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Bilateral international relations

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Avant-propos

Since it was formed in 1973, the Safety Authority has been assigned international missions with the following objectives:

- developing exchanges of information with counterparts in other countries,
- making known the French approach and practices,
- supplying the countries concerned with all relevant information on French nuclear installations located near their borders.

The following papers are intended to demonstrate, on the basis of examples, how bilateral relations can fulfil these objectives and also how the French Safety

Authority has benefited and continues to benefit from foreign experience; a forthcoming issue of the review *Contrôle* will cover multilateral international relations.

These examples are not intended to represent a comprehensive review of the relations that the Safety Authority maintains with more than twenty counterparts throughout the world, and I hope that those who are not mentioned will understand.

André-Claude Lacoste

Director of the DSIN

(Direction de la sûreté des installations nucléaires)

Germany : example of bilateral cooperation

by Christine Feltin, international relations sub-directorate – DSIN

Franco-German relations in the field of the control of nuclear safety date back to the seventies, when both countries were beginning their nuclear power plant construction programmes. These have developed and have focused on the numerous and extremely varied issues with which the authorities of the two countries have been concerned: reactors under construction and then in operation, radiological protection, discharge of effluents, fuel cycle installations and waste management. They have recently intensified with the joint work on the EPR (European Pressurised water Reactor) project for future reactors. The framework in which these relations have taken place, and their nature, have varied with time. This is an attempt to retrace the main stages of the process.

The seventies and eighties: the Franco-German commission on problems relating to the safety of nuclear installations

In the early seventies, Germany and France, as well as other leading industrial nations, were beginning major nuclear power plant construction programmes. Some ten reactors were already in service in both countries by 1973. These were of different technologies which had been developed over the previous fifteen years and only the most recent ones, which went on line from 1965, had rated capacities exceeding 300 MWe.

In 1970 and 1971, work began in France on the two units of Fessenheim Nuclear Power Plant on the River Rhine. The importance of cooperation between the authorities of the two countries became manifest and, by 1972, a comparison was begun between the safety of Fessenheim Nuclear Power Plant and that of Neckarwestheim-1 (a 785 MWe pressurized water reactor whose construction had recently begun).

Early in 1976, this cooperation was formally established under an exchange of letters by the German Minister for the Interior and the French Minister for Industry and Research,

then in charge of nuclear safety matters, announcing the decision to create the Franco-German Commission for problems relating to safety of nuclear facilities DFK (Deutsch-Französische Kommission für Fragen der Sicherheit Kerntechnischer).

At the end of the seventies, from the start of the project to build Cattenom Nuclear Power Plant, the DFK's work was extended to make a comparison between it and the Philippsburg-2 plant in Germany.

The French DFK delegation consisted of representatives of central administrative departments (the General Secretary of the Interministerial Nuclear Safety Committee, the ministries for foreign affairs, the interior, industry and the environment) and local administrative departments (the prefectures of the counties of Haut-Rhin and Moselle, and the DRIRE (Direction Régionale de l'Industrie, de la Recherche et de l'Environnement) of the Alsace region, as well as the Institute for Nuclear Safety and Protection (IPSN) and the Office for Protection against Ionising Radiations (OPRI). The head of the French delegation is a representative of the DSIN, currently the Deputy Director, Mr. Saint Raymond. On the German side, it included representatives of the federal authorities, today the BMU (ministry for the environment and nuclear safety), the authorities of the border regions of Baden-Württemberg, Rhineland-Palatinate and Saar.

A plenary meeting is held every year, the first in 1976 in Paris and the twenty-fifth in May 1998 in Stuttgart.

In addition, from the start, it set up working groups in charge of issues such as pressurized water reactor safety, radiological protection and emergency preparedness. This resulted, amongst other things, in the drafting of a number of reports containing comparisons between the practices and the results obtained in the two countries.

For instance, the work of the emergency preparedness group culminated in the signing on 28 January 1981 of an agreement between the French and German govern-

ments concerning the exchange of information in the event of an incident or accident liable to have radiological consequences.

The work of the pressurized water reactor safety group was concerned with comparing the safety requirements and the provisions for satisfying them. An early, if not the first, report which was published in August 1977, compared the safety of Fessenheim and Neckarwestheim-1 Nuclear Power Plants; another, approved by the DFK in 1982, compared the safety of Cattenom and Philippsburg Nuclear Power Plants. These two reports concluded that the safety and protection objectives in the two countries were comparable, although the technical solutions adopted for achieving them or the methods used to substantiate them were different in some respects.

Finally, the radiological protection group recently finalised a common model for calculating atmospheric dispersion in the event of an incident or accident involving a release. It estimates radiological consequences at a given point on the basis of atmospheric conditions, and a report describing the model was approved at the last DFK meeting in Stuttgart.

The nineties: extension of cooperation and the setting up of the Franco-German Management Committee

In 1989, industrial cooperation between France and Germany intensified: Cogema and VEBA, a private group to which the electrical utility PreussenElektra notably belongs, signed an agreement concerning reprocessing. Framatome and Siemens entered into an agreement on the marketing and development of nuclear reactors intended for export and set up a common subsidiary for the purpose. Thereafter, reactor development centred on the EPR project.

The context and the conditions in which the cooperation was to take place were to be established by an agreement between the two countries concerned : a joint declaration on cooperation in the field of the peaceful use of nuclear energy was signed on 6 June 1989 by the German Minister for the Environment, Mr. Toepfer, and the French Minister for Industry, Mr. Fauroux. This agreement was specifically concerned with nuclear safety.

Meanwhile, the frontiers were opening between Eastern and Western Europe and the shortcomings of nuclear safety in the East were revealed. Programmes to assist



DFD meeting in Germany (1997)

these countries were set up both in Germany and France and the need for Franco-German cooperation in the area was perceived.

To successfully perform these new activities, which extended well beyond border issues, the authorities of the two countries then decided to set up a new organisation, the Franco-German Management Committee DFD (Deutsch Französischer Direktionsausschuss). This Committee consists of the Director of the DSIN and his German counterpart from BMU, both accompanied by one or two assistants. The directors of the IPSN and GRS (Gesellschaft für Reaktorsicherheit) its German counterpart, also participate in meetings. The first meeting was held on 10 April 1991 and the Committee has since met regularly four or five times a year.

In addition to approval of the EPR project, which is described in another article, DFD's work covers all issues relating to nuclear safety policy. A number of *ad hoc* working groups have therefore been set up to examine the principles of nuclear safety and the management of radioactive waste in the two countries. Joint comparison reports have been drafted and approved by the DFD; for instance, in October 1997, a report on methods for assessing the long-term nuclear safety of deep geological repositories made it possible to identify numerous points of agreement as well as some differences, thus paving the way for harmonisation of the approaches in the two countries. As regards assisting the countries of Eastern Europe, the DSIN operates mainly in multilateral frameworks.

DFD meetings are an opportunity for keeping abreast of recent developments and attuning efforts in the interest of efficiency.

Exchanges of staff

To gain a more direct understanding of the nuclear safety approach and practices of its main counterparts, the DSIN has initiated a programme of staff exchanges. Germany is one of the first countries with which such exchanges have been organised at different levels.

For a number of years, a German expert has been appointed as a member of the French Advisory Committee for reactors and a French expert has, similarly, been a member of the German Commission for reactor safety RSK (Reaktor-Sicherheitskommission). This commission includes a number of committees responsible for preparing its work in various specialised fields: another French expert is a member of one of them, the pressure vessel committee. Up to now, language problems have prevented exchanges of inspectors for long periods (i.e. around three years), but this should be possible during 1999. Similarly, French inspectors are to be sent to Germany before the end of the year for short missions lasting between two and four weeks.

Finally, cross-inspections have begun to be organised this year: inspectors from the nuclear division of the DRIRE for the Alsace region have participated in an inspection of the Mülheim-Kärlich Plant in the Rhineland-Palatinate and German inspectors have participated in an inspection of Cattenom Nuclear Power Plant in France. Other inspections are planned with inspectors from Baden-Württemberg.

Conclusion

Relations between the French and German Safety Authorities go back a long way, hav-



Cattenom nuclear power plant

ing developed over some twenty five years, and they have adapted to change by continually extending their scope in the field of the control of nuclear safety. Better mutual understanding of the approaches and practices in the two countries, as well as the habit of working together, have made it possible to establish a climate of confidence, which was in no way a foregone conclusion.

The exchanges of staff which are taking place will enable mutual understanding to become general.

This will constitute a solid foundation on which to build the indispensable harmonisation of the nuclear safety requirements and their expression. The strengthening of links between the Safety Authorities, called for by the governments of the two countries during the last Franco-German summit meeting, will constitute another milestone and enable the development of a Franco-German axis in nuclear safety within Europe.

Joint assessment and approval of the EPR project in France and Germany

by **Laurent Moché**, deputy head of the NSSS Control Office (BCCN) and **Xavier Bravo**, power reactor sub-directorate – DSIN

The EPR (European Pressurised water Reactor) represents one of the few advanced reactor projects in the world which could eventually produce a successor for the existing reactors. The development of this reactor is being managed by the EPR project team, a Franco-German organisation set in place by EDF and the main German utilities, in association with the vendors Framatome and Siemens.

The strategic choice of the EPR project partners to develop a reactor acceptable to the French and German Safety Authorities has greatly accelerated cooperation between the DSIN and its German counterpart BMU (Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit).

To review the safety options for reactors of the future then lay down the corresponding safety requirements, the DSIN and BMU have, for the last seven years, been working together in a special organisation headed by the DFD (Deutsch-Französischer Direktionsausschuss), with the assistance of French and German technical support organisations and teams of experts who have been working together (see diagram). Since 1992, cooperation between the French and German Safety Authorities on reactors of the future has greatly intensified with the work on the EPR project.

