



## State of New Jersey

DEPARTMENT OF ENVIRONMENTAL PROTECTION

Bureau of Nonpoint Pollution Control

Division of Water Quality

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[http://www.state.nj.us/dep/dwq/bnpc\\_home.htm](http://www.state.nj.us/dep/dwq/bnpc_home.htm)

CHRIS CHRISTIE  
*Governor*

KIM GUADAGNO  
*Lt. Governor*

BOB MARTIN  
*Commissioner*

**February 17, 2017**

Dale Groff, Stormwater Division Director  
Terre Hill Stormwater Systems  
PO Box 10  
485 Weaverland Valley Road  
Terre Hill, PA 17581

Re: MTD Lab Certification  
Terre Kleen™ Hydrodynamic Separator by Terre Hill Stormwater Systems  
Online Installation

### **TSS Removal Rate 50%**

Dear Mr. Groff:

The Stormwater Management rules under N.J.A.C. 7:8-5.5(b) and 5.7 (c) allow the use of manufactured treatment devices (MTDs) for compliance with the design and performance standards at N.J.A.C. 7:8-5 if the pollutant removal rates have been verified by the New Jersey Corporation for Advanced Technology (NJCAT) and have been certified by the New Jersey Department of Environmental Protection (NJDEP). Terre Hill Stormwater Systems has requested an MTD Laboratory Certification for the Terre Kleen™ Hydrodynamic Separator.

The verification is subject to the "Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advance Technology" dated January 25, 2013. The applicable protocol is the "New Jersey Laboratory Testing Protocol to Assess Total Suspended Solids Removal by a Hydrodynamic Sedimentation Manufactured Treatment Device" dated January 25, 2013.

NJCAT verification documents submitted to the NJDEP indicate that the requirements of the aforementioned protocol have been met or exceeded. The NJCAT letter also included a recommended certification TSS removal rate and the required maintenance plan. The NJCAT Verification Report with the Verification Appendix (dated January 2017) for this device is published online at <http://www.njcat.org/verification-process/technology-verification-database.html>.

**The NJDEP certifies the use of the Terre Kleen™ Hydrodynamic Separator by Terre Hill Stormwater Systems at a TSS removal rate of 50% when designed, operated, and maintained in**

**accordance with the information provided in the Verification Appendix and the following conditions:**

1. The maximum treatment flow rate (MTFR) for the manufactured treatment device (MTD) is calculated using the New Jersey Water Quality Design Storm (1.25 inches in 2 hrs) in N.J.A.C. 7:8-5.5.
2. The Terre Kleen™ Hydrodynamic Separator shall be installed using the same configuration reviewed by NJCAT and shall be sized in accordance with the criteria specified in item 6 below.
3. This Terre Kleen™ Hydrodynamic Separator cannot be used in series with another MTD or a media filter (such as a sand filter) to achieve an enhanced removal rate for total suspended solids (TSS) removal under N.J.A.C. 7:8-5.5.
4. Additional design criteria for MTDs can be found in Chapter 9.6 of the New Jersey Stormwater Best Management Practices (NJ Stormwater BMP) Manual which can be found on-line at [www.njstormwater.org](http://www.njstormwater.org).
5. The maintenance plan for a site using this device shall incorporate, at a minimum, the maintenance requirements for the Terre Kleen™ Hydrodynamic Separator. A copy of the maintenance plan is attached to this certification. However, it is recommended to review the maintenance website at [http://www.terrestorm.com/Terre\\_Kleen\\_Maintenance\\_Procedures\\_201702.pdf](http://www.terrestorm.com/Terre_Kleen_Maintenance_Procedures_201702.pdf) for any changes to the maintenance requirements.
6. Sizing Requirements:

The example below demonstrates the sizing procedure for the Terre Kleen™:

Example: A 0.25-acre impervious site is to be treated to 50% TSS removal using a Terre Kleen™. The impervious site runoff (Q) based on the New Jersey Water Quality Design Storm was determined to be 0.79 cfs.

