

**SCAVENGER 2000  
Decontamination Vessel**

**Report  
Scavenger2000 Operations Report**

**Prepared By  
Water Management Technologies, Inc.  
10400 NW 33<sup>rd</sup> Street, Miami, FL 33172  
954-668-6937  
(March 8th, 2010)**

**Prepared For  
City of Miami Mayor's Office  
The City of Miami Commissioners Offices  
City of Miami Manager's Office  
City of Miami Public Works Director  
Miami-Dade County Mayor's Office  
Miami-Dade County Commissioners Offices  
Miami River Commission  
Congresswoman Ileana Ros-Lehtinen**

It has been a pleasure for us to clean and help rejuvenate the City of Miami Waterways and Miami River for the past several years. Our objective is to help clean the waters of the world.

These are the results for the operation of the Scavenger2000 Decontamination Vessel performed on the City of Miami and Miami-Dade County waterways for the period of last five years.

Please see below a general report of amounts of debris collected, injected oxygen, and gallons of water disinfected through our patented Oxy-Plus system equipped Scavenger2000.

An average of 48,572 of cubic feet of trash have been swept from the waters under the jurisdiction of the City of Miami and Miami-Dade County over the last five years. By removing this surface debris, we reduce contaminants in the waterways; eliminate potential navigational collisions with normal boating traffic and prevent debris from washing up on our shorelines. The Scavenger2000 removes debris as small as bottle caps to large debris, such as 55 gallon drums, large dock pilings, wooden pallets, mattresses, large wood boards, and such. Please see attached pictures.

Mother Nature provides her own set of trash items. Some of these include coconuts; palm fronds, tree limbs, small branches, leaves and sea grass which are all collected on a regular basis. Very strong foul odors are emitted from the floatable debris where bacteria and other contaminants lodge themselves. The Scavenger2000's ability to remove floatable debris and trash from the surface of the water allows nature's ability to oxygenate the water.

Approximately 1-2% of our trash includes carcasses of dogs, cats, and a few small fish but mostly chickens, and bags of rotting meat from local fishing fleets.

We are also working closely with USCG when we find navigational hazards too large for collection. We have found that the Coast Guard has very little resources to help discard any navigational hazard, therefore leaving the task generally to the Scavenger2000. We also report directly to the Department of Homeland Security in order to report any suspicious activities under the territory of the City of Miami and Miami-Dade County. Please attached letter from Homeland Security Department.

The Scavenger2000 has injected an average of 635 millions of liters of oxygen into the area waters we have been working in. Attached you will find a brief description of the benefits of oxygenation. Please find attached report for Dissolved Oxygen Levels before and after performance of the Scavenger2000.

The Scavenger2000 has treated an average of 3,225 millions of gallons of water that were disinfected through our Oxy-Plus decontamination system at a rate of **10 thousand gallons of water per minute** oxidizing bacteria, viruses, algae, and some nutrients. Please see attached rate of efficiency of the Oxy-Plus System.

The Department of Environmental Resource Management (DERM) monitors the City of Miami and Miami-Dade water quality by performing monthly e-coli and turbidity samples which were taken at several set testing locations for the last 10 years. The Scavenger2000 originally started its services on the Miami River in 2003. Since the implementation of the services of the scavenger2000 DERM's testing results indicate a noticeable decrease in e-coli and turbidity concentration. Please see attached report from DERM.

In the case of Turbidity tracking also provided by DERM, positive results were immediately noticeable. Please refer to the attached Turbidity tracking report.

Because of the City of Miami's fiscal budget and yearly maintenance schedule of the Scavenger2000 taking place in the month of September of every year, services were not rendered over the years in the month of September. DERM's water quality testing results indicate increases in fecal coliform and turbidity in the months of September over the last 5 years. When the Scavenger2000 services resume in October the water Quality results indicate improvements in water quality.

Our company has conducted research on obtaining reports on the Biological Oxygen Demand (BOD) for the City of Miami and Miami-Dade County. According to a representative from DERM, the department does not test for BOD, therefore, no records were found. In addition, the tests for BOD are not cost effective, and therefore not a test performed by our company.

Please see attached letter from FDEP to the City of Miami stating, "The department has determined that the City has met all of the requirements of this condition with the implementation of the Scavenger2000 pollution boat and is considered to be in compliance with this section of the consent to order."

The Scavenger's multi-purpose capabilities are a proven cost-effective addition to the continued effort of the City of Miami to keep the waterways both clean and safe.

We have received compliments and gratitude from the following businesses along the City of Miami Waterways including; Hurricane Cove Marina, Merrill-Stevens, Bassas Cargo, Fennigan's River, Garcia's, Bayside Marina, Davis Canal residents, Ademar canal residents, Grove Key Marina, just to name a few.

We are proud to be part of the City of Miami and Miami-Dade County's efforts in combating water pollution.

We have hosted many delegations from around the world to witness the Scavenger2000 in action in our waterways, and all praise the City of Miami and Miami-Dade County for the conscientiousness and foresight to keep our waterways clean.

Please see enclosed just a few pictures of the Scavenger2000 performing its duties on the City of Miami and Miami-Dade County waterwaysí A picture is worth a thousand wordsí Enjoy your accomplishmentsí

If you would like to see additional information or pictures, or should you have any questions, please do not hesitate to contact me.

Sincerely,

Sophie Mastriano  
President  
WATER MANAGEMENT TECHNOLOGIES, Inc.  
[sophie@scavenger2000.com](mailto:sophie@scavenger2000.com)

# Scavenger2000's Technology

## THE SYSTEM:

When ozone and UV light is added to the aeration/oxygenation process of the Scavenger2000 water decontamination and regeneration vessel, several unique abilities result in being greater than either of the processes applied in solo. Rather than having simply an aeration stream, a very powerful and yet, environmentally safe, disinfection process is carried out in the waters where the Scavenger2000 operates.

Ozone and UV Light have been applied with great benefit in the municipal sewer treatment process worldwide, because of its ability to disinfect water without leaving any harmful by-products as, does chlorine. In fact, ozone was found through laboratory examination to be over 100 times as powerful as chlorine in destroying E-Coli bacteria.

There are no other vessels in the world today that have all the capabilities of the Scavenger2000 water decontamination and regeneration vessel.

# **BENEFITS OF COMBINED AERATION, OXYGENATION and OZONE IN WATER**

**The EPA & FDA acknowledge ozone's ability to kill 99.9992% of all pathogenic life in water.**

## **Physical:**

**Reduces turbidity:** Ozone alters the surface charge which allows suspended particles to coagulate, they then are removed by sedimentation, filtration or flotation.

**Odor removal:** Organic and inorganic compounds containing sulfur and nitrogen are oxidized to simple odor free compounds.

**Color removal:** Ozone treatment oxidizes double bonds to single bonds which are simple compounds, generally clear. Tests at Nova University show that water clarity improved by more than 50%.

**Algae control:** Algae is a natural odor generator. Ozone indirectly kills algae by oxidizing the organic chemicals and some nutrients that algae feeds on.

