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COMMITTEE ON THE SAFETY OF NUCLEAR INSTALLATIONS

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**PRINCIPAL WORKING GROUP No. 1 ON OPERATING EXPERIENCE AND
HUMAN FACTORS (PWG1)**

REPORT OF THE TASK GROUP ON REVIEWING THE ACTIVITIES

AUGUST 2000

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- to provide authoritative assessments and to forge common understandings on key issues, as input to government decisions on nuclear energy policy and to broader OECD policy analyses in areas such as energy and sustainable development.

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The CSNI constitutes a forum for the exchange of technical information and for collaboration between organisations, which can contribute, from their respective backgrounds in research, development, engineering or regulation, to these activities and to the definition of the programme of work. It also reviews the state of knowledge on selected topics on nuclear safety technology and safety assessment, including operating experience. It initiates and conducts programmes identified by these reviews and assessments in order to overcome discrepancies, develop improvements and reach international consensus on technical issues of common interest. It promotes the co-ordination of work in different Member countries including the establishment of co-operative research projects and assists in the feedback of the results to participating organisations. Full use is also made of traditional methods of co-operation, such as information exchanges, establishment of working groups, and organisation of conferences and specialist meetings.

The greater part of the CSNI's current programme is concerned with the technology of water reactors. The principal areas covered are operating experience and the human factor, reactor coolant system behaviour, various aspects of reactor component integrity, the phenomenology of radioactive releases in reactor accidents and their confinement, containment performance, risk assessment, and severe accidents. The Committee also studies the safety of the nuclear fuel cycle, conducts periodic surveys of the reactor safety research programmes and operates an international mechanism for exchanging reports on safety related nuclear power plant accidents.

In implementing its programme, the CSNI establishes co-operative mechanisms with NEA's Committee on Nuclear Regulatory Activities (CNRA), responsible for the activities of the Agency concerning the regulation, licensing and inspection of nuclear installations with regard to safety. It also co-operates with NEA's Committee on Radiation Protection and Public Health and NEA's Radioactive Waste Management Committee on matters of common interest.

* * * * *

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PREAMBLE

A special task group re-examined the mandate of PWG 1 in 1994.¹ Since that time there have been a number of changes in the nuclear industry and in the member states making up the NEA. In addition, there have been some redirection within the NEA and the CSNI. As a result, it was decided to re-examine the role of PWG1 and reconsider its mandate.

To this end, a task group was formed to review the situation and to prepare a report for consideration by PWG1 and for submittal to CSNI. The Task Group has prepared the report and hereby submits it to PWG1.

Some of the factors which played a role in this reassessment were the NEA Strategic Plan, the CSNI Strategic Plan, the emergence of risk-informed analysis of operating events, along with the structural changes in the nuclear industry mentioned above.

This report builds on the 1994 report, and includes an analysis of how well the 1994 mandate was followed.

Following a critical review by PWG1 (soon to be known simply as WGOE, or the Working Group on Operating Experiences) at the September 2000 meeting, the report should be submitted for final CSNI review of the proposed mandate. The goal is to implement the new strategy and directions by the end of the year 2000.

¹ See NEA/SEN/SIN/WG1(94)5.

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1. INTRODUCTION

A Task Group was formed by PWG-1 in the latter part of 1999 to review the mandate of PWG1 in light of new directions and assignments from CSNI, and to prepare a report that suggests future directions of the Working Group, in harmony with directions from CSNI. This report is the response of the Task Group.

Principal Working Group #1 was organized in September 1982.² The group formed its charter, which included:

- ◆ reviewing periodically activities for the collection, dissemination, storage and analysis of incidents reported under the IRS;
- ◆ examining annually the incidents reported during the previous year in order to select issues (either technical or human-factor-oriented) with major safety significance and report them to CSNI;
- ◆ encouraging feed-back through CSNI of lessons derived from operating experience to nuclear safety research programmes, including human factors studies;
- ◆ providing a forum to exchange information in the field of human factors studies;
- ◆ establishing short-term task forces, when necessary to carry out information exchange, special studies or any other work within its mandate;
- ◆ making recommendations to CSNI for improving and encouraging these activities.

The mandate of the working group was systematically re-examined in 1994.³ The purpose was to determine whether changes since the formation of the original mandate would indicate some need to refocus the directions of the working group. It was concluded that the main line of work (sometimes called the core business) of PWG1, which was shown to be an efficient tool for exchanging safety-significant operating experience and lessons learned from safety-significant issues, remained as valid and necessary in 1994 as it was in 1982. Some recommendations for improvement of efficiency were made, but the core business was unchanged. Very little of the mandate needed modification.

With little change over nearly 20 years, these six items have constituted the mandate of PWG1. There have been twenty annual meetings of the working group. In addition there has been a large number of workshops, specialists' meetings, and other meetings focused on particular topics. Many reports of a special nature have been published.

In 1999 the CSNI has directed some changes in its existing working groups and this has prompted the re-examination of the processes by which PWG-1 discharges its functions. This re-examination is a consequence of the adoption of a Strategic Plan by the Nuclear Energy Agency and some conforming strategic plans by the CSNI and CNRA. In response to CSNI direction, PWG1 formed a Task Group to consider the directions contained in these strategic plans and propose the necessary changes in the working group mandate.

² SEN/SIN (82) 50.

³ NEA/SEN/SIN/WG1(94)5. By Mr. M. Hada, NEA Consultant. Distributed 20 October 1994.

As a point of departure the Task Group reviewed the accomplishments of PWG1 since 1994. It was thought that this review might help guide any changes to the group mandate. It was observed that for the most part PWG1 had been discharging its mandate in a careful and efficient manner.

The formal guidance from CSNI with respect to review and modification of the PWG1 mandate is contained in the Strategic Plan of the CSNI.⁴ One significant aspect of the Strategic Plan was to reassign the Human Factors aspects of PWG1, as embodied in the Extended Task Force (ETF), to a Special Expert Group which will report directly to CSNI.

Further, the CSNI decided to embed the Fuel Cycle Task Group within WGOE.⁵ Some structural changes characteristic of strategic planning, including prioritization duties, adoption of success criteria (or performance measures), consideration of customer needs, and consideration of the need to review operating experience for possible future research projects were part of the work of the Task Group.

The functions of PWG 1 up until the year 2000 are shown on Figure 1, whereas the proposed revisions are depicted on Figure 2.

This report provides an analysis of recent progress of PWG1, and also proposes changes to the group mandate, in response to the strategic plans of NEA and CSNI. The mandate is quite brief and lists some broad areas of work.

⁴ NEA/CSNI/R(2000)3

⁵ A minor aspect of the Strategic Plan was to refer to Working Groups, instead of Principal Working Groups. Hence, this report will hereafter use the WGOE term, meaning Working Group on Operating Experiences, as the future name of PWG 1.

Figure 1.