Maximum Treatment Flow Rate (MTFR) Evaluation:

The site runoff (Q) was based on the following:

time of concentration = 10 minutes

$i=3.2$  in/hr (page 5-8, Fig. 5-3 of the NJ Stormwater BMP Manual)

$c=0.99$  (runoff coefficient for impervious)

$Q=ciA=0.99 \times 3.2 \times 0.25=0.79$  cfs

Given the site runoff is 0.79 cfs and based on Table 1 below, the Terre Kleen™ Model TK09 with an MTFR of 1.27 cfs would be the smallest model approved that could be used for this site that could remove 50% of the TSS from the impervious area without exceeding the MTFR.

The sizing table corresponding to the available system models is noted below. Additional specifications regarding each model can be found in the Verification Appendix under Table A-1.

**Table 1 MTFRs and Required Sediment Removal Intervals for Terre Kleen™ Models**

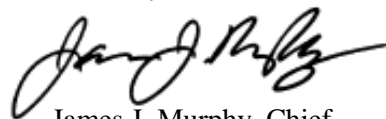
Model	Inclined Plates	MTFR <sup>1</sup> (cfs)	Horizontal Plate Area <sup>2</sup> (ft <sup>2</sup> )	Effective Treatment Area <sup>3</sup> (ft <sup>2</sup> )	50% Maximum Sediment Storage Volume <sup>4</sup> (ft <sup>3</sup> )
TK09	9	1.27	57.7	87.0	7.33
TK18	18	2.31	115.4	157.7	10.58
TK27	27	3.34	173.0	228.3	13.83
TK36	36	4.37	230.8	299.1	17.08
TK45	45	5.40	288.5	369.8	20.33
TK54	54	6.43	346.1	440.4	23.58
TK63	63	7.46	403.8	511.1	26.83

1. Based on a hydraulic loading rate of 6.55 gpm/ft<sup>2</sup> of effective treatment area
2. 6.41 ft<sup>2</sup> per inclined plate
3. Effective treatment area = primary chamber floor area + secondary chamber floor area + horizontal plate area
4. Sediment sump depth is 0.5 ft. 50% sediment storage volume is sum of the primary and secondary chamber floor areas times 0.25 ft.

A detailed maintenance plan is mandatory for any project with a Stormwater BMP subject to the Stormwater Management Rules, N.J.A.C. 7:8. The plan must include all of the items identified in the Stormwater Management Rules, N.J.A.C. 7:8-5.8. Such items include, but are not limited to, the list of inspection and maintenance equipment and tools, specific corrective and preventative maintenance tasks, indication of problems in the system, and training of maintenance personnel. Additional information can be found in Chapter 8: Maintenance and Retrofit of Stormwater Management Measures.

If you have any questions regarding the above information, please contact Mr. Shashi Nayak of my office at (609) 633-7021.

Sincerely,



James J. Murphy, Chief  
Bureau of Nonpoint Pollution Control

Attachment: Maintenance Plan

cc: Chron File  
Richard Magee, NJCAT  
Vince Mazzei, NJDEP - DLUR  
Ravi Patraju, NJDEP - BES  
Gabriel Mahon, NJDEP - BNPC  
Shashi Nayak, NJDEP – BNPC



## **Terre Kleen™ Maintenance Procedures**

### **Maintenance Record**

When a Terre Kleen™ unit is newly installed, quarterly inspection is highly recommended. The design of the Terre Kleen™ unit permits easy inspection. It is recommended that during the first year after installation, inspections be performed at least quarterly for the purpose of noting the rate of pollutant capture: oil, grease, trash, debris, vegetation and sediment.

Charts containing size and volume information for each Terre Kleen model is attached as **Exhibit A**.

Attached as **Exhibit B** is a form that may be used for recording information resulting from the inspections. Maintaining accurate records provides a history of the pollutant accumulation for the Terre Kleen.

### **Sediment Measurement**

To determine sediment accumulation, a stadia rod or similar measuring device may be used. Cleaning is recommended when the sediment is found to be at the level shown in the Terre Kleen™ flow diagram. To avoid underestimating the volume of sediment in the chamber, care must be exercised in lowering the measuring device to the top of the sediment pile.

**The storage level of sediment at which maintenance is required is 3 inches.**

### **Maintenance Cleaning**

The clean-out procedure may occur anytime after a rain event. It is not necessary to wait for particles to settle due to the high sedimentation efficiency of the device.

