

THE WAY FOR A BETTER MANAGEMENT OF THE MATERIAL FLOW GENERATED BY A DISMANTLING: THE IMPLEMENTATION OF A QA SYSTEM IN THE BR3 PWR DISMANTLING PROJECT

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ABSTRACT

When dismantling a nuclear installation, a complex material flow is generated due to the great variety of materials and their possible destination. Moreover, a small part of the material is contaminated and activated implying severe safety measures.

The dismantler has to meet different requirements. Due to the nuclear nature of the materials, several organisms request their traceability and, when the decontaminated material is going to be recycled, the requirements are even much severe.

To meet these requirements, it is necessary to collect all relevant information during the dismantling. To collect this information in a structured way, a QA system can be implemented.

In the case of the BR3 project, such a QA system was started in the beginning of 1998, based on the ISO9002 norm. This implies that all operations have to be written down in procedures. These procedures guarantee that the correct information is collected and that the operations are carried out in the same way, having thus an automatic control.

Although the system isn't completely realized, this paper describes the QA system itself as well as the first experiences.

INTRODUCTION

To improve the management of the complex material stream, generated with the dismantling of the BR3-PWR and to have a quality control on the evacuated materials, the BR3 team decided to develop a Quality Assurance (QA) system, especially for the free released dismantled materials, but also for the radwaste characterization and follow-up. As the generation of waste can be considered as a production process of which the evacuation of waste and material is the end-product, one decided to work towards the ISO9002 standard. This paper describes the implemented QA system and gives the chosen solutions for encountered problems.

The first part describes the objectives and the necessity of the QA implementation. Regarding the complexity of demands that are imposed by several authorities, the paper will show that correct information about the material stream is fundamental and it will give an overview of the general structure of the system and the limits which have been set up.

The second part of the paper highlights the implementation of the dismantling and material management QA system itself. This structure was developed in order to deliver "good products" (i.e. well known and characterized streams) in accordance with all the requirements of the safety authorities, national radwaste management authorities and financial supervision

committees. A complete description from the preparation of the dismantling operations, to the evacuation of the material from the site including the free release measurements, will be given and will show that the administrative as well as physical traceability of the demolished material and the quality of the material follow up can be reached.

This description will also draw the attention on the own developed material flow database, which is related to the radiological inventory database of the SCK•CEN and the use of a batch system which makes the material handling on the site easier.

Finally, an overview will be given of the encountered problems, technical as well as organizational, and the part of the QA system that still has to be finalized. The paper will also show that for some specific domains, like free release measurements, further developments have still to be done.

WHY A QA SYSTEM?

Requirements

When dismantling a nuclear facility, besides the owner of the plant (the SCK•CEN in the case of BR3), other organisms are controlling the dismantling activities. They concern mainly the safety authorities, national as well as at the SCK•CEN level, and the National Organism for Radioactive Waste and Fissile Materials (ONDRAF/NIRAS) as manager of the technical liabilities, funding which represents the main source of financement of the dismantling project. The dismantling team together with the above mentioned organisms have defined their requirements concerning the generated material flow. These requirements concern the traceability (administratively as well as physically), the final destination of the material and the free release measurements or characterization of the material.

The traceability aims at knowing at any moment the origin and destination of the dismantled material. Throughout the process, it is thus possible to quantify and to manage the different material flows (radioactive waste, free released waste, ...). The dismantler himself wants to know, in order to manage the material flow, where and how much demolished material is located at the site. This information is necessary to obtain a clear view of the project's progress and of the possible needs for storage or handling.

All the dismantled material will go to a final destination (waste, melting, scrap, ...), each with its specific requirements. In case of waste, the material has to fulfill the national waste requirements set out by ONDRAF/NIRAS. When the material is for unconditional recycling (scrap), it has to meet the severe free release limits.

In case of other final destination, the material has to satisfy a variety of specific requirements.

