THE INTERNATIONAL ATOMIC ENERGY AGENCY'S NET-ENABLED WASTE MANAGEMENT DATABASE

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ABSTRACT

Development of the International Atomic Energy Agency (the Agency) Waste Management Database (WMDB) began in 1989. The WMDB contains information on national radioactive waste management programmes, plans and activities, relevant laws and regulations, policies and radioactive waste inventories. Information contained in the WMDB was provided by Member States in response to three questionnaires issued by the Agency over the last decade. The information is compiled, stored and disseminated by the Agency in reports.

Development of a new version of the WMDB, the Net-Enabled Waste Management Database (NEWMDB), is to be completed by early 2001. The NEWMDB will provide user-friendly data collection and improved dissemination of radioactive waste management information via the Internet.

The NEWMDB is being developed to:

- support the routine reporting of status and trends in radioactive waste management based on quantitative data, rather than anecdotal information,
- assess the development and implementation of national radioactive waste management programmes,
- support the Indicators of Sustainable Development for the safe and environmentally sound management of radioactive waste, and
- conform, to the greatest extent practicable, with the reporting requirements of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management.

A key feature of the NEWMDB is that it allows Member States to report their waste management programmes and inventories according to their own national waste classification scheme(s). However, Member States are required to define their classification scheme(s) in relation to the Agency's proposed scheme. This feature will allow the Agency to transpose Member State supplied, radioactive waste inventory information according to a unified waste classification scheme and to roll up this information into a comprehensive, international radioactive waste inventory.

Another key feature is that Member States can customize submissions to the NEWMDB to match their nuclear infrastructures. A prototype of the NEWMDB was evaluated by representatives from 19 Member States in an interregional workshop held at Agency headquarters in July 2000. Participants agreed that the customizable reporting structure would significantly improve submissions to the NEWMDB for Member States with complex nuclear infrastructures (such as Canada, France, Germany, UK, USA) as well as for those with less complex infrastructures (such as Belarus, Chile, Denmark, Egypt, Philippines).

INTRODUCTION

The Agency's Medium Term Strategy (MTS) cites specific objectives and proposals for achieving them during the period 2001 to 2005. The MTS aims to show how the Agency will respond to the new

challenges and opportunities at the beginning of the 21st century and how the Agency expects to be perceived at the end of the five year time frame. The document states:

> *"In all aspects of its work it [the Agency] will be making optimal use of information technology. It will interact in a transparent and active manner with partners, be they Member States, international organizations or civil society… …The challenge for the Agency in the medium term is threefold:*
>
> - *to understand how the needs and interests of Member States are changing so as to be able to respond by focusing on the appropriate nuclear technologies;*
> - *to contribute to the objective assessment of the use of nuclear technologies and to assist Member States in the safe application of those technologies that continue to have a comparative advantage;*
> - *to play a catalytic role in the international effort to maintain and increase knowledge, understanding and expertise in the nuclear field, particularly through the collection and dissemination of scientific information and the transfer of technology.".*

Within this context, a comprehensive review of the Agency's existing Waste Management Database (WMDB) was undertaken in mid-1999. Based on feedback from Member State representatives, consultants and Agency staff members, it was concluded that:

- data collection and dissemination for the WMDB was not timely,
- the WMDB questionnaire lacked clear and concise guidance,
- respondents had difficulty reporting on their national radioactive waste management programmes and inventories according to the Agency's proposed waste classification scheme [1], and
- the information in the Agency's reports [2] was not easy to evaluate or use.

In short, the WMDB did not meet the needs of its customers.

In addition to the review, the following transpired since the WMDB was developed and implemented:

- radical changes have occurred in information management technology (ten years ago, very few could have imagined the power of the Internet and the profound changes it would bring),
- the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (the Joint Convention) was adopted on 5 September 1997 and opened for signature on 29 September 1997 [3]. When the Joint Convention comes into force, it will be the first legally binding, international instrument related to spent fuel and radioactive waste management. The Joint Convention contains specific requirements for the exchange of information between contracting parties and the Agency, and
- Agenda 21 was issued from the United Nations Conference on Environment and Development, held in Rio de Janeiro in June 1992 [4]. Chapter 40 of Agenda 21 calls for the development of indicators for sustainable development (ISD). In particular, it requests countries at the national level, and international government and non-governmental organizations at the international level, to develop the concept of ISD in order to identify such indicators. As a follow up, the Agency was assigned the responsibility to develop ISD for radioactive waste management, in accordance with Chapter 22 of Agenda 21 and the UN-wide indicators development work programme.

The events cited led to the initiation of a project to upgrade the WMDB. The objectives of the upgrade were to:

- identify and address the needs of the WMDB's main customers (governments and other organizations in Member States, international organizations and the public),
- take into account, to the greatest extent practicable, reporting requirements stipulated in the Joint Convention,
- support the ISD for the safe and environmentally sound management of radioactive waste,
- support the routine reporting of a comprehensive, international radioactive waste inventory,
- support the routine reporting of status and trends in radioactive waste management based on mainly quantitative, not anecdotal, information, and
- use leading edge technology to improve the collection, management and dissemination of waste management information provided by IAEA Member States.

DEVELOPMENT AND IMPLEMENTATION

Preliminary specifications for upgrading the WMDB were compiled in 1999. In early 2000, a prototype Net-Enabled Waste Management Database (NEWMDB) was developed as an Internet-based successor to the WMDB.

From 2000 July 12-14, representatives from the following Member States participated in an interregional workshop to evaluate the prototype NEWMDB and to provide suggestions for improving the prototype. The workshop was sponsored by the Agency's Technical Co-operation Project INT/4/131.

Belarus, Canada, Chile, Czech Republic, Denmark, Egypt
France, Germany, Hungary, India, Indonesia, Islamic Republic of Iran
Philippines, Poland, Romania, Sweden, Thailand, United Kingdom, USA

Based on feedback obtained at the workshop, a second prototype was implemented in late 2000. It will made available for testing via the Internet to workshop participants in early 2001. At time of writing, the first version of the NEWMDB was scheduled to be deployed in May 2001. The proposed implementation schedule is:

- work with Member States to designate single point-of-contacts (Country Co-ordinators) to interface with the Agency (January - June 2001),
- use the NEWMDB to accept Member State submissions (July - December 2001),
- assess submissions and make both the raw data and formal reports available on the Internet by March 31, 2002, and
- conduct a "lessons learned" workshop during 2002 (subject to available funding).

