tool for cross-departmental exchange of information, as well as a support to the decision making of the plant management. The policy note states clearly the need for performing of appropriate analyses prior to implementing of any change to the plant information system. The corresponding organizational note describes the responsibilities, functions and interactions amongst the plant personal and different plant sections, which are affected. A contractor company provides the hardware services needed to maintain the plant Information system. An Information System Committee chaired by the plant deputy director executes the strategic co-ordination on software related matters. The committee meets once a month and



has developed a set of performance indicators to monitor the effectiveness of its' activities, as well as the contractor's ones. The review of the performance indicators for the last year showed good plant performance and contractor's services.

In 1997 the plant developed a programme to assess the safety relevance of all software applications and to categorize them in accordance with the EDF DI 64 corporate directive and instruction IN26. 158, including 68 plant specific, software applications were subject to this process. The plant was responsible for the classification of its' own specific software products, while the EDF corporate performed the classification of the rest. This process resulted in a software categorization, which clearly defines the groups of safety, and non-safety related applications. The safety related applications are further categorized in three safety importance classes. The procedure used for categorization of the software applications is clear with well-defined and reasonable criteria. The later refer to the plant safety analyses report and are related to the severity of the potential events, which can occur as a result of the software malfunction.

The procedures developed and implemented by the plant to ensure the appropriate operation, availability and security of the safety related applications appear to be in accordance with good practices in the field. It is responsibility of each plant department to ensure the quality of the input data to the applications under its' management.

#### **STATUS AT THE OSART FOLLOW-UP VISIT**

A recommendation and a suggestion related to modifications have been resolved. A recommendation related to handling deviations and a suggestion concerning low level events have been treated with satisfactory progress to date.

The system of tracking temporary modifications is in the operational phase at Nogent NPP. Temporary modifications may be in effect for a maximum of one fuel cycle.

A list of modifications proposed for the 1300 MW units already containing their safety classification has been submitted to the regulatory body for approval. These modifications scheduled in a package will be implemented at Nogent NPP in 2007 and 2008.

A general system to handle all types of deviations, including the ones observed during surveillance tests was implemented. Managers and interested staff use the system to track the process of handling and resolving deviations. However quality audits have concluded that the system has not yet fully achieved the status of a management tool for improvement.

The plant has introduced a new initiative to analyze "potential events" which are not reportable, but may be considered by the plant to be worthy of local analysis. An "Operational Quality Committee" was set up to review the plant's operating experiences and identify major problem areas where near-misses may occur. The plant has performed three studies of lower level events from the aspect of recurrent equipment failure.

## DETAILED TECHNICAL SUPPORT FINDINGS

### 5.1. ORGANIZATION AND FUNCTIONS

- 5.1(a) Good Practice:** An Operating Quality Committee, headed by Safety Quality Director and led by Human Factor Consultant was created as a proactive means to promote adequate addressing of human factor related issues at the plant.

The plant has employed a human factor specialist to help and assist plant management in any matters relevant to human behaviour analyses or human performance. In order to facilitate the integration of this specialist in the plant team and to enhance the promotion of better understanding of human factors related matters a decision was taken to create an Operating Quality Committee. This committee comprises 22 volunteers staff members from all departments who are actively promoting good communications on human factors related matters to the plant staff. These arrangements seem to work very effectively, since the human factor analyst has proved already very useful in addressing human errors in the plant event analyses and developing several proposals for improvement of staff operational practices. This innovative approach to address human factors issues enables a better perception of human factors on the site, less focused on human error but perceived rather as an aid to understanding employee's behaviour. Additionally by involving the workforce in discussing human factor related issues, and then encouraging them by demonstrating good use of the information they have provided, "ownership" is strengthened.

## 5.2. SURVEILLANCE PROGRAMME

**5.2(1) Issue:** The surveillance test programme lacks a systematic approach to deal with deviations observed during the surveillance tests, which if they occur, may require an amendment to the rest of the test.

In the case of a surveillance test procedure, the pump flow rate test criterion was not met and the operator issued a work request for repair of the corresponding flowmeter. After this, the test continued and was regarded as successfully completed although the real value of the pump flow was not measured.

The surveillance procedures lack instructions on how to address situations when the test procedure has to be exited due to unforeseen circumstances.

One of the surveillance test procedures for the main batteries was completed by the test performer, but the results were not formally verified by the responsible supervisors before the restart of the unit.

Lack of plant systematic approach to address deviations observed during the surveillance tests may lead to inconsistent operator actions and potentially could lead to inadequate equipment operability determination.

**Recommendation:** The plant should develop and implement a systematic approach to address deviations observed during the surveillance tests.

### **Plant response/action:**

The deviation process deployed on the NPP results from a multi-disciplinary work group to integrate all the ‘professional sector’ components of the NPP. It was covered by a process review.

This process is tailored to ISO 9001 and 14001 standards (the former was heavily DI 55-oriented), and is applicable to all activities covered by the Management System through Quality, including the Periodic Tests.

The site’s overall vision is ensured by a single management tool shared by all the players (until now each department managed its own base).

Consistency is facilitated by the use of a single hard copy medium, under Quality Assurance controlled by the Safety Quality Department.

Application June 20, 2003 by decision DD – 03.10 with a temporary management tool.

Process review, October 2, 2003.

Decision DD – 03.11: minor modifications of the process and application of the new management tool.

January 2004, implementation of the new management base, ‘report sheet’ printed form and 2004 stub booklets.

Management base: This is a management tool, not a processing tool.

It is non-erasable and multi-user.

It allows sorting and extractions on each deviation characteristic.

The fields are locked

Partially when switching to “processed” status (title and action retained),

- Entirely when switching to “closed” status. The document under QA is the hard copy in stub booklet form management by the SQD.

The situation report drawn up at the end of 2003 shows that the process is implemented and that it works. In particular it was observed that it is applied by the Operations Department during non-conforming periodic tests, through sheets recorded in the management base.

### **IAEA Comments**

A general system to handle all types of deviations, including ones observed during surveillance tests was implemented in 2003 on a temporary basis, and from January 2004 as a permanent application. The detailed process from reporting a concern through filing a deficiency report up to determining immediate corrective actions and measures needed to avoid recurrence is documented in paper format. The deviations are also tracked in a computerised database, allowing flexibility in producing different kinds of informative reports. There are examples that managers use the system to track the process of handling and resolving deviations.

However quality audits have concluded that the reports in paper format are not fully reflected in the computerised database, and the system has not fully achieved the status of management tool for improvement. Some examples of unresolved items indicate that the feedback loop of registering the corrective actions do not allow to promptly review the status of implementation of these corrective actions. After analysis of experience from the first period of operation of the system and implementation of the necessary corrections it is expected that this system becomes a powerful tool to manage all kinds of deviations.

**Conclusion:** Satisfactory progress to date.

### 5.3. OPERATIONAL EXPERIENCE FEEDBACK (OEF) SYSTEM

**5.3(1) Issue:** The plant has in place a good programme to evaluate and disseminate the operational experience feedback, which however does not consider in a systematic way “low level” and “near misses” events. Implementation of corrective actions is sometimes delayed.

The implementation of about 47,5% of the corrective actions which have resulted from the analyses of operational events, reported to the regulatory body during last two years, was postponed. Of these 33% had to be postponed twice.

The plant has several systems for collecting details of “low level” events on site, handled by different departments. These systems provide valuable source of information that, at present is not being fully used since it does not receive the appropriate level of selection, analysis and trending to maximize its value.

No formal plant policy exists to encourage near misses and minor events reporting. Several of the observations made during the plant walk downs showed that such events are sometimes not reported. Industry experience indicates that most events can be traced back to precursors, which if detected and addressed in a timely manner could result in the full event being avoided.

Implementation of appropriate corrective actions in a timely manner is of utmost importance to prevent recurrence of operational events. Further more, analyses of low-level events and near misses events could help to identify potential problems, generic implications, precursors of declining performance and root causes of adverse trends before actual events happen.

**Suggestion:** To further increase the effectiveness of the plant operational experience feedback, consideration should be given to ensure that corrective actions are implemented without undue delays and low level and near misses events are analysed adequately.

#### **Plant response/action:**

Through situations covered by Work Record DI 103 “Monitoring the Failures of Important Equipment in PWR Plants”, the analysis of minor events is possible if the population is sufficiently significant.

Few sites use DI 103 data locally as the NPPs do not have a tool for analyzing Experience Feedback that enables DI 103 data to be suitably used in the framework of equipment behavior reports. Furthermore, a test conducted by the NPP at Gravelines shows that even for a six unit site the sample, over the year, does not allow a reliable statistical analysis.

Central Departments: Active Installed Base Support Center/Experience Feedback Group (CAPE/GRE) and National Active Installed Base Engineering Unit/Operations and Maintenance Branch (UNIFE/BEM) are working on the processing of recurrent events. Proposals will be made to the NPPs as soon as possible: a computerized query system will enable data to be processed under Excel.

A test on events notifications for all the NPPs was run at the Installed Base level in order to highlight recurrent events.

The following actions will eventually be undertaken:

- Study the possibility of detecting recurrent events using collected data in Saphir and check that results are instructive,
- Propose a method for identifying and processing these events,
- Integrate the processing of recurrent events in the existing experience feedback process (Inter-department Consultation),
- Use the IDC base (return loop to NPPs, capitalization etc. ),
- Support from the UNIPE – phases of identification & analysis,
- Use the appropriate tools to draw up local situation reports.

In the mean time, the NPP at Nogent will draw up a top ten list of plant systems or equipment system ID numbers having been involved in the greatest number of situations following servicing. This report will be compared to the classification drawn up in the framework of the ‘‘40 year vision’’. This approach is included in the Ad Hoc committee report (SAPHIR).

#### **IAEA Comments:**

Part of Nogent NPP’s response to this suggestion deals with the activities of EDF’s central departments. Since the operating experience feedback program of EDF’s corporate organization was recently reviewed through a PROSPER mission by IAEA, the OSART Follow-up team to Nogent NPP concentrated its efforts on the assessment of the relevant activities at Nogent NPP level.

The plant has introduced a procedure in September 2003 and revised it in January 2004, calling for the analysis of ‘‘potential events’’ which are not reportable, but may be considered by the plant worth to be analysed locally (RAL = Local Analysis Report). One such event analysis was initiated in 2003 and five in 2004, but not all of them have been finished so far.

Nogent NPP took the initiative of forming a task force jointly with other EDF plants in July 2003 to study possible ways of analysing near-misses. The task force proposed a definition of near misses and also several ways to detect them. Nogent NPP has decided in December 2003 to set up an ‘‘Operational Quality Committee’’, which consists of representatives of different departments, with the aim to jointly review the plant’s operating experiences and identify major problem areas that could be regarded as areas where near-misses occur. The committee has decided to study four areas, and the study is expected to be completed by January 2005.

Nogent NPP has performed three studies of lower level events from the aspect of recurrent equipment failure. Two studies were based on the analysis of the event database (SAPHIR). One of them analysed recurrent events linked to a piece of equipment, taking place after the maintenance of this equipment and associated not with its natural wear. The other study was looking at the number of events involving limiting conditions of operation (LCO), caused by specific systems of the plant. Actions will be taken depending on the frequency of recurrence. The third study was analysing recurrence of maintenance actions on plant systems, based on the work control database (SYGMA). The results of the analysis were used to initiate modifications or to provide additional confirmation for ongoing programs.

**Conclusion:** Satisfactory progress to date

**5.3(a) Good Practice:** A plant special committee, involving staff members from all departments, was created to enhance rapid and prompt dissemination of operational experience feedback

By establishing of information exchange (REX) committee and using a software application FIREX the plant has implemented a very effective means to disseminate the information on safety significant and safety important operational events amongst all the departments. During the REX meetings every second week the representatives of each department are requested to comment on the recent events reported. After a brief analyses during the Committee meeting a person is appointed to be responsible for providing more detailed information on the way given events could influence plant safety and on any further analyses or corrective actions, should such be needed. FIREX application allows to closely monitor and control the implementation on any plant actions which might be needed to react promptly to any particular event and to implement lessons learnt.

