

THE RA02 SYSTEM – TYPE A/AF PACKAGE FOR TRANSPORT OF LARGE COMPONENTS FROM DECOMMISSIONING

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ABSTRACT

The decommissioning of nuclear facilities such as power plants and enrichment facilities requires the transport and disposal of large contaminated components (e.g., valves, compressors, umps, piping, etc). These components have varying types/levels of contaminants including quantities that may require a Type A (or AF) package for transport and disposal. The size/geometry of some contaminated components prevents their packaging into current Type A containers without further processing. However, size reduction of these large objects is time consuming, expensive and presents further personnel safety/contamination issues. Robatel Technologies, LLC has developed a Type A/AF Package System (RA02 System) that allows the decommissioning contractor to transport large contaminated components with minimal to no processing. The RA02 System was originally developed and deployed in Europe by Robatel for the transport of plutonium-contaminated wastes such as glove boxes, tanks, testing devices, and tools; to date, two RA02 Systems have been utilized in France. However, its size makes it applicable to the disposition of other large components stemming from facility decommissioning. The current system design includes a stainless steel (or carbon steel) shipping container size of 20' X 8' X 10.6' and with a maximum payload of 8,830 lbs. In addition, the RA02 System employs a rugged, ultra-highly reliable transfer system that allows the waste generator (and the disposal site) to load and unload the contaminated component with minimal personnel involvement; the transfer system is integrated with the RA02 Package on a specially-designed flat-bed trailer. The RA02 System has been Drop-Tested and maintained its full functionality; the system has integrated impact limiters and can be USDOT licensed as a Type A container. Its size and payload is adjustable to meet the requirements of any specific decommissioning project. The RA02 System provides the decommissioning industry with a solution for disposition of large components, and it saves process/transport/disposal costs while enhancing worker safety.

INTRODUCTION

Recently, there has been an increase in the decommissioning and dismantlement of nuclear facilities in the United States including power plants, enrichment facilities, chemical processing buildings, hot cells, and other research related structures. Contaminated components from these facilities can be atypically large, and the extent of contamination on the components can require a Type A package for final disposition. Unfortunately, there is a limited choice of certified containers that can assist the decommissioning contractor in facilitating final disposition. Thus, a new package is needed to better support current and future disposition of large components.

LARGE COMPONENT DISPOSITION

Various large components are generated during decommissioning such as valves, piping, tanks, pumps, converters, hot cell components, plating, shielding, etc. These large components are not easily packaged into existing Type A containers:

- Metal drums and metal boxes --- components are too large, too heavy
- Transport Casks --- cask configuration (usually right-circular cylinder) limits component size; in addition, the component can damage the cask interior

The photos below demonstrate the size and geometry of typical components generated during decommissioning of major nuclear facilities. While many other components can be disposed without the necessity of a licensed container, the items below can become highly contaminated internally.



Piping Systems



CURRENT TECHNIQUES - CHALLENGES

The following Table summarizes some of the current techniques for the dispositioning of large components from dismantlement and decommissioning projects, and the challenges and issues that accompany those techniques.

Results: Current methods are time-consuming, expensive, potentially risky to personnel and the environment, or do not eliminate the liabilities. A new method that mitigates and/or eliminates these issues is needed to facilitate/expedite decommissioning activities at a reasonable price.

Techniques	Challenges and Issues
Segmentation into Smaller Pieces	<ul style="list-style-type: none"> • Potential Equipment Challenging • Typically labor intensive • Complex Preparation/Review/Procedures • Generation of Secondary Radwaste • Radiological/Industrial Injury to Workers • Mitigation of Cross-Contamination • Fiscally Expensive – Time Consuming
Segmentation / Decontamination	<ul style="list-style-type: none"> • Eliminate need for Type A Container • Same issues as Segmentation above
In-Situ Decontamination / Segmentation	<ul style="list-style-type: none"> • Make work for simple large components where all potentially contaminated surfaces can be accessed • Performance of Free-Release Survey – issue of inaccessible areas • Generation of Secondary Radwaste • Mitigation of Cross-Contamination • Potential Worker Contamination (use of PPE that may slow work) • Industrial injury to workers during segmentation
In-Situ Decontamination / Leave In-Place	<ul style="list-style-type: none"> • Similar issues as In-Situ Decontamination above • Elimination of Long-Term Liability?
Removal In-Toto / Long-Term Storage	<ul style="list-style-type: none"> • Long-term surveillance and monitoring • Elimination of Long-Term Liability?
No Action / Long-Term Surveillance	<ul style="list-style-type: none"> • Long-term surveillance and monitoring • Elimination of Long-Term Liability? • Defeats purpose of Decommissioning

SOLUTION – RA02 CONTAINER

The Robatel RA02 Container is a highly robust package for the transport of radioactive materials. Originally developed for the French military for the transport of Pu-contaminated items, the RA02 has a newly defined use in the decommissioning of nuclear related facilities. The first container was fabricated of stainless steel for specific military use; however, the RA02 may be fabricated of carbon steel and thus, lower the cost of manufacturing (the lower cost of using carbon steel may be offset by the cost of potential decontamination of the container interior).



