

International Trends and Safety Perspectives in the Decommissioning of Facilities Using Radioactive Material

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Abstract

Decommissioning of a wide range of facilities using radioactive material from e.g. nuclear power plants to small research laboratories, is increasing worldwide. This fact has drawn the attention of operators, regulators, other stakeholders and the international community to the importance of ensuring and maintaining safety of workers, the public and the environment during and after completion of decommissioning. For more than a decade the International Atomic Energy Agency (IAEA) has been working to establish a global safety regime including the field of decommissioning, through three main mechanisms; (i) the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management; (ii) the establishment of internationally agreed safety standards, and (iii) providing for the application of the safety standards through e.g. inter-comparison and harmonization projects, peer reviews, international, regional and national technical assistance projects and education and training programmes.

In view of the significant increase in the number of decommissioning projects and the importance given to decommissioning in Member States, particularly as a prerequisite for developing public confidence in the expansion of nuclear programmes, a specific high level safety standard (Safety Requirements WS-R-5) on the safety of decommissioning was developed and published recently. It provides a modern and up to date international point of reference on the subject. In view of this development, the existing Safety Guides on decommissioning of nuclear power plants, research reactors, and fuel cycle facilities are being reviewed and revised to provide consistency with the new Safety Requirements. The focus of IAEA activities is progressively shifting from the development of the Safety Standards to their implementation in Member States. Most of the current and planned IAEA tasks and projects associated with this evolution are a result of the "International Action Plan on the Safe Decommissioning of Nuclear Facilities" which was approved by the IAEA Board of Governors in June 2004. This Action Plan was revised in 2007 in accordance with the outcomes of the International Conference on Lessons Learned from Decommissioning of Nuclear Facilities and the Safe Termination of Nuclear Activities held in Athens, Greece in 2006.

The IAEA is enhancing its role with operating or regulatory organizations either currently engaged in, or actively planning to engage in, decommissioning. In this regard the IAEA has recently launched several new initiatives, including the establishment of an International Decommissioning Network (IDN). This initiative is intended to specifically address the needs of a large number of developing Member States providing a platform for access to the relatively mature nuclear decommissioning capabilities in countries with extensive nuclear programmes. As part of the programme organizations in Member States with a high level of expertise in decommissioning and with facilities that are suitable for demonstration or training purposes, and willing to share their experience via the IDN, will have the opportunity to share their experience and provide practical experience of real projects.

A summary of the recent trends and safety considerations in decommissioning, and also a summary of the ongoing and planned activities of the IAEA related to planning adequacy and to safe implementation and termination of decommissioning activities is presented in this paper. Specific emphasis is given to the recently developed Safety Standards and also the main outcomes from the technical assistance provided to operators and regulators on development and review of decommissioning plans (e.g. peer review, DeSa and FaSa projects, Research Reactor Decommissioning Demonstration Project - R²D²P, Iraq project, IDN).

KEYWORDS: Decommissioning, safety demonstration, safety assessment, intercomparison, international safety standards.

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1. Introduction

In the last sixty years a wide range of nuclear and other facilities using radioactive material have been designed, constructed, operated and some of them decommissioned. Many of these facilities are reaching their design lifetime and are expected to be shutdown and decommissioned in the near future. By way of example, of the 442 nuclear power reactors in the world, 88 have been in operation for 30 to 40 years, 200 for 20 to 30 years, 109 for 10 to 20 years and 45 for less than 10 years [1]. This means that 209 power reactors, about two-thirds of that total, are expected to reach and go beyond their original 30 year design lifetime within the next ten years. At present, several large facilities are undergoing decommissioning in a number of countries including France, Germany, Japan, Spain, the United Kingdom and the USA. Also, a number of nuclear power plants (NPPs) are to be decommissioned in Bulgaria, Lithuania, Russian Federation, Slovakia and Sweden as a result of reaching the end of lifetime or due to their premature shutdown. For most of these facilities decommissioning had not been considered in detail or often not at all during their design and/or during their operation.