The intent is to greatly reduce the data collection/dissemination cycle time. Previously, data were collected from Member States during 1989/90, 1991/93 and 1997/99 and disseminated in the form of reports in 1991, 1994 and 2000. The objective is to conduct data collection/dissemination annually for the NEWMDB.

DESCRIPTION OF THE NEWMDB

Like its predecessor, the NEWMDB will contain information on national radioactive waste management programmes, plans and activities, relevant laws and regulations, policies and waste inventories. However, the format and content of the NEWMDB address the short-comings identified for the WMDB and they also address the objectives of the upgrade project.

The NEWMDB is comprised of two major components - the Framework Definition and the Waste Data components.

Using the Framework Definition component, Member States can customize how they will report information about their national, radioactive waste management programmes - see Table I.

Table I: Illustration of Customizing the NEWMDB Reporting Structure

Name of Country Co-ordinator			
Name of Reporting Group #1		Name of Reporting Group #2	
Name of Waste Classification Scheme #1		Name of Waste Classification Scheme #2	
Name of Site #1	Name of Site #2	Name of Site #3	Name of Site #4
facilities • processing • storage • disposal • dedicated spent SRS [(1)]	facilities • processing • storage • disposal • dedicated spent SRS	facilities • processing • storage • disposal • dedicated spent SRS	facilities • processing • storage • disposal • dedicated spent SRS

[(1)] SRS = sealed radioactive sources

The IAEA has requested that each Member State appoint a single point-of-contact, known as the Country Co-ordinator, for matters pertaining to the NEWMDB. The functions of the Country Co-ordinator are to:

- interact with the Agency's Programme Officer for the NEWMDB,
- define the reporting structure for his/her country to provide information to the NEWMDB,
  - the number of Reporting Groups and their names
  - a Report Co-ordinator for each Reporting Group
  - if desired, Waste Experts to assist Report Co-ordinators
- identify the waste management site(s) that are considered to be within each Reporting Group
  - site name, location, license holder(s)
  - the waste management facilities that are located at the sites
    - waste processing facilities (name, type)
    - waste storage facilities (name, type, operating life, operational status, percentage filled)
    - waste disposal facilities (name, type, existing capacity, planned capacity, percentage filled, class(es) of waste disposed / planned for disposal, status according to eight phases)
  - dedicated spent, sealed radioactive source (SRS) facilities (name, type)

The reporting structure determines the number and content of the data reporting screens to be completed by Member States in the Waste Data component, where Member States provide information on waste inventories, treatment methods, conditioning methods and specific details about SRS inventories.

The flexible reporting structure allows Member States to customize reporting to the NEWMDB according to their nuclear infrastructures. For example, a Member State that only has spent SRS and small quantities of radioactive waste from medical/research facilities could opt for a single Reporting Group with all information provided by the Country Co-ordinator. Figure 1, shows a possible reporting structure for the United States of America, which has a complex nuclear infrastructure.

