



INTERNATIONAL ATOMIC ENERGY AGENCY

REPORT OF THE

OSART

(OPERATIONAL SAFETY REVIEW TEAM)

MISSION

TO THE

Golfech

NUCLEAR POWER PLANT

FRANCE

26 OCTOBER TO 12 NOVEMBER 1998

AND

FOLLOW-UP VISIT

6 to 10 March 2000

DIVISION OF NUCLEAR INSTALLATION SAFETY

OPERATIONAL SAFETY REVIEW MISSION

IAEA-NSNI/OSART/98/100

PREAMBLE

This report presents the results of the IAEA Operational Safety Review Team (OSART) review of Golfech 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 16 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 judgments 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 judgments 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. It also includes the results of the follow-up visit that was requested by the competent authority of France for a check on the status of implementation of the OSART recommendations and suggestions.

CONTENT

INTRODUCTION AND MAIN CONCLUSIONS	7
1. MANAGEMENT, ORGANIZATION AND ADMINISTRATION.....	10
2. TRAINING AND QUALIFICATIONS.....	29
3. OPERATIONS	39
4. MAINTENANCE.....	59
5. TECHNICAL SUPPORT.....	73
6. RADIATION PROTECTION.....	88
7. CHEMISTRY.....	105
8. EMERGENCY PLANNING AND PREPAREDNESS.....	119
SUMMARY OF STATUS OF RECOMMENDATIONS AND SUGGESTIONS OF THE OSART MISSION TO GOLFECH NPP - MARCH 2000	127
DEFINITIONS	128
ACKNOWLEDGEMENTS	130
TEAM COMPOSITION OSART MISSION	131
TEAM COMPOSITION - OSART FOLLOW UP VISIT	133

INTRODUCTION AND MAIN CONCLUSIONS

INTRODUCTION

At the invitation of the Government of France a three week OSART mission was conducted at Golfech Nuclear Power Plant. The plant is located in South West of France in the district of Midi-Pyrenees Region, county of Tarn-et-Garonne, district of Golfech. The site contains two PWR type reactors of 1300 MWe. The units were first connected to the grid in June 1990 and June 1993.

The team consisted of eight external team members, three Agency staff and three observers, two of them from the IAEA, as shown in Annex I. The team travelled to Agen on Friday, 23 October 1998. Saturday and Sunday were spent in team training activities. Following the entrance meeting, which took place on Monday, 26 October, a press statement was released and the team conducted the OSART review, completed its initial reports and presented its findings at an exit meeting on Thursday, 12 November. In addition to senior managers from Golfech, the exit meeting was attended by Mr. Carencu (Prefect of the Tarn-et-Garonne), Mr. Nunzi (Member of Parliament), Mr. Calafat (President of the Local Information Committee), Ms. Carnino (Director of the Division of Nuclear Safety of the IAEA), Mrs. Rousseau (Deputy Director DSIN), Mr. Frantzen (General Nuclear Safety Advisor to the EDF President) and Mr. Buttet (Vice President of Nuclear Generation Division of EDF).

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. 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.

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

At the request of the Government of France, the IAEA carried out a follow-up visit to the Golfech OSART mission from 6 to 10 March 2000. The team comprised of four members, one from USA and three from the IAEA, including secretarial support. Two of the three 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 Golfech Nuclear Power Plant and their staff to assess the effectiveness of their responses to recommendations and suggestions given in the official report of the Golfech OSART mission. The team provided comments on the responses, provided some additional suggestions for improving response actions and categorized the status of response actions. Definitions of categories of response status and a summary of the results in a quantitative manner are provided at the end of this report.

OSART MAIN CONCLUSIONS

The OSART team concluded that the senior managers at Golfech are committed to improving safety operation at the plant. The team found good areas of performance including the following:

- The senior management team is open minded, motivated and committed to ongoing improvement in striving for excellence.
- The overall material condition, preservation and cleanliness of plant equipment and areas are of a high standard
- Management contracts that clearly define objectives as well as the level of performance to be achieved by the respective department and plant director
- Computer based tools that are effectively used in most of the areas e.g: control room, work control and the assessment of applications in regard to safety. Performance indicator system is also a commendable feature.

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

- Management expectations are not clearly established, understood and effectively communicated to plant staff at all levels
- Operation management and personnel on shift do not always demonstrate a rigorous and conservative approach in daily operations.
- Insufficient presence in the field of managers and supervisors to communicate and reinforce expectations, coach subordinates, monitor performance and take corrective actions

FOLLOW-UP MAIN CONCLUSIONS

The follow-up team received excellent co-operation from the Golfech staff and was extremely impressed by the progress that had been made, openness, frankness and desire to learn exhibited by all staff during the visit. The willingness of plant management to consider new ideas and implement operational safety changes is a positive indicator of the potential of the plant to achieve continued future success. In all cases, agreement was reached with the Golfech management on the assessment of the actions implemented.

Management has taken numerous measures to address the OSART issues and improve performance of the station, and positive results were obvious to the team. The great majority of the issues were found to be making satisfactory progress. The opportunities for improvement mentioned in the summary of the OSART mission have been analyzed and actions taken to address the root causes.

Management expectations have been clarified, and in some areas such as industrial safety and radiation protection, these efforts have clearly paid off with the result that Golfech has moved from last place among French power plants in 1998 to the first place in 1999 in terms of industrial safety performance. Initiatives to improve a rigorous and conservative approach in operations have been

taken. However, this is an improvement area that will require on-going emphasis. Management has given this area one of the top three priorities in 2000 Golfech objectives.

The station has placed heavy reliance on the managers being in the field to provide oversight and coaching to continue with many improvements. During these tours, it is intended that expectations are communicated and non-conformances corrected. Nevertheless, to take this to a higher level of performance, individual managers need to do more frequent tours to be able to have more first hand interface with the staff and cover more worksites and plant areas in a reasonable time frame.

The final statistical analysis of the status of the 21 recommendations and 12 suggestions identified in the OSART mission in November 1998 showed that 30% were resolved, 67% were making satisfactory progress and 3%(one issue) was making insufficient progress. This was associated with improving operating experience through analysis and use of low level information.

1. MANAGEMENT, ORGANIZATION AND ADMINISTRATION

1.1. CORPORATE ORGANIZATION AND MANAGEMENT

Golfech is a two unit 1300 Mwe plant operated by Electricité de France (EDF). The corporate organization consists of major departments providing technical, engineering, training and human performance support to all EDF plants. While the EDF corporate strategy aims at maintaining a consistent design basis, common policies and standards on safety, including support resources, a flattening of the organization has taken place at Golfech. The effect of this decentralization of responsibility on plant operation will be discussed in the plant organization section.

Corporate policies provide clear statements to the plant director on his responsibilities for nuclear safety. Corporate provides the necessary resources to operate the Nuclear Power Plant (NPP) safety. Major programs to resolve plant problems are separately financed from corporate funds.

The plant director enters into a management contract with the vice president for the two units site NPP. Corporate support and expertise comes from both the corporate operational units (engineering, laboratory group, technical support) and the expertise and support department (industrial safety, nuclear safety, budget and finance) to name a few. This support is transparent, expedient, and timely.

EDF corporate defines the objectives and priorities, ensures through the use of mission letters and management contracts that Golfech has taken the measures appropriate for meeting the objectives, and monitors the achievement of those objectives through semi annual reviews.

There is a strong focus on nuclear safety. However, the policy of Golfech on fitness for duty requires change. In particular, the team recommended that management should establish clear guidance regarding the consumption of alcohol prior to and during working hours and to develop a strategy which will lead to the eventual prohibition of alcohol consumption on site.

In February 1999, a deregulation law takes effect. This is a new challenge for EDF that needs to continue emphasizing nuclear safety as its number one priority.

1.2. PLAN ORGANIZATION AND MANAGEMENT

The plant has a comparatively small staff of 616 EDF employees for both units. However, corporate provides many ancillary functions to support the operation of the units. The organizational system is hinged around a three-tier management structure. It consists of the director and the general management team known as the senior management team, the department head and the department team, and the basic line manager with the workers. The organizational structure in place at Golfech is an operational structure which is horizontal in relation to the operating coordination. Networks have been created to prevent the various departments from being isolated from each other. A number of committees have been formed which enables a good flow of information between groups.

The number of the meetings is larger than observed in similar nuclear power plants.

There is field evidence that management expectations are sometimes not clearly established, understood, or effectively communicated and enforced in the areas of : operator and maintenance conduct, radiation protection procedures adherence, procedure compliance policy, reporting or

correcting material or plant condition deficiencies. The team recommended that the plant should analyze, using multi level input (management and worker) the causes of why management expectations are sometimes not clearly established, understood or effectively communicated and enforced.

Plant tours with senior plant management and selected supervisors and workers are performed every Friday to identify housekeeping and personnel safety issues. A report is reviewed the following Monday at the senior management team meeting for implementing and assessing corrective actions. Senior plant management tours are an excellent example for plant personnel at all levels to communicate and demonstrate management expectations, however they have not been effective to achieve the required results in housekeeping, industrial safety or radiation protection practices. Discussions with plant staff reveal that managers and supervisors are not spending enough quality time in the plant to reinforce the expectations and provide appropriate corrective actions. The team recommended that management should analyze the causes of the lack of field presence of the managers and supervisors, establish corrective actions, and monitor performance.

The involvement and commitment of plant staff is managed through a contractual approach based on management contracts. Every six months, management contracts are reviewed between the boss and their subordinates. The management contract process is respected and liked by department heads and supervisors. It appears to be an effective management tool to maintain a focus and alignment of corporate and plant objectives. The team considered this to be a good practice.

The plant has developed a set of performance indicators within the Lotus Notes application to increase the availability of performance monitoring. Involvement of many plant staff has helped internalize its use. The team considered this also to be a good practice.

1.3. QUALITY ASSURANCE PROGRAMME

The quality assurance programme manual is based on regulatory requirements contained in IN-10 Quality Decree, Article 9, which has been in place since 1984. The QA manual is controlled by the safety and quality department. The manual includes a declaration by the plant director, various policies, rules, memoranda and the objectives of the manual. Independent checks are carried out in order to evaluate compliance with general operating rules and various quality related issues.

There is an effective auditing process. Numerous audits, checks and inspections are conducted and for 1998 have been timely. There is sufficient resources to complete the scheduled audits. The Technical Safety Committee (GTS) reviews the audit reports and tracks all the recommendations. The plant manager, deputy manager, or on call plant manager chairs the GTS. Those commitments together with those derived from Significant Operating Experience Reports (CRIS), other deviations and commitments made to the safety authority are tracked and reviewed on a monthly basis. There are however 39 out of 141 total commitments for 1998 that are overdue. A more formal process to escalate for timely resolution, prioritize the corrective actions and track and trend the correction actions may help alleviate the untimely status of the commitments.

1.4. REGULATORY AND OTHER STATUTORY REQUIREMENTS

In France, the plants are operated by Electricité de France (EDF) and are regulated by the French Safety Authority, the Nuclear Installations Safety Directorate (DSIN). The DSIN reports to two ministries : the ministry for industry and the ministry for the environment. The activities of the DSIN in addition to setting safety policy and standards common to all nuclear power reactors , also encompass fuel cycle installations, research reactors and laboratories and monitoring of transports operations involving radioactive materials. The regional Directorates for Industry, Research and the Environment (DRIRE) ensures at the local level the effective implementation of the safety policies and standards by monitoring plant operations, maintenance and modifications. The DSIN has approximately 100 staff and the Nuclear Safety and Protection Institute (IPSN) which provides technical support has approximately 350 Staff.

The French safety authority does not have any on-site resident inspectors but the local DRIRE is located close to the plant in Bordeaux with seven inspectors. Roles and responsibilities with its plant interface, Nuclear Safety/Quality Assurance department are well defined.

The plant's three guiding principles with respect to the safety authority one contact person, regular contacts via phone/e-mails and openness are established and effective.

The safety authority draws up the inspection programme setting targets for the inspections and the subjects. The range of topics for 1998 were suitably comprehensive for this period noting that DRIRE can carry out additional inspections. In fact, an additional inspection was carried out after two recent significant events. A sampling to verify compliance to reporting the significant events is performed.

The recording of findings and their corresponding action items between the safety authority and the Nuclear Safety and Quality (NS&Q) department is accomplished. There are, however, seven commitments which have not been closed out in a timely manner for this year. An open dialog is evident between both departments.

The technical specifications and subsequent surveillance tests in chapter 9 are required to be authorized by the Safety Authority. In spite of the requirement, approximately 25% of the surveillance tests have not been authorized by the Safety Authority. The plant in taking a safety conservative approach approved all test surveillances via GTS and is implementing them. The team recommended that the safety authority should review the current status of the outstanding surveillance rules of the technical specifications and take the necessary measures to complete the review as soon as possible.

1.5. INDUSTRIAL SAFETY PROGRAM

The Plant Director's policy on industrial safety is that safety is an absolute priority and takes priority over production needs. Safe work practices are supported and specified in an integrated, well presented, book of rules covering all potential hazards on the plant. These are developed by EDF for all plants and are designed to stipulate how safety from the system will be achieved by isolation of potentially hazardous equipment. This book also identifies all required personal protection equipment from other hazards which cannot be isolated e.g. hard hats, clothing, and hearing protection.

Personnel protective equipment is not always worn in known hazard areas as required by plant rules.

In many cases, plant supervisors or managers who were present did not correct the deficiencies. In some areas of the plant, there are uncorrected safety deficiencies such as inoperable safety gates for verticle ladders or, missing safety chains, unmarked or unprotected tripping, stepping and head hazards. The team recommended that plant industrial safety policies should be reviewed and modified as necessary, to ensure that they reflect management expectations and are consistent with accepted good international practices.

1.6. DOCUMENT AND RECORDS MANAGEMENT

The responsibility for document control and records management is with the plant common resources department. The functions related to procedure processing are well documented in controlling procedures. When internal or external applicable documents are produced, the original hard copy is filed and an electronic copy of the hard copy originals is produced in their Electronic Document Management Software package (GED), as well as a backup copy. The GED has been in existence since 1993 and is installed in most plant computers.

The document owner is in charge of content while the document control administrator is in charge of distribution and storage. Since satellite stations are used, the document owner is also responsible for the change, amendment and review control of the documents for which it has responsibility. Originals of expired versions of plant reference documents are kept for statuary purposes.

The staff carries out systematic checks by a sampling of the data. They explained QA audit results and the respective corrective actions. There are eighteen people that comprise the document control and records management department with additional contractor support to supplement the typing load. Even though a few uncontrolled document problems were encountered, overall control of documents and record management appeared very good.

STATUS AT OSART FOLLOW-UP VISIT

In general, good progress has been made on the Management, Organization and Administration issues. Of the five recommendations, four have made satisfactory progress and one was found to be resolved.

The issue concerning alcohol consumption at the plant was found to be resolved. The plant has established a clear policy that prohibits consumption of alcohol on site, and clearly instructed the internal EDF caterer not to serve alcohol. The internal regulation document (98-11138) has been changed to this effect, and also specifies requirements that prohibit consumption of alcohol prior to starting work or when on-call. These rules also cover drug use and are valid for contractors. It is clearly stated that no exceptions to these rules will be accepted.

Two issues were raised concerning establishment of management expectations and reinforcement of these in the field. The plant has responded adequately to the recommendations, and has analyzed the root causes and taken appropriate actions in its performance contract for 1999. The various actions taken range from clearly defining management expectations to reinforcing management presence in the field through activities like “Blue Helmet” tours, housekeeping inspections and departmental inspections. Several initiatives have also been taken or are in progress to ensure a more professional approach by managers to issues of staff management, communication of expectations and correction of non-conformance. However, the frequency with which senior management participate in “Blue

Helmet” tours means that individual managers will only cover a limited number of the different job sites. Evaluation of the effects of this situation by plant management is needed. The assessment with respect to both issues is “satisfactory progress to date”.

The issue concerning technical specification test rules which have not yet been approved has made progress, but the objective stated during the OSART mission has not been reached. Continued effort by EDF (corporate engineering groups) and the regulator should be applied in this area to complete the approval of outstanding rules as soon as possible, as this benefits the status of surveillance tests at the plant and their perception among operations personnel. The issue was found to have made satisfactory progress to date.

The plant has effectively mobilized around the issue in industrial safety and achieved significant improvement in results during 1999. A group of staff representatives of the various plant job functions has benchmarked with a steel industry company, and a pocket size risk prevention reference handbook was developed. This handbook was introduced during the 1999 outage. A review of risks in different locations has been performed, and access requirements and signs have been updated. Existing risk prevention plans for contracting companies and monitoring in the field have been enhanced. The reinforcement of management inspections has contributed to the results achieved through communication of expectations and correction of non-conformances, as well as systematic reference to industrial safety results and issues at plant management, departmental and team meetings. However, during field inspections by the team, some personnel were found not to be wearing hearing protection when a requirement to do so was posted. This issue was found to have made satisfactory progress to date

DETAILED MANAGEMENT, ORGANIZATION AND ADMINISTRATION FINDINGS

1.1. CORPORATE ORGANIZATION AND MANAGEMENT

1.1(1) Issue: The plant does not have a comprehensive strategy that prohibits the consumption of alcohol prior to work or during the work day including on site. The plant has allowed the consumption of small quantities of wine or beer during the lunch period. On site wine and beer is available in limited quantities to control room staff and to other plant staff and contractors from the canteen. The plant policy for fitness for duty for on-call staff addresses the prohibition of alcohol. However, there is no general policy that addresses the consumption of alcohol off-site during the lunch period or prior to reporting to work.

Fitness for duty in all aspects, of which alcohol is one of the aspects, is an essential element in nuclear plant operation and in overall plant and personnel safety. International experience indicates that the availability of alcohol on site should be strictly prohibited.

Recommendation: Management should establish and develop a strategy regarding the consumption of alcohol prior to and during work which will lead to the eventual prohibition of alcohol consumption on site. The experience of other EDF plants with more restrictive practices would be helpful in compiling this strategy.

Plant response/action:

The plant's internal regulations have been amended, to the effect that Plant Management prohibits the introduction, distribution and consumption of alcohol in work areas. The canteen will no longer be able to provide staff with low-alcohol drinks.

The regulations will be implemented following consultation with statutory bodies.

The internal regulations will be distributed at the site during February 2000. The regulations adopt the terms used under French law, whereby the introduction, distribution and consumption of alcoholic drinks are prohibited in work areas. The following actions have been implemented in the restaurants at the plant (contractors' restaurant and EDF canteen):

- bottles of beer and wine are no longer available in the restaurants,
- such drinks are no longer served in the 'upgraded' restaurant service.

Consumption of alcohol prior to starting work is prohibited. Attention is drawn to the need to inform the occupational health medical practitioner in the event of medical treatment likely to affect vigilance.

Furthermore, introduction of tighter controls at site entrances is planned for September 2000, in particular via the installation of metal detectors, X-ray equipment and contamination monitoring equipment (3000 Bq).

IAEA Comments

The plant has established a clear policy that prohibits consumption of alcohol on site and clearly instructed the internal Edf caterer not to serve alcohol in a letter dated 17 November 1999. The internal regulation document (98-11138) has been changed to this effect and also specifies requirements that prohibit consumption of alcohol prior to starting work or when on- call. These rules also cover drug use and are valid for contractors. It is clearly stated that no exceptions to these rules will be accepted. A stronger position and guidance at EDF Corporate level could have helped the plant and other plants, in their efforts to introduce internal regulations prohibiting drug use and alcohol consumption and develop appropriate monitoring programmes.

Conclusions: Issue resolved.

1.2. PLANT ORGANIZATION AND MANAGEMENT

1.2(1) Issue: Management expectations are sometimes not clearly established, understood or effectively communicated and enforced. Some examples of this are detailed below:

- Observation of activities in the spent fuel area, [see issue 4.5(1)] radwaste building, and in the application of lead shielding, job site arrangements, mainly performed by generation support department [see issue 4.5(2)] indicate a lack of understanding and knowledge of expectations.
- Personnel on shift do not always demonstrate a rigorous and conservative approach in daily operations. In some cases management does not encourage personnel to modify this attitude as detailed in issue 3.5(1).
- A review was undertaken of surveillance testing within the technical support trail, and this discovered several deficiencies as detailed in issue 5.2 (1).
- The plant smoking policy is not always enforced for example in cable trays under the electrical generator, hydrogen oil skid, and on top of the main turbine oil tank. Other areas of the plant such as the control rooms were clearly posted as a non-smoking area. However, smoking was allowed in the areas by managers and supervisors [see issue 3.7(1)].
- Personnel sometimes do not report or correct material or plant condition deficiencies. Some operations and maintenance did not believe this was part of their responsibility. Some plant staff when interviewed expressed their opinions which are different than their managers expectations.
- The plant has no policy on procedure compliance. This has been identified by the plant prior to the OSART review and is currently being written.

Without expectations that are enforced safe, reliable and effective operation may not be maintained. This type of environment could decrease the defence-in-depth against inappropriate human performance which is essential for a strong safety culture.

Recommendation: The plant should analyze, using multi level input (management and worker), the causes of why management expectations are sometimes not clearly established or effectively communicated and enforced. Some possible causes could be complacency, lack of being self-critical, organization changes, management turnover, lack of field presence or communications. Once the causes are identified then corrective actions can be established. Then management guidance can be strengthened clearly communicated and enforced for activities that may affect plant and personnel safety.

Plant response/action

An analysis carried out with the involvement of all department representatives has enabled clarification of Management expectations, as well as their communication (via information, training and coaching) and implementation via presence in the field.

Management expectations are described, in particular, via the Risk Prevention Reference Base Memo, following the proposals of a working group. In addition, the Power Generation Resources (MP) and Risk Prevention (SPR) departments (which handle service activities and radiation protection respectively) have reorganized in view of the changed expectations in these areas.

Over and above the housekeeping inspections carried out on Fridays, presence in the field and monitoring have been intensified, with a ‘blue helmet’ inspection by the Plant Management Committee during the week, and management field inspections being implemented by all departments. This presence in the field enables staff concerns to be heard, and enables key radiation protection issues to be explained. Reminders by management enable expectations to be notified and deviations corrected. Refresher training in Risk Prevention, based on practices used in the field, has been modified. All staff performing work in the field will receive this training on an annual basis.

Reinforcement of the message regarding prevention, comprehension and involvement of staff in the field has enabled us to achieve good results in the field of industrial safety and radiation protection in 1999.

This change in behavior on the part of all staff has meant that the actions of each of the individuals involved has proven effective.

Prohibition of smoking in industrial areas is referred to in Plant internal regulations, and compliance is not called into question.

Expectations in terms of equipment condition have been drawn up, deviations are logged during inspections, and the departments are responsible for correcting them. A system for identifying fluid leakages has been implemented :

- Operations detects and indicates fluid leakages,
- Maintenance commits to deadlines, implements the appropriate actions and removes the labels.

A handbook grouping the main processes/expectations in the fields of Nuclear Safety and Quality is currently in preparation.

IAEA Comments

The plant has performed an analysis of root causes with input from all departments. The root causes identified are:

- insufficient explanation of expectations and requirements
- lack of management presence in the field to provide explanations and supervision
- inadequacy in the level of requirements applied by managers
- lack of rigor which is not detected or corrected by management
- inadequate internal monitoring
- absence of reference guidelines defining the activities of various management positions.

These root causes have been addressed in the performance contract for 1999 and a new thorough diagnosis is currently being prepared as part of a project called “ New impetus for Operations” with a view to strengthening the position of Operations.

Actions have also been taken to strengthen the performance of internal monitoring and control in the departments.

Initiatives have been taken to re-focus managers on their main missions by defining responsibilities, duties and activities for department and section head and foremen.

There is a human factors plan under development that aims to foster more rigorous individual behaviour and a questioning attitude.

A number of initiatives have been implemented to strengthen management presence in the field, such as “Blue Helmet” tours, housekeeping inspections and departmental inspections. Work site references will be introduced for the first time during the outage in April. A handbook for Industrial Safety was introduced during the 1999 outage and another handbook covering expectations in nuclear safety is at the development stage.

The plant has achieved good results in the area of industrial safety by making continuous efforts to notify and correct non-conformances. This approach could serve as an example for other areas.

Further training of managers in the communication of expectations is planned.

Conclusion: Satisfactory progress to date.

1.2(2) Issue: Managers and supervisors do not provide sufficient or effective presence in the field to communicate, demonstrate and enforce management expectations, or conduct field observations and performance assessments. Weaknesses were observed in most functional areas of the plant.

The following are examples of areas of weakness that could be improved through a stronger presence in the field.

- Plant industrial safety practices and safety deficiencies exist in some areas of the plant including deficient work areas (see Issue 1.5 (1))
- Some plant staff do not comply with management expectations in areas of procedure compliance, posting of information in the plant, conduct of specific maintenance activities, reporting of material deficiencies, smoking, [see issues 3.5 (2), 3.5 (3) 3.7 (1), 4.5 (1), 4.5 (2) and 6.2 (1)].
- Personnel on shift do not always demonstrate a rigorous and conservative approach in daily operations [see issue 3.5.(1)].
- Some radiological work practices do not minimize the potential for the spread of contamination or minimize radiation exposure [see Issues 6.2(2) and 6.2 (3)].
- Managers and supervisors are not expected to conduct walkdowns of plant areas.
- Some managers and supervisors have stated that their considerable administrative and paperwork load is preventing them from spending adequate time in the field especially when the units are operating. Some reported that they spend 85% of their time in the office. Discussion with the staff in many areas revealed that they seldom see their supervisor or managers in the field on operating units except when there is a problem. When asked why standards and performance of industrial safety tends to be better during outages, most maintenance personnel replied it was due to the greater field presence of managers and supervisors during outage periods.