One of the first international discussions about the safety of decommissioning took place at the IAEA headquarters in the 1970s and resulted in several published reports [2, 3]. In the 1990s, the increased aging of NPPs and other facilities using radioactive material gave rise to the realization in the international community of the importance of internationally agreed safety standards and recommendations on the adequacy of planning for and on the safe decommissioning of the various types of facilities. This resulted in the publication of the first IAEA Safety Standards [4] on decommissioning of NPPs and research reactors [5], medical and research facilities [6] and fuel cycle facilities [7] in the period 1999-2000. Shortly after in 2002 the first international conference to address the safety of decommissioning was organized in Berlin (Germany). The conference recognized the need to develop a stand-alone Safety Requirements on decommissioning that would provide a clear reference for best practice to be followed by operators and regulators in Member States [8]. This outcome from the conference was reflected in the International Action Plan on Decommissioning of Nuclear Facilities of 2004 [9] which requested the IAEA to develop such a standard and to revise the existing Safety Guides accordingly.

In parallel, other international initiatives have been underway, such as that of the Western European Nuclear Regulatory Association (WENRA), where the development of safety reference levels for decommissioning was initiated. The reference levels were based on the IAEA standards and the experience of European Union countries with NPPs and have been used to review national legislation in the member countries against the levels [10]. A number of international meetings and conferences have also been organized in recent years on various aspects of decommissioning, e.g. Italy [11], USA [12, 13], UK [14]; Greece [15]; Lithuania [16], Germany [17], etc.

Infrastructural development have also taken place with new governmental organizations being established (e.g. in UK [18]) and dedicated funding mechanisms for decommissioning established (e.g. in Canada and Ukraine [15]). Notably an increased number of specialized technical publications have also dedicated sections to the discussion of safety and other technical consideration of decommissioning (e.g. France [19], Russia [20] and US [21]). This range of evolutions and initiatives has demonstrated an awareness of safety by operators, regulators and other interested parties and measures are increasingly being put in place at national and international level aimed at ensuring the adequacy of planning and the adequacy of resources for decommissioning and the eventual release of facilities and sites from regulatory control.

2. International Trends

2.1. Member States Experience

Significant decommissioning experience has been accumulated over the last forty years worldwide. This experience has demonstrated a number of key trends in the nuclear industry and in the field of decommissioning that were confirmed at the International Conference on Lessons Learned from the Decommissioning on Nuclear Facilities and the Safe Termination of Nuclear Activities held in Athens in 2006 [15]:

- Facilities are reaching their end of lifetime (e.g. Armenia, Bulgaria, Slovakia, Russia, Ukraine) and decisions are needed regarding decommissioning strategies to be adopted, end states to be achieved, waste management programmes needed etc. and these require considerable attention and action by all parties involved;
- In parallel, new build programmes are being developed (e.g. Bulgaria, Canada, China, Finland, France, Russia, South Africa, UK, USA) which in many cases affect the selection of decommissioning strategies, end states etc. and, significantly, the availability of human resources and labour deployment strategies.
- A need exists to increase the awareness of governments and other interested parties of the need for early planning, adequate funding, governmental support and long term strategies for decommissioning, waste and spent fuel management.
- For many facilities, and in particular small facilities, the preferred option is immediate dismantling. However, deferred dismantling may be a justified option for some facilities although more clarity is needed on the concept of entombment - considered in some Member States to be a storage rather than a disposal option.
- Early planning, together with clear waste management and spent fuel strategies, is vital for the safe and cost effective management of decommissioning waste and the success of decommissioning projects. The lack of waste disposal facilities is not a reason for delaying decommissioning, in particular, in the case of legacy and small facilities.
- There is a need for national and international mechanisms to preserve and maintain the operational knowledge and decommissioning experience that is important to the safety of decommissioning. Also recognized are the important challenges experienced in many countries to retain and maintain the necessary levels of knowledge (including long term maintenance of records) and skilled personnel during decommissioning, in particular, in the case of long term projects.
- Independent review of arrangement and planning for the decommissioning of facilities can be of benefit. During the past few years, the number of requests for the IAEA to provide technical assistance in planning or undertaking decommissioning of various nuclear facilities (e.g. nuclear reactors, research reactors, etc.) has increased. This assistance has been mainly provided on a case by case basis through national or regional technical assistance projects.
- With the recent increase in consideration and planning for the development of nuclear facilities worldwide, lessons learned from decommissioning to date need to be used as an input in the design, operation and maintenance of all new facilities.
- Decommissioning of small facilities requires specific attention. International support for decommissioning of such facilities (e.g. small reactors, research laboratories) in countries with limited human and financial resources through further elaboration of international centres in the different regions, complementing the experience of the R²D²P project (Research Reactor Decommissioning Demonstration Project) is being strongly encouraged [1].
- With the approval of the new Safety Requirements No. WS-R-5 [22], the suite of international safety standards for decommissioning of facilities using radioactive material now covers all relevant areas. However, there is a rapidly expanding body of experience worldwide that needs to be captured and reflected in the revision of the existing Safety Guides [5, 6, 7] which is currently underway. The importance of establishing clear regulatory policy, safety requirements and criteria, record keeping mechanisms, approaches and criteria for review of safety cases and interaction mechanisms between regulators and operators is increasingly recognized.