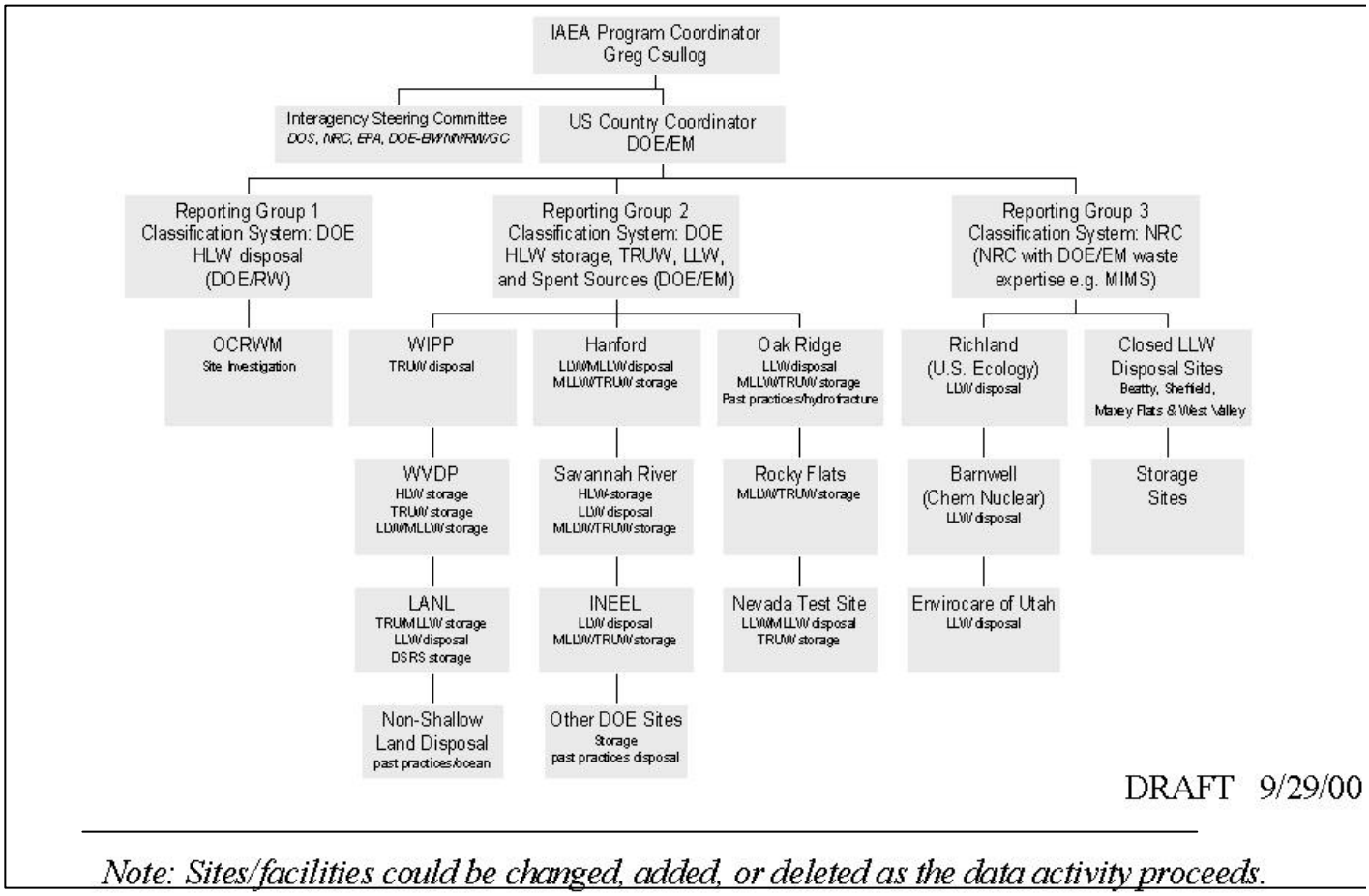

Figure 1 was prepared for an Advisory Group Meeting held at Agency headquarters October 2-6, 2000 in support of "preparing a report on the requirements and methods for compiling a comprehensive, international radioactive waste inventory".

Fig. 1: Possible NEWMDB Reporting Structure for the United States of America

An important tool within the Framework Definition component is the Waste Class Matrix, which was implemented in the NEWMDB to address the difficulties that were experienced by Member States with the WMDB, as described next.

The WMDB had a rigid reporting structure that required Member States to report on their national, radioactive waste management programmes and inventories according to the scheme shown in Table II.

Table II: Waste Classification Scheme for Reporting to the WMDB (1997/1998 Questionnaire)

Low and Intermediate Level Waste: Short-Lived	LILW-SL
Low and Intermediate Level Waste: Long-Lived	LILW-LL
High Level Waste	HLW
Transuranic Waste	TRU
Spent Fuel	SF
Spent, Sealed Radioactive Sources	SRS
Decommissioning Waste	DW
Uranium Mining and Mill Tailings Waste	UMMT

The above waste classification scheme is based on both qualitative criteria (wastes are grouped according to their origin, activity content, radiotoxicity and thermal power) and quantitative criteria (waste are grouped according to the safety aspects of their management). The quantitative classification of waste according to the LILW-SL, LILW-LL and HLW classes is based on "Classification of Radioactive Waste" [1], Section 3, entitled "Proposal for a Radioactive Waste Classification System", as indicated in Table III.

Table III: Summary of the Agency's Proposed, Quantitative Waste Classification Scheme

Waste Class	Typical Characteristics	Possible Disposal Options
Exempt Waste (EW)	activity levels at or below clearance levels	no radiological restrictions
Low and Intermediate Level Waste (LILW)	activity levels above clearance levels and thermal power below about 2kW/m^3	
- Short-Lived (LILW-SL)	restricted long-lived radionuclide concentrations (Note: Reference [1] only provides guidance for restricting the concentrations of alpha-emitting radionuclides - no explicit guidance is provided for other long-lived radionuclides)	near surface or geological disposal facility
- Long-Lived (LILW-LL)	long-lived radionuclide concentrations exceeding limitations for short-lived waste	geological disposal facility
High Level Waste (HLW)	thermal power above about 2kW/m^3 and long lived radionuclide concentrations exceeding limitations for short-lived waste	geological disposal facility

Most Member States that responded to the 1997/1998 WMDB questionnaire indicated that they had waste classification schemes that were different from the Agency's proposed, quantitative waste classification scheme [5]. Many Member State representatives also indicated that they had difficulty responding to the 1997/1998 questionnaire because they were uncertain about how to report information about their national, radioactive waste inventories according to the scheme shown in Table II.

The Agency faced a dilemma. On the one hand, Member States use a variety of waste classification schemes that differ from the Agency's proposed scheme. On the other hand, the Agency wants to compile a comprehensive, international radioactive waste inventory. The latter task requires the

compilation of Member State information according to a unified, waste classification scheme. The solution was to implement the Waste Class Matrix tool in the NEWMDB, using the rationale detailed in Table IV.

Figure 2 illustrates the Waste Class Matrix tool of the NEWMDB. Member States may use one or more waste classification schemes that are different from the Agency's proposed classification scheme. Using the Matrix, Member States:

1. assign a name to each classification scheme they use,
2. indicate the names of the waste classes used in schemes (e.g. LLW, ILW, A, B, C, etc.), and
3. estimate the relationship of their classification scheme(s) to the Agency's proposed scheme.

Step 3 is the one that presented the most difficulty to some participants in both the July 2000 interregional workshop to evaluate the NEWMDB and in an Advisory Group Meeting (AGM) held at IAEA headquarters in October 2000 to compile recommendations for preparing a comprehensive, international radioactive waste inventory.

Table IV: Rationale for Implementing the Waste Class Matrix in the NEWMDB

Question	What approach could the IAEA follow for reporting a comprehensive, international radioactive waste inventory?
Answer	The inventory could be compiled and reported as a series of subsets that reflect the following, generally acknowledged, disposition solutions for radioactive waste: 1. surface/near surface long-term stewardship or disposal (generally acknowledged to mean at depths up to 10's of metres) 2. long-term stewardship or disposal at intermediate depth (generally acknowledged to mean at depths from 10's to 100's of metres) 3. long-term stewardship or geological disposal (generally acknowledged to mean at depths from 100's to 1000+ metres) Options 1 to 3 generally represent increasing time for achievement of a disposition solution.
Question	Does an internationally accepted, waste classification scheme exist that is rigorous, well defined, broadly or universally implemented in IAEA Member States and is linked to disposition solutions?
Answer	No
Question	Does any scheme that would serve as the basis/starting point for such a "disposition-based classification scheme" exist at the international level?
Answer	Yes, the IAEA's proposed classification scheme exists [1]. While this proposed scheme is not rigorous and not completely defined, it could serve as a good foundation for developing the desired classification scheme. **Please note: A consensus could not be reached by those who participated in the preparation of reference [1], principally due to an understanding that the waste classification scheme under preparation was for adoption for use by Member States.**
Question	If the desired scheme existed, is it likely that it would be broadly or universally adopted as the national waste classification scheme by IAEA Member States?
Answer	No - not in the foreseeable future.
Question	How could a comprehensive, international radioactive waste inventory be compiled according to a unified classification scheme that is not yet developed and, if developed, may not be adopted by most Member States as their national waste classification scheme?
Answer	If the desired, unified classification scheme existed and if Member States could define their national waste classification scheme(s) in relationship to this scheme, an international body could compile the comprehensive inventory by transposing Member State information. **Please note: it may be possible to achieve consensus on a rigorous, complete waste classification scheme if the intended purpose of this scheme is for normalizing information to compile an international radioactive waste inventory rather than for adoption for use within Member States.**
Question	What international organization could compile and report the international, radioactive waste inventory?
Answer	The IAEA could do this task because its membership is broader than other international organizations, such as the OECD/NEA and the European Union.
Question	Assuming that the concept of transposing information can be used to harmonize diverse information provided by Member States, does a mechanism exist to do this?
Answer	Not yet. However, the Agency's NEWMDB, which is under development, will provide the capability for transposing information according to a unified classification scheme using its Waste Class Matrix tool.