The lack of a structured process to strengthen management presence in the field may inhibit managers and supervisors to assess the quality of work being done by their staff, preventing declining in safety performance.

Recommendation : Plant senior management should analyze the causes of the lack of field presence of the managers and supervisors, establish corrective actions, and monitor for performance. A structured programme should be developed to ensure managers and supervisors spend significant quality time in the field. Managers and supervisors should be trained and coached in the appropriate standards, expectations, monitoring and inspection techniques necessary to support the program. In conjunction with the job site performance assessment to evaluate and improve staff field performance, maintenance should also regularly conduct inspections.

Plant response

The plant's wish to continue improving housekeeping and strengthen effective management presence in the field has led Plant Management to develop a policy of management inspections.

The following decisions are currently in the process of being implemented in the departments:

- involvement of all levels of management in inspections, down to first-line managers,
- writing of reports and limiting of the number of findings selected for treatment, to enable prioritization,
- reinforcement of expectations.

Housekeeping is an important issue for Plant Management. The organization put in place is described in a memo which specifies expectations and acts as a reference base for equipment condition.

Housekeeping inspections are organized every Friday, with the Site Management Command Center representative and/or the Plant Director, the supervisor of the 'Units-in-Operation' project and/or the on-call Local Emergency Response Team representative, a representative of the Risk Prevention department, a representative of the Operations department, a representative of one of the maintenance departments, and a contractor. A report is given every Monday morning at the 'Units-in-Operation' meeting and at the Management meeting. In the long term, it is planned to extend this type of inspection to include staff with operational responsibility for rooms/compartments.

In addition, each department defines Management Field Inspections according to its own specific features, with first-line managers included. Performance of these inspections will be monitored following an implementation phase.

An organization based around 'disk tags' enables simple traceability of fluid leakages detected at any time.

The head of the 'Units-in-Operation' project is responsible for coordinating treatment of deviations. A database enables him to track deviations detected and corrective actions following management inspections. In addition, he monitors indicators, enabling regular reporting to the Plant Management Committee.

A training program for staff members conducting management inspections has been carried out, with a second program currently in the process of implementation.

A 'Management network' was recently set up to enable first-line managers to play their role fully.

The implementation of the M3E method at manager level will enable precise definition of their activities.

IAEA Comments

The plant has analyzed the causes behind the lack of field presence on the part of managers by asking managers and staff respectively how they communicate requirements in the field, and how the requirements are communicated to them. Several initiatives have been implemented as a result of this analysis, such as tours by plant management, housekeeping inspections and departmental inspections, all aimed at strengthening managers' presence in the field. These inspections are scheduled, and presented inspection protocols show that human performance non-conformities are corrected. Interviews with staff by the team in the field show that they regularly meet their managers in the field (with a frequency ranging from daily to weekly) and their duties in the field are discussed.

However, the presented list for participation in "Blue helmet" tours by plant senior management shows that the frequency with which they participate only enables a limited number of the different job sites to be visited by individuals. More frequent participation in these tours is suggested, as well as an evaluation of the coverage of the plant's different job sites by individual senior managers.

Furthermore, improvements are needed to free up more quality time for first line supervisors to go into the field and to make managers more professional in managing their personnel. Actions have been taken or are in progress, for example establishment of a management support function, a management network and a comprehensive set of indicators.

Conclusion: Satisfactory progress to date.

1.2(a) Good Practice: Management contracts are established between corporate and the plant director and between the plant director and department head and advisors. They are drawn up on the basis of priorities as defined by the Strategic Steering Committee. The management contract defines objectives as well as the level of performance to be achieved by the respective department and plant director. Contracts are signed by the respective director and subordinate for a one year period and every six months they are reviewed for progress between the department contracts not only incorporate their initiatives, but the plants and corporate objectives as well.

The process is respected and liked by the department heads and supervisors. It is an effective tool to maintain a focus and alignment of corporate, plant, and department objectives.

1.2(b) Good Practice: The plant has developed a set of performance indicators within the Lotus Notes application to increase the availability of performance monitoring. The indicators remain focused on the four strategies for 1997 – 2000 namely Nuclear Safety, Competitiveness , Management and Tools.

Each indicator has a corresponding description and graph illustrating progress over a rolling 12-month period, as well as a trend analysis. An abridged description, strategy by strategy, compares Golfech with other EDF or WANO plants. For a more detailed comparison, each indicator can be looked at individually.

The status of each indicator is represented by a different color to enable a quick view of performance. Data can be accessed from the computer in various forms due to a pre-defined number of categories (status, strategy, summary) as required by the user. The data is analyzed on a monthly basis by the operational departments. This was a Golfech initiative. All department heads, senior managers, and team managers have access to this data. This supports the collective awareness of where the plant is and where the plant wants to go.

1.4. REGULATORY AND OTHER STATUTORY REQUIREMENTS

1.4(1) Issue: Many of the rules of the technical specifications for safety equipment surveillance that are in force were submitted to the regulatory authority but have not yet been authorized.

The regulatory authority has approved approximately 75% of the complete chapter 9 test rules. Some of the systems not yet authorized include the safety injection system, auxiliary feedwater system, containment spray system and electrical primary circuits. However, it is noted that those surveillance test systems which have not been authorized by the Regulatory Authority have been approved by the technical safety committee. The plant is performing all chapter 9 surveillance tests to check for equipment availability as approved by the technical safety committee regardless of the lack of the regulatory authority authorization. The regulatory authority informed the plant that they intend to finalize the authorization by the end of the upcoming refueling outage.

Some defence in-depth is being lost because the external review has not taken place. In addition, the need for the plant to use many surveillance tests which are not authorized by the regulatory authority undermines from the importance of only using approved procedures.

Recommendation: The regulatory authority should review the current status of the outstanding surveillance rules of the technical specifications and take the necessary measures to complete the review as soon as possible.

Plant response/action

At the time of the OSART mission, the team was told that the surveillance programme (Chapter 9 of General Operating Rules) was being revised. The official version, approved by the safety authority (DSIN), did not include all safety related plant systems.

In 1999, the safety authority made a significant effort to approve a large number of surveillance test rules. As of today, there are only six rules outstanding out of 52 safety-related plant systems; approval of surveillance test rules remains a priority for the safety authority.

For the systems with respect to which no rules corresponding to the current plant status have so far been approved, the corporate level has always assumed responsibility for requesting that plants apply the latest revision of the test rule corresponding to current plant status. This approach is checked by the local safety authority during plant inspections.

IAEA Comments

In the modification packages sent to the regulator prior to installation, there are references to modified test rules. It is an accepted practice that these test rules may not be approved at the same time as the modification. The regulator defines the priority regarding when these rules are planned to be approved.

Although progress has been made during the period after the OSART mission, the objective stated in the issue has not been reached. Continued effort by Edf (corporate engineering groups) and the regulator should be applied in this area to complete the approval of outstanding rules as soon as possible, as this benefits the status of surveillance tests at the plant and their perception among operations personnel.

Conclusion: Satisfactory progress to date.

1.5. INDUSTRIAL SAFETY PROGRAMME

1.5(1) Issue : Plant industrial safety practices are not always followed by the staff and contractors or enforced by plant supervisors and managers. Additionally, safety deficiencies exist in some areas of the plant that are not being identified and/or corrected to minimize risk to personnel and the plant.

While plant management has stressed the need to improve in this area, there were many cases of poor safety practices observed during the mission. In numerous cases, the expected standards were either not clearly established or effectively communicated. In other cases, known standards were not met or enforced.

Personnel protective equipment is not always worn in known hazard areas or as required by plant rules. In many cases, plant supervisors or managers who were present did not correct the deficiencies. In some cases, the staff believe the rules are overly restrictive or not needed for the existing conditions. For example, many areas are posted requiring hearing protection at all times even though they are low noise level areas most of the time. The following are examples of observed weaknesses:

- safety helmets and hearing protection devices are sometimes not worn in areas of the plant where they are required by procedure or postings;
- work on the HP turbine at Unit 1 was being done without gloves in a high temperature and fiberglass insulation area;
- an electrician working in a diesel generator electrical panel was wearing a metal watch on the wrist;
- three workers on ladders to put cables in trays were wearing safety harnesses but these were not attached to a structure.
- Some examples of uncorrected safety deficiencies observed were as follows:
 - evidence of smoking in forbidden high risk areas such as near the turbine generator, the hydrogen seal oil system and the diesel generators;
 - head hazards exist in many areas of the plant – in one case, no corrective action was taken to clearly warn personnel or correct a head hazard that had resulted in a lost time accident for a mechanical maintenance worker several weeks earlier;
 - numerous safety gates for vertical ladders were not operable or safety chains were missing;
 - numerous unmarked or unprotected tripping and stepping hazards,
 - several leaks from overhead cranes causing potential oil slipping hazards,
 - Fyrquel a hazardous material, was on equipment, tops of tanks and in a large catch pan in room GFR 001 BA of Unit #2 turbine building.

- Highly flammable solvents and dangerous poisoning chemical were stored together where other chemicals are stored, although special cabinets for their separate storage are provided.

Deficiencies in industrial safety performance increase the possibility of personnel injury or plant damage. In addition, non-conformance to good industrial safety practices impacts on the plant staff's attitude towards safe working habits. This can result in an unsatisfactory attitude towards nuclear safety as well.

Recommendation: Plant policies should be reviewed and modified as necessary, to ensure that they reflect management expectations and are consistent with accepted good international practices. The policies should define clearly what must be worn and where the requirements apply. Routine industrial safety inspections conducted by managers and supervisors should include identification of existing industrial safety deficiencies and enforcement of management expectations. Pre-job briefings and field performance assessments are two possible means to help enforce management expectations. All staff and contractors should be encouraged to identify and report all potential safety hazards.

Plant response/action

Management expectations have been clarified and described, in particular via the Risk Prevention Reference Base Memo. Various communication media have been used (memos, video, industrial safety 'challenges').

The rules to be complied with while moving around the site and while performing work have been the subject of reminders, particularly basic radiation protection rules.

The Friday housekeeping inspections have enabled improvement of the level of cleanliness and housekeeping at the plant. Compliance with these good practices is progressively changing the behavior of staff, thereby improving attitudes to both industrial safety and nuclear safety.

Weekly inspections, known as 'blue helmet' tours, by the Plant Management Committee, reinforce these expectations. The Plant Management Committee notes defects, and corrects them. Explanations by management are sometimes necessary.

Speed of reaction following identification of deviations by Management, comprehension and acceptance of our rules, presence in the field and monitoring have enabled excellent results to be achieved in 1999 in the fields of industrial safety and radiation protection.

The Risk Prevention department, explains, reiterates and fosters understanding of key radiation protection issues relating to the Company (in terms of the credibility of nuclear power) and relating to staff themselves (the fewer becquerels they receive, the better they (and their families) feel). The messages which have been transmitted are simple and credible. It was also necessary to take a strong line with stubborn staff members, as only a few such cases can switch results indicators from green to red. Reminders by management enable notification of expectations.

Involvement of players in the field has enabled these results to be delivered. Without the involvement of field staff, which is effective without always being obvious, good results would not be achieved.

This change in behavior on the part of all staff has meant that the actions of each of the individuals involved has proven effective.

A reward system linked to industrial safety results and participation in prevention improvement initiatives has been set up. The rewards are given to individuals in the form of purchase vouchers.

IAEA Comments

The plant has effectively mobilized around this issue and achieved significant improvement in plant industrial safety results during 1999. A group of staff representatives of the various plant job functions has benchmarked with a steel industry company, and a pocket size risk prevention reference handbook was developed. This handbook was introduced during the 1999 outage.

A review of risks in different locations has been performed, and access requirements and signs have been updated. Existing risk prevention plans for contracting companies and monitoring in the field have been enhanced.

The reinforcement of management inspections has contributed to the results achieved through communication of expectations and correction of non-conformances, as well as systematic reference to industrial safety results and issues at plant management, departmental and team meetings.

However, during field inspections by the team, some personnel were found not to be wearing hearing protection when a requirement to do so was posted.

Conclusion: Satisfactory progress to date.

2. TRAINING AND QUALIFICATIONS

2.1. ORGANIZATION AND FUNCTIONS

The training department at Golfech NPP is responsible for the implementation, monitoring, and management of all training activities for the plant departments. Each department is responsible for defining the content of their workers' initial training and retraining programs, as well as the assessment of training effectiveness for the workers.

The staff of the training department is small and is composed of a training manager, three instructors dedicated to the training of the operation teams, one instructor involved mainly in other areas except operator training, and three persons responsible for administration tasks. Each department has one person whose responsibility involves providing the interface with the training department and corporate bodies, as well as performing training tasks assigned to the department. These tasks include maintaining training files, reviewing training procedures, and supervising training activities.

The Corporate Professional Training Department (SFP), is very well structured, and supports training for all EDF NPPs in different areas. The SFP is responsible for developing and applying more than 90% of the training of the Golfech plant's needs. In addition, some courses are developed and implemented by manufacturers.

The plant's training department has been responsible for the training activity performed at the plant for the last two years. Prior to this, the responsibility layed with the SFP. Within this two year period, the training department has developed training procedures, organized central training files, and developed the training programmes. The quality of the programme and training activities carried out is good considering this relatively short period of time. Furthermore, it was observed that EDF, in the last few years, has been investing approximately thirteen times more resources in training than the minimum established by the government laws.

The program created by EDF to provide incentives to experienced operations personnel to become instructors demonstrated the willingness to improve operator training at both the corporate and plant level. Subsequently, these individuals obtain professional instructor expertise by attending a one year course that ensures instructor knowledge and skills. To maintain the EDF instructor capabilities, they participate in retraining programs at the plant.

While the training programmes implemented by the plant's training department and the SFP generally reflect a systematic approach to training, it was noticed that the area of assessment of trainee performance capability was in need for improvement. The team recommended that both the SFP and plant training department should review their performance assessment practices to provide formal assessment for all trainees.

The initial training for Golfech plant is well structured, but the approach to determining retraining program content is insufficient to ensure training needs are met. The team recommended that the retraining programmes should be formalized and based on training needs and that line management should be more involved in determining programme content.

2.2. TRAINING FACILITIES, EQUIPMENT AND MATERIALS

The SFP provides some training facilities for maintenance, fuel handling and operations training, in different areas of France. The simulator retraining for Golfech NPP is conducted at the Bugey training center facility. This is a 1300 MWe full scope simulator, that is similar to Golfech plant.

The SFP provides strong support to Golfech and the Golfech training center is very well resourced and structured. It has classrooms and equipment to support good classroom training, labs and two computer based interactive simulators, SIPACT and SEPIA.

The SIPACT simulator is a multifunctional and physical phenomena simulator, that is used to train operation personnel to understand the thermohydraulics phenomena which occurred during accidents like LOCA and SGTR.

The SEPIA simulator, for 1300 MWe plants, is located in one classroom close to the control room. This simulator is used to train operators in plant startup, reactor criticality, synchronization, power ascension, load following, reactor shutdown, abnormal conditions, emergencies conditions like LOCA, SGTR, blackout etc. In this simulator the trainees use the current documentation of the plant.

Good training is made on steam generator mockup, where the technicians are trained before the outages to install nozzle dams and to open and close the steam generators man ways. The plant has also mockups to train control rods handling.

The training records are well organized, and easy to track. Each department maintains its trainee individual file. This is a new control system and it is still being implemented.

Golfech has three different types of authorizations that are given by the plant manager. These authorizations are the documents that allow the worker to execute specific jobs. There are authorizations for conventional safety, health physics and nuclear safety. The third one covers all subjects necessary for one specific function related to safety.

2.3. CONTROL ROOM OPERATORS AND SHIFT SUPERVISORS

The qualification of shift supervisors and control room operators in France is different from most of other countries. But, the content of and time spent on initial training including the simulator training are similar to international practices.

The Generation and Transmission Department (EPN), SFP, safety authority, plant manager, operations manager, shift supervisors and control room operators participate in identifying the content of the simulator retraining program. Although this approach is considered acceptable the assessment of simulator training is not sufficiently formal to demonstrate that training deficiencies are identified.

The classroom retraining programme for control room operators and shift supervisors, is not sufficient, in that, its content does not include plant systems knowledge, technical specifications and infrequently used procedures and related basis.

2.4. FIELD OPERATORS

The initial training for field operators is consistent and of good quality. Attention has to be paid to the retraining programme that, like that for control room operators does not cover relevant subjects.

2.5. MAINTENANCE PERSONNEL

The initial training for maintenance personnel is good. EDF has many special training centers that are used by all NPP's, besides some specific manufacture's training is also given. To prepare for outages, practical training in special workshops, like reactor coolant pumps and safety valves is given to maintenance personnel.

The mechanical area has developed for its technicians a structured training course that includes; work safety aspects, safety, quality, radiological protection, technical, administrative problems and operational experience feed back.

2.6. TECHNICAL SUPPORT PERSONNEL

The initial training for fuel handling group takes place at the CETIC training center. This training center is used to qualify people in fuel handling. The course is well structured, although a lack of some subjects was detected in the retraining applied just before the outages, such as; systems, procedures and technical specifications that will be used during the refueling operations and a formalized practical training.

Chemistry has a comprehensive training. It has been already using the very well structured on the job training and has been working well since some years.

The radiological protection group has also a good initial training and is beginning to apply the on the job training to qualify new technicians.

2.7. MANAGEMENT PERSONNEL

The managers as well as technical support personnel must have authorizations. Participation in the retraining programme is necessary for the renewal of the authorizations.

Management courses are being applied systematically. Line management has received six to twelve weeks in modules of management techniques. The supervisors and many others in charge of supervision teams, have on average six weeks of training management techniques, such as; leadership, managers role, planning and scheduling, information transfer, problem solving, decision analysis etc.

EDF has developed a course on human performance enhancement system for engineers and supervisors that is being applied for the plant. The main objective of this course is to give to everybody tools to identify root causes during the event analysis. Nine courses have already been applied and more than seventy people have been trained. Other courses involving problems solving techniques and root cause analysis have already been given at management levels.

2.8. GENERAL EMPLOYEE TRAINING

The content of initial general employee training is adequate. For some personnel levels it takes twenty

days. The retraining period on average takes 6 days. This year started a new retraining program with special emphasis on risks analysis. The first line management had effective participation in eight modules applied. Although the content of retraining program is good, three years periodicity does not meet international standards. The team recommended to reviewing and revising as appropriate, the schedule for the conduct of general employee retraining, and its contents, to ensure that plant personnel understand and retain adequate knowledge.

STATUS AT OSART FOLLOW-UP VISIT

In general, very good progress has been made to resolve the training and qualification issues. Of the three recommendations, one has made satisfactory progress and two were found to be resolved.

Good progress was found in the reviewing of the trainee performance assessment practices and development of formal evaluation modules for the training courses performed and managed by the plant. Difficulties were experienced in the development and application of formal evaluation modules for full scope simulator training. Further efforts are needed to resolve this issue completely.

At the beginning of 1999, all departments receiving training were requested to determine their refresher training needs and based on their response, a formalized refresher training programme was set up. Some of this training has already taken place and actual results from the trainees performance evaluation have been filed. It appears that the plant is committed to systematically continue the identification of staff refresher training needs and revise and update the retraining programme, as necessary.

To resolve the problems concerning the deficiencies in industrial safety and radiation protection practices, observed during the OSART mission, additional complementary training courses were developed for general employees in each particular area of concern. Some relevant training has already taken place. The team considers that these actions address the issue, but the plant should carefully follow up the implementation of the new training to ensure that stable satisfactory general employees performance is continuously maintained.

DETAILED TRAINING AND QUALIFICATION FINDINGS

2.1. ORGANIZATION AND FUNCTIONS

2.1(1) Issue: Training assessment is frequently not performed or adequately performed to evaluate the trainees' mastery of knowledge and skills.

Evaluation of the operator training programme, including observation of shift crew scope simulator training is not sufficiently formal to demonstrate that training deficiencies are identified. The simulator training reports that are sent from the corporate training center to the plant management concerning operator performance appear to be somewhat generic and shallow with only a determination that the trainee met minimum standards. These reports are used by operations management as input in making the final determination on suitability for operations. Typical industry practice is to complete formal sheets that evaluate each student in areas such as knowledge level, behaviour, leadership, diagnostic ability, team work, identification of problems and communication. The practice of using only one instructor when conducting full scope simulator training on plant emergencies can significantly impact the ability to adequately observe each operator and make a proper assessment of performance.

Most internal courses taught at the plant do not include an evaluation of the trainee. When an evaluation such as an examination is administered; the evaluations frequently do not require a minimum passing score for determining overall competency of what was taught. On some occasions the instructor reviews the evaluation results with the student but there is no formal documentation of the results.

The lack of effective trainee evaluations, a key component to a systematic approach to training, can result in failing to identify weakness in knowledge and skills that are necessary to perform assigned task.

Recommendation: Performance assessments practices should be reviewed and enhanced to provide formal assessment for all trainees. Particular attention should be paid to full scope simulator training.

Plant response/action

All training courses that lead to a formal qualification have been reviewed to include an evaluation. The evaluations carried out for the training courses entitled SQPR, FBSQ, PR1 and PR2 have either been revised and strengthened or are currently being finalised. The evaluation makes provision for the minimum pass mark to be attained, the instructor examines the results with the trainee and the report is sent to the trainee's line management.

Whenever the minimum mark to be attained is not reached, an action plan is drawn up by the line management with the individual concerned so that he will reach the training objectives of the course.

Responsibility lies with the line management for approving that training objectives have indeed been reached.

This requirement is now incorporated into new training courses : evaluation of trainees for training on

EPP, waste and practical risk prevention.

As for situation-based training courses on the simulator, senior plant management and the operations department manager participate as much as possible during the last day of training. The aim is not only to participate during the emergency situations, but also to listen to the views of the trainees. Two instructors give this training course.

As for other simulator training courses, a letter has been sent to the Professional Training Department (SFP) reminding them of the importance of this evaluation. A study is currently taking place at corporate level with experiments being carried out at several sites; Golfech is contributing towards this through the participation of operations department personnel.

IAEA Comments

The plant has taken prompt action to address this issue. Performance assessment practices have been reviewed and the need to provide formal assessment for all trainees was confirmed. More than one third of the training courses, which are performed at the site, were revised in 1999 to include formal trainee performance assessment, thus meeting the 1999 target set by the plant management to deal with the issue. Some of the new evaluation sheets were briefly reviewed by the team and it appears that appropriate assessment criteria have been identified. The staff of the training section are responsible for planning and coordinating the further work needed to complete the revision of the rest of the courses.

With respect to the introduction of a formal assessment of trainee performance during full scope simulator training, a letter was sent shortly after the OSART mission to the Corporate SFP department to underline the importance of the issue for Golfech NPP. Common actions were taken to identify the way to resolve the issue, but due to some circumstances beyond the control of the NPP management, these activities have been postponed. The plant is currently evaluating the experience of Fessenheim and Cattenom NPPs in solving the same problem.

The completion of the training courses revision and the implementation of actions, planned to develop relevant simulator training performance evaluation, should address the issue.

Conclusion: Satisfactory progress to date.

2.1(2) Issue: The approach to determining retraining program content is insufficiently structured to ensure training needs are met.

Strong industry retraining programmes are based on training needs being determined systematically with major consideration given to observed knowledge weaknesses, performance deficiencies, refresher topics and changes such as modifications, procedures, policies and internal and external operating experience. While there is some management and supervision contribution to the content of the programmes, there is no evidence that the content is systematically determined.

A review of the training programmes revealed that some of the plants retraining programmes do not contain topics that are typically identified and included industry wide as part of refresher retraining programmes.

Lack of effective retraining programmes could result in being inadequately trained on subjects important to nuclear safety and the performance of their jobs.

Recommendation: Retraining programmes should be formalized and based on training needs that are systematically identified to ensure all necessary topics are included. Line supervision and management should be more involved in determining programme content.

Plant response/action

The training needs for first-line supervisors have been identified. This has enabled training modules to be produced. A professional enhancement process for first-line supervisors is currently being undertaken.

As for the project leaders, studies are taking place and training will be implemented during the year 2000.

Some line management departments have set up shadow training sessions. The training files have been drawn up based around observation of work practices and will be used as a support for refresher training.

All these training sessions are recorded in the Individual Training Log (CIF).

In addition, a certain number of initiatives from the plant management contract for the year 2000 will contribute to strengthening the professional enhancement process.

Furthermore, this will make it possible to classify and identify skills criteria. Once plant personnel and their line management can see these aspects in a clearer form, they will become proactive in the way that the training needed is carried out so as to reach the required standards;

- enhanced presence of managers in the field will contribute to improved identification of needs for refresher training,

- the development of individual appraisals, taking into account the specific needs of each person, will increase the contribution made by line management to the content of training programmes.

Annual training surveys by the line management will complete the involvement of managers in the professional enhancement process, using the more detailed knowledge available about requirements and standards. The plant training plan (PFU), presented to the plant management committee, will validate this program.

Today, all training concerning QA activities have formal training specifications that clearly state the desired goal and the training objectives to be attained. The training specifications document is written by the respective line management, thus demonstrating their involvement in the training process.

