



# Houston

## world's 10<sup>th</sup> largest port – combines business with respect for environment through ISO 14001

by **Aston Hinds** *The Port of Houston (PHA), Texas, USA, is the world's 10th largest. Nationally, it ranks first in foreign waterborne tonnage and second in total tonnage. In 2002, it became the first US port to attain ISO 14001 certification. This article describes its implementation programme and the concrete benefits achieved in reduced pollution, improved water quality and energy conservation.*

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Five years ago, the Port of Houston Authority (PHA), Texas, USA, accepted an invitation from the US Environmental Protection Agency and the American Association of Port Authorities to participate in a pilot programme designed to assess our environmental management system (EMS) using objective, tangible standards of measurement.

**Our leaders were prepared to do more than just talk the talk**

Our management team saw this as an excellent opportunity to be evaluated on an international scale – an opportunity to be recognized as “best in class”.

We were fortunate to be one of nine ports selected for this project. We were assigned the mission of going where no port had gone before – to develop, within a three to five-year year timeline, programmes that would meet the rigorous requirements of the ISO 14001 EMS standard.

I am proud to say this was a challenge PHA enthusiastically adopted and one that has been embraced on all levels of our organization. Largely as a result of that commitment, we were able to achieve our goal within two-and-a-half years. We became the first United States port to attain ISO 14001:1996 certification (which we updated to the ISO 14001:2004 version in October 2005).

How did we successfully get to that point, and why did achievement come so quickly?

### The road to ISO 14001

The key to any successful programme, particularly one of this magnitude, starts with senior management’s depth of commitment to providing the resources necessary for success.

PHA management team’s commitment was both visible and palpable. Our leaders were prepared to do more than just talk the talk, as

the following figures demonstrate:

- PHA channelled nearly 3 700 hours of manpower, including 2 105 hours of environmental management representatives, 1 460 hours of core, steering and administrative team members and 87 hours by consultants toward the development and implementation of its EMS programme.
- Internal labour costs alone exceeded USD 97 000.

The speed and agility with which PHA was able to accom-

plish this goal is even more impressive when you consider the obstacles of size and the diversity of products and materials it handles.

The Port of Houston ranks as the world’s 10<sup>th</sup> largest port. It consists of a diversified complex of about 150 public and private facilities that extends along 25 miles (40 km) of the 52-mile (84 km) Houston Ship Channel. Nationally, it ranks first in foreign waterborne tonnage and second in total tonnage.

PHA is a political subdivision of the State of Texas with

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*The Port of Houston’s leading commodities are petroleum and petroleum products; organic chemicals; crude fertilizers and chemicals; iron and steel. The port does business with more than 1 000 ports located in 200 countries.*

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a mission to provide public docks for the transfer of cargo and to provide economic stimulus to Harris County.

The Port of Houston's leading commodities are petroleum and petroleum products; organic chemicals; crude fertilizers and chemicals; iron and steel. The port does business with more than 1 000 ports located in 200 countries.

The Port of Houston generates USD 65.9 billion per year in foreign trade, and moved more than 215 million tons (218 million tonnes) of cargo in 2005.

PHA owns or operates 11 terminals at the Port of Houston.

One of the biggest challenges facing PHA was how to meet the generic requirements of ISO the 14001 standard in a port environment. To the best of our knowledge, no other port had broken ground on a project like this and, consequently, we had no model to follow. It was up to us to identify and categorize our

*The brightly colored custodian vessel **Mighty Tidy** cleared Buffalo Bayou - a primary tributary to the Houston Ship Channel - of 1 150 cubic yards (880 000 litres) of debris in 2005. **Mighty Tidy** was launched in mid-2003 and had cleaned the bayou of 3 100 cubic yards (2.4 million litres) of trash by the beginning of 2006.*

environmental aspects and align our processes with the requirements ISO 14001.

### Involving the engineers

Among the initiatives we adopted was the integration of our engineering team as a cornerstone of our EMS. Involving our engineers in the programme ensures that every PHA project has an environmental imprint on it, from design through construction and completion.

This team building resulted in the implementation of our EMS by staff throughout the organization, resulting in a better understanding of job functions across and

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within department and vastly improved inter-departmental communication.