continued…

Table IV: Rationale for Implementing the Waste Class Matrix in the NEWMDB (continued)

Question	Is the NEWMDB, as it is initially being developed, a sufficient and adequate tool to compile a comprehensive, international, radioactive waste inventory?
Answer	No. The scope and diversity of radioactive waste are too broad to be adequately compiled and reported using a single tool. The Agency has a need for and/or plans to develop a suite of tools that can be used to compile a comprehensive, international, radioactive waste inventory: - a single, spent nuclear fuel database (not in planning stage at time of writing) - a directory of radioactively contaminated sites - a radioactive discharges database waste to be reported using these tools have been termed "excluded" wastes in the context of the NEWMDB. The NEWMDB will initially be used to compile / report the inventory for "included" waste, subject to a number of defined limitations, such as excluding *in situ* waste at sites to be remediated but including waste arising from remediation activities (see Table VI).
Question	Within the limitations defined, is it sufficient/adequate to subdivide the comprehensive, international radioactive waste inventory according to only a "disposition-based classification scheme"?
Answer	No - disposition options mainly indicate the availability / likely availability of disposition solutions. Additional factors should be "tracked": 1. waste in storage versus in long-term stewardship/disposal (indicates where wastes are in relation to the disposition cycle) 2. treatment/conditioning status (indicates the preparation of waste for dispositioning) 3. waste origin: reactor operations, fuel fabrication/enrichment, reprocessing, nuclear applications, defence, and decommissioning/remediation. Waste origin is an additional indicator of disposition options to be considered and it can also indicate accrued/accruing liability. The reporting of a international comprehensive, radioactive waste inventory according to 1, 2 and 3 plus disposition options would provide an overview of the world-wide status and trends for managing radioactive waste.

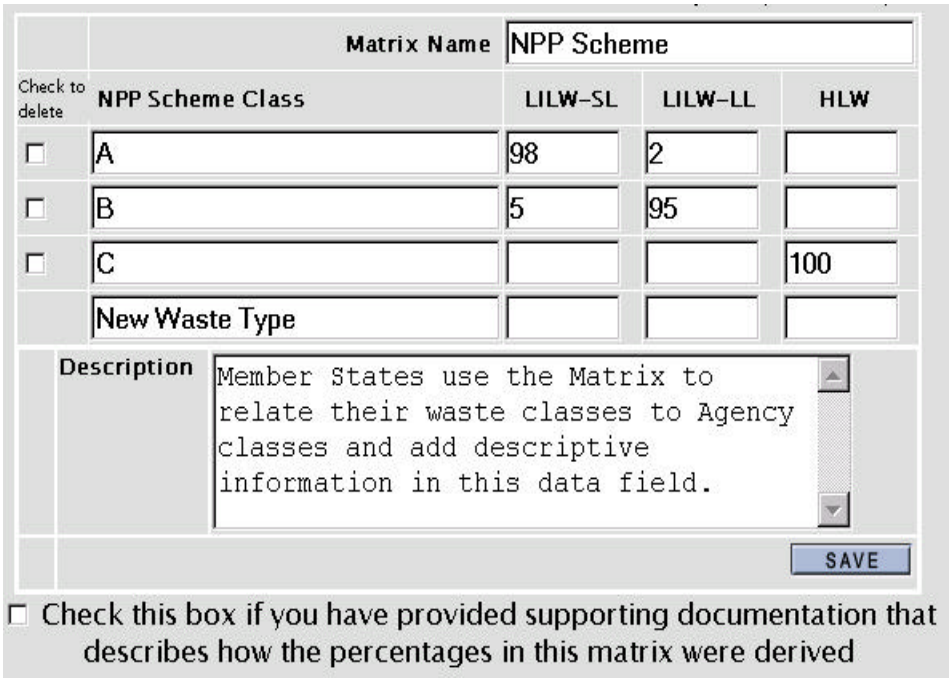

Figure 2: Screen Capture Illustrating the Waste Class Matrix in the NEWMDB
[Note: this screen capture is from the prototype version of the NEWMDB]

The difficulty in estimating the relationship of Member State waste classification scheme(s) to the Agency's proposed scheme can be attributed to one or more of the following:

- The Agency's proposed classification scheme is not rigorous and is not completely defined (please see the notes in Table IV).
  The Agency defines LILW by exclusion - it is neither Exempt Waste (EW) nor High Level Waste. Currently, there is no internationally agreed definition of clearance levels, which are used to define EW and there is no international consensus on the thermal power level for HLW. As such, LILW is not rigorously defined. In addition, short-lived LILW (LILW-SL) is defined by "restricted long-lived radionuclide concentrations", for which there is no international consensus.

- Many Member States do not have a quantitative, disposition-based, classification scheme for their wastes.
  The following indicates some Member State responses to the 1997/1998 WMDB questionnaire, which asked whether or not Member States had a regulation and/or code that contained a definition/classification for LILW-SL:

  Low level waste: wastes that need an isolation period around 30-50 years

  Category A: Covers solid waste with radioactive constituents, mainly beta or gamma emitting radionuclides, whose half-lives are considerably shorter than the institutional control period. Long-lived alpha-emitting radionuclides should only be present at very low concentrations.