**Red Tides:** Ozone oxidizes the toxic algae that cause red tides.

## **CHEMICAL:**

**Pesticide removal:** Ozone effectively oxidizes most pesticides, insecticides, herbicides, and fungicides that get washed into the watershed.

**Increases DOC:** (Dissolved Oxygen Content). The life force of the water is oxygen. Ozone is a triatomic oxygen that becomes oxygen anywhere from a few seconds to a few minutes. This increases the oxygen in the water.

**Sheen:** Ozone oxidizes some of the oil sheen in the water.

## **BIOLOGICAL:**

**Kills pathogens:** Ozone is a powerful defense against the microbial contamination of water. Cryptosporidium, a parasite, is one of many dangerous micro-organisms that ozone will kill. It also kills pathogens such as physteria.

**Kills fecal coliform:** Often in storm water run off, there are sewage spills or agricultural waste going directly into the waterways. Ozone can be a defense mechanism against such pollution. Tests effectuated at Nova University have demonstrated that Fecal Coliform decreased 95% with the use of oxygen and ozone combined..

**Inactivates virus:** A virus cannot survive when exposed to the ozone molecules. Tests have proven that viruses of all kinds are inactivated when mixed with ozone. Waterborne virus is a serious concern in our waterways.'

**Ozone is safe:** Chlorine and Ozone are disinfectants, but unlike chlorine, ozone is non-toxic. Ozone also inactivates viruses in water whereas chlorine is ineffective. The *Scavenger2000* uses special techniques to generate ozone and oxygen on board then drives the ozone into the water. Depending on conditions, the ozone life expectancy can vary from a few seconds to a few minutes where upon ozone goes back into its normal oxygen state.

The amount of dissolved ozone is so minute it only affects micro-biological pollutants. The natural plant life is not affected due to the short contact and small concentration of ozone. Ozone converts into oxygen in seconds. This procedure supports chemical oxygen demand (COD) removal, cracks undegradable substances so that they become digestible to bacteria, and supports the aerobic oxidation of toxic nitrogen compounds, allowing extremely high fish loads while at the same time maintaining excellent water quality.



The Scavenger2000



Scavenger2000 in full decontamination mode



Navigational hazard and typical trash collected





55 gallon drum and other trash



Long beam floating on surface water removed by Scavenger and hauled away



Typical trash collected on a daily basis



Another Hazard floating



Scavenger2000 normal operation removing debris



Various surface debris collected



Sheen coming from vessel refit oxidized by the Scavenger2000



Debris collected



Scavenger2000 decontaminating and oxygenating



Scavenger full of debris



Typical day for debris collecting



Many tires end up in our waterways, we pick them up.



Scavenger2000 removing debris



Shipping pallets end up in our waterways. We pick them up



Typical day of work for the Scavenger2000



The Scavenger2000 really recovers a little bit of everything!



# **WATER MANAGEMENT TECHNOLOGIES**

## SCAVENGER 2000 DECONTAMINATION REPORT

On May 21, 2009, Water Management Technologies conducted a test to determine the effectiveness of the onboard OXYPLUS DECONTAMINATION SYSTEM. These tests took place at the Riverside Center, located at the junction of SW 2<sup>nd</sup> Avenue and the Miami River; Miami, Florida. The system was activated for one hour of operation: an explanation of the conditions and results are included in this report.

### **The tests were conducted under the following conditions:**

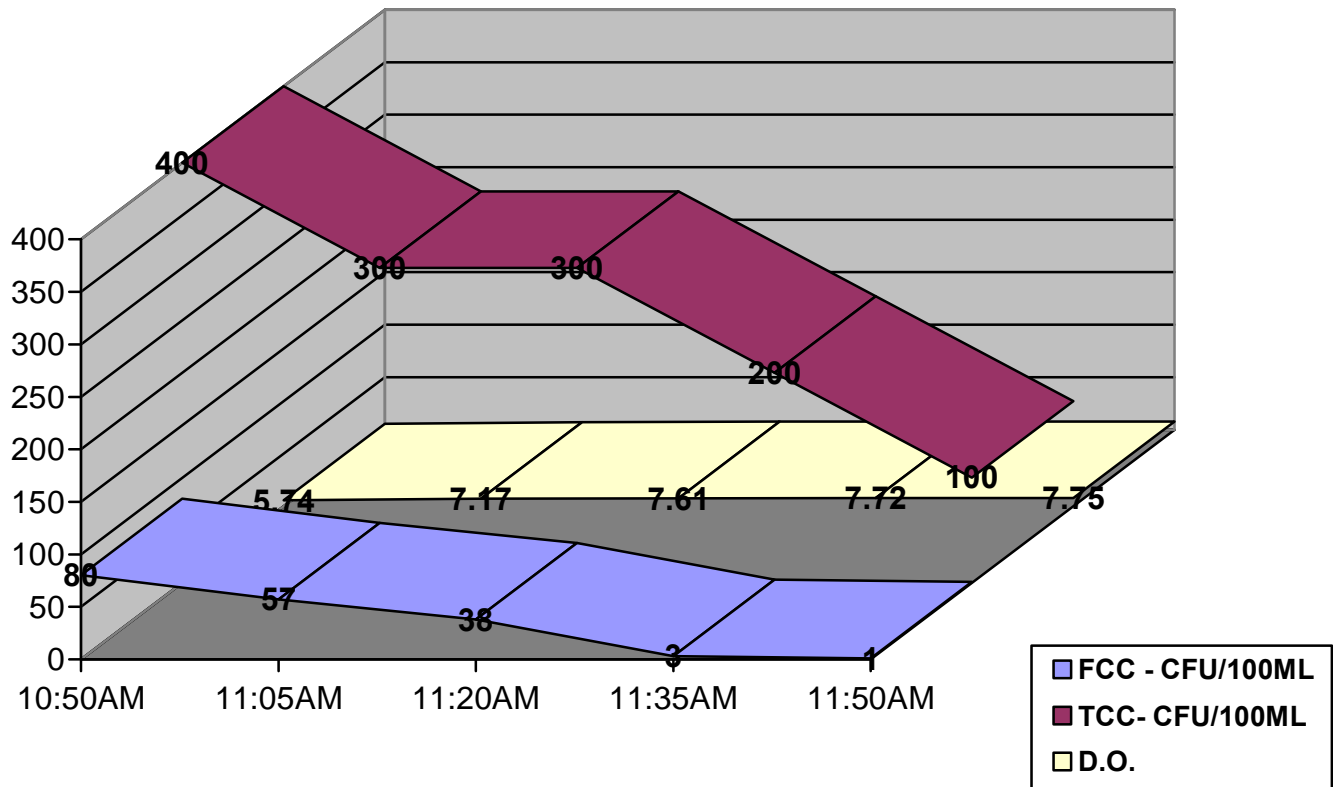
Slack Water  
High Tide  
Sunny skies  
Wind ó 4 to 5 MPH / ENE  
Air temp. 92.2°  
Water temp. 86.7°

At 10:50PM a test sample of water was taken from the starboard bow door; a dissolved oxygen reading was also taken. At 10:50PM the Scavenger was placed in the working mode ó main engine 1,200 RPMs and Oxy-Plus at 2,300 RPMs. The vessel was held in place with 4 mooring lines. Additional samples were taken at 15 minute intervals.

