UTILIZING STRONG TIGHT INTERMODAL WASTE PACKAGINGS TO MEET ACCELERATED CLEANUP GOALS AT THE SAVANNAH RIVER SITE

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ABSTRACT

In support of the accelerated cleanup challenge, personnel at the Savannah River Site have been working diligently to identify and acquire cost-effective waste containers that can be used to package a voluminous amount of low level radioactive waste that needs to be disposed. In so doing, personnel have transformed their paradigm in packaging low level radioactive waste in traditional 45-cubic-foot and 90-cubic-foot containers and utilizing refurbished intermodal containers instead. The transition has increased efficiencies in the processing, packaging, transportation, storage, and disposal of low level radioactive waste, while providing decreased procurement costs. Since large items do not have to be size-reduced to fit into the large containers, additional cost savings are being realized by minimizing void space, labor, time, equipment, and risks if size reduction techniques were performed. Cost savings for fiscal year 2003 exceeded one million dollars. Additional savings are estimated to be between $3 million and $4 million through fiscal year 2006.

In general terms, refurbished intermodal containers are acquired from a vendor near the Port of Charleston (the fourth largest port in the United States) who is focused on obtaining credible containers for resale from lots of intermodals that are deemed to be excess for sea cargo transport. These intermodals are due in for delivery within seven calendar days of an authorized release, compared to the delivery of the more traditional 45-cubic-foot and 90-cubic-foot low-level radioactive waste containers, with an estimated four-week delivery per release. In refurbishing intermodals, the vendor uses a qualified labor force that seeks to improve and ensure each container's integrity measures up to a well documented performance standard. These excess intermodals are then delivered from the vendor's facility to the Savannah River Site and

inspected by a quality professional that confirms the container conforms to rigorous acceptance criteria before being released for operational use. The progress to date has been a "win-win" by allowing a local economy to find an outlet for its excess cargo containers while at the same time providing a customer with a cost effective alternative to packaging low level radioactive waste in a safe and disciplined manner.

SITE DESCRIPTION, OPERATIONS AND NEW CHALLENGES

The United States Government in 1950 authorized construction of the Savannah River Site (SRS). The site covers approximately 300 square miles located along the Savannah River near Aiken, South Carolina. It is owned by the United States Department of Energy (DOE). Operations, support, and closure activities are performed by a coordinated team of contractors, consisting of Washington Group International, Westinghouse, British Nuclear Fuels, Bechtel, CH2M Hill, and Babcock & Wilcox employees. The primary operating missions at SRS are focused on the production of special nuclear materials, primarily plutonium and tritium. Conversely, the Site's waste management and transportation functions are recognized as a supporting arm to these robust defense related programs and at the present time seen as critical players in overcoming new and at times some most overwhelming challenges with regards to its environmental management and closure objectives.

In providing responsive and effective support related to our nation's defense needs, the DOE has recently challenged all personnel at SRS to accelerate its environmental management, closure, and clean up goals as a means to reduce it's out year expenses. In general terms, low level radioactive waste is being generated through SRS operations, support, and closure activities at increasing rates stemming from DOE's accelerated clean up goals. In addition to the routine wastes that were forecasted and have been planned for in past years, voluminous amounts of low level radioactive wastes from a number of accelerated risk reduction projects are now requiring close management and engineering attention. In the past year alone, more than 150 unique facilities have been identified as new closure objectives for Fiscal Years 2003-2006. In decommissioning this many structures in such a short time frame, flexible alternatives had to be identified to manage the low level radioactive that would be generated.

IDENTIFYING FLEXIBLE OPTIONS

Over the years, SRS has experienced both quality control and production rate problems from a number of vendors in purchasing containers for packaging waste. These problems have impacted waste disposition activities. After evaluating various packaging alternatives, SRS decided to exploit the availability of intermodal containers that can be acquired from local ports. In so doing, a readily available and low cost alternative to low level radioactive waste packaging is now being realized.