Needs

To meet the above mentioned requirements, the following needs have to be fulfilled:

- to get all the relevant information about the dismantled materials;
- to avoid loss of necessary information;
- to standardize the dismantling approach so that everyone knows his job;
- to describe the different treatment methods to be sure that the people use them correctly;
- to describe and validate the different characterization and contamination measurements to be sure that the read out of the measurement is the reality and that the destination requirements are met;
- to have an organizational description of the selected work so that there is a clear overview of the process;
- to prove to the public that everything we do is within the national and international legal framework.

Solution

To meet the needs deriving from all the above mentioned requirements, the rules have to be clearly defined and the organization must be very efficient. All these rules have been brought together in a quality assurance system.

As dismantling can be considered as the production of a product (material destined for reuse or nuclear waste), the BR3 dismantling team has chosen the ISO9002 QA system.

THE IMPLEMENTATION OF THE QA SYSTEM IN THE BR3 PROJECT AND AT SCK•CEN

First a general description of the QA system at SCK•CEN is given, then the BR3 QA system is described more in detail.

General

The SCK•CENs QA system consists of a hierarchical structure, in accordance to the one of the organism itself. The complete set of documents forming the QA system exists of three levels as shown in figure 1.

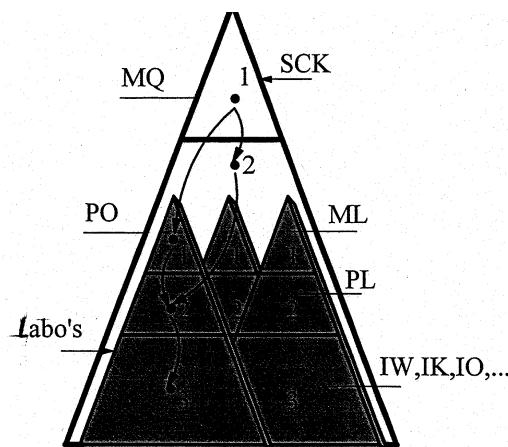


Fig 1: The hierarchical structure of the QA system at SCK•CEN

On top of the SCK•CENs QA system (level 1) is situated the quality assurance manual. It is a document describing in a general way the different elements of the QA system. It gives the mission and the lines of force of the procedures and work instructions. A quality manual exists at SCK•CEN level (code MQ, managed by the QA Management responsible) and at the level of every service (code ML, managed by the quality co-ordinator of the service).

The procedures, which are level 2 documents 2, describe in detail the organizational aspects of the QA system (management of the documents, how to treat complaints, internal audits, ...) and give the activities necessary to define the collaboration between different services or functions. A procedure explains the different responsibilities and standards, and says how and in which way they have to be carried out.

The SCK•CENs QA system contains two types of procedures:

- Organizational procedures (code PO): they describe the organizational aspects. These PO-procedures are valid for all services of the SCK•CEN.
- Laboratory procedures (code PL): they complete the global organizational procedures related to a laboratory or service and are more precise. They are valid within the laboratory or the service.

On the third and lowest level are situated the work instructions, describing how a technical activity has to be carried out. A work instruction explains "what" and is focused on a person, a machine or an equipment. Work instructions are thus meant for the persons who execute certain tasks. There are analyses, working steps (code IW), calibrations (code IK), maintenance works (code IO), ...

On top of the QA service we have the Quality Assurance Manager. He is, besides the general management of the QA system (SCK•CEN level), also responsible to assist the different QA co-ordinators, who are assuring the implementation and the management of the QA system within their service. Once a month the QA manager and the QA co-ordinators have a meeting during which the status of the different QA projects and specific problems are discussed. Every two months another meeting is organized to solve problems that involve more than one section. During this meeting, chaired by the General Manager in presence of all section heads, the general QA management is discussed.

The BR3 QA system

In accordance with the general SCK•CEN QA system, the BR3 QA system is described in the quality assurance manual (code ML, level 2). Now the advantage of the hierarchical structure of the QA system is being revealed.

