

The Port of Virginia's Environmental Management System

The Port of Virginia embraces *sustainability* as one of our anchor values and defines it as being “responsible stewards of all resources entrusted to our care.” Environmental stewardship is a key element of The Port of Virginia's efforts both on and off-terminal. As Stewards of Tomorrow, The Port of Virginia prioritizes incorporation of procedures and technologies that reduce emissions, identify environmental risk, and engage employees and the community while maximizing operational performance. At the cornerstone of our commitment to environmental stewardship is our industry-leading Environmental Management System (EMS). Beginning in 2008, the EMS program was recognized by the International Standards Organization (ISO) by meeting all of the requirements of the ISO 14001 standard, making The Port of Virginia the first east coast port to operate under this certification.

The Environmental Management System ensures that port colleagues and tenant activities operate, not only safely and efficiently, but also proactively with an informed ability to identify and respond to environmental risks, while improving performance through the effective use of resources. In that way, the EMS affords The Port of Virginia a competitive advantage and assists port colleagues in building trust and strong relationships. Identified in the EMS are our commitments to promoting the port's ongoing environmental programs, improving communication between the port and terminal tenant activities, tracking environmental performance, as well as meeting permit compliance requirements.

The Port of Virginia is comprised of six cargo terminals in Virginia: Norfolk International Terminals (NIT), Portsmouth Marine Terminal (PMT), Newport News Marine Terminal (NNMT), Richmond Marine Terminal (RMT), Virginia International Gateway (VIG), and the Virginia Inland Port (VIP). Each terminal specializes in moving diverse types of cargo including container, ro-ro, breakbulk, vehicles, and out of gauge equipment. All terminals contain operations and maintenance staff and work centers. All Port of Virginia terminals listed above, are the officially designated facilities for implementation of the Port's ISO 14001:2015 certified Environmental Management System.

- NIT is a 567-acre marine terminal located in Norfolk, Virginia and is the port's largest facility. It specializes in handling containerized cargo, as well as out-of-gauge cargo.
- NNMT is a 165-acre marine terminal located in Newport News, Virginia and is The Port of Virginia's main break-bulk and roll-on/roll-off facility.
- PMT is a 287-acre marine terminal located in Portsmouth, Virginia and is able to handle containers, break-bulk, and roll-on/roll-off cargo.
- RMT is a 121-acre barge terminal located in Richmond, Virginia primarily handling containers, temperature-controlled containers, break-bulk, bulk, and neo-bulk cargo.
- VIG is a 576-acre marine terminal located in Portsmouth, Virginia primarily handling containerized cargo as well as out-of-gauge cargo.
- VIP is a 161-acre intermodal container transfer facility located in Front Royal, Virginia which primarily handles containers.

Summary & Background of the EMS Program

The Port of Virginia has fostered an Environmental Management System (EMS) to document the processes and procedures that form the basis of our program and to guide decision making regarding potential environmental impacts. This EMS is consistent with and based upon the requirements of the International Organization for Standardization (ISO) 14001:2015 Standard "Environmental Management Systems – Requirements with Guidance for Use."

EMS Scope

The Port of Virginia has determined the scope of its EMS shall consist of all activities and operations conducted on-site and to a large extent within the terminal fence lines. The scope of the EMS also identifies areas of risk to guide program goals related to terminal operations which have the potential to impact the environment. Some activities outside of the physical fence line are identified as part of the scope; such as dredging, procurement, and real estate management. The scope excludes ship traffic, waste generated on vessels, and operations managed by federal agencies.

EMS Team

The EMS team is composed of members from the Virginia Port Authority (VPA) and Virginia International Terminals, LLC, (VIT) including the following departments:

- Crane, Vehicle, and Facilities Maintenance
- Finance
- Health & Safety
- Human Resources / Training / Workforce Development
- Information Technology
- Operations
- Port Police & Security
- Procurement & Purchasing
- Sustainability

Key Drivers for Developing an EMS

The Port of Virginia purposefully chose to develop an EMS that includes all six terminals to coordinate and maximize existing environmental stewardship activities, improve communication between the port authority and terminal activities, identify areas of risk for improvement, and track environmental performance and operating efficiency. Key organizational goals in the EMS are defined as:

- Maintaining compliance with all permits
- Reducing waste
- Encouraging energy conservation
- Reducing air emissions
- Improving community involvement and visibility
- Continually improving environmental performance

- Increasing employee awareness and participation in environmental performance initiatives

Current Goals and Objectives

The Port’s EMS team has established Goals and Objectives which complement our organizational goals also known as Environmental Management Plans, or EMPs. Our current EMPs are discussed below.