PWG 1 Present Functions

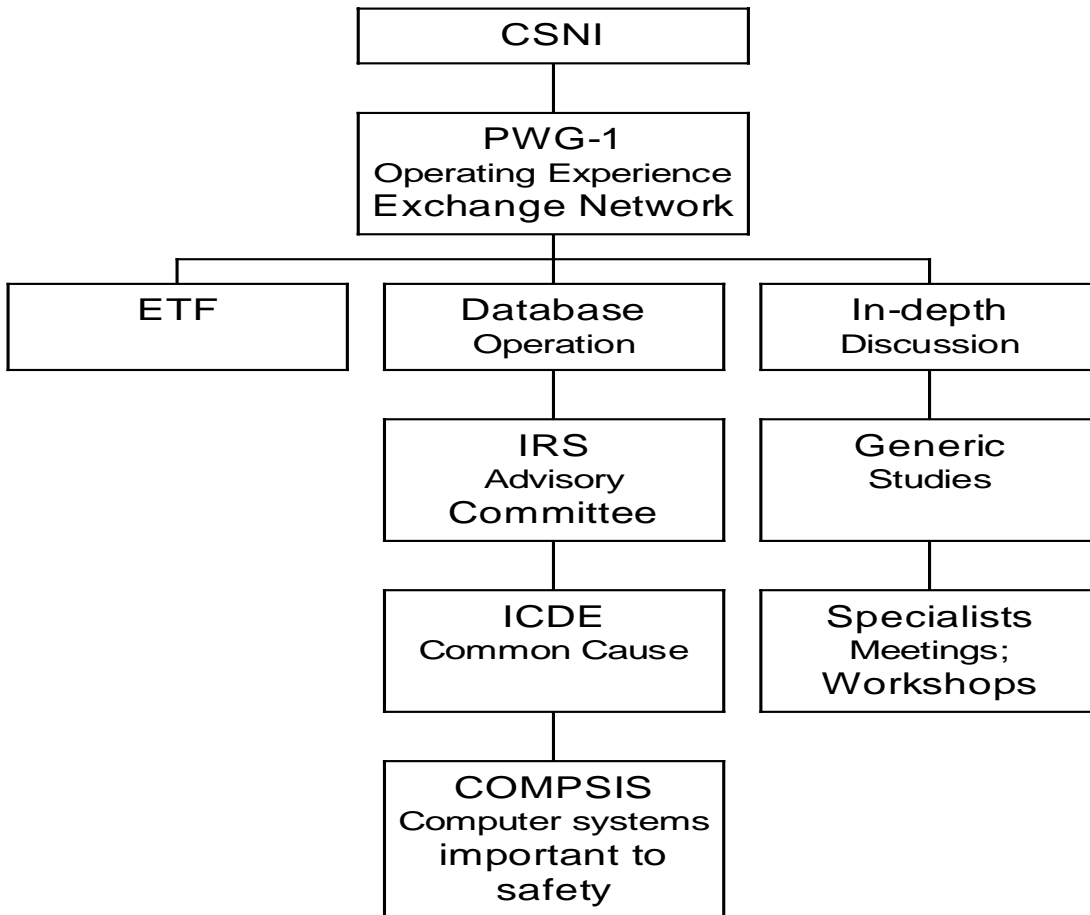
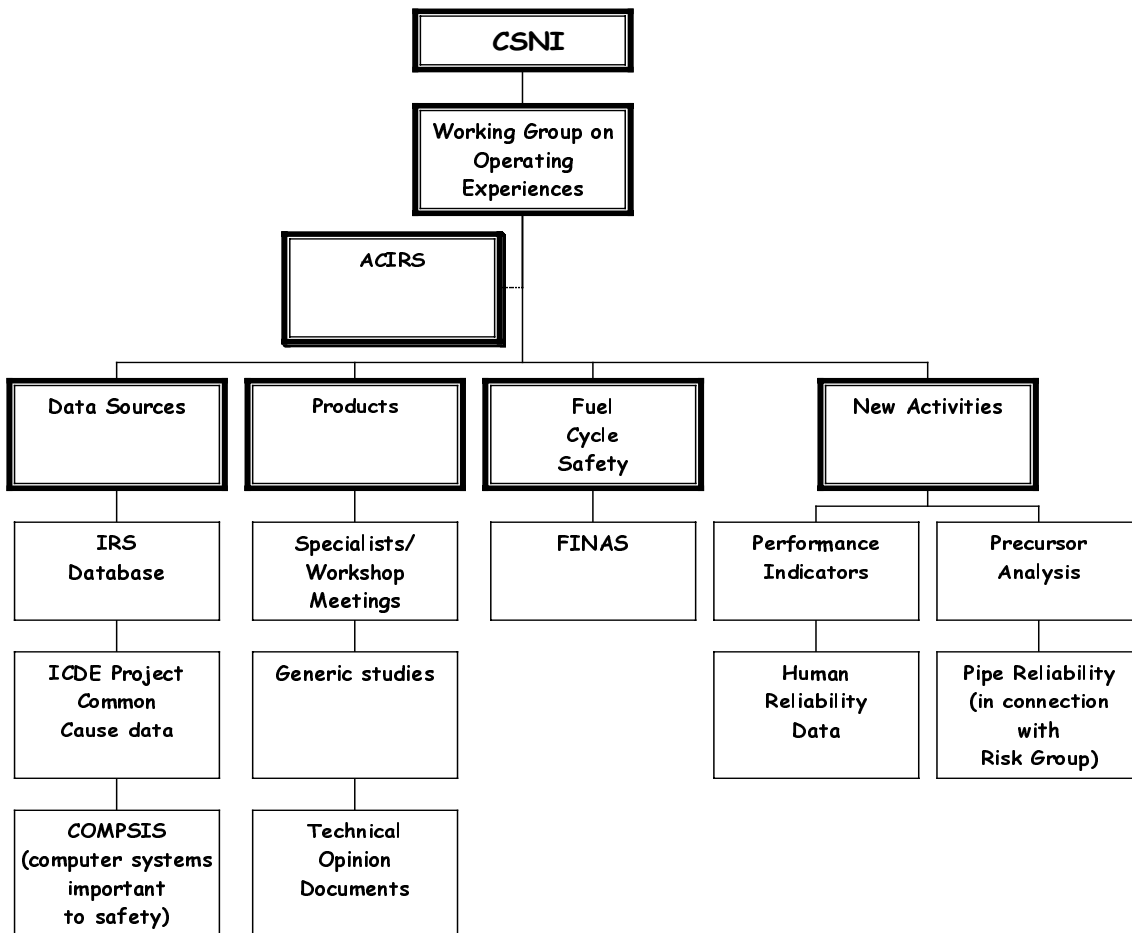


Figure 2.
Functions of Working Group on Operating Experiences
In Accordance with Guidance from CSNI
As of September 2000.



2. WORK OF THE TASK GROUP IN REVIEWING THE MANDATE OF PWG

2.1 Charter of the Task Group

2.1.1 The primary assignment of the Task Group was to review the PWG1 mandate and basic operations in light of the recently formulated NEA strategic plan and the resulting strategic plans of CSNI and CNRA. The Task Group reviewed the NEA strategic plan to determine what general and overall guidance it might contain. Some facets of that plan include:

- ◆ Ensure an effective exchange of safety information;
- ◆ Provide data on safety-related operating experience and related analyses aimed at identifying generic issues and trends;
- ◆ Assist in the resolution of safety issues;
- ◆ Promote, organize, and coordinate international autonomous research projects;
- ◆ Promote initiatives to maintain an adequate level of capability and competence in nuclear safety;
- ◆ Encourage international cooperation to better understand national regulatory requirements, to harmonize regulations, and to enhance the efficiency and effectiveness of the regulatory process;
- ◆ Promote cooperation with non-member countries with a view to advance nuclear safety technology and research.

Although these aspects are somewhat general, and could apply to more than one working group or expert group, nevertheless they reinforce the traditional mission of PWG1 with respect to the importance of review and analysis of operational information, and providing feedback to the regulatory bodies and utilities.

2.1.2 In reviewing the possible improvements to the mandate of WGOE the Task Group took into account a number of changes in the civilian nuclear power arena that have taken place over the past six years, including:

- New countries have joined the NEA
- There is a trend toward utility deregulation
- The use of risk-informed concepts, including accident sequence precursor methods, is growing
- There have been more than 2000 additional reactor-years without another major event
- For the most part, there is little trend toward advanced reactor concepts, and few construction projects for plants of existing designs. There is growing need and emphasis on plant life extension.

⁶ NEA/SEN/SIN/WG1(94)5. The Task Group should be provided with this reference, sometimes known as the Hada report, as he was the consultant.

- The budgets for nuclear research and development is shrinking in most member countries, and this might lend emphasis to the notion of more internationally funded projects.

These factors are relevant to possible changes in the charter or mandate (the terms being interchangeable).

2.1.3 Over the past 6 years PWG1 has had extensive interactions with the IAEA Technical Committee on IRS, and has participated in the ACIRS (Advisory Committee on the Incident Reporting System), which was created to govern the introduction and utilization of the Advanced IRS (AIRS). The use of AIRS has brought improvements in the quality and quantity of information in the reporting system.

