FREE RELEASING SCRAP FROM 22 FUEL FLASK TRANSPORT WAGONS TO THE SCRAP METAL MARKET QUALITY ASSURANCE ASPECTS

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ABSTRACT

Nuclear Electric have a fleet of redundant fuel flask transport wagons requiring disposal. The preferred option is to free release as much material as possible from each wagon as 'clean' scrap metal. During 1988/89, AEA Technology carefully dismantled and examined 3 of the wagons to locate, characterize and quantify the contamination present. Based on this work, a case was written for disposing of the uncontaminated steel as 'clean' scrap, and the contaminated material as low level waste. The case was based upon the ability to demonstrate complete segregation of contaminated and uncontaminated material, and to show that the latter is below the UK activity limit for free release. The case was approved by the regulatory authority, and decommissioning the remainder of the fleet began in October 1989. The disposal case is working well in practice. When work is complete in April 1991, 540 te of steel will have been free released and sold to the scrap metal market.

BACKGROUND

In the UK, irradiated fuel is commonly moved between power stations and other nuclear installations by rail. The fuel is placed in transport flasks which are loaded onto specially designed railway wagons known as Flatrol Wagons.

The wagons consist of a central flask-carrying well 3.2 m long, which is suspended at each end from a platform 5.5 m long. These three sections constitute the flatbed, which has an overall length of 15.8 m, a width of 2.5 m, and weighs 27.5 te.

The flatbed is mounted on bogies (one set beneath each platform). The two bogies and flatbed combined form the Flatrol Wagon with a total weight of 37.5 te (Fig. 1).

The original fleet of 22 Flatrol Wagons is now redundant, and has been replaced with new rolling stock. It was known that some of the redundant wagons had been slightly contaminated during their 20 years operational life; this is due to the sweating of flasks painted surfaces which had previously taken up activity from contaminated pond water. The levels of contamination are very low; the wagons have complied with IAEA transport requirements during their long and reliable operational life.

During 1988/89, three wagons were systematically dismantled and examined at Winfrith Technology Centre (WTC) in order to locate, characterize and quantify the contamination. The aim of this work was to show that each wagon contained contaminated and uncontaminated material, that the two types could be separated, and that the uncontaminated material was suitable for disposal as non-radioactive scrap.

The final objective was to dispose of the bulk of each wagon as 'clean' scrap by free release to the conventional UK scrap metal market.

The project is being undertaken by AEA Technology on behalf of Nuclear Electric.

THE ARGUMENT FOR FREE RELEASE

The fleet of 22 Flatrol wagons has a total weight of approximately 600 te. To dispose of this quantity of material as LLW would be expensive, and occupy around 500 m^3. In addition, because the wagons contain a large amount of uncontaminated material, space reserved for LLW at the Drigg disposal site would be occupied by 'clean' waste. This is wasteful of valuable LLW disposal space, and would contravene Drigg acceptance criteria.

Hence, by free releasing the uncontaminated bulk of each wagon to the scrap metal market, and assigning only contaminated material to LLW disposal, a significant saving in cost and Drigg space would be achieved.

Examination of the first three wagons showed that:

- contamination is restricted to 10% of the wagon
- contamination is limited to clearly defined areas of the central well
- contaminated sections are easily identified and separated from the uncontaminated bulk of the wagon
- contaminated sections exhibit activity levels (caesium) within the limit for LLW disposal in the UK
- the contamination was fixed

It was decided to use this information to write a case for free releasing the 90% of uncontaminated material on each wagon as 'clean' scrap, and to send the remaining contaminated material to Drigg as LLW.