We made our tenants and vendors active stakeholders in the programme as well. All tenants who lease PHA facilities are required to adhere to our EMS programme and all vendors desirous of doing business with the port authority must become familiar with our environmental standards and make a good faith effort to follow those standards.

**PHA channelled nearly 3 700 hours of manpower toward its EMS programme**

We also audit their operations to ensure compliance with our environmental policy and with state and federal regulations.

Our initial ISO 14001 certification came in recognition of our successes at our Barbours Cut and Central Maintenance facilities. **Table 1** demonstrates the strides we made in the areas of emission reductions, water quality, waste management and energy management.

### Employee buy-in

A progressive programme of employee education on our EMS has resulted in greater worker appreciation of how each of their respective tasks affects the environment, as well as a collective effort by all employees to work in an environmentally friendly manner.

### Barbours Cut facility

Pollutant	2002	2003	2004	2005
<b>NOx*</b> (tons/1000 vessel moves)	0.46	0.32	0.31	0.29
<b>VOC**</b> (tons per year)	0.140	0.126	0.117	0.0031

\* NOx = nitrogen oxides

\*\* VOC = volatile organic compounds

### Central Maintenance facility

Pollutant	2002	2003	2004	2005
<b>VOC**</b> (tons per year)	0.167	0.138	0.138	0.0046

### Water quality (mg/l) Barbours Cut

(Figures in bold indicate above benchmark)

Pollutant	Benchmark	2002	2003	2004	2005
<b>Aluminum</b>	0.75	<b>2.58</b>	<b>1.50</b>	0.29	<b>1.61</b>
<b>Iron</b>	1.0	<b>2.71</b>	0.98	0.55	<b>2.38</b>
<b>Lead</b>	0.0816	0.02	0.02	0.00	0.01
<b>Zinc</b>	0.117	<b>0.35</b>	<b>0.47</b>	0.10	<b>0.26</b>

### Water quality (mg/l) Central Maintenance

(Figures in bold indicate above benchmark)

Pollutant	Benchmark	2002	2003	2004	2005
<b>Aluminum</b>	0.75	<b>2.89</b>	<b>2.80</b>	2.84	<b>0.90</b>
<b>Iron</b>	1.0	<b>3.36</b>	<b>2.69</b>	<b>3.44</b>	0.89
<b>Lead</b>	0.0816	0.02	0.02	0.01	0.01
<b>Zinc</b>	0.117	0.08	0.08	0.22	0.08

### Waste management

Pollutant	2002	2003	2004	2005
<b>Barbours Cut used absorbent lbs (kg)</b>	3500 (1588)	2640 (1198)	420 (191)	<b>5,200 lbs (2360 kg)</b>
<b>Central Maintenance used shop towels</b>	3500 (1588)			<b>800 lbs (363 kg)</b>

### Energy management (KwH)

Pollutant	2002	2003	2004	2005
<b>Barbours Cut</b>	14,249,864	13,682,911	14,831,632	16,196,319
<b>Central Maintenance</b>	667,840	611,740	675,520	613,440

**Table 1 - Data on emission reductions, water quality, and waste and energy management achieved by PHA through its ISO 14001-based EMS.**

In addition to “buying into the programme,” employees are taking a leadership role in coming up with solutions and ways to better improve our EMS.

**Employees are taking a leadership role in coming up with ways to improve our EMS**

Our practice of using biodegradable oil for oil changes on our cranes was initiated by a mechanic who was concerned that using petroleum-based lubricants would be harmful to fish and waterfowl, if spilled into the waterway.

In 2003 PHA, began recycling maintenance shop towels and absorbents and tracking the results of this effort at our Barbours Cut and Central Maintenance facilities. After two years, this effort dramatically expanded to recycling and otherwise diverted from landfills 62 % of all waste generated at these two facilities and by marine vessels.

Working with the port authority’s waste contractor, a baseline inventory was developed, profiling waste material, amounts, and how the material is managed. Together with the waste contractor, opportunities for recycling and otherwise diverting waste material from landfills were explored with dramatic results achieved in the first year.

The percentage of items recycled will grow as the port authority continues to work with the waste contractor to

explore new options, especially as new technologies unfold.

