

**SCAVENGER 2000
Report and Analysis
June 16, 2003 – October 31, 2003**

Achievements for first 135 days of operation



Prepared By: Water Management Technologies
Prepared For: The City of Miami
C/O Albert Dominguez, Acting Public Works Director

The Scavenger, owned and operated by Water Management Technologies, began working for the City of Miami on June 16, 2003, we have learned much about the waterways in the Greater Miami area. Although there is still a tremendous amount to accomplish we have achieved the following in 135 days.

- 1,528.3 miles traveled.
- 5,055 cubic feet of trash have been swept from the waters under the jurisdiction of the city.
- 245 hazards to navigation found on or under the surface. Some have been as long as 24 feet and are as diverse as shopping carts, a bookcase and a tent.
- 23,959,000 cubic liters of oxygen have been introduced into the area waters we have been working. Attached you will find a brief description of the benefits of oxygenation.
- 337,616,000 gallons of water decontaminated. Attached is the rate of efficiency of the decontamination system as analyzed by Nova University.

The majority of the refuse we collect is small in size, however it does accumulate very quickly. Plastic appears the most often. Pop bottles, milk jugs, degreaser bottles, blue sheets of plastic (the type used in painting of boats) are just some of the examples of refuse. Glass is also common; beer, wine and liquor bottles. Spray cans are also found on a regular basis; hair spray, deodorant, paint and laundry starch. We also collect the sheen from petroleum products on the surface of the water with our oil/water separator. We estimate that we have collected approximately 10 gallons of sheen. Over the past month we also have swept numerous large wooden blocks like those found in dry docks that are used to shore up and elevate vessels being repaired.

Mother Nature provides her own set of trash items. Some of these include coconuts; palm fronds, tree limbs, small branches, leaves and sea grass are all collected on a regular basis. However, as the weeks go by, we have observed tree limbs, branches, leaves and grass clippings that are the result of landscaping, lawn maintenance and tree trimming.

Approximately 1-2% of our trash includes carcasses of dogs, cats, and a few small fish but mostly chickens. Whole pumpkins are also collected on a regular basis. The most unusual item collected to date is a four-foot, plastic religious statue found floating east of the Miami Avenue Bridge. However, **90% of the trash we collect comes from the major outfalls in the Miami River**. The remaining 8% or so comes from passing ships, marinas, trees, and tourists walking by the river.

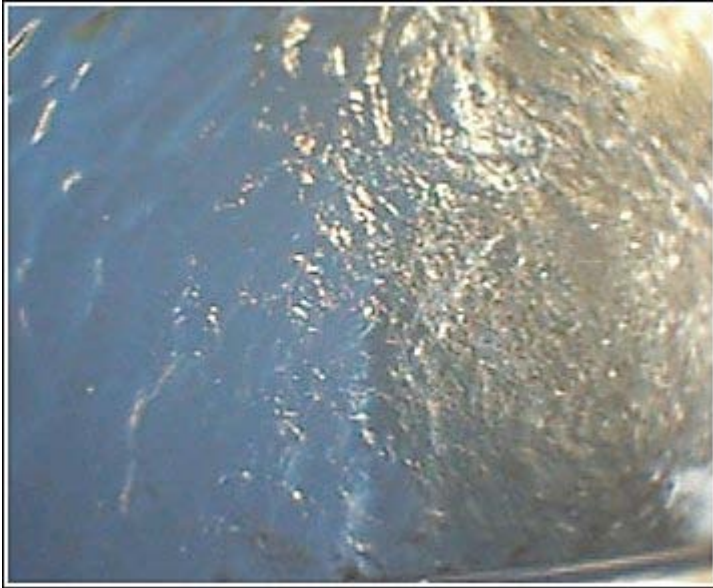
The most significant lesson learned from refuse collection on the river is how to read the water. Tide, current, rain and vessel traffic all affect the amount of trash we find and where and when we can get to it.

We have also begun to develop strategic relationships while demonstrating to the community our goodwill and stewardship of the environment. We always extend a “right of way” courtesy to any tug or tugs with tow or barge reflecting a positive image and a show of courteous seamanship. We have also worked closely with DERM when we have found hazards too large for collection. They have been prompt in their response to keep the waterways safe. Finally, we have worked in conjunction with Miami PD Marine Patrol in reporting or locating sunken vessels and hazards to navigation.

We continue to cooperate with the USCG, monitoring the area for environmental spills and possible threats to homeland security. We have met with the Coast Guard at our Riverside dock to demonstrate our vessel’s ability. Now we are in direct contact with the MSO Duty Desk using VHF radio, cell phone and text messaging. Our vision phone has proved to be invaluable when reporting specific information with pictures, concerning environmental spills or suspicious activities along the waterways.

The Scavenger’s multi-purpose capabilities will prove to be a cost-effective addition to the continued effort of the City of Miami to keep the waterways both clean and safe.