Intermodal containers are routinely used to safely store and transport materials in commerce. They have also been deemed to be a viable option to package low level radioactive waste. In support of accelerated clean up goals at SRS, intermodal containers are now being acquired from Associated Container Sales (ACS) who acquires intermodals from a variety of sources and refurbishes them for reuse.

The process of writing a purchase requisition, evaluating bids, placing the purchase order, and receiving intermodal cargo containers from a vendor took place in the course of weeks. The rapid response in obtaining the first release of intermodals narrowly prevented the shut down of the site's first closure project. It is estimated that, if this shortcoming had become a reality, a cost impact in the magnitude of one million dollars would have been incurred.

The purchase of intermodal containers in lieu of traditional packaging is a cost saving measure. The container savings alone is as much as $13,000 for a 2,500 ft3 unit volume.

The vendor that is now supplying SRS with intermodal containers is ACS, in Goose Creek, South Carolina, which is close to the Port of Charleston. By capitalizing on it's location to the fourth largest port in the United States of America as well as a handful of others along the east coast, ACS is able to arrange contractual agreements directly with shipping companies and storage container depots. In their accomplishments to date, the company has demonstrated that they have access to an abundant supply of containers coupled with a technical staff that can refurbish them to meet customer requirements.

Associated Container's market niche is in refurbishing and modifying excess intermodal containers. It also offers a host of welding repair services and related custom fabrication options to include steel shelving, roll up doors, finished office-warehouses and many other variations to containers. Associated Container Sales also supplies General Electric, Nucor and a number of other fortune 500 companies. At the present time, ACS is focused on the packaging market for low level nuclear waste containers. Associated Container Sales' equipment and facilities are configured in a manner that enables their technicians to work in all types of weather. They also have automated computer aided design capabilities and have implemented an NQA-1 Quality Assurance Program.

In July of 2003, ACS was awarded a one year contract with three additional option years to supply SRS with nine container variants. In addition to this contract, ACS is providing products to the Oak Ridge National Laboratories, the Tennessee Valley Authority, South Carolina Electric & Gas, and products for military special operations. Associated Container Sales is also on its second year of a five-year contract with the Department of Defense to refurbish ammunition containers. To accomplish the above, ACS has designed and built a state of the art blast and paint facility. Because of the clever building system and ongoing enhancements, increased production requirements are being met.

TRANSFORMING PARADIGMS

Most low level radioactive waste generators blindly accepted the paradigm that they must purchase new containers for packaging and shipping low level radioactive waste. Until recently, almost all waste generators at SRS followed this practice. However, in the fall of 2002, when waste packaging demand was at an all time high with low production outputs from various sources, coupled with an array of quality control problems, a new approach to thinking outside of the traditional waste box was required.

If SRS was to achieve its aggressive accelerated closure goals, effective and efficient waste packaging options were needed. The performance of waste generating projects involving decontamination and decommissioning objectives, which generate large volumes of low level radioactive waste from equipment strip out and demolition activities, depended on having viable packaging alternatives.

In supporting the challenge of procuring sufficient waste packaging, Waste Generator Services led an effort to identify alternative packaging options. Research indicated that other DOE sites had used refurbished intermodals to ship low level radioactive waste.

After a review of the Department of Transportation (DOT) regulations, it became apparent that a refurbished intermodal container met the requirements of a DOT strong tight package.

In supporting the high demand for waste packaging, the site's Waste Generator Services team investigated a number of sources for used cargo containers. Several vendors were identified that had a ready supply. In order to pursue these opportunities, it was first necessary to develop a contractual agreement to procure intermodal containers in accordance with federal and corporate requirements. In time, ACS was selected to supply SRS with its anticipated demands in accordance with documented technical requirements.

