ContaminationX 620
WATER
Filtration
Media

Dangers of Hydrocarbon Contamination

Hydrocarbons have been contaminating our waterways for decades. Only relatively recently has anyone, including governments, begun to handle and dispose of this hazard safely. Years of neglect mishandling, and improper disposal have resulted in pollution of our oceans, rivers, lakes, streams and underground waterways.

Studies have established the risks to human health associated, with hydrocarbon contaminated water. Cancer, abnormal fetal development, internal organ damage, learning disabilities, and even death are hazards identified with consuming water polluted with hydrocarbons, Hydrocarbons, Hydrocarbons are considered hazardous at levels of one (1) part per billion (PPB) in water. Therefore, it is imperative that hydrocarbons be removed from our water.

ContaminationX 620

The (5) major improvements of 620 over standard GAC are: Efficiency: Capacity: Predictability: Security ; and Cost of water treated.

Scandex´s polymer-enhanced granular activated carbon (620) is a recent advancement in water filtration media. It results from the proprietary blending of an advanced hydrophic elastomeric polymer and GAC. ContaminationX 620 is capable of bonding (absorbing) up to 4 times its own weight in hydrocarbon contaminants. It is designed to capture hydrocarbons after removal of free hydrocarbon product.

The polymer used in Sacndex`s ContaminationX 620 has been used since 1991 to bond hydrocarbons in spill response situations. It is so effective that it can remove hydrocarbons to "not detected" at less than 1 PPB in minutes and bonds the hydrocarbons permanently. The polymer itself could not be used to filter water, however, for it almost immediately plugs. In early 1993, it was discovered that it mixed with other ingredients and blended in a special way with Generated Activated Carbon (GAC), it became the Best Available Technology (BAT) for non-polar organic removal there is today.

ContaminationX 620 IS STATE-OF-THE-ART TECHNOLOGY

620 has, at a minimum, 20 to 40 times the capacity for hydrocarbon pick-up as does GAC alone. The 620media is on average 400% efficient, where GAC is at the best 15% efficient. (If 100 kg. of GAC will pick up 15 kg. of hydrocarbons, 100 kg. of 620 can bond up to 400 kg. of hydrocarbons).

ContaminationX 620 media reduces the cost of filtration treatment by 50% or more. Even greater savings are realized when labour, regeneration, hauling and disposal costs associated with dealing with 20+ times the volume of Generated Activated Carbon (GAC) are calculated.

The polymer used to enhance the GAC is hydrophobic(will not absorb water) and can absorb (bond, make a part of itself) up to fifteen times its own weight of hydrocarbons. 620 can be as much as 40 times more efficient that Generated Activated Carbon (GAC) alone.

One major benefit provided by 620 is the speed with which it removes hydrocarbons and VOC`s from water. 620 can remove most hydrocarbon contaminants to acceptable discharge requirements with retention times as low as three minutes. Analyses conducted on filtered waste water containing levels

of hydrocarbons up to 10,000 ppb show that 620 removes most hydrocarbons or voc`s within the first three minutes of exposure. Additional removal occurs with increased retentation time is required to achieve results similar to 620.

Another benefit of 620 is its predictable capacity through Delta P (the difference between inlet pressure and outlet pressure) and also through the loss of gallon-per-minute (GPM) has reduced to 50% of original flow, the 620 has reached approximately 80% capacity and should be replaced. The only way to effectively monitor the capacity reduces testing needs and costs.

620 will not release contaminants back into waste stream when capacity has been reached, unlike Generated Activated Carbon which will not only allow influent to pass, but will release previously filtered contaminants, adding to the contamination levels. ContaminationX 620 at capacity will only allow the influent level to pass through.

WHO,WHAT,WHERE,WHEN,WHY AND HOW?

**CURRENT STATUS: Scandex`s** 620 systems are in place around the U.S. They are on board U.S. Navy destroyers in sea trials. They are in place at several private wells around Reese Air Force Base in Shallowater, Taxas, American Marine`s Shipyard in New Orleans, an AMOCO offshore oil platforms and numerous other applications in shipyards, municipalities and ground water remedation projects around this country, including mobile units used for tunnel entry and work.