The WGOE mandate should consider enhancing the working relationship with the IAEA, in order to achieve efficiency and to minimize gaps and overlaps. The NEA strategic plan has stated that one goal is “to ensure complementarity and increase synergy with other international bodies; to avoid unnecessary duplication of effort; and to make NEA expertise available, and disseminate the results of its work, to a wide audience”. The strategy for this goal included specific reference to the IAEA in several areas, including the IRS. The logical focus in the IAEA for achievement of this goal is the Technical Committee of IRS Coordinators (or the TCM). This leads to recommendation #1:

Recommendation #1. *Role of the TCM in context of the WGOE function. Greater efficiency in both WGOE and the TCM can be achieved through more intense coordination. It is recommended that a coordination meeting (ideally, consecutive with the ACIRS meeting which occurs usually early in the year) should be held for the purpose of detailed agenda planning for both meetings, with the goal of further improvements in efficiency.*

2.2 Organisational process of the Task Group

PWG-1 received direction at the annual meeting in September 1999 to reconsider its role in light of recent developments, in particular the various strategic plans which have rearranged some of CSNI functions. It was decided to formulate a Task Group to prepare a report for consideration by WGOE.

The Task Group met in February 2000 to review a proposed report outline and to consider various options for preparation of the report. One element of the report was to review past PWG-1 accomplishments, from 1994 to present, as was done for the last assessment report in 1994.

The Task Group would then provide an analysis of the envisioned changes in the mandate in light of CSNI directions. The Task Group endorsed the concept of an Operating Plan as part of this review. This plan would provide more guidance on implementation of the new mandate. Preparation of such a plan will be a function of the secretariat.

Various drafts were circulated in the spring and summer of 2000 before submission of the final draft to WGOE in September. Following review and comment by WGOE, the final version will be sent to CSNI for its annual meeting in December 2000.

The Task Group consisted of:

Chair, Jean-Pierre Clausner, France⁷ and *Corentin LeDoare*
Jean-Jacques van Binnebeek, Belgium
Javier Zarzuela, Spain
Klaus Kotthoff, Federal Republic of Germany
Masashi Hirano, Japan
Lennart Carlsson, NEA Secretariat
Denwood Ross, consultant for drafting of report

2.3 Outline of the report

The report of the task group centers around three main sections. An analysis of the progress made in the last six years is contained in Chapter 3. Chapter 4 discusses changes in the nuclear field that might affect a new charter and mandate, followed by the elements of the new mandate. Chapter 5 contains conclusions and recommendations.

There are several appendices. Appendices A and B provide the original mandate (1982) and the revised mandate of 1984. Appendix C is an historical summary of the PWG1 accomplishments during the period 1982-1994 (as documented in the 1994 review of PWG1). Appendix D is the proposed mandate for 2000, on the basis of NEA and CSNI guidance.

Some of the revised guidance for the working groups is somewhat procedural in nature and might better be done, it least in a preliminary form, by the Secretariat. This includes prioritization⁸ of WGOE activities, measurement of success of WGOE activities, and assessment of research needs on the basis of operating experience. The Secretariat will prepare implementing procedures for these items.

⁷ Mr. Clausner withdrew from the WGOE effective June 1, 2000 due to a change in his work; however, he remained active in the preparation of this report. He was replaced on the WGOE effective July 1, 2000 by Mr. Corentin Le Doare, who has also participated in this Task Group.

⁸ The NEA strategic plan noted that the programs of work would be made transparent by, among other things, the showing of a clear prioritization of activities. Some specific prioritization criteria are suggested in the CSNI Strategic Plan.

3. CURRENT MANDATE AND PERFORMANCE ASSESSMENT SINCE 1994

This section of the report provides an evaluation of the performance of PWG1 since 1994 in light of its current mandate, (Appendix B), which is composed of six elements.

3.1 Reviewing periodically activities for the collection, dissemination, storage and analysis of incidents reported under the IRS

3.1.1 Current status

The Advanced IRS (or AIRS) jointly operated by the NEA and IAEA, has been in operation since 1994. AIRS, together with its predecessor IRS, has over 2,800 reports in the database. It offers a more user-friendly system, including full-text storage and retrieval, as well as graphics.

Since 1994 (year of the last review of the working group), most of the activities involving review of the IRS are in the area of fine-tuning and minor adjustments in a reporting system which operates reasonably well. Many of the member-state representatives to the working group also serve as the IRS coordinators.

The annual reporting rate to IRS over the past 20 years is shown in Figure 3.

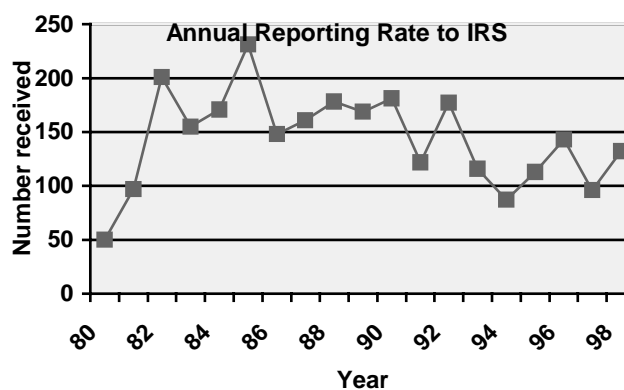


Figure 3. Reporting Rate

It is seen that during the 1994-2000 period the reporting has fluctuated, but averages about 120 reports per year, or about 0.3 reports per plant-year.

This report average is within the expected range, but some countries remain somewhat under this target value.

There is a joint committee between the NEA and IAEA known as the Advisory Committee on IRS (ACIRS) which meets annually to evaluate the operation of IRS. Some commentary from the most recent meeting (February 2000) is:

- ❑ the overall quality of IRS reports is good;
- ❑ some weaknesses were in the consequence analysis and safety analysis of some event reports;
- ❑ corrective actions could be further developed, and reporting should make the message clearer;
- ❑ generic reports are of great value for sharing of lessons learned, and some effort should be made to encourage more generic reports.

These comments will be taken into account in construction of the new mandate.

3.1.2 Achievements/Evaluation

As noted above, the reporting frequency, on average, is about what is expected. However, there is quite a bit of fluctuation between the member states. In the past, letters have been sent to member states urging more frequent reporting of events, without notable success.

Also, there has been some analysis and discussion of reporting delay, which is the time lapse between occurrence of the event and arrival of the event report to the Secretariat. The Figure 4 graph is a sample taken during the 1994-2000 time period of the reporting time (that is, the delay time as defined). There is room for improvement in that the delay could be substantially reduced.

In that the reporting guidelines are now closer to those of WANO, it should be less effort for member states to submit reports on a timely basis, by creative use of the WANO report. Possibly, in the future, the two systems can come closer in style and format.

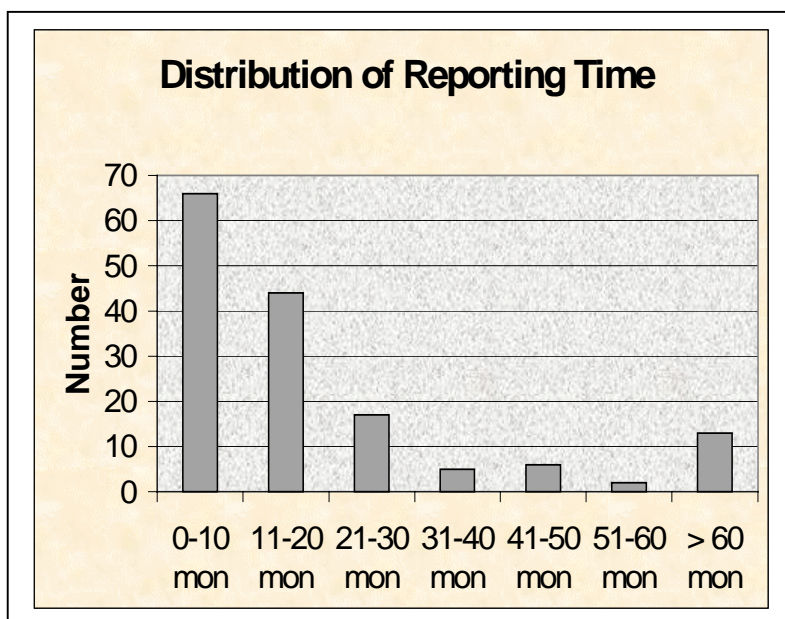


Figure 4. Reporting Delay

3.1.3 Current issues and proposals for improvement

The 1994 report commented on:

- More preliminary reports
- More generic IRS reports
- Recurrent events (in context).