MEETING REQUIREMENTS

In a disciplined manner, DOT regulations are depicted in 49 CFR which levies the requirements for radioactive material packaging based on the classification of the material. In particular, 49 CFR Section 173.427 delineates, Low Specific Activity and Surface Contaminated Object (LSA and SCO) materials can be shipped in DOT strong tight packaging.

In initiating such a transformation, purchase requisitions were written that incorporated sound technical requirements and the users' desired salient features for nine refurbished intermodal container variants. Actions were then taken to confirm expectations and requirements were clearly understood to best select candidate containers for refurbishment to vigilant inspection criteria. In turn, program mangers and engineers from SRS monitored the vendor's in-process and receipt inspection procedures to ensure the acquired intermodal containers met the documented strong tight packaging requirements.

As previously mentioned, intermodal cargo containers meet the requirements of a DOT strong tight package. This means that under conditions normally incident to transportation, there will be no identifiable release of hazardous material to the environment. It also means that the effectiveness of the packaging shall be maintained for the minimum and maximum temperatures encountered during transportation. In addition, the closures on the packaging are designed and closed so that there will be no identifiable release of hazardous material to the environment from the opening to which the closure is applied under conditions normally incident to transportation. To accomplish this requirement, the closure is secure and leak proof under conditions normally incident to transportation.

In an effort to ensure the overall integrity of the intermodal variants acquired for SRS use would not be compromised in various operating scenarios, formal engineering calculations were

completed. The purpose of the completed calculations was to evaluate the effects of the lifting loads on the structural components for each container variant being acquired. The scope of these calculations included each container's structural components to include its sides, forklift pocket cut outs, lifting castings, and rails. The analyses conclude that the structural components meet the stress requirements in accordance with national standards and that the corner lifting castings meet SRS requirements for hoisting and rigging.

CUSTOMER ORDERING AND PRODUCTION QUEING

Associated Container Sales presently receives purchase releases from SRS on a regular basis. It also works with key personnel at SRS to prioritize and balance the site's competing needs when user demand is greater than production capabilities at ACS. Deliveries are from quantities of one to four truckloads per day. Schedules for production are sent electronically to SRS on a weekly basis. The recipient of the container is also called directly, twenty four hours and around one hour prior to delivery. Since ACS has organized its scheduling and production systems, an electronic program has been established by SRS to order units on demand. This rapid ordering system has proved extremely easy with minimal time restraints for the site's purchasing department while addressing the respective customers' expectations for just in time delivery.

REFURBISHING INTERMODAL CONTAINERS

Associated Container Sales, through its contractual arrangements with shipping companies, is able to have containers delivered on a just in time basis. When the containers are delivered to ACS, an inspection report is submitted to the office for review. If the container has any deficiencies, a work order is created to correct the problem prior to returning the container to approved inventory.

When an order activates the need for an approved container, it is pulled from inventory and moved to a designated location in the production area. In turn, ACS's production supervision re-inspects the container with a Quality Assurance technician. The container is then refurbished, modified and constructed in accordance with the requirements of the order. It is continually inspected during the refurbishment process, and when completed, signed off by a Quality Assurance technician prior to entering the paint process.

As needed, ACS refurbishes the doors, flooring, gaskets, and structural components for each intermodal to ensure the resultant product conforms to strong tight packaging requirements. For some products, metal fabrication methods are used to provide customers with intermodals that have top loading capabilities, steel flooring systems to provide enhanced containment, and fork lift pockets for container maneuverability and lid removal / placement ease. Additional reinforcement is added to improve the structural integrity for each container. In one product line, a half-high intermodal option is available. As requested, these container variants provide customers with the capabilities and confidence they need to manage some of their more challenging packaging needs.

VENDOR INSPECTION & TESTING PROCEDURES

Associated Container Sales workers conduct in-process inspections and various tests in the production and refurbishment process of their units. Prior to releasing a unit for delivery, a documented visual inspection report is created. Applicable performance tests are also executed per container variant. Inspections are performed for all containers ordered. To accomplish an inspection, a Quality Assurance technician enters the intermodal during daylight hours and looks for any indication of light penetration. The visual inspection is passed when there is no sign of intrusive light. If the light test is not passed, the container is reworked and documented accordingly.