EPR: a Franco-German project for a next-generation reactor

The EPR corresponds to an evolutionary approach rather than a revolutionary one. If the project is successfully concluded, the first EPR will be the first-of-a-kind of a new 1700 MWe generation.

"Evolutionary" does not mean bereft of ambition or lacking in innovation. An evolutionary approach has the most potential for making significant progress in the design of reactors of the future. This is because it makes full use of what has been learnt from

the design and operation of past reactors, and also from the in-depth safety studies to which the reactors of the current generations have been subjected for two decades.

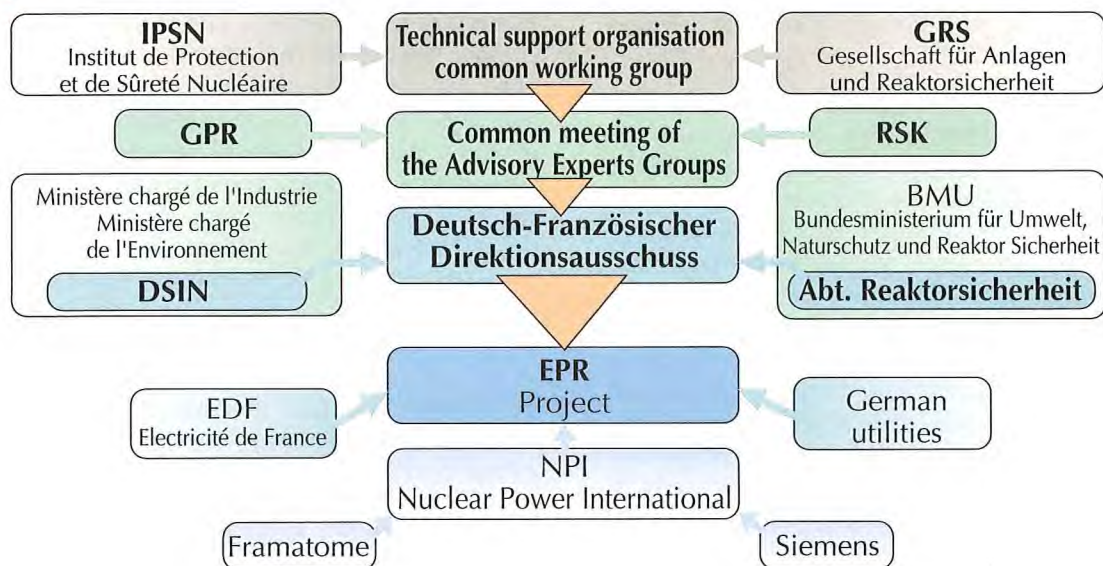
The French and German Authorities thus see considerable potential in the application of this approach to reactors of the future through far more detailed study of hypothetical severe accidents, by fuller allowance for multiple failure risks and by reinforcement of the containment, enabling:

- a significant reduction in accident probability,
- virtual elimination of the accidents with the most serious consequences,
- a significant reduction in the radiological consequences of other accidents. In particular, accidents involving core meltdown should no longer necessitate short-term local measures for protecting the population, and accident situations without core meltdown should not necessitate any special off-site protection measures.

Furthermore, operating conditions should be improved, particularly by making allowance at an early stage for problems relating to the production of nuclear waste and effluents, radiological protection, maintenance and human fallibility.

What are the industrial perspectives for such a project? The EPR is now at the basic design stage which should allow construction to begin at the start of the twenty-first century. If the new reactor is deemed acceptable by the Safety Authorities of the two countries, industrial implementation will depend on problems associated with ageing and the possible need to renew the existing nuclear facilities.

One scenario for industrial implementation in France and Germany, on a present-day basis and depending on what political options are taken up, would be to begin building a series in around 2010, possibly bringing forward the construction of a pilot plant to the first decade of the twenty-first century, in France or Germany, or possibly as



EPR – Franco-German organisations

an export project. One of the parameters in taking this decision will be preserving existing industrial capability, which requires the existence of an industrial tissue and maintaining know-how by practice.

A Franco-German approach for assessing the nuclear safety of the project

Studies of the EPR project in the context of activities concerning reactors of the future have taken place in three stages.

By 1991, the DSIN had established its policy concerning the safety of future pressurised water reactors, in a purely French context. This was reviewed in 1993 to establish a common Franco-German standpoint by the DSIN and the BMU concerning reactors of the future.

Subsequently, the EPR project team submitted a preliminary study in September 1993. On this basis, the experts of the French and German Safety Authorities reconsidered the main nuclear safety options in greater depth. The vendors expressed the wish that Franco-German standpoints be established concerning certain options before initiating work on the design, in view of their newness as well as the considerable differences in practices between France and Germany.

This was notably the case of the approach concerning possible severe accidents, the radiological consequences of accidents with and without core meltdown, protection against external hazards, the integrity of the

reactor coolant system, the design of the systems and the use of probabilistic methods.

In January 1995, the French and German Safety Authorities established a common standpoint concerning these subjects. The project team's proposals were recognised as being essentially consistent with this standpoint and the points of disagreement were brought to the attention of the project team.

In view of the standpoint of the Safety Authorities, the industrial partners decided to commence the basic design phase in February 1995.

The EPR project team began by submitting technical codes, material substantiating the safety case and *ad hoc* technical reports prior to finalizing an initial basic design report for the nuclear island, which was released in October 1997.

Between 1997 and 1998, the EPR project team was working on the cost-effectiveness aspect, which should make it possible to finalise the basic design for the end of 1998 with the release of the final basic design report.

During this third stage, joint Franco-German work on the EPR safety options, and latterly the basic design, has been conducted in parallel. Since 1995, joint sessions of the GPR and RSK teams of experts have been held a number of times a year, making it possible to gradually establish a set of recommendations which have been adopted by the DFD. This process is currently in a phase of intense activity with the goal of achieving a common standpoint of the French and German safety

authorities concerning the basic design around mid-1999.

This summer (1998), the assessment programme is extremely full, including in-depth appraisal of certain key issues and initial study of possible innovations (such as the design of the computerised control systems). Furthermore, issues requiring concentrated research and development (such as the design of the corium recovery system) are unlikely to be settled until after the basic design phase, and are therefore monitored as research and development progresses. Finally, work on some issues, such as the preliminary probabilistic assessment or study of the radiological consequences of accidents, will not be possible until the very last stage of the process. It will not be possible to make the final recommendations until the reactor concept and the *ad hoc* assessment modules have been established in sufficient detail.

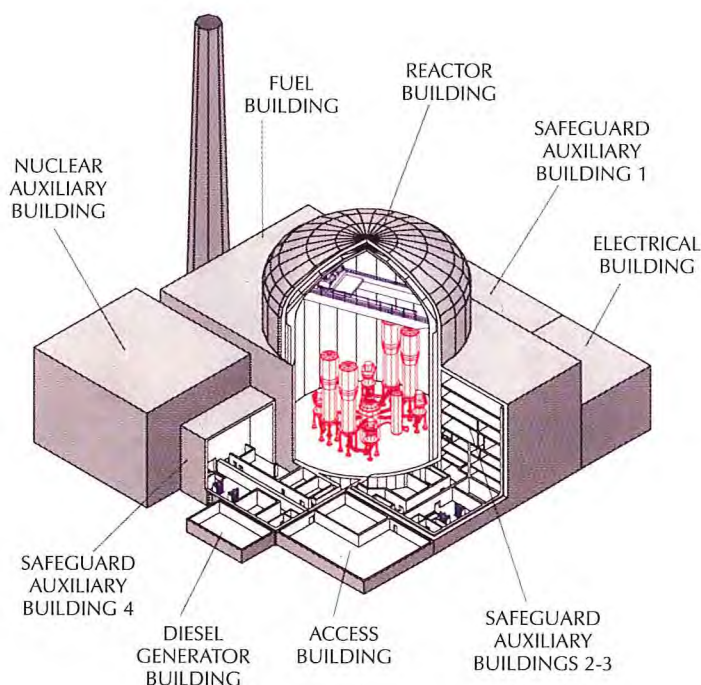
Outlook

A considerable amount of work remains to be done in order to continue and complete the safety analysis of the EPR. The same applies to harmonisation of the French and German regulatory practices. Concerning this issue, it is important to mention the large amount of work involved in re-writing the regulations concerning the construction of

the steam supply systems and the associated circuits, begun by the DSIN in cooperation with the industrial partners of the EPR project. The new text must, in particular, be harmonised with the German counterparts as concerns the technical provisions (e.g. material strength specifications). At the same time, the German "RSK Directives", which are of a virtually regulatory nature, are to be revised on the basis of the Franco-German work on reactors of the future.

In addition, the first practical implementation will require development of the detailed design by the EPR project team on the basis of the standpoints adopted by the safety authorities on the basic design. If an initial site were to be chosen in France or Germany, it would be necessary to process a licence application in accordance with the regulatory procedures in force.

The evolutionary approach adopted by the EPR has taught the Safety Authority a great deal, with implications for existing reactors. The Franco-German context of this process has been an additional benefit, constituting an opportunity for the Safety Authorities of the two countries to re-assess the basis of the nuclear safety practices in both countries in the light of the latest developments in nuclear safety understanding, associated tools and methodology.



General view of the EPR nuclear island

Cross-border relations: what Luxembourg expects

by Dr Michel Feider, Radiological Protection Division, Health Authority – Luxembourg

Luxembourg, a small country with a population of 400,000, situated between France, Germany and Belgium, has no nuclear facilities but is, ironically, greatly exposed to the nuclear industry as all its neighbours have numerous nuclear facilities nearby. The closest nuclear power stations are Tihange, 110 km from the Luxembourg border, Chooz 70 km away and Cattenom 9 km from the border. This represents a total installed capacity of 10,000 MWe in the immediate vicinity of our country.

