Information Management during Decommissioning – 15613

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ABSTRACT

A significant amount of data is collected during radiological survey and control measurements before clearance in a decommissioning project, and data quality has often been a challenge. An integrated information management system has been developed, and is in use for the R2 facility radiological survey. Special attention has been given to data quality assurance, in order to extend the data life span. A positioning system using Radio-frequency identification (RFID) has been developed to allow automatic registration of where measurements and sampling are performed in the facility, thus eliminating the need for manual entering of the position.

INTRODUCTION

Decommissioning projects often have the goal of clearance of the nuclear facility and clearance of the material from the nuclear facility. There are many requirements and mandatory steps before clearance can be achieved, see Fig. 1, showing the typical clearance process in Sweden. For buildings and facilities, respectively material, the clearance process are somewhat different (see Fig. 2 – 3), but the common requirement is to keep track of all data generated during the decommissioning project, as well as the origin of material and objects during until clearance can take place.

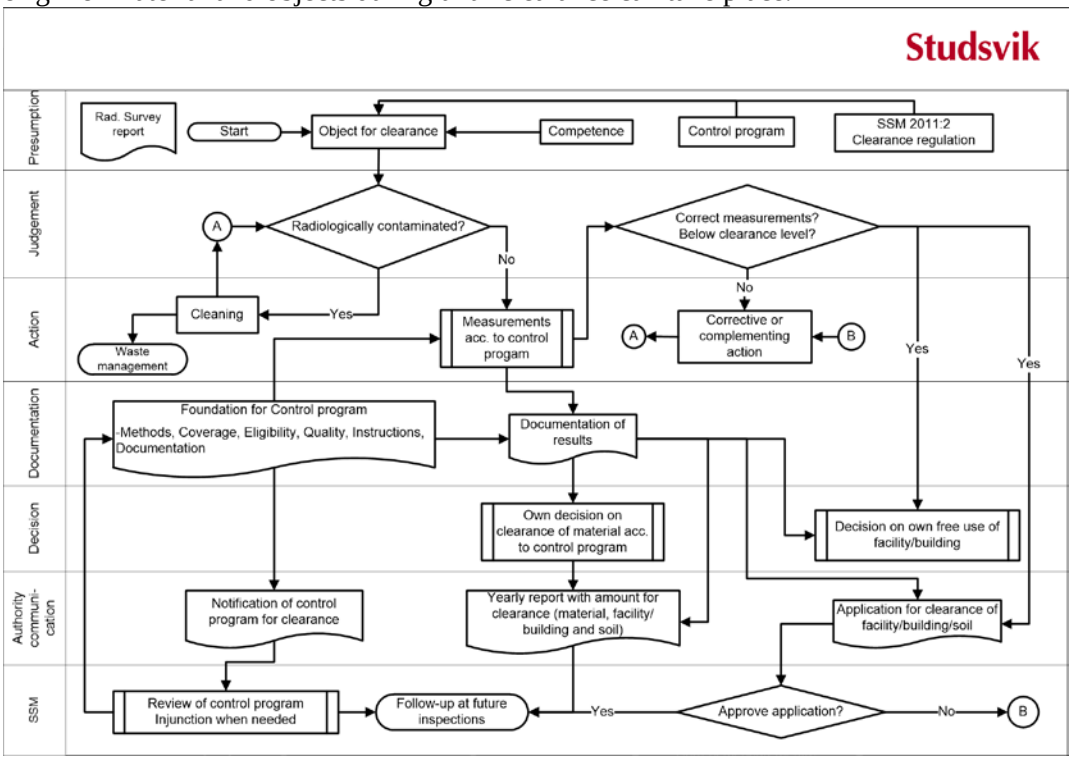

Fig. 1. The typical clearance process in Sweden.