Reducing Air Emissions: Green Operator Truck Program

Objective: Reduce emissions from dray trucks by offering monetary incentives for operators serving our terminals to purchase a “cleaner” truck. Trucks being replaced must be older than 2006 and are required to be replaced with trucks of model year 2011 or newer.

Environmental Benefits: The Port of Virginia worked closely with the Virginia Department of Environmental Quality to create the Green Operator Program. Green Operator is a voluntary diesel truck replacement program encouraging local motor carriers serving our terminals to voluntarily replace diesel trucks to reduce emissions.

Virginia was the first port in the U.S. to create a program of this kind, and it has served as a model for ports across the country. To date, the program has assisted in the replacement of nearly 500 trucks and has helped reduce emissions as outlined below.

Green Operator Current Annual Estimated Emissions Reductions

| Annual Results (short tons) | NOx | PM2.5 | HC | CO |
|--|---------------|---------------|---------------|---------------|
| Baseline for Retrofitted Vehicles | 38.54 | 1.818 | 1.883 | 10.206 |
| Amount Reduced | 31.494 | 1.702 | 1.62 | 9.023 |
| % Reduction | 81.70% | 93.60% | 86.10% | 88.40% |

Reducing Air Emissions: Hybrid Shuttle Carriers

Objective: Purchase and test the use of hybrid – electric shuttle trucks in port operations to reduce fuel consumption and emissions on terminal while demonstrating the potential to more fully integrate hybrid equipment into the terminal operating environment.

Environmental Benefits: In 2015, the port received a Diesel Emission Reduction Act (DERA) grant towards the purchase of three hybrid shuttle trucks at VIG. This grant enabled the port to pilot a comparison of new hybrid technology against traditional diesel units. Initial findings showed that the hybrid shuttle trucks save more than two gallons of fuel per hour compared to conventional diesel shuttle trucks. It is estimated that the each hybrid shuttle truck will save over 17,300 gallons of diesel fuel annually and more 248,000 gallons of diesel fuel over the full lifespan when compared to their diesel predecessors. The chart below estimates the emission reductions from the use of hybrid shuttle trucks compared to the use of conventional diesel shuttle trucks.

Hybrid Shuttle Estimated Emissions Reductions

| Emissions | NOx | PM2.5 | HC | CO | CO2 |
|--|---------------|---------------|---------------|---------------|---------------|
| Reductions/Year | 7.15 | 0.78 | 0.23 | 3.33 | 2,269.51 |
| Reductions/Lifetime | 76.72 | 8.54 | 1.65 | 36.11 | 24,943.48 |
| % Reduction | 96.12% | 98.81% | 52.76% | 97.72% | 99.87% |
| Cost Effectiveness (\$/ton)*based on capital cost of \$3,420.00 | \$44,579 | \$400,494 | \$2,077,922 | \$94,698 | \$137 |

Based on the success of this pilot, The Port of Virginia has elected to move towards widespread replacement of portions of the cargo handling fleet and has now integrated a total of 43 hybrid shuttle carriers into the existing fleet.

Reducing Waste: Recycling Program

Objective: Reduce solid waste disposal while also increasing recycling percentages on terminal.

Environmental Benefits: The Port of Virginia has been tracking the total waste generated and recycled on terminal since 2008. Prior to 2016, the port had been doing a good job tracking and ensuring that waste was handled and disposed of responsibly, while focusing on increasing recycling. Prior to 2016, the port had regularly recycled between 30 and 33 percent of the waste generated on terminal. Though a collaborative effort with our waste collection vendors and consultants, the port identified ways to not only increase recycling percentages, but also begin to reduce waste generated. Since implementing these changes we have seen significant improvement in both waste reduction, as well as recycling as detailed in the chart below.

The Port of Virginia Recycling Program (All Terminals)

| Calendar Year | 2016 | 2017 | 2018 |
|--------------------------|-------------|-------------|-------------|
| Landfilled Pounds | 1,391,564 | 669,720 | 618,972 |
| Recycled Pounds | 996,084 | 1,552,774 | 1,391,986 |
| Total Pounds | 2,387,648 | 2,222,494 | 2,010,958 |
| % Recycled | 41.7 | 69.9 | 69.2 |

Although not detailed in the chart above, the total waste reduction is tracked in this EMP, showing a 15 percent decline between the years of 2016 and 2018.