IAEA Comments

At the beginning of 1999 all departments receiving training were requested to determine their refresher training needs by June 1999, giving consideration to observed staff knowledge weaknesses and other relevant factors identified during the OSART mission. Later on, the departmental proposals for the needed training were discussed with the training department and a formalized refresher training programme was set up. This programme was approved by the plant management and where appropriate additional training modules have been developed, or available were modified, to meet each department particular needs. Line supervision and plant management were actively involved in the refresher training module development. Some of this training has already taken place and actual results from the trainees performance evaluation were presented to the team during the follow-up mission.

The plant is committed to systematically continue the identification of staff refresher training needs and revise and update the retraining programme, as necessary.

The actions taken to update the plant refresher training programme address the issues.

Conclusion: Issue resolved.

2.8. GENERAL EMPLOYEE TRAINING

2.8(1)Issue: The general employee training programme is insufficiently effective in communicating expectations and standards. Many deficiencies related to industrial safety and radiation protection practices were noted by the team.

The use of three year interval between refresher training courses is excessive in contrast to most countries whose general employee retraining programs are typically conducted yearly. Topics generally covered yearly include safe work practices and industrial hazards, the importance of quality programs, emergency preparedness, fire protection and safety culture. These programs also provide employees that work in controlled areas practical training in radiation protection.

It has also been the industry's experience that the use of annual general employee retraining activities is an effective management vehicle for focusing on, and correcting, personnel performance issues.

The excessive interval between retraining sessions could be limiting the ability of the plant to improve personnel performance in several areas. Insufficient or inadequate general employee training increases the likelihood of improper performance and the risk of accidents.

Recommendation: The plant should review and revise, as appropriate, the schedule for the conduct of general employee re-training, and its contents, to ensure that plant personnel understand and retain adequate knowledge. Management should consider assessing the use of general employee retraining programmes to focus attention on performance difficulties.

Plant response/action

The general employee training program has been completely reviewed :

The 'SQPR' training course that provides refresher training on operational safety, industrial safety, radiation protection and risk assessment has been left as it is both in terms of content and periodicity as the plant considers that it corresponds to a need.

Priorities and performance-based issues are systematically raised by a member of the plant management team as part of the introduction to the training course. A member of the plant management team also takes part in the summing-up session, thus enabling discussion to take place about the content of the course and on its suitability vis-à-vis the needs, but also about current issues or developments.

In order to provide a compliment to this set-up, a practical radiation protection training course has been created for those that work in the RCA. It has a one-year periodicity. It is planned as refresher training for radworkers and the training is given by competent staff members from the risk prevention department so as to make sure that the trainees understand and take on board relevant knowledge.

In the same way, the EPP training course that deals with theoretical knowledge has kept its periodicity of 5 years. A training aid will be provided at the beginning of the year so as to make the training more efficient. In addition, practical exercises are done so that each member of the on-call

staff does at least one practical exercise per year.

Fire training refresher courses for the second emergency response teams include exercises using a cold-source for smoke and are carried out at a specially-designed fire training area. These training sessions are given by contractors who are fire professionals.

A training course about waste that is mandatory for all work coordinators and work control supervisors deals with problems about cleanliness and managing radioactive waste both on the worksite and as part of the overall process.

It is planned to include this as refresher training as part of the next version of 'SQPR' training in 2001.

IAEA Comments

The recommendation identified during the OSART mission was considered and reviewed at the December 1999 plant management strategic meeting (CPS). During the detailed discussions at this meeting, it was concluded that the periodicity and the content of the "SQPR" training course were adequate and do not require any modifications. In order to resolve the problems concerning the observed deficiencies in industrial safety and radiation protection practices, a decision was taken to develop additional complementary training courses for general employees in each particular area of concern. The relevant training courses were developed as described in the plant response to this issue and were approved and implemented consequentially, the last one concerning Radiation Protection, being approved on 12 October 1999.

The team considers the actions are adequately taken by the plant to address the issue, but the plant should carefully follow up the implementation of this training to ensure that stable satisfactory general employees performance is continuously maintained.

Conclusion: Issue resolved.

3. OPERATIONS

3.1. ORGANIZATION AND FUNCTIONS

The organization of the operation department is clear with one operation department manager responsible for both units. The department is in charge of short-term operation and safety. The operations department consists of a small daytime staff and six shifts.

Each shift has one shift manager, responsible for both units, two shift supervisors, two tagging supervisors, four to six operators and approximately eleven field operators. Shift staff is considered to be adequate for normal and emergency operations.

Safety engineers from the safety and quality department within the plant perform a daily independent review of plant safety status. This review includes plant walkdown, meetings and daily shift manager interviews. One safety engineer is always on call.

Several cross-site meetings with key managers involved together with a modern information system creates a team spirit and mutual understanding of operational problems and priorities. Operations have a strong and leading role in the day to day planning of maintenance work. With a tagging supervisor on each shift a strong control over tagging activities is maintained.

During review it was found that insufficient formal requirements exist for ensuring that licensed shift personnel, who do not perform shift duties for extended time periods, retain sufficient proficiency. The team suggested these requirements be strengthened.

3.2. OPERATIONS FACILITIES AND OPERATOR AIDS

Each unit has a good modern design of control room, convenient for operation. Nevertheless the emergency control room is very small and inconvenient for a long operation, even though it is equipped with all facilities necessary for its purpose. The main control room light is good and panel lay out is amenable for ease of operation. Status of systems and equipment are clearly indicated. The process computer provides necessary data for operation. There is also a special “Lotus Notes” based computer program developed for operator information support and for plant work requests control. The system is widely used by all operations personnel and was identified by the team as a good practice.

The communication system used by operators is reliable and operators communicate effectively during the shift.

A number of unnecessary activated alarms were observed on the computer screens in the main control room (MCR) of both units during the review period. Although the plant has recently started a special program to minimize the number of alarms, the team recommended that additional efforts should be taken by the plant towards this initiative.

Equipment and all procedures are well maintained in order to support normal and emergency activities.

While the plant housekeeping was in general very good, the cleanliness of some specific pieces of equipment could be improved.

The plant principles of locking valves with chains and padlocks that are already available in the field was recognized by the team as a good practice that enable operators to perform locking easily and contributes to good housekeeping.

3.3. OPERATING RULES AND PROCEDURES

The operating rules are generally presented in technical specifications for operation, incident and accident operating procedures, monitoring and surveillance test programs for equipment and safety-related systems. All limits and conditions are presented in technical specifications. Main operation procedures are developed based on the technical specification limits. Documentation for surveillance tests for different units have a different color that prevents the operators from making mistakes. Surveillance programmes are usually well documented and all information analyzed by the operations department.

Operating procedures are in good condition, clearly written, well understood and provide necessary references. The system of procedures updating is based on a regular quarterly inspection for every satellite library and is conducted by the shift. The system for procedure updating works efficiently. There is a well organized system developed for operators to report all procedure errors. In case of any modification to operation, a temporary operating instruction is provided to take into account any deviation from the operation document. Flowsheets and emergency procedures are in plastic and carry all colored information, which is easy for fast reading.

Emergency procedures are state based. They are developed in a high quality standard, clearly understood and are easily accessible. When any deviation occurs an alarm always gives operators reference to the right procedure. Operators can easily and quickly find the procedure, which contain all necessary steps to be taken.

The operations department has started a special programme for analyzing and reviewing all procedures that may have an influence on safety with a view to enhancing the operation of infrequent evolutions.

3.4. OPERATING HISTORY

The two units went into commercial operation in 1992 and 1994 respectively. The unit capability factor has been higher than world average for four of the last five years, with a positive trend for the last three years. The number of significant events at the plant has over the last five years been slightly lower than the average for all French plants. Nevertheless, it seems to be slightly increasing. The system of collecting necessary operation information is well organized and provides prompt feedback.

3.5. CONDUCT OF OPERATIONS

Shift personnel are professional and have a high level of pride in the plant. The plant equipment is generally in good condition. Procedure status is good and well structured, both for normal operation and for emergency situations.

The shift turnovers are performed in a well-structured manner. Operator rounds are performed as functional (system review) rounds or as more general observational rounds. Readings from field operator rounds are fed into a computer as a tool for analysis of trends. Management of work requests is good.

However, the team found that operations shift personnel in some cases did not demonstrate rigorous and conservative approach in daily operations and that in some cases operations management did not encourage personnel to modify this attitude. The team recommended that management expectations on rigorous and conservative operating approach should be established and communicated to all shift personnel.

Unauthorized hand-written stickers, signs, old tags and drawings on walls and equipment were observed all over the plant. The team recommended to eliminate this unauthorized information. Labeling of large equipment is sometimes inconsistent or non-existent and the team suggested enhancing the labeling of it.

The team also found some equipment deficiencies that had not been reported through the work request system and it took some time to find out whether they were reported or not. The team suggested that operation management enhance the process for reporting equipment deficiencies.

3.6. WORK AUTHORIZATIONS

The plant system for work authorization is well organized. A person that detects a deficiency issues a work request using the SYGMA software, the work management system for maintenance. Three daily cross-site meetings with managers involved gives a broad understanding between departments of how the prioritizing of work is done. The participation of the operation shift manager and nuclear safety engineer ensure that nuclear safety always is considered most important.

Each shift has an experienced tagging supervisor whose main responsibility is to carry out tagging activities and real time monitoring to support the shift supervisor. The system used for control of temporary modifications and maintenance work is very good.

For each post maintenance test a “requalification record sheet” is produced, defining all verification measures to be performed and ensuring their traceability. The requalification is performed in two steps: component and system requalification respectively. Component requalification is performed by the maintenance department and system requalification by the operations department. The requalification record sheet is incorporated in the work request system, which makes it possible, even during an outage, to keep record of these sheets, and thereby ensure the operability of components and system after maintenance work.

3.7. FIRE PROTECTION PROGRAMME

EDF policy has been used to develop the site procedures. There are three basic objectives:

- To maintain safety functions
- To guarantee the safety of personnel
- To limit equipment damage

The system adopted to fight fire is as follows: first line response: person who discovers a fire; second line response: control room personnel who activate the assembly point for emergency services and request outside help if required. This team, which is managed by three specially trained workers, comprises a head of emergency services, a health official and three fire-fighting members. The second line response teams are well trained.

Observations carried out through the plant demonstrated that people smoke in areas where fire hazard exists. The team recommended that the plant take necessary actions to ensure that personnel do not smoke in such areas.

Numerous plastic fire action sheets throughout the plant enable personnel to carry out fast fire fighting actions. This system is very informative and helps to speed up the actions taken after a fire alarm is received. The team considered this system as a good practice.

All control room shifts have one fire drill a year. Training with external fire teams is performed once a year.

3.8. ACCIDENT MANAGEMENT

Accident management is clearly organized and provides a good response. The operation staff is trained in accident management on a regular basis. In case of an accident operators follow the state-based oriented emergency procedures and call for a shift manager who calls for a safety engineer. The shift manager applies permanent state surveillance procedure. If the situation requires, the on-site emergency plan is put into action and the shift manager controls the operation from the local command post at the MCR. The safety engineer and shift supervisor monitor the installation from the control room. The plant has a specially designed and good equipped local emergency response center. In case of emergency, the operations manager as head of the center, communicates to other EDF emergency response centers and government authorities. The on-site emergency plan clearly specifies the emergency response system. Operators have a well-structured, local, corporate and national support in case of emergency. Every shift carries out two weeks per year of simulator training which include special emergency training. The shifts also carry out required periodic on site emergency training.

STATUS AT OSART FOLLOW-UP VISIT

In general, good progress has been made on the seven issues in the operations area. Two suggestions were fully resolved. Four recommendations and one suggestions were classified as making satisfactory progress.

In addressing the need for formal requirements to ensure licensed shift personnel who have not performed shift duties for extended periods, a strong structured approach was implemented. Likewise, the labelling of large plant equipment has been significantly improved and plans exist for even more improvements.

Actions have been taken to reduce the number of unnecessary continuously actuated alarms in the control rooms. While ongoing station efforts should continue to make additional improvements, corporate support would be needed to eliminate some of the remaining alarms.

Unauthorized hand-written stickers, signs and other operational information has been removed from the plant. However, additional work is needed to remove other uncontrolled hand written information.

The identification and reporting of low level equipment deficiencies by field operators has been strengthened through newly established programmes and training. Additional emphasis is still needed in the identification, reporting and correction of deficiencies; especially in the turbine buildings.

The need to improve awareness and thoroughness has been stressed with the operating crews. Observations and coaching have been enhanced to strengthen this area. Other efforts are underway to more clearly communicate expectations and to reinforce human performance. Management has recognized the need for more improvement in this area and has given it a high priority for 2000.

Efforts to improve the fire protection programme by more clearly establishing expectations for areas where smoking is prohibited and communicating them to the staff have improved this area.

DETAILED OPERATIONS FINDINGS

3.1. ORGANIZATION AND FUNCTIONS

3.1(1) Issue: Insufficient formal requirements exist for ensuring that licensed shift personnel, who do not perform shift duties for extended time periods, retain sufficient proficiency or are provided appropriate refresher training prior to resuming licensed duties.

The current practice is to suspend the license for individuals who do not perform licensed duties for longer than six months. However, there are no requirements for periods of less than six months. Practices used in other countries include proficiency watch-standing under the direction of licensed individuals if the period since the last watch-standing exceeds several weeks. Without clear guidance on refresher training requirements operators and shift supervisors who are off shift for an extended period could be assigned licensed duties for which they are insufficiently prepared.

Suggestion: Consideration should be given to strengthening requirements and controls to ensure that licensed personnel who do not perform licensed duties for extended periods are provided appropriate retaining prior to resuming licensed duties. These requirements should address the absence period that would result in the requirements conduct of refresher training.

Plant response/action

The operations department has drawn up a draft document on retraining shift personnel after an absence from shift work for more than one month. The requirements will take into account the length of absence and the activities performed while off-shift. A period of doubling-up, determined according to the individual's professionalism and the length of absence, will refresh the memory about job-specific tasks. A review of qualifications and training courses needed to keep those qualifications will be performed before reassuming normal shift duties.

An on-the-job interview with the individual concerned will be used to confirm that he can reassume shift duties providing his qualification is upheld, taking into account his circumstances (doubling-up, training, etc.).

For each job position, a list of points that must be dealt with will be drawn up. This document will be approved by operations department management, and will make it clear as to how information can be traced back from the needs analysis through to the decision to reintegrate the individual into the shift team. This draft project is currently being presented to the shift teams.

IAEA Comments

Operations department has defined expectations and the requirements that must be considered for individuals who have been absent from licensed duties for more than one month before they can resume licensed duties. These requirements, which have been established for all the different positions that make up the shift operating team, must be considered on an individual basis. A specific programme is then designed based upon the individual needs. Review of an example of how this was applied showed a programme that appeared to be well tailored to refresh and meet the needs of the individual.

For absences of less than one month, management conducts a formal review to determine needs based upon changes in plant conditions and other operational information.

Conclusion: Issue resolved.

3.2. OPERATIONS FACILITIES AND OPERATOR AIDS

3.2(1) Issue: A number of unnecessary alarms were present on the computer screens in the main control room (MCR) of both units during the review period.

The number of alarms observed during the review period were 22 in Unit 1 and 16 in Unit 2. Some alarms have been actuated for several years, since the plant's commissioning.

The modification documentation package for the low sealing water pressure to the circulation pumps alarm on Unit 2 had recently been completed but the problem has existed in both units since the commissioning of the units. Another example is a low-pressure alarm for the pressure in the header of the nitrogen make up system to the accumulators. The header is isolated by operators because of small unidentified nitrogen leaks. The operators do not initiate a work request for this condition because it is not considered to be a deficiency.

The plant has recently started a special program to minimize the number of alarms present on the computer screens in the MCR of both units, but according to current conditions further efforts are still needed to resolve the situation.

Large number of unnecessary alarms present in the MCR may induce the operators to accept non-operationally relevant or nuisance alarms as a normal operational practice.

Recommendation: The plant management should make additional efforts to reduce the number of unnecessary actuated alarms on the computer screens to a level that is as low as possible in accordance with international accepted practices.

Plant response/action

An extensive alarm monitoring process has been introduced. The 'unit-in-operations' project team is directly involved in this process, the alarms being classified into 4 categories :

- Type 1 : Actions linked to behavioral aspects in the way that plant facilities are operated,
- Type 2 : Actions where a request is made following an anomaly (dealt with by a work request),
- Type 3 : Actions requiring a modification request (PTGF),
- Type 4 : Actions involving either inhibited alarms or standing alarms linked to either unsatisfactory or unfinished modifications.

In addition, the control room operator reports on the situation to his management at least once a month: a review is done of each alarm and answers are given as to what appropriate action is to be taken.

Finally, a computerized tool for tracking the history of standing alarms is currently being finalized and will be introduced during the first half of the year 2000.

IAEA Comments

The station has taken action to reduce the number of unnecessary continuously actuated alarms. Continuing attention is being applied to maintain and further minimize the number of continuous alarms. This includes daily monitoring of alarm status and weekly management review of existing alarms. Classification of alarms into different types has assisted in identifying those that should have operational attention and those needing modification for eliminating them when not needed. A study has been conducted in how alarms can be further reduced. Some of the continuous alarms cannot be eliminated without corporate action including generic safety related modifications for elimination. Efforts in this area could also assist other similar EDF stations. At the time of the follow-up visit, the number of alarms was 10 to 12 per unit.

Conclusion: Satisfactory progress to date.

3.2(a) Good Practice: The Operations Department has a well-structured “Lotus Notes” based system for operational and other important information.

The purpose of this information system is to give information in real time to all operations personnel and also to decrease the amount of documentation circulating within the control room during shift operations. The system includes information on: periodic meetings, unit operating events, outage information, chemistry, performance indicators, industrial safety, contracts, training, and nuclear safety. The system is widely used by all operations personnel.

The system has three modules:

- The “follow up module” which is a management tracking tool for actions assigned to operation personnel.
- The “unit in operation module” which has technical data information. Examples include: shift supervisor daily report, shift managers weekly report and the operation engineering top-ten concerns. It is also possible to retrieve all work requests, schedules and weekly nuclear assessments made by safety engineers.
- The “operations department module” is used for filing analyses, technical information, EDF social and political information. This module also includes a debate forum where questions and answers can be provided. This module contains 55 different topics.

3.2(b) Good practice: The plant practice of locking valves with chains and padlocks that are readily available in the field, enables operators to perform locking easily and contributes to good housekeeping.

The locking in the field is done with chains, padlocks and tags. To ensure quality and consistency each valve at the plant has its own locking equipment already available in the field. Chains are permanently attached to the valves and padlocks are kept in locked boxes nearby. When the field operator performs a locking, he only has to carry the tags with him. When the field operator removes the locking, the chain stays in place attached to the valve in a secure position and the operator stores the padlocks in the nearest box. All operators have identical keys for the boxes that store the padlocks. This method allows operators to perform identical locking throughout the plant. It also limits the number of unnecessary chains in the field and guarantees a sufficient number of padlocks for facilitating the task and contributes to good housekeeping.

3.5. CONDUCT OF OPERATIONS

3.5(1) Issue: Personnel on shift do not always demonstrate a rigorous and conservative approach in daily operations. In some cases operation management does not encourage personnel to modify this attitude.

Some examples where a lack of rigorous and conservative approach among operators were observed at the plant during the review are:

- An operator did not take further actions after he acknowledged the high radiation in the spent fuel building alarm, as stipulated by the alarm response procedure. He explained that he knew that cleaning work was in progress in the area and the alarm was for a short period of time.
- An operator did not take immediate action after he acknowledged the fire alarm on the circulation water pump on Unit 2. He considered it was incorrect. He only asked the field operator to check the conditions of the area locally during his routine round.
- Discussion with operators and shift supervisors indicated that their attitude is justified because operators are experienced enough to determine which alarms need immediate action, independent of actions required by alarm response procedures. It was stated that during outages there are many fire alarms due to planned maintenance work and operators cannot be sent everywhere immediately.
- Operators placed on the main control panels a procedure, drawings, rule, flowsheet and some other objects. Operators sometimes lean on the panel. In one case, an I&C technician was observed to be walking around the control room wearing his hard hat and carrying bag of tools hanging over his shoulder. He was not corrected by the operators.
- Operators locked some valves because shift supervisors decided to control the valve position although the valves are not in the list of valves to be locked according to plant policy. For example, operators locked in the open position valves on a fire pump header in order to avoid the valve's closing due to pipe vibration. However, operators did not either lock the valves for the fire pump on the other train or request a further analysis and investigations.
- The surveillance test procedure for the last resort turbo alternator contained values that did not meet the acceptance criteria, had a test value that had been altered without comments, and had some test values that were difficult to read. This procedure had been approved by the shift manager and shift supervisor.
- The following are examples of events directly connected to a lack of rigorous and conservative approach to operations:
 - An event on 25/04/98 at Unit 1 involved the inadvertent lowering of the level in the spent fuel pool because the field operator used a flowsheet instead of the procedure to carry out the valve alignment.
 - An event on 14/11/97 at Unit 2 involved the initiation of a manual reactor trip because

the reactor operator followed the wrong procedure which was given to him by the turbine operator following a turbine trip.

- During an event on 15/10/97 at Unit 2, while at shutdown conditions, the operator noticed an alarm for low feedwater tank level, but since level was increasing the operator did not use the alarm procedure. The alarm procedure giving the condition of the unit at the time would have instructed the operator to reach a more conservative shutdown status of the plant within one hour.

An insufficient rigorous and conservative approach to shift operations breaches one of the important defense in depth barriers and might consequently jeopardize personal and nuclear safety.

Recommendation: Plant management should enforce expectations for a more rigorous and conservative approach in the daily operations practices. Operations personnel should exercise a rigorous and conservative operating approach in all shift activities.

Plant response/action

All personnel have been given sessions for raising awareness. Considered by plant management as an essential area for improvement, thoroughness is one of the three priority areas for the year 2000.

With young employees being taken on and with shadow training, the raising of awareness of everyone will be encouraged, a questioning attitude being the key factor of improvement associated with this thorough approach.

Thoroughness is also a requirement, it is therefore first and foremost a question of management commitment. The initiative being undertaken with the 'Management Network' will contribute to the success of this change in both individual and group behavior.

The analysis of human factor-related events brings together those involved in the event and a person in charge of this subject area. A study is currently underway with a view to expanding and reinforcing the human factors approach.

IAEA Comments

The need to further improve awareness and thoroughness has been stressed with each operating crew and it continues to be stressed during continuing training. The main approach to improvement relies heavily on the time managers and supervisors are in the field coaching the operators. In the field oversight by senior operations management and operations engineers has been increased. Recently, this oversight has been increased in the control room. However expectations for this oversight activity, including scope of desired activities, has not been have not been structured or formalized.

The operations department has been doing a small amount of reporting of low level problems (about 60 in 1999). This reporting focuses mainly on material/equipment problems and does not address human factors problems. Lessons learned from events for which there is a human factors contribution are shared with the operating crews.

Efforts are currently underway to develop expectations for operators for the use of procedures and

operational documents. It could be helpful to also include other expectations for aspects of the conduct of operations.

A human performance improvement action plan is in the development phase which will be applicable to operations as well as other functional areas. This will include assessment techniques for looking at human performance.

Management has recognized the need for continued improvement in this area and it has been given a high priority for 2000. The increase in the number of technical specification violations, some of which are in part due to the lack of rigor or conservative approach supports this priority.

Conclusion: Satisfactory progress to date.

3.5(2) Issue: Plant low level equipment deficiencies and degraded material conditions are not always reported.

During observations carried out by the team the following examples of low level equipment deficiencies and degraded material conditions were found that were not reported to the work control system, some of them had existed for a long time:

- Trace of old boron leakage on sampling system heat exchanger 2 REN 054 RF
- Boron leaks were observed at: components 1 RCV 018 LP, 1 TEP 050 SN and valves 1 RCV 038 VP, 2 EAS 811 VB.
- Oil leakage on lubrication oil pump 2 RIS 191 PO for a safety injection pump and in 2 REV 171, 172 PO charging pump rooms.
- 2 DEG 021 PO water leakage on discharge line.
- 1 RRI 101 RF water at flange on heat exchanger.
- 1 CTA 601 TF polythene wrapped around valve actuator preventing oil leakage to floor.
- 1 AHP 169 VL control box covered in polythene and taped in place.
- In turbine building No. 1 and in the service water pumping plant, several small pumps had gland leaks. Also several orientation signs in the turbine building were not properly attached to the wall. Some were loose on the floor.

Failure to promptly identify and enter equipment deficiencies into the work control system could allow equipment degradation and cause a lack of awareness of actual plant status.

Suggestion: Consideration should be given by the operations management to enhancing the process for reporting equipment deficiencies in a complete and timely manner. The implementation of a more user-friendly process to determine whether a deficiency has been reported or not, or development of a deficiency tagging system could help the resolution of this issue. Consideration should also be given to implementing formal and regular inspection by maintenance foremen and managers to ensure a skilled eye is regularly cast over plant equipment condition.

Plant response/action

As part of our thoroughness initiative, the analysis of equipment defects has lead us to implementing a field identification system using labels.