A baseline of waste systems was developed which shows a total of 224 750 pounds (101 945 kg) of material was discarded, of which 62 % – or 136 190 pounds (61 775 kg) – was recycled or otherwise diverted from landfills.

The collaborative effort spilled over into the areas of water quality, wetlands development and improved energy management practices.

**Reducing energy consumption contributes to improving air quality**

Since 2005, PHA has been using geographic information systems (GIS) mapping software and global positioning system (GPS) data to give us an in-depth understanding of how storm water moves on the port authority's properties.

This new information helps us to identify the probable path of spills so that prevent-

ative measures can be developed to avert any discharge to the ship channel.

### Wetlands and water quality

Building wetlands is another way PHA works to improve water quality. One acre of wetlands can capture and hold 330 000 gallons (1.2 million litres) of run-off, breaking down and fil-

tering out pollutants before storm water enters the Houston Ship Channel and Galveston Bay.

We transformed 173.5 acres (702 130 sq m) of land the port authority purchased adjacent to the Armand Bayou Nature Center into 87.3 acres (353 290 sq m) of wetlands and 86.2 acres (348 839 sq m) of coastal prairie and upland habitat, in 2005. Known as the Memorial Tract, this permanent conservation easement project on Galveston Bay is 75 % complete with levees and weirs stabilized and functioning properly.

Prairie areas have been planted and invasive species, such as chinesetallow and cattails removed from the site, to

### About the author



*Port of Houston Authority (PHA) Environmental Affairs Manager, Dr. Aston Hinds, has been involved in environmental management for more than 20 years.*

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allow native wetlands and coastal prairie vegetation the opportunity to thrive.

Vegetation has proliferated with an excellent survival rate. A wide variety of wildlife, including 12 species of birds, yellow-bellied water snake, Texas rat snake, cricket and bull frogs, raccoon, coyote, and whitetail deer have been seen at the site.

By early 2006, a total of 144 100 plants across 67 acres (271 139 sq m) of the site will have been planted using specific local wetlands flora, including soft-stem bulrush, arrowhead, pickerelweed, giant cutgrass, common rush, and squarestem spikerush.

### Energy conservation

In the area of energy conservation, we did a baseline survey that allows us to look at our energy footprint. We com-

pleted two studies in 2005 that are essential to the development and implementation of an energy efficiency plan.

Fossil fuels supply 85 % of the nation's energy, according to the US Department of Energy.



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Reducing energy consumption contributes to improving air quality by decreasing the production of carbon dioxide and NOx (nitrogen oxide) emissions from burning fossil fuels.

A preliminary energy assessment funded by the Texas State Energy Conservation

Office (SECO) examined specific opportunities for reducing energy consumption at PHA's Turning Basin facilities through the selection of lighting devices; the installation of energy controls, and other techniques. This study compared current costs with anticipated savings through the use of more efficient methods.

### One outgrowth of our EMS is the development of a security management system

An energy profile performed in 2005 by Texas Industries of the Future, a consultancy sponsored by the Texas Commission on Environmental Quality (TCEQ), determined that the port authority could achieve an annual savings of six to 10 %, or USD 120 000 to USD 200,000 if additional energy best management practices were implemented.

Armed with this information, PHA's energy efficiency core team – made up of representatives from our engineering, building services, central maintenance and environmental departments, moved ahead with programme development early in 2006.

Our EMS also focuses on energy procurement. Beyond negotiating costs, we focused on acquiring more renewable energy as a key negotiating point in our quest for a new energy provider earlier this year. We were successful in acquiring a three-year contract with a new provider that allowed us to double our source of "green energy" without incurring any additional expense.

### The path forward

So, what is in store for the future ?

One outgrowth of our development and implementation of an EMS is the development of a security management system (SMS) to manage security issues in a like manner. We began developing our SMS in 2005 and are currently in process of implementing that management system.

In parallel, ISO had been working on ISO/PAS 28000: 2005, *Specification for security management systems in the supply chain*, which we plan to review.



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*Nicole Cass and Darryl Walker of the Port of Houston Authority's Environmental Affairs Department, collect a soil sample from PHA's Turning Basin facility.*