#### 5.4. PLANT MODIFICATION SYSTEM

**5.4(1) Issue:** Some temporary modifications remain in the field for long periods. Safety related modifications are not formally categorized by their safety significance and the plant lacks a systematic policy to periodically review the validity of safety justifications for long standing temporary modifications.

For example, cabinets 1(2)DVMOO1AR with electrical relay equipment were found open in the unit's turbine halls. The plant staff explained that problems with overheating have been experienced for last several years. The temporary decision of the plant is to open these cabinets when needed, however there is no formal temporary modification implemented. In another case, portable electrical heaters have been installed in the charging pump rooms, however no analysis to confirm compatibility of this modification with the design intent were found at the plant. The plant was not able to demonstrate that adequate analyses have been performed to assess the risk impact of such long lasting changes in the plant configuration; these were also not addressed as plant temporary modifications.

Some temporary modifications remain in the field for long periods and several sequential permanent modifications are sometime implemented to resolve a safety issue. For example a temporary modification for the flow control meters at the plant chimney was in the field from May 1999 till January 2003. There is a temporary modification on the PRV SEBIM at unit 2, which is older than a year. Several permanent modifications at turbine blowdown (ASG) system have been implemented, however the problem with vapor condensation in the oil tank of turbine auxiliary feed water pumps continues to exist. During the last outage of unit 2, a modification at RCV (charging pump) system was implemented as a "permanent one", although it was evident that the current solution does not rectify completely the design weaknesses. The last two examples question the adequacy of plant categorization of "temporary" modifications.

There is no periodic reassessment of the validity of the initial safety justifications for long lasting temporary modifications. The cumulative impact on safety of such modifications is not performed. Lack of adequate arrangements for addressing the impact of temporary modifications could eventually result in plant configurations which may not comply with the design intent.

**Recommendation:** The plant should enhance the temporary modification programme to ensure that temporary modifications are always adequately identified, analyzed and implemented. The cumulative risk impact of various long lasting modifications should be periodically assessed and the technical problems of high importance resolved without undue delays.

#### **Plant response/action:**

After analysing the recommendation, the NPP considers that the organisation and application memos in the field of the DMP/MTIs are not sufficiently explicit and may lead to comprehension errors.



To avoid this problem, a multi-professional sector work group has been set up. It has allowed our organisation to be clarified and optimised while remaining compliant with applicable references.

Reworking the organisation memo included and corrected the comprehension problems identified.

In light of the needs during the preparation phase regarding the DMP notifications necessary to the outages scheduled in April and June 2004, the new organisation will not be applied during these outages.

On the other hand, it will be applicable during the Unit Operating process as soon as the memo is distributed. This initial stage will enable us to validate, and if necessary correct, our new organisation.

The new organisation allows the DMPs and MTIs and their mode of management to be distinguished and identified unambiguously.

**IAEA comments:**

The system of tracking temporary modifications is in operational phase at Nogent NPP. Temporary modifications are divided into two categories:

- Those which have an impact on nuclear safety, industrial safety, environment or availability (DMP = Temporary Special Device)
- Those, which do not fall within the scope of DMPs (MTI = Temporary Plant Modification).

MTIs may be in effect up to one fuel cycle, after that they have to be either removed, or transformed into a permanent modification on plant or national level. The duration of DMPs is not specified by rule, because they usually are in effect just for a shorter period of time, until their existence is warranted by the plant conditions.

The DMP modifications are filed in a folder in each of the unit control rooms. At the moment four DMPs are in effect on unit 1, and one DMP on unit 2. All of them have been in place less than one year.

The engineer responsible for modifications checks each month the database of MTIs, and identifies modifications, which are in effect for one year. The modifications engineer provides the list of MTIs in effect to the shift manager. The shift manager asks for action or clarification from the responsible department concerning the delayed modifications. At the moment 24 MTIs are in effect on unit 1, and 25 MTIs on unit 2. At seven cases MTIs have been observed to be in existence for longer than one year since the implementation of the tracking system, and the modifications engineer has addressed all of them. These numbers can be considered as reasonable for a nuclear plant. Random review of the modifications confirmed that their categorization in relation to their safety significance had been performed correctly.

**Conclusion:** Issue resolved.

**5.4(1) Suggestion:** Consideration should be given to implement a plant modification programme that makes due account of modifications being categorized by their safety significance.

**Plant response/action:**

This suggestion does not directly concern the NPP but the National Active Installed Base Engineering Unit (UNIPE). This unit manages the integration of national modifications on the NPPs. A letter relaying the terms of the suggestion has been addressed to the unit.

The answer was as follows:

As soon as 2001, exchanges concerning the classification of national modifications according to their importance for the safety of installations were instituted between Electricité De France and the Nuclear Safety Authority. As a result of these exchanges, the Directorate General for Nuclear Safety and Radiation Protection stated its position in May 2002. This position applies to all national “safety-related” modifications, whether they are part of a whole or specifically and individually programmed.

In decreasing order of safety stakes, it ranks the modifications in three groups whose definitions are as follows:

- Group 1 Modifications

Any modification calling the safety demonstration into question.

- Group 2 Modifications

Any modification intended for execution on a series of reactors, which does not fundamentally call into question the safety demonstration but which has an impact on safety in terms of execution or operation.

- Group 3 Modifications

Modification with no safety impact.

Regarding the 1300 MW series, the ranking of modifications shall be effective beginning with technical lot “VD2/PID2”.

The purpose of this ranking is to improve the examination process in order to enable the Safety Authority to be able to make sure that the modifications are designed, executed and operated according to processes that allow the level of safety of installations to be guaranteed.

**IAEA comments:**

The National Active Installed Base Engineering Unit (UNIPE) has submitted a list of modifications proposed for the 1300 MW units to the Directorate General for Nuclear Safety and Radiation Protection (regulatory body) for approval. This includes modifications scheduled in a package (VD2) and modifications scheduled individually (PID2) for the second 10-year outage for these units, and each modification is assigned a safety classification (one of the groups 1, 2 or 3). The list of modifications is under evaluation by the regulatory body.

The VD2 package of modifications will be implemented at Nogent NPP in 2007 and 2008. The pilot implementation of the VD2 package will take place at Paluel unit 2 in May 2005.

If in the near future any individually scheduled modification for urgent implementation would be decided based on the operating experience feedback, it would be assigned classification “group 1”. Right now no such modifications are planned for the period of 2005 and 2006, because all planned modifications fall under category “group 2” or “group 3”.

The modifications that are under implementation at Nogent NPP at the moment have not been assigned a category, since they have been initiated in 1999.

**Conclusion:** Issue resolved.

## 5.5. REACTOR ENGINEERING

**5.5(a) Good practice:** Action plan “Optimisation of fuel processes” and monitoring the activities during start-up tests after refuelling.

The plant has developed very comprehensive complete and accurate action plan "Optimisation of fuel processes", with the following objectives:

- clarify roles and responsibilities including quality assurance (departments, plant, corporate level)
- guarantee the quality of all activities
- training, skills development and ensure their sustainability
- implement a programme for the integration of operating experience
- integration of corporate activities

The action plan includes a comprehensive set of indicators and trend analysis.

As part of this plant-wide action plan, the Testing Section of the plant Technical Department has set up an organisation designed to monitor and manage all activities carried out during physical start-up tests, particularly emphasizing the right understanding and control of actions implemented by the Operations shift team.

So as to improve interface management and clarifying everybody’s responsibilities, a testing manager is appointed within the Testing Section. He coordinates activities and their sequence based on a clear, efficient and rigorous document structure that integrates required check points, the comprehensive identification of risks and user-friendly testing procedures.

Combined to this, a highly innovative approach has led to the testing manager being the coordinator of and chairing the shift turnover (primary side) during tests after refuelling. (In addition to normal shift turnover). He uses a shift turnover form briefly describing the background and status of tests underway, the tests to be carried out during the next shift; a reminder to the operator of the criteria and rules to apply as part of the REPR (start-up test rules), the errors and traps to avoid and the appropriate monitoring methods. The operator can require additional input or reminder if he needs to. This system provides better sharing of knowledge with operators who, at this specific stage, act upon request by the Testing Section (which is the entity having the necessary skills in the area of physical testing).

## 6. RADIATION PROTECTION

### 6.1. ORGANIZATION AND FUNCTIONS

The plant director has ultimate responsibility for the radiation protection on the site. The industrial safety and radiation protection department includes the radiation protection section which ensures proper application of the regulations and doctrines. The RP section is independent of other departments and there is a RP director at the management level with direct line to the plant director.

The plant management policies are based on the principle of self-protection, which places the responsibilities for radiological protection with maintenance, operations, etc. As defined in plant procedures the radiological protection section has no direct operational responsibility. The main responsibility of the Industrial Safety and Radiation Protection department is to provide assistance, advice and monitoring on industrial safety and radiological protection activities and participate in risks prevention analysis.

The plant management provides policies, criteria and administrative limits, as well as goals and objectives.

The first person responsible for the ALARA principles is the plant director. Also, the ALARA principles are the responsibility of all the individuals when working in radiation control area (RCA). For all work in RCA a safety risk evaluation that includes a predictive dosimetry assessment and optimization, is done by the person responsible for the work. Radiation protection's role is to advise the workers in the dose assessment and optimization.

Five radiological event reports were issued in 2002, four related to posting in RCA and the other related to workers not wearing adequate protection while in contaminated areas. These events have been analyzed by RP but the reports of four of these analyses have yet to be approved by the safety committee. Also, there is a programme for analysis of internal and external experiences called "REX" supported by corporate reports on national events, and use of other tools (Saphir Committee, PEX meetings, PRISME database, etc.).

The radiation protection standards are developed at corporate level. At the time of the mission the French regulation was close to being revised to incorporate ICRP-60 recommendations, as already implemented in the directive 96/29 Euratom. And the incorporation of ICRP 60 into French regulation was completed by decrees on 31 March 2003. Therefore, though the legal dose annual limit was 50 mSv for workers category A, nuclear operators were encouraged to implement their standards in accordance with the future limit set at 20 mSv per year. In view of this coming new regulation, the plant has set an administrative warning limit at 16 mSv/year in order to make sure that no worker in an EDF plant receives more than 20 mSv in 12 consecutive months.

The staffing of the RP section is adequate to fulfill its mission. There is a good balance between more experience RP technicians and recently recruited staff. This assures the maintenance of the technical skills and transfer of knowledge from the more experience people to the younger ones. Lower skilled activities, such as routine surveys and control of access to RCA are performed by contractors.

The plant has a very good RP training facility with a replica of the real RCA access, a room with pipe, valves and pumps simulating a radioactive system for maintenance practice activities and practice in the use of radiological survey equipment.

Radiation workers in category A receive a medical surveillance every 6 months. For workers in category B it is annually. The results of these checks (medical aptitude) are reported to the worker Department Manager and the person himself.

## 6.2. RADIATION WORK CONTROL

Radiation work control is managed by the work supervisors themselves. First, during the planning, a safety risk evaluation is done by the maintenance planners. This evaluation includes industrial safety and radiation protection hazards. An optimization and establishment of a dosimetry objective is done with RP support. Then, the workers are informed of all the risks, including the radiological hazards and ALARA measures for dose optimization. Finally, it is the supervisor of the work who is fully responsible for all the workers protection and application of the radiation protection rules and dose limitations. For high risks activities, there is a briefing before the execution of the works where the workers are informed of the all the risks, including the radiological hazards.

The role of RP is to help maintenance planners incorporate ALARA measures and to do the dosimetry estimations of work packages during the planning stage. Therefore, there is not a Radiation Work Permit as such, except for areas with doses greater than 2 mSv/h where a special authorization from RP (orange zone) and plant director or his delegated representative (red zone) is required. After the work is finished, the predicted and received doses are compared and lessons learned recorded.