THIS TECHNOLOGY HAS BEEN DESIGNATED “INNOVATIVE” BY THE INNOVATIVE TECHNOLOGY DIVISION OF THE TNRCC OF THE STATE OF TEXAS. There are certain advantages to using technologies so designated in the State of Texas. Consult with the TNRCC innovative Technology Division for more information on this and other new technologies.

ContaminationX 620 Filtration Media Fact Sheet

Scandex**'s 620 Filtration Media** is a non-toxic, non-corrosive environmentally friendly filtration media. Scandex's **620 Filtration Media** will not only **ADSORB** hydrocarbon contamination, but also **ABSORBS, CONGEALS,** and **BONDS** the hydrocarbon, thus reducing the risk of hydrocarbon leaching during filtering applications. Scandex *'s* **620 Filtration Media combines** the **effects of ADSORPTION** and **ABSORPTION** for maximum
efficiency Scandex 's 620 Filtration Media can be up to 16 times more efficient than using straight sorbents.

Scandex*'s* **620 Filtration Media** can be integrated into an existing carbon System, or Scandex cancustom engineer a System to meet any need.

WEIGHT BY VOLUME:	One pound equals 115.5 cubic inches.
ABSORPTION CAPACITY:	4 kg hydrocarbon per one kg of 620
DENSITY:	18 PCF
SPECIFIC GRAVITY:	0.23 proximate
PH SPECIFICAT1ONS:	Neutral (6.5 to 7)
MELTING POINT:	83°C
MAX. WATERTEMP:	73°C
STORAGE:	Keep free of contamination
VOLATILITY BEFORE USE:	Non VOLATILITY AFTER USE:
	Varies with flammability of liquid bonded
DISPOSAL:	Caution should be exercised. Dispose of in accordance with federal, state and local laws for the bonded liquid.
PACKAGING:	On Request
TOXICITY NOTICE:	Non-Toxic, Non-Hazardous, Non-Corrosive

*One milligram is equal to one part per million.

Consider the following:

ContaminationX 620 Filtration Media
has at minimum 20 times the capacity for hydrocarbon pickup
(if 100 lbs. Of activated carbon will pick up 20 lbs. Of hydrocarbons, 100 lbs. Of 620 can pick up 400lbs.of hydrocarbons).

ContaminationX 620 Filtration Media
on average is 400% efficient, where activated carbon at its best is only 25% efficient.

ContaminationX 620 Filtration Media
reduces the cost of filtration treatment by 50% or more. Even
Greater savings are realized when labor and disposal costs associated with dealing with 20+ times the volume of activated carbon are calculated.

ContaminationX 620 Filtration Media
can remove most emulsified and dissolved hydrocarbon contaminants to acceptable discharge requirements with retention time as low as three minutes.

ContaminationX 620 Filtration Media
is a blend of proprietary polymers and activated carbon designed to capture hydrocarbons and VOC`s after removal of free hydrocarbon product.

After removal from the filtering process and setting for 24 hours, the polymer is so effective it will leach hydrocarbon contaminants from the activated carbon and bond them. The resultant bonded mix has passed TCLP testing. The expended media can then be land-filled or incinerated according to local requirements.

COST CONSIDERATIONS

If hydrocarbon contaminated waste water is simply pumped and hauled away for treatment and disposal, the cost can run as high as $1.00 per gallon (in Connecticut) or as low as $28 per gallon(Chicago), with a national average around $.40 per gallon.