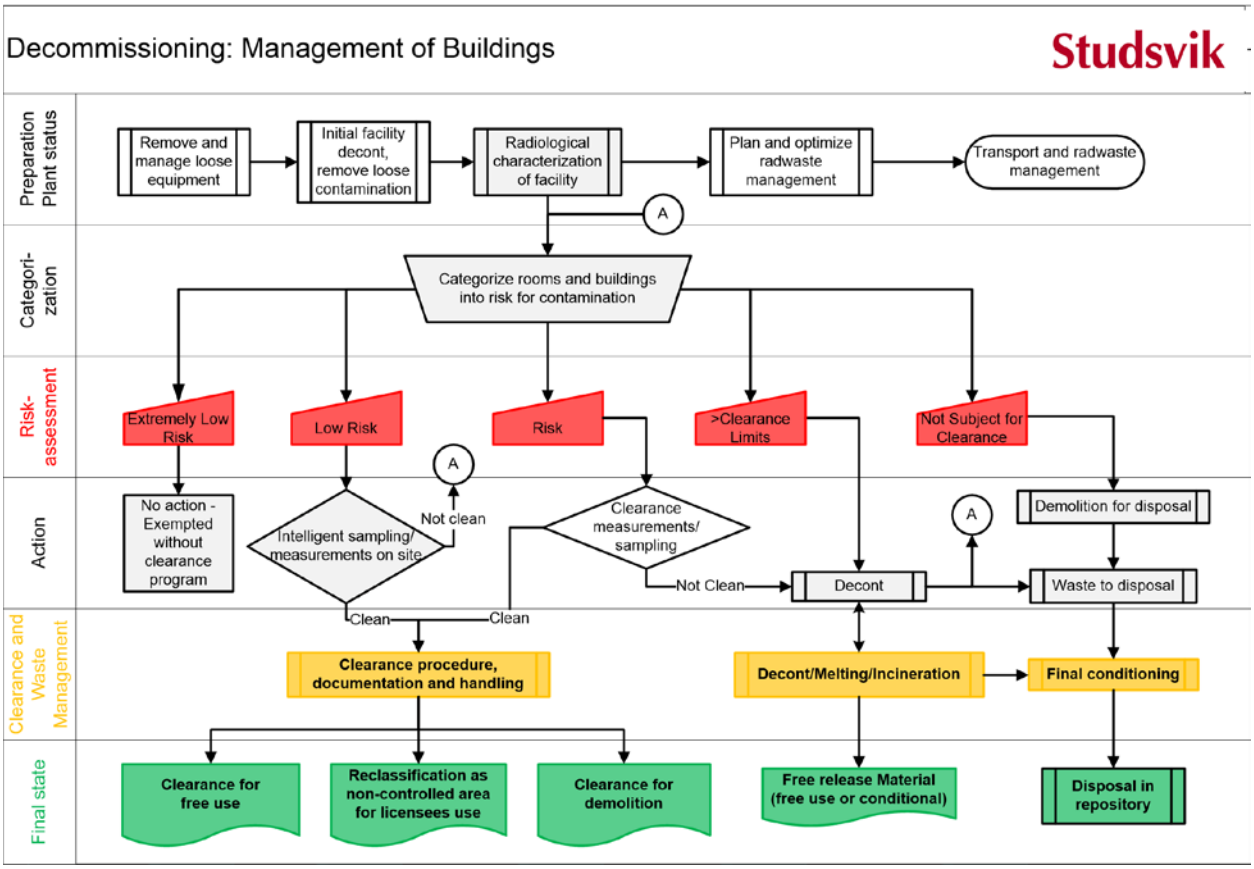

Fig. 2. The management of buildings during decommissioning.

Two areas of special importance from an information management perspective during a decommissioning project are the radiological survey and the controlling measurements before clearance. Several hundred thousands measurements may be needed, which need to be traceable, consequently a robust information management system is needed. This paper gives an example how the information management system has been developed for recent Swedish projects.