Integrated into our existing organization, the field operators identify fluid leaks, then a roundel-shaped identification label (equipment defect tag) is attached to the item of equipment concerned and a work request is raised in the maintenance work control system. The defect, visibly identified for all to see, is taken on board by the ‘unit-in-operations’ project team. The relevant maintenance department makes a commitment to a work date for the job, depending on the analysis carried out on the equipment and in agreement with operations. After standards have been restored to the part of the plant facility concerned, the work team remove the equipment defect tag.

In addition, the management plant tours, especially those taking place on Friday morning with the

senior plant management, allow regular checks to be made on plant condition and housekeeping standards as well as on the reliability of this method of equipment defect management.

Our Lotus Notes information system provides everyone concerned with information about how the work is progressing.

IAEA Comments

A new system where field operators use a deficiency tagging system to identify when fluid leaks have been reported into the maintenance work control system has been implemented. Currently, only fluid leaks are identified using this system. The station reported intentions to later expand this system to include other types of deficiencies. Management plant tours are also relied upon to identify plant material deficiencies.

Tours of the plant revealed some use of the deficiency tagging system in identifying leaks. However, there were numerous minor leaks that were not identified by tags in the turbine buildings and a few in the auxiliary buildings.

Additional emphasis is suggested in the identification, reporting and correction of low level equipment deficiencies and degraded material conditions particularly in the turbine building. Additional management/supervisor involvement and coaching could be of assistance in this effort.

Conclusion: Satisfactory progress to date.

3.5(3) Issue : Unauthorized hand-written stickers, signs, old tags and drawings on walls and equipment were observed throughout the plant.

Some examples:

- Numerous hand written stickers on cable trays and conduits were found in the plant.
- Many old stickers from commissioning are still installed throughout the plant.
- Hand written identification on motor as well as normal identification were found on several equipment
- Several hand written notes and stickers were found on HP turbine and other equipment.
- In the conventional island closed cooling water system (SRI) on Unit 2 all three pumps have two labels with the same information, one of them hand-written. These and other pumps also have numerous hand written marks on them, representing vibration measurement points
- The motor of the condenser vacuum system pump 2 CVI 022 PO has a hand-written identification note on an electrical box.
- In the refueling building on Unit 1, one drawing contained an instruction not to push buttons on a piece of equipment which had been removed
- In the chemistry laboratory in the RCA in Unit 1, an equipment description is placed on the plexiglas window to the glove box
- Components throughout the RCA of Unit 1 frequently have hand written information
- In room LD 0306, where the medium height safety injection pump of Unit 1 is situated, there are approximately 20 hand-written information signs on walls and equipment
- Tape is frequently used in work and left on walls and equipment when work is finished

Unauthorized hand written information in the plant increases the risk for human errors and may therefore be a risk to nuclear safety.

Recommendation: Plant and operational management should establish, communicate and enforce expectation to eliminate unauthorized information in the plant such as old tags, stickers, hand written drawings, marks and tapes.

Plant response/action

Senior plant management has asked for enhanced thoroughness in the field : only necessary information should be displayed in the field and it must comply with QA requirements, which includes its being authorized.

A QA system has been set up in the control room. The operations department has identified what information is deemed to be useful for the operator and has organized for this to be implemented.

In the field, stickers, old labels and other non-authorized diagrams etc. are removed from the plant, at least during plant tours. The requirement for thoroughness about information available in the field is well understood by plant personnel. Identification and response to needs are gradually leading to an increase in the standards of all posted information.

In addition, a study is currently underway to look at the checks performed during the tagging withdrawal process. Closing out of worksites should include the elimination of unauthorized information. A reference worksite will be operational for the fourth outage on unit 2.

IAEA Comments

A system to control authorized operational information has been implemented and seems to be well understood and used by the operations staff. A systematic process was used to identify which posted information was necessary and to formalize that information. Station staff conducted tours to identify and remove unnecessary/unauthorized operational information. During the follow-up visit, tours of the plant confirmed a large improvement in this area by the removal of unauthorized operational information. However, a significant amount of hand written information was still present throughout the turbine buildings and some existed in the auxiliary buildings. This information included hand written stickers on cable trays, conduits, electrical boxes, mechanical equipment, thermal insulation and on tape affixed to walls. A study to determine how to best identify and properly post or remove this type of information was reported to be in progress.

Conclusion: Satisfactory progress to date.

3.5(4) Issue: Many labels on large plant equipment are small, difficult to find, not clear, or do not exist at all. During team rounds several examples of poor equipment labeling were identified, some of them are:

- The pump motor to 2 ADG 021 PO has no label of identification on motor or foundations
- The pump motor to 2 SER 101 PO has no label of identification on motor or foundations
- The pump motor of the four pumps 2 CVI (021,022,023) 024 PO has no label of identification on motor or foundations
- The pump motors to 2 SRI 012 PO and 013 PO has label of identification on motor and also have stickers with hand-written identification note on the motor
- The pumps motors 1,2 SFI 001 PO have no label identification
- The pumps 1 SEC 001 PO, 1 SEC 003 PO have a small label attached at the bottom of the pump that is difficult to find
- The labeling of the motors of the condensate extraction pumps in Unit 2 are confusing, there are several labels but seemingly none that represent the pump motor itself.

Clear labeling on large equipment could prevent operator errors, especially in emergency situations.

Suggestion: Consideration should be given to enhancing the existing labeling of large plant equipment. The labeling on component cooling (RRI) water pumps at the plant could be a good example to be applied throughout the plant.

Plant response/action

The operations department has determined poorly-identified and unidentified equipment. The person in charge of the associated main plant system is responsible for correcting these deficiencies.

So as to improve the identification survey, new recruits are asked to draw up a list of equipment that they've had difficulties identifying, this task being done better by newcomers as experienced personnel are already familiar with these larger items of equipment.

It is planned for us to take on between 70 and 100 new persons over the next three years. This generalized approach towards labeling and identification of equipment will make sure that both operations and maintenance needs are thoroughly encompassed.

IAEA Comments

The plant identified many deficiencies in labeling of large plant equipment and installed several hundred new large labels. Additional improvement is now an ongoing effort. The efforts in using new staff to identify additional needed labels is a very good approach and has the potential to bring about excellent results.

Conclusion: Issue resolved.

3.7. FIRE PROTECTION PROGRAMME

3.7(1) Issue: Even though smoking is forbidden in industrial areas the team found ample evidence that personnel are smoking in places where fire hazards exist.

Observations carried out through the plant demonstrated that personnel smoke in areas where there is a risk of fire. The team found cigarette butts in the following areas:

- In the turbine hall, in one case near the hydrogen cooled electrical generator
- In cable trays under the electrical generator
- In the hydrogen oil skid, two were found in the oil
- In the service water pump building
- Under the high pressure turbine
- On top of the main turbine oil tank
- In the chemistry laboratory

Smoking in areas with combustible material is a fire hazard and therefore a risk that can jeopardize nuclear safety at the plant.

Recommendation: Plant smoking policy should be clearly communicated and enforced to all personnel and controls should be established to ensure that personnel do not smoke in industrial areas defined by the plant. [See recommendation 1.2(1)].

Plant response/action

Plant regulations have been modified and now take into account a smoking ban. A reminder of the fire risk is mentioned at the management team meeting as part of operating experience, as well as with personnel encountered during management plant tours.

In addition, all plant personnel, not just management, have been reminded of their duty to ask anyone who may be smoking in an ‘industrial’ part of the plant to stop smoking. This is a mandatory prevention duty, for the safety of everyone, as it is just as dangerous to smoke in a fire risk area as it is to allow smoking to take place.

IAEA Comments

Requirements for areas where smoking is prohibited have been more clearly established and communicated to station personnel. Smoking is now prohibited in buildings that include plant equipment. Some areas within the plant which are clear of fire hazards have been established as designated smoking areas. Tours of the plant indicated that the policy was generally understood and that plant staff was making progress in meeting the expectations.

Conclusion: Satisfactory progress to date.

3.7(a) Good practice: The colored Fire Action Sheets (FAI) located near the entrances to all fire controlled areas enable the operators to quickly implement fire fighting actions.

Every fire-controlled zone has near the entrance plastic covered fire action sheets. The identical sheets are in the MCR. They have the same identification as the fire alarms. Fire action sheets provide coverage for a fire zone and are used mainly by field operators to fight a fire. It gives necessary information for effective fire fighting (map of fire zones, location of main equipment, fire fighting equipment, phones, precautions to be taken, action to be taken to isolate the fire and evacuate smoke, etc.). The operation department is in charge of updating the FAI, including the experience feedback from fire drills. All FAI follow the same standard, use color-coded information to allow operators to make a fast analysis and effectively contain and eliminate the fire.

All operators assess the fire action sheet as a highly efficient operator's information support in case of fire.

4. MAINTENANCE

4.1. ORGANIZATION AND FUNCTIONS

Maintenance responsibilities are divided between a mechanical department comprising about 80 persons and a department combining I&C, electricity and industrial electronics of about 70 staff. Other maintenance services such as fuel handling, waste management, warehousing and custodial etc. are provided by the generation support department. A separate project based structure is established to manage outages. All the department heads report directly to the plant manager.

While this is not the typical organization seen in the industry, roles, responsibilities and goals for each department are clearly defined and understood via a memo (contract) between the plant manager and direct reports. Each department however, operates in an independent way converting policy to practice, each having their own tools and developing their own programmes from common policy. Although this may allow some differences in standards and practices and creates strong department ownership, a series of cross functional processes such as the “Unit operating organization”, “outage project” and the “Top Ten” priorities appear to apply the necessary plant integrating factors. The team recognized as a good practice, the integrated set of cross functional meetings known as “Unit operating organization” portions of which are used by many plants but the combination of the various processes, information dissemination and meeting activities makes this application unique.

Staffing appears adequate to control maintenance backlogs but some managers indicated a lack of ability to tackle the longer term issues. A large fraction of maintenance work is subcontracted including calibration of tools and testing equipment, outage activities and some custodial work. The team recognized as a good practice the way in which the contractor relationship is handled by the plant, developing good contractor skills and a focus on improving plant performance.

The plant has several data bases serving maintenance. The SYGMA, software developed for the entire population of plants serves well as the major maintenance management tool although it is not perceived as user friendly by some other work groups who need to input data.

A major strength is the corporate ability to provide, on a real time basis, maintenance experience, and equipment to all it's plants.

4.2. MAINTENANCE FACILITIES AND EQUIPMENT

Each of the maintenance functions has well equipped workshops. The standards vary from good in mechanical to acceptable in electrical. Mechanical maintenance uses a bar coding system to link tools to people and jobs. Other departments have different methods of achieving the same result. No parts manufacturing is handled by plant maintenance in the workshops. This is all done by qualified contractors. The only manufacturing and welding performed by maintenance is on tools. Apart from a multi-meter, no measuring equipment is given out as standard issue. Calibration of measuring instruments and tools are performed on a regular basis by contractors. For items which require regular checking such as torque wrenches and some measuring instruments, a calibration verification capability is maintained within the applicable maintenance section. Calibration records are up to date and complete.

Lifting equipment is normally tested annually by a qualified contractor and mechanical and warehouse equipment labeled with the year of authorized use. Slings and hooks in the electric shop were not labeled, nor were the special turbine overhaul slings.

Tools for use in the controlled area are of different manufacture to those for conventional area use which is quoted as a method of ensuring they are not returned to the wrong stores. The controlled area tools are also inscribed with a different identifier. Mechanical and electrical departments use different tool stores and different color codes to identify department and section ownership. Annual checks have not detected controlled area tools outside that area.

4.3. MAINTENANCE PROGRAMMES

The plant has a well defined preventive maintenance (PM) programme which is 90% defined by head office. All safety related PM is defined this way. The programme, used throughout EDF, is based on best internal and international experience which is a powerful capability. The site adds its own specifics for non-safety related systems. The corporation is presently changing over to a Reliability Centered Maintenance (RCM) base and the maintenance departments at each site are converting their programmes to match. Although each plant department is handling the process differently, they are all following correct policy and doing a good job in ensuring nothing is missed in the conversion.

Predictive maintenance techniques such as vibration monitoring, valve diagnostics, thermographics, oil analysis etc. are all utilized to adjust the PM programme and also to inform head office and other plants of results.

The overall In-Service Inspection (ISI) programme is clearly defined for safety related systems by head office and the plants programme and perform the work to an agreed schedule. There is a comprehensive process for handling deviations with considerable expert advice available from corporate resources.

The corrective maintenance programme appears efficient with a well managed work control system in place. All work requests, deviations and maintenance records are stored on the SYGMA system and accessible to all with need at the plant. The identification of minor defects in the plant could be improved and the team suggested, improved field inspections by maintenance management and supervisors.

4.4. PROCEDURES, RECORDS AND HISTORIES

Almost every maintenance task at the plant creates a job file that contains all requirements, nuclear safety risk analysis for all work on safety related systems, procedures, deviations and history of the job. In general, such documentation is well managed and complied with. However, there are a few markups. A common criticism of several staff has been that the documentation load is too high. However it does ensure the procedures are available, appropriate safety analysis is complete and the approval processes are adhered to and deviations adequately addressed.

The documented history of the plant is available in a main document control system and several satellite centers. Documentation is well controlled and easy access is available by computer.

4.5 CONDUCT OF MAINTENANCE WORK

Overall, maintenance is performed conscientiously and professionally by staff well trained in their specialized skills. Procedures are followed and, in most cases, deviations diligently reported. There are however some specific maintenance and support activities areas where observed standards needed improvement, for example in personnel safety and radiation protection, spent fuel pool operations, storage of material and job site conditions postings. A strengthening of performance and management oversight in these areas was recommended by the team. In particular the team also recommended improvements to foreign material exclusion practices in the spent fuel area.

It is apparent that many maintenance managers and supervisors are not in the field sufficiently demonstrating high standards, monitoring job performance, safety conditions and equipment status. This is most prevalent on units in operation in stark contrast to good field presence during outages. The team feels this is a significant factor in several areas identified in need of improvement including, standards of industrial and radiation safety and the identification of low level plant and equipment deficiencies. The team recommended improvement to avoid longer term performance degradation.

4.6. MATERIAL CONDITIONS

In general the plant material condition appears good especially in the controlled areas. There is evidence that some low level equipment deficiencies are not being identified in the work management system which is essential to enable maintenance to prevent further deterioration. Improved supervisory and operator diligence in reporting was suggested by the team.

4.7. WORK CONTROL

The operating unit work management system and all the associated processes, is effective in the timely planning and execution of work while minimizing conflicts with safety requirements. The “unit in operation” process effectively pulls together the various sections involved in getting work done on the operating units and enables them to work together in a well disciplined manner. An effective management process such as this is essential in a flat organization with many autonomous departments and sections.

The work prioritization process and the work control system are taking material and manpower considerations into account and designating achievable timelines and the overall guidance provided by the “top Ten” priority system directs effort onto the right areas. Work achieved vs. target is tracked and reported daily and is generally good.

Many maintenance performance indicators have been developed over the last two years and the following are included in monthly monitoring by senior management; ratios of preventive vs. corrective maintenance, work orders issued vs. completed and any time variance from prediction, emergent work vs. total, work held up for any reason i.e. spare parts, number of deviation records opened, repeat interventions or failures. A corrective action process follows which includes a “problem in progress” for difficult issues and all the activities associated with correction of problems are effectively tracked.

Although some minor maintenance work such as installation of lead shielding on a pipe is not classed as a temporary modification it does impact the system and should therefore be classified as a

modification. The team feels that in such cases there is a potential to adversely affect the response of safety related systems and this recommended improvement in this area.

Safety related maintenance activities undergo a post job review and where necessary changes to procedures and processes are made. On average there are about 50 changes per week (most of these coming out of outage work). To keep that in perspective there are 8000 mechanical procedures alone for the site.

4.8 SPARE PARTS AND MATERIALS

Procurement of all safety related and large spare parts is performed by the head office who also manages the rebuilding and redistribution of overhauled spare parts. The plant only orders common issue items.

On receipt, all safety related spare parts are checked for condition and the necessary documentation and specially packaged. The paperwork remains with the article while stored. A safety related part received without paperwork is quarantined. Foreign material exclusion practices are carried out for safety related components but not necessarily for others. The main warehouse area is adequate and well managed.

There is no comprehensive shelf life program for the plant and no policies have been supplied by head office. A head office working group is active on the issue and is due to report shortly. In anticipation of the report the plant is presently ensuring a shelf life is assigned to safety related material entering the warehouse and all new material containing polymers are allotted a 10 year shelf life. The team feels this topic should be given a high priority by the head office.

Oil and grease is acceptably stored in a separate building and there are few examples of flammable substances being incorrectly stored around the plant. In-plant storage cages are open to view and display a flammable inventory form.

4.9. OUTAGE MANAGEMENT

Outage management is performed well to a long term plan developed by head office and the plant. Dedicated resources and a strong management team have been built with considerable project management expertise. A managed process with structured meetings has been developed to keep tight control of outage activities and a quick response to deviations. Detailed planning and work package preparation starts six months before outage and changes frozen four months later. Nuclear and industrial safety experts are part of the team and pay special attention to planning and maintaining adequate assurance of safety margins throughout the outage stages. An outage execution team is assembled from experienced people on the running units starting six months before the outage. From the time of their secondment to the end of the outage they are dedicated to outage work.

The reference outage duration is 31 days before approved plant requirements are added. The plants outage performance has been good in comparison with the rest of the fleet in all areas except costs. Outage industrial safety performance has been somewhat better than operating industrial safety performance despite the fact that about 1200 contractors are hired to complete the majority of the work. Control of safety during the outage and particularly during the start-up phase is well structured with the operations manager retaining the accountable authority throughout.

STATUS AT OSART FOLLOW-UP VISIT

The plant has made good progress on the Maintenance issues. Of the three recommendations, all were found to have made satisfactory progress to date.

One issue concerned foreign material exclusion practices in the fuel pool area and reactor cavity. The plant first carried out a study of six pilot cases in order to identify methods of improvement and provide the basis for the subsequently developed FME procedure. The pilot study has been circulated among the departments for comment. In addition, experience feedback from Vogtle NPP has been evaluated. The developed procedure includes definitions of FME zones, requirements for the zones, and a list of tasks to be performed under this procedure. The procedure will be partially implemented during the next outage and fully implemented in the outage after that. During team inspections, clear plastic was found in the form of bags for protecting clothing and covers for documents/records. The use of clear plastic should be prohibited as soon as possible.

One issue identified during the OSART mission concerned the fact that some specific maintenance activities were not performed to acceptable industry standards. This issue mainly focused on one maintenance section. The plant has responded to the recommendation in several different ways to deal with the analysed causes. The General Service section is undergoing a reorganization process to improve staff motivation, management environment and the structure of work processes. Senior management has recognized the importance of this section's work, and work processes are to be formalized in the same way as in other maintenance sections.

In other areas mentioned in the issue, actions have been taken or are in progress to label slings, establish work site references, and improve work practices in the fuel pool area and handling of welding material. However, during the team's field observations, improper storage welding material was found in a storage area at turbine deck level in unit 2 (the material was immediately removed).

The third issue identified in this area concerns temporary installations, radiation shielding and possible temporary additions to areas containing safety-related components. A document was recently issued (3 January 2000) stating the requirements for installing permanent and non-permanent lead shielding. Before installation, the impact of lead shielding on safety related equipment has to be analyzed according to the document. The plant has concentrated its effort on formalizing installation of lead shielding, but insufficient consideration is given to seismic requirements for non-permanent installation. The installation or placing of other equipment not covered by modification procedures should also be covered by similar requirements.

DETAILED MAINTENANCE FINDINGS

4.1. ORGANIZATION AND FUNCTION

4.1(a) Good Practice: In compliance with the French regulations and internal EDF prescriptions, the plant has developed an integrated approach for the management of contractors. Hiring is performed with the intent of building longer term relationships and maximizing contractor autonomy followed by close monitoring of site performance of individual contractor personnel in improving plant performance.

The contractor is involved in the planning stage and is sent a list of work requirements several months before the work is required. A meeting is held to review and discuss the documentation and the subcontractor's resources and targets for performance improvement on which the subcontractors performance will be assessed. The plant's work co-ordinators and inspection supervisors who will be involved in the work are involved in this meeting.

During execution of the work every activity is evaluated by at least one inspection supervisor paying special attention to performance improvement activities. This is done by use of a check list covering performance areas that can be selected depending on the job requirements and information previously obtained on performance. All the remarks are formalised into a memo and given to the senior foreman or work co-ordinator. The combination of this data formulated into an annual report is discussed with the subcontractor's manager pointing out areas for improvement. This information is also used to inform corporate resources and other EDF plants. The result is a very clear understanding of expectations by the subcontractor and a very close measure of performance with associated improvements in contractor relationships.

4.1(b) Good Practice: "Unit Operating Organization" an integrated set of cross-functional meetings enables all key staff on site to jointly decide and commit on operating and maintenance priorities and schedules, while ensuring safety is given appropriate priority.

Every morning at 0745 there is a " Work request pre meeting" of shift supervisors units 1 and 2, head of operations department, operating engineers, and a maintenance engineer, to review the work requests created the day and night before. The agenda for each unit commences with safety. This is followed at 0900 a.m. by a "Work request meeting" chaired by the shift operations manager. This meeting which is run to a strict agenda with safety first and lasts about one half hour includes about 25 representatives from all departments including sometimes; plant manager or deputy plant manager, maintenance engineers, heads of departments et. al, The assembly reviews plant status/unit conditions (safety first) and all work requests including emergent work and work called up from surveillance and preventive maintenance programs. Results of the previous day, the present day schedule and the next day are reviewed and work is allocated to all departments. Once accepted, the receiving department is beholden to complete the work on time and is tracked accordingly.

Immediately following these meetings each day there is a special one half hour review of key plant areas:

- Monday, Weekly summary
- Tuesday, Status of Industrial Safety Work requests
- Wednesday, Top ten technical issues meeting (pending technical issue prioritization and tracking)
- Thursday, 3 week schedule,
- Friday, Nuclear safety assessment, on-call check, weekend schedule if shutdown planned, followed by safety field visit.

Technical issues are dealt with between parties over the remainder of the day culminating in a 300 pm daily tag-out meeting. This is chaired by the shift manager who reviews and gives authorization to those requesting tag-outs for the next day. All the maintenance sections are represented along with shift and scheduling representatives and the safety manager who has to accept individual items as well as the combined plan. If the requesting organization is not present the work is rejected similarly if there are any significant safety and/or tech-spec and serious production concerns. This meeting provides a good barrier for co-ordination and schedule driven events and provides key people with a common schedule.

The facilities for these meetings have designated seating (ensures representatives from all departments are in attendance). Numerous video monitors fill the center of the table and are used display the latest schedules, activity details, etc. at will. The controlling mouse is handled by the chair.

Quarterly, during one meeting, a review of the effectiveness of the process is carried out and every six months the process develops a memo assessing all key plant issues for release to top management.

This integrated process has been under development for several years and in the last year has served the users well. It has been instrumental in preventing conflict affecting tech specs , reducing its delays due to lack of spare parts, provided the forum necessary for department to work cooperatively together. The process is liked by the participant who feel it is a strength for the plant and possibly the EDF fleet.

4.5. CONDUCT OF MAINTENANCE WORK

4.5(1) Issue: Good foreign material exclusion practices are sometimes not being followed in the spent fuel pool area.

On several occasions, people working in the fuel pool area were observed leaning over the pool wearing unsecured hard hats and with loose items in their hands. In one case, a foreman and supervisor observed such behaviour and neither took any action.

In one case, a mechanic was dismantling a tool with two wrenches close to the pool. The wrenches were not tied off and could easily have fallen into the pool.

A bin containing loose clear plastic was observed up against the pool railing. Clear plastic cannot be seen if it enters the pool and can impact cooling of the fuel. There is also frequent use of plastic sheeting (pink) and bagging in the region of the pool for covering contaminated material. Several tubes and wires were observed attached to the pool railing with tape.

Foreign material entering the fuel pool could find its way into the cooling system or transfer mechanisms and onto fuel possibly causing damage and potential fuel failures. Normal practice for spent fuel pool areas is to insist that anything coming near the pool is tied off to prevent it falling into the pool.

Recommendation: The plant should institute a clear foreign material exclusion policy for the spent fuel pool area. This should have provision for ensuring any loose articles coming close to the pool are tied off and the use of clear plastic or polythene is prohibited. The use of colored polythene, tape and other material which could potentially enter the pool should be minimized. Additionally, the plant should review the foreign material policy in the refuelling cavity in containment.

Plant response/action

A memo describing the program for foreign material exclusion is currently being analyzed by the different departments.

The approach adopted is a preventive one, which entails ensuring, throughout the process from planning of an activity to job history filing, that no foreign material can be left or lost in or close to a pool.

Where a risk is identified, it has to be incorporated into the Safety Quality Plan. The elements which will guarantee that fuel damage is prevented are : inventorization, prevention of loss, and recovery.

A list, to be completed for experience feedback purposes, has been drawn up containing activities with which risks are associated.

An organization will be definitively adopted, taking account of the remarks made by line departments, for the unit maintenance outage 2VP4.

IAEA Comments

Since the last outage, the plant has studied six pilot cases concerning foreign material exclusion (FME) in the fuel pool area and reactor cavity. Analysis of possible improvement with respect to these cases has been carried out, and a report circulated among the departments for comment. Experience feedback from Vogtle NPP has also been evaluated.

A procedure with definitions and requirements for work in FME zones has been developed, as well as a list of tasks that should be carried out in accordance with this procedure. The procedure will be partially implemented during the next outage and fully implemented in the outage after that.