*SCAVENGER: AN EXTRA SET OF EYES AND EARS ON
THE RIVER*

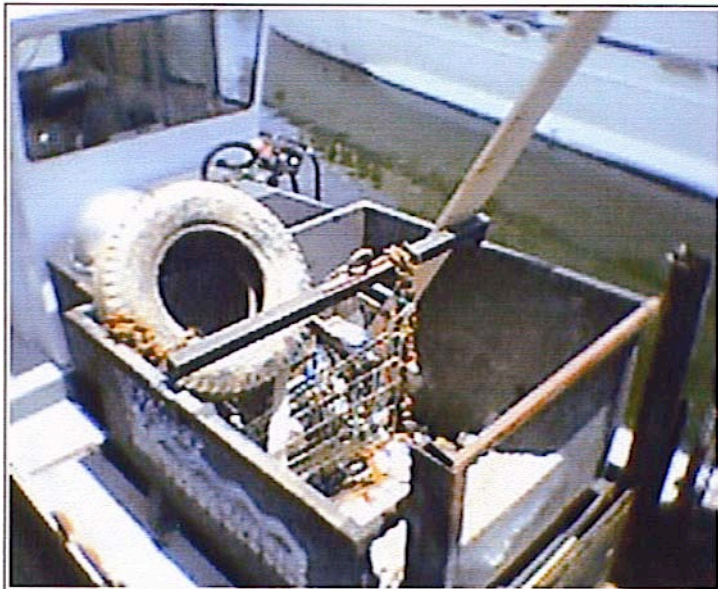


Fuel Oil Spill reported to USCG



Sunken Vessel reported to Miami PD Marine Patrol

SAMPLES OF SUNKEN AND FLOATING HAZARDS TO NAVIGATION



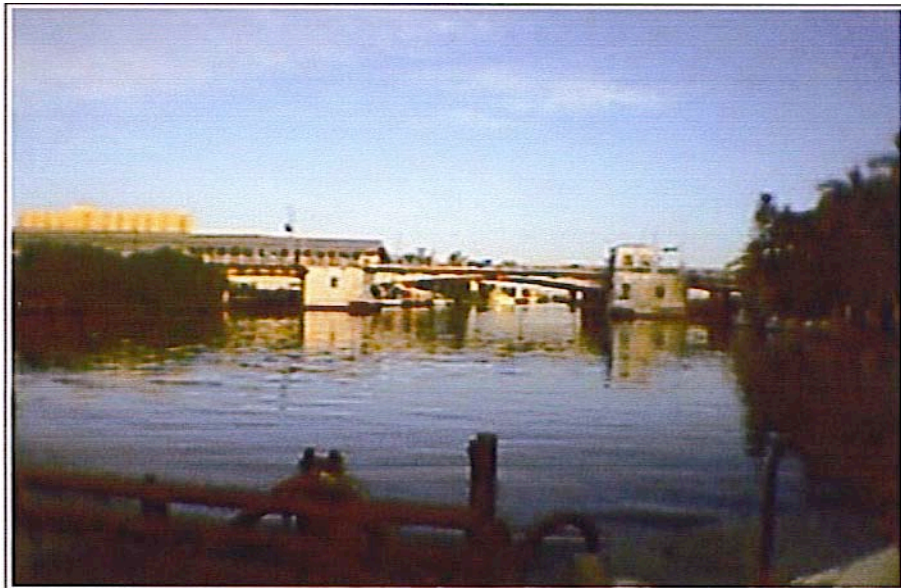
MIAMI RIVER

Distance from home dock – 0

Rapid Response Time from Home Dock (6 Knots) – 0.00

Length (mouth to West End Dam) – 5.3 nautical miles

One Way Sweep at 2 knots – 2 hours and 40 minutes



The Miami River is our longest and most challenging waterway to clean up. With the high concentration of large ships, tugboats and fishing fleets, it is where we collect the most trash on a daily basis.

Based on our observations there are several variables that contribute to higher than normal concentrations of trash. Inbound and outbound ships, usually with two tugs, produce powerful wheel wash, which disturbs the bottom and leaves debris in their wake. We have followed these vessels up and down river numerous times and collected large amounts of refuse.

Rain is another significant factor. After a strong, constant downpour, litter appears almost everywhere in the river because of the numerous outfalls discharging into the river. There are hundreds of major and smaller outfalls, which contribute to the problem. The outfalls we have observed include:

MAJOR OUTFALLS

284, 283, 300, 298, 295, 294, 264, 274, 210, 229, 228, 233, 231, 243, 250, 256, 259, 257, 260, 262, 265, 266, 267, 268, 269, 271.

MINOR OUTFALLS

290, 291, 292, 296, 297, 299, 195, 230, 252, 272.

We have also observed litter being washed from the riverbanks by the rain. This is refuse that in normal conditions would be inaccessible to collect.

Also, the ebb tide with outbound current is another major contributing factor. Where pop bottles, milk jugs and pieces of styrofoam may be nestled behind a piling or dock, the strong outbound flow (two times per day) draws these items into the main river and sends them downstream. Conversely, flood tide periods (also two times per day) diminish the prominent outbound flow of the river and render a more docile environment for trash movement.