Although no specific survey has ever been made, the great majority of Luxemburgers can be assumed to be against nuclear power, or at least critical of it. For some, nuclear facilities represent an intolerable risk and an accident in a plant is synonymous with the Chernobyl accident of April 1986. When Chernobyl is mentioned, what immediately comes to mind is the resettlement of the population living within a 30 km radius of the plant. Most of our fellow citizens are therefore convinced that an accident in Cattenom Nuclear Power Station, only 25 km from our capital, would automatically result in the resettlement of some three quarters of our population, who would thus lose their homes and their national identity.

Other citizens question the equity of the installation of nuclear power plants near national borders. The current situation is perceived as unjust as the benefits of nuclear power and the associated risks are not fairly shared between nuclear and non-nuclear countries.

What a Luxemburger may expect of France in terms of nuclear safety can thus be considered to depend on his state of mind. It is up

to the Luxembourg authorities to intensify the dialogue with the neighbouring countries to fulfil not only its own expectations but those that the public may have.

This task is however complicated by a number of factors:

- public expectations have never been explicitly formulated. A national authority representing the public has the tendency to put its own expectations to its French partners;
- the Chernobyl accident has shown that the population is frequently extremely wary of information supplied by competent authorities;
- the extremely critical attitude concerning nuclear technology can be reinforced by events, such as the recent case of surface contamination of spent fuel transport containers;
- difficulty in understanding this very complex issue does nothing to increase the credibility and acceptability of nuclear technology;
- problems associated with the flow and quality of information exchanged by nuclear operators, public authorities and the general public also represent a cause of mistrust;
- it has been observed that there is generally considerable disparity among the public between the risk as perceived by the public and the actual risk.

To express Luxembourg's expectations concerning nuclear power with regard to its neighbour, a distinction must be drawn between a normal operating situation in a plant, an event or incident with no radiological consequences and a radiological emergency situation.

In periods of normal operation, it would appear to be difficult to clearly express the expectations. This could consist in periodically receiving confirmation by the authorities or the nuclear operator that the situation is normal, or perhaps receiving information concerning radioactive releases in the environment to date, or again results concerning radiological monitoring of the environment. It is our experience that, in both France and Luxembourg, there is little public appetite for such information. However, this information must be supplied and the first edition of the information newsletter "Lettre de Cattenom" recently issued by EDF, shows that the nuclear operator has reached the same conclusions.

If an event or incident with no radiological consequences were to arise, the situation would be completely different: the Luxemburgers already hostile to nuclear technology would become extremely attentive. It is not the event itself which appears to interest the public and the media, but rather the manner in which the event or incident is made public. The questions raised by the media and the public do not relate to the nature of the incident but how and when information is supplied. Such events and incidents are thus used as indicators for judging the transparency, rapidness and the manner of the supply of information by the French authorities and the plant operator. There is a simple reason for this attitude: the Luxemburgers tend to assume that if the French authorities cannot rapidly supply their neighbours with clear information on commonplace events, how could they be expected to do so in the event of a severe accident.

To meet the expectations of both Luxembourg and its German neighbours, a dedicated information system named SELCA (an acronym standing for system of exchange and liaison between Cattenom and the authorities) has been set up within France, Rhineland-Palatinate, Saar and Luxembourg. In the past, the susceptibility of the Luxembourg public concerning the transparency of the supply of information has been made clear during discussions in the

media on the occasion of failures which have occurred in the practical implementation of the exchange of information.

In the event of a severe nuclear accident with radiological consequences for the population, Luxembourg would be in a very special situation: the Luxembourg government has the same responsibilities and duties concerning prevention and protection of its population as the nuclear equipped neighbour, but without, in principle, having the same authority over the plant operator. To meet its responsibilities, Luxembourg therefore has to depend totally on information supplied by its neighbour, at least during the early stages of an accident before radioactive releases into the environment have occurred. This situation is considered to be uncomfortable, if not unacceptable, by many Luxemburgers, and explains the particular importance they pay to transparency of information concerning commonplace events. The Luxemburgers, who show little support for nuclear technology, fear that the French authorities may profit from their monopoly on the supply of information to conceal facts and minimise an accident for fear of over-reaction by the Luxembourg public.

This has thus constituted the background for the dialogue between the French and Luxembourg authorities which has developed in recent years. This dialogue, which was difficult to establish ten years ago, has been fostered by the spirit of openness and transparency which has come to prevail among the French nuclear safety authorities and the nuclear operator, in the wake of the lessons learnt from the Chernobyl accident. Within the joint French and Luxemburger commission on nuclear safety, two technical committees have been formed, one to deal with issues concerning nuclear safety and radiological protection, the other with civil defence problems. These two committees actually constitute a platform enabling those involved to express their respective expectations and to arrive at bilateral solutions.

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It is not possible to describe the activities of the two committees in detail, but the work

they have carried out indicates one thing: the exchange of information and organisation of exchanges are not always simple matters. When organising exchanges, allowance must be made not only for the different expectations, but also the existing hierarchical structures in the different national organ-

isations, the skills of the different national (and international) authorities, the organisation of the administrative structures set in place in the event of an emergency, the existing channels of communication etc., without compromising its effectiveness, its speed of reaction and its flexibility.

Franco-Luxemburger radioactivity measurement facility



Exchanges of inspectors

Objectives and means

by **Michèle Rousseau**, deputy director – DSIN

The DSIN (Direction de la sûreté des installations nucléaires) has long been developing its relations with its counterparts in other countries in order to:

- gain a better understanding of how these Safety Authorities actually operate, and to use this as a basis for improving its own functioning;
- to increase the pertinence of the requirements it places upon EDF, CEA and COGEMA in different technical fields, with its practical knowledge of the situations in other countries adding weight to its arguments;
- make known the French standpoints concerning certain issues (such as very low level waste).

In early 1996, the DSIN sought to intensify this international collaboration by setting in place a policy of exchanges of senior staff between both itself and the Nuclear Installation Departments of the DRIRES, and between its own counterparts and those of the DRIRES.

The most ambitious aspect of this project has been to organise reciprocal secondment of engineers to Safety Authorities in other countries for assignments of around three years. It is made clear that these are working assignments and not courses: an American or a German coming to the DSIN will, after an inevitable period of adaptation, be entrusted with exactly the same duties as his French colleagues.

The DSIN is convinced that this practice will fundamentally change its working methods in the long term and substantially increase its effectiveness.

Although this process is only beginning, two inspectors left to work in the USA and Canada in the summer 1997. Another will be leaving for the UK this summer. More than 30% of the eligible engineers in the DSIN and the DRIRES have announced their willingness to be candidates.

The policy of exchanges of DSIN inspectors is not, however, limited to these working exchanges. Other more conventional opportunities include:

- short duration missions (lasting between two weeks and one month) on predetermined topics. Up to now, our inspectors have focused on the inspection methods of their counterparts, as well as discharges, modifications and, as regards reactors, unit outage surveillance. Extremely interesting comparisons have thus been made between our own working methods and those of the UK, Belgium and the USA. A mission will be sent to Spain in the near future to study the topic of waste. Finally, a British inspector has spent three months with the Safety Authority, two in a DRIRE and one in the DSIN;
- cross-inspections during which a combined team of inspectors (e.g. two British inspectors and one French inspector) will inspect a site abroad and a site in France in succession. Inspections of this type have been organised by the DRIRES with their British, Belgian and Swiss counterparts and are being prepared with Germany and Spain. Apart from the differences in the installations, language has been the main barrier: the large number of acronyms used in the nuclear industry, which differ from one country to another, make the dialogue particularly difficult.

After all these missions, reports are distributed to all the staff and presentations are made. Every six months, action is taken to derive benefit from experience feedback: ten are currently being organised.

The DSIN and the DRIRES have thus, for the last two years, been applying a proactive policy of openness. This is stimulating for all their personnel, although it requires considerable efforts to organise. The future of this policy will depend on the attitude of our foreign counterparts; if they are unwilling to send engineers on reciprocal working assignments, our investment will be limited to the existing level.

These international exchanges will foster the self-appraisal that every Safety Authority must periodically undertake to ensure that nothing essential has been missed as a result of over-familiarity with the current situation.

Interview with Fabien Féron, DSIN inspector, after one year of his assignment to the Atomic Energy Control Board (Canada)

Conducted by Sandrine Le Breton, communication adviser – DSIN

What does your everyday work consist of ?

My job is in the applied radiological protection department and consists of verifying the effectiveness of the radiological protection programme set in place by the nuclear operators. The members of this department carry out two types of mission: they examine the technical files submitted by the nuclear operators for their operating licence applications, and they make field assessments to verify that the nuclear operators are developing good practices and applying the programme that they have agreed to.

Technical file evaluation is normally carried out by a single person, whereas field assessments are conducted by a team of three or four inspectors and relate to specific topics. It is not necessarily those who have processed the files who make the checks.

How are field assessments conducted in the Canadian system ?

They generally extend over a week, which constitutes a significant difference from French practice. The inspections begin with an opening meeting attended by the plant management. Then, over a number of days, the inspectors proceed with the necessary interviews, observe practices, consult documents etc. At the end of the week, the inspection team meets to record all the facts it has observed with a view to supplying the nuclear operator with a detailed review of all the positive and negative points identified, and verifying with it that these findings do not include errors of interpretation. The team then presents its preliminary conclusions to the management of the plant. A month and a half later, the operator receives a formal report, possibly including a list of requests for corrective actions. There are, of course, accelerated procedures for cases where a major shortcoming/fault has been detected.

What struck you most when you arrived at the AECB ?