It seems appropriate to evaluate whether any progress was made on these three items.

Also, the 1994 report reflected on reporting delay (between date of incidence and date of receipt of report by IRS). In the past PWG-1 has discussed these topics. There have been several discussions on reporting delay (as illustrated by Figure 4.)

The number of generic IRS reports seems to be reasonable. For example, during the 1997-99 period (three years) there were 101 generic reports, out of the total number of 347 reports received by IRS. (Also, during that time span there were 10 preliminary reports.)

One item for consideration as a possible improvement in generic studies (as distinguished from generic IRS reports) concerns their relevance to operational safety. According to the new CSNI direction, efforts to generate new generic studies must be screened for prioritization in advance, and must be subject to success measure after completion. WGOE could consider further efforts along these lines to ensure that generic studies have high relevance. The goal is not necessarily to have more generic studies, but generic studies of more use and relevance. Some suggestions along these lines are in the Appendix E Operating Plan.

In the last year (1999) there has been progress on consideration of recurring events. There was a special study (report 99-19, see Table 1) by PWG-1 on recurring events, and it is a major topic for discussion at the year 2000 annual meeting.

Except for reporting delay, it is felt that adequate progress had been made on this topic. One possible improvement could be in the more frequent use of preliminary reports.

In this area one recommendation for improvement is:

Recommendation #2: *Reporting Trends and Other IRS Matters.* It is recommended that at each annual meeting there be a summary consideration of the reporting interval (between incident date and reporting date) and of the use of preliminary reports. Trends over time should be presented so that observations can be drawn as to improvement in the situation. This material would be provided to the Advisory Committee on IRS (ACIRS) for its consideration and action.

Generic studies are discussed further in Section 3.5, and in Chapter 4.

3.2 Annual examination of the incidents reported during the previous year in order to select issues (either technical or human factors oriented) with major safety significance and to report them to the CSNI

3.2.1 Current status

The 1994 report noted that PWG1 devoted much of its annual meeting to discussion of recent events, actions taken as a result of IRS, in-depth discussion (of a topic selected at the previous meeting), and presentation of issues of most concern. The main goal of this part of the mandate is to identify issues of major safety significance and to discuss causes and corrective actions taken in order to avoid recurrence of an accident. One logical end-point of the in-depth discussion is the development of insights on lessons learned and possible actions to be taken, as a result of the group discussion.

Reporting to CSNI is by presentation at the annual meeting of the CSNI.

3.2.2 Achievements/Evaluation

In the past six years there has been a large number of technical reports issued by PWG 1 on a variety of technical subjects, as illustrated in Table 1. These reports are for the joint benefit of the member states, via the WGOE member, and for the CSNI.

The report topics are selected at the annual meeting and are performed by members of the group, on a volunteer basis. In general the topics reflect current concerns.

In some cases, for example the strainer clogging issue illustrated by the Barseback incident, the report served as a basis for setting up of national programs for resolution of the issue. The topics of thermal fatigue as well as fuel and control rod issues have also had a significant effect on national programs.

However, the benefit of other technical reports has not been fully measured. As noted in Chapter 4, the new direction from CSNI states that there should be performance measures and criteria for measuring success in achieving objectives.

TABLE 1**Work Products of PWG-1 from 1994-2000**

Report Number	Area of Concern
94(9)	Specialists Meeting on Fire Protection
94(13)	Generic Study on Reactivity Related Events
94(14)	Proceedings from Barseback Event
94(16)	Specialists Meeting on Motor-Operated Valve issues
94(21)	Risk-based Configuration Control
95(9)	Evidence of Aging
95(10)	human-factor related CCF
95(11)	Knowledge base for ECCS recirculation (strainer clogging)
95(27)	Symposium on Human Factors in NPP Maintenance Outages
97(2)	Fuel and Control Rod Issues
97(5)	Latent Failures in Safety Systems
97(12)	Joint IRS Guidelines
97(13)	The Role of Simulators in Operator Training
97(15)	Improving HF Coding in IRS
97(23)	Experience with Computer-based Systems
97(24)	Research Strategies for Human Performance
98(16)	Human Performance in Operational Events
98(17)	Identification and Assessment of Organizational Factors in Safety
98(20)	Periodic IRS Report, 1996-1999
98(19)	Relqualification of safety-related equipment following outages
99(2)	ICDE report: CCF on pumps
99(21)	Organizational factors: Identification and Assessment
99(14)	COMPSIS: Computer-based Systems Reporting Guidelines
99(17)	The Impact of Human and Organisational Factors on Nuclear Plants Transition from Operation into Decommissioning
99(18)	Approaches for Integration of Human Factors into the Upgrading and Refurbishment of Control Rooms
99(19)	Recurring Events

3.2.3 Current issues and proposal for improvement

It is difficult to assess the benefit of the annual examination of reported incidents. Ideally there would be a feedback loop where the WGOE members could report on safety improvements or corrective actions that were made on the basis of this annual examination. At times during the annual meetings there have been discussions of actions taken on the basis of IRS reports. It appears that there is an opportunity to enlarge and enhance these discussions to provide a more robust list of actions taken.

Perhaps if the right question were being asked with respect to “actions taken”, a more forceful case could be made on the application of information from the experience database to member state regulatory actions. With respect to “actions taken”, there may be some ambiguity in this term. For example, if one substituted the phrase: “benefit of operating experience as reported through WGOE” instead of “actions taken”, then the member states might give a different picture.⁹

In 1994 the areas for improvement included the use of precursor techniques. A suggested area of improvement is to prioritize reports (perhaps using precursor techniques) according to the perceived risk importance. Such a prioritization, alluded to in the CSNI strategic plan, could be of use in allotment of time for the discussion of reports and events. Prioritization should take into account such factors as the number of reactors affected; accident frequency; public dose in event of accident; average remaining life of affected reactors; political/social considerations.

Also, the events discussed at the annual TCM need not to be discussed again at WGOE, unless there is something new to say. In effect, the TCM could be a sort of a screening procedure for more detailed discussions at the WGOE meeting, so that only the events of highest importance would be discussed at WGOE.

The discussion of events at the annual WGOE meeting is time-consuming, but is the heart of the meeting, however. At times there is insufficient time for full discussion of some of the more interesting and important events. One possible improvement is to use prioritization techniques, in advance by an agenda planning session, so that time is allotted according to the perceived safety importance. Implementing procedures for this effort should be developed by the secretariat. This is discussed further in Chapter 4.

It is believed that more emphasis on quality of the reports produced by WGOE, and less emphasis on quantity, would be worthwhile. This is especially true when considering the end use, or motivation, for the reports, in terms of eventual use in the regulatory arena.

3.3 Feed-back through CSNI of lessons derived from operating experience to nuclear safety research programmes, Including Human Factors Studies, should be encouraged.

3.3.1 Current status

In the past PWG-1 has made some recommendations for research on the basis of operating experience. The strainer clogging issue previously mentioned gave direct input to research planning in many countries.

⁹ In a study done several years ago, the NRC identified a number of technical areas where the NRC benefited from information from the NEA operating experience data base. This included ATWS, thermal stratification, degraded control rod insertion, MOV pressure locking and thermal binding, strainer clogging, feedwater piping cracking, core shroud cracking, CRDM cracking (PWR upper head), interfacing LOCA, CCF of solenoid valves, thimble wall thinning, turbine building hazards, BWR stability, among others. This list could be updated.