The plant has good results in terms of collective dosimetry (0,43 man-Sv per unit in 2002) being in best quartile of the 1300 MW PWR French fleet. It participates in the EDF ALARA network in three projects for dose optimization, being the project leaders in "Decontamination of reactor building pools". Also, an optimization of the cleaning of the sumps cut by half the doses received on this activity. The cleaning method has been improved by using a pump and a shielded filter. Also, the main contractors with activities in RCA participate in the ALARA Committee.

To enter the main radiation control areas workers disrobe (except the underwear) and are assigned an operational dosimeter. In the hot change room the worker puts on a standard protection. A RP assistance officer checks that he is wearing the legal dosimetry (film badge) and the rest of the equipment. At the exit, there is a first control of contamination (gamma portal C1). If the person sets off the high alarm, he takes off all the clothes and they are sent as radioactive waste. If it is not a high alarm, he localizes the part contaminated and the clothes are recycled in the laundry. After passing the C1 control the person undresses, washes his hands and the clothes are sent directly to the laundry. Then a skin contamination control is passed (beta portal C2) and the operational dosimeter is returned. In unit 1 both paths in/out RCA through the hot change room are the same. In the hot change room of unit 2, the two paths have been separated in order to avoid cross contaminations. It is planned also to apply this concept to the unit 1 hot change room this year (2003).

Nevertheless, this standard is not maintained in all controlled areas outside nuclear buildings (no C1 and C2 controls and no operational dosimetry available locally). Examples of this are the main source control room, the low level storage waste areas and the chemistry laboratory. A suggestion was offered by the team in this area.

The plant radiation area classification consists of surveyed (grey areas,  $>2,5 \mu\text{Sv/h}$ ) and controlled areas. The controlled areas are divided according to colors in:

- Green:  $>7,5 \mu\text{Sv/h}$  and  $<25 \mu\text{Sv/h}$
- Yellow:  $>25 \mu\text{Sv/h}$  and  $< 2 \text{mSv/h}$
- Orange:  $> 2 \text{mSv/h}$  and  $< 100 \text{mSv/h}$
- Red:  $> 100 \text{mSv/h}$

The access to orange zones must be approved by RP and the access to red zone needs additionally to the RP permit, the authorization of Plant Manager or his delegated representative. Nevertheless, the accesses to orange areas are not locked (red areas are locked). Also, the electronic dosimeter used in RCA doesn't have an audible alarm; it has just a red light that flushed when  $1 \mu\text{Sv}$  is accumulated. Possibility exists that an individual may inadvertently enter a high radiation area and reach exposure limits without being aware of it. The team provided a suggestion that the plant pursue additional opportunities to protect against inadvertent exposure.

The team found a significant amount of contaminated material stored temporarily in RCA without proper labeling and posting. Additionally, there is neither an inventory nor a control of the material temporarily stored in RCA. The team recommended that the plant should strengthen their procedure for the control of radioactive materials.

The plant has an extensive survey programme. The general policy for RCA is to check all accessible areas every month. Road contaminations checks are done every year. However, there are some weaknesses in the identification of radiological hazards within the site (offices, cafeteria, main control room, etc.). Even though procedures exist covering the posting and surveillance of areas, they are not always complete. The team recommended that the plant strengthen its radiological survey and posting programme. The programme should be rigorously implemented in the field.

### 6.3. RADIATION DOSE CONTROL

The ALARA Committee is very effective. There is a good attendance and agreements attained in the ALARA Committee, and although it is not chaired by the plant manager or his deputy, contractors and maintenance planners and supervisors attend. The annual dosimetry objectives for the year 2003 have been approved for the first time in Nogent NPP in the ALARA Committee. The team encourages the plant to continue with this policy of fostering the ALARA Committee and good dosimetry results. The team also discussed with the plant the development of ALARA aids or lectures for designers in order to help them to incorporate the ALARA concept in the minor plant designs that are developed at plant level.

The plant has developed several innovative ways to reduce dose at the site. These are:

- a mechanized way to clean sumps
- additional shielding around waste drums
- optimization of cavity decontamination

The team has identified these as good practices.

The internal dosimetry is the responsibility of the medical service. There are two whole body Counters and one chair for iodine in the thyroid and abdomen measurement. The programme for internal dose assessment is not supported by a well defined and structured set of procedures, that covers all the actions needed to perform an internal dose assessment. However, EDF corporate expertise is available if needed. No internal doses were reported in 2002.

The system employed at Nogent NPP for legal external dosimetry is film. This technology has a detection threshold of 0,2 mSv/month (register level). The operational dosimetry is based in the semiconductor technology and its detection threshold is 0,01 mSv per entry (register level) to RCA. The legal dosimetry is the responsibility of the Medical Service, while the operational dosimetry is controlled by RP. Therefore, the individual and collective dosimetry are followed by RP just in terms of operational dosimetry. Every month, the films are replaced and the olds ones are sent to a contractor laboratory, in order to develop the doses. The results are received after two months, and then RP sends the operational doses of that month to the medical service. Difference tolerance between operational and legal (film) dosimetry is defined by EDF corporate procedure (typically <20%). However, RP section does not routinely update his operational dosimetry accountability with the film dosimetry results, just in case of discrepancy pointed out by the medical service.

The RP section has ring dosimeters for extremity dosimetry, for its use in cases where the predictive dose to the extremity is ten times the total effective dose. No extremity doses have been recorded recently. Neutron dosimetry is made by means of Bubble dosimeter or with an area dose integrating dosimeter (most used system) during entries at power to Reactor Building.

Visitors' entrance to RCA requires permission of plant manager or his delegated representative and has to be escorted and with an operational dosimeter assigned.

#### 6.4. RADIATION PROTECTION INSTRUMENTATION, PROTECTIVE CLOTHING, AND FACILITIES

The plant has a sufficient inventory of radiation protection equipment to survey the RCA. However, the operational dosimetry has not been changed since the start up of the plant, and this system lacks of dose and dose rate alarms as it is the international standard today.

As part of a national radioactive source management programme, a comprehensive organization and storage facility has been organized for seal and non-seal radioactive sources. The team identified this as a good practice.

The calibration/verification programme is very well structured. All the portable survey equipment is source checked and registered by a RP assistance at the entrance of RCA of units 1 and 2, and main RP equipment storage. The fixed instrumentation (C1, C2, C3, CPO, hands & feet, etc.) is verified and source checked every month. All the equipments, both fixed and portable, are calibrated annually by a contractor, except the operational dosimeters that are calibrated every 6 months.

The protective equipment availability seems to be sufficient for the activities in RCA. Also respirators are available when airborne contamination risks exists. Respirators with a light in



the mask to inform air capacity in the pressure bottle is a good ALARA practice when working in high noise environment, as in entries to Reactor building during normal operation (primary pumps on). The respiratory equipment is checked in the plant every year.

#### 6.5. RADIOACTIVE WASTE, MANAGEMENT AND DISCHARGES

The management of waste discharges to the environment and environmental monitoring is performed by the Technical and Nuclear Logistic Department.

The waste treatment building has a high level of occupancy of wastes. Currently, there are two shifts working on the facilities to process this waste. Because of the lack of storage space and as an ALARA tool to reduce the doses of the decontamination crew, the plant has designed a big shielded steel drum where the high dose rate concrete drums, with filter of the plant processes, can be introduced and therefore, the contact dose rate be reduce by a factor of 8. The team identified this as a good practice.

The doses of the persons working on the waste treatment building activities accounts for approximately 20% of the plant normal operational dose. Also, scaffolding with blanket shields have been put outside this building in order to reduce the doses in a nearby building occupied by plant office workers. The plant is finishing a new storage area for low waste temporary storage before shipment offsite to incineration or compaction (CENTRACO) or to the national low level waste storage facility (ANDRA). The team encourages the plant to consider improving its housekeeping and posting of materials and areas in the different waste storage areas. Also, a high quantity of non-reusable material is introduced inside RCA that ends up as a radioactive waste (mules, plastic bags, etc.) and the use of plastic could be minimized on painted decontaminable floor.

The radioactive effluents releases are controlled by the chemistry laboratory. The limits for effluent release are established in the French inter-ministerial order for gaseous and liquids effluents of Nogent NPP of 1987, and are still valid. These limits are set in terms of activity. Chemical analyses are made in the tanks prior liquid release to the river. However, neither a source check to the Process Radiation Monitor (PRM) that monitors the discharge is made prior the liquid releases, nor any comparison to the PRM values and chemical analysis values are made. The team suggests the plant to review this practice.

The plant has a programme for optimization of its effluents releases that is based mainly in daily monitoring of effluents produced, optimizing waste treatment through sampling of the source and reducing the released activity by applying the most appropriate purification method (evaporator or demineralizer).

Additionally, during outages the plant has a so-called “Effluents group” composed of three fulltime people (1 from operations, 1 from chemistry and one from General Services Section) for liquid and waste reduction. This is a beneficial programme to reducing its activity releases to the environment.

The environmental monitoring programme is established in accordance with Regulatory requirements and directives. This programme consists of sampling air, water and food chain. The results of the environmental programme are sent to the regulator and national and also to local authorities for diffusion to the public.

## 6.6. RADIATION PROTECTION SUPPORT DURING EMERGENCIES

The RP support for emergencies consists of a radiological evaluation center composed of 4 persons for evaluating the releases, procedures and computer codes, two mobile units well equipped for ambient and dose rate measurement, and a radiological supervisor and two RP technician for support activities in the plant.

There is also an environmental radiometric measurement network (stations at 1 Km, 5 Km, 10 Km), some of which retransmit the dose rate data by telemetry to the expert group in charge of assessing the radiological consequences of the releases.

### **STATUS AT THE OSART FOLLOW-UP VISIT**

The plant has made big progress in resolving the issues found during the OSART mission. The plant has reviewed its program for monitoring of persons in the annexed radiological controlled area outside the main controlled area. The use of operational dosimeters in these areas is now mandatory; and new dosimeters have been bought.

Zones within the controlled area with higher dose rates are marked with stepovers and banners across the door to prevent staff from inadvertently entering such areas. After a risk analysis staff is equipped with a dosimeter with audible alarm if necessary.

The requirements for temporary storage of material are now clearly described in a procedure. A file attached to the storage place contains all the necessary information to keep temporary storage under control.

The plant has strengthened its radiological posting and monitoring program. The transit area is now a controlled area and it will be enlarged. Places outside the controlled area are monitored regularly for contamination and fixed installed monitoring equipment is used to trend radioactivity in the plant.

## DETAILED RADIATION PROTECTION FINDINGS

### 6.2. RADIATION WORK CONTROL

**6.2(1) Issue:** There are some weakness and inconsistencies in the radiological control of persons and materials in the annexed radiological areas outside the main RCA. The process established for access/egress of persons and materials to these areas do not meet IAEA standards. There are no portal monitors for contamination control, and no operational dosimetry is available in the annexed RCA.

Examples of these are:

- The main source control room, the low level storage waste area and the chemistry laboratory.
- Inside the protected area, outside the main RCA there is an area for radioactive material storage in transport containers with poor labeling.
- On June 14, 2001 the plant reported an event where unmonitored office workers were exposed to radiation from radioactive wastes stored near by.
- A radiation source used for checking the RP instruments in the main storage RP room outside RCA is not properly protected to prevent a member of the public from approaching the source.

Without proper monitoring of the persons and materials risk exists of unexpected contaminations outside Radiological areas and inadvertent exposures to radiation.

**Suggestion:** The plant should consider reviewing its programme for monitoring of persons and materials in the annexed radiological controlled areas, outside the main RCA, to meet international standards. Contamination controls could be relaxed if the plant can assure that no contamination risk exists, otherwise contamination control should be provided

#### **Plant response/action:**

Wearing of an operational dosimeter and film badge is specified for access to an auxiliary controlled area: SUC lab., VLL area, source rooms, transit area.