For containers with steel floors and removable hard top lids, ACS conducts a series of methodical water leak tests. The units are initially water leak tested via an external spray test comparable to a simulated thunderstorm. For containers with lids, the lids are placed on a test apparatus and filled with water and left to stand until the Quality Assurance technician can verify that the lid is leak proof. A similar test is performed on the steel flooring system. This test fills the intermodal's cavity with a nominal amount of water to confirm it is leak tight. In the event that any of these water performance tests fail, the results are documented and the unit is reworked until it passes the testing criteria.

PLANNING, SCHEDULING AND COORDINATING DELIVERIES

In time, units are scheduled for delivery to SRS customers following production refurbishment and successful testing. ACS is responsible for scheduling and coordinating deliveries with SRS customers and has sub-contracted its deliveries to a local source that uses three different drivers on a rotating basis. SRS customers make arrangements for the off-loading of their units in accordance with the site's rigging and handling procedures. The drivers that make deliveries have been badged for general site access. This minimizes delays that were previously experienced in waiting for security escorts. Although SRS customers are spread all over the site's geographic boundary, effective communication and coordination now ensures units are delivered to the right location while minimizing off-loading delays.

Intermodal deliveries have been an ongoing improvement initiative. Early on, delays were experienced with security access and escorting requirements. On a periodic basis, delays have been experienced due to inadequate planning and scheduling of available riggers to off load the delivered units. At times, this has impacted the capability of getting additional unit's delivered on the same day with a snow balling effect on future deliveries since safe road and wait time constraints are followed by the drivers. Whereby, they only return to ACS for an additional round trip delivery in the same day, if time permits. To overcome this challenge, efforts have been established for a central delivery and off loading location plus acquiring additional trailers and resources to support inter-area transportation requests to move intermodal containers.

RECEIPT INSPECTIONS

The SRS receiving inspection program ensures delivered products comply with standards and features imposed by technical organizations and procurement documents. For intermodal cargo containers that are procured to comply with the general design requirements of 49 CFR 173.410, the receiving inspection criteria engages 100% of the containers received. In so doing, units are

verified for correct identification and markings. Examinations are also done for shipping damage with consideration that refurbished containers will have minor dents, scratches and scrapes. Verifications also ensure no holes, rips or tears exist in container walls, roof, or flooring systems. The overall workmanship of the container is also examined to ensure the general configuration is complete with all components and gaskets installed with no indications of damage. An examination is also performed for suspect counterfeit fasteners as well as a review of the supplier's quality documents to verify all are sent, authenticated, and in compliance with the established requirements.

RESULTS

To date, approximately 400 intermodal cargo containers have been ordered within the past twelve months. The cost savings for SRS in Fiscal Year 2003 for container acquisitions exceeds one million dollars. The anticipated life cycle cost avoidance for containers and labor involved in handling, moving, and surveying fewer containers over the next three years is now estimated to exceed twelve million dollars in comparison to the more traditional low level radioactive waste packaging options.

In general terms, this is the minimum savings which does not include the significant cost reductions related to performing and documenting radiological surveys for smaller sized packaging options. It also minimizes data entry requirements to properly manifest each package and labor for proper package closure, handling, and transport.

The anticipated demand in the next year from SRS operations and closure business units is expected to exceed 600 intermodal containers. The immediate need is mostly driven by accelerated cleanup objectives from the decontamination and decommissioning activities that are on a fast track schedule for completion. In general terms, intermodal cargo containers serve to provide users with flexible and cost effective low level radioactive waste packaging options.