Reducing Air Emissions: James River Barge Line (The 64 Express)

Objective: Reduce emissions, road congestion and highway wear and tear by moving cargo on the James River between Hampton Roads terminals and Richmond Marine Terminal.

Environmental Benefits: In 2008, The Port of Virginia created a barge service connecting the port’s terminals in Hampton Roads with the Richmond Marine Terminal located 100 miles up the James River. The tugboats used to move the barge are powered by low-emission Tier II engines which are fueled by ultra-low sulfur diesel. The service carries up to 240 containers per round-trip between the terminals in Hampton Roads to RMT, averaging three tips per week. Each container on the barge represents one truck removed from crowded highways of Virginia.

Our barge service represents the East Coast’s longest-running barge service on the James River, having moved over 19,000 containers in 2016, nearly 24,000 containers in 2017, and over 31,000 containers in 2018. In a “Cost Allocation Study” conducted in 2000 by the Federal Highway Administration, it was estimated that the pavement impact of an 80,000 lb. tractor-trailer is nearly \$.12 per mile. In 2018 alone, the diversion of more than 31,000 containers to our barge service for the ~100-mile trip equated to an estimated savings on pavement impact of more than \$370,000.

James River Barge Estimated Emissions Reductions

| Calendar Year 2018 | | Emissions (Tons) | | | | | |
|---------------------------|--------------|-------------------------|------------|------------|-------------|------------|------------|
| | Trips | NOx | CO | HC | PM10 | SO2 | CO2 |
| Truck Service | 31,544 | 41.49 | 11.58 | 1.93 | 1.89 | 0.07 | 6,637.60 |
| Barge Service | 169 | 31.89 | 5.78 | 1.73 | 0.97 | 0.04 | 2,966.37 |
| Difference | | -9.60 | -5.80 | -0.20 | -0.92 | -0.03 | -3,671.23 |
| % Reduction | | 23% | 50% | 10% | 49% | 43% | 55% |

Reducing Air Emissions: Hybrid and Ultra-Low Emission Locomotives

Objective: Reduce emissions from on-terminal rail moves.

Environmental Benefits: A long-standing program which continues to deliver impactful results is our employment of multi-gen-set switcher locomotives at NIT. In July 2008, the port received a \$750,000 DERA grant from the US Environmental Protection Agency to test a 2,000 horsepower hybrid locomotive and purchase two 2,000 horsepower ultra-low emission gen-set locomotives. In 2011, the port determined the hybrid locomotive was not suitable for yard moves and returned it to the manufacturer, but retained the gen-set locomotives. These two locomotives at NIT reduce NOx emissions by 80 percent and consume 50 percent less fuel than conventional diesel locomotives. These locomotives continue to be used at NIT and have been key in reducing on-terminal emissions.



One of two multi gen-set locomotives at NIT

Improving Community Involvement and Visibility: Clean the Bay Day

Every year, The Port of Virginia participates in the Chesapeake Bay Foundation's Clean the Bay Day event as volunteers from Virginia and Maryland gather at various locations along the Chesapeake Bay to remove trash and debris. In 2018, The Port of Virginia partnered with CSX Transportation and SKW Contractors bringing together more than 100 volunteers to clean 3.5 miles of shoreline and removing 6,000 pounds of trash from the Elizabeth River. Volunteers were able to clean portions of the river near Plum Point Park in Norfolk or took a boat ride to Portsmouth to clean a shoreline adjacent to the Virginia International Gateway terminal.



Volunteers help unload trash that was collected next to VIG



The Port of Virginia and CSX Transportation volunteers at the annual Clean the Bay Day Event in Norfolk

Independent effort and involvement

Adoption of, and conformance to, an ISO standard is not required for any port, but for more than a decade, The Port of Virginia has voluntarily continued to maintain an EMS program because we see the benefits of the integration of the EMS in our daily activities. As explained in more detail below, the port conducts internal and external audits annually in addition to regular tailgate sessions and shop walk-throughs. The EMS team meets quarterly and augments the port's environmental staff during daily activities and internal and external audits. With the exception of the external audits, the port independently administers the EMS program, ensuring expectations are met for customers and port partners, as well as the requirements established in standard operating procedures and the ISO standard as a whole. To properly integrate an EMS program into a port environment (or any complex and dynamic industry) takes time, dedication, and commitment to the implementation of the standard. The Port of Virginia has a designated staff member who commits 50 percent of their time to curating the EMS program, while also ensuring compliance obligations are met.