In several cases, workshops provided some research recommendations, which were not specifically acted on by CSNI. However, PWG-1 did suggest further work on thermal fatigue, and this is now under consideration by Working Group 3.

The Extended Task Force on Human Factors (or ETF) has a logical counterpart in the Human Factors work at the OECD project at Halden, Norway.

3.3.2 Achievements/Evaluation

The 1994 report noted that the process of reporting to the CSNI of needs for research activities could be improved. The concept of research needs on the basis of operating experience was not discussed rigorously or systematically at the PWG-1 annual meetings. As noted above, recommendations were made on occasion.

Current issues and proposals for improvement

The 1994 report suggested that one way to provide improvement would be to add a specific topic to the meeting agenda on safety research. This has not been done in WGOE. The 1994 report did observe that both CNRA and CSNI should receive the views of PWG1 on safety research; this has not taken place.

This one of the main strategies of NEA in its strategic plan, therefore this topic merits additional emphasis by the WGOE. This is especially true when it is considered that more timely research might have prevented some events from recurring.

A specific recommendation is:

Recommendation #3: *Research Recommendations from Operating Experience. It is recommended that the WGOE take a more proactive stance with respect to recommendations for research as evidenced by operating experience.*

3.4 Providing a forum to exchange information in the field of human factor studies¹⁰

3.4.1 Current status

The 1994 report observed that, via the ETF, the PWG1 was complying with its mandate. The ETF has met twice a year (generally in March and September) during the period 1994-2000.

This Expanded Task Force was a forum to exchange information in the field of human factor studies. At each annual meeting there was an update given by the chair of the Task Force to the full PWG 1.

3.4.2 Achievements/Evaluation

The 1994 report noted that the ETF approach should continue as embedded in PWG1; however, it was recommended that better integration was needed. There was specialists' meeting on Human Performance in Operational Events (Report 98-16; see Table 1). However, there was not a full integration of the work of ETF into the work of the main Working Group.

¹⁰ Note that one result of the 1994 Task Group report was to augment this portion of the mandate; see text in paragraph 2.4.3.

3.4.3 Current issues and proposal for improvement

Because of the perception that human factors studies and operational events analyses were too disjoint, the 1994 report suggested a modification to the mandate to state:

- “Providing a forum to exchange information in the field of human factors studies and ensure that operational experience (either events or conditions) with significant human factors implications is systematically reviewed.”

During the period, the importance of organizational factors was pointed out by operating experience (in Canada and Sweden, for example). The member countries needed tools to evaluate organisational factors, but no tool that could be applied directly was available.

ETF was given other tasks by CSNI in 1997. ETF contributed to the improvement of IRS guidelines regarding classification (coding) of human-factor related events. The ETF has produced a number of reports and held several workshops in recent years.

Recently it has appeared that the ETF has not appreciably integrated its work in human factors to the area of reactor operations. However the ETF is being transferred to a status reporting directly to CSNI so no further action by WGOE is indicated.

3.5 Establish short-term task forces, when necessary, to carry out information exchange, special studies or any other work within its mandate.

3.5.1 Current status

PWG1 has continued to sponsor generic studies, specialists' meetings, and workshops. The list of events in Table 1 is testimony to the many such meetings that have taken place over the past six years.

3.5.2 Achievements/Evaluation

The list of studies in Table 1 shows that the Working Group was quite active in furtherance of this portion of the mandate. A summary of a few examples follows below.

In the latter part of the period, the issues of latent failures of safety systems prompted a generic study. Events were reviewed and several recommendations were given. However, it did not reduce the number of events of this nature. The feedback loop was not closed with the reporting to CSNI and finalisation of the report.

The introduction of computer based control systems in many power plants initiated a study of operating experience. Among the recommendation was the recommendation to start a database on failures in computer based systems. This task was given to a group and the data collection has just started.

The important role of simulators in operating training was surveyed in more than 25 countries. Several issues were identified but again it seems that they did not lead to research activities or other actions by member countries.

In the latter part of the period a follow up of the conclusions from latent failure report initiated a study on requalification of safety related equipment following outages. This study is not yet reported because of problems have arisen with respect to conclusions.

PWG1 took a lot of initiatives to organize workshops and specialists meetings. The fuel and control rod issue was of concern and information was exchanged among many participating countries. It seems that the conclusions were fed into national programmes.

A specialist meeting on human performance in operational events was held amongst NEA and IAEA specialists. Several good recommendations came out of the meeting but it is difficult to know what effect this had on reactor safety. One recommendation was to collect human performance data and this has been discussed with PWG5 and was a part of the strategic plan for ETF.

Among the events discussed at PWG1 were several thermal fatigue events. PWG1 initiated to held a specialists meeting (CSNI/R(98)8) on experience with thermal fatigue in LWR piping caused by mixing and stratification. The recommendations are now followed up by PWG3.

3.5.3 Current issues and proposals for improvement

In 1994 it was mentioned that a wider participation of member countries should be promoted. It is unclear as to whether this was attempted, and was there any success. This should be addressed, as probably not much progress was made.

Although many reports and meetings have been held, it is not obvious to what extent these have been successful or useful. Some systematic assessment of the utility of generic studies and specialist's meeting should be done, and this is further discussed in Chapter 4.

Also, it is noted that future directions from CSNI will require that generic studies be prioritized in advance of the study, and evaluated for success at the end of the study.

Generic studies have been somewhat difficult to execute. Once the topic is selected, one member (a volunteer) serves as the report coordinator, and other members volunteer to work on the project. Such work takes time, and often money, and thus it is not always possible to obtain volunteers for work on needed projects. Feedback on the effectiveness of generic reports needs to be improved and documented.

Thus, in the future, it appears that initiation of a new generic study should be subject to the new directions for prioritization, and, upon completion, should be evaluated for success according to new evaluation criteria. One difficulty in the last few years has been in obtaining sufficient volunteers to participate in generic studies, and this is especially true for the leader, or member-sponsor, for the studies. Resources are not always available for these studies. Further use of consultants for report coordination may be needed.

3.6 Make recommendations to CSNI for improving and encouraging these activities (Resulting from operating experience)

3.6.1 Current Status

Through the Chairman's presentations, PWG1 makes recommendations to CSNI (or CNRA) for improving and encouraging these activities.

3.6.2 Achievements/Evaluations

The 1994 report suggested some improvements, both in style and in substance, in the reporting to the Committees. It is believed that the Working Group did improve its role with respect to CSNI

recommendations, both in style and in substance. Greater use of written overview reports or technical opinion papers regarding problems of safety significance would be useful.

3.6.3 Current issues and proposal for improvement

The 1994 report did note the need for informing both CSNI and CNRA on the feedback of operating experience which is more oriented on event investigation and regulatory activities, as well as safety research needs. It is believed that there is no archive of research recommendations that it has made (to either committee) or what disposition that was made of the recommendations, if any.

It was also suggested that the WGOE chair could provide a written contribution that defines issues and proposes actions, in context of issues of major significance. This would be for CSNI and CNRA, in addition to the oral presentations. Although it has not been done, it would be a candidate for improvement. Again, this would take the form of a technical opinion paper, which would be something new for the WGOE.

Some consideration should be given to a standard format for the report of the Chairman, to ensure that all items are covered in the presentation (consistent with the views on prioritization), as time is limited at the CSNI meetings. This would be a joint function for the Secretariat and the Chairman.

4. MODIFIED MANDATE AS BASED ON CHANGES SINCE 1994

4.1 General

New issues identified in 1994 were:

- ♣ Identification of precursors, as a more systematic task of PWG1;
- ♣ Feedback to CNRA of issues related to licensing and regulatory matters that arise from event investigation;
- ♣ Feedback of issues from consideration of operational factors and human factors, such as management, maintenance, and safety culture;
- ♣ Advanced design considerations, such as control room design and protection systems;
- ♣ Severe accident management and operator responses.
- ♣ The 1994 report suggested that PWG1 should consider these new and emerging topics, and define the future direction. It seems proper to review what progress PWG1 made in this regard since 1994.

