

## Operation and Maintenance Experience with CSO Floatables Control Facilities Using Netting TrashTrap® Systems

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The North Bergen, NJ MUA was the first municipality in New Jersey to fully implement facilities for solids and floatables control under its CSO permit in 1999. The facilities consist of nine Netting TrashTrap® systems and one mechanical screen from Fresh Creek Technologies, Inc. The paper reviews North Bergen's three years of experience with these facilities.

To comply with the US EPA CSO Policy and the NJ DEP CSO Permit, North Bergen evaluated a range of control technologies to meet the Nine Minimum Controls and Long Term Control Plan requirement for solid and floatable control and rated them according to the following criteria:

1. Applicability as a potential long-term control
2. Implementability
3. Aesthetics
4. Simplicity of operation and maintenance
5. Impact on CSS O&M

The technologies evaluated and the associated costs were as follows:

	<b>Technology</b>	<b>Cost in \$</b>
1	Stationary Screens	\$107,700,000
2	Rotary Screens	\$144,500,000
3	Dynamic Separators	\$29,910,000
4	Swirl Concentrators	\$101,890,000
5	End-of-Pipe Netting	\$1,565,000
6	In-line Netting	\$3,055,000
7	Mechanical Screens	\$14,563,000

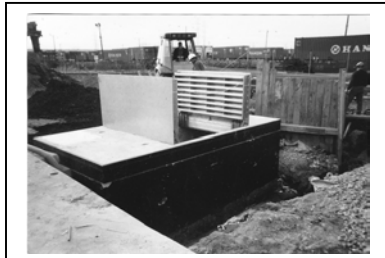
The alternatives were narrowed down to alternative 7 and combinations of 5 and 6. The netting technologies (#5 and #6) were selected for their cost and space availability advantages. The mechanical bar screens were selected for their proven reliability.

The alternative chosen to meet the CSO Permit requirements was a combination of three versions of netting technologies. They were chosen for their *simplicity*; the netting system has a straightforward approach to solving the floatables problem. They were chosen for their *durability*; concrete and stainless steel are the materials of construction for this system. The only material that wears away is the material we throw away, the disposable nets. And they were chosen for their *O&M advantages*. Replacing the used nets is a 3-man operation, no confined space is involved in the change-out process, and there are no mechanical components to deal

with. Finally, the most compelling factor in the choice of the netting system was the *cost*. The only long-term alternative that came close to the cost of the netting system was the installation of mechanical screens, and the difference in cost between these alternatives was close to 300 %.



The engineer's estimate for construction costs on the total project was \$3,565,000 and included 3 end-of-pipe systems, 4 in-line systems, 2 floating systems, and 1 static bar screen. The actual construction costs for the project came in at \$3,318,056 – 7% below the estimate.



In Line Netting TrashTrap®



End of Pipe Netting TrashTrap®



Floating Netting TrashTrap®

The community did not want garbage dumpsters filled with decaying organic matter left at the sites. The NBMUA solution to this constraint involved the purchase of two pieces of Army surplus equipment. The first was a 1950 camouflaged Army- issued boom truck for net removal, and the second was an Army-issued dump truck.



Equipped with these units the MUA is able to remove nets that have weighed over 5000 pounds and transport them back to the treatment plant for disposal with the screenings taken from the treatment plant. Not only was this equipment very inexpensive, we jokingly say that the camouflage painting reduces public awareness of the maintenance operations of our stealth CSO crew!

A third, more conventional, vehicle is the indispensable CSO van, a 1999 Ford Cube van that transports the crew and all necessary equipment and supplies for their daily operations.

The CSO crew consists of two men and a supervisor. These personnel are full time in the CSO Department. The duties of this crew entail the following:

- Daily inspection of the 2 pump stations and dynamic regulators.
- Weekly inspections of high priority regulators, collection



- of industrial samples as per our Pretreatment Program requirements, inspection of all netting systems and replacing the nets as necessary. Run and evaluate all emergency power generators, Preventative maintenance on all vehicles and equipment, as per manufacturers specifications.
- Monthly inspection of all regulators, preventive maintenance on all process equipment at pump stations, remove grit from high priority regulators.
  - Quarterly cleaning and vacuuming of all regulators and chambers within the Combines Sewer System.
  - Annually, during the month of June, (same month as the CSO Permit was issued) inspect all components of the Combined Sewer System. This inspection is coordinated with the consulting engineers, and a report on the status of the system is produced and submitted to the State Department of Environmental Protection.
  - After 1/8" of rain, visually inspect and clean all high priority regulators.
  - After 1/4" of rain, visually inspect and clean all regulators. Check all netting systems and replace nets and necessary.



The average change-out time for a netting system outfall varies depending upon the physical characteristics of the system. For example: In-Line netting chambers with a minimal slope upstream tend to deposit silts and grit more readily than chambers with a strong positive slope. As a consequence, some chambers will require the vacuuming of grit on a monthly basis. In this instance, the change-out of the nets a will require 4 man-hours. In most instances however, the labor required for a typical change-out is 2 man-hours.