The Terre Kleen™ is designed with clear access to the primary and grit chambers. A vacuum truck, or similar trailer mounted equipment, can be used to clean both chambers by lowering the suction hose through the openings.

The oil and litter in the primary chamber should be removed first.

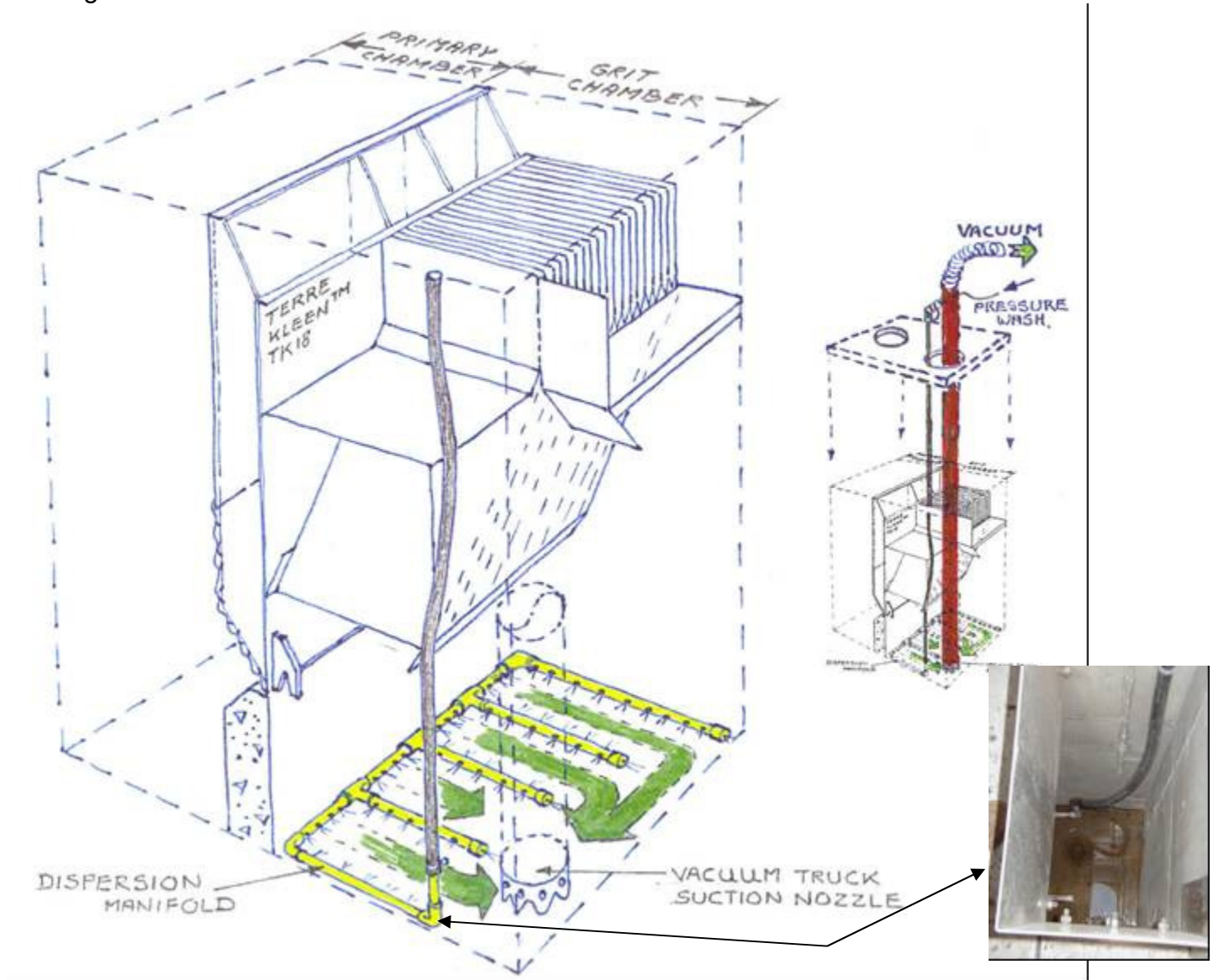
Depending on the equipment used, it may be necessary to remove floating trash and debris with a net or rake.