During our weeks of operation, we have discovered many areas that require daily cleaning. Some of these areas require multiple stops in a twenty-four hour period. The Northeast side of the Miami Avenue Bridge is the main accumulation point for the entire river. Our day begins at 0700 and this area is always our first stop and is our last stop before ending the day at Riverside Center and securing the vessel. When time permits, we return to this major accumulation area at midday and always find additional refuse.

The northeast corner of the Fifth Street Bridge is another busy area for the Scavenger. We have monitored the current and found it to come directly under the bridge then veer to the north side. The accompanying trash is left between the northeast fender of the bridge and the riverbank. It is challenging to collect debris in this area because of the rocks and minimal depth of water.

Another troubled area is the long cement wall at the Mahi Temple. This wall is just west of the 17th Street Bridge on the north side of the river. We have collected large amounts of refuse, which included tree limbs, shopping carts (pulled from bottom with Scavenger rake) pumpkins and gourds.

We have received compliments and gratitude from the following businesses along the river; Norseman Shipyard, Detroit Diesel, Consolidated Yachts, Merrill Stevens, Bassas Rice, Garcia Brothers, just to name a few. While visiting our vessel, David Miller of the Miami River Commission stated that he has “never seen the river so clean”.

SEYBOLD CANAL

Distance from City Dock - .8 nautical miles
Rapid Response time from City Dock – 5 minutes
Length - .3 nautical miles (Mouth to Wagner Creek)
One Way Sweep Time at .5 knots – 36 minutes



Based on our observations, The Seybold Canal is another accumulation point for trash and debris. This narrow and shallow waterway is darker and thicker with sediment than other locations we clean making our transit speed slower but we are still able to maintain our flow rate.

High tide is the optimum time to clean this area. We have made several attempts to clean at low tide but have run aground just north of the first fixed bridge. We clear this bridge by one foot at high tide and therefore should always be able to clean this area when water depth allows.

The end of the Seybold Canal always has large amounts of refuse which requires several three hundred sixty degree turns to clean all corners. As we clean the Seybold Canal and operate our decontamination system, the clarity of the water will improve over time.

We recently rode the waters of the Seybold Canal with members of the Miami River Commission and The South Florida Water Management District. The purpose of this transit was to work with these organizations to develop an overall cleaning program for the Seybold Canal. While this plan is still developing, we are dedicated to our immediate work and any future obligations that may be placed upon us to expedite the cleaning of this waterway.

BLUE LAGOON

Distance from City Dock – 5 statute miles

Rapid Response Time from City Dock – 30 minutes

(Subject to advance preparation and traffic conditions)

*One Way Sweep Time at 2 knots – 2 hours and 30 minutes,
complete perimeter*



Scavenger raised by crane



Scavenger hits the road



Passerby observes collected trash

On September 12, 2003, Friday, The Scavenger hit the road, literally.

Water Management Technologies re-positioned the Scavenger for the first time since contracting with the City of Miami. The vessel was removed from the Miami River using a marine travel lift then placed on a wide body, lowboy tractor/trailer unit and arrived at Antonio Maceo Park 30 minutes later.

Using two mobile cranes, it was lifted again and placed into the waters of the Blue Lagoon. Work began the next morning at 0700. There was much interest generated by this transportation achievement judging by the large turnout of local residents and those enjoying the park that afternoon.

The Blue Lagoon was a new waterway for Water Management Technologies to operate upon and manage for the City of Miami. Our approach to this new challenge was to implement all of our techniques and skills we have developed while operating almost 1000 hours upon the Miami River.

On Saturday, our first day of operation, while making our initial sweep of the perimeter of the Blue Lagoon, we accurately recorded permanent landmarks, predominant currents, major and minor accumulation areas for trash or grass and a complete sounding of the bottom.

This information was supported by our on-board GPS system and led to our development of a new chart of the Blue Lagoon area, which we later delivered to the City of Miami, Public Works Division.

After 35 hours of operation that took place over the course of 3.5 days, we achieved the following:

- 217 cubic feet of trash collected
- 1, 085, 000 liters of oxygen injected into the water.
- 21,006,000 gallons of water decontaminated.

The above figure for trash collected does not include the debris we pulled from the bottom after discovery such as a love seat, bar stool and a baby crib. By the afternoon of the second day we had developed, then implemented, a detailed plan to sweep then maintain the waterway. With this specific game plan we look forward to our next “road trip” to the Blue Lagoon.

Recently, we installed an SC100 Water Analyzer and Side Mounted Probe. The Scavenger will now be able to document our achievements above and below the surface of the water. We will improve the quality of the water as we oxygenate at a rate of 31,000 liters per hour and decontaminate 10,000 gallons per minute.

Although we still operate on our dedicated cleaning schedule, there were no significant changes or announcements for the following waterways:

- Biscayne Bay
- Coconut Grove
- Wagner Creek
- South Fork
- Lawrence Waterway
- Tamiami Canal
- Miami Canal
- Little River
- Davis Canal