Creativity of the Program

While the ISO program requires strict compliance with the standard, the Port's program is designed to nimbly address specific environmental risks identified by port colleagues or port partners. The port staff regularly meet with cross-functional teams to vet risks identified via the EMS program and seek alternate funding mechanisms to aid in the demonstration and implementation of new and more environmentally friendly technologies, as detailed above. The port often interacts with private industry vendors to present new and emerging technologies to members of port staff. Therefore, while the EMS program may not seem to be a creative solution to address environmental risk, creative methods of addressing each EMP can be found throughout the port's program.

Whether the Program Results are Apparent

When an organization implements an EMS, it adopts an obligation to continually improve. A decision point for many organizations considering implementing an EMS is a concern about their obligations under environmental and related legislation and requirements. Although there is an inherent challenge to operating an EMS program that requires an organization to make ongoing environmental performance improvement, the medium to long term outcome of implementing an EMS is that an organization will have increased awareness of its impact on the environment and will have formal procedures established to deal with both normal and abnormal risks and impacts on the environment. Recognition at this level and the ability to identify risk and act prior to an incident can save an organization thousands of dollars in fines and civil penalties, not to mention preserving public perception of the organization. In addition, The Port of Virginia volunteers to have the EMS audited annually both internally and externally to ensure conformance with standards.

Having multiple sets of eyes on your programs throughout the year ensures that employees are aware of the importance management places on environmental improvements and risk identification. Auditing also allows staff to step in the shoes of a regulator/auditor and view their program from a different perspective. Finally, through the auditing process and the audit results, it is apparent after an

audit where your program stands. The fact that the Port of Virginia continues to hold the ISO 14001:2015 certification via an independent audit firm is evidence of a successful program and apparent results of each EMP are tracked. Improvement can be seen in each EMP which the port has elected to pursue.

Conclusion

For over a decade, The Port of Virginia has voluntarily maintained a certified EMS program and utilized the program to identify risk and make programmatic improvements to improve operations, save money, and enhance customer service.

Through grant opportunities, the port has been able to successfully implement the Green Operator Truck Program. This program allows the port to partner with our industry partners by, not only providing a financial opportunity for owner/operators to purchase newer and safer equipment, but also eliminates between 81 and 93 percent of measured pollutants from truck emissions. This program not only improves local air quality, but also supports the local economy.

The port is implementing the Hybrid Shuttle Carrier program to efficiently move cargo on terminal. By replacing the diesel carriers with newer, hybrid models, the port was able to reduce measured pollutants between 52 to 99 percent annually, with carbon dioxide being reduced by nearly 100%.

Since 2016, the port aspired to address waste challenges and improve recycling initiatives. By establishing this as one of our EMPs, the port was able to implement an enhanced program to increase recycling port-wide from 41% in 2016 to 69% in 2018. The port recycling program far exceeds Virginia Department of Environmental Quality's recommendations of recycling approximately 15-25% of waste.

The James River Barge Line has also proved to be an innovative program that, not only reduces harmful air pollutants by between 10 and 55% annually, but also assists with addressing the

transportation challenges Hampton Roads faces and providing cargo to end users faster. This program has the potential to remove 720 trucks from heavily traveled roads during just one week.

The implementation of the Hybrid and Ultra-low Emission Locomotives at NIT continues to allow the port to reduce fuel consumption by more than 50% and eliminate 80% of NO_x from air emissions.

The port continues to partner with local environmental special interest groups such as the Chesapeake Bay Program and the Elizabeth River Project on programs such as the annual Clean the Bay Day program. This program brings litter awareness to the forefront the community and allows port staff to work closely with volunteers to improve water quality for the Hampton Roads area.

The benefits garnered from the EMS program through independent audits not only improves the awareness of environmental stewardship with port staff, but also identifies programs that could benefit from continuous improvement and site-specific EMPs. The port continues to receive ISO 14001 re-certification each year via an outside auditing firm. Due to the noted value of the program, the port will voluntarily continue to use the 14001 program to meet our goals of environmental stewardship and identify environmental initiatives that may provide multiple benefits to customers, partners, staff, and other stakeholders.

The Port of Virginia appreciates the AAPA considering our application this year for an Environmental Improvement Award.