At the conclusion of the tests all samples were immediately taken to **MICRIM LABS INC.**; the samples were analyzed for fecal coli form and total coli form content.

### CONCLUSION

The results showed that after one hour of operation the fecal coli form count was decreased by 99%, the total coli form count reduced by 75% and the dissolved oxygen levels were increased by 32%. The results are expressed in the following graph:



Notes:

1. The dissolved oxygen analysis was performed by the on-board testing equipment.
2. MICRIM LABS INC. 800 NE 62<sup>nd</sup> St. Suite 202, Ft. Lauderdale, FL 33334  
Ph. 954-776-9479, 800-330-4376, Fax 954-776-9481

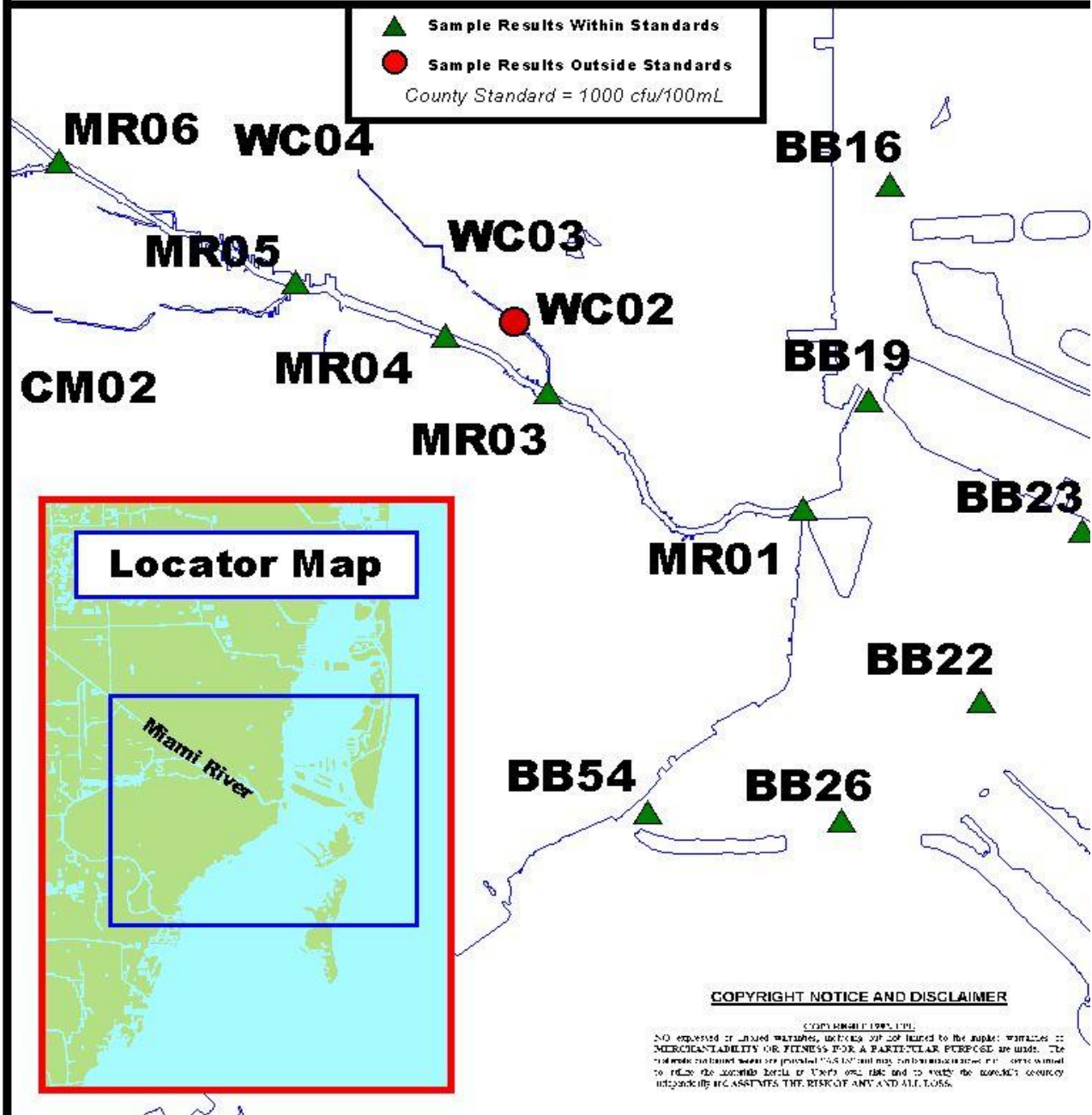
| SAMPLE | TIME OF DAY | DISSOLVED OXYGEN | TOTAL FECAL COLIFORM | TOTAL COLIFORM |
|--------|-------------|------------------|----------------------|----------------|
| A      | 10:50AM     | 5.74             | 80                   | 400            |
| B      | 11:05AM     | 7.17             | 57                   | 300            |
| C      | 11:20AM     | 7.61             | 38                   | 300            |
| D      | 11:35AM     | 7.72             | 3                    | 200            |
| E      | 11:50AM     | 7.75             | 1                    | 100            |