THE CASE FOR FREE RELEASE

In the UK, material from the nuclear industry can be released for unrestricted use or disposal outside the industry (free release), providing it satisfies the requirements of

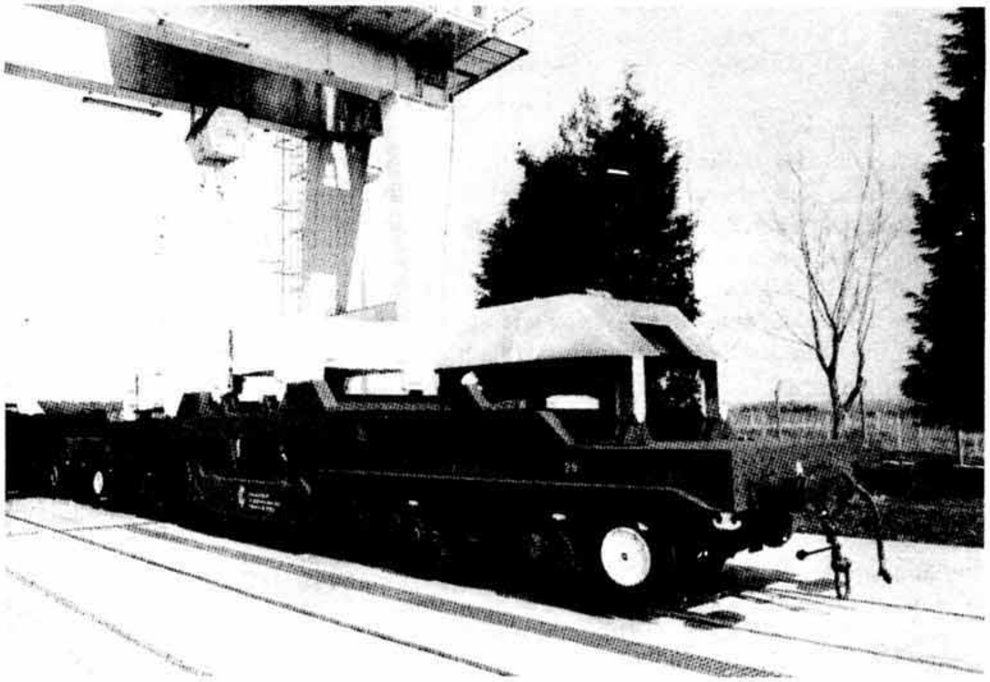

Fig. 1. A flatrol wagon.

the "Radioactive Substances (Substances of Low Activity) Exemption Order 1986".

To satisfy the Order, two important conditions must be met. These are:

- The ability to ensure total segregation of contaminated and uncontaminated items, and
- The ability to demonstrate that uncontaminated items exhibit less than 0.4 Bq/g of activity.

A case to satisfy these conditions was written and submitted for approval to the regulatory authority, HMIP (Her Majesty's Inspectorate of Pollution). The case is outlined below:

To ensure segregation of contaminated and uncontaminated material, each section is monitored and uniquely numbered as it is removed from the Flatrol. This procedure identifies the section as contaminated or uncontaminated, so that it can be assigned to the 'dirty' or 'clean' compound respectively (Fig. 2).

Sections from the 'clean' compound can then be sentenced to free release, while those in the 'dirty' compound will go to Drigg as LLW.

All monitoring equipment and procedures used comply with AEA Technology Quality Assurance Policy.

To demonstrate that activity levels on uncontaminated material are below 0.4 Bq/g, a number of uncontaminated sections are randomly selected from each Flatrol, and subjected to examination by highly sensitive gamma monitoring