Over the period 1994-2000 the Working Group made some progress along these six lines of work. Some observations on these issues follow:

- Precursors: several of the member states are moving forward in the use of accident sequence precursors as an important part of operational experience feedback. Some presentations and reports incorporate the conditional risk perception of events and conditions and use the quantification to enhance the relative importance of events. Further use of this technology is expected and encouraged.
- Licensing and regulatory matters: For the most part the Working Group does not specifically identify licensing and regulatory matters that arise from event investigation. Such matters could include justification for continued operation, backfiring, and modification of guidance such as rules, interim v. final solutions, and use of cost-benefit analysis techniques. This may be more in the arena of the Working Group on Inspection Practices.
- The ETF has considered a number of factors associated with management, maintenance, and safety culture, but there is still room for improvement in the use of ETF products in the mainstream of licensing and regulation, and in the analysis of operating events.
- Advanced design considerations has been given very little attention.
- Severe accident management and operator responses likewise have not taken much of the Working Group's time; it was more the responsibility of Working Group 4.

Thus, it is appropriate for the Working Group to reconsider these issues during the year 2000 review of the mandate.

4.2 Fuel Cycle Group

Another new issue is that of the Working Group on Fuel Cycle Safety which, according to CSNI direction, will now be attached to the Working Group on Operating Experiences. In October 1999 the Fuel Cycle Group proposed a mission statement and mandate as follows:

“The main mission of Working Group on Fuel Cycle Safety (FCS) is to advance the understanding of relevant aspects of nuclear fuel cycle safety in Member countries. In pursuing this goal, the Working Group shall:

- *meet to exchange information on relevant matters including licensing systems, safety philosophy and safety standards to improve mutual understanding,*
- *maintain a database on incidents involving fuel cycle facilities (FINAS),*
- *indicate where further research is needed,*
- *review and prioritise safety issues,*
- *prepare state-of-the-art fuel cycle safety reports, and*
- *collaborate with other groups as necessary”*

The detailed means by which the FCS would achieve this mandate (in terms used before the consolidation with WGOE) are:

- a) The Working Group¹¹ shall report to the Committee on the Safety of Nuclear Installations (CSNI) and assist that Committee with its work. The programme of work of FCS will be approved by CSNI. It shall also with the approval of CNSI sponsor specialist meetings and workshops to further its objectives.
- b) The Working Group shall constitute a forum for exchange of information and experience of activities related to nuclear fuel cycle safety in Member countries. Accumulation of operational experience should be used to improve safety technology. Mutual understanding of licensing systems, safety philosophy and safety standards should be common goal between members.
- c) The working Group shall maintain the Fuel Incident Notification and Analysis System (FINAS) is a database, which collects and disseminates safety-related information concerning incidents at nuclear fuel cycle facilities. The main objective of FINAS is to serve as a tool for sharing “lessons-learned” from significant events, which can be used to improve safety.
- d) The Working Group shall indicate where further research and analysis is needed and denote priorities actions to be undertaken. It should prepare technical reviews (such as state-of-the-art reports, compilations of ongoing efforts and standard problems, as appropriate) of work in all phases of the nuclear fuel cycle where such reports are needed for further development. In doing so, care will be taken to avoid duplication of effort or scope with other CSNI Working Groups, or with other international bodies.
- e) With prior approval of CSNI, FCS shall collaborate with or assist the other PWGs, NEA committees or other international organisations.

¹¹ In this context, the Fuel Cycle group referred to itself as the Working Group, which should not be confused with WGOE.

The WGOE will have to take notice of the FC group and its present charter and mandate. However, it is noteworthy that the main ingredients of the FC group mandate includes:

- ❑ Exchanging information
- ❑ A database of events, and feedback of safety information
- ❑ Recommendation for research
- ❑ Preparing technical reviews; state-of-the-art reports.

These items in the FC mandate closely mirror what has commonly been present in WGOE mandate, and suggest that perhaps a common mandate would eventually serve both for the main WGOE as well as the attached FC group. However, it is believed that a separate mandate, for now at least, would be a better way to manage the transition. Some procedural aspects will be necessary to accommodate the CSNI guidance, in terms of work prioritisation, measurement of success, and research based on operating experience.

4.3 Strategic Planning

A major new issue/topic is that of the NEA strategic plan and the subordinate strategic plans of the CSNI and the CNRA. Various elements of these plans directly affect Working Group 1 mandate and its line of work. For example, the strategic plan encourages units such as WGOE to have performance measures so that it can measure performance against specific strategies. For example, if a strategy is to gather information about operating events and conditions from member states in a timely fashion, then a performance measure could be at least 60 (or some number) IRS reports per year, with a mean delay time less than 1 year (from date of incident). The actual numbers are not so important as would be the trend over time. It could be one generic study report per year, or one workshop or specialists' meeting per year, although as already stated, quality is more important than quantity. These are performance measures.¹²

Further, the notion of a strategic plan emphasizes the importance of knowing the customer's needs, and measuring how well the needs are satisfied. In this context there are two sorts of customers. For the WGOE as a whole, the customers are CSNI and CNRA. However, each delegate individually has a customer his/her home organization, usually the regulatory body. The individual regulatory body is not so interested about whether CSNI/CNRA is satisfied as it is about its own needs. The regulator wants the delegate to gather safety information through the NEA process and bring it home. That regulatory body is also a customer. Once the customer and its needs are identified, then ways to measure the satisfaction of the customer can be devised.

According to the CSNI strategic plans, some common functions of the Working Groups are:

- ♣ Serve as a centre of expertise;
- ♣ Maintain an efficient communication network among experts;
- ♣ Review the main orientation and group. Identify emerging issues, discuss their implications and propose that CSNI address these issues;
- ♣ Promote and help organize international autonomous research projects;
- ♣ Organize workshops, international discussions, international standard problems, and submit the outcomes and conclusions to CSNI;

¹² See, for example, paragraph B4 of Appendix B of the CSNI Strategic Plan: Criteria for Measuring Success in Achieving Objectives.

- ♣ Prepare state of the art reports, technical opinion papers and other papers as necessary. Ensure that they are submitted to the PRG in a timely manner.
- ♣ Through the efforts of the Chairman and Secretary, maintain an efficient interface with other groups operating in the same field, to minimise duplication and transfer information;
- ♣ Efficiently manage the projects approved by the CSNI;
- ♣ While continuing to take instructions only from CSNI, submit the results of the work and proposals for future activities to the new PRG.

There are criteria for prioritizing work, which, according to the CSNI plan, are to be used by Program Review Group (PRG) and CSNI; however, it makes sense that the Working Groups must also be responsive to these criteria in deciding issues to work on:

- a) An issue of high importance to regulators in many OECD countries;
- b) An issue of potentially high safety significance;
- c) An issue better resolved through international cooperation;
- d) An issue which will help maintain or develop key competencies or facilities.

Success criteria, according to the strategic plan include:

- ♣ Products used to set priorities for national research programmes;
- ♣ Products used directly to support decision-making and resolve safety issues;
- ♣ Products avoid the need for a national program on that issue;
- ♣ Products provide peer review of national efforts on that issue;
- ♣ Products directly contribute to the national research programme.

These factors will need to be considered in the WGOE in its plan of work.

4.4 Relations with other organizations and countries

4.4.1 Relations with the IAEA

WGOE has a close analog in the IAEA known as the Technical Committee (TC) on IRS. There is a joint annual meeting of the NEA and IAEA to exchange Information on Recent Events in Nuclear Power Plants. The TC has a further meeting in conjunction with this joint meeting. The two committees -WGOE and the TCM- agree on scope and timing of the meeting so as to minimize redundancy.

In the future, as WGOE modifies its procedures consistent with the new mandate, it is anticipated that corresponding changes in the functions of the TCM would be indicated. This may be a topic for the IRS Advisory Committee to consider.

4.4.2 Relations with the World Association of Nuclear Operators (WANO)

WANO attends and participates in the annual meeting of WGOE. A close contact and collaboration is of mutual benefit to Working Group 1 and WANO. Workshops, for example, are co-sponsored to a degree.