As part of the implementation process, various communications activities aimed at the departments and individuals involved are under way. In addition, briefings will be held before starting work under this procedure.

During team inspections, clear plastic was found in form of bags for protecting clothing and covers for documents/records. The use of clear plastic should be prohibited in fuel pool area as soon as possible.

Conclusion: Satisfactory progress to date.

4.5(2) Issue: Some specific maintenance and support activities are not being performed to acceptable industry standards or in accordance with management expectations. Insufficient management and supervisory oversight is contributing to these weaknesses not being identified and corrected. Lack of understanding of expectations and knowledge level also contribute. Many of these activities are performed by the general services unit.

The following are examples of areas in need of improvement :

Activities are performed near the spent fuel pool without minimizing the potential for foreign material entering the pool. [see issue 4.5(1)]

Radiation protection associated activities in the fuel building did not minimize exposure or the risk of spreading contamination. [see issues 6.2.(2), 6.4.(1)].

Radioactive waste building activities and conditions do not consistently minimize the risk of exposure and contamination spread through good work habits, proper storage and housekeeping.

Lead shielding installation was hung on a pipe sufficient to deflect it without analysis.

The safety of job sites is sometimes reduced by poorly placed barriers and signs.

Lifting slings in the electrical shop are not marked to show test validity as they are in other areas of the plant.

Some welding rods and filler materials were not properly stored or controlled to prevent inadvertent use.

Inadequate performance of these types of activities could result in inadequately maintained equipment and the lack of minimizing personnel hazards.

Recommendation: The plant should identify the causes of weak performance in the above area and strengthen oversight of maintenance and support activities to ensure causes are eliminated and management expectations are met.

Plant response/action

Management presence in the field, and the involvement of staff, have enabled progress to be made in work performance :

- the plant is in first place in the radiation protection challenge,
- the plant's move from last place in the industrial safety rankings at the end of 1998 to a place among the leaders at the end of 1999 symbolizes how industrial safety has been taken into account (through an identification- and correction-based approach) in maintenance and support activities.
- In addition, a review of behaviors has been initiated in the longer term. Analysis of the reasons behind quality defects has identified the following principal root causes :

- inadequate acceptance and implementation of monitoring,
- an incomplete questioning attitude in professional practices (regarding performance of comprehensive analyses, and confirmation).

A progress initiative has been implemented with the participation of the players concerned, based on the malfunctions identified as potential causes of quality defects.

Quality Assurance with respect to activities in the field of industrial safety/radiation protection and General Services has undergone certain modifications. The organizations have been changed, becoming more similar to those adopted within the Mechanical Maintenance department, and are adapted to the increases in expectation levels (in terms of engineering, planning and performance). Professionalism has also been consolidated via recruitments and job function recognition.

The Decree of December 24, 1998 makes optimizing radiation exposure levels a mandatory requirement. An ALARA methodology guide has been prepared. Incorporation of these elements into the plant's ALARA training course should further improve our 1999 results, which were already satisfactory at 0.272 man-millisieverts per unit per year.

Some specific points arise in response to the findings :

With regard to lead shielding, there is a general procedure which makes provision for placement of shielding, including analysis. Specific placement and removal dossiers will be used in the next outage. An analysis is carried out for each dossier.

Monitoring of slings is carried out by an approved external body. Following the OSART, labels were placed on slings which previously had none. Affixing monitoring labels ensures compliance with test frequencies.

Welding operations on equipment subject to special regulations are subcontracted, and include the supply of welding materials. As a result, such activities must comply with the requirements of the 'Technical Specifications and Conditions' (CSCT), and must be monitored as part of contractor monitoring procedures. No procurement requests, and therefore no storage requests, can be made for this type of material. Metals in store in the warehouse will only be used for so-called 'hardware'-type activities which are subject to no specific requirements in terms of statutory regulations.

IAEA Comments

The plant has responded to the recommendation in several different ways to deal with analysed causes. The General Services section is undergoing a reorganisation process to improve staff motivation, management environment and the structure of work processes. The Senior Management has recognised the importance of the section's work, and work processes are to be formalised in the same way as in other maintenance sections. Work preparation and planning will be improved and quality plans implemented. More free quality time for first line supervisors to manage their staff in the field is one of the objectives of the changes. The importance of this section's work has been communicated to other departments to strengthen the motivation of its staff.

In other areas mentioned in the issue, actions have been taken or are in progress to label slings, work site references, and improve work practices in the fuel pool area and handling of welding materials.

However, during the team's field observations, improper storage of welding material was found in a storage area at the turbine deck level in unit 2 (the material was immediately removed). Room for improvement was also identified in work practices in the fuel pool area unit 1.

Conclusion: Satisfactory progress to date.

4.7. WORK CONTROL

4.7(1) Issue: The installation of temporary radiation shielding and possibly the temporary additions to areas containing safety related components may not be classed as temporary modification. This could lead to unanalyzed inadvertent modifications being made to critical systems.

Radiation shielding blankets were hanging on a pipe in the unit 2 spent fuel pool clean-up room to the point that the pipe is significantly deflected. In addition, bare lead sheet has been placed directly on a stainless steel line on the unit 2 pool circuit and has been wrapped around a major stainless steel pipe associated with a charging pump on unit 1.

Placing lead shielding on components can significantly increase stresses, cause a chemical reaction and or change the dynamic response of components leading towards an unanalyzed state.

The EDF manual on temporary modifications (DMP) does not address radiation shielding. The application of shielding could be considered by some as not affecting the system. It therefore would not be considered applicable to existing processes designed to ensure the appropriate scrutiny is applied to any modification.

A temporary heater mounted on a moveable trolley was found installed in a Unit 1 changing pump room. The heater had been installed to ensure the room temperature remained above a certain value to ensure boron solubility. It was uncertain whether the physical existence of such equipment in the same room as safety related equipment had to be analyzed.

Any unapproved temporary modifications in the vicinity of safety related systems could lead to unanalyzed conditions on critical systems.

Recommendation: The plant should adopt a policy to ensure that all changes, minor and/or temporary, to safety related equipment is analyzed before implementation. This should include any additions of temporary shielding or the introduction of non-standard equipment to rooms containing safety related components.

Plant response/action

Provisions for management of specific temporary devices and measures (DMP) are intended only to take account of the power plant's operational equipment.

In accordance with corporate-level directives, the power plant has a quality organization which ensures that any modifications, including minor ones, to safety-related equipment are analyzed prior to implementation.

Lead shielding does not fall within this type of activity. However, an analysis must be carried out before placement of such shielding. The impact of any significant increase in stresses, of any modification in the dynamic response of the safety-related equipment being protected by the shielding, and of any chemical reaction with the stainless steel must be taken into account. This will form part of the risk analysis carried out prior to placement during the next unit 2 outage.

With regard to lead shielding, there is a general procedure which makes provision for placement of shielding, including analysis. Specific placement and removal dossiers will be used in the next outage. An analysis is carried out for each dossier.

Specific solutions are analyzed on an individual basis, including in particular the production of specific framework supports, and will be fed into the experience feedback loop for unit outages.

IAEA Comments

A document was recently issued (03 January 2000) stating the requirements for installing permanent and non-permanent lead shielding. Before installation, the impact of lead shielding on safety related equipment has to be analyzed according to this document. The document specifies how to proceed if the installation of lead shielding is intended to be permanent during operation, or if it is used temporarily during outages. Two cases of permanent installation of lead shielding and two cases of non-permanent lead shielding were presented. A logbook for non-permanent installations has been set up, and so far, contained the two above-mentioned installations. A special sign will, in future, be posted on all non-permanent lead shielding.

The plant has concentrated its effort on formalizing installation of lead shielding, but insufficient consideration is given to seismic requirements for non-permanent installations. The installation or placing of other equipment not covered by modification procedures should also be covered by similar requirements.

Conclusion: Satisfactory progress to date.

5. TECHNICAL SUPPORT

5.1. ORGANIZATION AND ADMINISTRATION

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. Although this results in a fragmented structure, the interrelationship between elements of technical support appeared well understood by those staff interviewed by the team. Additionally, targets and accountabilities are set via a formal system of mission statements and contracts between staff and their managers to secure a sound structure for progress monitoring and accountability review.

A result of fragmenting technical support processes places significant challenges on the plant to coordinate and achieve consistent quality in these activities. To control this, the plant has adopted a structure of operational networks targeted at specific areas of activity to provide cross functional forums which allow a coordinated approach to managing specific processes. Several of these networks have direct relevance to technical support, and appear to be working well. Their effectiveness is considered critical to the success of many technical support activities within an organization with a mixture of vertical and transverse management structures. An important feature of the networks is that they do not have significant authority, or control resources in their own right, this being under the control of line management within departments. In these circumstances the quality of leadership on, and cross-departmental support for the networks will be essential to their success and the effectiveness of the technical support processes.

Of particular importance to the success of plant technical support effort is the liaison with corporate departments, which impacts all areas of activity. Corporate staff contributed to the review in all these 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. To maintain and enhance this relationship it is important that each side of the interface continues to challenge the other strongly to ensure the quality of service and support on safety related activities is always under review.

5.2. SURVEILLANCE PROGRAM

Corporate departments have generated the surveillance program on behalf of plants, each department having its own quality arrangements, but not necessarily supporting each other. For example, the surveillance rules are generated by Design and Construction Division and then forwarded to Central Services for the addition of any requirements from the Regulator. At present the system requires no complimentary check by Central Services of the rules supplied to them, and indeed in discussions there was no knowledge of the scope and content of the quality process employed by Design and Construction. There has been at least one case where an anomaly within the rules has been identified within the plant processes for validating rules, having passed through both corporate departments.

When the process of surveillance rule preparation and review was being considered, attention focused on the progress on the move towards the 18 month fuel cycle. It became apparent that although the technical specifications themselves (chapter 3 of the Nuclear Safety Reference Document, NSRD) have been approved by the regulator there are still a significant proportion of the surveillance test rules that are not, even though the regulatory authority intends to approve them

eventually. The team recommended that the regulatory authority should take the necessary measure to complete the review of the technical specifications as soon as possible [see issue 1.4(1)].

On site, engineering department plays a major role in validating the rules, which once cleared, pass to the implementing departments to write the surveillance test procedures and schedule the tests. There are several departments involved, each with apparent variations in the way they implement the process. This was unusual in the team's view, and could lead to variations in quality without a single point of focus reviewing and influencing such issues. Several surveillance tests were reviewed and examples were found of anomalies in completed tests. The team recommended that the process for managing surveillance test procedures with special attention to compliance with technical specifications be reviewed to identify root causes and correct them to prevent reoccurrence.

Of particular note was the scheme recently introduced by the plant to systematically record and analyse first time failures of surveillance tests and tests associated with plant availability.

5.3. OPERATIONAL EXPERIENCE FEEDBACK (OEF) SYSTEM

The plant has an extensive OEF system on site that is focused through the OEF Network which comprises the Engineering Manager, who acts as chairman, and representatives from each department. This group plays a key role in both the arrangements for dealing with events on-site and the interface with corporate OEF activities. The company has a hierarchical approach to event grading, that provides criteria and/or guidance to plants through three corporate procedures, DI's 19, 30 and 55. These address safety significant events, safety relevant events, and deviations respectively. Reporting, recording, information transfer and action tracking are supported by several databases, both corporate and local. In addition to the above event categories there is a significant population of general OEF events and issues. At the lowest levels of event detection there are several different mechanisms some of which vary from department to department, while others apply across the site.

A principle on-site is that departments analyze events that occur in their areas of activity, which can present a challenge to consistency of analysis standards. However, the OEF Network is seen as playing a very positive role in maintaining such consistency. What is apparent is that the diversity of information sources provides a large and significant volume of data, that as yet is not being made full use of to maximize the benefits from studying low level and precursor events. The team recommended that information should be reviewed from all available reporting sources to improve the analysis and level of use of the available data.

Several events were reviewed from the perspective of causal analysis and it was noted that the company has provided an event analysis methodology, and training has been given in this over the period from 1991. The commitment of the company and the plant to this is clear, but from the team's review it became apparent that although direct causes were invariably highlighted, the deeper, root causes were not consistently identified, principally in the human factors area. In addition, the time taken to complete some analysis report for safety relevant events is excessively long. The team recommended to strengthen efforts in this area.

In the event review it was clear that substantial effort is put into understanding events, particularly the more significant category. However, the event reports are kept as concise as possible and as such the supporting documentation in them is restricted. To support retrospective analysis of events

following possible repeat occurrences, or future audits the team suggested that, when events occur, an event file is formally raised to enable directly supporting information to be gathered and retained. It is further suggested that this file form part of the formal document structure on-site.

5.4. PLANT MODIFICATION SYSTEM

The principal area of interest within technical support is in the permanent modification system, although views are expressed on temporary modification systems which came under review during assessment of a particular event.

Corporate (Construction and Engineering, and Transmission Divisions) provides essential company requirements in the administration of permanent modifications within a guide book (Guide de l'Ipe, 1994), with each site basing its local procedures on this. Temporary modifications do not form part of this guide. The underlying principle of the guidance is that plants do not carry out safety related modifications, these being originated by corporate. However, although this is a principle, plants are given the freedom to implement safety significant modifications, which at this site are administered in accordance with local procedures, always involving the Technical and Safety Committee.

Engineering department is seen as having a key position in the permanent modification process with their overview of the station safety case, knowledge of engineering standards and independence/distance from actual modification implementation. This depth and breadth they bring to the network is considered highly beneficial for the oversight it brings, and should continue to contribute to the maintenance of safety standards. The engineering network is an essential feature of the modifications system since it is the single point of focus through which on-site modifications review is coordinated. The chairmanship of the engineering network by the technical support manager is considered a positive feature since through this safety engineering standards can be promoted.

In reviewing one permanent modification it was made clear that the change on safety related plant involved had been carried out as a temporary modification some time in advance. This event coupled with another through which a significant plant deficiency had been treated through the plant deviation process, rather than as a temporary modification, caused the team to review the temporary modifications issue. It is clear that within formal plant processes use of one of two separate temporary modification processes (for mechanical, and I&C sections of maintenance department), or the deviation process is considered acceptable to address temporary conditions that impact nuclear safety. Further, on the basis of the limited review, it was clear that with one exception those processes had been complied with, and consequently the team concluded that the processes, although fragmented were being adhered to. Additionally, the plant has indicated that these areas have been reviewed in the past, although the team is unaware of the plant's plans in respect of continuing this beneficial process.

5.5. REACTOR ENGINEERING

Reactor engineering activity on site is considered to be adequately resourced, and the staff interviewed demonstrated a sound appreciation of the importance of their role in ensuring reactor safety. A structured program of corporate training, which particularly focuses on physics testing supports staff competence. One such module is run on a simulator based at the Paluel site. The approach to off-site training is considered good. In addition, the reactor engineering team undertake

training locally just prior to going into outages, to ensure the infrequently carried out surveillances associated with zero power and startup physics testing are well prepared for. This training incorporates familiarization with procedures, and confirmation that those procedures have incorporated operating experience and changes to surveillance rules.

A significant event was that had occurred on site in September 1997, when an application that calculates core parameters important to fuel cladding integrity was not initialized at reactor startup. The plant took the event particularly seriously and took steps to ensure it would not be repeated, as well as launching on a cross site review of safety significant computer applications.

The overall view of this area of activity was competence, good involvement with associated areas of activity and a willingness to learn from experience. This is considered to be a sound situation in an area of work that, without care, can become isolated from other functions on site.

5.6. FUEL HANDLING

The practical administration and handling of fuel is carried out within the Support Services Section of Generation Support Department. This strategy of restricting responsibility for the fuel to one section is considered good since it establishes clear accountabilities in a sensitive area. The front and back ends of the fuel cycle are the responsibility of corporate who contract with the monopoly fuel supplier Framatome for the manufacture and delivery of new fuel, and Cogema who take delivery of spent fuel for reprocessing. There appears to be a sound level of liaison between the site and corporate, the latter taking part in inspections at the manufacturer's works and review of fuel performance data provided by the plant.

Support Services Section start work on the fuel as it is unpacked and goes through various statutory and quality checks before being lowered into the fuel storage pool. Inspections on the new fuel are carried out against identified acceptance criteria with a representative of the fuel vendor in attendance, and non-conforming fuel is stored in a purpose built dry storage facility until apparent deficiencies can be resolved. This process again appears sound, and analysis of failed fuel statistics suggest a good standard of quality assurance, by the vendor, by corporate and at site. However, a review of working conditions and practices in the fuel storage pool (FSP) (see Maintenance report) and discussions with staff have identified that no Foreign Materials Exclusion policy is in place, at least in the FSP.

Handling of the fuel both at delivery and during refuelling activities is carried out by trained and authorized technicians within Support Services Section who are responsible for operating the equipment, although there is an interface with shift operations staff who operate the isolating valves on the fuel transfer canal.

Training for staff involved in fuel handling incorporates off-site modules provided by corporate and on-site practical training which is refreshed before going into each outage. It was not clear whether the quality of this brief and the effectiveness of training are ever formally assessed.

5.7. SAFETY RELATED COMPUTER APPLICATIONS

Safety related computer applications fall into two areas - industrial data processing and management information systems (MIS), and different departments manage these. It was noted that the direct operational safety of the plant does not rely on any computer application. However, with software applications the definition of what constitutes 'safety related' is particularly important since the impact of these applications on safety may be subtle. It was further noted that both areas of computing had a consistent definition of 'safety related' that essentially focuses on whether the application is liable to impact compliance with safety criteria resulting from regulations or standards. This was considered to be a high level statement that is potentially open to interpretation. On further review, however it became clear that a questioning approach had been adopted to ensure that lower level safety related applications providing data relevant to compliance and safety related decisions had been identified. The local review of safety relevance is carried out well and is compatible with that adopted by corporate.

Corporate is responsible for both the quality of the software provided and the design of the support equipment. The plant's responsibility for corporate software is limited to installing the new versions supplied, and the quality of both maintenance carried out on support equipment and the databases used. For those applications provided by corporate, they carry out the assessment of safety significance. It was noted that the level of liaison between site and corporate is high which is essential to both ensure that the customers' views are taken into account when company wide applications are developed, and transmit feedback on the success of installations.

The plant experienced an event on a reactor engineering application that had no physical consequences, but infringed the limits on core parameters relevant to the integrity of the fuel cladding, and this was reviewed. As a result of this, the plant embarked on a review of all applications to confirm safety significance, and further to carry out a structured risk assessment on all those identified. This work, and particularly the structured risk assessment of software was considered by the team to be a good practice.

STATUS AT OSART FOLLOW-UP VISIT

The Engineering Department, working in close cooperation with the other plant departments, has made in general good progress in addressing the OSART recommendations and suggestions. Of the three recommendations, two have made satisfactory progress and the only suggestion was found to be resolved. One recommendation was not addressed sufficiently at the time of the follow-up mission.

Good efforts have been made to improve the surveillance tests procedures management and performance at the plant. The experience of Vogtle NPP in this area has been analysed by the Golfech Engineering Department. This department was reorganized in 1999 from a "job oriented engineers" department to a "function and elementary systems engineers" structure, to better serve other departments and plant management needs.

A thorough process has taken place to review the Corporate surveillance test rules and procedures and apply them at Golfech. As a result of these activities, a significant part of the plant surveillance test procedures had to be changed. The revision process is completed for unit 1 and the

implementation of the new procedures for unit 2 is pending final DSIN approval.

During the OSART follow up mission, records from the surveillance tests performed in 1999 were reviewed on a random basis. No significant anomalies were observed in the completed tests. However, during one of the periodic tests, observed by the team, several deviations from international good performance practices were noted and the team recommends that further efforts be made to improve the surveillance test performance.

Considerable actions have been taken to reduce the excessive delays in completing CRIS reports and applying root cause analysis methodology for event analysis, which effectively addresses human factors. However, in 1999 most of the reports were still not completed within the two-month deadline and some inconsistency in the event assessment process were identified. Plant efforts to fully resolve this issue should continue.

Appropriate actions have been taken by the plant and the issue concerning the event analysis records filing and storage is resolved.

The plants efforts to more effectively use information on “low level” events should be reconsidered since there was no evidence of more effective use. Insufficient progress was no made on this issue.

DETAILED TECHNICAL SUPPORT FINDINGS

5.2. SURVEILLANCE PROGRAMME

5.2(1) Issue: There are various aspects of the management and implementation of surveillance test procedures that could compromise technical specifications compliance.

Examples of these fall into the following three areas:

- A completed surveillance test procedure (STP) was found that had been carried out with the incorrect issue of the procedure. The procedure that was used had been superseded for four months.
- The completeness and quality of surveillance test results do not always support effective operability determination. STP's were found approved with missing sheets, with values that did not meet the stated acceptance criteria, and with values that had been altered without comments and were difficult to read. These tests were signed off by the shift supervisor and shift manager. Some examples of deficiencies found are:
 - A test carried out on Unit 1 LLS was signed off by the field operator, control room supervisor and shift manager as successfully completed even though some acceptance criteria were apparently not met.
 - During a safety injection system surveillance the shift operator did not check that activities on train A had been completed, as required by the procedure, before starting work on train B.
 - A RPR test was carried out using worksheets based on those from another plant with a different organizational structure and part of the test was not performed.
- In the conduct of STP's, "informal methods" are sometimes used to identify key limiting factors rather than inclusion into the STP. An example was found where a limit required by the regulator was on a copy of a fax but did not appear in the STP.

The deficiencies identified above could lead to inadequate operability determinations, non-compliance with technical specifications and failure to comply with regulatory requirements.

Recommendation: The process for managing surveillance test procedures from issue to completion, with particular attention to compliance with technical specifications, should be reviewed to identify root causes of deficiencies and rectify them to ensure they do not reoccur.

Plant response/action

The plant has reviewed and changed its management of surveillance testing. An exhaustive study on this topic has been finalized and is currently used as a reference guideline. The scheduling of surveillance tests is now computerized in a Sygma module and tracked for delays by the TEF Unit in Operation Project.

Each department carries out internal checks and analyzes the surveillance test results before the deadline stated in the TechSpecs, in line with the plant organization.

As to rigorous performance and supervision, plant management has made this area one of its three top priorities for the year 2000.

An approach to professionalism campaign has recently been launched. The system for performance recognition and improved professionalism should encourage plant staff to be more efficient, all the more so than line management is now involved in the implementation of the means necessary for skills acquisition.

Moreover, thought is given to better accounting for and correcting human errors.

IAEA Comments

Good efforts have been made to implement proposals seen at the time of the OSART and to improve the surveillance tests procedures management and performance at the plant. After the OSART mission the Regulatory Body intensified its review and evaluation of the new Corporate surveillance test rules and good progress has been done in the approval process. The Engineering Department has gone through a thorough process for reviewing of the Corporate surveillance test rules and procedures and applying them at Golfech. As a result of these activities a significant part of the plant surveillance test procedures had to be changed in the Operations department. The other departments also had to modify some of their surveillance tests to comply with the approved rules. The process for the revision of the plant surveillance test procedures is completed for unit 1. The new surveillance procedures have also been developed for unit 2. Their implementation will be done before the refueling outage in April this year, pending final DSIN approval.

In order to enhance and coordinate the surveillance test procedures revision process the Engineering Department has developed a guidance to be used by each department on management and supervision of the surveillance test activities. The Engineering department itself was reorganized in 1999 from a “job oriented engineers” department to a “function and elementary systems engineers” structure, to better serve other departments and plant management needs.

During the OSART follow up mission records from the surveillance tests performed in 1999 at unit 1 for Diesel Generators, High Pressure Injection and Low Pressure Injection systems have been reviewed. No significant anomalies were observed in the completed tests. However, during the periodic test of the operability of unit 2 Electrical Building Smoke Exhaust System (DVF), observed by the team, several deviations from international good performance practices were noted.

The team concluded that although much valuable work has already been done at Golfech in the area under consideration, the plant should continue its efforts and activities to ensure the complete resolution of the issue.

Conclusion: Satisfactory progress to date.

5.2(a) Good practice: First time failures to tests required by technical specifications, other safety rules tests, and tests supporting availability are systematically recorded and analyzed. The plant has formalized a system to monitor first time failures of tests the details from which are maintained on a plant developed database. This enables summaries to be prepared which identify test details, dates of test failures, work order numbers to enable tracking of the associated defects, and the urgency of the response. Surveillance test first time failures are place on the plant “Top Ten” priority list and consequently under weekly management review. The database is a recent development, but has already highlighted recurrent problems with a feedwater valve, and position microswitch unreliability on main steam isolating valves on both units. Additionally, issues have been identified on emergency lighting and phones. As well as supporting detailed analysis against plant items and systems, the database can be used to provide ‘bulk monitoring’ trends which will be a useful management tool as the level of data builds up. Although insufficient data exists at present in the database, as it becomes more densely populated it will additionally provide information to support probabilistic safety assessment.

If tests fail on technical specifications related equipment, then the data is put on the corporate operational feedback database (Saphir) since it may have relevance to other sites. The plant’s test failure database allows them to provide better quality information to enhance its value to other sites. Additionally, the data will support the work of the operational feedback network on site which undertakes an annual review of plant system performance

5.3. OPERATIONAL EXPERIENCE FEEDBACK (OEF) SYSTEM

5.3(1) Issue: The plant has several systems for collecting details of ‘low level’ events on-site. However, these are distributed around departments, and although extensive data is collected more effective use could be made of it.