CONCLUSION

The contractual relationship established with Associated Container Sales has been very sound. In contrast, Associated Container Sales has been very responsive, flexible and committed to meeting customer requirements. Their insights continue to yield novel suggestions aimed at increasing production rates and capitalizing on opportunities that increase efficiencies while at the same time fostering open communications. To realize production efficiencies and to meet an increasing unit demand by end users, a structured inventory system is now being established. The system is based on the production cycle times for each intermodal variant and anticipated needs, using waste forecasting and modeling tools. In short, designated quantities of containers are now available and can be automatically reordered to replenish future needs. This agreement makes new releases using an automated electronic ordering system that recognizes future production requirements by ordering on demand. In other words, if the requirement for a particular variant is 4, when 2 are pulled for use, the system automatically orders 2 units to replace those acquired from inventory. To further expedite deliveries, efforts are also underway to strategically locate to be received containers in a common area at SRS, as a means to optimize deliveries from Charleston, South Carolina. In due time, the individual requesting a container for immediate use, will be able to obtain it on demand.

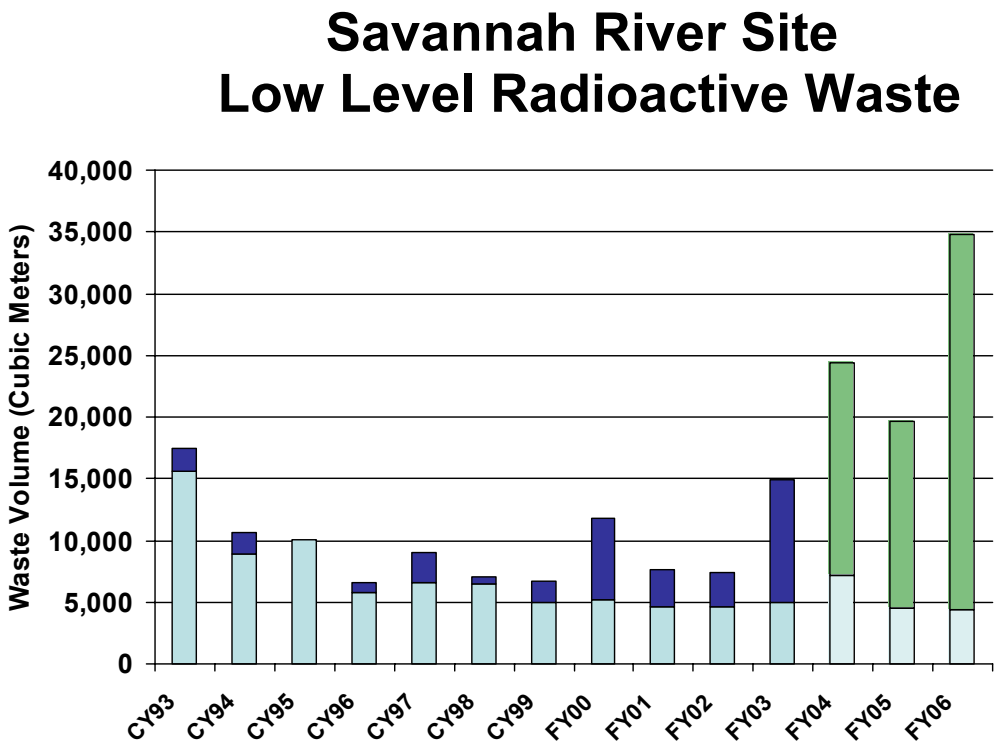

Fig. 1

Routine plus project & cleanup low level radioactive waste volumes

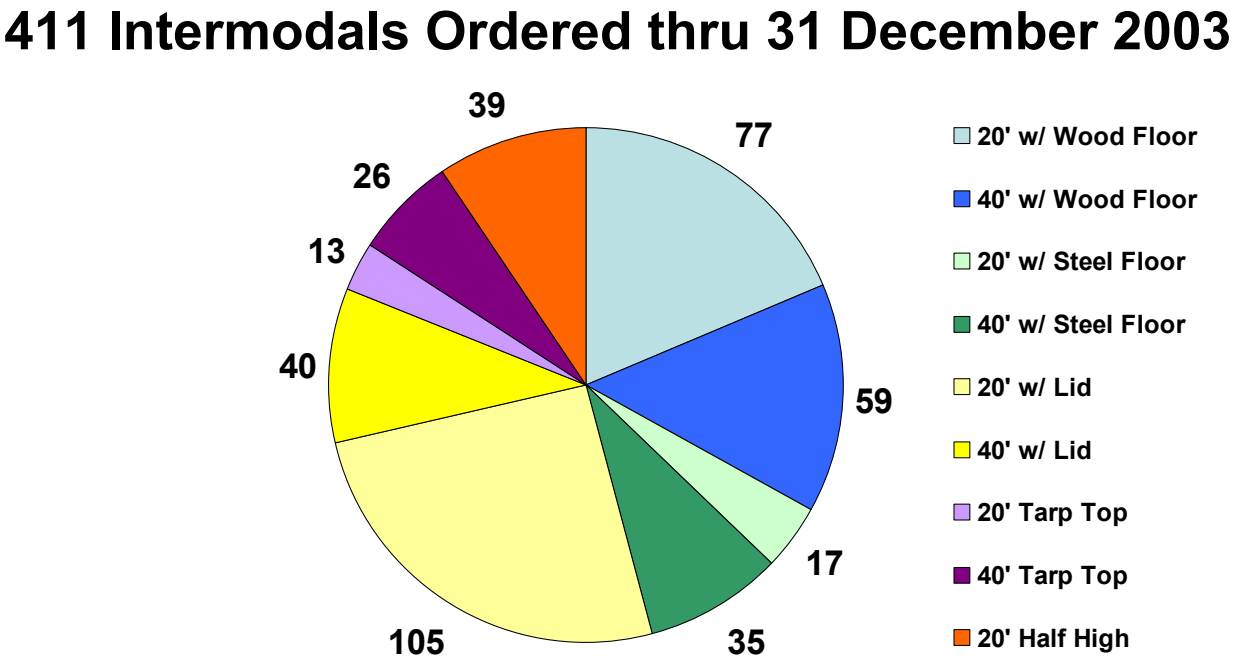

Fig. 2 Low level radioactive waste packaging ordered by savannah river site