*Note: Given the absence of any irradiation risk, but the possibility of contamination, the SUT labs and the infirmary decontamination room were downgraded from controlled area to supervised area. The dosimeter film badge must be worn in these areas.*

For this purpose, and in the absence of monitoring portals directly in these areas, DMC 2000 type personal dosimeters were purchased in 2003. the NPP already had 35 of them, so an extra 70 were acquired. These personal dosimeters (which can also be used for specific work programs as they have adjustable dose and dose rate alarm thresholds) require the use of a computer system to retrieve the dose, and this has been operational since the end of 2003.

Monthly non-contamination checks on these auxiliary areas were implemented as of 2003. No contamination has been detected in these areas since these checks were instigated.

**IAEA Comments:**

The plant has provided new dosimeters for controlled areas in annex buildings e.g. the chemistry laboratory and the main source storage room. The use of operational dosimeters there is now mandatory. The handling of the new dosimeters is described in a procedure released in January 2004. The received doses are recorded and assessed with the help of a computerized system. Contamination checks are now performed monthly in the controlled areas outside the main controlled area.

**Conclusion:** Issue resolved.

**6.2(2) Issue:** The plant is not taking advantage of some opportunities to limit radiological dose to workers. The accesses to high radiation areas (orange areas) between 2-100 mSv/h are not locked and the operational dosimeter normally used in RCA has not the capability of audible dose & dose rate alarm.

- A significant radiation protection event was issued in 4<sup>th</sup> October 2002 when a high contact dose filter (180 mSv/h) was being transferred within its shielded concrete drum to the room QA506 (yellow labelled) of the Waste Treatment Building, for putting the top shielded plug of the drum. When the drum reached this room, the Area Radiation Monitor alarmed. Safety and Quality Department personnel near the area heard the ARM alarm (3 mSv/h at the entrance door) and then, the room was then immediately posted as orange (>2 mSv/h). No exposure occurred during the approximately 15 minutes that the room was not properly posted. However inadvertent entrance of a worker to this area could have caused significant radiation exposure.
- Ten workers exceeded during 2002 the alarm threshold dose of 16 mSv over 12 months. It should be noted that all these workers were close to this limit when they arrived to the plant.
- Electronic dosimeters used in the plant do not alarm when dose limits are exceeded.

Without these radiological barriers risk exists that an individual inadvertently exceeds a dose limit.

**Suggestion:** The plant should consider to lock high radiation areas and/or make available an operational dosimeter with audible dose and dose rate alarms available, when possibility of approaching dose limits in high-unexpected exposures.

**Plant response/action:**

The NPP does not envisage systematic locking of access to orange areas. This position is in conformity with the reference framework and the regulations and is one that is shared by the other NPPs. However, in order to improve our management of orange areas, proposals were validated by the ALARA Committee in September 2003.

These in particular include:

- improved signage (display of controlled access conditions, experimentation with use of interactive gamma monitoring and alarm systems (BIG) for those areas with fluctuating dose rates (sumps)).
- reinforced physical warning systems (systematic area transitions in place since September 2003, and installation of eye-level signalling (rubalise tape) of orange areas.
- use of audible alarm dosimeters which will be handed out to the participants following the risk analysis (dose rate and work duration criteria). These dosimeters may be used for other particular work programs even outside orange areas for operations with high individual dosimetry potential.

Mise en forme : Puces et numéros

The proposals are in conformity with the conclusions of the National Orange Areas working group.

**IAEA Comments:**

Doors to areas with higher dose rates (orange zones) are marked with a stepover and a banner across the door to indicate the danger. The plant will not lock these areas. Doors to red zones are locked. During a risk analysis an estimated dose for every work is forecasted and a dosimeter with audible alarm is provided if necessary. Therefore the risk of persons entering high dose areas inadvertently is reduced.

**Conclusion:** Issue resolved.

**6.2(3) Issue:** There is no procedure that clearly addresses temporary storage of radioactive material and numerous examples of poor labelling and inappropriate storage of radioactive material were found in RCA.

Examples of these are:

- Material in bags containing compactable wastes with doses up to 2 mSv/h in cubicle NB 04 08 (Auxiliary Building unit 2 level –5,4 m) were found without clear marking.
- Various materials and containers (mainly ventilation ducts and filters from the recent outage) were stored in a corridor of Auxiliary Building unit 2 level –5,4 with contact doses up to 100 µSv/h. The only posting was a yellow tape indicating the risk.
- Material used in the last outage in unit 2 was found packed in cubicle KA.10.40, a low dose area in Fuel Building, with contact dose rate >50 µSv/h without any kind of posting in the equipment.
- Vacuum machine with contact dose up to 0.2 mSv/h was stored in a low dose area in a corridor without labelling.
- More than 20 filters with contact dose rate 60 µSv/h stored in the basement of the Laundry (green area) without proper labelling (no yellow signal).

Without proper monitoring and labelling of radioactive material, risks exist for inadvertent exposure to radiation and personnel contamination.

**Recommendation:** The plant should strengthen their procedure for the control of radioactive materials. The plant should implement stronger controls over radioactive material inside the RCA.

**Plant response/action:**

In chronological order, the action taken was as follows:

1/ Definition of clear rules concerning interim storage of equipment and waste in the controlled areas. Any interim storage may only be in a clearly marked out area. The person in charge of the area, the radiological conditions and the calorific potential are identified. This measure forms part of the remit of the working group handling Recommendation 1.5 on equipment and worksite management.

It is finalised in note reference D5350/TX/ENVIR/NA/401.

1bis/ At the same time, the NPP is making considerable efforts to further improve management of the flow of waste by continuing to reduce congestion in the Effluent Treatment Building and the storage areas in the units (BTE action plan).

2/ Stipulation of requirements:

- In the safety field log,
- Reminder in Risk Prevention training,
- Provision of sufficient quantities of markings and labels,

- Support in the TEF and AT processes and in the departments
- Inclusion in the Particular Technical Specifications

3/ Periodic check on marking out and identification of the storage areas by the professional sector officer for the area and by SPR as part of installation surveillance.

**IAEA Comments:**

In March 2004 the plant released a procedure about intermediate storage places. The procedure contains a sheet to be posted on every intermediate storage place with information about identification, responsibilities, radioactive and fire loading risks, date of initiation as well as scheduled removal of the material. In addition the plant released a small pocket brochure (Carnet de terrain sécurité), which also describes the necessity of these sheets in a section of the pocket brochure. This is a very practical approach to the problem of intermediate stored material. During a field inspection however three examples were found in the 1NB-Building (1NB04, 07, 10 floor), where the file was not in place.

**Conclusion:**

Satisfactory progress to date.



**6.2(4) Issue:** There are some weaknesses in the identification of radiological hazards within the radiation control area. Even though procedures exist covering the posting and surveillance of areas, they are not always complete.

Examples of these are:

- Inside the protected area, but outside the main RCA there is an area for radioactive material storage in transport containers with just a chain to prevent persons' entrance and with ambiguous posting (green and grey signals).
- The practice for posting the radiological information of the areas is to write with an erasable pen on a white panel at the door entrance. This practice is being improved by the use of inerasable products to assure that the information is not modified inappropriately.
- Inside the rooms there is no information of the radiological classification of the area, even in very spacious areas. Also, the plant does not post the green areas (low dose) inside the RCA.
- Outside the RCA, the radiation protection survey programme does not include areas such as main control room, offices, cafeterias, etc. Also, the monthly surveillance of peripheral areas to RCA does not cover ground contaminations surveys.
- There is no routine check of area and process radiation monitors (KRT system) by RP for trend analysis and prompt leak detection.
- Hotspot policy in green and yellow areas is that they are only posted if contact dose is greater than 2 mSv/h.

Without proper monitoring and labelling of areas, risks exist for inadvertent exposure to radiation and personnel contamination.

**Recommendation:** The plant should strengthen its radiological survey and posting programme. The programme should be rigorously implemented in the field

**Plant response/action:**

This recommendation can be split into several parts and an attempt must be made to reply to the various problems listed as follows:

- 1/ Markings on the transit area have been improved. This area is now identified as a controlled area. Use of a film badge and dosimeter is mandatory.

The NPP aims for significant improvement of this area. This involves a change study in order to expand the perimeter of this area and improve the physical perimeter (fencing). The expression of requirement has been produced and the aim is to validate it in the Engineering Technical Committee meeting before the end of the 1st half of 2004.

- 2/ The use of indelible felt pen is now systematic when producing placards. It is no longer possible to erase the radiological condition of the premises inadvertently.

3/ The NPP considers that using green area panels contributes nothing in the Controlled Areas of units 1 and 2 and in the Effluent Treatment Building. After passing through the control gates, controlled areas are green by default when there is no indication of a yellow, orange or red classification.

Furthermore, the NPP is continuing actions to improve risk markings in the premises. This work has already been done on unit 2 and is currently continuing in the BTE/laundry/hot shop and on unit 1. This plan of action significantly improves the markings (panel at each point of access).

4/ Implementation of Directive 104 (annual check on non-contamination of the premises) on the site covers the entire premises, in particular the canteen, offices and control rooms.

A study of the frequency of checks on the roads shows that the NPP is correctly positioned:

— The roads are checked annually in compliance with the installed base radiation protection reference framework.

— An annual check is also conducted on the sand traps on the rainwater collection system

— The NPP also checks the sensitive areas (exits from the Nuclear Auxiliaries Building, BTE, Laundry, Hot shop) after each unit outage.

- Furthermore, after each spent fuel unloading operation, the roads near the exits from the Fuel Building (BK) and the site gate are checked.
- Mapping of the contamination points over the past 5 years confirms the pertinence of the choices made by the NPP concerning these additional checks.

5/ Concerning the Unit Operating process, and within the framework of surveillance of the installations, weekly monitoring of the KRT systems was reactivated in mid-March. A monitoring file is used in order to produce a trend analysis. A summary is made using the monthly Risk Prevention records.

Concerning the Outage process, and as of Partial Inspection outage 12, a daily reading of the KRT 41 MA system (reactor building iodine activity) is taken by the technicians working the 3x8 shifts. A monitoring file is used to produce a trend analysis. The ORLI IT system tracking the installation's parameters cannot be used because these parameters are not made available on the KIT (unit computer and data processing system).

In addition, each shift takes readings from the mobile iodine and aerosol monitoring and alarm systems. A monitoring file is also used.

6/ The site is well positioned concerning the national "area control" requirement in the reference framework and is in conformity with the regulations. However, as the Nogent units are not "polluted", the limited proliferation of hot spots makes it easy to identify them. This is why we decided to go further than simply identifying hot spots higher than 2 mSv/h as part of the radiological risk prevention and ALARA approach, in other words to identify yellow hot spots > 1 mSv/h, particularly in green areas.

Mise en forme : Puces et numéros

## IAEA Comments:

The plant has strengthened its radiological survey program with regard to monitoring and labeling of areas.

The transit area is now a controlled area. A change request was started in the beginning of 2004 and a budget to enlarge it and surround it by a fence will be available in 2005.

Controlled areas are by definition at least green areas unless marked otherwise. The staff is informed about this during the risk prevention 1 training.

Hotspots inside the controlled area are now identified if their dose rate exceeds 1 mSv/h.

Outside the controlled area places like the control room, cafeteria and canteen are checked for contamination on an annual period

Roads where radioactive transfers are carried out are checked at least two times a year.

However since several hot spots were found on the plant site, the frequency of contamination checks could be higher.

Fixed monitoring installations are now used again for trending.