  For solid waste: LLW = radiation field less than 0.2 R/h

- Some Member States do not consider all of the disposition options on which the Agency's proposed classification scheme is based, and therefore, there may be uncertainty about how to

  complete the Matrix. The following response to the 1997/1998 WMDB questionnaire illustrates this issue:

  …no definition for LILW-SL waste in Germany. To fit the data into the format of the WMDB, non-heat generating waste appears under LILW/SL and heat generating appears under HLW and Spent Fuel

  The above is based on the fact that, currently, near-surface disposal is not a consideration in Germany.

The difficulty that some workshop and AGM participants had completing the Matrix is yet another indicator of why problems were encountered with the WMDB, which required Member State representatives to "*fit data*" into an international database without adequate guidance.

The main reasons for identifying Country Co-ordinators to interact one-on-one with the Agency's Programme Officer for the NEWMDB are to ensure that Country Co-ordinators receive the needed guidance and support to help them complete one or more Waste Class Matrices and to help them define an appropriate reporting structure for providing information to the NEWMDB.

Along with the reporting structure, the Matrix determines the number and content of the data reporting screens to be completed by Member States in the Waste Data component.

Another important feature of the Framework Definition component of the NEWMDB is the General Information section. In this section, Country Co-ordinators are asked to provide information related to national, radioactive waste management programmes, plans and activities, relevant laws and regulations, and policies. The implementation of the last item, policies, is very different from that of the WMDB, as explained next.

In the 1997/1998 WMDB questionnaire, Member States were asked to describe "any policies, laws or statutes" related to radioactive waste management in a free-form text format. While some very comprehensive information was provided by Member States, it was not in a format that could be readily used to assess national systems for radioactive waste management.

In 1995, the Agency issued the Safety Standard, "Establishing a National System for Radioactive Waste Management" [6]. The objective of this Safety Standard is to assist Member States in developing national systems for radioactive waste management, to identify the key responsibilities of the parties involved and to delineate essential features of such systems. The Safety Standard:

- set out the main objective for radioactive waste management and the principles on which radioactive waste management policy and strategies should be based,
- presented the basic components of a national framework for radioactive waste management,
- outlined the responsibilities of the Member State, the regulatory body and the waste generators and operators of radioactive waste management facilities, and
- described the important features of radioactive waste management.

Figure 3 illustrates how requests for waste management policy information have been implemented in the General Information section of the NEWMDB within the context of the cited Safety Standard. The objectives of this format are to:

- eliminate the free-form input of text to minimize the burden for providing information to the NEWMDB,
- put the information into a format that lends itself to statistical analysis, and
- have a mechanism to assess Member State implementation of national systems for radioactive waste management, per the cited Safety Standard.

Initially, individual Member State responses to the policy questions will not be reported by or accessible from the NEWMDB. Instead, information such as the percentage of Member States that responded Yes, Partially or No to a given policy question will be reported.

The following describes the Waste Data component of the NEWMDB.

Table V illustrates how information entered in the Framework Definition component determines the number and content of the data entry screens to be completed by Member States within the Waste Data component of the NEWMDB. In the example shown, the Country Co-ordinator would identify the Reporting Groups and the Report Co-ordinators and would complete the Waste Class Matrices. The Country Co-ordinator, with or without the assistance of the Report Co-ordinators, would also identify the waste management sites, and their facilities, within each Reporting Group.

When a Report Co-ordinator logs on to the NEWMDB on the Internet, he/she will be able to enter information only for those sites within his/her Reporting Group. In the example shown in Table V, when Mr. Smith logs on to the NEWMDB, he would enter information into the NEWMDB only using Screen 1 through Screen 6. Mr. Wilson would enter information only using Screen 7 through 10.

Screen 1 to Screen 10 are the "waste inventory screens". For each waste management site identified, there would also be screens to enter information about waste treatment methods at the site, waste conditioning methods at the site and, if applicable, information about dedicated facilities for managing spent, sealed radioactive sources. Refer to Figure 4.