There is a considerable difference in size between the AECB and the DSIN. In France, I

worked in an organisation consisting of some fifty engineers at headquarters. Here I belong to a team of around 350 members, most of whom work at the headquarters in Ottawa. The regional offices and the offices at the nuclear power plant sites are proportionally smaller. I was also struck by the fact that the organisation is more hierarchical, with more levels of supervision than in France. Although this organisational system offers more possibilities for internal promotion than the French system, I think that, on the other hand, it results in greater internal complexity which sub-divides the supervision of the nuclear operators.

Finally, I have noticed that in the Canadian system more care is taken over budget management than in the DSIN. The allocation of resources – manpower, travel etc. – is the subject of particular attention. It is to be noted that the AECB's revenue is essentially derived from fees paid by nuclear operators, and is currently decreasing, hence the greater care concerning expenditure and allocation of time and manpower resources. This corresponds perhaps to the greater concern for cost-effectiveness in the English-speaking world. This has revealed to me the relative comfort in terms of resources from which the inspectors benefit in the French system.

How do the Canadian and French nuclear safety control systems compare?

The Canadian regulations are somewhat more formal than in France, with a level of detail which appears to me to lie between that of the French system, which is rather flexible, and the American system which is relatively prescriptive.

One of the most significant differences is the possibility open to the public of consulting documents concerning the regulations themselves or their application before they are released in final form. After a phase of internal preparation, conducted jointly by the Safety Authority and the nuclear operators, the technical documents are submitted to the public in the form of consultation documents, to which comments can be added. In

France, there is no equivalent to this system of public consultation.

How does public opinion react to nuclear safety issues? Is it very different from what you are used to in France ?

Public opinion reacted strongly to the publication, last year, of an internal Ontario Hydro report which was extremely critical of the operating conditions and performance of its reactors. There was a lot of media comment on the decision by Ontario Hydro to shut down eight of its twenty reactors for reasons of cost-effectiveness, and it was particularly difficult for the Canadian Safety Authority to get the public to understand that safety was not being called into question. In Canada, as in France, nuclear power has been the subject of strong criticism during the last few months.

In the few months you have been in Canada, have you identified any Canadian practices from which the French system could benefit ?

The assessment criteria are, in my opinion, more formal in the AECB than in the French system. Although the Canadian inspectors are generally more senior than their French counterparts, I noticed that they tend to make more use of internal guidelines, using assessment methods that are more structured than in France.

Another important issue is the relationship between the inspectors and the nuclear operators. The Canadian system tends to favour exchanges between the inspectors and those they inspect more than in the French system, which is positive in terms of acquisition of skills. There is, however, very little suspicion concerning the impartiality of the inspections, as in the Canadian system, which goes into far greater detail than the French one, the relationship is much more formally defined, and any risk of "potential, real or apparent" conflicts of interest between inspectors and those they inspect are covered by the multiple written declarations which must be submitted annually by all members of the AECB.

Conversely, what French practices could usefully be exported ?

My experience in Canada has highlighted the quality of the French inspection system. Although there are no resident inspectors in our system, it is based on shorter and more frequent inspections which appear to me to be generally more effective as they are sufficiently frequent, although generally conducted in less depth, and our system puts more emphasis on the process of internal checking by the nuclear operator.

The existence of a ministerial order on quality in the French system is a good practice in this respect as it ensures greater traceability of nuclear operator actions.



Interview with Serge Roudier, DSIN inspector, after one year of his assignment to the Nuclear Regulatory Commission (USA)

conducted by Sandrine Le Breton, communication adviser – DSIN

What does your everyday work consist of ?

I started working at the NRC a year ago. For the first five months, I was assigned to the Special Inspection Branch. This department, which belongs to the NRC headquarters in Washington, consists of ten or so inspectors who conduct long-duration inspections – generally four weeks – relating to specific subjects. I was then assigned to the Emergency Preparedness and Radiation Protection Branch, partly so that the NRC could benefit from the special experience I have acquired in the DSIN. On principle, exchanges of inspectors should constitute operations that are beneficial for the host organisation, as concerns both the skills made available and the everyday work performed by the foreign inspectors.

How are inspections organised in the American system ?

In my opinion, there are two main differences relative to the inspections conducted by the DSIN. In the USA, inspections are carried out by specialists assigned to particular technical subjects, whereas in France they are mainly carried out by multi-disciplinary inspectors. In the USA, these periodic inspections supplement a system of continuous monitoring of nuclear operator action by resident inspectors, permanently assigned to the nuclear plants.

Furthermore, inspections frequently last for a week, if not longer. These rather long inspections make it possible to tackle problems in depth.

However, if I compare the two systems, the French inspections which last for one or two days appear to be more effective in view of their timing and their frequency.

What struck you most when you arrived to the NRC ?

Of all the existing Safety Authorities, the NRC is the largest. One cannot fail to be impressed by this mammoth organisation with some 3000 staff – the size of which constitutes a source of strength but also of

weakness as there is necessarily less flexibility.

Its large size is the result of two factors, firstly the nature of the different American nuclear facilities which are widely dispersed (110 reactors at some sixty sites) and essentially unstandardised (47 nuclear operators, 4 plant vendors and a dozen different designs) necessitating substantial means of supervision... Secondly, the Three Mile Island accident in 1979 marked a turning point for the American nuclear industry, making relations between the Safety Authority and the nuclear operators more tense. This accident was also the direct cause of the permanent surveillance of the installations by resident inspectors.

Finally, I was struck by the importance Americans attach to seeking maximum efficiency in terms of human and financial resources. The time spent is recorded and the corresponding costs are passed on to the nuclear operators. This situation results in a degree of tension, as supervision of nuclear safety is perceived as a service rendered to the nuclear operators. The latter can call for greater efficiency, even at congressional level. This permanent search for efficiency has resulted in budget restrictions and even, more recently, plans to drastically reduce manpower (700 staff out of 3000).

How do the American and French nuclear safety control systems compare ?

In France, the DSIN deals essentially with a single, publicly-owned nuclear operator that is not subject to the same constraints concerning cost-effectiveness and competitiveness as the American nuclear operators. This results in the problems being dealt with far more calmly, whereas the quest for cost-effectiveness directly affects the relationship between the nuclear Safety Authority and the nuclear operators in the USA.

Furthermore, the American system is extremely transparent, and seeks to democratise the regulatory processes. Virtually all the documents received and sent out by the NRC can be consulted in a public document room, both at NRC headquarters

and in the different regions. All inspection reports sent to nuclear operators can be freely obtained by the public, which is not the case in France. All changes in the regulations are announced in the Code of Federal Regulations which is available to the public for consultation. Finally, a large number of technical documents are available on the NRC web site.

How does public opinion react to nuclear safety issues ? Is it very different from what you are familiar with in France?

Public opinion is not particularly reactive. The public document rooms are little used, except by a small number of individuals or groups that are active in the nuclear field.

In the few months you have been in the USA, have you identified any American practices from which the French system could benefit ?

I report regularly on NRC practices which could be useful in the DSIN. I have already indicated certain aspects of the American system which I consider to be particularly interesting, such as, for instance, the existence of extremely precise criteria for triggering emergency plans and qualifying incidents on a four-level scale of severity. The American system is particularly clear and easy to understand in this respect.

Another example is the training of inspectors in inspection techniques (and not only in purely technical subjects) which I consider to be extremely good, and in some respects more detailed than in France, and this type of training could well be adopted.

Conversely, what French practices could usefully be exported ?

Cross-inspections of the type practised by the DSIN could result in greater consistency in the checks conducted by the NRC, particularly as the population of plants is basically heterogeneous. Unannounced inspections, which are not practised by the NRC, could increase the vigilance of the nuclear operators, by forcing them to make greater allowance for the demands of "safety culture".

Similarly, the emergency drills conducted in France appear to me to be closer to reality as they involve the regular participation of the public. I believe that this type of field exercise, which does not exist in the USA, would enable NRC to better test its emergency plans.



NRC headquarters in Washington

Feedback on cross-inspections : the French standpoint

by Vincent Pertuis, head of the Nuclear Installation Department – DRIRE
Nord-Pas-de-Calais

Openness to others' approach, particularly at international level, is one of the priorities of the French nuclear Safety Authority. The DSIN has therefore asked the Nuclear Installation Departments (DINs) of the Regional Directorates for Industry, Research and the Environment (DRIREs) to organise cross-inspections of sites near borders.

A cross-inspection consists of :

- inviting a foreign inspector to attend, as an observer, a surveillance inspection and its planning,
- sending a French inspector to participate, under the same conditions, in an inspection at a nuclear installation in another country.

Thus, in liaison with the inspection organisation department of the British nuclear Safety Authority, the DIN of the Nord-Pas-de-Calais region organised a number of exchanges at the end of 1997 :

- at the Gravelines plant : participation of a British inspector in a 1997 review meeting with the nuclear operator, and two inspections ("waste" and "Reactor 5 outage"),
- at the Dungeness B plant (an Advanced Gas Reactor located in Southern England) : participation in a unit outage inspection and a unit outage review meeting.

My impressions after the trip to the Dungeness B site are given below.

An inspection day

Overall, the inspection appeared to me to be less formal than in France. The British inspector, who has an office at the site, is very free to move around. Inspections consist of exchanges, discussions and reading (the inspector is on the controlled distribution list for all documents approved by the nuclear operator). Face-to-face meetings with operating staff are frequent.

The British Safety Authority's goal is to verify that the operator's checking system is functioning properly. The inspector thus encourages nuclear operator self-regulation. The installation surveillance system is therefore basically non-prescriptive.

Unit outage review meeting

This meeting, which is held shortly after the outage, is intended to provide an opportunity for sorting out delicate issues which have been identified and which must be resolved before restarting the reactor.