# Biscayne Bay Surface Water Quality Monitoring Program

## Total Coliform Violations

### August 2008

#### Miami River & Tributaries



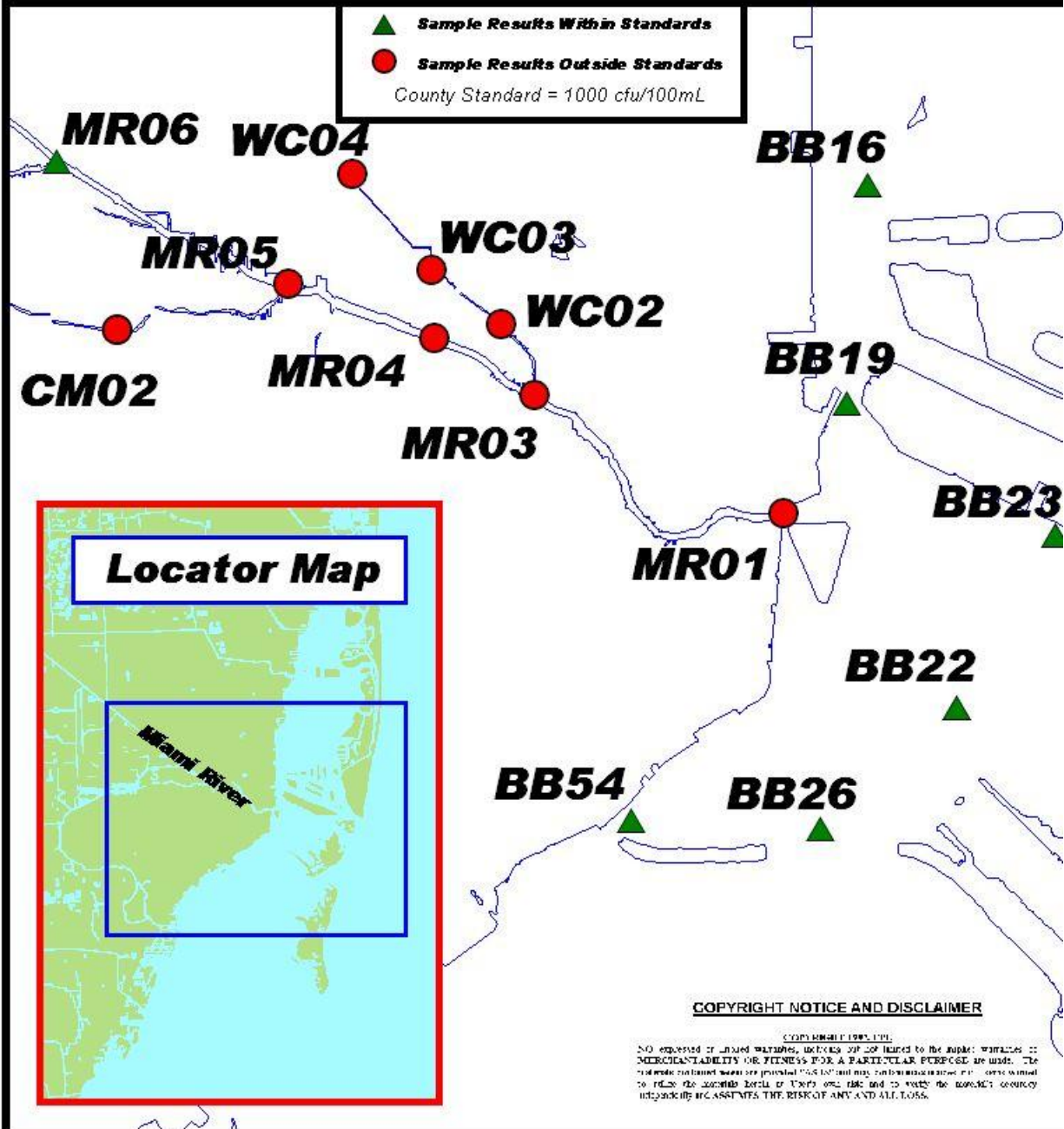
NOTE: The Scavenger2000 does not go up Wagner Creek, it is too shallow

**Biscayne Bay Surface Water Quality Monitoring Program**

**Total Coliform Violations**

**September 2008**

**Miami River & Tributaries**



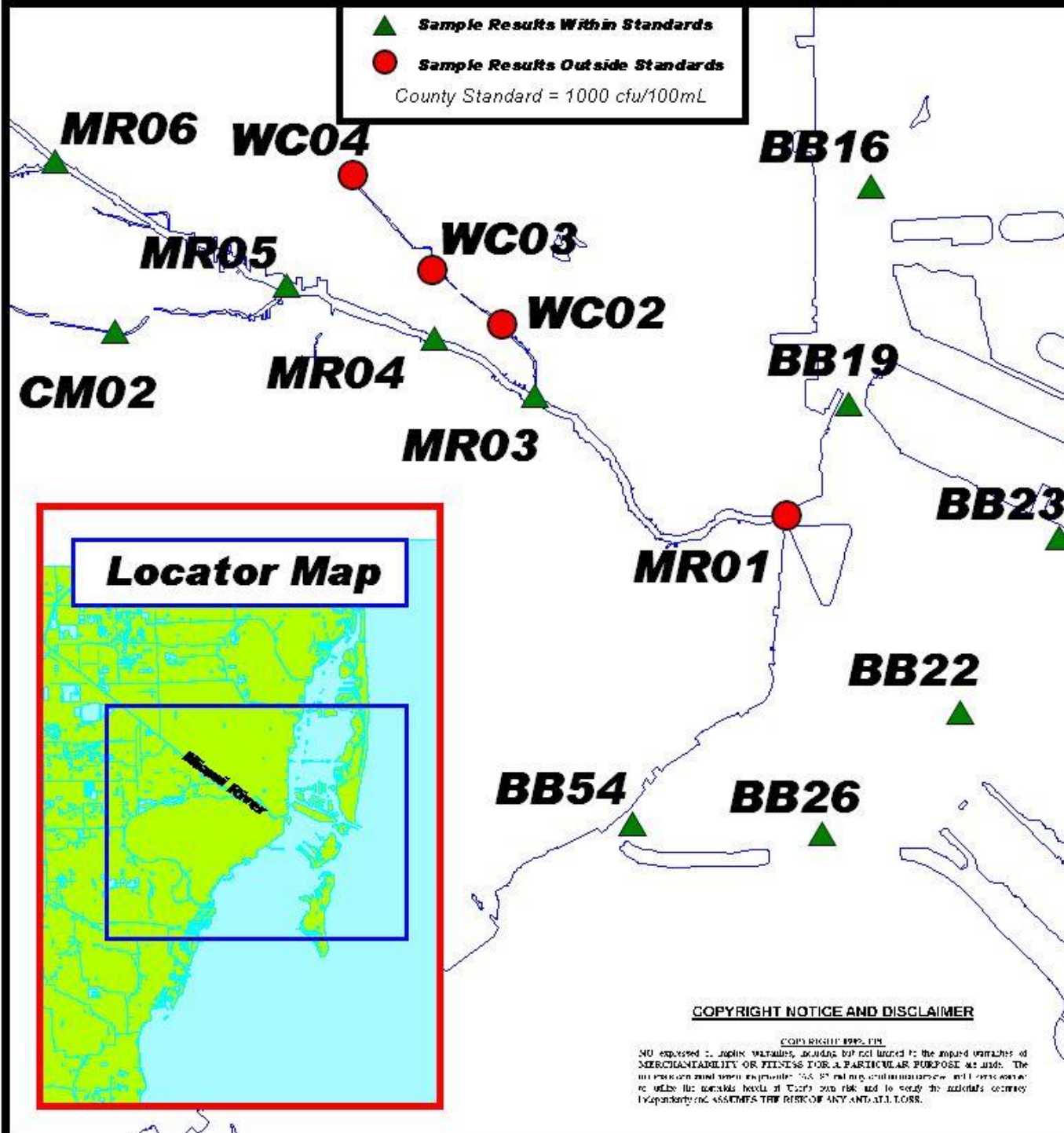
NOTE: Scavenger2000 on stand by for renewal of fiscal year contract.