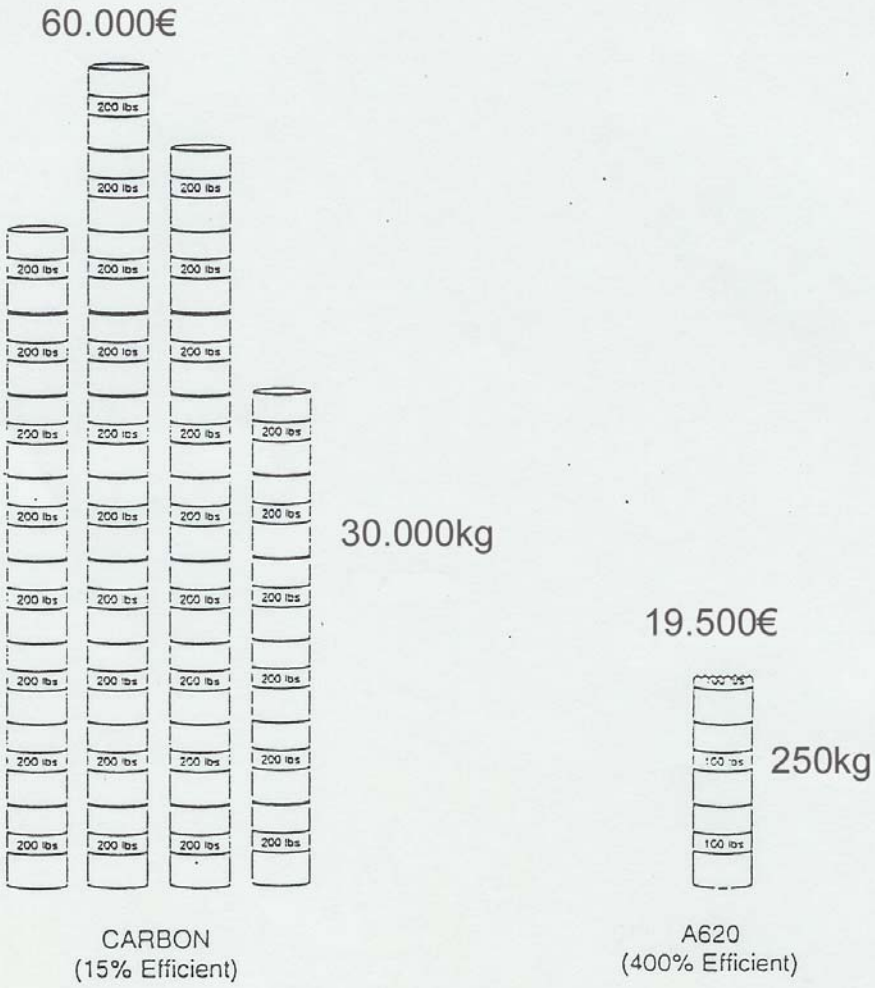
The cost of activated carbon in a pump-and-treat system can run from $.75 per pound to $2.50 per pound depending on the quality and the efficiency of the product. It is generally found that the less efficient the activated carbon, the lower the cost per pound. While actived carbon can be regnerated, the efficiency is reduced with each regeneration. A major consideration here is the cost of handling and transport. If the activated carbon is 20% efficient, one needs 20 times more GAC than 620 to remove the same level of contaminants. If the activated carbon is 10-12% efficient (national average), one needs up to 40 times more GAC than ContaminationX 620.

Calculate the cost of removing 100 PPM of TPH (Total Petroleum Hydrocarbons) from a waste stream to not-detectable levels. One hundred pounds of 620 Filitration Media can clean 477,900 gallons of waste to not detectable. To accomplish the same removal in activated carbon, 100 pounds could treat 24,000 gallons of waste water at 20% capacity, or 12,000gallons at 10% capacity. The treatment cost would then be the retail cost of activated carbon in dollars divided by either 24,000 or 12,000. Generally, the 620 will average 30% lower in material cost.

The total cost, however, must take into account the handling and disposal of used product. If 100 pounds of 620 will filter 477,900 gallons of water contaminated to 100 PPM, it will take from 2,000-4,000 pounds of activated carbon to do the same. This is 20-40 times the quantity of material to receive, handle and remove for regenerations or disposal. This is where the significant cost reduction of ContaminationX 620 use is evident.

ContaminationX 620 / Activated Carbon Cost Coparison (Equal Weigth Removed)

To remove 1,000 **kg** of hydrocarbon contaminants it would take:



Standards for Calculating Liquid Phase Filter Beds for ContaminationX 620

Formula for the daily hydrocarbonpollution:

Dirtwater in Liter for a Day	x	Dirtparts in Million	=	daily pollution in mg	mg

Formula for the Filter Bed:

Weight kg Filter bed	x	4.000.000 capacity 620 mg per kg	=	Receptiveness of the Filter Bed in mg	mg

Receptiveness of the Filter Bed in mg	/	daily pollution in mg	=	life span of the Filter Bed in days	Days

Formula for the cost calculation per treated liter:
(the costs are dependently of the degree of pollution)

weight of the Filter Bed in kg	x	selling price per kg in EUR	/	life span of the Filter Bed in days	/	flow in liter per day

= _____
costs in EUR
per liter

ContaminationX 620 APPLICATIONS

1) Marine Applications

Company	Application	System
American Marine	Bilge cleaning	40 LPM
Kentucky Marine	Barge degassing	40 LPM
Colonna`s Shipyard	Bilge cleaning	400 LPM
Limited Leasing	Barge degassing	40 LPM

These barge cleaning and degassing operations were having their waste pumped and hauled at a cost of 34 to 90 cents per gallon. ContaminationX 620 is treating their waste stream at a cost of less than one cent per gallon.