Recommendation #4: *WANO Interface.* Consideration should be given to more detailed interface meetings with WANO to discuss problems that may arise from late or incomplete event reporting, and to discuss forthcoming studies, research perceptions, and success measures.

4.4.3 Relations with utilities

Some workshops and specialists' meetings have significant attendance by utilities. However there is, as was also noted in the 1994 review, little direct participation by utilities in the WGOE annual meeting.

WGOE should reconsider the ways by which more active utility representation can be made at the annual meeting.

4.4.4 Relations with non-OECD countries

WGOE has no direct contact with non-OECD countries. It does interact at the joint meeting previously described. The Working Group reports are distributed to the IRS coordinator of the non-OECD countries.

4.5 Mandate Discussion and Analysis

It is seen that a variety of factors play a role in the establishment of a new mandate for Working Group. The primary guidance will, of course, be the CSNI strategic plan. Other factors would be derived from the twenty years of experience that PWG1 had in the review of operating experience. The mandate should be a high-level document, on the order of one page in text.

The elements of the new mandate are:

- *Review and Analysis of Operating Events:*
On an annual basis, the WGOE should review and analyze the risk and safety significance of operating events, and make recommendations to CSNI on the basis of these reviews.

Discussion:

The term operating events refers both to events as logged into the AIRS data base, as well as more recent events from which an event report has not been filed. In addition, the review and analysis may focus on in-depth discussions on important topics identified at a previous meeting. These discussions on recent events of safety significance and on in-depth discussions fulfill the CSNI direction that WGOE should focus on analysing and developing insights from operating experience.¹³

In performing this review and analysis, the group should make use of IRS, ICDE, COMPSIS, and other data sources in preparation of the review and analyses. Performance indicator programs would be followed and the Working Group would comment on the utility of the several programs for performance indication.

This is the highest priority of the mandate.

¹³ Item A1.O of the CSNI Strategic Plan

- *Fuel Cycle*
Provide general supervision of the FCG, in accordance with separate mandate of the FCG. Provide direction with respect to maintenance and improvement of FINAS.

Discussion:

The Fuel Cycle Group will meet separately according to its own mandate, as described in Section 4.2. It is expected that the Fuel Cycle Group will make summary presentations of its work at the annual meeting and that the WGOE will comment or concur in the recommendations.

- *Special Studies, Workshops, Generic Assessments*
Conduct special studies in areas of high safety and regulatory significance, and make recommendations to CSNI and member states on the basis of these studies.

Discussion:

Generic studies should continue to be done, but with added emphasis on quality, instead of quantity. Greater attention needs to be focused at the beginning to assure that the safety significance is commensurate with the effort involved. In this context, generic studies includes the topics of technical opinion papers and other special reports.

The CSNI strategic plan¹⁴ emphasizes the need for Working Groups to “identify emerging issues, discuss their implications and propose that CSNI address these issues”.

- *Data Bases:*
Operate, in cooperation with the IAEA, the Incident Reporting System. Monitor its application and modify and improve as necessary. Make use of specialized databases such as ICDE, COMPSIS, precursor analyses, piping reliability, and human performance. Assist the Fuel Cycle Group in improvement of FINAS.

Discussion:

The work under this item includes making observations and recommendations on the content of IRS reports, the timeliness, the usage of preliminary reports, and the completeness (are important events being reported). It is expected that a summary report on this facet of the mandate would be sent to the delegates in advance of the meeting, and that the Secretariat would make a brief oral summary, followed by a search for consensus recommendations. Ideally, most of the detailed work would be delegated to the ACIRS.

The content of IRS reports should be strengthened in the areas of corrective action, consequence analysis, and safety analysis. To accomplish this, some specific examples will be generated by the secretariat and offered to the WGOE for discussion, and then sent to the members for action.

¹⁴ See Section 5.0

□ *Procedural Matters*

Additional matters to be considered by WGOE are work prioritization, development of research recommendations, and measurement of success of the operation of WGOE. These matters will be handled by the Secretariat, under guidance and review by WGOE, using procedures developed and maintained by the Secretariat.

Discussion:

Much of the work added to WGOE as a result of the adoption of strategic plans by CSNI and NEA will of necessity devolve to the Secretariat, as the three-day annual meeting is essentially devoted to the higher-priority consideration of events.

The topics of work prioritization, success measurement, and research recommendations are ultimately the responsibility of the WGOE as a whole. However, the Secretariat will do advance work and present summary results at the meeting, so as to conserve the meeting time of the WGOE. The WGOE then can comment or concur on these results, for forwarding to either the Program Review Group or the CSNI.

The CSNI has defined broadly the criteria for success measurement, prioritization, and research recommendations. The Secretariat will take these broad criteria and develop implementing procedures.

These five elements of the mandate are arranged in descending order of importance. It is expected that advance planning will be needed to assure that the most important items receive appropriate time for discussion and resolution. The recommendation #5 below is intended to produce that result.

Recommendation #5: *New Mandate. It is recommended that the agenda for the annual meeting take into account the levels of importance of the new mandate.*

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The mandate of the Working Group on Operating Experiences has been reviewed according to the direction from CSNI, as augmented by the NEA Strategic Plan, and taking into account the experience over the past 20 years. The progress and experience since 1994, the year of the last PWG 1 review, was in particular taken into account. Changes, some significant, in the operating environment and in the relationships between the utility and the regulatory body have occurred, and were pertinent to changes in WG1 operations.

In 1994, the Task Group had some conclusions in its report, which bear repeating:

- ❑ Numerous benefits have accrued to the member states as a result of the Working Group;
- ❑ There is no alternative international incident reporting system accessible to regulators;
- ❑ IRS provides sufficient information to the regulators on safety significant event and lessons learned.

These comments are still true today, and one conclusion that the present Task Group has is that any mandate changes or other modifications to the basic operations of WG1 should not be so radical as to divert attention from the core business of event assessment.

It is concluded that for the most part the general mandate need not change. The classical elements of operational experience feedback have not changed, and include the collection of information, analysis, drawing of safety conclusions, and feeding back into the process of operation and regulation. That is still the main line of work of the newly renamed Working Group on Operating Experiences.

The WGOE concludes that the ETF work can certainly proceed as a separate unit, and it also concludes that the former mandate of the Fuel Cycle Task Group fits neatly into the general mandate of WG1.

5.2 1994 Recommendations

In the 1994 report there were five recommendations:

- 1) Maintain current management of IRS;
- 2) Member countries to do utmost to improve situation regarding reporting rate and delay;
- 3) Keep current format of PWG1 meetings, and hold joint meetings with IAEA;

- 4) After ETF completes certain tasks, in light of objective not to create a new group and not to separate fields of expertise, reconsider ETF.¹⁵ Modify mandate accordingly.
- 5) Re-examine role of PWG1 with respect to both CSNI and CNRA, and modify current mandate.

It is concluded that for the most part these recommendations were complied with.

5.3 Year 2000 Recommendations

The recommendations below are derived from the review of the progress that PWG-1 made in the period 1994-2000 and from the redirection of the group as documented in the NEA and CSNI Strategic Plans. Among other things, the recommendations should allow WGOE to remain focussed on the prime role envisioned by CSNI, while at the same time also discharging the new duties and functions of the group.

Recommendation #1: *Role of the TCM in context of the WGOE function. Greater efficiency in both WGOE and the TCM can be achieved through more intense coordination. It is recommended that a coordination meeting (ideally, consecutive with the ACIRS meeting which usually occurs early in the year) should be held for the purpose of detailed agenda planning for both meetings, with the goal of further improvements in efficiency. (Section 2.1.3)*

Recommendation #2: *Reporting Trends and Other IRS Matters. It is recommended that at each annual meeting there be a summary consideration of the reporting interval (between incident date and reporting date) and of the use of preliminary reports. Trends over time should be presented so that observations can be drawn as to improvement in the situation. This material would be provided to the Advisory Committee on IRS (ACIRS) for its consideration and action. (Section 3.1.3).*

Recommendation #3: *Research recommendations from operating experience: It is recommended that, as outlined in Appendix F, the WGOE take a more proactive stance with respect to research needs as evidenced by operating experience. (Section 3.3.3)*

Recommendation #4: *WANO Interface. Consideration should be given to more detailed interface meetings with WANO to discuss problems that may arise from late or incomplete event reporting, and to discuss forthcoming studies, research perceptions, and success measures. (Section 4.4.2)*

Recommendation #5: *New Mandate. It is recommended that the agenda for the annual meeting take into account the levels of importance of the new mandate, as outlined in Appendix D. (Section 4.6)*

Although not directly linked to a specific section of the report, two additional recommendations are offered in the interest of efficiency:

¹⁵ Perhaps this reconsideration should have been done before this Task Force report; at any rate, such reconsideration should be part of this report.