**Conclusion:** Satisfactory progress to date.

### 6.3. RADIATION DOSE CONTROL

**6.3(a) Good practice:** The plant has developed several innovating ways to reduce dose for specific problems in plant areas and the actual doses in the plant are very low. Some of these are:

1. In order to reduce doses of the decontamination crew in the tasks of manual sump cleaning, this activity has been mechanized. Now, the operation is done with minimum time near the sump, by means of a mobile system that employs a pump to suck the water and a shielded filter to clean it. The results are a drop in the ambient dose rate with direct impact on the dosimetry of the operation and chemical teams. The collective dose has been reduced by a factor of two for the decontamination crew. Also, there have been gains in terms of dose reductions for operating and chemistry teams by means of eliminating hotspots and the reduction of area dose rate near the sump. Additionally, there is no production of prohibited waste (sludge) because particles are retained in the filters and these are treated as normal waste.
2. In order to reduce the doses around the concrete drums of high activity waste, an additional biological shielding has been designed as a big metal container drum, where the smaller drum can be introduced. The dose rate produced by these high activity drums inside and outside the waste treatment building has been reduced by a factor of 8.
3. Optimization of the cavity decontamination operation by reducing the dosimetry and the critical path. This was accomplished by changes in the cleaning method (no manual scrubbing) to low pressure water with cleaning foam, and an optimization

of zones to decontaminate. The results are a reduction of outage critical path and collective dosimetry by a factor of 7 for decontamination after unloading the fuel and by a factor of 2 after refueling.

#### 6.4. RADIATION PROTECTION INSTRUMENTATION, PROTECTIVE CLOTHING, AND FACILITIES

**6.4(a) Good practice:** As part of a French national “Radioactive Source Management” action plan, a comprehensive organization and storage facilities have been implemented to manage sealed and non-sealed radioactive sources.

The main source storage room is a best performer with two separate rooms, each one individually monitored by an ARM with audible alarm in the outside of the rooms. In each room there are locked shelves where the sources are stored. Only an authorized person can get the key. There is one “person competent for source management” (SPR) that organizes source training courses, manages relation with the regulator, controls the inventory, checks permits of utilization and sets the procedures.

The organization relays also in:

- Two persons in charge of sources (sealed and non-sealed), responsible for day to day management of sources.
- One person in charge of each storage area, responsible for the management of sources of his storage area.
- Trained users, with specific permit issued to each staff member concerned.

There is one register for each storage area. The entrance/exits are recorded in the register of the area by the end user and tracked systematically by those responsible for the storage area and sources. Computer monitoring (MANON) exists in addition to paper monitoring for all source movements with change of storage area. The source rooms and lockers locked with keys held by the person in charge. Also source safes used with a code (Medical Service). Double padlock for ARM and PRM sources (SPR + store responsible) and for contractor sources (SPR + contractor responsible). The sources on site are transported in type A cases.

Rigorous traceability (user and responsible) of the movement of each source, enables the location on the site to be known at all times and thus reduces the risk of loss or theft. The use of sources is limited to trained people who know the organization in place for the management of sources (specific permit). Transport is easier and safer (protection against knocks and falls, suitable posting and leak tightness) thanks to the use of Type A handling cases.

## 7. CHEMISTRY

### 7.1. ORGANIZATION AND FUNCTIONS

The chemistry section at Nogent NPP is part of the technical department and reports to the head of the technical department.

The chemistry section is directed by the laboratory section manager who is assisted by a deputy section head. To facilitate and clarify the responsibilities, the section is subdivided in two branches, the unit operating branch including the demineralization plant and the preparation and effluent branch (technical sub unit).

Chemistry section is responsible for chemical, radiochemical analysis and conditioning of primary, secondary, tertiary and auxiliary systems during all plant operational modes. The chemistry section monitors the quality of the conditioned and unconditioned makeup water. It analyses and manages the liquid radioactive and non-radioactive effluents and the gaseous releases. The anti-amoebic treatment and the injection of anti-lime agents into the third circuit are monitored by the chemistry section, as well.

The management of the plant recognizes the important role of chemistry section and gives chemistry section the necessary support. The staff is regularly informed of the management policy and recognizes its tasks as a contribution to guarantee safety and reliability of the plant.

Descriptions for every functional position in the section are available. Responsibilities and authorities are clearly defined.

The quality and safety department and the safety authority perform periodic assessments of the section. A chemical indicator for the secondary circuit and the WANO fuel reliability indicator are used as tools for self-assessment.

The section performs most of the analytical and chemical treatment programmes itself. However some clearly defined tasks are performed by contractors.

Other departments, especially operation and radiation protection, acknowledge the competency of the chemistry section. They realize the contribution of good chemistry to minimize corrosion and activity build up and therefore the importance of monitoring main chemical parameters as required by the technical specifications.

The corporate laboratory group (GDL) with its cold laboratories in Paris/ St. Denis and hot laboratories in Chinon is the competence center for the chemistry sections of EDF NPPs. These laboratories are extensively equipped with analytical instruments. Engineers and technicians develop analytical and chemical methods, supply research capacity on special requests, perform damage analysis, approve suppliers, recommend analytical instruments, collect and assess data from all EDF NPPs etc. GDL guarantees a national and international information feedback via a liaison officer. It organizes annual meetings of the NPP chemical engineers. In addition there are national meetings of work groups on different themes (e.g. Merlin), a corporate chemical Intranet forum and a periodical newsletter of the EDF group, which all promote good exchange of information on operational experience.

Within the plant, chemical and radiochemical data are reported regularly to the management and to corporate groups. Well-organized meetings guarantee the information exchange within

the plant. The chemistry section meets daily with the operation department and representatives of the other departments to exchange operational information and to schedule activities. The analytical results are communicated daily to the operation department. The operation department has 24h access to chemical and radiochemical data via Merlin software application.

In case of deviations the chemistry section advises the operation department, which is responsible for the final decision.

Deviations from chemical specifications and expected values are responded sufficiently fast in an appropriate manner and, if necessary, together with other departments.

The head of the department together with the section manager is responsible for training and qualification of the staff. During the education a tutor is assigned to the student.

The training and qualification programme is detailed and described in a procedure. The training is appropriately monitored and the qualification of the staff is regularly reevaluated. The team recognized the plant activities in this area and noticed good practice in the training and qualification section of this report.

The section is sufficiently staffed to perform the required tasks. Job rotation is regularly performed taking into account the different levels of education, responsibility and task. Outside working hours enough staff is available on call duty.

Corporate groups provide technical specifications for operation, which are approved by the authority and valid for all NPPs of EDF. These specifications contain every parameter to be analyzed including target values, limiting values, frequencies and behavior in out-of-specification situations. The chemistry section has adapted the national specifications by implementing more stringent criteria for some parameters or adding some new parameters to be controlled. These specifications are approved by the section manager and are compulsory for the section.

Information flow within the section is well organized. Weekly the whole section meets to have a feedback of experience and to receive information about policy, e.g. new procedures. Every member receives minutes of this meeting.

## 7.2. CHEMISTRY CONTROL IN PLANT SYSTEMS

The water chemistry is monitored according to the established GDL specifications. The chemical conditions are in compliance with the material concept.

The chemistry section constitutes a special group to organize and perform the required analysis during an outage. This group is chaired by a responsible sector officer and a deputy. The group is in charge of hide out return measurements, pond sipping of fuel elements, secondary circuit conditioning, oxygenation of the primary circuit and effluent treatment. The procedures for shut down and start up are clearly structured in form of flow charts. Holding points and limiting values are well defined and obeyed. Due to elevated Co-60 and Co-58 activity concentrations, the primary coolant is treated with hydrogen peroxide during shutdown. The activity concentrations, and the hide out return effect are well monitored. However, the detection limit of potassium is not low enough to see any effects.

The makeup water system provides sufficient volume of demineralized water and

demineralized water that is conditioned with morpholine for the secondary circuits. The operation department is responsible for the makeup water production. The chemistry section monitors performance and conditions of the equipment. It also manages the chemical products needed to operate and regenerate the system. The system is in compliance with the specifications. However, organic compounds are not monitored during the water makeup process.

Two groups have been constituted to manage the effluents. These groups are: the environment process operational group during operation and the effluent group during outage. The latter was constituted in 1990 in Nogent and several other EDF NPPs copied this practice. This group provides advice e.g. the operation department when big volumes of potential effluents are handled.

The primary circuit is operated according the coordinated lithium/boron chemistry concept to minimize corrosion and reduce the transport of corrosion products. Due to extended load following operation, the lithium concentration is often below the intended values and so the optimum pH is not kept. However, due to cobalt-based alloys in the primary circuit more attention should be given to the lithium and boron management. The team issued a suggestion on this subject.

The concentrations of corrosion inducing anions like fluorine and chlorine are kept low. The WANO fuel reliability indicator is regularly calculated and assessed.

The activity concentrations of corrosion products and fission products are routinely monitored. The presence of cobalt-based alloys in the primary circuit is visible.

The monitoring of the demineralizer of the coolant treatment system is considered to be not comprehensive enough. The plant recognized this as a weakness and is going to improve the surveillance programme. The team issued a suggestion on this subject.

The secondary circuit is conditioned with hydrazine and morpholine to obtain reducing conditions at elevated pH, which minimizes corrosion (all volatile treatment AVT). Measurements of N-16 and the H-3 activity concentration are indications of leaks of the steam generator tubes in both units. To keep the H-3 activity concentration in the secondary circuit at a low level and to obey the authorized values for release water, secondary water is continuously replaced by morpholine conditioned makeup water. This means that morpholine is released to the environment. Chemical analyses of the secondary circuit are performed according the requirements, but these requirements are considered to be not comprehensive enough. Therefore the team issued a suggestion on this subject. A chemistry indicator defined by EDF is regularly calculated to assess the condition of the secondary circuit. However, the iron concentration in the feedwater and the steam generator blow down system are not routinely monitored.

The third circuit is chemically conditioned to prevent precipitation of lime. During summer period monochloramine is injected to reduce the growth of ameba.

The emergency cooling-, auxiliary- and raw water systems are routinely sampled and analyzed according the procedures. The results are within the limits.

The maintenance department is responsible to maintain the quality of oil lubricants and diesel fuel. They are sampled periodically and analyzed by a contractor.

### 7.3. CHEMICAL SURVEILLANCE PROGRAMME

The chemistry surveillance procedures have a clear structure and contain all information to perform reliable work. Analytical methods are characterized by statistical parameters, especially measurement uncertainties, which are necessary to assess the results obtained. Unfortunately these uncertainties are not included in analysis reports. It is guaranteed that the procedures available at the work places are always up-dated.

The chemistry section is using a corporate Laboratory Information and Management System (LIMS) called Merlin. This LIMS contains national and local specifications, analysis frequencies and quality control data of the instruments. It is also used to store and compare data, to process them and to visualize (graphs) them. Merlin is also used to calculate the pH of primary coolant at 300 °C according the actual concentrations of lithium and boron.

The sampling plan is properly defined and implemented into Merlin, which schedules the regular daily work. Additional samples are analyzed, if required.

Online instruments are installed wherever sensible and possible to monitor systems like the primary circuit, the secondary circuit and the makeup water production. The results of online instruments are regularly checked and compared with those of offline instruments. All instruments are calibrated according the analytical procedures. The quality of the calibration is visualized with control cards. The instruments are at least checked annually by the manufacturer. Merlin controls the correct calibration and the required frequency of calibration and maintenance.

The expiry date for chemical standards is clearly defined and depends on the concentration of the standard. The standards prepared have the same matrix like the sample to take into account the matrix effects.

The chemistry section participates each year on two round robin tests to verify methods and instrumentation and to improve competencies of the personnel. They are organized by GDL for chemical samples and the National Henry Bequerel Laboratory for radiochemical samples. From time to time there are intercomparisons of the online instruments. The section also exchanges samples to other NPP of the EDF group or asks for external samples with known characteristics to approve new methods or to improve existing methods.

The chemistry results are entered into Merlin, which compares the data with upper and lower limits and provides e.g. the last ten results of the analysis. A supervisor approves the data.

### 7.4. CHEMISTRY OPERATIONAL HISTORY

Since the implementation of Merlin in 2000 the data are recorded in this database. Before that the data were recorded on paper files and transferred to GDL. These older data have been transferred to Merlin. All data are accessible and can be displayed as graphs or tables. Responsibility for documentation and data exchange are clearly defined.

GDL reviews the chemistry results regularly.