2) Military Applications

Base	Application	System
Reese Air Force Base	Well water	100 LPM

Aquifer under Reese Air Force Base has been contaminated with TCE.Aquifer supplies all water for water for base. Scandex`s contractor installed three 10 GPM systems leading
to living quarters. One 30 GPM unit was installed on a wellhead supplying water for ten living quarters. Systems have been operating since early 1994. Reese had been exhausting 200 lbs. Of carbon every month. Althoug ContaminationX 620 has a theoretical bed life of 65 years, Reese is changing the 620 beds every 12 months.

3) Oil/Water Separator Mfg.

Customer	Application	Systems
Taylor Environmental	Polish effluent	600 LPM

Taylor Environmental is a manufacturer of oil/water separators. They are using 620 as a final polish before discharge.

Oil/Water seperators are best at removing free oil. They can routinely drop Contamination levels to 25 ppm. When discharge requirements are below 25ppm, a polish unit needs to be installed.

4) STATE REMEDIATION

Customer	Application	Systems
Iowa	Maintenance garage discharge	200 LPM
North Carolina	Ground water remediation	20 - 400 LPM
Virginia	Mobile filtration	400 LPM
Illinois	Ground water remediation	40 LPM
Maryland	Ground water remediation	10 LPM
Tennessee	TVA, BTEX and PCB´s	40 LPM
Pennsylvania	Ground water remediation	150 LPM

TECHNICAL BULLETIN

Designing Filtration Systems Using ContaminationX 620

I. HEADSPACE ALLOWANCE:
ALLOW 20% OF HEADSPACE IN VESSEL FOR MEDIA EXPANSION.

II. LENGTH AND DIAMETER RATIO REQUIREMENTS FOR VESSELS:
IDEAL DESIGNS INCORPORATE:

1. **HIGH FLOW RATES:**
   2:3 RATIO, 60 METER HIGH AND 30 METER IN DIAMETER. AT 2.3 RATIO, MAXIMUM FLOW OF 200 l PRO SQUARMETER

2. **LOW FLOW RATES:**
   2:1 RATIO,60 CM HEIGHT AND 30 CM DIAMETER MAXIMUM VELOCITY OF FLOW 120 L PER SQUARE METER FILTER BED.

III. **HYDRAULIC LOADING IN BULK APPLICATIONS:**
12 - 20 L SQUARE FEET, DEPENDING ON L/D RATIO (LENGTH/DIAMETER)

IV. **SCREENING OF EFFLUENT MANIFOLD:**
PARTICLE SIZE OF SCANDEX´S A620 STANDARD IS 12/36 CARBON ENHANCED WITH 10/24 SCREEN POLYMER. MESH SCREEN FOR MANIFOLD HAS TO BE SMALLER THAN SCREEN SIZE OF MEDIA.

V. **620 CARBON HARDNESS:**
SLIGHTLY HARDER THAN BITUMINOUS COAL, SOFTER THAN ANTHRACITE. POWDERING OF CARBON COMPONENT IS SLIGHT AT START UP, NONE THEREAFTER UP TO 100 PSI OPERATING PRESSURE.

VI. **BALLASTING:**
10 POUNDS OF BALLAST PER CUBIC FOOT OF MEDIA

VII. **COST PER GALLON OF WATER TREATED:**
AVERAGE COST PER GALLON (AT 200 mg/l TOC/THP) IS $0,001 TO $ 0,002

VIII. **RETENTION TIME FOR CONTAMINANTS**
BTEX - 3 MINUTES
LIGHT CHLORINATED HYDROCARBONS - 4 MINUTES
MIXED CHLORINATED HYDROCARBONS OR LEVELS ABOVE 20 PPM - 5 MIN

COMPOUNDS TO BE FILTERED BEFORE ANY 620 VESSEL

COMPOUNDS	MAXIMUM LEVEL	SOLUTION
IRON	1 PPM	Greensand, Potassium Iron Removal Filter
MANGANESE	5 PPM	Same as Iron
TSS	5 Micron (Total Suspended Solids)	Bag filter, CArtridge, D.E. Sand Filters, Cyclonic
HYDROCARBONS	100 PPM*	O.W.S, Skimmer

The above is a list of compounds that will prematurely blind 620. The above levels are maximums that any 620 vessel come into contact with.