Table I. Intermodal container descriptions and general information

40' Intermodal-Sealand	Description	20' Intermodal-Sealand
Interior Dimensions Length: 39'-5 1/2" Width: 7'-9 1/2" Height: 7'-9 1/2" Exterior Dimensions Length: 40' Width: 8' Height: 8'-6"	Refurbished strong tight containers.	Interior Dimensions Length: 19'-4" Width: 7'-9 1/2" Height: 7'-9 1/2" (3'7" Half-High) Exterior Dimensions Length: 19'10" Width: 8' Height: 8'-6" (4'3" Half-High)
40' Wood Floor Container  Tare Weight: 8,245 lbs Payload Capacity: 58,955 lbs Max. Gross Weight: 67,200 lbs Cubic Capacity: 2,394 cu. ft. ACS Model: 408STU WSRC Model: IM40WEL SRS Material ID: 32-13414.01 CAR-SWE-96-0003 WITS# 494 SEALAND CONTAINER-40FT	**Dumb Box** Refurbished strong tight end loading fixed top container with wood floor and opening/closing rear doors.	**20' Wood Floor Container**  Tare Weight: 4,760 lbs Payload Capacity: 48,150 lbs Max. Gross Weight: 52,910 lbs Cubic Capacity: 1,173 cu. ft. ACS Model: 210STU WSRC Model: IM20WEL SRS Material ID: 32-13412.01 CAR-SWE-95-0027 WITS# 468 SEALAND CONTAINER-20FT
40' Open Top Container w/Tarp  Tare Weight: 7,580 lbs Payload Capacity: 58,955 lbs Max. Gross Weight: 66,535 lbs Cubic Capacity: 2,394 cu. ft. ACS Model: 408TOT WSRC Model: IM40TCWTL SRS Material ID: 32-13666.01 CAR-SWE-2003-0030 WITS# 323 40FT TARP COVERED SEALAND	**Top Loading Rag Top** Refurbished strong tight top loading container with tarp covering, wood floor and opening/closing rear doors.	**20' Open Top Container w/Tarp**  Tare Weight: 4,890 lbs Payload Capacity: 48,020 lbs Max. Gross Weight: 52,910 lbs Cubic Capacity: 1,173 cu. ft. ACS Model: 208TOT WSRC Model: IM20TCWTL SRS Material ID: 32-13665.01 CAR-SWE-2003-0029 WITS# 322 20FT TARP COVERED SEALAND