Unlike in France where the review meeting essentially involves the technical support organisations, the start-up meeting is held at management headquarters. The meeting is chaired by a member of the central services (Health and Safety Department), and includes representatives of the different disciplines, who are called upon to state their views in turn. The plant manager attends and frequently intervenes. The NII (Nuclear Installations Inspectorate) is represented by the site inspector and his superior (the superintending inspector). Only the issues under debate are reviewed, and this is done on the basis of summaries. This makes it possible to place the outage in a long-term perspective. It became clear during the meeting that the plant management was deeply involved in the field.

Conclusion

Like the staff of the DIN of the Nord-Pas-de-Calais region, the British inspectors found the experience extremely interesting and are willing to follow it up. I was extremely well received.

The main lesson learnt from these two days is that the NII is capable of stepping back from the situation to avoid being submerged in documents and of taking concrete action should the nuclear operator fail to meet its responsibilities.

More generally, these exchanges have made it possible to give substance to the Safety Authority's desire for openness and to enrich our practices with our working counterparts. A number of decisions concerning inspection organisation were, or will be, taken accordingly...

Experience feedback from cross-inspections : the point of view of a British inspector after an inspection in France

by Ian J. McNair, Principal Inspector – Nuclear Installations Inspectorate, Health and Safety Executive

Background to visit

Having learnt basic French at school, some 30 years ago, and spent several holidays in France, I volunteered for a 6 month (2hrs/week) refresher course to allow me to participate in planned Anglo-French regulatory exchanges. In December 1997, I followed this with a visit to DRIRE Nord Pas-de-Calais, to participate in inspections and meetings at Gravelines – an intense week both thinking and conversing in French.



Gravelines nuclear power station

Impressions

My first impressions of the French approach, were of regulation divided between DSIN/DRIRE/IPSN; whereas in the UK, NII is a centralised organisation. However, by the end of the visit I realised that DSIN/DRIRE also covered aspects, such as radioactive waste discharges and transport, undertaken by other UK regulators.

The second difference was the relationship to sites. NII's site and specialist inspectors are all based at the Headquarters in Liverpool. The site inspectors spend 57 days each year on site, visiting for up to a week at a time, working from an office provided by the

licensee. They attend the Licensee's training sessions, which provides them with sufficient familiarity to allow them to be free to go where they want and when; and to talk to all levels of licensee (and contractors) staff and workforce. Most inspectors give their sites a general indication of topics they wish to discuss during their visits, primarily to programme availability of relevant staff, especially if NII specialists are also going onto site. However, they also undertake unannounced evening and weekend inspections. DRIRE's procedures for notification, accompaniment and feedback appeared much more formal. Without having had the opportunity to develop an understanding of how the inspection programme had been produced, I did not have time to see how the French inspectors ensured that what they saw was representative of the practices if warning had not been given of the visit. Similarly, I did not have enough time to develop an understanding of how EdF operate their own internal safety organisation.

My third impression was of the difference in inspectors backgrounds. NII recruits people mostly from industry with 10-20 years of nuclear, then train them as regulators; some occasionally later return to industry. It appeared that French colleagues were recruited direct from University, then given nuclear and regulatory training so that their experience was developed in the regulatory framework.

My last thoughts are of the contrast between the regulatory environments. In France there is 1 main generating utility (EdF) whereas in UK there are 4 (Nuclear Electric limited, Scottish Nuclear limited, Magnox Electric plc, British Nuclear Fuels plc). In France there are three standard PWR designs, whereas in UK there are 4 AGR, 1 PWR and 7 Magnox designs. This makes it more difficult for the UK regulators to implement a centralised, standard approach.

Conclusions

I believe that such exchanges provide a useful comparison of operating standards in another country, and identify areas where one's own licensees could improve. Those insights, coupled with one's own understanding of our own sites, can contribute to

targeting of future inspections and hopefully improves safety for both the public and workers.

Martin Sayers' longer exchange to DSIN/DRIRE should provide NII with a much clearer understanding of the organisations, and related thoughts behind the French inspection programme.

The impressions of a British inspector after a three month secondment at the French Safety Authority

By Martin R. Sayers, Principal inspector – Nuclear Installations Inspectorate, Health and Safety Executive

On the 27 March 1998 I handed in my HSE warrant and departed the UK for a 3 months secondment to the French Nuclear Regulatory Authority (la direction de la sûreté des installations nucléaires, DSIN, in Paris and the regional unit of Directions régionales de l'industrie de la recherche et de l'environnement, DRIRE, in Bordeaux). The purpose of the secondment was for a joint exchange between the French and British nuclear regulators to enable each to understand the methods of working of other. This hopefully would allow a comparison of regulatory practices and for each regulator to identify possible improved methods of working.

Since leaving university in the UK I had worked in the nuclear industry in the design of nuclear chemical plants for 12 years before joining the Health and Safety Executive (HSE) in its Nuclear Installations Inspectorate (NII). For the first six years in NII I had been involved primarily with the assessment of Sizewell B, the UK's only civil PWR, and for the last four years I have been the Site Inspector for the Research Reactor sites (currently five sites with six nuclear facilities). The UK's Research Reactors were constructed in the 1960's and most of these sites are now in various stages of decommissioning.

There had been two short exchanges of NII Inspectors in 1997 of a weeks duration on

specific inspection topics. This exchange was for a period of three months and was to permit a better understanding of the day to day method of working primarily of the DRIRE but also the interrelationships between DRIRE, DSIN, and IPSN. The region of France covered by the DRIRE offices in Bordeaux includes all of the three PWR types in France and therefore gives the opportunity to experience the differences between the first generation PWRs and the latest design.

- From my observations, the regulatory system in France has many similarities to that in the UK, with a non prescriptive regime and safety being the responsibility of the licensee. France has retained a system in which Approvals and Regulations are used to control the licensees. The power to grant most of these is retained by the senior managers within DSIN. In the UK we have seen a trend over the last few years to place more responsibility on the licensees, their independent assessors, and local safety committee, with NII substituting agreements for many high level Consents and Approvals. The power to grant these agreements has been delegated further down the management chain.
- My first impression on arriving at the DRIRE offices was that the DRIRE covers a range of activities from Research – Technology (innovation and creation of employment

for the young), Industrial Development, Environment, Industrial Safety (including Heavy Goods Vehicles), Weights and Measures, and Energy (Hydro, Gas, Electricity distribution, Energy Usage – LPG & electric vehicles), through to Nuclear Safety. The Nuclear Safety aspect being a more recent area of work. In some respects this is similar to the arrangement in HSE where Nuclear Safety is just one directorate amongst the Inspectorates for Mines, Railways, Off-shore, Agriculture, Factories, and Major Chemical Hazards.

- In comparison with the staff at NII and the method of working, there were two areas of significant difference that I observed at the DRIRE offices. Firstly many of the inspectors are younger than in NII. Also there is a movement of staff around the various areas covered by the DRIRE. In NII the recruitment is of engineers and scientists with on average 10 years experience, predominantly in the nuclear industry. Most NII inspectors remain within NII until retirement. The second difference relates to the actual inspections at the Nuclear sites. The inspections that I observed were of one day duration, usual for a specific purpose, with travel to and from the site the same day, (the DRIRE offices are located in the regions of France but this could still involve a 300 mile [480km] return journey to the sites). In the UK the practice has been for inspection visits to extend over a number of days, covering a number of inspection topics and reactive inspection, with the nominated site inspector generally staying overnight close to the site. The UK inspectors carry out not only their own planned and reactive inspection but also co-ordinate special team inspections on selected topics.
- The French inspections, (surveillance visits) appear to be of an "audit" nature with the regulatory team composed of DRIRE, DSIN and /or IPSN personnel. This arrangement results I believe from the split of expertise within the three organisations: DRIRE – the local knowledge, DSIN – the regulatory authority, and IPSN the assessment expertise. The actual inspection visits tended to be dominated by presentations by the operator with on-plant monitoring activities being limited. In defence, PWR's do have restricted containment access during operation.
- At DSIN at Fontenay-aux-Roses, Paris, the difference in age structure to NII was more striking with many DSIN inspectors in their 20's and the Sous-Directeurs also frequently young. Whereas NII is an operational unit, working within DSIN appears to be a requirement for personnel to progress through the French Civil Service system. This results in staff moving on to other departments of the civil service after just a few years and an influx of new personnel. The constant introduction of new young personnel into DSIN does bring with it fresh ideas, and I have found the people within DSIN more receptive to alternative approaches, but this is at the loss of previous experience. CEA/IPSN appears to be the means to provide the injection of industrial experience both by providing the assessment expertise and also by secondment of staff into DSIN.
- Within IPSN there is a significant resource (DES) funded directly by DSIN. This contrasts with NII where the assessment expertise is within NII though with much reduced numbers to DES. Also DES carries out studies and specialist analysis which in the UK would be carried out by private organisation or universities on NII's behalf.
- The nuclear problems are similar in the two countries. Both have nuclear chemical facilities covering fuel production through to reprocessing. The nuclear power generation industry in France is significant in that 80% of electricity is nuclear in comparison to 20% in the UK. The French industry benefits from standardisation of plant, there being three PWRs types in operation. Alternative power sources are limited in France and unlike the privatised UK power generation industry where competition is strong, Electricité de France is still a public utility and protected from the demands of the open market and private financial sector. However, the problems associated with the extensive use of contractors, currently being experienced by parts of the UK nuclear industry, are also a concern of the

French regulator since PWR operation lends itself to use of contractors during maintenance/ refuelling outages.