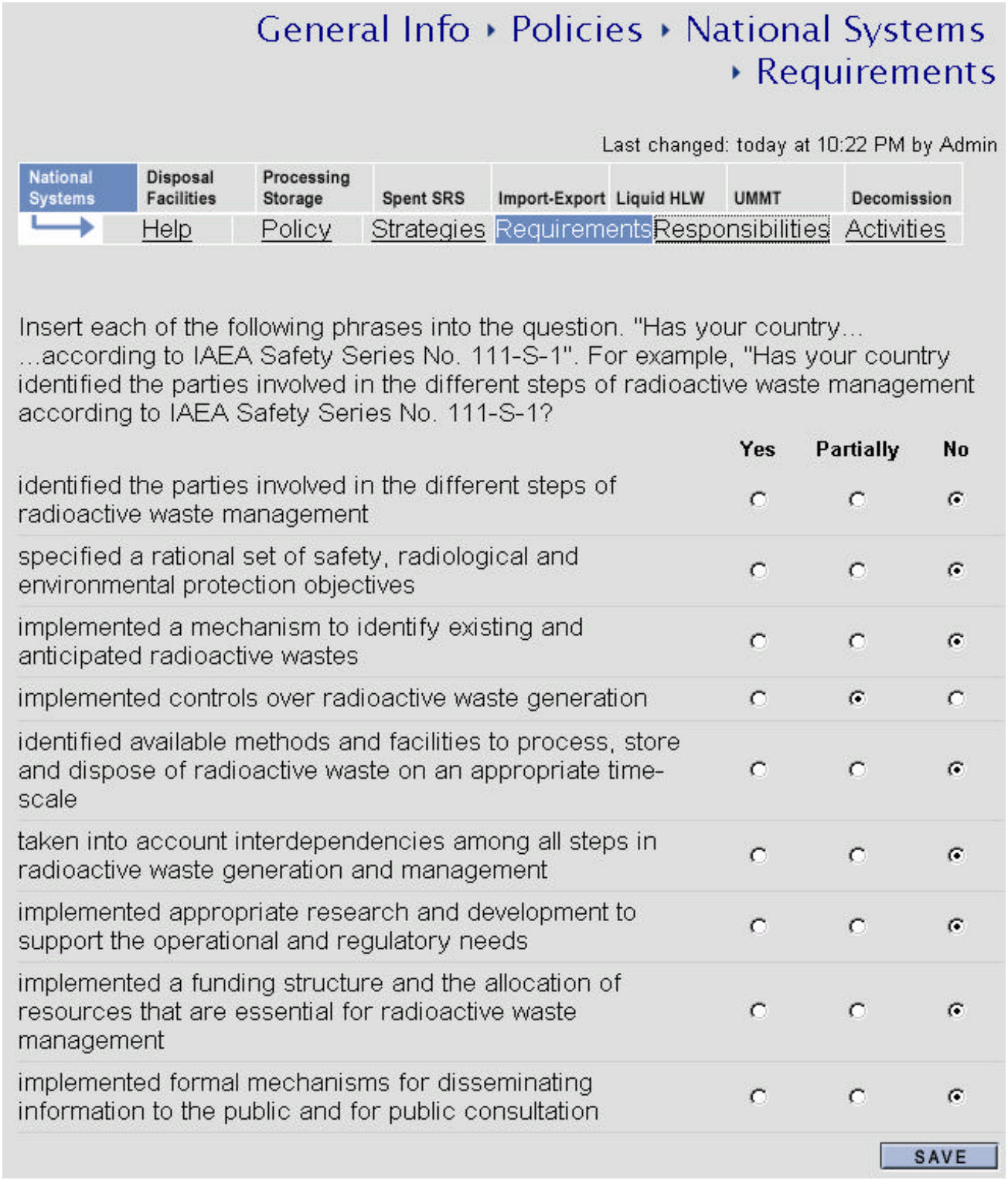

Figure 3: Screen Capture Showing one of the NEWMDB "Policies" Screens
[Note: this screen capture is from the prototype version of the NEWMDB]

In general, information entered as part of the Framework Definition component should not change very much from year to year. For example, for facilities, their name, location type and status (e.g., operating) are not likely to change annually. However, percent filled would likely change annually. This contrasts to the waste inventory information in the Waste Data component, which is likely to change annually. One of the reasons for creating the two major components was to separate, as much as possible, requests for information that changes infrequently from requests for information that changes frequently to minimize the burden on Member States for reporting to the NEWMDB.

Table V: The Relationship between the Framework Definition and Waste Data Components - Example

<table>
<tr><th>this column provides an example of what a Member State could define in the Framework Definition component of the NEWMDB</th><th colspan="2">this column illustrates the Waste Data entry screens that would have to be completed as a result of the Framework Definition</th></tr>
<tr><td>Country Co-ordinator = Ms. Jones

Report Group 1 Name = non-NPP
Report Co-ordinator for Group = Mr. Smith
Matrix 1 Name = System 1
<table><tr><td></td><td>LILW-SL</td><td>LILW-LL</td><td>HLW</td></tr><tr><td>A</td><td>80</td><td>20</td><td></td></tr><tr><td>B</td><td>10</td><td>90</td><td></td></tr><tr><td>C</td><td></td><td></td><td>100</td></tr></table>identify Sites and Facilities for Group = non-NPP
(Site 1 and Site 2)</td><td>Screen 1 for Site 1
Waste Class = A
Waste in Storage
- m^3 unprocessed waste
- % by waste origin
- m^3 processed waste
- % by waste origin
Waste in Disposal
- m^3 unprocessed waste
- % by waste origin
- m^3 processed waste
- % by waste origin

Screen 3 for Site 1
Waste Class = B
- storage/disposal info

Screen 5 for Site 1
Waste Class = C
- storage/disposal info</td><td>Screen 2 for Site 2
Waste Class = A
Waste in Storage
- m^3 unprocessed waste
- % by waste origin
- m^3 processed waste
- % by waste origin
Waste in Disposal
- m^3 unprocessed waste
- % by waste origin
- m^3 processed waste
- % by waste origin

Screen 4 for Site 2
Waste Class = B
- storage/disposal info

Screen 6 for Site 2
Waste Class = C
- storage/disposal info</td></tr>
<tr><td>Report Group 2 Name = NPP
Report Co-ordinator for Group = Mr. Wilson
Matrix 2 Name = System 2
<table><tr><td></td><td>LILW-SL</td><td>LILW-LL</td><td>HLW</td></tr><tr><td>non-HGW</td><td>95</td><td>5</td><td></td></tr><tr><td>HGW</td><td></td><td></td><td>100</td></tr></table>identify Sites and Facilities for Group = NPP
(Site 3 and Site 4)</td><td>Screen 7 for Site 3
Waste Class = non-HGW
- storage/disposal info

Screen 9 for Site 3
Waste Class = HGW
- storage/disposal info</td><td>Screen 8 for Site 4
Waste Class = non-HGW
- storage/disposal info

Screen 10 for Site 4
Waste Class = HGW
- storage/disposal info</td></tr>
</table>

