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ELABORATION OF A QUESTIONNAIRE FOR ESTABLISHMENT OF THE BRAZILIAN INVENTORY OF LOW AND INTERMEDIATE LEVEL RADIOACTIVE WASTE

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ABSTRACT

Since 2008, Brazilian Commission for Nuclear Energy, CNEN, has been working in the Project of Repository for Low and Intermediate Level Radioactive Wastes, (RBMN Project) and the Centre for Development of Nuclear Technology (CDTN) is responsible for the technical coordination of this project. Among activities under development, the survey of National radwaste inventory must be firstly concluded since it is a requirement for the project cost estimation. Hence, an electronic questionnaire was created to collect all information necessary to obtain the volume of the treated and non-treated waste, presently stored in Brazil. This questionnaire was elaborated after survey of the possible characteristics of radioactive waste generated in nuclear and radioactive facilities and it will be available online only for registered users. The information gathered with this questionnaire was related only with the amount of radioactive waste and some generic characteristics, the isotopic inventory will be performed in future. The objective of this work is to present this form and its creation process.

1. INTRODUCTION

Since 2008, Brazilian Commission for Nuclear Energy, CNEN, has been working in the Project of Repository for Low and Intermediate Level Radioactive Wastes, (RBMN Project) and the Centre for Development of Nuclear Technology (CDTN) is responsible for the technical coordination of this project. Among activities under development, the survey of

National radwaste inventory must be firstly concluded since it is a requirement for the project cost estimation.
Decisions must be made based on reliable data regarding amount, characteristics and history of the collected wastes. In this way, an electronic questionnaire was created to collect all information necessary to obtain the volume of the treated and non-treated waste, presently stored in Brazil.

According to European Comission [1], to achieve confidence in the data collected, a broad range of information has to be compiled, considering the various steps of radioactive waste. These data which include the waste production need to be detailed enough to allow disposal planning among others activities. Information related with temporary stored treated waste have to be sufficient to demonstrate compliance with the safety case of disposal facilities. Therefore, not just the amount of waste is important information to be gathered but also their contents. In addition, for the planning phase of a disposal facility, it is demanded to know the volume, mass, activity, as well as the number and type of packages.

Based on these information, a questionnaire was elaborated and it will be available online only for registered users. The information gathered with this questionnaire was related only with the amount of radioactive waste and some generic characteristics, the isotopic inventory will be performed in future. The objective of this work is to present this form and its creation process.

2. METHODOLOGY

2.1. Definition of the Questionnaire Content

To create the questionnaire, first a brainstorm was performed with the team engaged in the process. The goal of this brainstorm was to collect all relevant information that must be addressed with the questionnaire answers. The questionnaire was planned to gather the amount of treated an non treated radioactive waste currently stored in Brazil, and some features of these material, as physic state, nature (organic or inorganic), matrices in which they are immobilized, and so on.

In this first step, the main topics with concerning of these information were elected, thus the questionnaire was based on six principal sections:

1. Information about the institute/company: address, name of responsible, phone, area of operation.
2. Generic information about radioactive waste: classification concerning generation of radioactive waste (generator, treater, storer), types of radioactive wastes handled, generating operations, information concerning Norm materials.
3. Information about the inventory control: radionuclides and their characterization methods.
4. Information about treatment process: process apply to treat each kind of waste – liquids aqueous, organics, compactable solid, non compactable solid, biological, etc.
5. Inventory of non treated waste: amount of non treated compactable solid waste, non compactable solid waste, liquid waste, and main contents of each group.

6. Inventory of treated waste: amount of treated compactable solid waste, non compactable solid waste, liquid waste, and so on, related with the matrices of immobilization if applicable.

After the definition of the information that had to be collected, a questionnaire was drafted in spreadsheet application. This initial version was converted in an online version.

2.2. Migration to online version

The electronic version was planned to be as easy as possible to filled out. Whenever possible, some alternatives were provided in order to drive the answers, facilitating the process for the responders and also the analysis of the answers after the return of the questionnaire.

The previously planned questionnaire had to be modified and some fields were simplified in order to make it faster to be processed. The software adopted did not have enough tools to manage all information as we planned.

Once the questionnaire was available electronically, the responders were registered as users, and could access the questionnaire and fill it out online. The form was firstly distributed only to the Institutes of CNEN.

3. RESULTS

Hereafter, figures 1 to 6 show the questionnaire, page by page.

Altogether, the questionnaire has seven pages, whereas the last page is a summary of the answers. The information of the summary page can be transferred to any spreadsheet program to facilitate the data analysis.

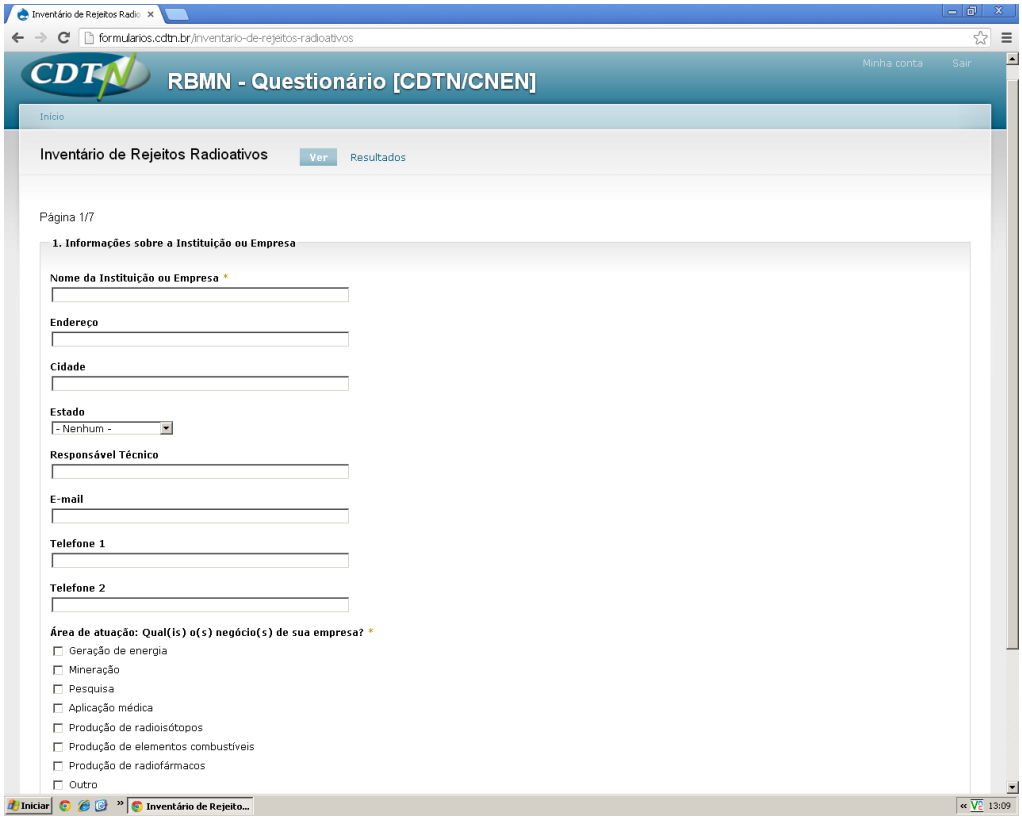

Figure 1: Overview of the first page of the electronic questionnaire.

Figure 2: Overview of the second page of the electronic questionnaire.

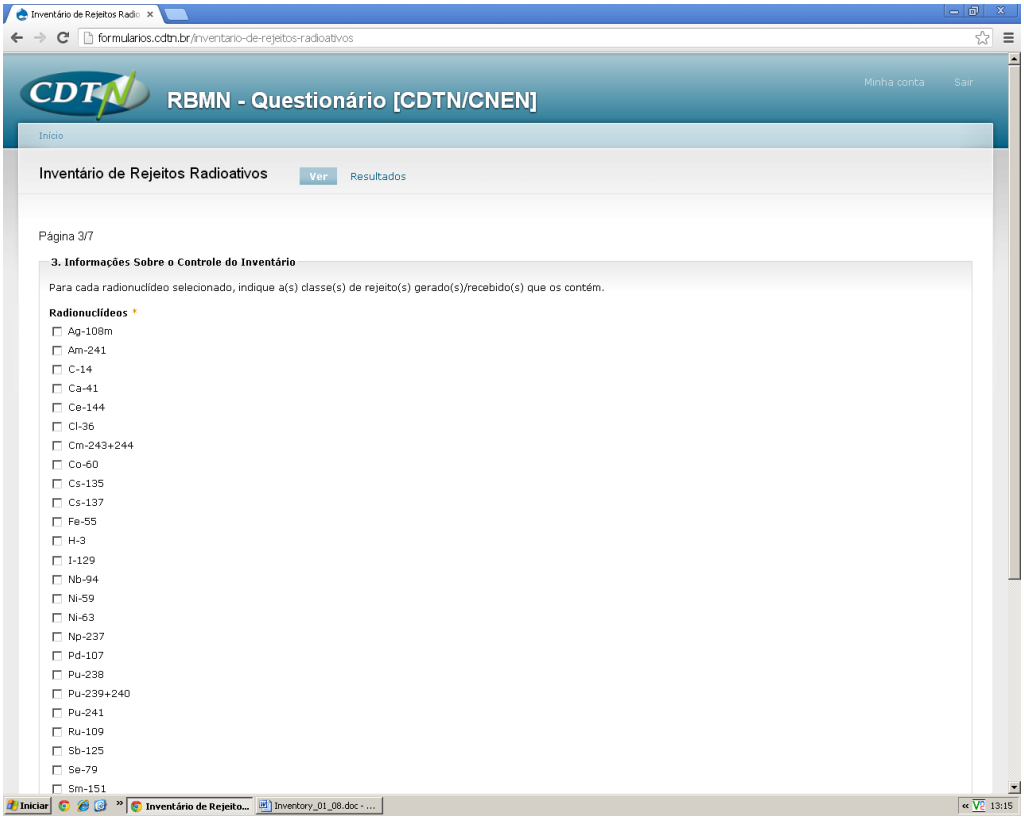

Figure 3: Overview of the third page of the electronic questionnaire.

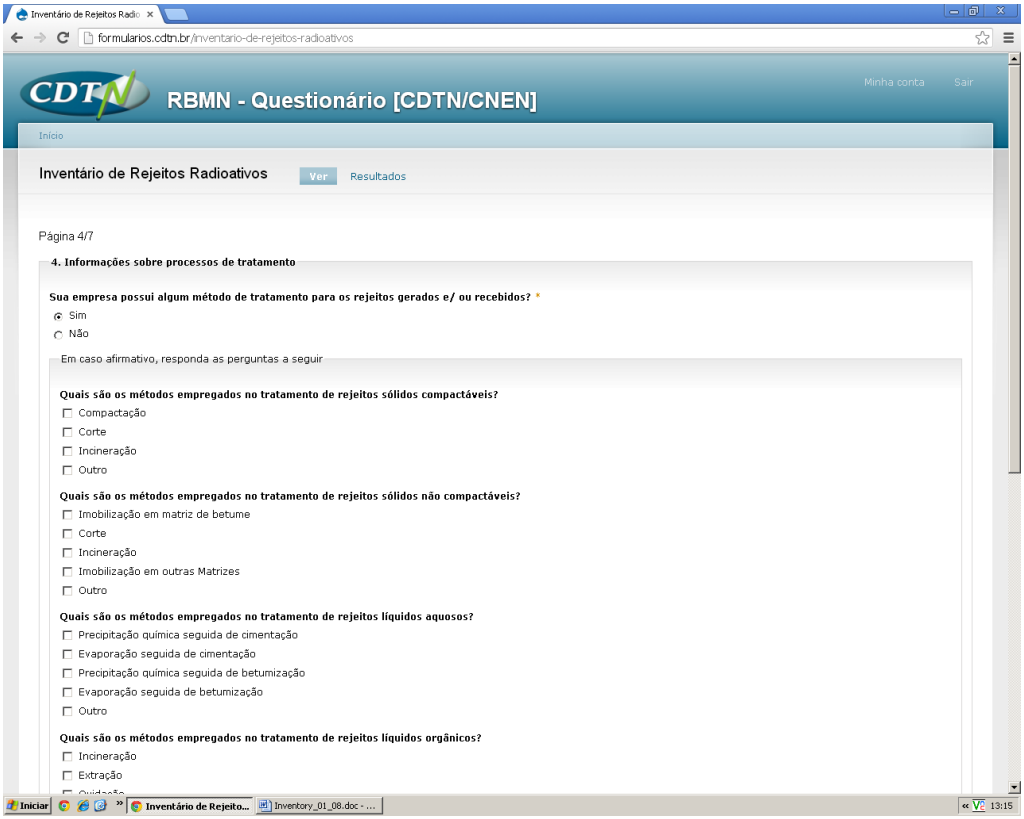

Figure 4: Overview of the fourth page of the electronic questionnaire.

Figure 5: Overview of the fifth page of the electronic questionnaire.

Figure 6: Overview of the sixth page of the electronic questionnaire.

4. CONCLUSIONS

The questionnaire was tested and distributed to the institutes of CNEN. It showed to be a very friendly form and apparently the answerers had no difficulty to fill out it. The collected information was easily transferred and analyzed by Microsoft Excel.

ACKNOWLEDGMENTS

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REFERENCES

1. European Commission. Brenk Systemplanung GmbH (BS) "Radioactive Waste and Spent Fuel Data Collection, Reporting, Record Keeping and Knowledge Transfer by EU Member States" *Final Report*, **BS-Project N° 0707-03**, (2009).