# Biscayne Bay Surface Water Quality Monitoring Program

## Water Quality Sample Compliance

### August 2009

Miami River & Tributaries



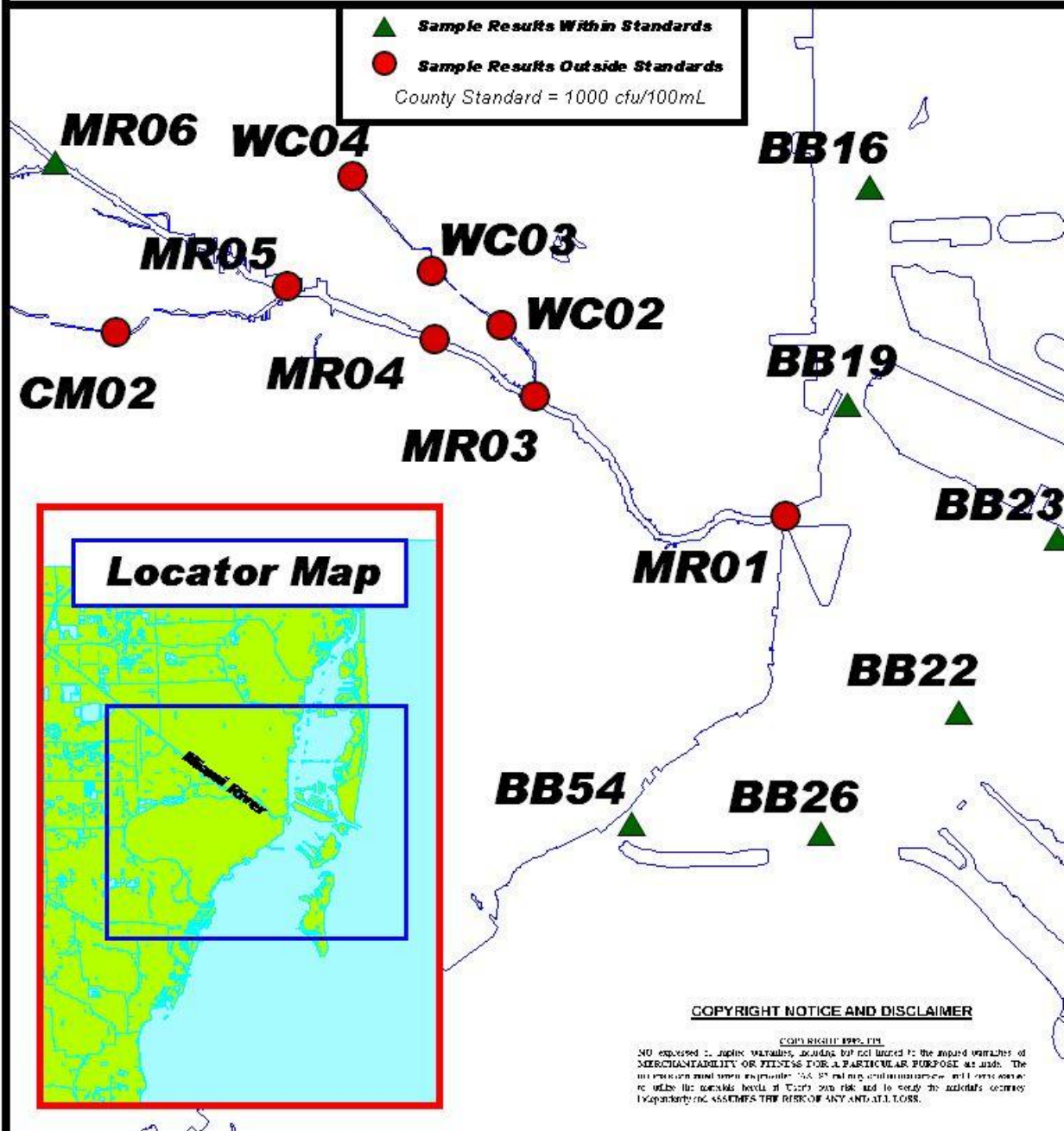
NOTE: The Scavenger2000 is in operation

# Biscayne Bay Surface Water Quality Monitoring Program

## Water Quality Sample Compliance

### September 2009

#### Miami River & Tributaries



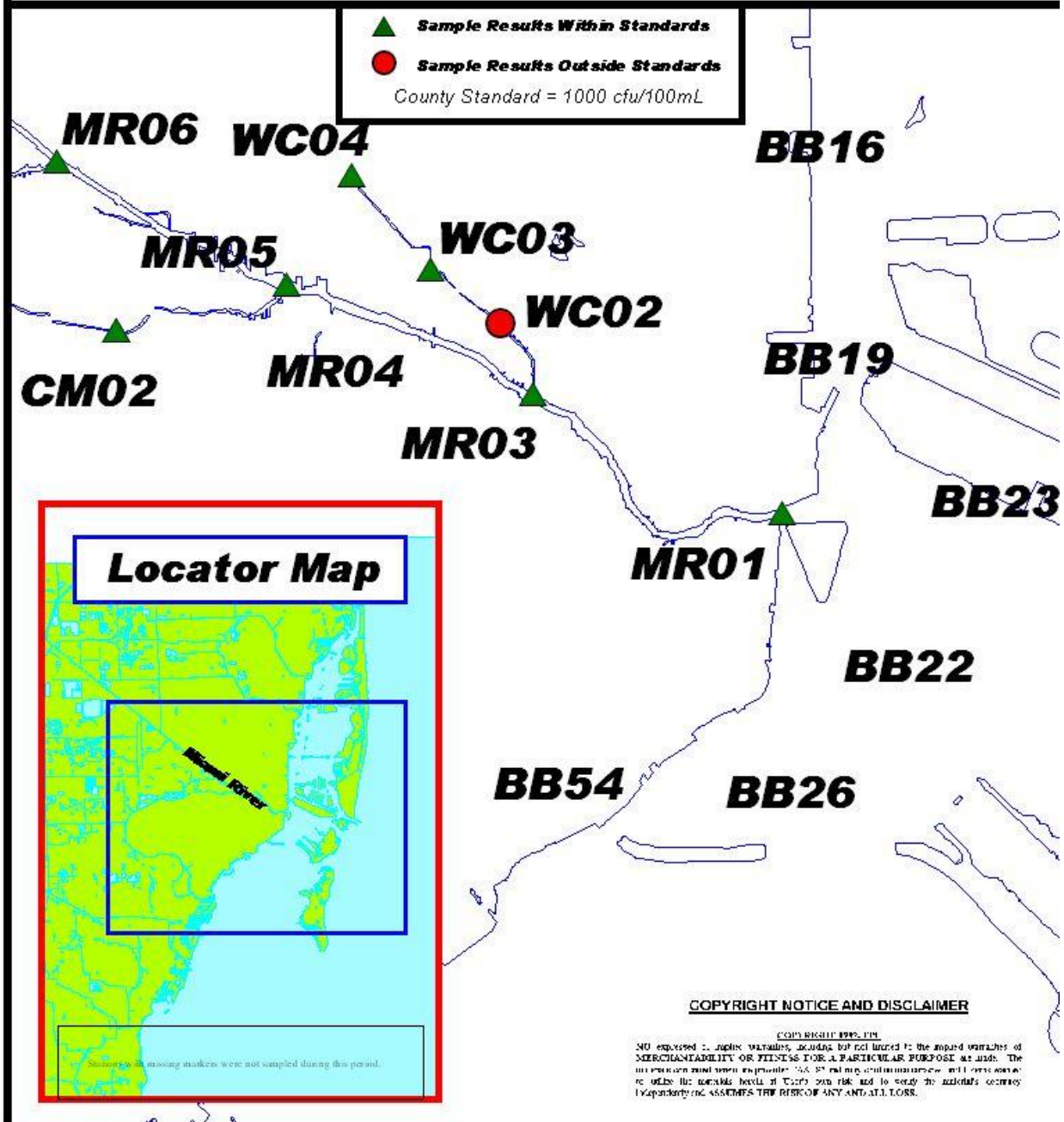
NOTE: The Scavenger2000 is on stand-by awaiting renewal of fiscal year contract