## 7.5. LABORATORIES, EQUIPMENT AND INSTRUMENTS

The sampling systems have a continuous flow or can be rinsed easily to ensure reliable and representative samples.

The analytical equipment is sufficient and redundant to perform the required analysis, especially the atomic spectrometers to analyze cations are state of the art. However for anion analysis in low concentration ranges there is no instrumental redundancy. The laboratories are large enough and clean, except the BAN laboratories that could be in better conditions concerning furniture and cleanliness. The observed work practice was good, especially the preparation of calibration standards for spectroscopy. Some slight changes like handling of pipettes, rinsing and thermal conditioning of spectrometers can easily optimize the situation.

Reactor accidents should have no impact on the analytical measurements as the laboratories are not located near the reactor buildings.

Laboratory chemicals are stored in a separate lockable room. In addition hazardous chemicals (organic solvents, acids, bases, poisons) are deposited in special cabinets within this room. These cabinets are connected to the ventilation system and also locked. A list including all laboratory chemicals is updated at least once a year. Obsolete chemicals are removed periodically to minimize negative impact. Safety data sheets are available for the chemicals. The storage and management meet international standards.

For every job a risk analysis is performed according to site requirements. The laboratory work files include description of the work, the associated risk analysis and the determined countermeasures. This is a valuable tool to improve safety especially for young employees. The team regarded the plant activities on this area as a good practice which is included in the MOA section.

However, there is neither an optical nor an acoustic indicator when the ventilation system in the central laboratory breaks down. The flame hood of the atomic emission spectrometer was not large enough to guarantee the safe removal of radioactive aerosols during operation of the spectrometer but it was replaced during the OSART mission.

After an accident liquid samples from the primary circuit and from the sump of the reactor building as well as gaseous samples from the atmosphere of the reactor building can be taken. However the EDF accident policy does not request analysis in the first phase of an accident, as no decisions are depending on the results. The radiochemical and chemical parameters of liquid samples are determined with routine methods. The composition of gaseous samples in regard to radiolysis products like hydrogen and oxygen are also performed according routine methods. The radiochemical parameters of gaseous samples are analyzed with additional equipment and the help of the corporate laboratory.

## 7.6. QUALITY CONTROL OF OPERATIONAL CHEMICALS AND OTHER SUBSTANCES

GDL supplies detailed specifications for chemical conditioning products like resins, hydrazine etc. These products are PMUC certified (products and materials to be used on nuclear plants). The suppliers are approved and regularly reevaluated by the corporate operational technical unit.

The supplier labels PMUC products with a tag indicating batch number and expiry date.

PMUC is available in the EDF Intranet database which contains chemical specifications of the product, characteristics of approved suppliers, e.g. the expiry date of the suppliers' validation and address of contact. For every product safety data sheets are kept up to date.

The Intranet guarantees a real time information feedback e.g. if a supplier does no longer meet the expectations. The Team regarded the use of the Intranet database as a good practice.

A list of all chemical substances including non-PMUC products in the plant is available including the safety data sheets. Expiry-dates of the products are well controlled with the PMUC tag.

Samples of delivered goods are taken from time to time to check the quality. In each case the delivered certificates are checked.

Diesel fuel is discharged into the tank after a rough identity check. However an identity check is not performed on products such as hydrazine, resins, morpholine. The team provided a recommendation on this subject.

## **STATUS AT THE OSART FOLLOW-UP VISIT**

The plant has made good progress in resolving the issues raised by the OSAR Team.

The Corporate Laboratories have extended the chemical surveillance program to provide additional information of the plant status. Now deviations with the systems can be detected earlier and necessary actions can be prepared more thoroughly. With the help of new analytical instruments, the behavior and impact of phenomena, e.g. decomposition products of morpholine in the secondary circuit and corrosion inducing anions, can be evaluated.

An improvement of the lithium management is still a problem for almost all PWRs in load following operation. The plant has discussed some ideas to resolve the problem but could not implement the solutions to the systems, because Nogent was not in load following operation.

The process of goods receiving was analyzed in depth and administrative measures to enhance the reliability and traceability of the process have been strengthened. Together with the strong support of the corporate level in quality control the plant decided to perform an administrative identity check rather than a chemical one on all operational chemicals in packages.

## DETAILED CHEMISTRY FINDINGS

### 7.2. CHEMISTRY CONTROL IN PLANT SYSTEMS

**7.2(1) Issue:** Although the analysis programme complies with the specifications of corporate laboratory group (Groupe Des Laboratoires), it is not complete enough to obtain all necessary and available information.

For example, the condition of the demineralizer of the coolant treatment system is not checked regularly. Information on the capacity of the resins would facilitate the planning of the exchange of the resins. The availability of the demineralizer would be improved.

Also, due to the steam generator leakage the chemistry of the secondary circuit should be better known so as to avoid any additional negative impact. But since the cation conductivity in the blowdown system of the steam generators is rather high due to decomposition products of morpholine, the change of the cation conductivity is not a very suitable way to monitor the quality of the blowdown water. Also the online monitoring of sodium in the purge down system is no suitable indicator for condenser leakages as due to conditioning the third circuit with sulfuric acid ( $H_2SO_4$ ) and monochloramine ( $NH_2Cl$ ) the relation between sodium and chloride and sulfate respectively is not constant. A frequent analysis of chloride and fluoride ions in low concentration ranges in the blowdown system would give additional valuable information with regard to small leakages of the condenser.

In the feedwater and steam generator blowdown system there are no regular checks of iron concentrations.

Organic compounds are not monitored in the makeup water plant.

Without a comprehensive analysis programme it is difficult to decrease the risk of damage of components or to increase the availability and reliability of the plant.

**Suggestion:** Consideration should be given to extending the analytical programme to provide additional information and to improve the availability and reliability of the plant.

#### **Plant response/action:**

##### Analysis programme:

The integration of new chemical specifications in the Merlin IT application that was put into service in the first half of 2004 supplements this analysis programme.

The Corporate Chemical and Metallurgical Laboratories provide our guidelines and follow the reference approved by the Nuclear Safety Authorities.

##### State of the demineralisation system of the reactor coolant system:

The measurement of lithium on the intermediate Boron Recycle System tanks is performed to anticipate the demineraliser change.

#### Plant make-up water demineralisation plant:

An analysis programme will be developed for the demineralised water production plant to guarantee the quality of the water over time. The measurements will enable malfunctions to be analysed in detail.

#### Chemistry of secondary cooling system:

The concentration factor at the steam generators is 100, which enables us to see the possible pollution of the secondary system well below the measurement thresholds of our devices (Atomic absorption spectrometry (SAA)). Anionic monitoring is achieved via continuous cationic conductivity measurements. Cationic monitoring is achieved by the continuous sodium meters.

A certain number of parameters are transmitted to an IT application including the SG chemical parameters, which, associated with other physical parameters (Pressure, Temperature, power, etc.) enables us to monitor the installation.

This surveillance has enabled us to determine the source of pollution of the secondary system makeup water (phosphate containing water from a non-leak tight valve).

#### *What is planned for the medium term:*

The implementation of new Liquid Phase Chromatography will enable the definition of a surveillance programme that allows us to map our two secondary systems with respect to the anions resulting from the decomposition of morpholine.

If this is possible, (presence of sampling) we will add a few supplemental measurements to this mapping to understand the path taken by the anions (vapour/liquid phases).

#### **IAEA Comments:**

The Corporate Laboratories have extended the analysis program to provide additional information on the plant status. Corrective actions can be organized more thoroughly as deviations are recognized earlier. Some deficiencies identified during the first mission were removed with the new surveillance program. In 2004 two ion chromatographs were purchased and put into service. With the help of these instruments, valuable information about the decomposition products of morpholine and the behavior of these products in the secondary system has been obtained. In addition, the total concentration of morpholine in the secondary circuit was reduced; resulting in a reduction of the cation conductivity in this system. Together with the results of the ion chromatographs, the chemical conditions of the secondary circuit could be assessed very transparently.

**Conclusion:** Issue resolved.

**7.2(2) Issue:** The plant has not optimized the coordinated lithium/boron programme in the primary circuit.

The plant is very often in load following operation. The exchange of large amounts of primary coolant makes it very difficult to obtain optimum chemical conditions. However, in other EDF NPPs progress has been achieved in adjusting the lithium concentration.

Without a well-coordinated lithium/boron programme, lithium concentrations may not be optimally adjusted to reduce the build-up of corrosion products within the primary circuit.

**Suggestion:** Consideration should be given to enhancing the plant efforts in optimizing the lithium management of the primary circuit.

**Plant response/action:**

During the load movements and the ensuing water movements, the concentration in lithium hydroxide is not always optimal. The lead time between the appearance of the problem (poor lithium concentration) and treatment (injection of lithium hydroxide) is long. One must go through the sampling and measuring phases before injection.

The NPP has contacted the various sites that have developed a specific technique anticipating the adjustment of lithium concentration. Based on these examples and in a concern for simplifying operations, the laboratory proposes to implement the following solutions:

Daily evaluation by calculating the content of lithium in the RCS:

This evaluation will be performed by the laboratory technician at the start of each day using an Excel spreadsheet. It will allow actions (injection or switch to demineraliser) to be anticipated in the morning.

Based on this evaluation and if corrective action is undertaken, the measurement of the concentration will be performed in the afternoon to check the adjustments made.

Nevertheless, the manual measurement will remain programmed in the "Merlin" application.

If on the day of the programming corrective action was requested in the morning, this manual measurement would be deferred to the afternoon to check the adjustments made.

Benefit: the concentration is adjusted earlier in the day.

Operation under load follow conditions:

There is a problem with the D+1 day programme that is only known day D at about 8.00 pm. There is also another problem regarding the unscheduled load drops.

The solution is to determine the dilution volumes called into play to perform the transient by calculating them. Once these volumes are known, it is easy to determine the volume of lithium hydroxide to inject, as close as possible to the transient, to return to the target concentration.

But on day D, we cannot precisely know the dilution volumes. However, we can calculate a theoretical dilution volume – called the critical volume – that causes an acid overshoot and then associate the volume of lithium hydroxide to be injected.

This quantity will be placed in the chemical reagent injection tank by the Laboratory Section on day D and will be injected by the Operation Department once the critical dilution volume has been exceeded.

**Benefit:** The lithium will be injected as close as possible to the transient.

**Drawbacks:**

- Good communication with Operations will be necessary so that the lithium hydroxide is opportunely injected.
- The volume of lithium hydroxide placed in the RCV 151 BA injection tank will have to be well managed in the absence of a load drop.
- The injection of lithium hydroxide is triggered when the critical dilution volume is reached. Insofar as the dilution continues, part of the lithium hydroxide is lost which represents a certain cost.

The aim is to avoid acid overshoots during these transients and good communication on this new practice will also be necessary.

**Scheduled or unscheduled shutdown:**

During shutdowns, the dilutions performed on the reactor coolant system (Reactor Boron and Water Makeup system water and boron volume) can easily be estimated and as result the Laboratory Section will prepare the quantities of lithium to inject and will place it in the chemical reagent injection tank. The Operation Department will perform the injections at a time determined by the Laboratory.

**IAEA Comments:**

The plant has discussed two ways to improve the lithium management of the primary circuit in detail with all the advantages and disadvantages. However due to fuel leakages and rather high activity concentrations in the primary circuit, both units of Nogent NPP were not asked for load following operation. Therefore there has been no need to apply a new lithium management. Although an Excel-spreadsheet was written Nogent has not used the time to prepare e.g. a comprehensive procedure how to handle the lithium concentration if load following is required.

The team encourages the plant improve the lithium management.

However on the corporate level experiments are performed to develop an online lithium sensitive electrode. With such a lithium sensitive electrode and with a lithium injection system like it is already available in Tricastin NPP the problem of load following would be totally solved.

**Conclusion:** Satisfactory progress to date.

**7.6(1) Issue:** Deficiencies in controlling the identity of conditioning products exist in the plant.

When receiving conditioning chemicals such as hydrazine, morpholine and resins there is no regular identity check.