- Although the French nuclear industry is not declining, as in the UK there is a significant amount of old plant, both nuclear chemical and reactors. This brings with it the problems of regulating a decommissioning industry and handling the wastes produced. With respect to waste the DSIN/DRIRE have the advantage of controlling both the nuclear licensee and the waste authorisation. The strategy for handling radioactive wastes in France appears to have some advantages over that in the UK, with segregation of the shorter half life waste away from the longer term wastes.
- As in the UK, the nuclear operations that require licensing are defined in law. In France the types of facility extend to include accelerators and irradiators. The

regulator is also responsible for the authorisation of pressure vessels, including the PWR steam generators.

In conclusion

The problems of regulating the nuclear industry in the UK and France are similar. The approach to regulation is also similar being non prescriptive. The major differences appear to be as a result of the make-up of the French Civil Service and the fact that the department of the nuclear regulator forms an important branch in the development of the experience of French civil servants. Nuclear energy is the major power generator in France and there is a significant resource within DSIN/DRIRE/IPSN to regulate this industry. The method of site inspection, number of authorisations, and delegation of power of authorisation do differ from those used in the UK.

Reciprocal participation in groups of experts

by **Philippe Saint Raymond**, deputy director – DSIN

One of the dangers nuclear experts have to be watchful about is working in isolation, establishing their own philosophy and avoid to confront it with others'. To avoid this danger, in addition to opening membership of its Advisory Groups to specialists from other hazardous activities, such as rail or air transport, and more generally specialists of "human factors", the Safety Authority decided to open these groups to foreign experts.

Such a participation certainly raises problems, the first of which and the most obvious being the language problem : it is not easy to take part in technical discussions, often rapidly progressing, in a language which is not one's mother-tongue. This is the reason why the first foreign experts to join the Advisory Group for reactors came from Belgium and Switzerland, followed successively by experts from Germany and Great-Britain, and probably soon from Spain. The other Advisory Groups are progressively following the same path.

Co-operation in this field with Germany has to be specially mentioned, as it developed on a reciprocal basis : French experts also participate in the German RSK which is equivalent to the French Advisory Group for reactors.

Here are the impressions of some actors in this reciprocal participation exercise.

Point of view of a British expert at the Groupe Permanent Réacteurs

By **Richard Bye**, Head of the Nuclear and Hazardous Installations Policy Division -Safety Policy Directorate, Health and Safety Executive

Responsibility for nuclear safety rests firmly with the country in which the nuclear plants are situated but this topic is of great international concern and it is essential that countries operating nuclear power plant learn from the experiences in other countries. In the UK, regulation of nuclear installations is the responsibility of the Health and Safety Executive and we consider that bilateral arrangements between ourselves and the regulators in other countries is one of the best ways of keeping abreast of developments in nuclear safety around the world. One of our most important and successful arrangements is with DSIN with whom we have long standing and very valuable formal meetings at working level and between the Director of DSIN and our Chief Inspector of

Nuclear Installations. We were honoured to be invited to nominate a representative of HSE to be a member of the Groupe Permanent Réacteurs (GPR) and in January 1996 I was appointed as an expert to the group.

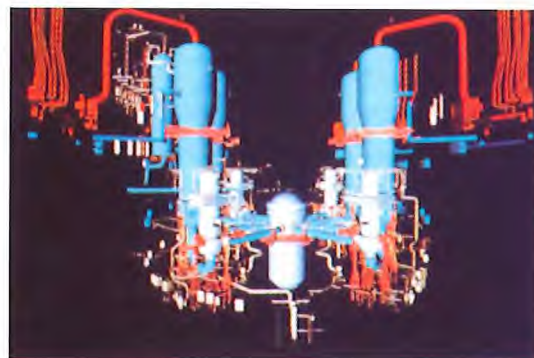
We have no similar group in the UK so the terms of reference and the way of working was of considerable interest. The different history and legal systems of our two countries are reflected in the way in which we work but, although the methods might be different, the end results are usually very similar. In the UK we have only one PWR and the rest are gas cooled reactors, Magnox or AGRs, but many of the meetings of GPR are relevant to us as they address either issues which are of current concern to us in the PWR or they

deal with more general issues that are applicable to a wide range of reactor designs. We are particularly interested in the developing ideas for new designs as these reflect the most up to date thinking on a wide range of safety issues. The UK does not at the moment plan to build any new reactors but an understanding of the issues discussed in the meetings of the GPR allows us to re-examine some of the safety issues on UK plant in a different light and to be prepared for the future.

I have been very impressed with the great amount of knowledge and experience brought to the discussion by the members of the GPR who ensure that the recommendations made to the Director of DSIN have been thoroughly examined and have a proper technical basis. The GPR looks for a clear explanation from the assessors (IPSN) of their findings on the safety cases prepared by the operator and also gives the operator the opportunity to respond and to explain their positions. Both sides are often questioned in considerable depth by members of the GPR. The way of working of the GPR is very well

documented, much more formal and, perhaps, more bureaucratic than I am used to in the UK but it provides a very good auditable trail of how and why decisions are taken. This is important in an age when decisions taken by government organisations are open to increasing public scrutiny.

Attending meetings of GPR over the last two years has been very fulfilling for me and I look forward to continued close cooperation between HSE and DSIN on nuclear safety issues.



The point of view of the French staff at RSK in Germany

by Jean Scherrer, senior engineer, Conseil général de mines

I was appointed a member of RSK (Reaktor-Sicherheitskommission) on 1 January 1995.

Straight away, it was clear to me that I was confronted with a particularly well structured organisational system when I received my "induction package" consisting of :

- a copy of the document attesting my appointment,
- an agreement to sign concerning observance of the confidentiality of the deliberations of the commission,
- the internal rules of RSK,
- the terms and conditions of reimbursement of expenses relating to participation in meetings,
- lists of the members of the plenary commission and the different committees (Ausschuss),

– RSK standpoints concerning the various issues over the last few years.

During the first meetings in Bonn, I discovered that we were seated around the table in order of our date of appointment and that I had benefited from preferential treatment by having been directly appointed a member of the plenary RSK without having participated for a number of years in the work of at least one committee.

I also soon realised that participation in plenary meetings alone would not enable me to attend technical discussions with the technical support organisations, the experts of the Länder or the nuclear operators, as only the conclusions of these discussions are presented in plenary meetings of the RSK. I therefore

decided to participate in the committee for light water reactors (Leichtwasser-reaktoren).

My presence at RSK results from the cooperation between the French and German Safety Authorities, which goes back for more than 20 years, and which was reinforced on the occasion of the EPR project (European Pressurized water Reactor), which is being designed by a project team including Framatome, Siemens, EDF and German utilities.

In a context where the French and German Safety Authorities, with the support of their respective groups of experts, are to make a joint assessment of the nuclear safety of the EPR, the main purpose of my participation in RSK was to liaise between RSK on the one hand and the French Safety Authority and the French Advisory Group for reactors (GPR) on the other. In return, a German expert (from the German technical support organisation GRS, Gesellschaft für Reaktorsicherheit) is participating in the work of GPR.

This liaison necessitates direct participation in a significant number of meetings. Thus, in 1997, I attended 7 plenary meetings of RSK (out of a total of 9), 5 meetings of the Light Water Reactor committee (out of 7) and 4 joint GPR/RSK meetings (in France and Germany alternately), as well as the GPR preparatory meetings for these meetings. This therefore represented some 20 days of meetings per year, fourteen of which were in Germany.

But simply attending is not enough, and it is also necessary to provide information and to report back. Having signed a confidentiality agreement concerning the internal debates of RSK and its committees, I was obliged to devise a special mode of reporting reserved for French participants in the Franco-German liaison committee for a useful flow of information to be established.

After three years of regular participation in the work of RSK, conclusions can already be drawn. In the joint GPR/RSK expert group meetings, my participation in the preparatory meetings of the two groups enabled me to detect certain sources of misunderstanding

between my French and German colleagues or revealed that a particular case could be of greater importance for one of the parties than for the other.

A good example of this is the case of the safety injection system envisaged for the EPR which finally consists of pressurized accumulators connected to the cold legs of the reactor coolant system (i.e. to the water inlet to the core in the normal direction of flow of the primary coolant). This solution, identical to that adopted for the existing reactors in France, has not raised any problems on the French side. However, in Germany, the existing reactors of the Konvoi series have accumulators connected to the hot leg and thus which discharge water at the top of the core. When this solution was being analysed, my German colleagues were convinced of its importance for safety. Some even considered that the solution adopted for the Konvoi reactor represented a distinct advantage. Therefore, accepting this feature to be abandoned requested detailed discussions.

As a consequence, I was obliged not only to convince my French colleagues that the case merited more thorough joint examination than they had supposed and also to make sure that the German colleagues in charge of the issue received all the information they required. After a few months of examination of the case by the Germans, which led to the conclusion that the emergency cooling proposed for the EPR would, in view of the operating parameters of the reactor, provide an equivalent level of safety, and even better for some parameters, compared to the Konvoi reactor, it was then possible to agree at a joint GPR/RSK meeting that the solution proposed for the EPR project did not raise any problems of principle.

Reciprocal participation in groups of experts can thus help to identify issues which, as a result of the prior practices of one of the parties, merit in-depth examination, taking particular care to overcome mutual misunderstandings. It was thus that, more recently, Mr Moché, deputy head of the NSSS Control Office (BCCN), participated in the Pressure Vessel Committee of the RSK and an expert from that Committee participated in the

work of the Standing Nuclear Section of the Central Commission for Pressure Vessels in France (see article below).

What more can I say ? My participation in RSK has been an extremely enriching experience. I was extremely well received by the members of RSK, who are mainly German university professors and by the secretariat of the commission; although I have made a lot of progress in German, and can understand debates in German, I am extremely grateful that the chairman of RSK authorised me to

address the committee in English, of which I have a better command when it comes to expressing the extremely technical concepts of nuclear safety.