# Biscayne Bay Surface Water Quality Monitoring Program

## Water Quality Sample Compliance

### October 2009

#### Miami River & Tributaries

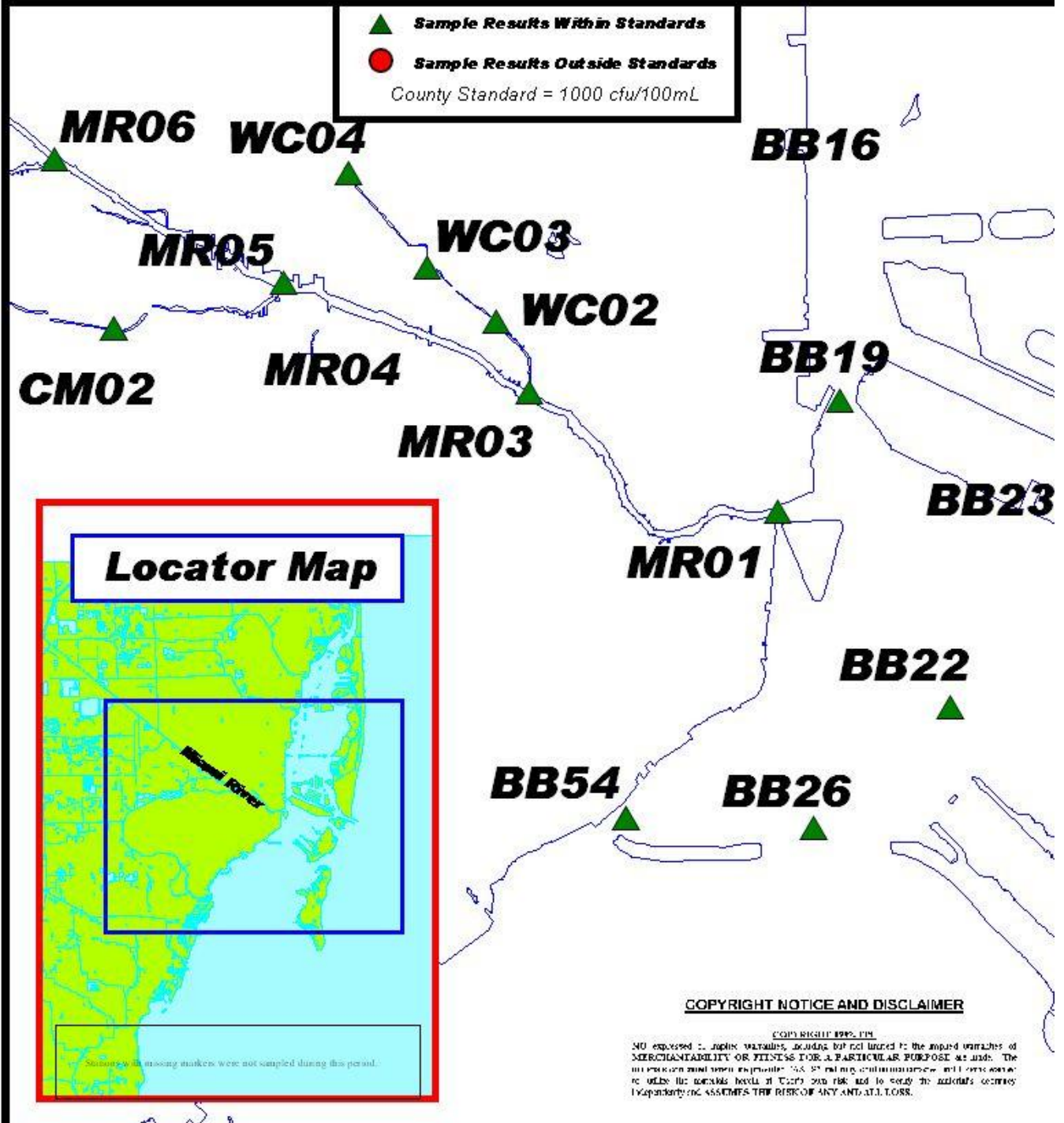


NOTE: The scavenger2000 resumed its operations

# Biscayne Bay Surface Water Quality Monitoring Program

## Water Quality Sample Compliance

**November 2009**  
**Miami River & Tributaries**



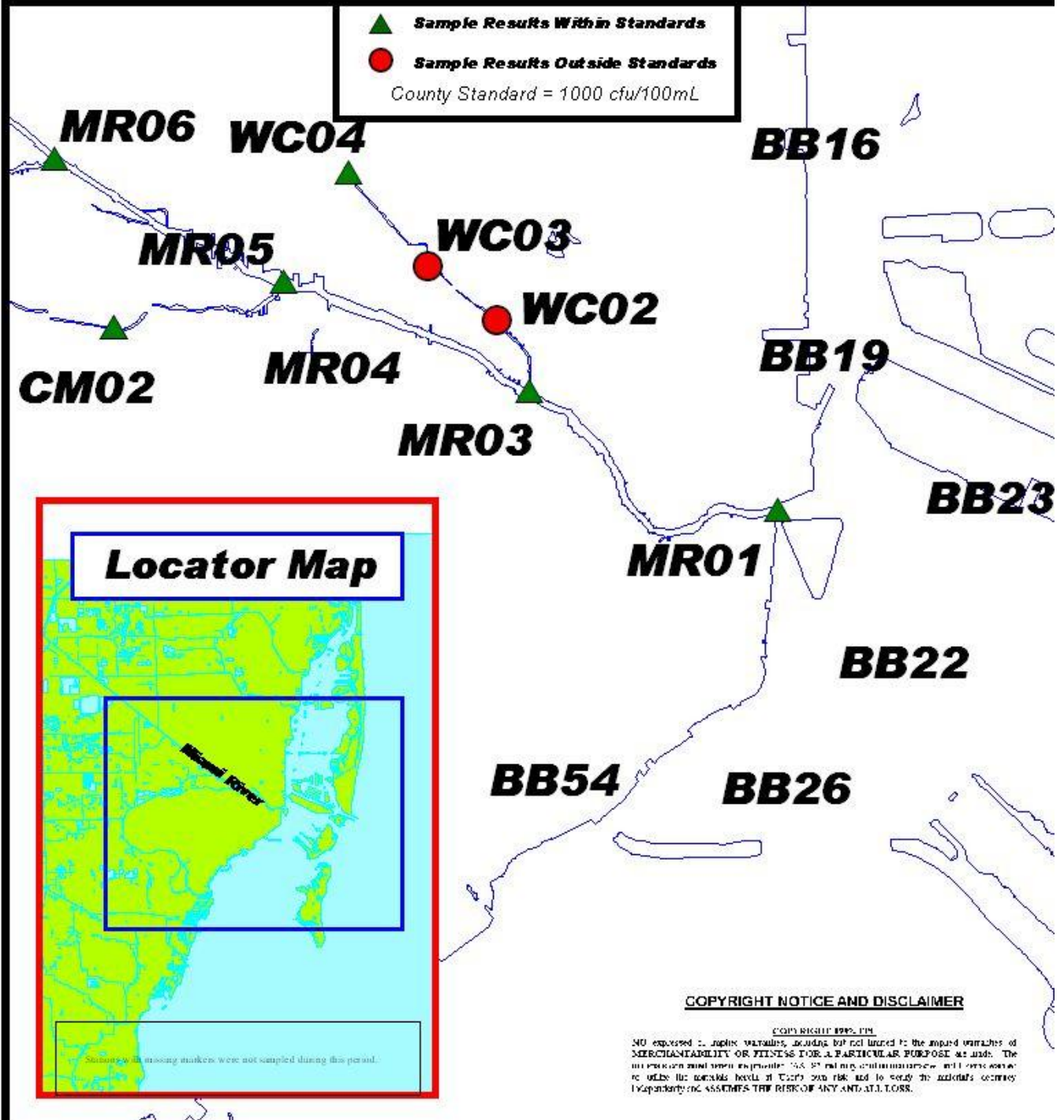