The photo of the RA02 on this page shows the 20-foot long model and the Automated Loading/Unloading System (discussed below). As needed, the container can be designed and fabricated as a larger unit up to 40-feet long. The width of the container is designed for 8-feet. The RA02 is meant to be a Legal-Size, Legal Weight Load.

Unique Feature of the RA02 --- Automated Loading/Unloading System

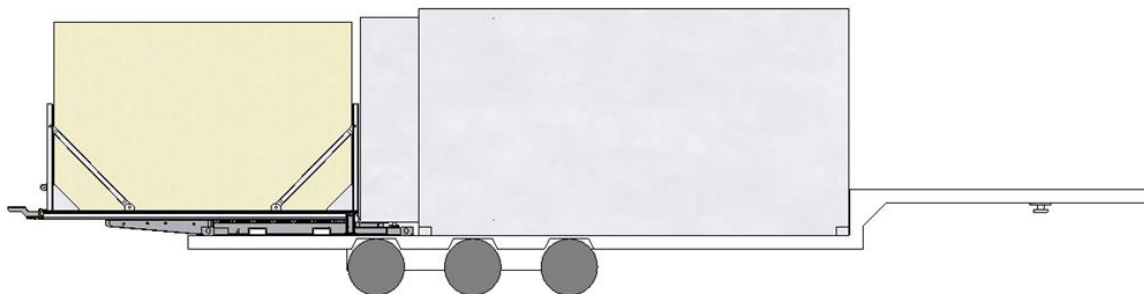
A unique feature of the RA02 is an Automated Loading/Unloading System as shown herein and on the next two pages.

In many instances, decommissioning includes the disposition of large components with high levels of removable contamination and thus, is a personnel exposure hazard for both decommissioning and disposal site personnel. For example, disposal rates at the DOE Nevada National Security Site are based on “special handling costs” for disposal of contaminated items; obviously, the disposal site prefers to mitigate radiological risks to its personnel and the environment.

The RA02 Automated Loading/Unloading System allows users to load and unload large contaminated items while minimizing the direct contact of personnel with the payload. Also, the system facilitates/expedites the loading/unloading of the payload using minimal handling equipment (i.e., forklift). As an example, a highly contaminated component can be wrapped, palletized, lifted by a forklift, and loaded directly onto the automated RA02 loading system. The loading system is “locked” into place as demonstrated in the following photos. Upon arrival at the disposal site, the operation is conducted in reverse --- leading to minimal personnel involvement and mitigation of cross-contamination.

Results:

- Reduced Handling and Potential for Personnel/Environmental Contamination
- Lower Disposal Costs
- Save Time & Money



General View of Loading/Unloading

RA02 Data --- Based on Current 20-Foot Container

Characteristic	US Standard	Metric Units
Trailer Size (L x W)	535" x 100"	13600 mm x 2550 mm
Trailer Weight	10395 lbs	4715 kg
Useful Loading (L x W x H)	165" x 59" x 104"	4200 mm x 1500 mm x 2650 mm
Payload	8819 lbs	4000 kg
Container Size (L x W x H)	238" x 95" x 125"	6056 mm x 2438 mm x 3189 mm
Container Weight (without loading)	23149 lbs	10500 kg
Container Weight (with maximum loading)	31968 lbs	14500 kg
Loading System Weight	2954 lbs	1340 kg
Loading System Power Requirements	Local power supply 24 V DC	Local power supply 24 V DC

Certification of the RA02 as a Type A/AF Container

Currently, the RA02 is IAEA Certified UN 2195 for over-the-road shipping in France. Robatel believes that the RA02 can be certified as a US Type A/AF Package for transporting low-level radioactive waste generated from decommissioning projects. Certification of the RA02 is expected to take approximately six months and subsequent fabrication lasting three months.

The Type A/AF Certification of a longer version of the RA02 is problematic based on the maximum payload which can still meet the Type A/AF Container requirements. Higher payload weights may require greater structural integrity (weight) and thus, the one issue becomes the antithesis of the other issue. A longer version of the RA02 without increasing payload can accommodate the transport of very long, lighter components and may still have application to specific decommissioning items.

CONCLUSIONS

The RA02 Container can be licensed as a Type A/AF Container and used as a cost-effective and less risky alternative for the disposal of large, contaminated components generated during decommissioning projects. The RA02 facilitates operational activities at both the decommissioning and disposal sites, reduces personnel/environmental risks, and saves time and money.

The RA02 Transport Container



External View – RA02 Mounted on Trailer



**Automated Loading/Unloading System
Integrated with Container/Trailer**



RA02 Highway Ready



Operation of the Automated Loading System



**Automated Loading System
Power System**



**Securement of the
Automated Loading System
(and Payload)**