Such deficiencies may result in serious impact on integrity and safety of the plant.

**Recommendation:** The identity of conditioning products should be checked in order to prevent negative impact on the systems.

**Plant response/action:**

The laboratory section has set up an organisation for the inspection of chemical conditioning products and ion-exchanging resins from on-site product delivery to discharging and their injection in the various systems.

This organisation completes the process of “control and monitoring the conformity and time limits of PMUC products” set up by the Maintenance Resources Department (Stores management section).

The checks and traceability of the products are presented in technical instruction: “Checks of chemical products used by the laboratory section on the process”.

The various control and tracking documents are filed and archived in the notebooks. Attached is a summary of the checks performed on the various conditioning products.

Products	Checks performed	Comments
Sulphuric acid Hydrochloric acid Sodium chlorite ammonia sodium hydroxide organic anti-scaling agent	The nature of the product delivered is filled in on the delivery note Measurement of product density or concentration Measurement of pH Product colour	Products delivered in tank trucks Discharging is performed after verification of product conformance
- hydrazine hydrate - morpholine - lithium hydroxide - Boric acid - Trisodium phosphate - resins for water treatment	Upon delivery: <ul style="list-style-type: none"> <li>- quality of product delivered</li> <li>- presence of certificate of conformity</li> <li>- Batch number on the packaging compared to the certificate of conformity</li> <li>- Presence of the "PMUC" label for products with this approval</li> <li>- Batch limit date</li> </ul> On discharging: <ul style="list-style-type: none"> <li>- Cross check ordered/delivered</li> <li>- Presence of product name on packaging</li> <li>- Presence of the "PMUC" label for products with this approval</li> <li>- Packaging integrity (sealed cover of drain valve)</li> <li>- Filling out of product traceability document</li> </ul>	Products delivered to the NPP stores Discharging is performed after verification of product conformance

#### IAEA Comments

The plant performs chemical identity checks on bulk products and resins but not on operational chemicals delivered in packages. However the process of goods receiving was analyzed in depth. Additional checks and administrative measures improve the traceability and reliability of the process. All this is summarized in a procedure released in January 2004. Together with the quality certificate of the corporate laboratories (PMUC) the plant considers this to be sufficient to prevent serious negative impact on the plant and on its environment.

**Conclusion:** Issue resolved.



**7.6(a) Good Practice:** The power plant uses an intranet database with approved suppliers and safety data sheets of materials and products to be used on site. This Intranet database, which is managed by the technical operations unit, allows Nogent NPP to share information with all NPPs of EDF.

The corporate laboratory group supplies specifications for chemical conditioning products like resins, hydrazine etc. to guarantee that these products have no negative impact on corrosion, activity build-up and safety. These products are PMUC certified (products and materials to be used on nuclear plants).

PMUC is available in the EDF Intranet database and contains chemical specifications of the products, characteristics of approved suppliers, e.g. the expiry date of the validation granted to the supplier and address of contact.

For every product safety data sheets are kept up to date.

The Intranet guarantees a real time information feedback e.g. if a supplier does no longer meets the expectations.

As the database is accessible from any office, appropriate products are used systematically and traceable.

The team regarded the use of this database as a good practice.

## 8. EMERGENCY PLANNING AND PREPAREDNESS

### 8.1. EMERGENCY ORGANIZATION AND FUNCTIONS

In case of emergency, Nogent NPP is responsible for controlling all aspects of the situation within the Site, while the Public Authority is responsible for taking countermeasures for the protection of the populations under its authority.

EDF's responsibilities are assumed by the Director of the NPP, and those of the Public Authorities by the Prefect of the Department.

This local organization is supplemented for both EDF and the Public Authorities by national organizations set up with the dual role of providing assistance and advice, and handling relations with the national media.

### 8.2. EMERGENCY PLANS

In the event of an incident or accident, the Nogent On-site Emergency Plan (PUI) defines the emergency response organization that takes over from the normal organization. The main objectives of this organization are:

- To put in place the necessary human and material resources to manage the incident or accident.
- To inform the Public Authorities in real time on the development of the incident or accident.
- To restore the system to a safe state as rapidly as possible.
- To limit the consequences of the incident or accident on persons and property, both on the Site and in the surrounding environment.

The Public Authorities Off-site Emergency Plan (PPI) aims at:

- maintaining public order
- monitoring the environment
- taking measures to protect the population (confinement, evacuation, distribution of iodine pills)

The KI (Potassium Iodine) distributions were done in year 1997 and 2000 within the 10 km of Nogent NPP at pharmacies, recommended by Aube Prefect. The percentage of people who got the KI was around 60% in these distributions. Therefore the Prefect decided to distribute the KI by door to door by volunteers within 28 communities during three weeks of September and October 2002 with cooperation of CLI (Committee for Local Information) of Nogent-Sur-Seine. The results showed that more than 95% of households received them successfully.

### 8.3. EMERGENCY PROCEDURES

The procedures used in case of an emergency are mainly included in the PUI file (actions sheets). In the emergency center, controlled copies stored in plastic sealed envelopes are provided as well as other specific support documentation to be used within the emergency centers. A specific “Health and Fire Fighting” plan (PSI: Plan Sanitaire et Incendie) supplements the PUI. This PSI plan is well developed and uses a part of the PUI functions in combination with people from the on-duty plant staff and external rescue teams who have received specific on-the-job training in the area.

### 8.4. EMERGENCY RESPONSE FACILITIES

#### PUI (On-site Emergency Plan)

The Nogent NPP Director, who is responsible for Nuclear Safety and the organization of emergency response measures on the site, is assisted in his task by three centres:

- a decision centre
- reflection centre, (technical support centres)
- an action centre

#### DECISION CENTRE

The Local Management Command Centre (PCD) serves as the decision making centre. It is advised at the national level by the National PCD (National Management Command Centre). These Command Centres are responsible for:

- the incident or accident management decisions
- coordinating of the other Command Centres
- informing the local media (Local PCD) and the national media (National PCD)

The Site Director or his local Representative is the only EDF person authorized to take decisions concerning the NPP.

#### REFLECTION CENTRE – technical support centres

At local level this consists of the Local Emergency Response Team (ELC) and part of the Local Assessment Command Centre (PCC). At national level, the ETC-N (National Emergency Technical Team) also takes part in providing technical support for management of the emergency. These teams cooperate in the following responsibilities:

- Making a real time diagnosis of the situation and predicting the development of the situation, and drawing up recommendations on the technical management of the incident or accident.
- Making a diagnostic of the consequences of the radioactive discharges.
- Coordinating activities of the emergency team from FRAMATOME (nuclear steam supply system manufacturer) and other specialists.

## ACTION CENTRE

The Local Operations Command Centre (PCL), the Local Logistic Command Centre (PCM) and the second part of the Local Assessment Command Centre (PCC) constitute the Action Centre.

If specialist equipment is required (robots, etc.), the GIE-INTRA (INTRA Economic Interest Group) can assist.

The PCL, under the authority of the Operations Shift Manager, is responsible for:

- Managing the installation in compliance with the incident/accident management documents, informing the other EDF Control Centres of the installation parameters, informing the other Control Centres of the development of the incident or accident and managing the fire and/or sanitary interventions.

The PCM is responsible for:

- Providing the other Control Centres, and the PCL in particular, with all the technical resources (human and material) available on the Site, receiving and guiding the External Emergency Services, managing the Personnel Muster Points, and organizing Site evacuation if necessary.

In addition, some of the PCC agents are responsible for monitoring the radiochemical conditions of the Primary System, the atmosphere of the reactor confinement, the Site environment and the environment outside the Site.

## PPI (Public Authorities' Off-site Emergency Plan)

The local Prefect is responsible for activation of PPI. In making his decision he relies on information from Nogent NPP, DRIRE (Regional Directorate for Industry, Research and Environment), the IRSN Health Department, competent Local and National Authorities. Two Command Centers are set up at local level for this purpose: the PCF (Fixed Command Center) and the PCO (Operational Command Center).

## PCF (FIXED COMMAND CENTRE)

The PCF situated in Troyes, the Department Prefecture, manages all aspects of the situation, and more specifically it:

- centralizes and analyzes the information in order to take the appropriate measures
- processes the Prefect's decisions, transforms them into operations orders and monitors their execution
- informs the Central, Regional and Departmental Authorities concerned
- communicates to the Prefecture press office the information necessary for its correct functioning
- prepares requests for support from public resources and requisitions for private resources

It groups together the representatives of the local organizations under the authority of a member of the Prefectoral body.

These organizations are:

- SIDPC (Interministerial Civil Defense and Protection Service),
- SDIS (Departmental Fire and Emergency Services Department)
- SAMU (Emergency Medical Aid Service)
- DDASS (Departmental Sanitary and Social Affairs Department)
- IRSN (Institute for Radiological Protection and Nuclear Safety) Health Department
- DRIRE (Regional Department for Industry, Research and the Environment)
- Inter-regional Meteorological Office
- Gendarmerie
- Police Force
- DDE (Departmental Infrastructures Department)
- Communication Unit of the Prefecture,
- A Representative of the Military Authority (when Army's resources are deployed), or a Representative of one of the organizations involved (EDF, SNCF, Civil Aviation, The Seine River Waterway Navigation Board, etc.)
- A Representative of the Nogent NPP mandated by the PCD
- A Representative of Inland Revenue
- A Representative of the Telephone Operators

#### PCO (OPERATIONAL COMMAND CENTER)

The PCO is installed in the CSP (Principal Emergency Centre) of Romilly/Seine, and in principle is directed by the Director of the Prefect's Cabinet or by a sub-Prefect designated by the Prefect. It is made up of Representatives of the same Services as the PCF (Fixed Command Centre). The PCO implements the decisions of the Prefecture, directs operations on the ground and coordinates the action of the Services involved. It reports permanently to the PCF about the situation and its development (assessments, difficulties encountered, etc.) or forwards requests for reinforcements to it. It keeps the local authorities of the risk area and the media informed of the development of the situation.

#### 8.5. EMERGENCY EQUIPMENT AND RESOURCES

The Nogent NPP is adequately equipped with emergency equipment and resources. This includes the equipment in the local emergency response centres, for environmental surveillance, fire fighting and first aid/medical support. The emergency equipment is regularly tested and maintained. The external organizations are adequately equipped. The emergency centre of the Prefecture of Aube is also adequately equipped. All the equipment observed during the evaluation was well maintained. The on-site medical centre is well equipped to support the Nogent NPP staff radiation protection activity if contaminated individuals are to be treated. There are off-site agreements with 3 hospitals (Provins, Troyes, Percy military hospital close to Paris).

## 8.6. TRAINING, DRILLS AND EXERCISES

Emergency training at Nogent NPP comprises basic training for all the Site personnel, and training specific to each Command Centre for those assigned a specific role within the emergency contingency organization.

A programme for emergency exercises is defined at the Nogent NPP. The arrangement that each person participates at least once a year is consistent with best practice, some even participate in more. The lessons learned from these exercises are fed back in the PUI committee and are followed up by the coordinator of the emergency plan.

The local exercises are classified into two categories. One is mobilization exercise and another is to test collectively the efficiency of emergency response organization.

Mobilization exercises are as follows:

- two exercises/year to call up the staff to the Nogent NPP during off working hour
- one exercise/year to evacuate the staff from control zone and administrative building
- one exercise/year to call up the staff at assembling points

Collective exercises to test efficiency are as follows:

- PUI conventional, simulating fire and body injury accident. Each is conducted once /year with participation of outside rescue teams.
- PUI radiological, simulating the radiological accident. These exercises are to test the efficiency of each PC. As a minimum four exercises /year are required.

The national exercises are classified into two categories.

- Exercises with EDF – local and national

These exercises are conducted with participation of EDF and Framatome. All PCs of the Nogent site, EDF's ETC-N and Framatome's crisis team in Paris will participate once every three years.