- Early involvement of relevant stakeholders in planning for decommissioning and in the definition of a clear endpoint of decommissioning are important, particularly in relation to the release of material from control and the reuse of sites. Such involvement contributes to the building of public confidence and in the building and maintenance of staff motivation.
- Straightforward, proven and available decommissioning technologies are generally preferable to new and innovative technologies. Where new technologies are foreseen, provisions for their testing and demonstration of their suitability need consideration in planning for decommissioning. It is also important to involve the operational workforce in the application and, as appropriate, in the development and application of decommissioning technologies.

2.2. The International Safety Regime

At the international level much progress can be observed in the establishment of a global safety regime covering all areas of radiation, waste, transport and nuclear safety, including decommissioning of facilities using radioactive material. This has come about through the development of an agreed set of safety standards for decommissioning of all types of facilities where radioactive material has been used, handled and stored. The standards are aimed at assisting regulators, operators and other specialists involved in the planning, implementation and completion of decommissioning of facilities through to the release the facilities or sites from regulatory control for wither unrestricted or restricted use. More specifically, international agreement has been reached on a unified set of *Fundamental*

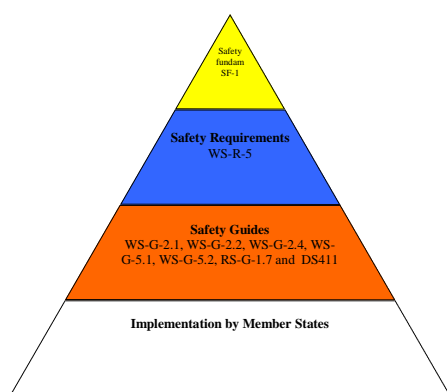


Fig. 1 Approach to global safety regime

Principles (No. SF-1) [23], which provides a coherent basis for all safety standards addressing nuclear, radiation, waste and transport safety. In addition a new Safety Requirements on *Decommissioning of Facilities Using Radioactive Material* (No. WS-R-5 [22]), and the supporting Safety Guide on *Release of Sites on Termination of Practices* (No. WS-G-5.1 [24]) were published in 2006. In 2008 a new Safety Guide on *Safety Assessment for Decommissioning of Facilities Using Radioactive Material* (No. WS-G-5.2) [25] will be published. On the basis of the new Safety Requirements No. WS-R-5, revision of the Safety Guides on decommissioning of NPPs and research reactors (No. WS-G-2.1 [5]); fuel cycle facilities (No. WS-G-2.4 [7]) and medical and research facilities (No. WS-G-2.2 [6]) is underway. The IAEA is also preparing a new Safety Guide “*Orphan Sources and Radioactively Contaminated Material in the Metal Recycling Industry*” (DS 411) [26], that will apply also to material resulting from decommissioning activities and reaching the scrap metal chain at both national and international levels. It is envisaged that this draft Safety Guide will support and complement the Safety Guide RS-G-1.7 on the *Application of the Concepts of Exclusion, Exemption and Clearance* [27]. It is planned to circulate a draft of this Safety Guide to Member States for comments at the end of 2008.

The three levels of safety standards related to decommissioning is now considered to provide complete coverage of all relevant aspects as presented in Figure 1. The further practical implementation of these standards in Member States and demonstrating compliance with them remains the main challenge in the near future, with particular consideration of the trends presented above.

3. Safety Perspectives

3.1. Practical Safety Issues from Member States

Presentations of experience from Member States at the Athens conference [15] and other international fora, as well as the experience gained in providing IAEA technical assistance to operators and regulators around the world, have identified specific and practical safety issues in need of further discussion at both national and international levels with a view to establishing agreement on best practice. The main issues are presented below:

- a. *Preliminary decommissioning planning* – most of the current international recommendations is focussed on the structure and content of a final decommissioning plan. With the nuclear renaissance, many new nuclear facilities are planned and for all these facilities the need for more specific recommendations on the development and review of preliminary decommissioning plans is indicated to be needed [22].
- b. *Safety assessment and decommissioning plans* – there is substantial agreement at the international level on the safety assessment methodology to be adopted for decommissioning [25, 28], however there is still a need for detailed guidance on (i) the use of the output from safety assessments in decommissioning planning; (ii) the evolution and maintenance of the safety assessment throughout the decommissioning project and (iii) the use of safety assessment output in the performance of decommissioning work (e.g. in establishing limits, controls and procedures). The discussion of the use of the “safety case” concept and the “decommissioning plan” is ongoing and will require agreement for future reference and consistency of the international standards.
- c. *Graded approach* – proportionality is required [22] in the development and implementation of decommissioning plans. The principle is applied in most cases, however, without specific written



Fig. 2 Decommissioning activities in UK

procedure or guidance. Through several international initiatives such as the DeSa project [28], the potential value of international guidance on the application of a graded approach has been recognized, especially for countries with limited or no decommissioning experience. The use of a graded approach to the development and regulatory review of safety assessment was the first to be addressed in Ref. [25] and further guidance on the application of a graded approach to decommissioning planning and implementation is being developed by the IAEA.

- d. *Development and review of cost estimates* together with the performance of safety assessment have proved to be of the more difficult areas of decommissioning planning. In the recent years the majority of requests for assistance to the IAEA from the Member States have been focused on these two areas. As a result the IAEA is working on the development of recommendations on the ‘Yellow Book’ [29] – to provide practical guidance for facilities and countries with limited resources. It also is planning to start a project on the development of recommendations on regulatory review of cost estimates.
- e. *Sudden shutdown* – It is required [22] that decommissioning plans consider measures in case of a premature (sudden) shutdown of facilities. However, many facilities either do not have decommissioning plans developed, or do not include provisions (e.g. technical, financial and human) for the safe termination of the practice under such circumstances.
- f. *The need for an appropriate safety culture* is also addressed by the new Safety Requirements [22] and its development and maintenance during decommissioning. The concept is quite well established, understood and implemented during the design, construction and operational stages of nuclear and other facilities. However, it is not that well perceived in the area of decommissioning and further work and guidance recommendations at an international level needs to be developed.
- g. *Adequate project management* becomes a crucial factor in the safe and successful implementation of decommissioning projects to meet safety criteria, licence conditions and to effectively implement decommissioning plans. This has been recognized by many operators, such as at the Chernobyl NPP, where there is currently extensive reorganizing underway of the operational structure of the NPP in order to be adequately prepared for the implementation of the deferred dismantling strategy adopted for the units 1, 2 and 3.
- h. *Clearance of material and site release* – although international agreement has been achieved on clearance values for bulk material and criteria for both restricted use and unrestricted release of sites, many countries have not implemented these criteria in their legal and regulatory systems. Others are in a process of implementation (e.g. Sweden) and the main challenge that remains for the future is the selection and implementation of strategies for monitoring to demonstrate

compliance with the clearance values or site release criteria. The IAEA is finalising two new Safety Reports that will assist both operators and regulators in this regard.

- i. *Decommissioning lessons learned in new build programmes* - valuable input to the design, construction, operation and future decommissioning of new facilities, in particular NPPs can be provided from lessons learned to date from decommissioning projects. As such, it is important that operators, designers and decommissioning organizations collect, consolidate and share their experience at national and international levels. In this regard the IAEA is planning to provide specific recommendations as part of the revised International Action Plan on Decommissioning of Nuclear Facilities [30].
- j. *Human resources* remain a significant issue that affects the timely and effective decommissioning. This affects operators, where skilled staff is moving to other nuclear projects (e.g. new build) or non-nuclear projects (e.g. oil exploration). It also affects regulators who face difficulties to attract and maintain sufficient and competent staff often for less competitive remuneration packages than offered in other sectors of the nuclear industry. In both cases this results in negative impact to the licence application/implementation and regulatory oversight of decommissioning projects, and requires particular attention at national and an international level.
- k. *Funding and governmental support* is becoming increasingly important, in particular for state owned facilities (e.g. NPPs, research reactors). In many cases funds are limited or non-existing. In addition, there are countries where the funds established for decommissioning are estimated to be insufficient to cover the costs for all nuclear facilities. It is important to re-evaluate the decommissioning costs and the fund contributions on a regular basis to ensure adequate resources will be available when needed throughout the projects.
- l. *Legal frameworks for decommissioning* - in some countries are not adequate, requires revision, do not address activities beyond shutdown or have not been developed. This has a significant impact on the planning for and implementation of decommissioning. The IAEA is providing assistance to a number of Member States in establishing an adequate legal and regulatory framework in line with the international safety standards and good practice.

3.2. Related IAEA Activities

3.2.1 Finalization the revision of Safety Guides

All of the issues mentioned above are currently being addressed in the revision of the Safety Guides WS-G-2.1 (DS402), WS-G-2.2 (DS403) and WS-G-2.4 (DS404) which are expected to be finalized in 2011. Following the five-year revision cycle, the Safety Requirements WS-R-5 are also to be reviewed after 2011 to take into consideration Member States experience and feedback from the implementation of the standards.

3.2.2 Peer review

In response to the increasing requests for technical assistance related to decommissioning, in 2008 the IAEA established a new peer review service for decommissioning. This new service is aimed at operators and regulators involved in planning, conduct or termination of decommissioning activities. The objective of the peer review service is to provide an independent review of the activities associated with the planning and implementation of decommissioning projects against the international safety standards and good practice in Member States. This service is also aimed to complement the existing international peer review services such as the OSART (Operational Safety Review Team) and IRRS (International Regulatory Review Service) services. The first review to be undertaken will be performed at the Bradwell site (Magnox NPP) in UK (30 June – 4 July 2008) [31]. The outcome of this review will be presented and discussed at a technical meeting at the IAEA headquarters from 6 to 7 November 2008 in Vienna. This will be an important opportunity to present feedback from the operator, the peer review team and the IAEA to interested experts from Member States.

Similar IAEA peer review has been prepared to commence in 2008 for the decommissioning planning of the fifteen operating WWER units located at four reactor sites in Ukraine. This project is a joint

initiative between the European Union, the Government of Ukraine and the IAEA that aims to review compliance of the WWER units with the IAEA safety standards in four areas (design – Task 1, operation – Task 2, waste and decommissioning-Task 3 and regulatory infrastructure – Task 4). The project is expected to be completed at the end of 2009.

3.2.3 DeSa and FaSa projects

As part of the Action Plan [9], in 2004 the IAEA launched a three-year international project "Evaluation and Demonstration of Safety during Decommissioning of Nuclear Facilities (DeSa)". During the three years of the project, over one hundred participants from over thirty-three Member States explored the experience available worldwide in developing and reviewing safety assessments for decommissioning [28]. Based on this work a harmonized approach to safety assessment methodology and regulatory review procedure has been developed and recommendations for the application of a graded approach to safety assessment for decommissioning have been established. The approach has been tested and demonstrated on three safety assessments for real facilities in the DeSa project – an NPP, a research reactor and a Pu-laboratory. The outcomes of the project provided very useful input to the development of the Safety Guide No. WS-G-5.2 [1], see Fig. 3, to several specific national decommissioning projects and are expected to be published in a four-volume Safety Report in 2008 [28].

At the 4th Joint DeSa meeting in November 2007 and in accordance with the revised Action Plan [30], a new follow-up international project is to be launched on 17 November 2008 entitled *Use of Safety Assessment Results in Planning and Conduct of Decommissioning of Facilities Using Radioactive Material (FaSa)* [32]. This project aims to build on the DeSa project outcomes. It will further review international experience and develop agreed recommendations on the use and application of safety assessment in the development and review of decommissioning plans and safety related documents throughout the life cycle of facilities.

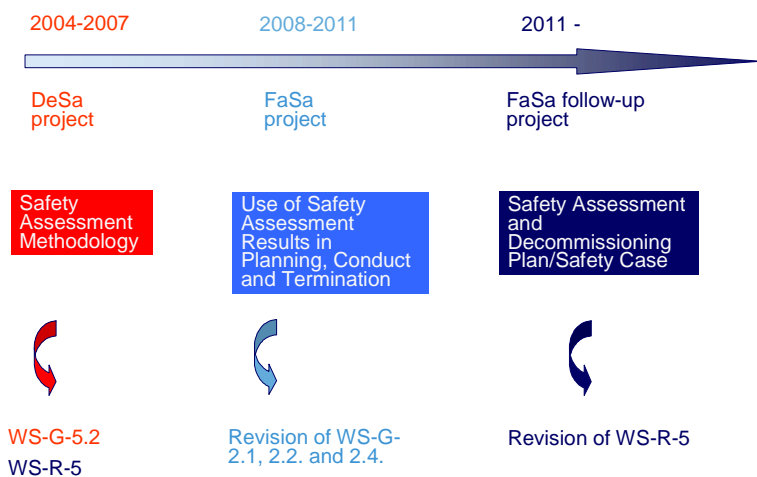


Fig. 3 Relationship between intercomparison projects and development or revision of IAEA safety standards

3.2.4 Demonstration decommissioning projects

In order to illustrate the practical application of the safety standards on decommissioning, in 2006 the IAEA launched a demonstration project for decommissioning of research reactors. One facility has been volunteered for the project by the Philippines with a view to later expand the scope and number of projects in various regions of the world as appropriate. The rationale for establishing the Research Reactor Decommissioning Demonstration Project (R²D²P) [31] was the fact that there are over 200 research reactors worldwide that are either close to permanent shutdown or have not operated for a considerable period of time and may never return to operation. In most cases these facilities have limited staff and funding available and the staff have little or no experience in decommissioning. The IAEA is providing assistance to both the operators and regulators in a number of countries with such facilities through the R²D²P project. The six year project aims to demonstrate the application and use of the IAEA safety standards on the decommissioning of a real facility (Philippine Research Reactor - PRR-1), from the planning stage through to the termination of decommissioning. Experts from over 13 countries will take part in the project. The project is expected to be expanded in 2008 with inclusion of the Chinese Heavy Water Research Reactor (near Beijing) as another demonstration facility. In addition, the IAEA is considering the preparation of complementary demonstration projects for nuclear facilities such as NPPs in the future.

3.2.5 Decommissioning project in Iraq

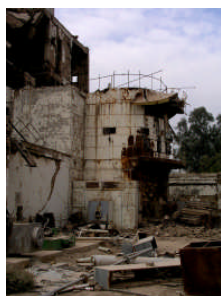


Fig. 4 IRT-5000,
Tuwaitha site

A number of former nuclear sites in Iraq are extensively contaminated and require the remaining facilities to be decommissioned and the sites cleaned up to ensure safety both in the near and in the long term (many of the facilities are located at the nuclear research centre at Al Tuwaitha near Baghdad). Since 2006 the IAEA has been providing assistance to the Government of Iraq in evaluating and planning for the decommissioning of these facilities with the focus on [31]; collection and analysis all available data (Phase 1); training of local staff (Phase 2); and development of a decommissioning and remediation plans (Phase 3). A multinational team of experts is currently working on (i) data collection and analysis, (ii) development of a system to prioritize the work; (iii) development of decommissioning and waste management strategies; and (iv) development of a law and relevant regulations.

3.2.6 Technical cooperation projects

There has been a considerable increase in requests for IAEA technical assistance in the field of decommissioning throughout the past few years. In response the IAEA has been working closely with the Member States having NPPs and research reactors that are close to decommissioning. Assistance has been provided in a number of areas [31]. These include the review and development of legislation (e.g. Georgia, Serbia); the selection of decommissioning strategies (e.g. Armenia, Bulgaria); development and review of decommissioning plans (e.g. China, Kazakhstan, Hungary, Uzbekistan, Ukraine, Romania); review of cost estimation methodologies for decommissioning (e.g. Russia, Ukraine, China); development and review of safety assessments for decommissioning (e.g. Ukraine, China), carrying out of radiological characterization (e.g. Armenia), development of decommissioning databases (e.g. Ukraine). This assistance has been provided at both a national and regional level and will be continued into the next Technical Cooperation Cycle (2009-2011) and beyond and it is intended to extend this assistance to other regions such as Latin America and Africa.



Fig. 5 Chernobyl NPP, Ukraine

3.2.7 Building competence for decommissioning

Building competence in the new generation of personnel that will be involved in the planning, performance and regulation of decommissioning is of high importance for the IAEA. A number of measures have been taken to assist Member States in this field [31], including (i) the development of reference training material on decommissioning (planned to be published in 2008); (ii) a reference training syllabus on safety of waste management, including decommissioning (publication envisaged in 2008); (iii) organization of up to ten training events (workshops and training courses) per year and (iv) establishment of a post-graduate training course on waste safety and decommissioning that will be based on IAEA safety standards and identified good practices (planned to be launched in the first half of 2009). The main fields covered by the training are – decommissioning planning, characterization, technologies, safety assessment, cost estimation, waste management, clearance of material and project management. Training events are organized at the request of Member States and are tailored to the needs of the facility and individual country decommissioning strategies, policies and needs (e.g. decommissioning, waste management).

3.2.8 Sharing of information and lessons learned

The sharing of experience and lessons learned is an important contributor to the successful planning and implementation of decommissioning projects. The IAEA is working on improvement of the existing mechanisms and is focusing its efforts on three activities [31];

- The International Decommissioning Network (launched during the general Conference in September 2007);

- Launching an Annual Forum for Operators and Regulators in Decommissioning (3-7 Nov 2008, Vienna);
- Organization of an international conference (follow-up of Athens, Greece, 2006) in 2011.

In addition a new IAEA web site [31] was launched in September 2007 to help specialists around the world to obtain up to date information about the IAEA activities related to safety and technology for decommissioning.

3.2.8 International Action Plan

In May 2004, the IAEA Board of Governors approved the International Action Plan on Decommissioning of Nuclear Facilities [9] and requested the IAEA to provide guidance and assistance to the Member States in several specific areas. On the basis of the Athens conference [1], the IAEA revised the Action Plan in 2007 [30] to reflect the current trends and needs of Member States around the world and the increased progress and number of decommissioning projects. The revised Action Plan aims to establish the IAEA as an international focal point for technical assistance to operators and regulators in the field of decommissioning before 2010.

3.2.9 The Joint Convention

The IAEA has provided the Technical Secretariat for the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (Joint Convention) since its coming into force in 2001 and presently with forty six Contracting Parties. The Joint Convention has a specific article, Article 26 that encourages Contracting Parties to implement measures to ensure the safety of decommissioning of nuclear and other facilities. The IAEA has been providing the Secretariat for the Joint Convention which has involved (i) organizing the review meetings of Contracting Parties (2003 and 2006), and (ii) promoting the convention through regional workshops and meetings, newsletters, brochures and a website. The IAEA is currently working on the preparation of the Organizational Meeting scheduled for October 2008 and the third Review Meeting of the Contracting Parties, scheduled for 11-22 May 2009 in Vienna [34].

4. Future IAEA Assistance and Initiatives

Taking into account the current needs of Member States and the ongoing and planned international initiatives, the IAEA is planning to further broaden its activities on safety of decommissioning and provide further technical assistance to Member States, through the following:

- a. Periodic review and revision of the Safety Standards (e.g. DS402, DS403 and DS404);
- b. Focusing on implementation of Safety Standards through broadening the scope and promoting the peer reviews for decommissioning; coordination of inter-comparison projects such as DeSa, FaSa and their follow-up projects, as well as technical cooperation projects and special projects (e.g. Iraq) and training mechanisms (such as the Post Graduate Training Course);
- c. Further development and management of demonstration projects for various types of facilities (e.g. NPP, research reactors, fuel cycle facilities) to serve as a basis and good example for Member States and at the same time to provide feedback and support to the revision of IAEA Safety Standards and supporting technical reports;
- d. Establishing joint effort between IAEA and Member States in facilitating the collection, analysis and dissemination of lessons learned, and exchange among Member States to improve safety of decommissioning projects and termination of practices for future uses, as well as to facilitate the development of new build facilities.

5. Conclusions

Significant progress and development has been observed in the field of decommissioning in the last few years. Clear trends have been identified with particular focus on the demonstration of safety and aimed at effective and timely decommissioning. Experience to date has also indicated areas where further international cooperation and exchange of experience is needed. The IAEA role in developing a

global safety regime, including decommissioning is recognized and also in facilitating the sharing of information and experience, and providing technical assistance with a view to improve safety worldwide. The IAEA has launched and is also planning new initiatives to strengthen its support to operators, regulators and other specialists in Member States.

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