Table I (Continued). Intermodal container descriptions and general information

40' Steel Floor Container  Tare Weight: 10,245 lbs Payload Capacity: 58,955 lbs Max. Gross Weight: 69,200 lbs Cubic Capacity: 2,394 cu. ft. ACS Model: 402U WSRC Model: IM40SEL SRS Material ID: 32-13416.01 CAR-SWE-96-0003 WITS# 494 SEALAND CONTAINER-4OFT	**Smart Box** Refurbished strong tight end loading fixed top container with steel floor and opening/closing rear doors.	**20' Steel Floor Container**  Tare Weight: 5,860 lbs Payload Capacity: 48,150 lbs Max. Gross Weight: 54,010 lbs Cubic Capacity: 1,173 cu. Ft. ACS Model: 202U WSRC Model: IM20SEL SRS Material ID: 32-13415.01 CAR-SWE-95-0027 WITS# 468 Sealand Container-20FT
40' Open Top Container w/Lid  Tare Weight: 12,960 lbs Payload Capacity: 58,955 lbs Max. Gross Weight: 71,915 lbs Cubic Capacity: 2,394 cu. ft. ACS Model: 404TLU WSRC Model: IM40STL SRS Material ID: 32-13419.01 CAR-SWE-2002-0031 WITS# 268 SEALAND TOP LOAD-4OFT	**Top Loading w/Lid** Refurbished strong tight top loading removable lid container with steel floor and opening/closing rear doors.	**20' Open Top Container w/Lid**  Tare Weight: 7,680 lbs Payload Capacity: 48,150 lbs Max. Gross Weight: 55,830 lbs Cubic Capacity: 1,173 cu. ft. ACS Model: 204TLU WSRC Model: IM20STL SRS Material ID: 32-13418.01 CAR-SWE-2002-0029 WITS# 266 SEALAND TOP LOAD-20FT
Contact Information **Buyer: Doris Rouse** Phone: (803) 557-4147 **Inventory Analyst: Ken Brosseau** Phone: (803) 557-5792 **Operations Support: Joe Kinney** Phone: (803) 557-6356 **Transportation Services: Mark Bowers** Phone: (803) 557-8662 **Associated Container Sales** **Bruce Cohen- President / CEO** **Bob Bell- SR. V.P. Operations** **Rob Sienko- Q.A. / AutoCAD** **Sarabeth Pegram- Customer Service** **1.888.554.4900** **www.stowmax.com** **Email: bruce@stowmax.com**	**Half High** Refurbished strong tight half-high top loading container with steel floor.	**20' Half High Container**  Tare Weight: 7,000 lbs Payload Capacity: 48,150 lbs Max. Gross Weight: 55,150 lbs Cubic Capacity: 535 cu. ft. ACS Model: 206HHU WSRC Model: IM2OHHSTL SRS Material ID: 32-13417.01 CAR-SWE-2002-0030 WITS# 267 HALF-HIGH SEALAND-2OFT

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