NOTE: The Scavenger2000 is in operation



# Biscayne Bay Surface Water Quality Monitoring Program

## Water Quality Sample Compliance

**December 2009**  
**Miami River & Tributaries**

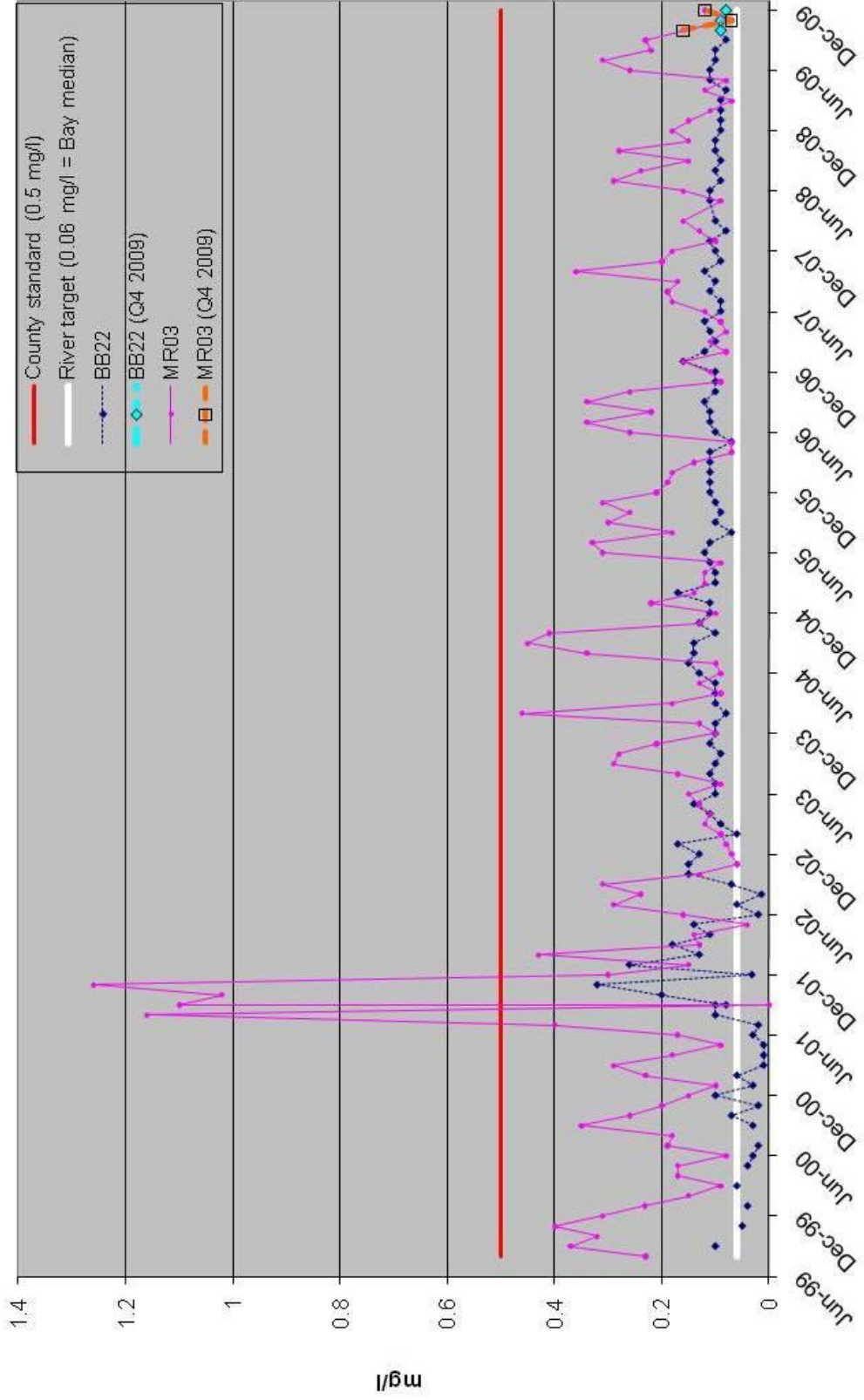


The Scavenger2000 is in operation

# Ammonia Nitrogen Tracking

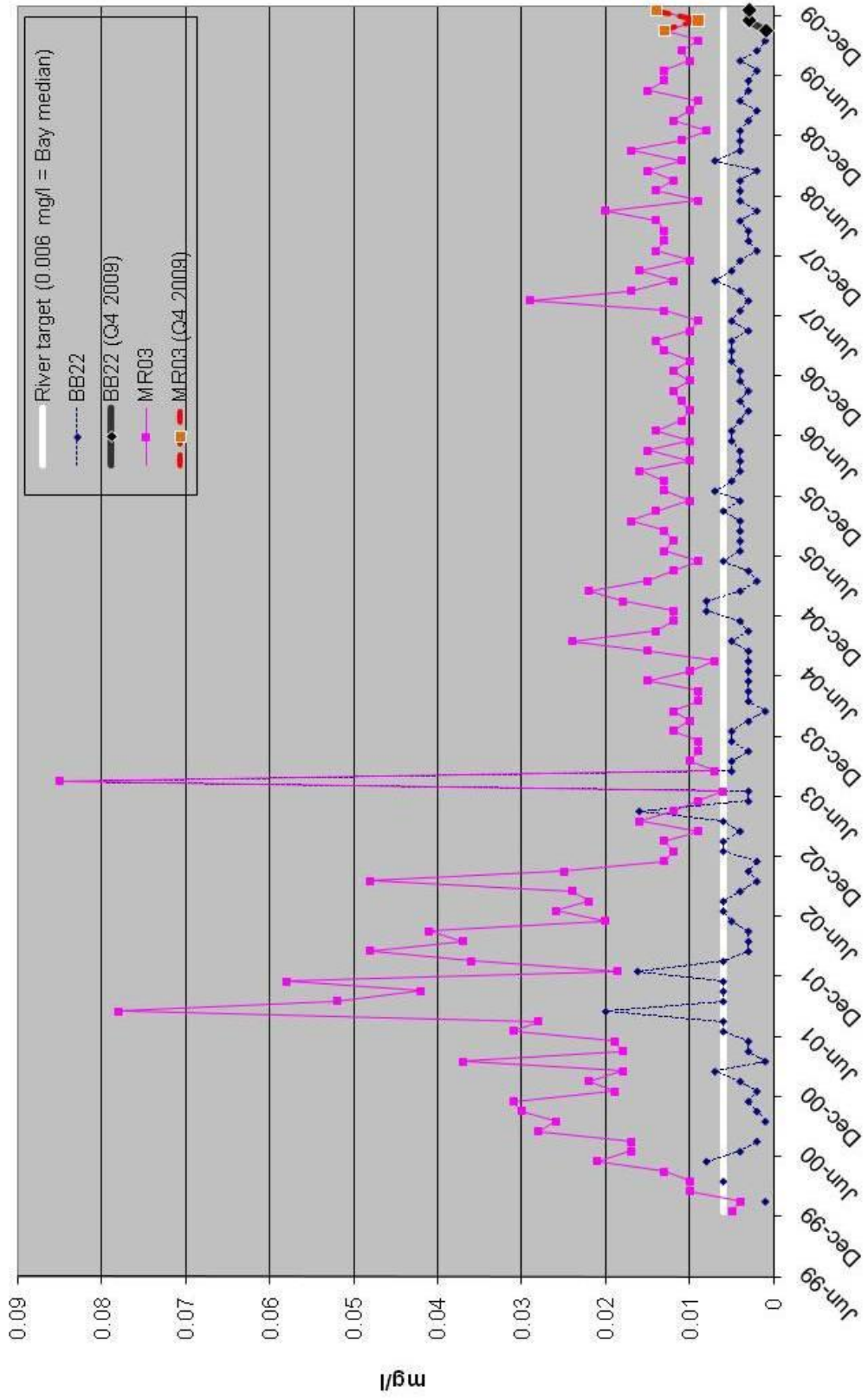
Ten Year Period: 1999 - 2009