After the oil and litter is removed, the grit chamber can be cleaned out. Finally, switch back to the primary chamber to remove remaining debris. Water can be sprayed into the chambers as necessary to loosen debris

To further prevent discharge of hydrocarbons, "oil absorption booms" were added to the primary chamber during installation. They will float among the litter and begin to sink as they absorb oil. The boom size 2¼" Ø x 12" will absorb about a quart of oil. These booms should be replaced when they become saturated with oil and no longer appear above the water surface. Additional booms can be purchased from Terre Hill Concrete Products. ( *The sorbent booms are placed in the primary chamber for the absorption of gasoline; diesel fuel, lube oil, jet fuel, transformer oils, chlorinated solvents, aromatic solvents, hydraulic oils, and light crude. The sorbent boom is Rubberizer® boom manufactured by Haz-Mat Response Technologies Inc. A standard TerreKleen™ TK09 has 4 booms, TK18 has 8 booms, TK27 has 12 booms, TK36 has 16 booms, TK45 has 20 booms, TK54 has 25 booms and a TK63 has 30 booms.*)

## Sludge Dispersion Manifold

Each Terre Kleen™ water quality device contains a “Sludge Dispersion Manifold”. The manifold pipes are mounted to the floor underneath the inclined plate settler and connect to a hose that leads to the clean out opening at grade level. This hose is pressurized by the vacuum truck’s spray nozzle. While the suction nozzle removes the captured pollutants, the pressurized manifold sprays water through the small horizontal holes in the manifold pipes. This water lifts and disperses the sludge blanket causing it to drain to the suction nozzle.



## Disposal of Removed Pollutants

Disposal of removed material will depend on the nature of the drainage area. For example, sediment collected from a system of stormwater inlets may possibly be disposed at a landfill after the liquid fraction is decanted at a sewage treatment facility. Material removed from the Terre Kleen™ must be handled according to local, state, and federal regulations. Some materials, such as sediment and detritus from lawn areas may be reused on site, which is often recommended by the local authorities. After the clean-out procedure is complete, replace the manhole covers securely to the frames for safety purposes.

## **Cold Weather Conditions**

The depth of the structure in the soil insulates it from freezing which is similar to exposure conditions of septic tanks. There have not been any reported issues regarding ice and snow accumulation in any Terre Kleen installation.

The Terre Kleen insert is made of “5052 Marine Grade Aluminum” with stainless steel fasteners which guards against corrosion.

Colder temperatures and saltwater stratification may reduce the settling velocity of particles, which can result in fewer particles being “trapped”.

The amount of grit and sand in the runoff from paved areas may be significantly increased in the winter, which may warrant more frequent inspection and maintenance.

## **Confined Space Entry**

*Regular maintenance and clean out does not require confined space entry into the Terre Kleen™ unit. If confined entry is required, it will need to be performed by qualified personnel who are properly trained for confined space activity using proper equipment as per the latest OSHA regulations.*

The Terre Kleen™ will trap floatable litter and oils that are not emulsified in the stormwater runoff.  
**Keep sparks and open flames away when working around a Terre Kleen™ unit that may contain flammable material**

**Exhibit A:** Terre Kleen™ Model Size and Volume Charts

**Exhibit B:** Terre Kleen™ Maintenance Chart

**Exhibit A Terre Kleen™ Model Size and Volume Charts**

<b>Model</b>	<b>Primary Chamber</b>	<b>Grit Chamber</b>	<b>Removal Volume (gal)</b>	<b><u>Storage</u></b>		<b>Water Depth (full) (inches)</b>
				<b>Oil (gal)</b>	<b>Sediment (ft³)</b>	
<b>09</b>	oil, trash, sediment 4 oil booms	sediment	1,473	140	90	72
<b>18</b>	oil, trash, sediment 8 oil booms	sediment	2,127	205	129	72
<b>27</b>	oil, trash, sediment 12 oil booms	sediment	2,782	264	168	72
<b>36</b>	oil, trash, sediment 16 oil booms	sediment	3,442	327	208	72
<b>45</b>	oil, trash, sediment 20 oil booms	sediment	4,097	389	248	72
<b>54</b>	oil, trash, sediment 24 oil booms	sediment	4,745	451	287	72
<b>63</b>	oil, trash, sediment	sediment	5,399	513	327	72