* 620 is a media designed to be the final polishing of a given waste stream. 620 is capable of handling hydrocarbons higher than 100 PPM. In order to achieve the maximum economics of 620, a level of less than 100 PPM is recommended.

PROPYLENE AND ETHYLENE GLYCOLS WILL COAT 620 FILTRATION MEDIA CAUSING PREMATURE BLINDING AND FAILURE OF THE MEDIA

LIQUID FILTERS
STEEL TANK SERIES
INSTALLATION & OPERATION INSTRUCTIONS

Tank Series are supplied individually or coupled with additional accessories such as Series I Valve Systems and other OEM equipment. High pressure Series are generally serviced on-site. For service please contact your sales representative.

Tank Series are carbon steel pressure vessels with vinyl ester lining (other systems available). The vessels are available with ASME code stamped as an option.

SHIPMENT

Tank Series are shipped when possible upright with 620 pre-loaded. However, with larger systems it may become necessary to ship the Tank unit on its side with or without the 620 pre-loaded. The Tank series when shipped upright are generally bolted to timbers for forklift movement. All Tank Absorbers are fitted with lifting eyes capable of lifting the vessel with dry media only. Certain special systems may be pre-plumbed and skid mounted and may require specific shipment methods. Contact your sales representative if you have any questions regarding shipment.

ContaminationX 620 MEDIA LOADING INSTRUCTION

1. Remove manway

2. Inspect vessel (remove any debris found inside vessel).

   Inspect INFULUENT & EFFLUENT piping, looking for loose or not properly fitted screens if present. Inspect for broken piping and or disconnected fittings.

4. Fill the bottom portion of the vessel with PEA GRAVEL (1/4" - 1/2" size) cover the effluent piping distributor until the gravel is a minimum of 1" above the highest point effluent piping distributor (pea gravel must cove entire effluent piping distributor).

5. Cover entire pea gravel bed with 1 HOG HAIR FILTER MEDIA.

6. Load 620 Filtration Media.

   *Top of Media must be level to insure a flat surface for ballast.

7. Cover entire 620 with 1" HOG HAIR FILTER MEDIA. Load ballast gravel (minimum 1' diameter)

   * Amount of ballast is determined by the amount of 620 previously loaded. 10 lbs.Of gravel ballast is required for every cubic ft. of ContaminationX 620 Media.

WETTING AND DEAERATION

Scandex's ContaminationX 620 must be wetted and deaerated prior to use. This procedure displaces air from the internal structure of the carbon granule, thus assuring that the liquid to be treated is in contact with the media surface.

Prior to operation, the vessel must be filled with clean, uncontaminated liquid. The recommended method for filling the vessel is through the outlet line. Open the inlet line to purge air from the system. Feed water into the outlet line until water flows from the inlet line. The wet carbon should be allowed to set for a minimum of 2 hours to allow most of the carbon internal surface to be wetted.

After wetting, the 620 bed can be deaerated by draining the vessel, and again filling the vessel upflow with uncontaminated water. This procedure will eliminate any air pockets which may have formed between the 620 granules. The vessel is now ready for operation.

INSTALLATION

The vessels should be set on a flat surface, capable of supporting the operation weight of the unit or system. Operating weights are listed on the specification sheet.

If the filter(s) is supplied individually the inlet and outlet piping should be connected to the unit using either flexible hose or hard piped. The outlet piping should be designed to allow flooded operation of the vessel at all times to assure effective operation. If the outlet

line does not provide for back pressure on the vessel unit, then the discharge piping should include an elevated piping loop to assure flooded operation.

If the supply pump is capable of producing pressure greater than the design limitation of the filter it is recommended that a rupture disk or pressure relief valve be installed.