Subsequent to the initiation of the operating the CSO system, the MUA realized the need for a portable vacuuming system capable of sufficient storage capacity, yet small enough to nuzzle up close to the netting system chambers and remove the deposited solids on a periodic basis as necessary. To meet these needs, the MUA purchased a portable, self-contained vacuum unit with an 800-gallon vacuum hydraulic dump tank and a 4,000 psi water pump. The associated water tank has a 225-gallon capacity. This unit has been a very versatile and important piece of equipment in the maintenance and operation of the CSO system.



The total capital equipment cost for the boom truck, dump truck, vacuum unit, and the CSO service van was \$80,000.

## Benefits and Costs

During the 36 months these facilities have been in operation, a total of 90 tons of floatables have been captured. The average weight of a single net has been 638 pounds and the heaviest net weighed over 5,000 pounds. There is significant variation between each of the CSO outfalls in terms of the amount of floatables collected and the frequency of need for service. The most active outfall has been serviced an average of once per month and has collected a total of 46,490 pounds of floatables. The least active CSO site has only been serviced 4 times per year and collected 1,115 pounds of floatables. These variations are due to the drainage basin characteristics of each outfall.

NBMUA employees have taken on all operation and maintenance of these facilities with no increase in staff. Actual operating and maintenance costs are less than projected in the original Plan. Annual costs consist of the following:

<u>Cost Element</u>	<u>Amount per change-out</u>	<u>Annual cost</u> <u>(1 change/month)</u>
Change-out labor	7.5 man hours @\$18/hr	\$10,800
Replacement nets	18 nets @ \$100	14,400
Waste disposal	4.4 tons @ \$67.50/ton	2,673
Equipment O&M		7,000
Vehicle Insurance		4500
Permit Fees		9,000
Inspection labor	1 man-hour @\$18/hr	<u>9,000</u>
TOTAL		\$57,373

Because the Netting TrashTrap<sup>®</sup> systems have no moving parts, no power requirements, and no complicated clean-out procedures (the full nets are transported intact to the treatment plant and disposed with other treatment waste) costs are highly predictable and manageable.

## Lessons learned

- It is possible to meet the CSO compliance requirements in a cost effective and timely manner by thinking outside of the box in a creative way, applying new cost effective technologies with sound engineering principals, and by being proactively involved in all aspects of the project.
- A mechanic is only as good as his tools. Even with systems designed for simplicity and ease of operation, attention to details such as operator training and having the right equipment are critical.
- Detailed and accurate record keeping is an important part of managing the CSO control program. All full nets are weighed at the time of removal and weights and any unusual conditions logged for subsequent analysis. With



this and other data the NBMUA can monitor operations continuously and also comply with the record-keeping requirements of the NJPDES CSO Permit including annual reports required by NJ DEP on the program.

- North Bergen MUA worked closely with the NJ DEP and EPA Region 2 during the planning and design of the CSO facilities and has taken a proactive approach with these regulatory agencies to the clean up of pollution from CSOs. This is a team approach, designed to get everyone on board, early and a relationship of trust, from dependency, through independency, to interdependency.

### **Recommendations for others:**

- Do lots of up front planning on a site-specific basis. “One size fits all” is not the best answer to the CSO pollution abatement challenge.
- Involve your operating people from the beginning – their practical experience will help produce programs that will really work and they will have bought into it by being involved in the process.
- Reach out to the regulatory authorities and involve them with your planning and program implementation so that it is a partnership approach rather than an adversarial one.
- Have vision and be creative in exploring and combining alternatives. Be prepared to take calculated risks where the probability of success is high and the rewards are large.
- Use sound engineering with attention to detail and close management of the project are critical to completion on time and within budget.
- See that the system is operated properly and that the administrative paperwork is kept current.

### **Conclusions**

Through innovative planning and sound engineering, North Bergen was able to implement a CSO floatables control program that meets both short term and long-term requirements. Both the initial cost and the ongoing operation and maintenance are highly affordable, especially compared to the alternative technologies evaluated.

The benefits are obvious and highly visible: 40 tons per year of obnoxious trash and floatables are removed and disposed rather than discharged into the Hudson and Hackensack Rivers and ultimately onto beaches. Perhaps most important, by selecting a solution with a short installation cycle time, benefits were achieved now, not at some indefinite time in the future.



Table 1  
Pollutant Removal Logs

Date	Netting Chamber #	# of Nets	LBS. PER NET				Total Lbs
			Net 1	Net 2	Net 3	Net 4	
01/18/02	003	4	400	400	500	400	1700
01/22/02	005	2	800	800	x	x	1600
01/30/02	006	2	200	240	x	x	440
02/04/02	009	2	50	50	x	x	100
03/12/02	003	4	600	800	800	400	2600
03/28/02	005	2	1200	1000	x	x	2200
04/02/02	006	2	200	200	x	x	400
04/02/02	007	2	700	600	x	x	1300
04/04/02	011	2	1300	1600	x	x	2900
04/05/02	008	2	140	120	x	x	260

	# of Nets Removed	Total Lbs. Removed	Average Lbs. Per Net	Total Tons Removed	Total Rain/Yr.	Average Rain/Mo.
<b>1999</b>	24	10000	417	5		
<b>2000</b>	134	60925	458	30.46	41.31	3.44
<b>2001</b>	105	96740	921	48.37	44.35	3.70
<b>2002</b>	24	13500	562.50	6.75	0.84 To Date	
Totals Since 4/19/99	<b>287</b>	<b>181165</b>	<b>589.63</b>	<b>90.58</b>		