Recommendation #6: *It is recommended that WGOE have a management meeting (consisting of Chair, Vice chairs, Chair of FCS, and secretariat) in March of each year to review the progress of the group and to make corrections as necessary to keep the group on course. (March is suggested, as this meeting could be consecutive with the annual March meeting of ACIRS). At this meeting there should be guidance given for the preparation of an annual WGOE Progress Report, to be completed in the summer, for use and guidance at the annual September meeting of WGOE. This progress report would have much of the assessment information in terms of success measurement, technical progress, actions-taken summary, prioritization, and research needs assessment.*

For purposes of coordination within the CSNI family the following recommendation is made:

Recommendation #7: *The WGOE recommends that consideration be given to a joint meeting of the chairs of the Working Groups, ideally in conjunction with the annual CSNI meeting, to review the interfaces and cross-cutting issues among the groups.*

APPENDIX A

Mandate of 1982

- ❖ reviewing periodically activities for the collection, dissemination, storage and analysis of incidents reported under the IRS;
- ❖ examining annually the incidents reported during the previous year in order to select issues (either technical or human-factor-oriented) with major safety significance and report them to CSNI;
- ❖ encourage feed-back through CSNI of lessons derived from operating experience to nuclear safety research programmes, including human factors studies;
- ❖ providing a forum to exchange information in the field of human factors studies;
- ❖ short-term task forces, when necessary to carry out information exchange, special studies or any other work within its mandate;
- ❖ making recommendations to CSNI for improving and encouraging these activities.

APPENDIX B

Mandate of 1994

- Reviewing periodically activities for the collection, dissemination, storage and analysis of incidents reported under the IRS
- Annual examination of the incidents reported during the previous year in order to select issues (either technical or human factors oriented) with major safety significance and to report them to the CSNI.
- Feed-back through CSNI of lessons derived from operating experience in nuclear safety research programmes, including human factors studies, should be encouraged.
- Providing a forum to exchange information in the field of human factors studies and ensure that operational experience (either events or conditions) with significant human factors implications is systematically reviewed.
- Establish short-term task forces, when necessary, to carry out information exchange, special studies or any other work within its mandate.
- Make recommendations to CSNI for improving and encouraging these activities.

APPENDIX C

PWG 1 Accomplishments

1982-1994

In-depth discussions

- ❑ General lessons learned from the Salem incident, measures to be taken to reduce the number of incident causes by valve-mispositioning, measures to be taken to alleviate problems with calibration procedures and performance of switches (1984)
- ❑ Losses or near-losses of redundant safety systems and their support systems (1985)
- ❑ Failures of safety valves, relief valves and check valves (1986)
- ❑ Incidents due to systems interactions (10987)
- ❑ Events occurring during refueling and maintenance outages (1988)
- ❑ Unexpected events in NPPs (1989)
- ❑ Safety related events that involve a breakdown or weakness in organizational or management controls which in turn contributed to the event initiation or which adversely affected the plant operation (1990)
- ❑ Common cause failures and operational problems with MOVs and/or check valves (1991)
- ❑ Backfitting related to operating experience (1992)
- ❑ Human factors activities in member countries mainly based on operating experience (1993)
- ❑ In-depth discussion on recent events of safety significance which occurred recently in member countries (1994)

Generic Studies

- ❑ Loss of safety functions (CSNI Report 127 Vol. 1 & 2; 1986)
- ❑ Loss of containment functions (CSNI Report 151; 1988)
- ❑ Loss of residual heat removal (CSNI Report 168, Vol. 1 & 2; 1988-89)
- ❑ Incidents related to reactivity (CSNI/R(94)13; 1993)
- ❑ Evidence of Aging Effects on Safety Related Components in NPPs (CSNI/R(95) 9; 1995)

Specialist meeting/symposium

- ❑ Operator training and qualification (CSNI Report 63; 1981)
- ❑ Decay heat removal systems (CSNI Report 80; 1983)
- ❑ Steam generators (CSNI Report 91; 1984)
- ❑ On-site electric source power (CSNI Report 115; 1985)
- ❑ Reducing the frequency of nuclear reactor scrams (1987)
- ❑ Training program for NPP personnel (1987)
- ❑ Technical specifications (CSNI Report 138; 1987)
- ❑ Trend and pattern analysis (CSNI Report 159; 1989)

- ❑ Pump design and reliability (CSNI/R(91) 4; 1990)
- ❑ Steam generators (1991; proceedings published)
- ❑ Fire and fire protection systems (CSNI/R(94) 9; 1993)
- ❑ Workshop on Barseback strainer incident (CSNI/R (94) 14; 1994)
- ❑ Motor-operated valve issues (CSNI/R (94) 16)
- ❑ Human Factors and Organization in NPP Maintenance Outage: Impact on Safety (1995)

Human Factors Activities

- ❑ Assessing Human Reliability in NPPs (CSNI Report 75; 1983)
- ❑ Identifying Significant Human Actions in Reactor Accidents (CSNI Report 89; 1984)
- ❑ Expert Judgment of Human Reliability (CSNI Report 88; 1985)
- ❑ Design and Implementation of EOPs (CSNI Report 81; 1985)
- ❑ Approaches to Training Programs in NEA Member Countries (CSNI Report 128; 1986)
- ❑ Analysis of Incidents Involving Human Factors (CSNI Report 137; 1987)
- ❑ Use of Digital Computers in Control Rooms (CSNI Report 150; 1988)
- ❑ Analysis of Incidents Involving Cognitive Errors and Erroneous Actions (CSNI Report 180; 1989)
- ❑ Human Reliability in PSA's Use of Operating Experience (CSNI Report 170; 1989)
- ❑ International Practices for Analysing, Regulating and Improving Performance of Maintenance Activities in NPPs (Task 1) (CSNI/R (91) 6)
- ❑ Management of Maintenance Outages and Shutdowns (Task 2) (CSNI/R (94) 17; 1993)
- ❑ New Man-Machine Interface in NPPs (Task 3); (CSNI/R (93) 18)
- ❑ Human Interactions: Critical Operator Actions and Data Issues (TBD)
- ❑ Human-Factors related Common Cause Failures (Task 4) (TBD)

APPENDIX D

The New Mandate for WGOE-Year 2000

- ***Review and Analysis of Operating Events***
On an annual basis, the WGOE should review and analyze the risk and safety significance of operating events, and make recommendations to CSNI on the basis of these reviews.
- ***Fuel Cycle***
Provide general supervision of the FCG, in accordance with separate mandate of the FCG. Provide direction with respect to maintenance and improvement of FINAS.
- ***Special Studies, Workshops, Generic Assessments***
Conduct special studies in areas of high safety and regulatory significance, and make recommendations to CSNI and member states on the basis of these studies.
- ***Data Bases***
Operate, in cooperation with the IAEA, the Incident Reporting System. Monitor its application and modify and improve as necessary. Make use of specialized databases such as ICDE, COMPSIS, precursor analyses, piping reliability, and human performance. Assist the Fuel Cycle Group in improvement of FINAS.
- ***Procedural Matters***
Additional matters to be considered by WGOE are work prioritization, development of research recommendations, and measurement of success of the operation of WGOE. These matters will be handled by the Secretariat, under guidance and review by WGOE, using procedures developed and maintained by the Secretariat.