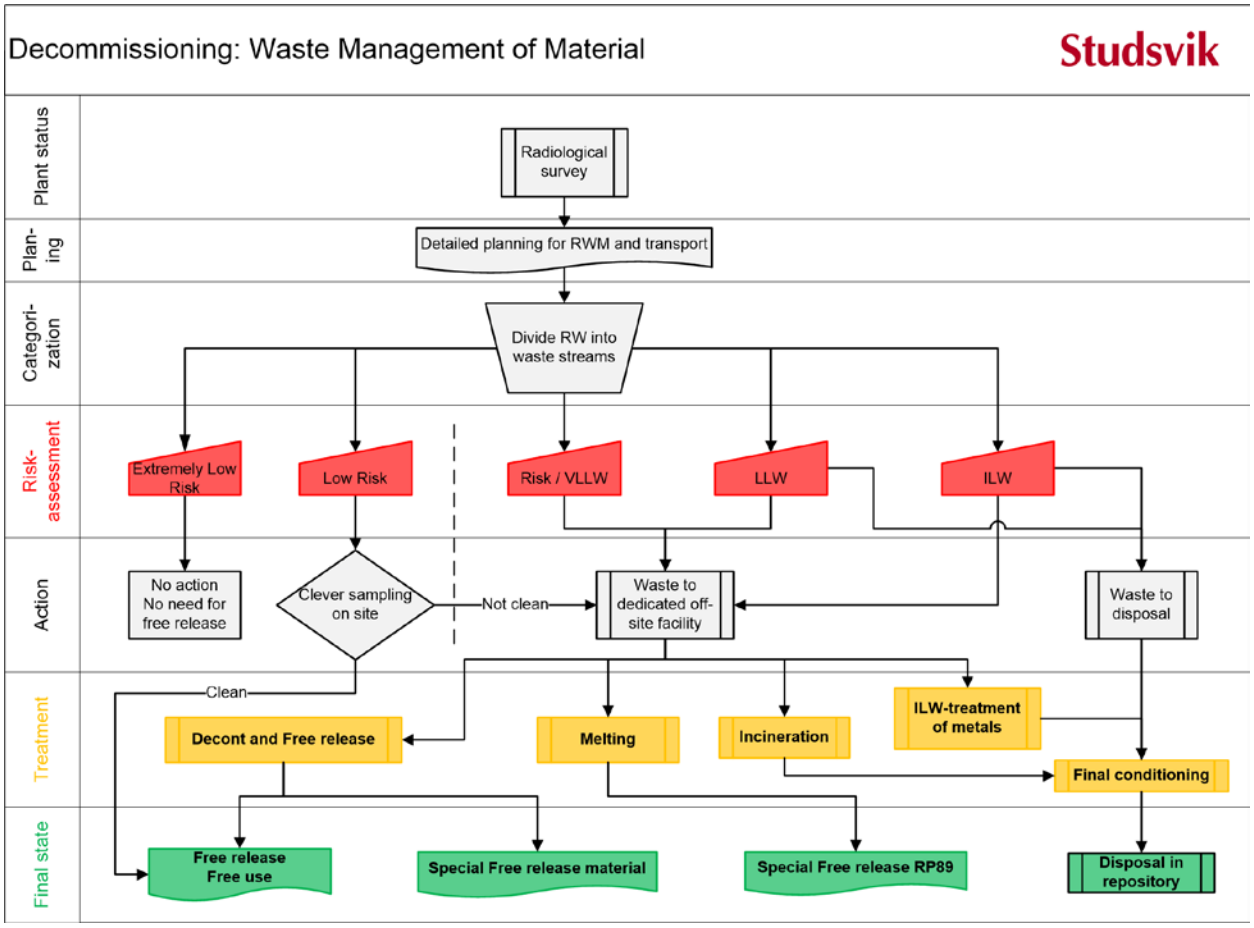

Fig. 3. The management of material from buildings during decommissioning.

METHODS

Information Management and Software Support

The methods described focus on information management and software support for radiological survey and control measurements before clearance.

Information Chain

In a larger project or a company, often many software need to exchange information. The acquired and treated data during radiological survey and control measurements before clearance will be needed in other situations, both within and outside the project and the company. For this reason it is important that the software for radiological survey and control measurements before clearance is open both for import from other systems and for export to other systems. The data transfer often needs to be performed on short notice in order to deliver current status.

Quality in Every Step

In the whole information chain, it is important with the right quality in each step. Right quality means not only that the data itself is quality assured, but also that the staff evaluating and interpreting the information has the right knowledge and makes the proper interpretation, and that data is presented and reported in an adequate manner. Quality in every step needs to permeate the control program for the

radiological survey and the control measurements prior to clearance.

Integrated Information Management

In order to achieve the information chain with quality in each step, an integrated information management is needed. Information collected in one system shall not require manual re-entering into another system. The used systems shall be able to import and export information to a reasonable degree. In practice, the same information is often needed in several systems.

Example from an Ongoing Project

Fig. 4 shows an example from Studsvik how an integrated information management has been used. Data is needed in the software solution SVALA, for waste projects it can be transport and waste information, for decommissioning projects it can be data from a radiological survey. From SVALA the needed information is exported to other systems in the project, and for authority reporting.

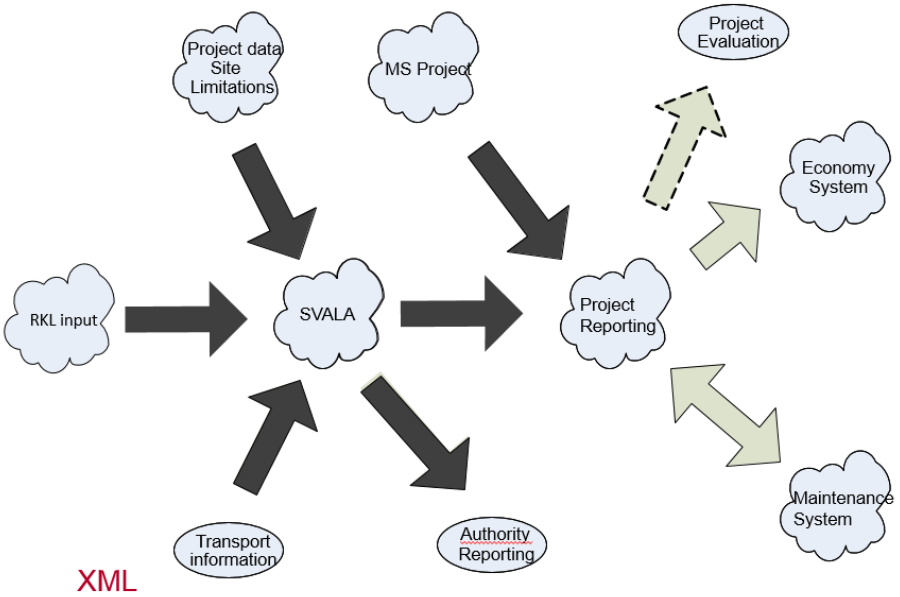

Fig. 4. Information from radiological survey and control measurements prior to clearance needs to be integrated in other systems. When large set of data are to be moved between databases it is preferable made using the Extensible Markup Language (XML)-standard [1].

Experience from Earlier Projects

The experience from earlier Swedish decommissioning projects regarding integrated information management is relatively limited. Among recently performed projects Active Central Laboratory (ACL) in Studsvik and the Ranstad facility can be mentioned. The ACL project started to use a software solution for measurement and sampling data during the project, but the issue was not present at project start. For the decommissioning at Ranstad, there were different operators with different view and focus on how the information management is best performed.

Decommissioning of the R2 reactor at Studsvik is ongoing, and decommissioning of the Barsebäck reactors is under planning. For these projects integrated information management is more advanced, but more will be made in order to achieve an optimal integrated information management. SVALA will be further developed to become a decommissioning management system.

Among European decommissioning projects, two good examples can be mentioned:

1. ENRESA has for decommissioning of the José Cabrera nuclear NPP integrated the information management quite far, and had an explicit goal in quality assuring the information during project performance [2].
2. SCK-CEN has for decommissioning of the BP3 NPP and the fuel facility Belgonucleaire developed an information management similar to SVALA in order to achieve good traceability for the waste from the projects [3].

Measurement and Sampling Equipment – a Project Example

The measurement and sampling equipment for the radiological survey and control measurements before clearance used for the R2 reactor decommissioning project (phase 3) is described below. Phase 3 includes as the entire reactor facility except the reactors R2 and R2-0 (phase 1) and the biological shield (phase 2). Both radiological survey and control measurements prior to clearance are needed for the entire reactor facility.

Fig. 5. The R2-reactor complex at Studsvik.

System Overview

The R2 reactor facility at Studsvik consists of ten buildings and approx. 250 rooms. All buildings, rooms and room surfaces are present in the SVALA system in a tree structure. Other objects can belong to a room surface, e.g., a square for measurements or equipment not being dismantled.

An inventory of the facility was established in order to register room surfaces and corresponding objects. An initial risk assessment (five graded scale) for all rooms and objects was performed and is part of the SVALA information, together with a planned measurement and sampling program for each risk level. The amount of planned measurement and sampling will increase with increasing risk. Registration in SVALA is performed online, i.e., internet connection is required for object editing or adding files with measurements or sampling results.

SVALA has been in constant use by AB SVAFO and Studsvik Nuclear AB since 2006, and has been upgraded over the years with new functionalities (to map needs at the companies) or to reflect new regulatory requirements (such as clearance regulation). SVALA users have a role based personal login, and a framework of rules sets the limits for what each of the ten nuclear facilities at the Studsvik site are allowed to handle, treat, condition, store, and, transport.

SVALA of today is a valuable tool for daily use for all waste management, radiological survey and control measurement before clearance at AB SVAFO and Studsvik Nuclear AB. The access to SVALA over the years has been good, with few and short interruptions.

Prerequisites

Among the prerequisites before the practical part of the radiological survey could start the radiological survey report (compiled 2010) can be mentioned, which required good facility knowledge.

Before the R2 reactor decommissioning project the SVALA system had been used for radiological survey of the Ranstad facility, and for the R2 decommissioning the SVALA functionality was extended with a positioning system using RFID in order to further increase the data quality. The radiological survey is described in a set of project specific instructions. It is important to separate the roles and the responsibilities used for performing the radiological survey. In SVALA, four different roles are used for actual project work:

1. Staff performing measurements and sampling
2. Staff supervising the radiological survey
3. Staff approving results from the radiological survey, and
4. Software administration.

The roles have different responsibilities during the radiological survey and are used to assure the data quality during the project. The Software Admin has extended administrative tools to support the project.

Measurement Equipment

In the project measurement equipment are used capable of collecting data in files for direct import to SVALA. The project has chosen to work with Canberra Colibri units for the following reasons:

1. Personal login
2. Configuration capabilities
3. Possible to connect multiple measurement probes to one Colibri
4. Integrated RFID-handling
5. Build in GPS
6. The data file structure.
7. Easy access to data files and configuration via web server.

Fig. 6 shows example of used measuring equipment in the project. One RFID-reader is used for reading the RFID ID and is communicating with the Canberra Colibri using Bluetooth. RFIDs are linked to each object in the radiological survey tree in SVALA. The project has chosen a few different scintillation

probes for different purposes, e.g., Canberra Smart Probe SAB-100 and Thermo DP8 are being used.
Fig. 6. Measurement equipment for the radiological survey of the R2 decommissioning project.

Sampling Equipment

Equipment used for documentation of sampling is shown in Fig. 7. By the time of sampling, the hand held computer reads the radio tag ID, which is then printed as a barcode on an adhesive label by the attached printer. At the analysis laboratory, the bar code is read, and the same ID is then following the reporting of the results from the laboratory to SVALA. If SVALA cannot find a match for a specific ID, an alarm is send by mail. By this handling, the results are guaranteed to match the intended radiological survey.

Fig. 7. Equipment for documentation of sampling position in the facility.

Positioning

The RFIDs are used for automatic positioning of the place in the facility where measurement or sampling takes place. Manual registration of the position in the facility during measurement or sampling is not needed when the RFIDs are used. Since there are thousands of positions for the measurements and the sampling, mixing IDs are easily done is manual registration is required. Positioning with the help RFIDs increases the quality of the performed survey, and saves working time and therefore cost.

QA

The quality assurance of the performed radiological survey is to a large extent determined by the QA-system in place and being used in the project. The actions taken for measurements as well as for sampling and further on with data handling and evaluation need to be instruction driven to allow the work to be precise, repetitive, and possible for others to repeat. All involved functions and their responsibilities needs to be defined and describes as part of the project. All project documentation within the project shall follow the common company QA-system and other applicable requirements. Make sure that all instruments are calibrated before the survey starts.

Measurements
Both indoor and outdoor measurements are needed during the radiological survey and the control measurements before clearance. The R2-decommissioning project has chosen a few different types of measurements (e.g., pulse rate and dose rate) with the Canberra Colibri and different probes. The data files from all types of measurements are directly imported into SVALA, where needed data handling also takes place. For most of measurements, pulse rate and dose rates are measured simultaneously.

Sampling
Also sampling will be needed both indoors and outdoors during the radiological survey and the control measurements before clearance. Several types of sampling are described in instructions and SVALA is prepared for registration of the samples and for receiving data files with measured results.

DISCUSSION

Some aspects of the integrated information management are discussed below.

Scalability
There is normally a large difference (up to a factor 100) between the amount of measurements and samplings used for radiological sampling and the control measurements before clearance. It will mainly affect the time to perform all measurements and sampling. However, time will be saved when using already proved solutions (equipment, software solution, instructions, evaluation and reporting). Even more time will be saved on the second project with similar needs.

Experience Feedback
Even if the R2 decommissioning project is ongoing it is still possible with some experience feedback.

System Development
The SVALA version used for the R2 decommissioning is a development of the version used at the Ranstad site 2009-2010. The positioning system is one of the enhancements added for the ongoing project.

There are different standards for RFID, and the project has chosen the more robust industrial standard. Some of the equipment used in the project had support for other RFID standards, which needed to be adjusted during the development.

Life Span of Data
By having quality assured data already during the radiological survey, the life span of these data can be extended, which enables savings later in the project. A common principle in earlier projects has been that data from radiological surveys is not used after the survey, making the life span very short for this data.

Competence and Resources for handling of Data
A more strict handling of data, and a more instruction driven implementation of the radiological survey means a longer startup period for the project. More education and some new way of thinking may be required, especially when personnel with different background and experience gather around a new working method.

The feedback so far from the project staff has been that everyone involved aims at the same target, and

have been willing to participate in creating a system and a handling that works in real life. One of the goals have been to reduce the manual registrations needed during the radiological survey to a minimum. Previous experience has shown a small portion of erroneous registrations, and it can be time consuming to find and correct these registrations. Besides the lost time, the creditability may also be questioned, are there more errors that have not been found?

QA

The experience feedback so far in the R2-decommissioning project is that the increased ambition regarding data quality will have a pay back in the future, even that the starting phase have been longer compared with previous radiological surveys. SVAFO aims to use the system in coming projects, meaning that synergy effects can be achieved since the staff is already familiar with the system and its routines.

CONCLUSIONS

An integrated information management system has been developed for decommissioning projects, and is in use for the R2-facility radiological survey. Special attention has been given to data quality assurance, in order to extend the life span of the collected data.

A positioning system using RFID has been developed to allow automatic registration of where measurements and sampling are performed in the facility, thus eliminating the need for manual entering of the position.

The project benefits are better structure for the information together with increased traceability and generally increased QA, which in combination will lead to good possibilities to use project data for a longer time and for all expected needs.

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