Although the site has a variety of data collection initiatives for low level precursor events, the extensive information they generate is not fully used. This is collected in several systems which are individual to different sections and departments, as well as a system of reporting cards for plant issues available around the site in general. These systems provide a 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.

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. Consequently, access to such information is highly desirable from a safety perspective. Additionally, by involving the workforce in reporting low level events, and then encouraging them by demonstrating good use of the information they have provided, ‘ownership’ is strengthened. The information provided by a fully effective system such as this provides both a useful indicator to management, and a positive influence on safety culture.

Recommendation: A review of information from the various ‘low level’ event reporting systems around site should be undertaken and methods implemented to optimize those systems and improve the level of analysis and use of that data to avoid more serious events and support safety. Other plants have found it useful to maintain a common database to serve the site, usually administered by a single group.

Plant response/action

To answer the corporate nuclear division’s major stakes, i.e. nuclear safety and availability, the corporate Maintenance and Nuclear Safety Departments have developed jointly with EdF’s NPPs a module called “Failure modes and causes ” within SAPHIR. This module will collect, store and analyze experience feedback for the most significant equipment. It will make it possible to track the behavior of these major pieces of equipment, update safety probabilistic studies and reliability-centered maintenance reports.

The impact on plant organization has been investigated and a corporate instruction (ref. DI103) provides for its implementation at the plants in the year 2000. By next June, plant engineering will suggest how to organize the analysis of the events thus collected based on this method. With the first-level analysis carried out by operational departments, the new position of engineering - which now includes function and system engineers - will allow a macroscopic approach to such functions. Based on their yearly experience feedback report, each operational department will have to enhance selection and analysis of low level events in order to detect precursors as early as possible.

IAEA Comments

The plant continues to have several systems for collecting details of 'low level' events on-site. These are still distributed around departments, and although extensive data is collected there is no evidence that more effective use has been made of it since the OSART mission.

The team was informed that some efforts were made by the Engineering Department in 1999 to develop a plant specific strategy and software for "user- friendly" collection and analysis of "low-level" events. These activities were interrupted after receiving the Corporate instruction DI 103, requiring a newly developed module called "Failure modes and causes" within SAPHIR to be used for experience feedback analysis. Golfech plant management has been requested by the Corporate level to prepare, by June 2000, a proposal on how Golfech NPP should comply with the DI 103. Only after this will it be possible to reconsider the issue with the "low-level" events analysis.

Based on the presented information the team was not able to conclude that effective actions have been undertaken to resolve the identified issue.

Conclusion: Insufficient progress.

5.3(2) Issue: The approach taken to plant event analysis does not consistently achieve the depth necessary to identify root causes. In addition, the time taken to complete some analysis reports for safety relevant events is excessively long, and could impact on a timely response.

The plant uses corporate guidance on event investigation to analyze the development of an event, and its causes, and it is recognized that EDF has provided training to plant staff on event analysis techniques. However, on reviewing events, particularly those with a significant human factors content, it becomes apparent that inappropriate actions are identified as well as direct causes, but root causes are not consistently assigned. The reason for this is that the guidance followed does not incorporate a root cause methodology that addresses human factors issues.

The responsibility for event assessment lies with the affected department. The priority given to event investigation in safety relevant (CRA reports) events is often low, and consequently they can take an excessive time to complete. Of five examples reviewed in this category, four event investigations had taken between 5 and 18 months to complete.

By not consistently addressing root cause, there is a significant risk that underlying causal factors may be missed. As a consequence, remedial actions may not be fully effective in preventing related or repeat events in the future. The excessive time taken for analysis of CRA events can lead to remedial actions that are not timely and may lead to avoidable, repeat events.

Recommendation: A root cause analysis methodology which effectively addresses human factors issues should be put in place, and training given to applicable staff in this methodology. The plant should review its resourcing policy for event analysis to avoid excessive delays in completing event reports. It is anticipated that training in techniques and appropriate resourcing will alleviate the problems experienced with completing analysis.

Plant response/action

Each department has appointed a representative who belongs to the plant experience feedback network. This representative and those within the safety culture network are in charge of analyzing events that represent a major stake for their department. These resources apply a root cause analysis method and integrate human performance aspects. A document entitled “Personal fact sheet ” filled in immediately after an event has taken place will be the basis for data collection, which will be used for further analysis. This document was validated on January 25, 2000, by the plant Safety Technical Committee (GTS). A human performance-dedicated staff member within the Safety Quality Dept participates in this analysis. The department experience feedback representative complements his(her) training into event analysis in order to improve overall plant - level analysis.

The 2-month deadline set for finalizing CRA reports is not always complied with although it is tracked at department level. Because of the significant workload resulting from the high number of CRIS and CRA reports, it was not possible to comply with this 2-month deadline in 1999. Analysis of workload, organization, priorities and training should make it possible to determine areas for

improvements on a departmental basis, so that we are in a position to comply with our commitments. A summary and communication document was submitted to the GTS meeting held on Jan. 25, and is now used as a work basis : since it will simplify CRA reports, it should lead to reduced delays.

IAEA Comments

Since the beginning of 1999 revision No 4 of the Corporate guidance on root cause analysis methodology has been used by the plant to analyze the development of an event and its causes. The plant staff noted that this new revision of the guidance takes into consideration the recent relevant industry developments and incorporates a root cause methodology that addresses human factors issues. Special training in this methodology was provided or is planned for concerned staff including the members of the plant Safety Technical Committee (GTS). From the overall review of the 1999 CRIS reports it appears that there is still some inconsistency in identifying and recording of the results of the root cause analysis performed for particular events, but in general good progress has been made.

The plant has reviewed its policy for event investigation so as to identify the root causes of the excessive delays in completing event reports. As a result of this review, needs for additional support resources and staff training were identified and provided. Two additional staff members, one from the Engineering Department and a Safety Engineer, together with a Human Factor Analyst are now assigned to support, on a systematic basis, the report drafting and event analysis for CRIS records. Although the actions taken have allowed the plant to significantly reduce the time needed for completing CRIS reports, most of the reports for 1999 were not completed within the 2-month period set as a deadline by the Safety Authority. It appears that in some cases, most of the delay occurred after the reports had been presented to GTS meetings.

Completion of the training planned for all the staff concerned, as well as optimization of the event report drafting process should resolve the issue.

Conclusion: Satisfactory progress to date.

5.3(3) Issue: Backup event documentation which details supporting information to the event report is not maintained and consequently the plant's ability to undertake self-assessment, or support third party audits is impaired.

The content of event reports in terms of supporting information for causal determination is limited. As a consequence, actions placed from reports are frequently not explicitly limited to the report analysis. In this situation it is important to retain at least an intermediate level of supporting information to justify the analysis and action taken.

The impaired ability of the Plant to carry out self-assessment will restrict its ability to return to an event and effectively reconstruct the detail. This is important if suspected repeat event(s) have occurred, or a third party audit is to be undertaken.

Suggestion: The plant should consider implementing requirements to keep event files as plant records within the document control, or other appropriate, formal systems.

Plant response/action

A draft memo lists the documents that are necessary to create a file for a CRIS or CRA event analysis. This document shall be submitted to the Feb. 8, GTS. This memo identifies the various elements that have to be included in the analysis file.

These analysis documents include details of the event reports: they will be stored in a file and may be obtained from the analysis supervisor during the investigation stage. After the CRIS or CRA report is validated, its writer hands it out to the document center for archiving, together with the relevant checklist.

IAEA Comments:

During the plant Safety Technical Committee meeting on 8 February, 2000 the above mentioned requirements to keep event files as plant records within the formal document control system were identified and approved. The content and format of the event analysis files were also approved at the same meeting. Although tangible results from the implementation of the new requirements should be observed in the future, the team concluded that the actions taken by the plant address the issue.

Conclusion: Issue resolved.

5.7 SAFETY RELATED COMPUTER APPLICATIONS

5.7(a) Good Practice: After an event on a safety related computer application the plant decided to undertake a comprehensive review of all local applications to identify which are safety related. To carry out this work, the plant have developed a structured quality plan which incorporates a useful risk assessment methodology, which they have developed on-site. This methodology provides a consistent, basis for safety assessment, and reviews failure modes and significance. This is especially helpful in identifying sensitive applications and prioritizing any improvements required.

6. RADIATION PROTECTION

6.1. ORGANIZATION AND FUNCTIONS

The radiation protection programme defined by national radiation protection organizations at corporate level such as the radiological protection committee, the scientific advisory board coordination group and many others is well established, structured and effective. There is an independent radiation protection department under the authority of the national nuclear power plant operations department, called Industrial Safety Radiological Protection and Environment (DSRE). This department is delivering high grade technical support, advising on radiological issues (e.g. alpha contamination), External Experience Feedback (ISOE), and independent modification reviews to the plant. The main responsibilities of the Golfech industrial safety & radiation protection department are to coordinate risk avoidance policy, to provide assistance, advice and surveillance on safety and radiation protection activities, to provide training and analyze safety events.

This department has no direct operational responsibility, which, as defined in plant procedures, lies with maintenance, operations etc. The department has an advisory and controlling function for radiation protection procedures and documents. These responsibilities are clearly understood by supervisors and staff.

Since the standards are established at corporate level, the industrial safety and radiological department is not involved in their development, only in implementation and control.

To improve the implementation of the safety and radiological standards and objectives, the plant developed an evaluative programme called “Challenge” which is a very helpful tool in coaching and assessing the staff performance in the execution of management expectations from the radiological health and safety department.

The plant management provides policies, criteria and administrative limits, as well as goals and objectives. Management expectations are all communicated as personal performance based individual contracts (lettre de mission) between the hierarchical levels from department manager to supervisor (contremaître). However, supervisors do not spend sufficient time in the field. The team feels more emphasis could be given to better communicating these objectives and expectations to the workers and correcting inadequate practices and behaviors in the field.

The application of the ALARA principle is based on the policy of “self-protection” and personal responsibility. This rule is considered by plant management as the foundation for avoiding risks related to ionizing radiation. Even though the plant is performing very well in relation to individual and collective dose targets, there could still be improvements made on ALARA aspects concerning work preparation and follow-up. An important contributing factor to the very good dose results is the relationship with the contractors where the contractor companies agree to commit themselves not to exceed predefined dose objectives. These commitments are even stated in the commercial agreements.

6.2. RADIATION WORK CONTROL

Radiation work control is managed through a combination of radiation protection (RP) advice, work control documents and the MICADO computer code radiological control system, which controls access to the Reactor Controlled Area (RCA) and monitors and records doses.

Some radiation protection activities observed during the review are not in compliance with plant procedures and in some cases activities are carried out without the use of procedures. The team recommended that radiation protection activities be conducted in accordance with plant procedures.

In accordance with good international practices procedures are established to ensure that individuals are free of contamination before leaving the plant. However, the exiting and undressing process for leaving the RCA does not always minimize the potential for contaminated people reaching the final monitor. In addition, in some cases, potentially contaminated clothing is reused for subsequent visits to the RCA, which could result in the spread of contamination or personnel skin contamination. The team suggested improving some of these practices.

It is recognized that the plant decontamination and housekeeping efforts are very effective in maintaining the controlled area free from contamination. Surveys performed during the mission did not detect any existing contamination outside the controlled area. However some contamination control practices inside RCA do not minimize the opportunity for spread of contamination or transport of low level radioactive material to clean areas of the plant. Not all access points to radiologically controlled work sites have adequate manual or automatic personnel contamination monitors available. The team recommended that contamination control practices be implemented, understood and strictly enforced inside the RCA.

The ALARA principles are applied at the plant to both individual and collective doses. The primary responsibility for optimizing personnel radiation exposure is assigned to the supervisors that are responsible for the work performed in the RCA, such as maintenance supervisors. Although the ALARA principles are clearly defined in a plant organization procedure, work methods used to plan and prepare the activities performed in RCA are sometimes inadequate to minimize the dose. Observation of work within the radiation waste storage and the spent fuel buildings indicates that some personnel do not always ensure doses are ALARA and limits for taking additional radiological precautions are not always apparent. The team suggested improvements in this area and setting up an evaluative and more formal system to control the ALARA process to facilitate potential dose reduction.

6.3. INTERNAL RADIATION EXPOSURE

The plant is well equipped to perform measurements of internal contamination. There is a very thorough and effective whole body counting (WBC) program (Dosicut). Only two out of 1500 WBC were found internally contaminated which compared to international values is very low. The fact that 34 people in 1998 when entering the plant, were found to be contaminated is a proof of the programme effectiveness. The contamination was found on clothes or on small items such as badges etc. This initiated a national wide campaign to measure and evaluate external contamination controls.

6.4. INSTRUMENTATION, EQUIPMENT AND FACILITIES

The plant has sufficient portable and fixed instruments for normal operations and outages. Contractors perform instrument maintenance and calibration. Good records are kept of location, issue and calibration. With regard to radiation monitoring, the plant still has many radiation instruments calibrated in Rem rather than in Sv. This can lead to confusion in interpreting dose and dose rates. The team suggested to considering a plan to convert to the usage of one set of units only.

The plant has a sufficient supply of protective equipment and material. Facilities for storage of protective equipment and laundering of protective clothing are adequate in space and well maintained.

6.5. PERSONNEL DOSIMETRY

Whole body external doses are well controlled by the use of electronic dosimeters and film badges. Dose and time of entry and exit from the reactor controlled area (RCA) is recorded on the dose and control system called MICADO. The fact that a significant fraction of staff are not complying with procedures in the use of RCA entrance and exit codes and punctuality of returning film dosimeters is placing an unnecessarily heavy administrative burden on the radiation protection department.

6.6. RADIOACTIVE WASTE, STORAGE AND DISCHARGES

The total annual radioactive effluents released are very well controlled and the total is one of the smallest amongst French nuclear power plants. These good results are mainly obtained by use of a system to reduce the activity of water in the various sumps in RCA by using a mobile filtration system. Liquid effluents are effectively treated by using existing facilities. Due to the strong commitment of staff to effluent management optimization considerable reductions in amount of possible solidified radioactive waste and processing costs-have been achieved. This was considered to be a good practice by the team.

Objectives and goals for reducing the amount of the activity in effluents are a part of the management contract. Although good results are obtained concerning the reduction of the release of liquid and gaseous effluents, ALARA practices in the area used for sorting and processing solid radioactive waste could be improved.

6.7. RADIATION PROTECTION SUPPORT DURING EMERGENCIES

The support of radiation protection during an emergency is more than adequate. The procedures and equipment are very well established and there are extensive communication facilities.

Since at corporate level it has been decided not to take any post accident samples, there is also no program to reduce the dose and enhance the safety when taking those samples.

Even though according to EDF accident analysis there is no need to take post accident samples. At corporate national level studies are in progress to determine what levels of dose can be expected in the auxiliary building and laboratories in case of design and beyond design based accidents.

STATUS AT OSART FOLLOW-UP VISIT

The newly formed Risk Prevention Department working along with other plant departments has made good progress in addressing the OSART recommendations and suggestions for improvement in the radiological protection area. The two recommendations and one of the suggestion were making satisfactory progress. Two suggestions were fully resolved.

The additional emphasis the station has placed on radiological protection was clearly obvious. Expectations for performance have been clarified and seem to be well understood. This has contributed significantly to the improved performance in this area.

Efforts to improve contamination control have brought about good results as demonstrated by the results achieved. Most noteworthy areas of performance were in the areas associated with radiological cleanliness. However, additional improvements could be realized through continuing emphases on compliance with expectations and timely improvements to the exiting area when people are leaving the RCA.

Golfech has the best results for radiation exposure in EDF and the current efforts to improve the ALARA programme could serve the station well in further minimizing exposure.

DETAILED RADIATION PROTECTION FINDINGS

6.2. RADIATION WORK CONTROL

6.2(1) Issue: Some radiation protection associated activities are being performed either not in compliance with plant procedures, or, in a few cases, without the use of procedures.

The following are examples:

- Radiation and contamination surveys were conducted without the use of or reference to the procedures. This resulted in some of the weekly survey points being missed.
- On numerous occasions, plant staff entered potentially contaminated areas without proper protective clothing or exited without first removing the clothing. Many also exited the area without performing the required checks for personal contamination.
- Plant procedures allow visitors to access the controlled area provided they are accompanied by a trained and qualified person. During the mission an interpreter was asked by radiological protection staff to enter and leave the controlled area alone. She had not received training on the use of contamination control monitors or exposure measuring equipment and had to ask for help after departing the area.
- It is required that ear protectors be cleaned and checked for contamination after use. On several occasions, ear protectors were returned to a container for reuse without being checked for contamination.
- The film dosimeter is to be worn with the electronic dosimeter turned to the outside. An RP officer on duty, a storage man, and a worker from general services were wearing the film dosimeter in the wrong pocket. When questioned, several plant staff were not knowledgeable of how the dosimeters were to be worn.
- When exiting the spent fuel building, workers, staff and supervisors left the area without checking themselves for possible contamination. This is against management expectation of “autoprotection” that states that everybody leaving a possible contaminated area such as the spent fuel building should check themselves for possible contamination.
- When performing inventory checks on the solid waste barrels for transportation, the worker did not follow the radiation protection procedure. He did not wear an additional radiation monitoring device that can alert him to the presence of high radiation fields.

The plant had recently identified a concern with the lack of compliance with radiation protection form to fill before taking out equipment from the radiation controlled area. Ten percent of these documents were not adequately completed.

A major contributing factor to the lack of correction of deficiencies could be the observed absence of managers and supervisors in the field. In addition, supervisors reported that administration task limits their presence in the field to 10-20 percent of the time.

Failure to comply with procedures may result in unnecessary exposure or the spread of contamination.

Recommendation: Management should ensure expectations for radiation protection associated activities are clear and conducted in accordance with plant procedures.

Plant response/action

Priority has been given to clearly laying down the basic rules of risk prevention. As part of a second phase, specific worksite risks will be analyzed.

A certain number of actions have been carried out so as to improve prevention in the area of radiation protection and to make sure that rules are adhered to:

- a reference standard has been written, clearly stating the basic rules (*).
- the radiation protection section has been reorganized into the Risk Prevention Department so as to enhance the importance given by plant management to risk prevention.
- management check that standards are applied, in particular through presence of plant management in the field via the ‘blue hard hats’ initiative. In addition, the Risk Prevention Department checks that risk prevention rules are applied as part of the tasks that are allocated to it,
- following on from the implementation of the radiological cleanliness plan at the corporate level, a project leader monitors plant actions, a plant management advisor for cleanliness and the environment has been appointed onto the plant management team and a cleanliness and environment committee enables both internal and external environmental improvements to be coordinated,
- in 1999, Golfech had the best results of any EDF plant in the radiation protection challenge (internal contamination, contaminated clothing, fuel transportation issues), synonymous with the fact that contamination is being contained,
- better collective radiation exposure performance, indicating improved awareness at the plant,
- a second effort is now focusing on specific worksite risks.

* These rules are listed in a pocket-sized booklet.

A communication campaign for both EDF and contractor personnel was given to coincide with the document.

IAEA Comments

Station management has increased the emphasis placed on radiological protection which has included reorganization and the addition of positions to perform in-field supervisory oversight of radiological protection activities, radiological work planners and a project manager for radiological cleanliness. The station investigated the causes for this weakness and found a major root cause of procedures not being followed to be a lack of awareness of requirements and expectations of the procedures. Also contributing to this was a lack of clarity in the requirements and some requirements not being suited to the actual work.

General requirements have now been clarified and provided to all staff and contractors via a pocket size book and through reinforcement of the standards using verbal communications in each department. The general employee training programme is also being used to communicate the requirements. However, this training has not yet been provided to all station staff. Observations in the radiological protected area revealed a general improvement in compliance with radiological procedures.

Conclusion: Satisfactory progress to date.

6.2(2) Issue: Some contamination control practices do not minimize the opportunity for spread of contamination or transport of low level radioactive material to clean areas in RCAs. Nevertheless, it is recognized that the plant decontamination and housekeeping efforts are very effective in maintaining the controlled area free from contamination.

Some personnel were observed not putting on or removing the required protection clothing when crossing contamination control boundaries. This occurred in several areas of the plant including contaminated areas. For example:

- A demarcation area had been installed in the spent fuel building to prevent the spread of contamination in support of decontamination works. Instructions on the wall stated that additional protective clothing in the demarcated area should be worn. On several occasions, people did not dress properly as stated on the instruction board in that they did not put on over shoes or plastic gloves
- While working in a demarcation area in the fuel building, workers removed their protective gloves to make a phone call. This is against the plant policy which establishes that gloves should always be worn in the RCA.
- Personnel exiting posted contamination areas do not always monitor hands and feet for contamination.
- Plant workers are expected to survey for contamination materials that they intend to remove to the RCA exit. This practice was typically not done. Radiological Protection supervisors recognized this expectation was not met in an earlier report.
- Contamination control monitors are frequently used in a manner that would not permit the detection of contamination. This included moving the probe too quickly and at too great a distance and only checking one side of the hands.
- Contamination was detected on the shoes of an individual who was leaving the spent fuel building; there was no adequate demarcation of the possible contaminated area.
- Protective clothing is not consistently removed in a sequence that minimizes skin contamination.

Failure to follow proper contamination control practices increases the potential for the spread of contamination outside the radiologically controlled work site.

Recommendation: The plant should ensure that contamination control practices are implemented, understood and strictly enforced inside the RCAs to contain contamination at its source and minimize the potential for spreading to clean areas.

Plant response/action

Risk prevention reference standards have been written, widely-distributed to plant personnel and contractors and used during the sixth outage on unit 1 and during power operations. Application of these requirements is checked during management plant tours, and systematic action to correct the

discrepancy taken whenever a problem is observed. The blue hard hats worn by the senior plant management and the involvement of management/supervisory staff encourages adherence to rules.

The industrial safety challenge during the outage has given a big boost to the motivation of field workers and contractors alike; situations of jobs being done professionally along with no discrepancies are given recognition in front of all those working on that job.

The setting-up of a risk prevention reward scheme among all the groups at the plant and throughout the whole of the year will lead to long-lasting good practices both during power operations as well as during outages.

Giving annual risk prevention refresher courses about practices in the field will favour awareness and ownership of these standards. First training courses take place in January.

The study into a 'pilot scheme' worksite at Golfech (on the vessel head), covering the planning through to the actual job being done, will incorporate radiological cleanliness aspects.

A reference standard for RCA worksites is currently being examined. The aim of this is to :

- improve the containment of contamination at its source,
- enhance our radiological cleanliness,
- improve waste management at the source,
- inform those involved of the need to perform regulatory radiation exposure estimates,
- lay down requirements about closing out worksites.

IAEA Comments

Initiatives to improve contamination control practices have brought about many improvements in this area as demonstrated by the results. The additional in-field supervisory oversight and new annual practical refresher training in radiological protection practices should bring about additional improvements. While the controlled area has been well maintained relatively free from contamination and the ability to detect contamination has been improved, some practices continued to be observed that did not minimize the opportunity for spreading contamination. These included insufficient demarcation of a contaminated area to warn personnel or properly control entry and exit, lack of disposal of used protective clothing and leaving it available for reuse and protective clothing not being consistently removed in a sequence that minimizes skin contamination. Contributing to this is a lack of establishing expectations for removing protective clothing.

Conclusion: Satisfactory progress to date.

6.2(3) Issue: The exiting and the undressing arrangements when leaving the RCA do not minimize the potential for contaminated people reaching the final monitor. Good international practice requires that every effort is made to ensure that individuals are free of contamination before the check at the final portal monitor. In addition, in some cases, potentially contaminated work overalls are reused for subsequent visits to the RCA. However, surveys performed during the mission did not detect any existing contamination outside the controlled area.

The plant has a premonitor (C1) that is set at 9700 Bq as a first check. This is set at a significantly higher level than the final monitor (C2). In addition, it does not check for shoe contamination. Personnel must pass through the C1 premonitor to reach the undressing area. Once in the undressing area, potentially contaminated clothing and shoes are removed in a random manner with no controlled undressing process to limit the spread of potential contamination. Some workers who frequently visit the RCA remove their potentially contaminated radiation overalls and store them for reuse. Personnel then proceed from this area without passing an intermediate step over barrier to limit the potential for contamination reaching the final portal monitors. They then enter the final portal monitor which is set at 580 Bq. There have been an average of 20 decontaminations necessary each year as result of personnel alarming the final portal monitor which the plant relies on as the final barrier.

While the final portal monitor is there to ensure that no contamination exits outside the RCA above the allowed levels, inadequate undressing and monitoring practices could result in an unnecessary spread of contamination in the RCA. It should not be relied on to detect known contamination which can exist right up to the final portal monitor (C2).

When exiting the RCA, some workers pass through the final portal monitors with the materials such as books between their legs. This practice could result in contaminated materials leaving the RCA.

The practice of reusing work overalls which may be potentially contaminated inside the RCA could also result in the spread of contamination and personnel skin contamination.

Suggestion: The plant should consider re-evaluating the undressing and monitoring procedures in the zone located immediately before the exit from the RCA. More disciplined undressing procedures, the use of a step over barrier before reaching the final monitor and discontinuing the reuse of potentially contaminated work overalls should be part of this re-evaluation.

Plant response/action

It could be straightforward to review and opt for one type of undressing procedure. However, experience feedback about practices used is not homogeneous around all the plants. This is despite us working a lot, especially during outages, with national contractors working at all French NPP sites. A corporate reference standard, currently being studied, consists of setting up standardized practices thus maintaining the existing good habits but above all to make our expectations understood and adhered to.