Indeed, for some aspects necessary for the QA system within a service, one can refer to the existing SCK•CEN procedures (code PO). Examples are the training of persons, internal audits.

Aspects specific for one service, like for instance the personnel structure in function of the QA system and the manner of working, can be described in a general way in this QA manual and can be more specified in the laboratory procedures (code PL, level 2) and in work instructions (mostly code IW, level 3).

It is essential that the structure of our QA system leads to a qualitative execution of the requested demands. As mentioned at the beginning of this paper, the traceability of the dismantled material and the data collection are very important. Therefore, our working procedure is based on two different aspects:

- the dismantling file and connected database for the administrative traceability;
- the batch system with batch identifier for the physical traceability.

The BR3 inventory describes the complete plant and equipments in an arborescent system based on the functionality of the equipment leading to the constitution of groups (different loops, infrastructure, equipment, ...). To be able to trace the evacuated dismantling material in an easy way, one dismantling file per dismantling group was set up. In this file are gathered all documents relative to the dismantling of that group. A simple reference system and the centralization of the dismantling documents in the files facilitate the (administrative) traceability. Once the equipments are dismantled and sorted, they are distributed in different batches each with a unique batch number. A batch has to be considered as an amount of material having the same nuclear and physical characteristics, and having the same destination or treatment.

The following figure shows the different steps that the dismantled material follows from the beginning till the end (figure 2) and describes the related group of procedures and work instructions as well as their purpose.

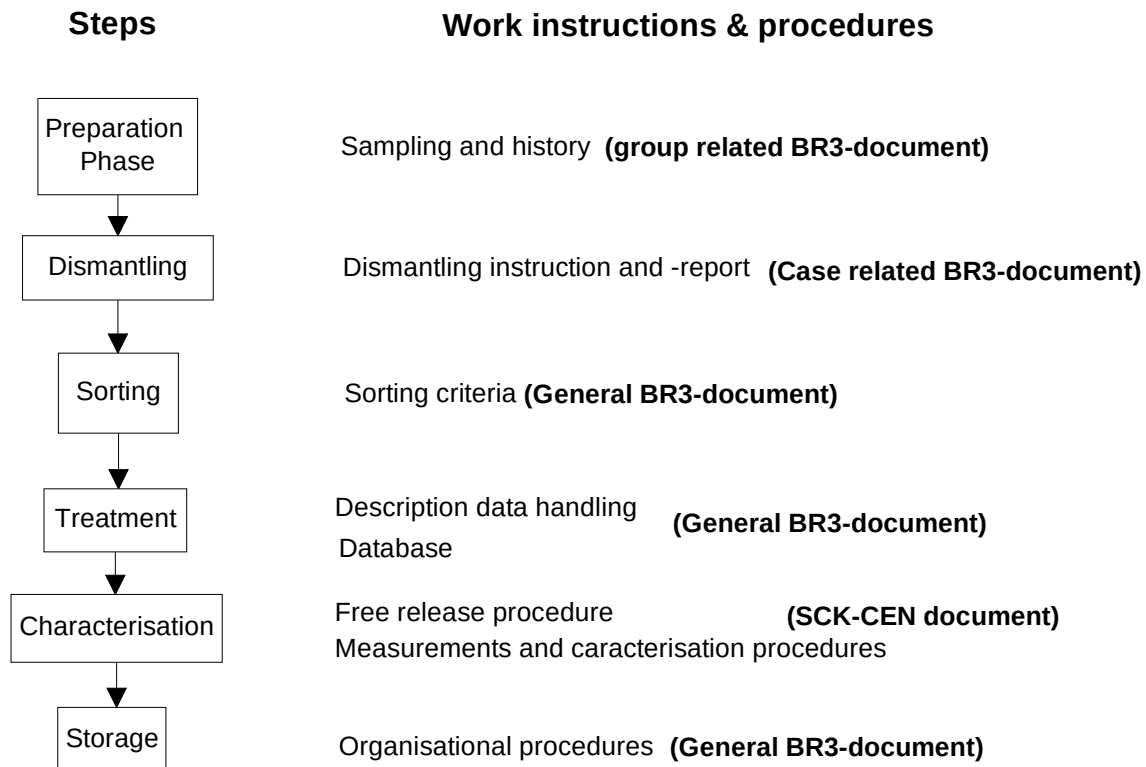


Fig. 2 : The relation between groups of procedures and different steps in the material flow

Besides the procedures and work instructions mentioned, there exist others describing mainly the management of the different documents, as well as their content, lay-out and structure, the general management of the material, ...

When the management of BR3 decides to dismantle one specific part of the plant following the decommissioning plan, the first phase is the preparation. The procedures with regard to this preparation work have to give as much as possible information about the part to be dismantled and the way to follow as well as the proposed final destination. Therefore, sampling, characterization and history are very important; the latter one especially for the release of material.

Regarding the dismantling phase itself, the procedures give primarily information about the safe execution of the work and the gathering of information (dose uptake, volume of dismantled material, ...). The reports are important as first step on the way to the administrative traceability.

The dismantling finishes with the sorting of the material in the batches. It is evident that the sorting criteria are of great importance. As said before, the unique batch number directly linked to the computerized database allows an easy physical traceability.

The material flow itself starts with the treatment of the batches. Not only the instructions for decontamination treatment methods (to release decontaminated material or to decategorize it) but also the material flow procedure is very important because here the complete organization of data collection and transfer of the batches are described. The collection, receipt, centralization and processing of the information are described in detail in order to meet the requirements. Unnecessary to mention that the own-developed database plays a key role.

Next step after the different treatment methods is the characterization or free release measurement of the batches. The free release procedure, issued by the Health Physics Department, together with the procedures giving the different measurement characterization methods, are the main documents. However, as many of these methods are still being developed, some development has to be done.

FIRST EXPERIENCE OF THE IMPLEMENTATION OF THE QA SYSTEM

Although the QA system is still being implemented, some pleasant as well as unpleasant experiences can be noted.

One of the experiences is the reluctance of the older operators towards the implementation of a QA system. Although it is not intended to change completely the existing working methods, it is inherent to a QA system that the administrative tasks increase. However, while reducing the amount of supplementary work to a minimum, one has to keep in mind that it is indispensable in order to keep a good traceability. Also, this reluctance can partly be explained by the fact that the older operators are less familiar with the philosophy of a QA system and are often driven by ancient habits of doing.

One could reduce this reluctance by showing the benefits of the system, thus increasing people's motivation. However, in the case of BR3 it is very difficult to translate this easily into quantitative information.

A positive aspect of the QA system is that, by defining the working methods, the goals are reached in a very efficient way. The system gives also an incentive to a more structured way of working thus increasing the clarity of work organization and work methods for the operators. By giving details, possible difficulties in working methods and organization and sometimes unknown before (especially internal communication) can be detected and remedied.

POINTS OF INTEREST FOR THE FUTURE

As QA implementation has only recently been started, its progress will go on mainly by distributing the different procedures and work instructions. Internal audits will be started to verify the good functioning of the QA system, with a view to future qualification by external auditors.

As the organizational aspects and work methods are already included in the QA system, the redaction and implementation of control- and inspection procedures has started. This concerns activities carried out by our own personnel, increasing the quality of the work.

Moreover, measurement and characterization methods will be finalized and validated, especially with a view to unrestricted release of dismantled materials. This action will be carried out in close collaboration with other departments of SCK•CEN, i.e. health physics and departments specialized in nuclear measurements. This collaboration is one of the challenges for the future implementation of the QA system.

Nevertheless, up to now, the part of the system already implemented, i.e. the data base and batch identifier system, has proven to be really efficient and thus gives positive indication for the finalization of the full QA system implementation.