Fourth Quarter 2009 Data (Oct-Dec Highlighted)



# Total Phosphate Tracking Ten Year Period: 1999 - 2009

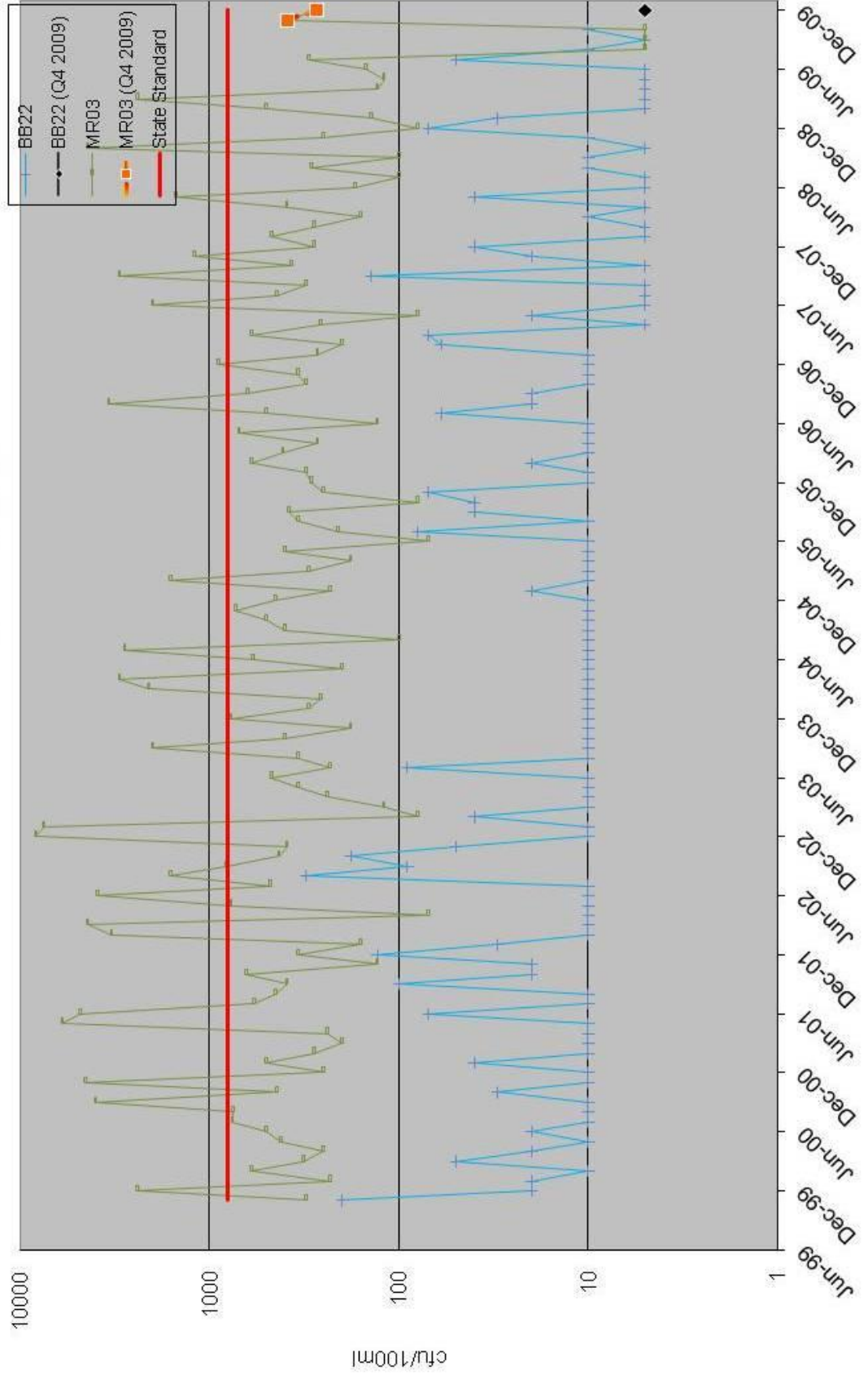
FourthQuarter 2009 Data (Oct - Dec) Highlighted



# Coliform Tracking

## Ten Year Period: 1999 - 2009

Fourth Quarter 2009 Data (Oct - Dec) Highlighted



# Turbidity Tracking

## Ten Year Period: 1999 - 2009

Fourth Quarter 2009 Data (Oct - Dec) Highlighted