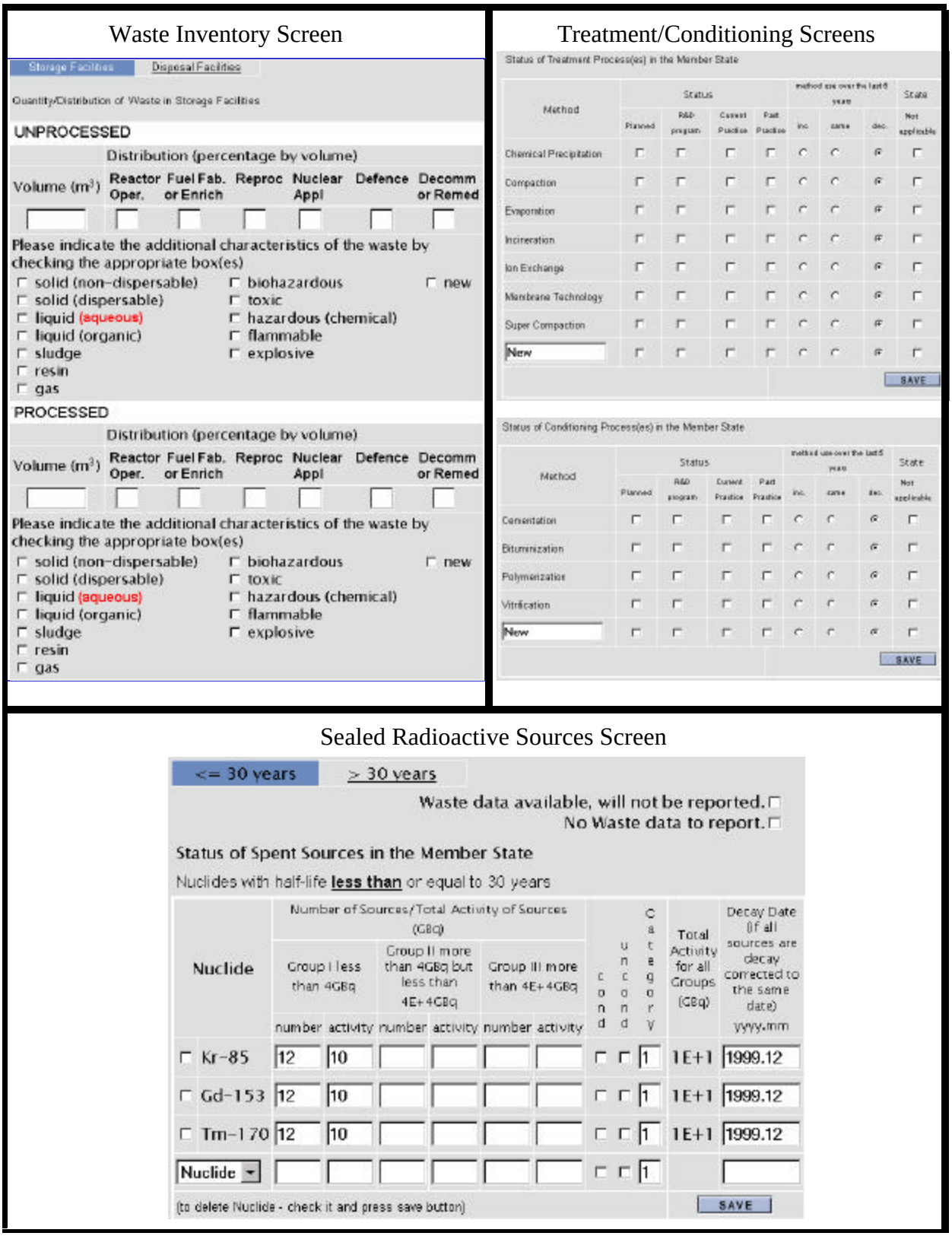

Figure 4: Overview of the Data Entry Screens in the Waste Data Component of the NEWMDB
[Note: these screen captures are from the prototype version of the NEWMDB]

Tables VI and VII summarize how the information to be collected for the initial version of the NEWMDB will partially or fully meet the objectives of the WMDB upgrade project.

Table VI: WMDB Upgrade Objectives versus Information to be Collected for the NEWMDB

WMDB Upgrade Objective	Is the objective met by the NEWMDB, version 1?	
take into account, to the greatest extent practicable, reporting requirements stipulated in the Joint Convention **Note 1**: The NEWMDB does not include spent fuel storage facilities or uranium mining and milling facilities. **Note 2**: waste in storage in Member States will be reported to the NEWMDB subject to the limitations cited in Table VII. **Note 3**: Please refer to the limitations cited in Table VII. **Note 4**: Activity is reported qualitatively by way of classification (LILW-SL, LILW-LL, HLW) **Note 5**: Specific radionuclides will be reported only for spent, sealed radioactive sources (refer to Figure 4) **Note 6**: Information about facility decommissioning status in Member States is managed in another Agency database, the Nuclear Fuel Cycle Information System; see Reference 7	• spent fuel management policy	No
	• spent fuel management practices	No
	• radioactive waste management policy	Yes
	• radioactive waste management practices	Yes
	• criteria used to define and categorize radioactive waste	Yes
	• a list of the spent fuel management facilities subject to this Convention, their location, main purpose and essential features	No
	• an inventory of spent fuel that is subject to this Convention and that is being held in storage and of that which has been disposed of	No
	• a list of the radioactive waste management facilities subject to this Convention, their location, main purpose and essential features	see Note 1
	• an inventory of radioactive waste that is subject to this Convention that	
	- is being held in storage at radioactive waste management and nuclear fuel cycle facilities	see Note 2
	- has been disposed	Yes
	- has resulted from past practices	see Note 3
	• this inventory shall contain a description of the material	Yes
	and other appropriate information available, such as:	
	volume or mass,	Yes
	activity	see Note 4
	specific radionuclides	see Note 5
	• a list of nuclear facilities in the process of being decommissioned and the status of decommissioning activities at those facilities	see Note 6
support the Indicators of Sustainable Development (ISD) for the safe and environmentally sound management of radioactive waste (still under development) The IAEA has proposed the following ISD for radioactive waste management: 1. arisings of waste destined for disposal (m^3/year) 2. accumulated quantities of waste awaiting disposal (m^3) 3. operational status of national, radioactive waste management systems	The NEWMDB will only partially support the ISD for radioactive waste management, as proposed by the IAEA (see the column to the left). The NEWMDB will be used to compile inventories of radioactive waste at waste management facilities (processing, storage, disposal and dedicated spent, sealed radioactive source facilities). It will not include waste from abandoned facilities, contaminated sites or discharges to the environment (see Table VII). The NEWMDB will also be used to assess the waste management infrastructure in Member States. Even with its initial limitations, the information in the NEWMDB will provide strong support for ISD 1 to 3.	