- Exercises with EDF – local and national + public authorities

These exercises are organized together with Public Authorities once every three years. The last one was conducted in January 2002 with participation EDF-Nogent, EDF-National, Public Authorities-Local and National level.

The OSART team reviewed the facilities and records of emergency drills. In this review, the team must mention some weakness with communication, evacuation, and participation of operators to the exercises. The team offered a suggestion on additional opportunities for improving these exercises.

## 8.7. LIAISON WITH PUBLIC AND MEDIA

Nogent NPP maintains a well-equipped staff for the liaison with public and media. Good relations to the local media (press, radio, TV) are established. A "Prefecture Information Agreement" defines the respective responsibilities of the NPP Director and the Prefect of the Aube Department in the mutual exchanges of information regarding events concerning the NPP and its surroundings.

Also, there exists CLI (Committee for Local Information), composed of locally elected officials, local organizations, local residents, representative of Nogent NPP and chaired at present by the mayor of Nogent-Sur-Seine since year 1982, from the start of Construction of Nogent NPP. CLI plays important role for the liaison between Nogent NPP, public, and media.

In case of an incident/accident, in order to coordinate press releases Nogent NPP contacts EDF at corporate level, the Prefecture in Troyes as well as DRIRE before the press release. This arrangement ensures a coordinated press release. In the case of site evacuation the liaison officers of the plant go to the press centre of the Prefecture, which is installed at Troyes, so current information can be provided to the public.

Nogent NPP publishes a quarterly journal, "L'écho des tours" which is distributed to the population within 10km of site since the start of operation. There is a toll-free phone number "Numéro vert" operated by the plant used to present information to the population.

From spring 2002, EDF conducted a survey of the public about the nuclear power plant, and found that many people were not correctly informed about the NPP. Subsequently, Nogent NPP has started the project "Natural Network of Opinion" since Dec. 2002.

Contact between the local people and staff of NPP is being improved by:

- evaluations of the image of NPP by direct contact with 30 individuals both professional and residents
- the plant staff's sensitivity to the concerns of the residents

This kind of close contact with public by NPP staff will strengthen the liaison with public.

The OSART team recognized a good practice of the various efforts undertaken by the plant to improve communication with the public.

#### **STATUS AT THE OSART FOLLOW-UP VISIT**

The plant has instituted four measures to address the points raised in the one suggestion made during the OSART visit. These actions fully resolved the issue.

Nogent has adjusted their transportation contract to require the contractor to allow the buses at the site to be used for emergency evacuation. The control room is no longer used during emergency drills. The new simulator was completed in September 2004 and is now used to simulate the plant during drills. Use of the simulator has allowed the plant to upgrade the quality and realism of the scenarios. While the plant continues to use the manual counting technique, a corporate initiative is underway to study the system and develop a more effective technique that is compatible with the identification badges used at EDF sites. Training has been developed and presented to better inform emergency team members about the activities of the corporate teams.

## DETAILED EMERGENCY PLANNING AND PREPAREDNESS FINDINGS

### 8.6 TRAINING, DRILLS AND EXERCISES

**8.6(1) Issue:** Some emergency exercises and training activities miss opportunities to enhance the knowledge of participants and improve emergency response.

Some examples of these are:

- Results of nuclear emergency exercise showed a problem for communication and evacuation of on-site people.
- Regular emergency exercises (4-6 times/year) are conducted using the control room. It would be better to keep the control room calm and to develop other areas where operators can be more involved. (The simulator at Cattenom is only used every 18 months for on-site and off-site exercises).
- Concerning the exercise for evacuation of onsite people, the accounting of evacuated people will take 1-1.5 hours, which is longer than good international practices.
- There is no (white) board or other highly visible communications aid in the LTC (Local Operations Emergency Centre). Boards are necessary to have a discussion or share information among emergency response people.
- Staff responsible for ELC (Local Emergency Response Team) was not completely familiar with the content of analysis done in EDF national as he was recently appointed to this position.

If all aspects of the emergency planning and practices arrangements are not comprehensively conducted, opportunities to improve individuals' competence (preparedness for an emergency situation) may not be assured.

**Suggestion:** The plant should consider enhancing emergency tools, drills and emergency planning to improve knowledge and emergency response.

#### **Plant response/action:**

##### **1. Problem with evacuation of people from the site (transportation)**

In the event of an evacuation of people from the site, the buses used to transport personnel on the site will be requisitioned. This point is included in the "Collective Personnel Transportation" specifications.

##### **2. Discontinue using the control room for exercises.**

Beginning in September 2004, the IEP exercises will be run on this simulator in this building.

##### **3. Counting the agents present at the gathering points.**

Currently, manual counting at the gathering points is favoured. The sheets used by the gathering point managers are included in Emergency Plan model.



In the framework of the IEP exercise of 11/5/03, the agents present at the gathering points were counted by the gathering point managers.

An exercise was performed at the beginning of June 2004. Its objective was to perform a count at the gathering points and a comparison with the 3K system (access control of people).

The implementation of an IT counting system at the gathering points is currently being studied.

#### **4. Lack of knowledge of ETC-N activities by the Local Crisis Team.**

In the “triple diagnostic and triple prognosis” training course, a section on the organisation and role of the ETC-N has been included. This point was taken into account in the 3D/3P method training specifications.

#### **IAEA Comments:**

The plant has instituted four measures to address the points raised in this suggestion. These actions are:

- After benchmarking with other plants, Nogent has adjusted their transportation contract to require the contractor to allow the buses at the site to be used for emergency evacuation. The new feature was successfully demonstrated during site drills.
- The control room is no longer used during emergency drills. The new simulator was completed in September 2004 and is now used to simulate the plant during drills. Use of the simulator has allowed the plant to upgrade the quality and realism of the scenarios. In addition the emergency center, located within the security building, has been expanded to provide more room for the emergency response staff.
- While the plant continues to use the manual counting technique, a corporate initiative is underway to study the system and develop a more effective technique that is compatible with the identification badges used at EDF sites.
- Training has been developed and presented to better inform emergency team members about the activities of the ETC-N and the ELC1 teams.

**Conclusion:** Issue resolved.

## 8.7. LIAISON WITH PUBLIC AND MEDIA

**8.7(a) Good Practice:** Nogent NPP has instituted many unique and beneficial ways to maintain contact with the residents in the area of the plant. Among these projects are:

- "Natural Network of Opinion" since Dec. 2002. This kind of close contact with public by NPP staff will strengthen the liaison with public.
- One-to-one contact with residents to evaluate the image of the plant and to increase the plant staff's sensitivity to local concerns.
- A quarterly journal "L'Echo des Tours" with information on the plant and emergency actions.
- A toll free number for residents to call.
- Excellent facilities for briefing the press.
- CLI (Committee for Local Information) of Nogent-Sur-Seine plays important role for the liaison between Nogent NPP, public and media.
- Personal distribution of potassium iodine tablets by volunteers fire fighters, Red Cross, etc. which also provide an opportunity to discuss emergency activities one-to-one with residents.

**SUMMARY OF STATUS OF RECOMMENDATIONS AND SUGGESTIONS  
OF THE OSART FOLLOW UP MISSION TO NOGENT NPP  
15 – 19 November 2004**

	RESOLVED	SATISFACTORY PROGRESS	INSUFFICIENT PROGRESS	WITHDRAWN	TOTAL
Management, Organization and Administration	R1	R-2			R-3
Training and Qualification	R-1 S-1	R-1			R-2 S-1
Operations	S-2	R-2 S-2			R-2 S-4
Maintenance	R-1	R-2			R-3
Technical Support	R-1 S-1	R-1 S-1			R-2 S-2
Radiation Protection	S-2	R-2			R-2 S-2
Chemistry	R-1 S-1	S-1			R-1 S-2
Emergency Planning and Preparedness	S-1				S-1
TOTAL R	R-5	R-10			R-15
(%)	33%	67%			
TOTAL S	S-8	S-4			S-12
(%)	67%	33%			
TOTAL	13	14			
(%)	48%	52%			

## DEFINITIONS

### DEFINITIONS - OSART MISSION

#### **Recommendation**

A recommendation is advice on how improvements in operational safety can be made in the activity or programme that has been evaluated. It is based on 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.

#### **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 or 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.

#### **Good Practice**

A good practice is a proven performance, activity or use of equipment which the team considers to be markedly superior to that observed elsewhere. It should have broad application to other nuclear power plants and be worthy of their consideration in the general drive for excellence.

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### DEFINITIONS - FOLLOW-UP VISIT

#### **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.

Supprimé : ¶  
¶

#### **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.

## **ACKNOWLEDGEMENTS**

The Government of France, the Nuclear Regulatory Authority of France and EDF Nogent-sur-Seine Nuclear Power Plant provided valuable support to the OSART mission to France. In particular, the staff of Nogent-sur-Seine provided excellent support throughout preparation and conduct of the mission. Team members felt welcome and enjoyed good co-operation and dialogue with Nogent-sur-Seine managers. This contributed significantly to the success of the mission. Nogent-sur-Seine managers and especially the team's counterparts, engaged in frank discussions and assisted the team in understanding Nogent-sur-Seine's performance and the basic factors contributing to it. Nogent-sur-Seine managers were receptive to comments and suggestions made by team members and seemed dedicated to achieving operational safety improvements, where possible. The personal contact made during the mission and follow-up visit should promote continuing dialogue between team members and Nogent-sur-Seine staff. The support of liaison personnel was outstanding. Their help was highly professional and greatly appreciated by the teams.

## TEAM COMPOSITION OSART MISSION

### EXPERTS:

**Androjna, Ferdo**

Nuklearna Elektrarna Krško, Slovenia

Years of nuclear experience: 21

Review area: Maintenance

**Bolz, Michael**

EnBW Kraftwerke AG Kernkraftwerk, Germany

Years of nuclear experience: 8

Review area: Chemistry

**Carvalho, Anselmo**

Usina Nuclear de Angra 2, Brazil

Years of nuclear experience: 22

Review area: Operations II

**Cook, John**

IAEA

Years of nuclear experience: 34

Team Leader

**Fragio Rodriquez, Ramiro**

Central Nuclear de Cofrentes, Spain

Years of Nuclear Experience: 10

Review area: Radiation Protection

**Holubec, Jaroslav**

Slovenske Elektrárne a.s., Mochovce NPP, Slovak Republic

Years of nuclear experience: 18

Review area: Management Organization and Administration

**Lipar, Miroslav**

IAEA

Years of nuclear experience : 25

Assistant Team Leader

**Molin, Göran**

Ringhals AB, Sweden

Years of nuclear experience: 25

Review area: Operations I



**Murfin, Tony**

British Energy, United Kingdom

Years of nuclear experience: 22

Review area: Training and Qualification

**Ranguelova, Vesselina**

IAEA

Years of nuclear experience: 18

Review area: Technical Support

**Takahashi, Keizo**

Nuclear Cycle Development Institute, Japan

Years of nuclear experience: 32

Review area: Emergency Planning and Preparedness

OBSERVERS:

**Zarghami, Reza**

Atomic Energy Organization of Iran

Years of nuclear experience: 7

**Chen, Zhigang**

Jiangsu Nuclear Power Corporation, China

Years of nuclear experience: 13

## TEAM COMPOSITION OSART FOLLOW-UP MISSION

### EXPERTS:

#### **Bolz, Michael**

EnBW Kraftwerke AG Kernkraftwerk, Germany

Years of nuclear experience: 10

Review areas: Chemistry  
Radiation Protection

#### **Cook, John**

IAEA

Years of nuclear experience: 36

Team Leader

Review areas: Management Organization and Administration  
Emergency Planning and preparedness

#### **Murfin, Tony**

British Energy, United Kingdom

Years of nuclear experience: 24

Review areas: Training and Qualification  
Operations

#### **Vamos, Gabor**

IAEA

Years of nuclear experience: 27

Deputy Team Leader

Review areas: Maintenance  
Technical Support