My assessment of this participation in a group of experts is therefore that it is extremely positive, and I hope that this feeling is shared by my German and French colleagues. It is only if this condition is fulfilled that my participation in RSK can be considered as a success.

The tribulations of a Frenchman at RSK

by Laurent Moché, deputy head of the NSSS Control Office (BCCN)

The French and German Safety Authorities encourage reciprocal participation in their groups of experts. In early 1997, I was therefore appointed a member of Committee DK, a team of German experts on nuclear pressure vessels, which plays a similar role to that of the French Standing Nuclear Section of the Central Committee for Pressure Vessels (SPN). With experience of both SPN and Committee DK, what are the impressions I have gained from the first dozen sessions ?

There are no special comments to make on the organisational structure of Committee DK. Assembling experts with a range of skills (design studies, welding, inspection etc.) results in a composition which is similar in both France and Germany. My colleagues mainly originate from institutes, inspection organisations or GRS (Gesellschaft für Reaktorsicherheit) technical support bodies, and even from some nuclear operators. The federal nature of the German state is clearly apparent down to the regional accents !

Committee DK's field of action extends beyond pressure vessels to other mechanical devices such as pressure vessel internals.

As concerns the functioning of Committee DK, I have noticed that the same subjects keep coming up in successive sessions as new

material associated with them arises, with no consistent overall plan.

The work of the experts is, indeed, a long-term process and draws on personal experience, but different currents are involved too. A number of experts are attached to other institutions forming part of the system, such as the KTA code sub-commissions. This enables Committee DK to delegate studies, on an *ad hoc* basis, to sub-committees consisting of some of its members.

The rapporteurs before Committee DK are frequently nuclear operators with cases to defend (in which case they are "marked" by their inspection organisation). Although, contrary to SPN practice, hearings and deliberations are separate, the experts are, in fact, directly exposed to the nuclear operator views with only their own experience to fall back on.

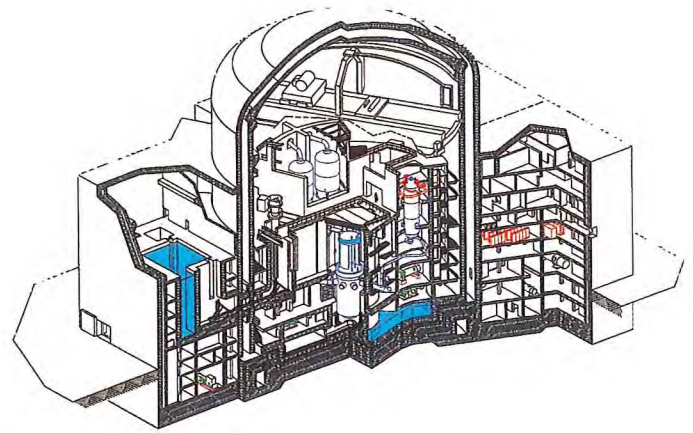
However, the strength of Committee DK lies in its capacity to keep abreast of the state of the art and to conduct research : it continuously monitors international feedback, and has for instance learned much from the NRC. It also carries out research into the behaviour of materials, an area in which it keeps itself fully informed. This enables it to indicate to the ministry areas where efforts should be concentrated, notably the corrosion of sta-

bilised austenitic steels, a recurrent issue and the subject of endless research.

If I may overdo things, Committee DK appears to be more directly involved than its French counterpart in safety cases for which EDF is considered to bear prime responsibility. In a decentralised federal context, Committee DK is the defender of the established doctrine and, to a greater degree than the French SPN, openly expresses its wish to continue to interpret it. This is typically the case of "Basissicherheit" (a set of rules required for postulating the preclusion of pipe rupture). Committee DK also has to give its standpoint on changes in the codes more frequently, in practice, than the SPN.

On the other hand, the SPN is more focused on its mission, which consists of issuing recommendations to the Safety Authority on self-contained cases. I see the SPN's recommendations as being more "operational" than those of Committee DK, since they are, for instance, ratified during the session.

A positive aspect of Committee DK is its ability to anticipate, essentially on the basis of



Cross section of EPR nuclear island

research and development, enabling it to familiarise itself at an early stage with the EPR project, of which the SPN and Committee DK are to jointly study certain issues.

Although these are only first impressions, this type of total integration in a German organisation will certainly pave the way for future co-operation. In any case, it has been a unique experience.

Assistance to a Safety Authority licensing nuclear equipment of French origin : the case of the People's Republic of China

by **Jacques Rabouhams**, international relations sub-directorate
– DSIN

In 1986, the People's Republic of China ordered two French 1000 MWe nuclear units for the Daya Bay site. The Chinese National Nuclear Safety Administration, the NNSA, which had just been formed, had previously consulted the French Safety Authority to provide assistance in granting the necessary regulatory licences. This led to the signing in 1984 of a preliminary arrangement between the NNSA on one side, and the Service Central pour la Sûreté des Installations Nucléaires, the predecessor of the DSIN and the Institut de Protection et de Sûreté Nucléaire (IPSN) on the other, covering numerous issues including the training of Chinese Safety Authority personnel and co-operation in the assessment of the reactors nuclear safety. This was followed up in 1986 by a specific agreement between the NNSA and the IPSN concerning joint assessment of the safety of the two Daya Bay reactors. In 1994, these agreements were replaced by two new ones, one between the NNSA and the DSIN and another between the NNSA and the IPSN. Meanwhile, EDF was, from 1985, handling the training of the staff of the Chinese nuclear operator, the Guangdong Nuclear Power Joint Venture Company (GNPJVC).

Assessment of the safety of the two reactors took place between 1987 and 1993 in the form of a joint project by French and Chinese experts. Thus, during six months of 1987, twelve IPSN experts and twelve NNSA experts worked together full-time to analyse the preliminary safety analysis report prepared by the Chinese nuclear operator with the assistance of Framatome and EDF. The methodology, which consisted in studying issues separately then jointly in a weekly session between the counterparts, made it possible not only to make progress with the project but also to provide direct training of the

Chinese experts in safety assessment. The results, remarks and recommendations concerning the safety of the installation under construction were then submitted to the NNSA. The remainder of the project, in particular assessments of the results of the start-up tests and the final safety analysis report, continued in the same manner with a joint team of twenty experts from the IPSN and twenty from the Chinese side.

This method of working was found to be extremely effective. Although, in the beginning, most of the time was devoted to training, the Chinese experts were quick to learn and showed the progress they had made by the pertinence of their questions and remarks, as well as by their active participation in the assessment work.

Furthermore, between 1984 and 1997, some seventy members of the NNSA and the institutes it uses as technical support organisations came to France to familiarise themselves with pressurized water reactor safety and methods of its assessment. Until 1996, these courses, which normally lasted for one year, were dispensed by the IPSN alone with the financial support of the French foreign ministry. All the courses began with training in the French language.

Beyond the phase of construction, safety assessment and commissioning, the NNSA requested French training for inspection and for monitoring unit outages, which has involved substantial participation by the DRIRES : and a trainee has correspondingly received nine months training in the subjects at the DRIRE of the Rhône-Alpes region.

It is important to mention that the NNSA is also seeking to develop broad-based co-operation with its French counterparts. For instance, the steering committees for the

agreements with the IPSN and with the DSIN regularly meet to assess the work completed and to agree on a work programme for the future. In addition, it did not hesitate to contact the French Safety Authority to obtain its opinion on specific issues. Thus, when control rod drop-time anomalies were discovered in 1995, it asked the DSIN to formally state its opinion concerning their importance for safety and the best means of solving the problem.



NNSA-DSIN seminar in Beijing in 1977

Up to now, the results have been extremely positive in terms of transfer of safety culture.

Both Safety Authority and nuclear operator personnel have benefited from this transfer. Thus, while the future operators were participating in the preparation of the safety documents (safety analysis reports, general operating rules and procedures) in accordance with recognised international criteria, the Safety Authority personnel were being trained in their assessment, which all took place in a coherent context while using as a basis the regulatory system that China had selected which was largely derived from the IAEA NUSS codes and guides.

The effectiveness of this transfer was all the greater as the Chinese experts, due to the rapidity with which they managed to master the French language after their initial courses, were capable of working directly from the French documents. In addition to the transfer of the safety culture, a veritable transfer of experience was possible, not only for the nuclear operator personnel but also for the members of the Safety Authority and its technical support organisations.

Finally, assistance was not limited to the phases of construction and commissioning, but extended to those of inspection and unit outages.

However, although a significant number of those who were trained at the IPSN have now left the Chinese Safety Authority for better paid employment in industry, particularly in the nuclear field, many are still involved in regulatory activities at Daya Bay and also at Ling Ao, another French-supplied plant now under construction.

On the other hand, the French Safety Authority would necessarily be highly concerned if the reform of the Chinese civil service decided upon by the new Prime Minister were to affect the manpower of the Safety Authority, at a time when China has decided to utilise different nuclear reactor technologies including Candu, VVER and fast reactors. This would necessitate the forming of teams specialised in each of these technologies, increasing the manpower requirements. Whatever the case, the French Safety Authority and the IPSN are ready to continue their co-operation with the Chinese nuclear Safety Authority.

DSIN international relations concerning the management of radioactive waste: from exchanges of technical information to lobbying

by Olivier Brigaud, deputy head, sub-directorate in charge of the management of radioactive waste – DSIN

The issue of the management of nuclear waste gives rise to numerous exchanges at international level both between nuclear operators and between Safety Authorities. These exchanges take place either in the context of bilateral agreements between countries or on a multilateral basis under the auspices of organisations such as the International Atomic Energy Agency (IAEA), in Vienna, or the Nuclear Energy Agency (NEA) of the OECD in Paris.