620 filters can be manifolded in parallel operation for higher flow rates. Series operation is the preferred method of operation as it provides for the greatest degree of bed utilization.If water conditions such as high suspended solids exist a filter should be

installed prior to the vessel. A simple cartridge or screen filter helps prevent pressure buildup in the 620 bed. Many other water issues may effect 620 operation and we therefore recommend you discuss your specific installation with your sales representative. OPERATION With the vessel full of liquid, flow can be introduced to the unit. Liquid enter

through the inlet connection, flows downward through the 620 bed and exits through the outlet connection.

Flow rates to the vessel should be determined based upon the required

contact time between the liquid and the 620 media. The required contact time

normally is determined prior to installation and operation of the vessel.

Monitoring

ContaminationX 620 units only require periodic monitoring if properly installed. The following items may be monitored:

1. Pressure Check inlet and outlet pressure. Increase in pressure differential may indicate build-up of filtered solids.Never exceed maximum design pressure of filter.

2. Samples: Inlet and outlet sample points if provided for liquid analysis to determine System Performance.

3. Air: Check for trapped air by opening upper vent valve and allowing small amount of liquid to flow out- If your System provides an automatic vent Systems it is still necessary to periodically verify it's Operation.

VESSEL SERVICING

The vessel may be serviced on-site using either vacuum or manual removal methods. Prior to servicing, the unit should be closed off from influent and effluent lines and any electrical devices or connections should be tagged off. If the unit is to be vacuum serviced it is recommended that the filter be drained of all water 24 hours prior to Service.

After removal of the spent 620 is complete, it is recommended that the inside of the vessel be washed to remove all contamination and any trace of spent 620. After System is washed, the vessel should also be checked thoroughly and any minor maintenance conducted.
If vessel will be shutdown for extended periods in climates where freezing may be a problem certain procedures should be taken to protect the vessel. Drain all water from the vessel utilizing the effluent connection and the drain port if available. When draining allow air to enter the System by venting the influent line. Store the drained filter with system vented. Caution should be taken during System startup following exposure to freezing conditions as the 620 may still be in a frozen State days or weeks after. Refer to the startup procedure earlier in this document.

SAFETY CONSIDERATIONS

Scandex 's 620 contains activated carbon. Wet or dry activated carbon preferentially removes oxygen from air. In closed or partially closed Containers, oxygen depletion may reach hazardous levels. If workers must enter a container containing carbon, appropriate sampling and work procedures should be followed for potentially low-oxygen Spaces - including all applicable federal and State requirements Never exceed maximum operating pressure of the vessel.

620 FILTRATION MEDIA CANNOT BE BACKFLUSHED.

Due to the mixture of polymer and carbon, Scandex's 620 media CANNOT be backflushed. Pre-filtration is essential to sustaining the 620 Media life.

CONTAMINANTS REMOVED

The following contaminats can be successfully removed from waste water using ContaminationX 620 Filtration Media. The critical variable for degree of removal is residence time (contact time with the media bed). As a rule of thumb, to get contaminants to less than 1 PPB requires 3 minutes for BTEX, 4 minutes for light chlorinated hydrocarbons, and 5 minutes for mixed chlorinated hydrocarbons at levels above 20 PPM.

1,1,2 Trichloroethane
1,1 Dichloroethane
1,1 Dichloroethylene
1,2,3 Trichloropropane
1,2 Dichloroethane
1,2 Dichloropropane
Acetone
Benzene
Benzol
BHC
Karbon Tetrachloride
Chloride
DBCP
Diedrin
Diesel
Endrin
Flouride (some)
Halogene Kohlenwasserstoffe
Lindan
Methylen Chlorid
Napthalen
Nitro Komponenten
PCB
Petroleum
Phenol
Phthalate
Pyren
Tetrachloroethylen
THM
Toluen
Toxaphen
Trichloroethylen (TCE)
Xylenes

Performance Data

The follwing data represents actual applications at installations around the country. While the data is summarized, the actual data is available upon request. The filtration systems are being use to meet or exeed discharge regulations.

Material	Influent	Effluent
Oil and Greas	370,0 mg/l	3,8 ug/l
Toluene	5,6 ug/l	ND
BTEX	54,3 mg/l	12,4 ug/l
Benzine	950,0 ug/l	< 1 ug/l
Ethylbenzene	10,0 ug/l	ND
Xylene	900,0 ug/l	< 1 ug/l

Holland, MI
Test – Nr. 8468
Test – