EUROPEAN COMMISSION

European network of testing facilities for the quality checking of radioactive waste packages

Multiannual report 2001–03

2005

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Luxembourg: Office for Official Publications of the European Communities, 2005

ISBN 92-894-8784-4

Printed in Luxembourg

PRINTED ON WHITE CHLORINE-FREE PAPER

FOREWORD

The European Network of Testing Facilities for the Quality Checking of Radioactive Waste Packages, further abbreviated to the Network or "EN-TRAP", was created in 1992 on the initiative of The European Commission. Its objectives are to promote and facilitate collaboration in the development, application and standardisation of quality checking for waste packages. The Network involves laboratories of the European Union Member States that are performing checks related to regulatory issues on waste packages.

This Multi-Annual Report covers the Network activities for the years 2001, 2002 and 2003. It reviews the Network's creation, objectives and organisation, and describes its status. The status of the various actions, as organised in working groups is also presented.

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1. INTRODUCTION

In the early 80's quality assurance policies were introduced in the field of nuclear waste management. Quality assurance was first formally and widely applied in the United States by the Department of Defence, in particular in the Polaris submarine programme. As any other industrial activity, radioactive waste management requires quality assurance. Quality assurance in general is defined as *« all planned and systematic actions to provide adequate confidence that the entire system, the processes and the products involved will satisfy given requirements for quality » [1].*

More than ten years ago, the European Commission, through its Plan of Action, recognised the importance of a sound QA approach in the field of nuclear waste management. In 1982 the EC Plan of Action created a working group to review the current status of implementation of production standards and quality assurance for radioactive waste in Europe. As a conclusion, it was stated that QA would help to provide confidence in the safe management of radioactive waste. This confidence implies that QA is applied by responsible operators and based upon effective regulation by national authorities. The need for QA in radioactive waste management is also further justified by examples of problems in this field "if QA had been applied properly…" [1]. The creation in the early 80's of the different national authorities for the management of radioactive waste also helped to establish quality programmes. Reviews on quality assurance requirements and potential implementations for waste packages were also prepared by the International Atomic Energy Agency [2, 3, 4]. In these reviews, considerations on both disposal and conditioning are given.

A global QA programme requires, as a final step, the control or verification ("checking") of the quality of the product (the radioactive waste package) by an organism independent of the waste conditioner. This final quality checking can also be motivated based on practical experience. This is especially true for conditioning processes, which suffer from an incomplete qualification before starting, or incomplete quality control during conditioning. The EC Plan of Action recommended in 1989 the constitution of an ad-hoc group of experts to advise on how to implement this final product control. More precisely, the objective was "to examine the needs, incentives, scope and ways of implementation of a European Network of national QA/QC facilities for radioactive waste products". As one action, the expert group reviewed the laboratories with quality checking capability for radioactive waste.

The ad-hoc group agreed that collaboration in a European Network would be of considerable benefit for the operators of national laboratories performing regulatory checks on radioactive waste. This European collaboration would also be beneficial for the regulatory or licensing organisation taking decisions on the basis of such checks and for the safe management of radioactive waste in general.

Further information on the activities of the Network is available on the internet web-site: http://www.en-trap.org.

2. OBJECTIVES OF THE NETWORK

On the initiative of the European Commission (EC) nine laboratories performing regulatory quality checks, founded in October 1992 an association to enhance the control of radioactive waste packages. The association is officially called the "European Network of Testing Facilities for the Quality Checking of Radioactive Waste Packages" (EN-TRAP) [5]. In 1997,

two other laboratories from Austria and Finland joined the European Network and the last agreement was signed between The European Atomic Energy Committee and:

- Commissariat à l'Energie Atomique (DCC, CEA) established in France,
- Centro de Investigaciones Energéticas, Medioambientales y Tecnologicas (CIEMAT) established in Spain,
- Ente per le nuove Tecnologie, l'Energia e Ambiente (ENEA), established in Italy,
- Empresa Nacional de Residuos Radioactivos (ENRESA) established in Spain,
- Forschungszentrum Jülich GmbH (FZJ), established in Germany,
- N.V. Kema (now NRG Arnhem), established in the Netherlands,
- Studiecentrum voor Kernenergie (SCK•CEN), established in Belgium,
- NNC Limited, established in the United Kingdom,
- Institut für Radiochemie der Technischen Universität München (RCM/TUM) established in Germany,
- Research Centre Seibersdorf (now Nuclear Engineering Seibersdorf), established in Austria,
- Technical Research Centre of Finland (VTT), established in Finland.

The basis for the involvement of the EC is the Plan of Action in the field of radioactive waste. This calls for the promotion of European co-operation on issues such as the improvement of existing technology, as well as questions of a legal, administrative, financial and social nature, which must be addressed in the same context. The links between national teams working on quality control that have grown under the EC's R&D programmes on radioactive waste management have contributed significantly to the launching of the new association.

The Network is devoted to joint activities related to the conformity of conditioned radioactive waste with regulatory specifications and criteria. Its objectives are to promote and facilitate collaboration in the development, application and standardisation of quality checking for waste packages.

Quality assurance in general and quality checking in particular are of considerable importance to the safety of managing and disposing radioactive waste packages. Regulatory checking by qualified laboratories is a key component in building up the confidence of authorities and the general public in this crucial area of nuclear activities.

The following activities are pursued under the Network agreement:

- Exchange of information e.g. by organising specialist meetings or by circulation of statistical data;
- Identification of R&D requirements and collaboration in the development of new test methods;
- Joint evaluation of test methods and (Round Robin) proficiency testing;
- Co-ordination in the field of national and international standardisation of test methods;
- Provision of training services for laboratory staff;
- Promotion of the availability of testing/analytical services.

Further fields of collaboration can be proposed by the Network's members.

3. ORGANISATION OF THE NETWORK

The Network is a non-profit making organisation. Its management and operation are conducted as follows:

- Decisions on the programme of activities, on policy issues and on membership are made by a Steering Committee, in which all parties to the Network agreement (members) are represented. Representatives of national regulatory authorities are invited as observers to all meetings of the Steering Committee, which are chaired by a Chairman, who is elected for a period of one year; detailed information on present and past chairmen is given in Annex I. The secretariat of the Steering Committee is assured by the European Commission.

- The practical work is carried out in specialised working groups. The participation in working groups is not limited to the members of the Network. They meet on the initiative of the Convenor of the working group. Four working groups (WGs) are active at present:

  - WG A on Non-Destructive Methods,
  - WG B on Destructive Chemical and Radiochemical Techniques,
  - WG C on Quality Assurance and Quality Control Procedures,
  - WG D on Quality Checking of ILW and HLW.

Information on the composition of the WGs is given in Annex II.

The working procedures of the Steering Committee and the Working Groups, including matters such as the reporting system, are defined in the Internal Rules of the Network.

Each member of the Network contributes an annual fee of 1000 € to the appointed treasurer. This budget covers general running costs e.g. publications, organisation of workshops, etc.

4. WORKING GROUP A ON NON-DESTRUCTIVE TESTING

4.1 General

Non-destructive assay is commonly used to check the radioactive content of entire waste packages. Two measurement techniques are routinely applied. These are gamma spectrometry and neutron counting. With gamma spectroscopy the gamma-emitting radionuclides can be identified and quantified. Neutron counting is only applicable on alpha-bearing wastes and is not nuclide specific e.g. it cannot distinguish between different neutron-emitting radionuclides. As well as these techniques, tomography is also applied in some quality checking laboratories to investigate the internal structures and density distributions of the waste packages or to quantify the activity distribution. This information is generally required to make unbiased assays. Some laboratories use X-radiography to interrogate waste packages. Other non-destructive techniques such as ultra sound or endoscopy are only seldom used in quality checking.

4.2 Objectives of WG A

Non-destructive assay (NDA) is a very powerful tool in quality checking. It enables testing for the activity of certain radionuclides in waste packages without the need of sampling. NDA methods, however, are generally very sensitive to measurement bias when no appropriate item-specific calibrations or correction techniques are applied or exist. Measurement bias is mainly caused by the unknown density distribution in combination with the unknown activity distribution in the waste packages. When not taking into account the waste package specific density and activity distributions, e.g. when no item specific corrections are used, a measurement bias generally occurs, the magnitude of which depends on density or composition of the waste matrix.

Although NDA techniques are basically very simple, setting up and using correction procedures for matrix and activity distribution effects is not straightforward. Such correction techniques are commonly based on additional measurements (e.g. dedicated scanning methods in combination with transmission experiments or tomography) from which, to some degree, the missing information needed to make unbiased assays can be reconstituted. NDA systems and methods mainly differ from one another by the way that correction techniques are implemented and used. It is also a fact that the NDA systems for quality checking are seldom based on commercially available software, but rather run on in-house built software.

The aim of WG A is to give its members insight into all these different working methods applied in the different laboratories and to identify possibilities to improve the quality, efficiency and cost-effectiveness of NDA methods.

4.3 Achievements

The meetings of WG A are meant to be, in the first place, a forum where the NDA specialists can exchange information and ideas. WG A further aims at promoting the harmonisation of measurement procedures and at assisting and guiding upcoming quality checking laboratories.

WG A, a forum for NDA in quality checking and related matters

Each meeting of WG A is an occasion where the specialists of the different quality checking laboratories meet directly with each other offering the possibility for efficient dialogue. To stimulate dialogue during the meetings, each laboratory is allowed to communicate its major progress or evolutions in a round table session. This has proven to be a valuable formula for learning about one another's ideas, approaches or problems. Synopses describing the different NDA systems, both gamma and neutron systems, of the participating laboratories have been compiled and issued. Such documents provide knowledge of the different systems and enable others to learn about their similarities and differences. [6, 7]

Next to the more informal communications, WG A also works on selected topics of common interest to the participants. Each meeting is devoted to one or more topics that are elaborated by the participants and are based on presentations followed by discussions. Results and conclusions are drafted in meeting minutes. The main topics that have been elaborated or discussed so far are as follows:

- The identification of the different radionuclides of interest for quality checking with NDA (gamma spectroscopy and neutron counting).
- A comparison of the differences in national limits for the maximum allowed alpha and nuclide-specific activity in waste packages.

- How are detection limits defined and how to account for background counts?
- Which type of calibration sources should be used in NDA and how to perform calibrations.
- A presentation of the results of a small inter-comparison test between members of WG A.
- An evaluation of gamma analysis software packages through the analysis of an ^{227}Ac spectrum by several members of WG A.
- NDA on high-level glass canisters.
- Uncertainty estimation in gamma assay.

On a regular basis, the progress of R&D projects involving members of WG A and in the field of quality checking with NDA is discussed.

WG A held meetings at:
KfK, Karlsruhe, Germany in October 2001
CEA Cadarache, France in June 2002
NE Seibersdorf, Austria in October 2002
and the JRC Ispra, Italy in October 2003.

The 2003 meeting also included a joint session with WG C. Comprehensive meeting minutes containing all information presented during the meeting are available from the EN-TRAP web site.

A major topic of discussion at these meetings, in fact a continuation of discussions at a meeting at Mol, Belgium in 2000, has been the setting up of uncertainty budgets for quality-checking of waste via gamma spectrometry and via neutron assay. In order to comply with the measurement standard ISO 17025, a testing laboratory must estimate such uncertainty. The Working Group therefore set up a task group within WG A to develop a set of general spreadsheets from which uncertainty budgets can be derived for any specific assay system. Such spreadsheets were documented with a set of guidelines on how to estimate and quantify the individual components of uncertainty. These guidelines are sufficiently general so that they are applicable to the most common scanning techniques and that they are in accordance with existing norms and standards. The advantage of this approach is that collaboration will increase the effectiveness of setting up such uncertainty budgets, indeed, in some areas, a correct approach has sometimes yet to be defined! Another advantage of collaboration is that an agreed European dimension and uniformity of approach will help the technical defence of a budget at a national/local level.

Uncertainty budgets were also discussed in the joint meeting of WG A and WG C in 2003. It became clear that those laboratories working towards accreditation could benefit from other participating laboratories that had already gained accreditation – particularly in the setting up and validation of uncertainty budgets. It is intended that validation studies of particular NDA systems should be presented at subsequent meetings of WG A.

During 2003, WG A began to focus on the use of numerical and simulation tools in NDA assay – either to calibrate gamma-based systems or to correct for non-homogeneous activity distributions and matrix effects. Three types of software are finding such application. These are bespoke software developed by various participating laboratories, more general simulation codes such as MCNP and dedicated commercial software. As well as aiding calibration, such tools may help bridge the gap between the use of relatively fast and simple NDA methods and more time-consuming complex analysis by tomography systems. In view of the increasing use of such calibration and simulation software, WG A decided to organise a benchmark

exercise among the different laboratories in order to gain an understanding of similarities and differences.

EN-TRAP has developed close relations with ISO and members of WG A have begun to contribute to ISO standards in the area of NDA assay.

R&D programmes

A part of the WG A meetings are devoted to identifying the needs for R&D that are of common interest to the different participating laboratories. In this way, projects initiated from within WG A, have been set up, and were accepted for EC co-funding.

In the Nuclear Fission and Radiation Protection Programme 1998-2002, one project, initiated from within WG A was accepted for EC funding:

"Non Destructive Assay of Large Waste Packages". This project involves the use of portable scanning equipment to examine three large waste items – a retired heat exchanger from the Olkiluoto NPP (Finland), a block of cemented waste (France) and an entire consignment of 72 low-level waste drums in an ISO freight container (England). All experimental work is complete and the final report is in preparation.

Harmonisation and standardisation

Because many different systems and procedures are used in the various laboratories and taking into account the numerous waste forms and requirements that have to be (quality) checked, it is clear that no truly uniform quality checking of waste packages can be established among the participating laboratories. However the basic approaches are generally similar and it is noted that there is a common understanding of these and the pros and cons of any differences. Documenting these approaches in the form of ISO norms or guides can also bring a level of harmonisation and standardisation. As such, WG A has been working on ISO norms in the field of NDA but currently this has only addressed gamma assay, since this is the most used non-destructive assay technique. Information on ISO norms on neutron counting has also been exchanged, but no structured plan for contributing to such norms has yet been adopted by WG A.

The standard guide N165 was developed by some members of WG A and submitted to ISO for their “voting process”.

5. WORKING GROUP B ON DESTRUCTIVE TECHNIQUES

5.1 General

Chemical and radiochemical analytical methods are widely used to characterise raw and conditioned waste, particularly for those radionuclides which are difficult to measure by non-destructive techniques and are important for the evaluation of the safety of disposal. WG B provides a forum for assessing and exchanging information on destructive methods including:

- Establishing a compilation of destructive methods, including lists of radionuclides and matrices;

- Determining the reliability of measurements through inter-laboratory measurement programmes, the promotion of systematic and correct use of ad hoc reference materials, and the harmonisation of methodologies;
- Evaluating sampling problems, such as the representativity and stability of samples;
- Stimulating co-operation and the exchange of information between laboratories;
- Providing assistance to laboratories seeking formal QA accreditation;
- Influencing R&D programmes of the participating laboratories according to the requirements set by the Network, such as fast techniques, fingerprint analysis.

5.2 Objectives of WG B

The quality control of waste forms and waste packages includes the evaluation of many physical, chemical and mechanical properties. In order to minimise radiological hazards and the generation of secondary wastes, it is desirable to evaluate many of these by non-destructive methods, but waste characterisation usually requires the determination of important properties by sampling and application of destructive methods. Such analyses become necessary when the nuclides involved cannot be assayed non-destructively either because the nuclide's gamma emissions are too low energy for reliable analysis or because they are 'pure' alpha or beta emitters. It is important that the results of such analyses are statistically evaluated and that they are obtained from representative samples.

Sampling of waste packages may also be necessary to assess critical parameters required by regulatory bodies in their supervisory control of the storage and disposal of waste. However, sampling is not always possible. This is particularly the case for finished or intermediate products when sampling would destroy a valuable manufactured item and it also applies to very heterogeneous materials, the very nature of which hinders representative sampling. Moreover, destructive procedures based on traditional analytical methods include many, and often rather complicated, radiochemical procedures that result in much time-consuming manual work accompanied by high radiological doses.

As more radioactive waste will be produced in the future, it is necessary to evaluate faster and more selective methods, in order to reduce the time necessary for sample preparation, to meet dose restraint objectives and to process more samples with high precision and accuracy.

5.3 Achievements

Working Group B was set up to compare and validate methods, promote harmonisation and to develop common destructive techniques applicable to various types of waste streams.

WG B provides a forum for the assessment and discussion on chemical, radiochemical and physical destructive measurements and techniques in the field of radioactive waste controls useful for:

- Treatment and conditioning processes;
- Quality Control;
- Measurement of volatile release from waste packages;
- Verification and characterisation of the waste forms and waste packages.

The Working Group aims to:

- Build and maintain an up-to-date list of chemical and radiochemical methods and physical techniques in the frame of Network activities;
- Build and maintain an up-to-date list of analytical procedures and techniques for measurement of gas releases in waste packages through the processes of internal irradiation, corrosion, biodegradation or others;
- Stimulate the investigation on modelling of gas release from waste packages;
- Stimulate R&D programmes in the participating laboratories relevant to the aims of the Network (e.g. fast techniques, fingerprint analysis, etc);
- Determine the reliability of measurements via detailed discussion and inter-laboratory measurement programmes, promoting the systematic and correct use of ad hoc reference materials and the harmonisation of methodologies;
- Consider sampling problems and the representativeness and stability of the samples;
- Stimulate the co-operation and the exchange of information between laboratories and Working Groups;
- Provide assistance for the harmonisation of methods used by the WG B laboratories.

The above represents a vast menu of activities. However, during its existence, WG B has helped improve the quality and effectiveness of destructive analytical techniques in the following areas:

- Combined radiochemical methods
- Volatile releases and sampling procedures
- Physical and chemical characterisation of waste packages
- Sampling of radioactive wastes
- Key nuclide measurement
- Leaching procedures and application.

For the period covered by this report, WG B has focussed on analytical procedures and leaching procedures and this initiated two EC-sponsored research programmes which are further discussed below. In addition to progress meetings associated with specific research programmes, WG B has met on 5-6 April 2001 at Casaccia (Italy), on 22 February 2002 at Saluggia (Italy), on 5 July 2002 in Callantsoog (Netherlands) and on 1 April 2003 in Madrid (Spain) in order to report on activities and to discuss development work.

The focus on analytical procedures revealed that many different destructive methods were being used based on differing sample preparation procedures and differing counting techniques. Therefore a synopsis of the actual methods being used in the various laboratories was compiled and agreed at a meeting in Casaccia (Italy) during 2001 [8]. This synopsis included the analysis of a group of ‘critical’ nuclides which represent a long-term risk due to their long half-lives and which are detectable only by destructive methods.

This compilation was the spur for an inter-laboratory comparison exercise of the analysis of two waste types (ion exchange resin and evaporator concentrate) from a Spanish PWR (INTERLAB – see below). This project was successfully concluded. Further discussion and evaluation of results in WG B has resulted in the compilation of the laboratory procedures used in the project structured under five headlines: Pre-Treatment, Separation, Chemical Yield, Analysis and Interferences. Work continues.

The focus on leaching procedures has ultimately produced a report "Leaching Methods for Conditioned Radioactive Waste" which will shortly be published as an EN-TRAP report. The report attempts to collect and describe the most representative leaching methods used in international (mainly European) laboratories. These tend to be based on internationally recognised standards or are derivatives of them. In order to identify similarities and shortcomings in the various procedures being used in EN-TRAP laboratories, the information gleaned was structured under four headlines: Scope, Specimens, Description of Leaching Test and Conclusions. It is hoped that this report will further facilitate the exchange of information and scientific and technical experience in the field of leach testing among EN-TRAP laboratories.

During 2003, the ITU Laboratory at JRC Karlsruhe joined WG B.

R&D Programmes

Two projects in the ambit of WG B have been part of the Nuclear Fission and Radiation Protection Programme 1998-2002.

1) Development and Automation of Chemical Analytical Procedures for Determination of Non-Gamma-emitting Radionuclides in Radioactive Waste (DACAPO).

The aim of the DACAPO project was the development and automation of new analytical procedures for the determination of non-gamma-emitting radionuclides in conditioned radioactive waste. The project evaluated the main steps of the analytical procedure namely sample preparation and selective extraction agents. The main conclusions of the project were that microwave dissolution is a suitable method for the dissolution of waste matrices and that catalytic combustion is a fast method for the determination of ^{14}C. The project also evaluated procedures based on solid phase extraction, ion exchange chromatography, liquid-liquid extraction, HPLC and co-precipitation by inorganic collectors for the more selective separation of specific nuclides. Significant additional effort will be required if these processes are to be fully automated.

The project is complete and the Final Report has been written.

2) Interlaboratory Radiochemical Analysis Comparison on a Primary Waste Flux (INTERLAB)

In the field of destructive techniques, depending on the needs of each organisation, different procedures have been developed and qualified to analyse the waste streams, such as ion exchange resin, reactor filters, cements, liquids and solids coming from fuel fabrication plants, waste forms and packages.

Accurate knowledge of a radionuclide inventory requires validated chemical and radioanalytical procedures, which provide results with adequate precision and accuracy. The precision of the results can be determined by internal control in the laboratory using certified standards. However, the determination of the accuracy requires specific tasks such as carrying out repeated analysis using different methodologies and analytical techniques. If each laboratory would have to perform all these tasks by themselves, it would be a time-consuming and expensive job. Interlaboratory comparison studies are a valid and accepted alternative.

The main aim of the INTERLAB project was to perform an inter-laboratory radiochemical analysis campaign on the destructive measurement of radiotoxic and long-lived radionuclides in a primary waste flux from nuclear power plants [10].

The inter-laboratory test was performed by each partner using its own procedures of analysis for ^{3}H, ^{14}C, ^{55}Fe, ^{63}Ni, $^{89/90}Sr$, ^{99}Tc, ^{129}I, ^{238}Pu, $^{239/240}Pu$, ^{241}Pu, ^{241}Am, $^{242/244}Cm$, $^{234/238}U$, with resins and concentrates as matrices. The results were statistically evaluated and a Final Report has been issued [10]. Further analysis continues in WG B.

6. WORKING GROUP C ON QUALITY ASSURANCE/QUALITY CONTROL

6.1 General

Working Group 3 which later became WG C of the European Network (EN-TRAP) was set up in 1993 to focus on quality assurance and quality control (QA/QC) issues relevant to the quality checking of radioactive waste packages. In 1994 a questionnaire was compiled by the group, which established the QA/QC roles of the different organisations involved in radioactive waste management in partner countries. These ideas were built upon in the Concerted Action project in 1998, which attempted to compare the approach to QA/QC of low and medium level radioactive waste within the European Community represented in EN-TRAP.

6.2 Objectives

The objectives of Working Group C have evolved and been developed since its creation in 1993. In discussions at the Steering Committee meetings, it was proposed that the objectives of the working group should be expanded and be focussed on the key issues listed below. The general consensus of the Steering Committee was that Working Group C had the potential to produce the most important achievements and could provide the link between the other two working groups in developing procedures and test methods for accreditation by the appropriate bodies.

- *Laboratory Accreditation*. Quality standards for testing laboratories are being updated e.g. ISO EN 17025 will replace ISO EN 45001. WG C to facilitate and assist with accreditation of partner laboratories where applicable.

- *Test Method Accreditation.* Expertise on writing quality documentation can be provided to WG A and WG B so that recognised non-destructive and destructive test methods can be accredited at partner laboratories.

- *Test Method Validation.* Inter-laboratory comparison tests such as those already initiated by EN-TRAP are an important means of providing validation data. Other similar schemes may be devised

- *Management of Uncertainties.* Expression of the overall uncertainty in a measurement performed on a waste sample is the topic of much debate. A unified approach is needed.

6.3 Achievements

At a meeting of the working group held at NNC Winfrith, UK in March 2002, it was proposed that a survey of EN-TRAP partners should be compiled to assess the level of QA accreditation held by each partner laboratory and their interest in gaining further QA accreditation. The idea was further discussed at the WG C meeting held concurrent with RADWAP '02, Würzburg, Germany in September 2002 and it was agreed that the questionnaire should cover the following main issues:

- Status of QA accreditation in the partners' laboratory or institute
- What standard e.g. ISO 17025 / ISO 9000 is worked to?
- What is the name of the Accreditation/Certification body used?
- Accreditation/Certification of QA system/specific methods
- Specific methods e.g. gamma assay of waste drums
- Sampling methodologies
- Involvement of the Commission in these activities.

Following the Würzburg meeting, a questionnaire was drafted by the Convenor and distributed to the other members of the Working Group for comment. Some comments were received and incorporated into a second draft of the form. This version of the questionnaire was e-mailed to SC members prior to the SC meeting held at the JRC Ispra in November 2002.

The results of the questionnaire were thoroughly reviewed by the Convenor and were presented at a joint meeting of WG A and WG C held at the JRC, Ispra in October 2003.
The main conclusions from the review are summarised below.

- All those partners who do not currently hold QA Accreditation/Certification would like to get it or are in the process of getting it.
- The majority of partners would like to gain or extend accreditation through the EN-TRAP Working Groups.
- EN ISO/IEC 17025 is the most widely accepted standard for this area of work.
- Specific methods identified covered NDT and DT. Five partners would like to gain accreditation for gamma scanning.
- Expertise exists within EN-TRAP to make this possible.

The results of the survey will be compiled into a short EN-TRAP report.

The 2003 meeting of WG C focussed on QA accreditation of NDA systems, where the experiences of partners who hold accreditation or are actively seeking accreditation in this area were presented.

7. WORKING GROUP D ON QUALITY CHECKING OF ILW AND HLW

7.1 General

Many countries of the EU operate quality control and quality checking of radwaste packages. This is often linked to the operation of a surface or near-surface site for the disposal of LLW. However, such procedures have not yet been fully established for ILW and HLW. Furthermore, geological disposal sites for such wastes are not yet operational in the EU.

The currently perceived needs for the characterisation of ILW and HLW are:

- Internationally accepted and demonstrated methods and procedures need to be developed and standardised to characterise high-level and other long-lived radioactive waste packages (arising from both reprocessed and non-reprocessed fuel) with a view to verifying their conformity with acceptance criteria and specifications.
- As part of a global approach to quality assurance, there should be a common approach in quality control and quality checking underpinned by a common understanding of analytical techniques and procedures for all kinds of waste packages – including future new forms.

These needs are related to the following observations:

- The treatment, conditioning and disposal of ILW and HLW, the development of disposal sites, waste acceptance criteria and performance assessment do have strong supra-national features.
- Individual laboratories cannot develop by themselves the multiple methods required for the characterisation of ILW and HLW packages.
- Co-operation at a European level will contribute to the public acceptance of nuclear waste management by increased transparency through the development of common methodologies.
- Ethical considerations strongly apply to radioactive waste management. Present and future generations need an in-depth knowledge of the different kinds of long-lived waste packages that are being produced today but will not be ultimately disposed of for many years.

7.2 Objectives

WG D has the following objectives:

- to exchange information and discuss harmonisation of existing characterisation systems, taking into account waste acceptance criteria;
- to stimulate and co-ordinate on-going R&D on characterisation methods and procedures for ILW and HLW;
- to standardise test methods that are used in non-destructive and destructive testing facilities.

7.3 Achievements

WG D has met once and discussed its terms of reference.

8 EN-TRAP WEB-SITE

The Network maintains a web-site. The web-site can be visited to obtain up-to-date information on the members and structure of the Network, not only on the Steering Committee, but also on the working groups and their achievements. The address is: http://www.en-trap.org [11].

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ANNEX I

STEERING COMMITTEE OF THE NETWORK

Members

- Nuclear Engineering Seibersdorf (formerly Forschungszentrum Seibersdorf), AT **
- Studiecentrum voor Kernenergie/Centre d'Etudes de l'Energie Nucleaire (SCK•CEN), BE
- Forschungszentrum Jülich (FZJ, formerly KFA), DE
- Technische Universität München (TUM), DE *
- Commissariat à Energie Atomique – Saclay and – Cadarache (CEA), FR
- NRG Arnhem, NL (formerly NV Kema)
- ENEA, IT
- ENRESA Madrid, ES
- CIEMAT Madrid, ES
- NNC Limited, Winfrith, UK ***
- Technical Research Centre of Finland (VTT), FIN **

* member since 1994
** member since 1995
*** replaced Taywood Environmental Consultants in 1998

Chairmen of the Steering Committee

1992/3	G. Baudin, CEA Saclay, FR
1994	R. Odoj, KFA Jülich, DE
1995	P. Van Iseghem, SCK•CEN Mol, BE
1996	A. Morales, ENRESA Madrid, ES
1997	G. Grossi, ANPA, IT
1998	S. Newstead, Environment Agency, UK
1999	G. Brunel, CEA, FR
2000	J. Neubauer, Forschungszentrum Seibersdorf, AT
2001	A. Tiitta, VTT, FIN
2002	Ch. Lierse von Gostomski, RCM-TUM, DE
2003	R May, NNC Limited, UK

Meetings of the Steering Committee 2001-2003

17-18 May 2001	-	VTT, Espoo, FIN
26-27 November 2001	-	ENRESA, Vandellós, ES
16-17 April 2002	-	COVRA, Vlissingen, NL
14-15 November 2002	-	JRC Ispra, IT
6-7 May 2003	-	NES, Vienna, AT
24-25 November 2003	-	ENEA, Casaccia, IT

ANNEX II

WORKING GROUPS OF THE NETWORK

WORKING GROUP A

Participants

- CIEMAT-DFN, ES
- SCK•CEN, BE
- Technische Universität München, DE
- Forschungszentrum Jülich (formerly KFA), DE
- Forschungszentrum Karlsruhe, DE
- Commissariat à l'Energie Atomique (CEA), FR
- ENEA/RAD/LAB Saluggia, IT
- JRC Ispra, IT
- NNC Limited, WQCL, UK
- NRG Petten, NL
- Belgoprocess, BE
- VTT, FIN
- NRI Rez, Czech Republic

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Meetings organised during 2001-2003

29-30 October 2001	-	Karlsruhe, DE
3-5 June 2002	-	Cadarache, FR
21-22 October 2002	-	Vienna, AT
20-22 October 2003	-	Ispra, IT [Partly joint with WG C]

WORKING GROUP B

Participants

- CIEMAT-DFN, ES
- Commissariat à l'Energie Atomique (CEA), Cadarache, FR
- ENEA-RAD-LAB, Saluggia, IT
- ENRESA, El Cabril, ES
- Forschungszentrum Jülich, DE
- NRG Petten, NL
- COVRA, Vlissingen, NL
- SCK•CEN, Mol, BE
- NNC Limited, WQCL, UK
- Technische Universität München, DE
- JRC Karlsruhe (ITU), DE

Convenor

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Meetings organised 2001-2003

5-6 April 2001	-	Casaccia, IT
22 February 2002	-	Saluggia, IT
5 July 2002	-	Callantsoog, NL
1 April 2003	-	Madrid, ES

WORKING GROUP C

Participants

- NNC Limited, WQCL, UK
- ENRESA, ES
- Commissariat à l'Energie Atomique, FR
- Joint Research Centre (JRC), IT
- SCK•CEN, BE
- ANPA, IT
- NRG, NL
- Forschungszentrum Jülich (FZJ), DE

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Meetings Organised 2001-2003

19 March 2002	-	Winfrith, UK	
26 September 2002	-	Würzburg, DE	
20 October 2003	-	Ispra, IT	[Joint with WG A]

WORKING GROUP D

Participants

- Commissariat à l'Energie Atomique, FR
- ENEA, IT
- SCK•CEN, BE
- NAGRA, FR
- NRG, NL
- BfS, DE
- VTT, FIN
- Forschungszentrum Jülich (FZJ), DE

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Meetings Organised 2001-2003

26 November 2003 - Casaccia, IT

European Commission

EUR 21225 — European network of testing facilities for the quality checking of radioactive waste packages

Luxembourg: Office for Official Publications of the European Communities

2005 — V, 20 pp. — 21.0 x 29.7 cm

ISBN 92-894-8784-4

Price (excluding VAT) in Luxembourg: EUR 15