These international discussions are intended to allow the exchange of useful information on numerous issues and to make the best possible use of experience feedback concerning the practices of different countries. When fruitful, these exchanges lead to better coordination of nuclear safety approaches and contribute to attaining higher levels of nuclear safety. It is therefore all the more important as certain issues concerning the management of waste are essentially new and practical experience needs to be accumulated.

The following three examples relating to the management of nuclear waste illustrate, in different ways, how the DSIN can benefit from the contacts it has with its foreign partners.

- The first example corresponds to background work carried out jointly by the French and German Safety Authorities, the DSIN and BMU (Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit). These hold institutional meetings a number of times a year in the context of the Franco-German safety committee DFD (Deutsch-Französischer Direktionsausschuß) in association with their technical experts, the Institut de Protection et de Sécurité Nucléaire (IPSN) on the French side and the Gesellschaft für Reaktorsicherheit (GRS) on the German side. A number of years ago, this committee decided to create a working group for com-

paring the strategies of the two countries concerning the fuel cycle. Its conclusion was that it would be helpful to also compare the French and German approaches concerning assessment of the long-term safety of deep radioactive waste repositories by making use of both the experience acquired in Germany with the existing repositories (Morsleben) and future repositories (Konrad and Gorleben) as well as current studies in France. A working group, co-managed by the DSIN and the BMU, was therefore formed with experts from the IPSN, GRS, ANDRA (Agence nationale pour la gestion des déchets radioactifs) and BfS (Bundesamt für Strahlenschutz), the operator of the German radioactive waste repositories. Five meetings were held before the 1997 submission of an interim report outlining the approach to be adopted for Franco-German harmonisation of the manner of assessing the long-term safety of deep radioactive waste repositories. On this basis, and at the request of the DFD, the working group continued its work in 1998. This is to be completed at the end of 1999 with the drafting of a discussion document describing a harmonised approach for improving the nuclear safety assessments to be conducted in Germany and France.

This document will be submitted for joint discussion to the French Advisory Group of experts in charge of examining, at the request of the DSIN, the reports concerning the disposal of radioactive waste, and to its German counterpart RSK (Reaktor-Sicherheitskommission). After this stage, the document may, if required, be embodied in a French Basic Safety Rule (RFS).

It must be added that the French Safety Authority and its technical expert, the IPSN, participate in a number of international fora on the subject under the auspices of the IAEA, the OECD and the European Commission. It must, however, be mentioned

that the exchanges are far less fruitful than those which take place in the bilateral Franco-German context. In a multilateral context, achieving the goal of producing a document on which all the parties can agree often means skimming over issues of substance and concentrating on matters of form.

- A second example illustrates how the DSIN's knowledge of international bodies and its relations with its counterparts in other countries enable it to carry out effective lobbying, i.e. to ensure that its standpoints are known and to get them accepted. In the present case, the purpose of lobbying was to clarify at international level the rules for the management of very low activity radioactive waste. This subject was spotlighted in France in the early nineties, when slack practices were discovered (the Radiacontrôle affair for instance). To address this situation, the DSIN began a process of rationalisation in 1994 which called into question current thinking in the nuclear world. To summarise, the need became apparent to replace conventional practices of "release" (i.e. transfer to the public domain) of very low level radioactive waste by an approach based on licensed and monitored processes of which the impact has been the subject of prior assessment. This innovative French approach aroused scepticism and incomprehension among our foreign partners, whether Safety Authorities or nuclear operators. It is only now, in 1998, that we can claim to have begun to convince some of our interlocutors. This has been achieved by a sustained effort to explain the French position during regular bilateral meetings between Safety Authorities and *ad hoc* working groups (with the German BMU and the Spanish CSN for instance), and during international conferences organised by the IAEA and the OECD. These efforts were rewarded by the issuing of the Franco-German communiqué on the subject and the holding of a meeting of experts organised by the IAEA in March 1997, which led to the decision being taken, and its confirmation in 1998, by the IAEA Member States to prepare a safety guide. This document, which will embody French thinking, will consist of a series of recommendations intended to rationalise the management of very low level radioactive waste. It will be published by the IAEA and made available to the member States in some two years. The intervening time will be used to continue the task of explaining its position, as it has for the last few years.

- The last example shows the importance of international feedback for the everyday verification of the nuclear safety of French Basic Nuclear Installations. On 11 March 1997, an explosion occurred in the Tokai Mura plant in Japan which destroyed a radioactive waste packaging installation. In France, there are two nuclear installations of this type which were the subject, in following days, of surveillance inspections to ascertain that conditions could not arise which could lead to an accident situation of the type which occurred in Japan. The findings made during one of these inspections led the DSIN to suspend the licence of the installation involved pending due consideration of feedback on the accident in Japan.

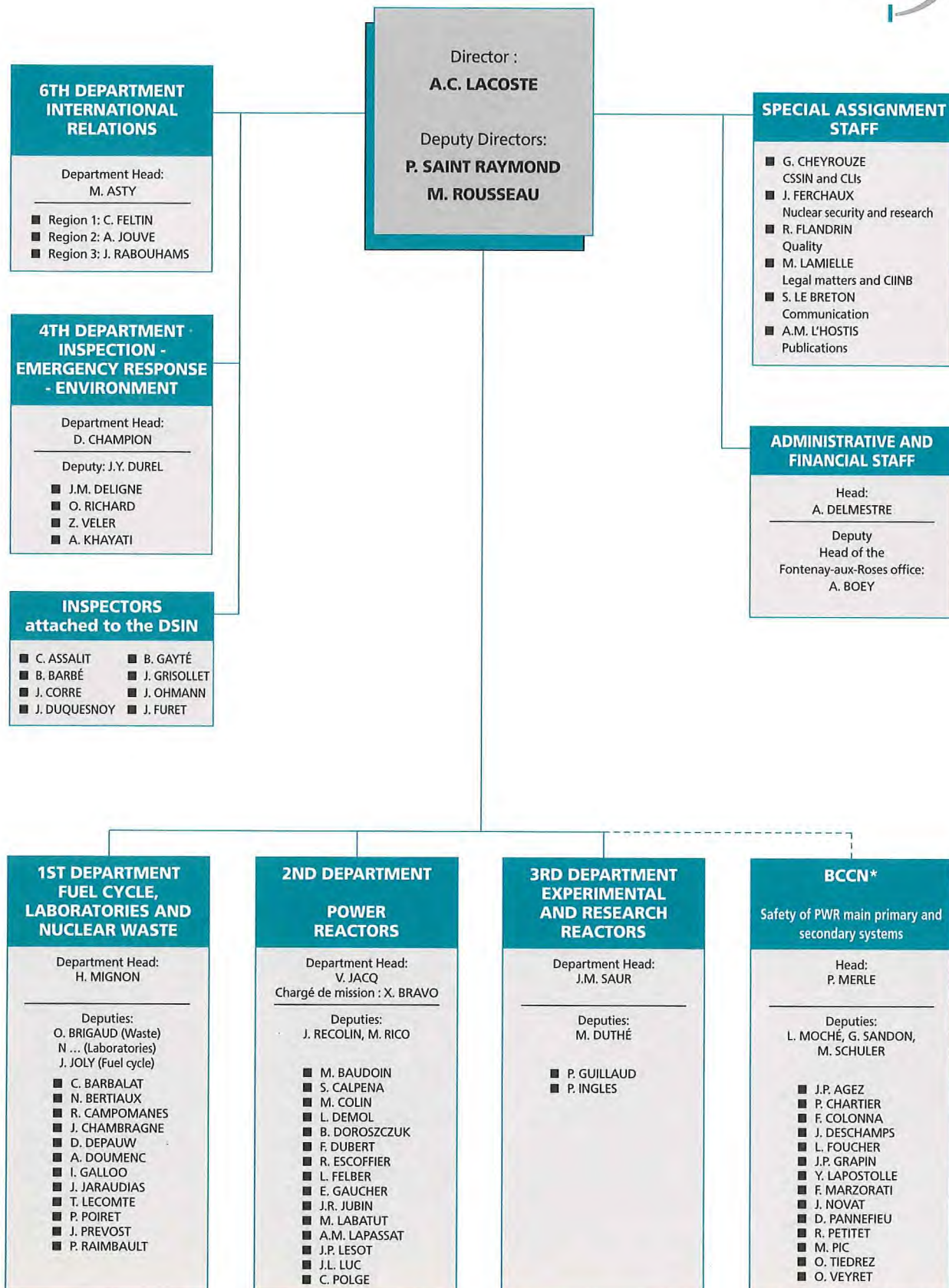
These three examples show the many aspects of international action by the DSIN. Other examples include training of members of safety authorities in Eastern European countries in the context of European co-operation programmes or the substantial involvement of the DSIN in the work carried out to prepare and adopt a "Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management", under the auspices of the IAEA.

In the field of waste management, some 40 man-days are devoted every year by the Safety Authority engineers to contacts with counterparts in other countries. In 1998, this policy will lead to the exchange of two inspectors for two weeks each between the French and Spanish Safety Authorities. On this occasion, French and Spanish experiences will be compared concerning the acceptance of packages of waste in the equivalent disposal facilities of El Cabril and Aube. Each inspector will observe an on-site surveillance inspection by its partner.

The success of technical exchanges and lobbying can be summarised as follows: perseverance, credibility, professionalism and openness. Perseverance, as projects can only take root and bear fruit over a long period during which confidence is established between partners and personal relations develop. Credibility and professionalism, as it is on these qualities that the willingness of our partners to accept our arguments and information depends. And finally openness, as no one knows the whole truth. For progress to be made in the international arena, there must be a mutual willingness to listen and to understand different ways of thinking.

DSIN ORGANISATION CHART

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