As for our results, we were classified in first position in EDF's radiation protection challenge. Golfech is a clean plant and we are continuing our 'cleanliness and the environment' initiative. In September 2000, the site will be equipped with an additional detection monitor (C3), that will monitor all persons entering or leaving the site.

In addition, a study has been carried out into how people move around the RCA changing rooms, with an aim of avoiding having common areas for those entering and those leaving the RCA. To reduce the contamination risk from clothing, the C1 portal threshold should initially be lowered to 7,000 Bq. The thresholds on the C2 portal monitors and the 'small objects' monitoring device have already been lowered as far as is technically possible for this type of equipment. A reminder of good practices for exiting equipment from the RCA and for using the small objects monitoring device has been given; these good practices were applied for the last outage on unit 1.

IAEA Comments

The plant has considered improvements to the exiting and undressing arrangements when leaving the RCA. Plans have been formulated and approved for a two step process in making improvements. However, progress has been slow and no physical improvements have yet been implemented. The plan is to implement the first step of the improvement process before the next outage.

Conclusion: Satisfactory progress to date.

6.2(4) Issue: Work methods and the preparation of work activities performed in RCA do not consistently minimize the dose. It is recognized that the plant has low radiation exposure compared with other plants but opportunities exist for additional improvements.

Examples for work planning and conduct for ALARA improvement are as follows:

- Decontamination workers removed a radioactive bag from the spent fuel pool area that had a dose rate of 0.5 Sv/hr. The bag was carried over a distance of 40 meters to a lead shield. Bringing the lead shield into the fuel pool area could have significantly reduce the dose. When carrying the bag, the alarm level 1 from the radiation monitoring device in the spent fuel building went alarmed due to passing the measuring device with that radio-active bag at a distance of 2 meters. The personnel present in the spent fuel building did not react to the alarm, nor did the control room shift crew.
- Although the ALARA principles are clearly defined in a plant organisation procedure, there is no written procedure that includes a check list of the different tasks to be completed. Tasks that are not addressed include how to assess the minimum dose, how the follow-up should be organized, and how a formal evaluation is to be performed after the work has been done. How to elaborate an ALARA dossier is left to the informal approach of each supervisor.
- Work practices during radiation surveys do not include teledetectors to measure dose. These detectors have the same sensitivity and are available for technicians, and could be used, for example for measuring hot spots.
- The ALARA approach as well as the preparation is the same for any work whether the estimated dose is 1 or 100 mSv.
- In the radioactive waste building, a barrel for emptying oil is located close to a concrete barrel with a radiation dose of 30 mSv/hr. Moving the oil barrel to another place of storage, could reduce the dose for people emptying the oil. In addition, barrels and other radio-active materials are not stored in an orderly manner with consideration for dose rates and exposure that could be received during routine activities such as conducting an inventory.

As plant's age and the source term increases without having strong ALARA programmes, good radiation exposure control programmes can easily degrade.

Suggestion: The plant should consider reviewing existing ALARA practices for additional opportunities to reduce exposure. Consideration should also be given to a more formal system to control the ALARA process.

Plant response/action

A reminder of our results in 1999 : 0.272 man mSv / year / unit, better than the international standard.

The fundamental rules for optimizing radiation exposure have been formalized in a QA manual

document entitled : "Organization of radiation protection" dated 30th June 1999 (note 02004). The risk prevention reference standards document highlights practical requirements for all work performed in the RCA.

Furthermore, guidelines on ALARA methodology have been drawn up so as to formalize the ALARA process. It deals with the practical application of the ALARA initiative from the activity planning phase through to the experience feedback.

The aim associated with this document is to coach plant personnel in applying this initiative for carrying out activities under ionizing radiation conditions.

For each activity to be carried out under ionizing radiation conditions, it is now a regulatory requirement (decree dated 24th January 1998) to:

- evaluate beforehand the collective and individual radiation exposure values that the radworkers are likely to be subjected to,
- measure and analyze the radiation exposure values actually encountered during the operation,

In order to adhere to these requirements, two levels of investigation for have been incorporated into the plant organization for operations and maintenance jobs:

- **Level 1:** operations or maintenance jobs without an individual or collective radiation exposure risk will undergo a straightforward evaluation, followed by a quick optimization of the collective and individual radiation exposure.
- **Level 2:** a list of operations or maintenance jobs with a radiation exposure risk will be drawn up by each line management department, with the support of the craft counterparts from the risk prevention department. This ever-changing list will be constituted based on the following non-exhaustive criteria:
 - Overall radiation exposure value,
 - High ambient dose rate (orange and red zones),
 - Those crafts subjected to the highest radiation exposure,
 - Contractor companies that are subject to monitoring,
 - Radworkers having already reached one of the alert thresholds,
 - Radwork governed by the 'exposure – contract' principle ("Prorata Temporis")
 - New worksites,
 - etc.

All operations or maintenance jobs appearing on this list are subject to a detailed pre-job analysis, optimization of individual and collective radiation exposure, monitoring and experience feedback.

This approach was first applied from the planning phase for the fourth outage on unit 2. It will also be applied for work carried out in the RCA during power operations.

IAEA Comments

The ALARA process has been formalized as outlined in the plant response. The risk prevention department has composed a list of tasks (about 20 during outages and 15 for non outages) for which detailed prejob analysis and postjob analysis will be done. Other departments are preparing similar lists. A detailed estimate and exposure goal has been established for 2000 that is based on scheduled outage work.

Conclusion: Issue resolved.

6.4. INSTRUMENTATION, EQUIPMENT AND FACILITIES

6.4(1) Issue: The interchangeable use of the units mSv and mRem throughout many plant instruments and RP-practices, could lead to a misinterpretation with a potential risk of overexposure.

Examples include the following:

- Portable radiation monitoring equipment indicates in units of mRem while throughout in the plant the SI-unit(mSv) is used.
- When plant staff inside the RCA were asked about the difference in the measurements, many had difficulty in making or understanding the conversion.
- The unit Rad/h is used as the unit for radiation readings in the control rooms, further increasing the risk of misinterpretation.
- The dose estimation documents used by contractors use mRem. This may lead to confusion in dose estimation or calculation .
- In an emergency, the fire and rescue service of the department Tarn et Garonne establishes measuring teams which monitor the ambient gamma-dose rate. These dose rate meters are calibrated in mRem/h but there are also ratemeters with $\mu\text{Sv/h}$ in the equipment of these teams.

Suggestion: Consideration should be given to utilizing one unit of measure in plant documents, practices and instruments in order to minimize confusion and the risk of a possible overexposure due to misinterpretation of the radiation dose.

Plant response/action

The management has decided to go over to the officially-recognised units. As upgrading all equipment to meet these standards has financial consequences, the plant has drawn up an action plan over three years to solve this problem concerning the new units of measurement.

Meanwhile, the old instruments and equipment are labelled up with a conversion sticker.

Practical exercises on conversion of measurements have been added to the training course on waste so that the work team leaders get used to this conversion. The same exercises are added to the practical training course on radiation protection that has been in force since January 2000.

Whenever instruments or equipment are replaced, the new equipment ordered uses the officially-recognized units.

The off-site emergency services have taken this suggestion on board for their part. Initially, a conversion label will be put on those dose rate measuring devices having the old units. In May 2000, when the EURATOM directive comes out, all non-compliant equipment will be withdrawn from use for scrapping. (Position taken by the SDIS command structure on 22nd November 1999).

IAEA Comments

The station has adopted the mSv as the standard for their use. Instruments that indicate in mrem have a conversion aid attached to help minimize misinterpretation.

Conclusion: Issue resolved.

6.6. RADIOACTIVE WASTE, STORAGE AND DISCHARGES

6.6(a)Good Practice: The plant has investigated and implemented methods to effectively reduce the volume of liquid radioactive waste that needs to be solidified. Starting with laboratory scale experiments, two techniques were proven to be effective and introduced in the plant.

Ferric-chloride is introduced as a flocculating agent into liquid effluent storage tanks of chemically polluted wastes with high boric acid content and radioactive concentration. This agent forms ferric-hydroxide which effectively adsorbs radioactivity from the solution. The activity concentration of radio nuclides in the remaining water phase is reduced by a factor of 100 allowing the contents of these tanks to be released to the environment following the control measurements.

A mobile cartridge type membrane filtration unit is used to effectively remove suspended particles from the collecting sumps. After removal of the particles, the liquid contents of the sumps can either easily be pumped to the subsequent treatment equipment or can be released depending on the radioactive concentration.

Implementation of these techniques has considerably reduced the need for solidification of waste solution and volume of liquid radioactive waste, resulting in a significant liquid waste reduction and considerable cost savings.

7. CHEMISTRY

7.1. ORGANIZATION AND FUNCTIONS

The laboratory section at Golfech reports to the technical department. The section is responsible for the operation of the demineralization plant, chemical and radiochemical analyses of primary, secondary and auxiliary circuits; environmental surveillance of liquid and gaseous effluent; and the management, control and assessment of the consequences of a release to the environment. Tasks and responsibilities are clearly defined.

The section has 24 full-time employees, led by a section head. This staffing is sufficient to carry out all the analyses during steady operation as well as the transient periods without need for contractor support. The head of the laboratory section is supported by the senior foremen. The laboratory section has a multiple skilled team of technicians and there exist good communications with the management team.

Extensive performance appraisal of the staff is conducted to enhance individual performance. The average experience level of the section is high and maintained continuously by job rotation and by the well formalized and structured shadow-training programme, which is based on training guides. The team recognized the continuous development and effective rotation of the chemistry staff as a good practice.

The laboratory section effectively coordinates with all the other sections and departments of the plant, especially with the operations department. Daily status update, work request and “out of service” meetings help in coordinating the work distribution among the laboratory staff.

The policy, objectives and performance indicators are worked out by EDF Corporate Chemical and Metallurgical Laboratories (GDL) and DSRE (Département Sécurité Radioprotection et Environnement) reflecting industry and French national practice.

The material and human resources of GDL, Corporate Radiation Protection and Environment Department and of Corporate Operations Department (UNIPÉ) are extensively used in chemistry and radiochemistry areas, as well as environmental and fuel assembly monitoring. Quarterly liaison, experience feedback and plenary meetings of plant chemists with representatives of the various EDF departments that support the chemistry area, give excellent opportunity to evaluate and revise policy documents.

Industrial safety and nuclear safety performance indicators are known by the workers and reviewed by the department and section managers as rigorously as production indicators.

7.2. CHEMISTRY CONTROL IN PLANT SYSTEMS

A coordinated lithium/boron chemistry is used for preserving the integrity of primary circuit components, to limit the workers’ dose exposure and to increase the lifetime of components.

The integrity of plant materials is ensured during extended cycle operation by the appropriate chemistry condition maintained by injecting isotopically pure Li-7 and hydrogen during normal operation.

The secondary side all volatile treatment (AVT) is appropriate for the materials used in secondary

circuit. Morpholine and hydrazine injection is used to minimize the corrosion rate and preserve integrity of secondary side components.

The continuous operation of the steam generator blow down purification system effectively helps to maintain excellent secondary side water chemistry conditions. The low corrosion rate of secondary side systems effectively contributes to good steam generator material conditions. Very low amounts of magnetite deposition can be found on steam generator heat transfer surfaces which is removed regularly by high pressure water lancing.

Shut down and start up chemistry are well defined and performed, which results in low radiation conditions during normal operation and outages.

All the administrative interfaces between the laboratory section and other groups supporting the chemistry area are clearly defined, understood and effectively used by the staff.

7.3. CHEMICAL SURVEILLANCE PROGRAMME

Key parameters are well monitored by on-line instruments installed in the primary and secondary circuits. The instruments that have nuclear safety significance, have main control room readouts to provide information and alarms to facilitate implementation of prompt corrective actions.

All the on-line and manual analytical equipment are properly calibrated by using proper standards and procedures. Calibration results are well documented according to the quality assurance policy of the laboratory section.

Risk analysis is effectively integrated into surveillance programmes and chemical work procedures.

The integrity of fuel cladding is monitored by gamma spectrometry during normal operation and power transients with the aim of detecting fuel cladding defects and to follow defect evolution. On-line and off-line wet sipping methods are used for identifying defective fuel assemblies. In case of indications identified during on-line sipping, the suspected fuel assemblies are investigated by off-line sipping. The determination of the equivalent diameter of cracks on fuel rod surfaces is based on the results of off-line sipping. The plant is allowed to refuel failed fuels based on criteria determined on EDF Corporate level.

Liquid effluents are effectively treated by using the existing treatment facilities. A reduction in solidified radioactive waste, and its associated processing costs, have occurred because of the strong commitment of laboratory staff to an effluent management optimization programme and the close cooperation with the operations department. The good values on performance indicators regarding the release of radioactive waste from the site are the result of implementing special treatment practices. These practices were recognized by the team as a good practice.

Although weak organic acid measurements are carried out regularly from samples taken from demineralized water and the steam generator blow down system the team suggested based on international practices, to regularly measure the Total Organic Carbon (TOC) content measurement.

A separate laboratory exists for monitoring the amoebae content of river water for their effective elimination from cooling water systems by chlorination.

7.4. CHEMISTRY OPERATIONAL HISTORY

Detailed procedures are defined and followed by the staff for reporting. Results of analytical measurements are reported and stored on data sheets of the excellent laboratory guides. The use of these guides was identified by the team as a good practice.

Following a six month period, all reports are archived in the central documentation center. Simultaneously, the data is stored in computer files, that are retrievable via the computer network system. This network system is also connected to the corporate level network to export and import data, evaluation results and experience feedback. This computer data base is effectively used for carrying out trend analysis.

Relevant information and reports are regularly provided to management, which are well accepted. Corrective actions and measures to be taken are well supported by management, especially those involving shut down and start up operations.

Lessons learned from past occurrences and from extensive testing, including experiences from other plants are effectively integrated into laboratory practices and used for corrective actions.

7.5. LABORATORIES, EQUIPMENT AND INSTRUMENTS

The laboratory section has well equipped laboratories. All the analytical instruments are properly maintained and calibrated by using appropriate procedures.

The systematic use of verification solutions just before carrying out determinations aids is effective in controlling the good state of analytical equipment. The regular and voluntary cross-checking and cross-comparisons assure the quality of the measured chemical and radiochemical parameters.

Adequate sampling facilities with high continuous flow rate are available for obtaining samples from primary and secondary systems. However, sampling and analysis is not being done to determine the activity of insoluble corrosion particles in primary coolant and the team suggested the introduction of measurements for determining it.

Laboratory chemicals and spare parts are present in sufficient amount and quality.

The plant has a Post Accident Sampling (PAS) facility that enables obtaining samples from the containment spray system by using the normal sampling lines. Nevertheless, the PAS does not have adequate capability for determining aerosol, iodine and hydrogen concentration and the team suggested to enhancing the existing sampling, transporting and measuring facilities.

7.6. QUALITY CONTROL OF OPERATIONAL CHEMICALS

Corporate policy properly determines the quality of operational chemicals and ion exchanger resins to be used in different plant systems by taking into consideration the material quality requirements. The choice of supplier is based on the corporate list of PMUC (Products and Materials to be Used in Power Plants) approved products. After approval for use, the chemical product is checked after one year of use, then on a random basis in order to have each specification checked once every three years.

The corporate has a three level approval process for chemicals used for conditioning. The first level gives the full authorization, the second one is with restrictions and the third level prohibits the use of the chemical.

The isotopically pure lithium-hydroxide (Li-7) is the only conditioning chemical that has not been through the PMUC approval procedure. The team recommended that the lithium-hydroxide be included in the appropriate corporate authorization system.

The quality of diesel oil is properly controlled by the laboratory and contractors.

7.7. RADIOCHEMICAL MEASUREMENTS

Alpha and pure beta emitters are determined regularly from the primary circuit and plant effluents by qualified analyses and skilled staff using appropriate separation techniques. Gamma emitting nuclides are measured by properly calibrated high sensitivity gamma spectrometry.

Appropriate methods for sampling aerosols, soils, plants, food products and vegetables are provided. Environmental samples are obtained and analyzed regularly by the staff and contractors using proper procedures and calibrated equipment.

The environmental laboratory is suitably protected and located. It can still be used after a serious accident at the plant has occurred.

STATUS AT OSART FOLLOW-UP VISIT

Appropriate action has been taken on the OSART recommendations and suggestions and improvements were noted in the chemistry area. The one recommendation has been resolved and the three suggestions were considered to be making satisfactory progress.

After the OSART mission, the plant requested a support from the Corporate Chemical and Metallurgical Laboratories to resolve the issues on total organic carbon (TOC) content measurements, measurement of insoluble corrosion particle activity and enhancement of the post accident sampling, transporting and measuring capabilities.

Measurements of the TOC content in samples taken from different locations at Golfech NPP have been performed and a need for regular measurements was not identified. The Corporate level is committed to continue its programme for sampling, measuring and analysing the trends of the TOC content at different plants and locations and take appropriate actions, if found necessary.

The importance of the issue concerning the measurement of insoluble corrosion particle activity was recognized. A long-term general programme has been launched by EdF to study the problem and address the issue. The Golfech NPP is actively participating in this programme, thus making satisfactory progress to date on the issue.

At the July 21, 1999 CTE meeting, the EdF policy concerning the use of a post accident sampling and analysing system was discussed and determined in general. As concerns the Golfech NPP it is foreseen to install hydrogen meters and recombiners in the reactor buildings. A special transport container for gaseous samples is to be designed, manufactured and supplied to the plant.

The corporate authorization for the use of lithium hydroxide for the primary coolant conditioning was received by the plant in March 1999. In resolving this issue, the plant has gone beyond the team's original recommendation, requesting from the Corporate GDL an independent verification of the isotopic purity of lithium hydroxide. The results of these analyses were received in October 1999.

DETAILED CHEMISTRY FINDINGS

7.1. ORGANIZATION AND FUNCTIONS

7.1(a) Good practice: Continuous development of chemistry staff by systematic training that provides for progressive levels of qualification and job rotation is an effective tool to maintain the quality of chemistry work.

The safety significance of analyses carried out by chemistry technicians led the laboratory to focus on the development of a structured shadow training system based on training guides. There is one guide for each job function performed in the laboratory. These guidelines are considered as a common standard for management, trainers and trainee. The systematic use of these guides allows each worker to carry out self diagnosis of their knowledge and also helps line management to be aware of the staff member's skills. They include a full description of the skills the trainee needs to acquire, divided up into three categories or steps:

- analyst (basic level required for authorization),
- confirmed technician (generally acquired with experience and training sessions),
- expert (for the most skilled staff members to create analytical methods).

Training process follow-up and granting authorization to the relevant staff member according to a given job function can be easily and consistently done based on the requirements stated in the training guides. With these guidelines, management is in a position to check that all safety related topics are mastered by the trainee.

The job rotation practice used in the laboratory section is an effective way to maintain the skills of technicians and foremen so that they are always competent to do different tasks without the need for extensive retraining. The 18 technicians rotate in their jobs every month with 10 months for operations linked technical functions and 6 months for other technical functions. The average rotation for the four foremen is to rotate every three months.

By using this systematic training and job rotation practice a high level of technical and practical knowledge and performance of laboratory personnel is continuously refreshed. This helps ensure high quality of chemistry work that effectively contributes to the safe operation of the plant.

7.3. CHEMICAL SURVEILLANCE PROGRAMME

7.3(1) Issue: The total organic carbon (TOC) content of demineralized water is not measured regularly. It is well known in the international nuclear and industrial practice that organics remaining in the demineralized water and in steam generator secondary side can cause serious corrosion damage and problems on different surfaces. On the other hand, products from decomposition of morpholine and ion exchanger resins may also accumulate having the similar effect, especially on steam generator tubes in secondary side. The best way to detect and measure these is through organic carbon determination. Application of TOC measurement can be found all over the world such as in the USA, Spain, Switzerland and Hungary. Although determining the weak acid concentration may help to follow the possible effects, without TOC determination, the corrosion risk of steam generator tubes cannot be reduced effectively by taking the necessary measures.

Suggestion: Consideration should be given to introducing regular total organic carbon determinations in demineralized water and steam generator secondary side.

Plant response

The suggestion regarding TOC indicates that the TOC content in demineralized water might lead to serious corrosion-induced damage and other problems on different types of equipment. However, there is no example evidencing that such damage has already occurred at a plant. As part of its tests on loop systems, EDF has investigated the potential impact of organic matter on corrosion on the steam generator secondary side. Results (1) clearly show the absence of risk.

Moreover, damage in France on the steam generator secondary side is limited compared to that detected on similar materials in the United-States, in Spain and Switzerland. This is a further evidence that EDF's policy is efficient when it comes to make sure that chemistry control ensures better protection against corrosion. To date, only one of our 54 units has had its steam generators replaced due to SG secondary side corrosion, while many SGs have been replaced in the United-States, in Spain and Switzerland for that same reason.

The use of amines other than ammonia for the conditioning of the secondary side appears in many international organizations' guidelines (EPRI,...) which means that organic compounds are acceptable inside the secondary system.

Finally, the potential risk induced by organic acids is limited because cationic conductivity is measured on an ongoing basis at the steam generator blowdown.

Demineralized makeup water in the secondary system

As part of a corporate project file, the corporate GDL (corporate Chemical & Metallurgical Laboratories) establishes a report on the organic matter content at several NPPs representative of the French fleet. These units were chosen according to the origin of their raw water, conditioning of the secondary system and corrosion on the SG secondary side. As part of this project, the GDL is going to measure TOC in samples that comes from the Golfech makeup water system.

These samples will be collected by plant staff and subsequently sent for analysis to the GDL's

Expertise Dept in St Denis. The samples will be taken at four different locations, i.e. raw water, demineralized water in the SED system (nuclear island demineralized water), conditioned makeup water in the SER system (conventional island demineralized water) and possibly at the outlet of the demineralization chain. Samples will tentatively be taken during Weeks 3 and 4. The sampling and shipment methods will jointly agreed upon by GDL and the Golfech Chemistry section.

When the results are fully known (i.e. before the OSART follow up mission), they will be sent to Golfech.

SG steam

Corrosion risks in steam are induced by organic acids rather than non dissociated organic compounds.

In steam, carbon compounds become organic acids as a result of heat and are subsequently recycled in the blowdown of dryers overheaters (GSS in French) where ongoing measure of cationic conductivity is a good indicator of organic pollution.

Measuring TOC directly in steam is not appropriate because, in line with international practices, the secondary system is conditioned with an amine (morpholine). TOC measurement would therefore make it impossible to detect the organic pollutant whose content would be much lower than that of the amine. No proven specification requires the measurement of TOC in steam.

(1) Corrosion on the secondary side of steam generator tubes, Dec. 1995, EDF-FRAMATOME-CEA-Editeur JM Gras EDF-France.

IAEA Comments

The plant has given satisfactory consideration to the issue. Although the strategy for monitoring the total organic carbon content is drawn up for all French plants by the Corporate Chemical and Metallurgical Laboratories (GDL), samples from different locations at Golfech NPP have been collected by plant staff and plant specific measurements were performed by an independent laboratory called IEEB located in Bordeaux. The results were presented to the plant staff at the end of February 2000 and sent to GDL for subsequent analysis. During the follow-up mission a representative from the GDL provided information on the latest developments in the Corporate programme for monitoring total organic carbon (TOC) content and indicated that the values of TOC content measured in the Golfech samples are in a tolerable range and a need for regular measurements was not identified.

It is planned to continue the EdF programme for sampling, measuring and analysing the trends of the TOC content at different plants and locations. The Corporate GDL intends to send some of the samples for verification measurements to a German laboratory in order to carry out cross comparisons of the results and measurement methods.

Conclusion: Satisfactory progress to date.

7.4. CHEMISTRY OPERATIONAL HISTORY

7.4(a) Good practice: Effective control of the laboratory analytical work is achieved through the use of well organized and structured laboratory guides.

Separate guides exist for each parameter to be determined. The guides consist of pre-printed sheets providing the information for technicians on the conditions to be fulfilled before, during and after the analytical measurements. The following information is included:

- frequency of sampling
- sampling location
- parameters of sampling during different operation modes
- methods to be used for determination
- calibration data
- limit values for quick evaluation
- calculation method

The guides also include follow-up activities such as checking of surveillance tests, analyses, measuring equipment and on-line instruments and serve as a basis document for scheduling, implementing and evaluating the laboratory activities.

The structure of the guides makes it possible to store all the relevant and important data in one file, helping with coordination and evaluation of laboratory work.

7.5 LABORATORIES, EQUIPMENT AND INSTRUMENTS

7.5(1) Issue: Sampling and analysis is not being done to determine of insoluble particle activity in primary coolant samples.

According to international practices, soluble and insoluble species are determined separately following their separation by membrane filtration using filters with pore size of 0,45µm. The samples taken by the laboratory staff from primary coolant are measured by gamma-spectrometry without separation into soluble and insoluble phase. Activated and also the non-radioactive corrosion products are present in both forms. Their ratio dramatically changes during transient operations, such as during shut down or start up due to chemical and erosion processes taking place. During these periods, the newly born particles can either form layers on the surface of the primary system resulting in additional dose exposure during maintenance work or while circulating in systems result in deposit on fuel assembly surfaces creating neutron flux and temperature anomalies. Corrosion reactions may also accelerate in these layers since they can concentrate impurities such as chloride and sulphate and cause stress corrosion damages.