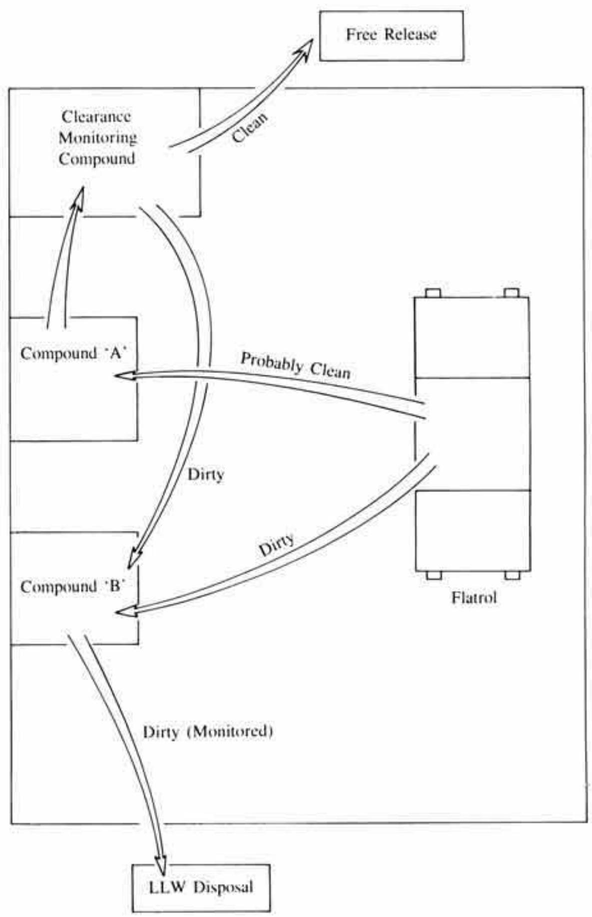

Fig. 2. Schematic of decommissioning facility.

equipment. Only when the results of this monitoring are known, and activity levels are shown to be below 0.4 Bq/g, is the uncontaminated scrap from that wagon permitted to leave WTC.

HMIP accepted the case, and gave written approval for decommissioning and disposal of the remaining 19 Flatrol Wagons.

FREE RELEASE IN PRACTICE

Decommissioning work on the 19 Flatrol Wagons began in October 1989, and the free release case agreed with HMIP is being successfully applied.

To achieve total segregation of contaminated and uncontaminated sections in practice, the procedure shown schematically in Fig 2 is followed.

Preliminary monitoring is used to assign uncontaminated and contaminated sections to compounds A and B respectively. All sections placed in compound B are monitored for total activity to ensure compliance with Drigg acceptance criteria. The monitoring results are recorded on a manifest, and the sections are packed for disposal as LLW.

Sections assigned to compound A are moved to the 'Clearance Monitoring Compound' for final clearance monitoring. In this low background area, specialist Health Physics staff monitor all surfaces of each section according to a written procedure. Each section is recorded on a manifest sheet, and, providing activity levels are below 0.4 Bq/g, the section is placed in a skip to await collection by the scrap metal contractor. If a section is found to be above the 0.4 Bq/g limit, it is transferred to compound B (Note: under no circumstances is a section permitted to move from compound B to compound A).

The purpose of final clearance monitoring is to ensure that only 'clean' scrap is consigned to free release.

To demonstrate compliance with the less than 0.4 Bq/g requirement, a number of uncontaminated sections are selected from each Flatrol and subjected to quantitative gamma spectrometric examination. A Shadow Shield Whole Body Monitor, normally used for routine monitoring of radiation workers, is employed. This equipment is very sensitive, and capable of measuring activity levels of 0.001 Bq/g.

The procedure is carried out for each Flatrol as it is decommissioned. Only after measurements have confirmed that activity levels on the 'clean' scrap from a particular Flatrol are below 0.4 Bq/g, is the contractor permitted to collect the 'clean' scrap from that wagon.

The above segregation and monitoring procedures are working well in practice. An inspector from HMIP has visited the site, and expressed satisfaction with the manner in which the work is being conducted.

The work is on schedule, and due for completion to time and cost in April 1991. By then 22 Flatrol Wagons with a total weight of approximately 600 te will have been decommissioned and disposed of. 540 te of this will have been sold as 'clean' scrap metal.

CONCLUSIONS

A case for free releasing a significant quantity of 'clean' steel, which has been associated with contaminated material, has been agreed with the regulatory authority. It is enabling AEA Technology, on behalf of Nuclear Electric, to successfully release 'clean' material for unrestricted use. At the end of the work, 540 te of steel will have been disposed of in this manner.

The work demonstrates that small amounts of contaminated material can be segregated from the uncontaminated bulk, and that the latter can be released for unrestricted use outside the nuclear industry.

BIBLIOGRAPHY

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