4. meeting national targets related to disposal 5. radionuclides in discharges to air and water (Bq/year/radionuclide) 6. impact of radioactive discharges (dose) 7. meeting national targets related to discharges The Agency also proposes to develop indicators related to waste arising from Naturally Occurring Radioactive Materials (NORM) and past practices involving radioactive materials.	It is worth noting that ISD should meet the following criteria: 1. primarily national in scale or scope; 2. relevant to the main objective of assessing progress towards sustainable development; 3. understandable, that is to say, clear, simple and unambiguous; 4. realizable within the capacities of national Governments, given their logistical, temporal, technical and other constraints; 5. conceptually well founded; 6. limited in number, remaining open-ended and adaptable to future developments; 7. broad in coverage of Agenda 21 and all aspects of sustainable development; 8. representative of an international consensus, to the greatest extent possible; 9. dependent on data that are readily available or available at a reasonable cost to benefit ratio, adequately documented, of known quality and updated at regular intervals. At first glance, "arisings of waste" and "accumulated quantities of waste" would appear to meet criteria 3 and 5. However, about a decade of experience with the WMDB has indicated that differences in waste classification schemes used by Member States make it difficult to compare waste arisings and inventories, regardless of the issue of sustainability. By using the Waste Class Matrix tool, information on waste arisings from Member States can be normalized according to a unified waste classification scheme, which will greatly facilitate the interpretation of waste arisings and inventories in the context of sustainable development.
support the routine reporting of a comprehensive, international radioactive waste inventory	The NEWMDB achieves the objective, subject to the identified limitations for the initial version of the database and the "included/excluded" wastes (see Table VII). The intent of the Agency is to limit the scope of the NEWMDB for initial data collection cycles to minimize the burden of reporting for Member States. Once Member States gain confidence in using the NEWMDB and are routinely reporting information to it, the Agency intends to consult with Country Co-ordinators to introduce enhancements and to minimize the amount of excluded waste. It needs to be noted that contributions by Member States to the NEWMDB are voluntary. The success of the NEWMDB, as measured by an increase in the number of Member States reporting information and in the quality of information provided, depends completely upon the NEWMDB meeting the needs of its principal customers, the Member States. Without Member State participation, the Agency cannot compile the information needed to report a comprehensive, international radioactive waste inventory.
support the routine reporting of status and trends in radioactive waste management based on mainly quantitative, not anecdotal, information	The NEWMDB will achieve most of the identified objective. After the first few data collection cycles, the NEWMDB will provide valuable quantitative information about the status of and the trends in waste treatment and conditioning methods, the state of spent radioactive sources, the establishment of national systems for radioactive waste management, radioactive waste inventories (treatment, conditioning,

	storage, disposal, and classification state), and the state of waste storage and disposal facilities (e.g., planned, operational, shut down, closed).
use leading edge technology to improve the collection, management and dissemination of waste management information provided by IAEA Member States	The NEWMDB completely achieves the identified objective.

Table VII: Waste to be Included/Excluded from the Initial NEWMDB Data Collection Cycles

waste	excluded	included
low specific activity (LSA) waste	in situ	moved (1)
abandoned/contaminated sites	X	
exempt/clearance waste	X	
spent fuel	X	
UMMT/TE-NORM waste	X	
discharges to the environment	X	
special fissionable materials that are considered a resource (e.g. Pu)	X	
remediation waste	in situ	moved (2)
waste awaiting transfer to "disposition option" that is available	X (3)	
HLW at processing facilities		X (4)

(1) LSA waste that is moved to a "licensed waste management facility", i.e., storage/disposal, will be included

(2) waste generated during remediation of a site and moved to a "licensed waste management facility" is included - waste that remains in situ is excluded (the former may be accurately quantified, the latter may not)

(3) to avoid the possibility of double accounting, waste that is awaiting transfer to an available "disposition option" is excluded from the NEWMDB. Examples are hospitals & research centres carrying out what is often referred to as "interim storage" prior to transfer of the waste to a central facility (either storage or disposal). Waste that is being held because there is no disposition option, e.g., greater than class C waste held at reactor sites in the US, would be included in the NEWMDB as inventory because a disposition option is not available.

(4) HLW at processing facilities (vitrified, cemented) should be reported by the facility holding the waste as of the "reporting date" for the NEWMDB. While this waste may be considered as part of (3), they should be reported to avoid missing "significant" waste in any given reporting cycle.

SUMMARY

The Agency's Net-Enabled Waste Management Database will contain information on national radioactive waste management programmes, plans and activities, relevant laws and regulations, policies and waste inventories. As an Internet-based application, the NEWMDB will improve the collection, analysis and dissemination of information that is provided by IAEA Member States.

The NEWMDB was developed to:

- take into account, to the greatest extent practicable, reporting requirements stipulated in the Joint Convention (to minimize the burden of reporting by Member States),
- support the Indicators of Sustainable Development for the sound management of radioactive waste,

- support the routine reporting of (a) a comprehensive, international radioactive waste inventory and (b) status and trends in radioactive waste management based mainly on quantitative, not anecdotal, information, and
- provide a means to assess the development and implementation of national radioactive waste management programmes.

The NEWMDB allows Member States to customize the reporting structure for providing information to the Agency. Member States can tailor the NEWMDB to fit their national radioactive waste management infrastructures.

The Waste Class Matrix tool requires Member States to relate their own waste classification scheme(s) to the Agency's proposed, quantitative, disposition-based scheme. This tool will allow the Agency to transpose Member State supplied, radioactive waste inventory information according to a unified waste classification scheme and to roll up this information into a comprehensive, international radioactive waste inventory.

Currently, the Agency's proposed waste classification scheme is not rigorous, it is not completely defined, and it is not broadly used by Member States to classify their wastes. However, the proposed scheme could serve as the foundation for developing a rigorous, disposition-based, waste classification scheme. Until such a scheme is developed, the transposition of Member State information according to the currently proposed scheme will be subject to uncertainties, but it is the best available option. If such as scheme is developed, the transposition of Member State information can be done more rigorously.

The driving force for developing a rigorous, disposition-based, waste classification scheme is the transposition of information provided to the NEWMDB - it is not to have this scheme adopted for use by Member States.

The Agency has requested that every Member State nominate a single point-of-contact, known as a Country Co-ordinator. Country Co-ordinators will interact one-on-one with the Agency's Programme Officer for the NEWMDB to ensure that they receive the needed guidance and support to help them complete one or more Waste Class Matrices and to help them define an appropriate reporting structure for providing information to the NEWMDB.

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