Without having the information on activity concentration of insoluble corrosion particles to analyze, effective methods can not be worked out and used to minimize their dangerous effects.

Suggestion: Consideration should be given to introducing measurement of insoluble corrosion particles.

Plant response/action

Regarding the measurement of insoluble matter inside the primary system fluid, EDF hereby confirms its position that such measurement is not carried out on a systematic basis.

EDF considers that a systematic follow up requires operators to be instructed of the thresholds to comply with as well as what to do in case such thresholds are exceeded. Currently, no power generator may reasonably determine which concentration in suspended particles would make it possible to prevent phenomena such as crud on fuel assemblies that would lead to abnormal flow or re-contamination of out-of-flow areas.

The first guidelines of the OSART guide (EPRI TR-105714, vol 1, rev. 4 dated Jan. 1999, page A15) state that “PWRs do not have a standard requirement to sample the reactor coolant system for crud analyses during operation ...

Plant specific sampling practices have evolved in the industry, depending on manpower and interest in sampling the reactor coolant for crud activity ... Recognizing that major system modifications to improve sampling technology are impractical in most existing plants, the purpose of this section is to provide an historical review of sampling technology literature... ”.

Indeed, experts agree (see EPRI guidelines) on the fact that there is no clear connection between the quantity of suspended particles and potential cruds. The French experience at the Nogent 1 and 2 units is a further evidence thereof.

An abnormal flow was detected at Nogent 2 and the primary fluid showed normal characteristics whereas Unit 1 underwent a significant activity increase with the presence of particles, though without any specific operating problem. The only thing that happened was that filters were replaced more frequently. The activity increase was the only problem then and was well under control thanks to radiochemical measurements. Moreover, since colloids are very small and therefore weigh less, they may play a role which should be accounted for (but they are difficult to measure).

In case suspended particles are measured for trend analysis - as is the case in the EPRI guidelines - we feel that our current checks are sufficient (in particular gamma spectrometry). Besides, it is known that in our reactors particles usually come from the core when their number increases.

Measurements carried out at several units in normal operation show that the concentrations are low (close to 1 µg/kg) and fluctuate. These measurements are difficult to perform : this is the reason why this topic is dealt with at international level as part of the Robust Fuel Program organized by EPRI.

However, in view of current knowledge and in case of abnormal flow, we feel that it is worth specifically analyzing the primary fluid in order to have a diagnosis and better understand these phenomena. In this case, apart from looking for the suspended matter concentration, we feel characterization of the particles (size, [Ni], [Fe], ...) is better suited. This is the option we have chosen for our NPPs.

IAEA Comments

The importance of the issue was recognized after the OSART mission and was also discussed by EdF at the November 1999 WANO meeting in Lyon, France.

During the OSART follow-up, a representative from the Corporate Chemical and Metallurgical Laboratories (GDL) participated in the discussions to provide information on the relevant Corporate activities under way. Although insoluble corrosion particle activity measurements are not carried out on a systematic basis at French plants, a long-term general study has been launched by EdF to investigate the problem. Several plants such as Cattenom 2, Civaux 1, Chooz 1, Dampierre 3, Belleville 2, etc. have been selected for different reasons to participate in the programme. The Golfech unit1 & 2 are also amongst those units, where measurements and analysis are performed. The activity of insoluble particles in primary coolant samples was measured for unit 1 in December 1996 and June 1998, and for unit 2 in June 1998. The results from these measurements were presented during the follow-up mission.

The study is not completed, but the intermediate results are regularly presented at the quarterly Corporate Network for Chemistry Engineers meetings. Appropriate actions to be taken, if necessary, will be identified after the completion of the study and this should resolve the issue.

Conclusion: Satisfactory progress to date.

7.5(2) Issue: The existing post accident sampling system does not have adequate capability for determining aerosol, iodine and hydrogen concentration following an accident situation.

While some capabilities exist, it may not be possible to obtain the needed information until several days after an accident. The generally accepted industry practice is to provide for sampling liquid and gaseous phases shortly after an accident, to determine the actual source term and carry out calculations based on that for the environmental consequences. However, adequate sampling, transporting and measurements facilities have not been provided to accomplish this. Sampling from the beginning of an accident situation has a very important role to monitor, follow and estimate the core situation and possible damage and to assess radiological effects on the environment in an accident situation.

Suggestion: Consideration should be given to enhancing the post accident sampling, transporting and measuring capabilities in order to follow the evolution of an accident situation

Plant response/action

After confirmation was obtained from FTC/GENV and UNIPE, a training guide was provided to the plant together with an action plan ref. D 4008-2202/99/939 ACC. During the CTE meeting (plant Operational Technical Committee) on July 21, 1999, the corporate nuclear division's overall post-accident liquid and gaseous sampling strategy was redefined. The guiding principles thereof are described in a corporate letter sent to the safety authority and to the relevant ministries (ref : D4008.25.02.AG.99/328). Since this CTE meeting, the corporate chemical and metallurgical laboratories have been drawing up the new applicable analytical procedures.

IAEA Comments

At the July 21, 1999 CTE meeting, the EdF policy concerning the use of a post accident sampling and analysing system was discussed and determined in general. The required modifications and actions to be implemented were identified. As concerns the Golfech NPP it is foreseen to install hydrogen meters and recombiners in the reactor buildings. Commitments by the Corporate level have been made to improve the means for sampling and transportation of gaseous samples following an accident situation. A special transport container is to be designed, manufactured and supplied to the plant. Relevant operational and training procedures will be developed by the Corporate level and adapted at the Golfech NPP.

Conclusion: Satisfactory progress to date.

7.6. QUALITY CONTROL OF OPERATIONAL CHEMICALS

7.6(1) Issue: The lithium-hydroxide used for primary coolant conditioning does not have the appropriate level authorization for use.

All the conditioning and almost all the applied chemicals have corporate approval for their use in the plant. This authorization is given based on detailed analyses carried out to determine their possible effect on material integrity, especially concerned to their contaminants such as sodium, chloride and sulphate. The isotopic purity of lithium-hydroxide is also an important factor in the authorization procedure.

Using a conditioning chemical, without having appropriate authorization may increase the corrosion hazard to structural materials and tritium concentration in plant systems.

Recommendation: The plant should obtain the appropriate authorization from the corporate organization to use the isotopically pure lithium-hydroxide as soon as possible.

Plant response/action

All PMUC approved products (Category 21) are subject to a periodic quality follow up in line with instructions set by the Corporate Chemical & Metallurgical Laboratories (memo D.5001/BTE/RB 93101 rev.2). For a given product, all specified parameters have to be checked on a three-year basis. Moreover, there is a yearly systematic verification of the most significant features. One third of all other specified features is checked every year over this 3-year period.

The following entities are in charge of these checking activities :

Corporate DAC (Fuel Division) for lithium hydroxide and boric acid, as per corporate memo ref. D.5234 MSRQ 96-0053,

SINO (North-West Engineering and Services Division - PMUC Procurement Center) as per corporate memo ref. DIR/AAM/AGS/93106 regarding all other conditioning reagents and nuclear quality ion exchange resins.

PMUC approved laboratories (i.e. SEISO and ICR in Chartres) are in charge of practical performance of analyses on behalf of SINO or DAC.

Although the verification of the Li7/Li6 isotopic ratio tracking system was up to now included in a specification (document ref. D5001/BTE/RC 931010 rev.1), it was not carried out since the relevant equipment was available neither at GDL nor in the authorized laboratories.

An ICP-MS was bought by GDL and the corresponding analysis procedure finalized, which means that this analysis will be included in the 3-yearly verification program organized by DAC provided the relevant memo is revised accordingly. COGEMA's lithium hydroxide was checked for the first time this year (addition to the authorization dating back to the end of 1998) and NUKEM's lithium hydroxide (authorization pending).

As a reminder, these follow up checks are designed to verify a potential drift of contract-based specifications. They are only a complement to the analyses carried out by suppliers as is to be the

case for the verification of lithium isotopic ratio for each manufactured batch, as has been the case since this initial distribution of specifications in 1994.

Prior to this date, these checks were carried out by the manufacturer though there were no contractual provision thereon.

In view of this, the PMUC authorized products have to be delivered with at least a compliance certificate or an analysis report indicating all the verifications carried out for a manufactured batch. If these provisions are complied with, there is no verification upon entry at the site - except for physical checks (density, color, aspect) of batch products (acids and bases).

IAEA Comments

The corporate authorization for the use of lithium-hydroxide for primary coolant conditioning was received by the plant in March 1999. Although not required by the authorization process, the plant has gone beyond the team's original recommendation by requesting from the Corporate GDL an independent verification of the isotopic purity of lithium-hydroxide. The results concerning EdF's sole lithium-hydroxide suppliers COGEMA and NUKEM were received in October 1999.

Conclusion: Issue resolved.

8. EMERGENCY PLANNING AND PREPAREDNESS

8.1. EMERGENCY ORGANIZATION AND FUNCTIONS

In emergency matters the responsibilities of EDF at corporate and local levels are clearly defined and separated. The corporate level is responsible for the outlines of emergency planning whereas EDF NPPs are responsible for the local implementation of the emergency planning. In an emergency the EDF general director takes the overall responsibility, the corporate organization gives advice to the plant concerned and the plant manager is responsible for emergency response. For the external support of EDF at corporate level the interfaces are well set up.

With the emergency planning framework ("maquette du plan d'urgence interne et documents associés au PUI") EDF has provided a very efficient tool to its plants, to develop and implement emergency plans, which are adapted to the special on-site conditions. The NPPs and EDF corporate level have regular meetings to strengthen coordination and make feedback of emergency planning more effective. In contrast to its first edition, updated versions of this framework are not approved by the competent authority.

The plant manager of the Golfech NPP is assisted by an effective on-site emergency organization, which consists of a decision making team, an assessment team and three response teams. After drafting the outlines of the local emergency procedures the nuclear safety/quality manager, who is assisted by the coordinator for emergency planning and preparedness, passes the responsibility for the development and updating of these procedures to the emergency response teams themselves. Therefore the teams identify themselves with their own procedures and tasks and in that way, very effective results are obtained. The coherence in the emergency planning and the feedback of experience is assured by the EPP network. The EPP network consists of the head of each emergency team and representatives of concerned NPP departments and is conducted by the nuclear safety/quality manager. This network is appropriate in optimizing the NPP Emergency plan.

In order to cover all fields of concern in an emergency, external aid is settled by agreements between the Golfech NPP and off-site organizations. These organizations participate in periodic exercises. The frequency of these appears to be sufficient. The experience of these exercises is regularly fed back to the emergency plan.

A remarkably good collaboration is established between the NPP and the prefecture of Montauban (Departement Tarn-et-Garonne), which is responsible for off-site emergency planning and preparedness and acts also as coordinator for the neighboring Departments "Gers" et "Lot-et-Garonne".

8.2. EMERGENCY PLANS

Most emergency plans of NPPs cover the on-site hazards. However, there are events (protest actions, bomb threats, etc.) which represent no emergency but have also to be settled. The wrong treatment of such a situation could give rise to an uncontrollable problem. To prevent those cases the first procedure of the Golfech NPP emergency plan covers 10 main event groups (nuclear emergencies outside of France, nuclear accident on another EDF NPP, sabotage, protests, flooding of the Garonne river, etc.). This procedure will ensure the capability of those persons, who are charged with the managing of these events.

The on-site emergency plan is adequate and provides good means of treating emergency situations. Local concerns have been implemented in coordination with the prefecture at Montauban. The plan reflects a good understanding of the real needs of emergency planning. The responsibilities of the different emergency teams are clearly defined, no overlapping of the tasks or unnecessary redundancies were observed. There is adequate staffing foreseen to cover the exigencies of the plan. In addition to that, if supplementary support is needed, sufficient relief personal from other EDF plants could be made available.

The prefect of the department “Tarn-et-Garonne”, who is responsible for the off-site countermeasures, is very engaged in emergency matters. The updated off-site emergency plan, which is in its final state of approval, shows an appropriate planning. The intention of the prefecture, to hold regular table top exercises with the Golfech NPP, will improve the already existing command on emergency situations. These exercises are foreseen within the three years period, where exercises with the national corporate and administrative organizations take place. A good coordination of all interfacing organizations was observed during the visit to the Prefecture of Montauban. The implementation of countermeasures on the basis of communal limits instead of geometrical sectors is a good decision.

The measures for notifying organizations and advising the public are adequate. The feature that a plastic card is attached on the advance information to the public was found to be a good idea. This credit card sized plastic shows the main recommendations, how to behave in the case of sheltering and evacuation.

8.3. EMERGENCY PROCEDURES

The procedures, which are edited by the emergency teams themselves, are obviously developed under the view of practicability and efficiency. The updating of the procedures and the documentation control show a good understanding of emergency planning and preparedness. A good assessment of the behavior of persons in stress situations is reflected by the fact that the same telephone number to call fire fighting or medical aid is used inside the plant and countrywide in France. Nevertheless, it was noticed that the full functionality of the badge systems is not utilized to identify missing persons. The team suggested to use the badge system for this purpose.

The final draft of the off-site emergency plan procedures (“fiche reflexe”), which cover in a detailed manner all the tasks, which have to be fulfilled in an emergency. Lessons learned from the foreseen regular table top emergency exercises will help to develop even more detailed procedures.

8.4. EMERGENCY RESPONSE FACILITIES

Depending on the radiological situation the Local Management Emergency Response Center (PCD), the Local Surveillance Emergency Response Center (PCC) and the Local Logistic and Means Response Center (PCM) will be created in normal on-site buildings (main office, medical building) or in the Protected Emergency Building (BDS). The Local Operations Response Centre (PCL) will be created in the control room, the local emergency response team will meet in a room adjacent to the control room. These rooms are efficiently shielded and air-conditioned with iodine filters. Golfech NPP plans now, that the PCD, the PCC and the PCM will be created in the BDS immediately. This will facilitate the orientation of the staff personnel, the update of the documentation and the maintenance of all equipment, which is needed by the emergency staff. When completed, this will enhance the emergency preparedness of the Golfech NPP. The emergency building has sufficient diesel driven electric power supply (2 redundancies) and batteries, to cover a plant black-out. In the BDS there is enough food and water available, so that the emergency teams in this building can withstand for several days.

In the BDS each team has a room for its own. The rooms are sufficiently equipped with redundant and diverse communication equipment. At the moment of the review the furniture has not been completely installed in the BDS, so a definitive statement cannot be given. But it has to be underlined, that the BDS at its actual state provides already the means to deal with an emergency situation.

The new Rear Emergency Response Center (PCFI) of the prefecture at Montauban, which is about 50 km away from the site, will be inaugurated in June 1999. The outline of the new center meets the needs of such a establishment. The command center of the departmental fire and rescue service in Montauban, is suitably equipped to alert and control the intervening fire and rescue service teams.

The mobile Forward Emergency Response Center (PCOI) of the inter-departmental and national emergency organizations will improve the dispatching of the response personal. For this center which is adequately equipped with vehicles and containers for the staff and response personnel, two sites on opposite directions of the plant are foreseen, where it can be installed in respect to the actual wind direction in order to prevent its contamination.

8.5. EMERGENCY EQUIPMENT AND RESOURCES

The Golfech NPP is adequately equipped with emergency means. This statement stands for the equipment in the local emergency response centers, for the environmental surveillance, for the fire fighting and for the first aid/medical support equipment as well. It has to be specially mentioned, that the vehicles, which are used for doserate monitoring and sampling in the environment, are equipped with Global Positioning System (GPS) devices. By these means it is possible, to display the measurements on maps automatically, which substantially facilitates the assessment of the off-site emergency situation. The intended use of the simulator (SIPACT) for the refresher training of the emergency assessment staff will reinforce the assurance of such persons. The emergency equipment is found to be regularly controlled and maintained in good condition.

The external organizations are adequately equipped. As far as it could be seen by the drawing, the new Rear Emergency Response Centre of the prefecture of Montauban will also be adequately equipped. All the equipment, which could be seen during the visits, is well maintained. Golfech NPP

performs all the radiation protection tasks in the hospital, where a contaminated person of the NPP has to be treated. This was identified as a good practice by the team. In spite of those good features, the doserate-meters of the departmental fire and rescue groups indicate different unit of doserate. The team suggested that consideration should be given by the plant to using the same doserate units.

8.6. TRAINING, DRILLS AND EXERCISES

For all persons, who shall participate in the emergency response, detailed qualification schemes and training programs with periodical retraining exist. The EPP staff shows to be efficiently trained. However, training possibilities for the assessment of an off-site emergency situation could be essentially improved. The team suggested to providing more scenarios to the computer code to cover a wider spectrum of emergencies.

An exhaustive programme for emergency exercises is defined at the Golfech NPP. The arrangement that each person participates at least at one exercise/year is regularly reached is adequate, some persons even participate in more exercises. The lessons learned from these exercises are fed back in the EPP-Network and are followed up by the coordinator of the emergency plan. It is an excellent feature at Golfech NPP, that every local emergency response team has to execute the periodic tests of the telecommunication equipment by themselves, in order to keep the staff trained. The on-site fire and medical aid units demonstrated their good skills and timely reaction in an fire fighting exercise with an injured person and in a real case during the OSART visit.

8.7. LIAISON WITH PUBLIC AND MEDIA

Golfech NPP maintains a well equipped staff for the liaison with public and media. Good relations to the local press are established. The agreement between the Golfech NPP and the prefects of the three neighboring departments on mutual information exchange assures an effective coordination of the public and media information. In order to harmonize press releases Golfech NPP contacts EDF at corporate level and the prefecture in Montauban as well. This is a good arrangement and important in emergencies.

At the Golfech NPP the installation of a press center is foreseen, which is equipped with some technical means. This center will be sufficient to host over 100 journalists with their telecommunication equipment brought along.

In the case of site evacuation the liaison officers of the plant go to the press center of the prefecture, which is installed at Montauban, so a current information to the public can be provided. In addition to the already existing media training, the Golfech NPP proposed to the prefecture, regular common media training. This would be very useful when managing an emergency situation.

STATUS AT OSART FOLLOW-UP VISIT

Both of the suggestions in the Emergency Planning and Preparedness area identified during the OSART mission made good progress. One was fully resolved and the other was making satisfactory progress.

To enhance training for responding to an emergency, the station has obtained typical accident scenarios and these scenarios are presently being used for practice training in various command

posts.

In support of identifying any missing persons in the event of a plant evacuation, a plan has been developed for using a bar code system in conjunction with the normal access control system to be able to account for all people who were on site.

DETAILED EMERGENCY PLANNING AND PREPAREDNESS FINDINGS

8.3. EMERGENCY PROCEDURES

8.3(1) Issue: In plant evacuation planning the full functionality of the badge system is not utilized to identify missing persons. The computerized badge system is used to authorize persons, entering controlled areas. On plant evacuation persons would have to go to several mustering points, where their names are written into lists. These handwritten lists have to be compared with the lists of the badge system to determine missing persons. This process offers a high potential of errors, which could lead to unnecessary loss of time in the search and rescue of persons.

Suggestion: Consideration should be given, to also using the badges to automatically count and identify persons at the mustering points.

Plant response/action

The plant has drawn up specifications for using badges as part of staff counting at muster points. The experimental phase of the project will take place in 2000. According to the results, the system will be implemented after the relevant PC emergency planning action sheets have been modified, as well as the relevant technical memos.

IAEA Comments

A specific document has been developed on how plant evacuation and reactor building evacuation are to be managed. A system using bar codes which are to be added to access badges will be used in conjunction with the normal access control system is planned. A test of this approach is planned for the next outage in April 2000. The necessary equipment has been ordered to support this test. Full implementation is planned for 2001.

Conclusion: Satisfactory progress to date.

8.5. EMERGENCY EQUIPMENT AND RESOURCES

8.5(a) Good Practice: Golfech NPP has a special agreement with the three nearby hospitals. Not all hospitals dispose of sufficiently trained radiation protection personnel and radiation protection means. For this reason, difficulties in the reception of contaminated persons, which need urgent medical care, are sometimes observed in hospitals. In addition, a contamination hazard arises when contaminated persons have to be transported inside of the hospital to be treated by specialists of different disciplines.

The agreement deals with the following features: If there is a contaminated person delivered to a hospital, the NPP establishes a radiation controlled area in the hospital, which is managed by the plant's radiation protection staff and the staff from the plant medical department. The contaminated person stays in the controlled area and the specialists of different disciplines, who may need to intervene, go to this area.

8.6. TRAINING DRILLS AND EXERCISES

8.6(1) Issue: The computer code “GEEE” that is used for the diagnosis and prognosis at off-site emergencies is not sufficiently utilized for training. Data input to this program system can be provided by on-line data (for example from the automatic off-site dose rate measuring devices, or from the stack instrumentation) or manually. At the moment, only one model scenario for training with the “GEEE” code is available at the plant. Use of many more scenarios could improve the capability of the emergency response personnel to respond to different kinds of emergencies.

Suggestion: Consideration should be given to obtaining additional scenarios to cover an ample spectrum of emergencies during the training sessions.

Plant response/action

Other scenarios have been obtained from the corporate level. They will be tested by and gradually adapted to the Golfech NPP during the next emergency drills.

A general emergency preparedness training was drawn up as an educational software. This training is designed for all on-call staff (at least) and will take place at the beginning of the year 2000. The targets being reached will be checked based on an “ Assessment ” module. The emergency planning mockup is being thoroughly reviewed and redrafted at corporate level (deadline : Sept. 2000). The associated training scheme will also be reviewed and will include the works carried out by the plant work group.

IAEA Comments

Typical accident scenarios were received at the station in late 1999. These are presently being used for practice training in various command post, especially the assessment command post that uses the data along with the “GEEE” software.

Conclusion: Issue resolved.

**SUMMARY OF STATUS OF RECOMMENDATIONS AND SUGGESTIONS
OF THE OSART MISSION TO GOLFECH NPP - MARCH 2000**

	RESOLVED	SATISFACTORY PROGRESS	INSUFFICIENT PROGRESS	WITHDRAWN	TOTAL
Management, Organization & Administration	1 R	4 R			5 R
Training & Qualification	2 R	1 R			3 R
Operations	2 S	4 R 1 S			4 R 3 S
Maintenance		3 R			3 R
Technical Support	1 S	2 R	1 R		3 R 1 S
Radiation Protection	2 S	2 R 1 S			2 R 3 S
Chemistry	1 R	3 S			1 R 3 S
Emergency Planning and Preparedness	1 S	1 S			2 S
TOTAL R (%)	4 (19 %)	16 (76 %)	1 (5 %)		21 R (100 %)
TOTAL S (%)	6 (50 %)	6 (50 %)			12 S (100 %)
TOTAL (%)	10 (30 %)	22 (67 %)	1 (3 %)		33 (100 %)

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.

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.

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 provided valuable support to the OSART mission to Golfech. In particular, the staff of Golfech Nuclear Power Plant provided excellent support throughout preparation and conduct of the mission. Team members felt welcome and enjoyed good co-operation and dialogue with Golfech managers. This contributed significantly to the success of the mission. Golfech managers and especially the team's counterparts, engaged in frank discussions and assisted the team in understanding Golfech performance and the basic factors contributing to it. Golfech 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 Golfech staff. The support of liaison personnel was outstanding. Their help was highly professional and greatly appreciated by the team.

The Government of France has provided other support to the OSART programme, including experts for missions to other countries. France has also hosted nine other operational review missions. The IAEA, the Department of Nuclear Safety, the Division of Nuclear Installation Safety and the Operational Safety Section wish to thank all those involved for the excellent working conditions and support of the Golfech OSART mission, follow up visit and for the on-going support of the OSART programme.

TEAM COMPOSITION OSART MISSION

EXPERTS:

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Nine Mile Point Nuclear Station, USA

Years of nuclear experience: 26

Review Area: Management, organization and administration

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IAEA

Years of nuclear experience: 28

Team Leader

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Kerncentrale-Doel NPP, Belgium

Years of nuclear experience: 15

Review area: Radiation protection

Eberbach, Friedrich

Ministerium für Umwelt und Forsten, Germany

Years of nuclear experience: 25

Review area: Emergency planning and preparedness

Hollinger, Wayne

IAEA

Years of nuclear experience: 32

Assistant Team Leader

Hultquist, Jan Olof

Vattenfall - Sweden

Years of nuclear experience: 20

Review Area: Operations

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Years of nuclear experience: 23

Review area: Training and qualification

Runalls, Richard

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Review area: Technical support

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Years of nuclear experience: 20

Review area: Chemistry

Talbot, Ken

IAEA

Years of nuclear experience: 28

Review area: Maintenance

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Rosenergoatom - Russian Federation

Years of nuclear experience: 15

Review area: Operations

OBSERVERS:

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IAEA

Years of nuclear experience: 25

Ranguelova, Vesselina

IAEA

Years of nuclear experience: 14

Sheronov, Yuriy

Rovno NPP, Ukraine

Years of nuclear experience: 17

TEAM COMPOSITION - OSART FOLLOW UP VISIT

HANSSON, Bertil

IAEA

Years of nuclear experience: 33

Review Areas: Management Organization and Administration

Maintenance

RANGUELOVA, Vesselina

IAEA

Years of nuclear experience: 15

Review Areas: Technical Support

Training and Qualification

Chemistry

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Years of nuclear experience: 33

Review Areas: Operations

Radiation Protection

Emergency Planning and Preparedness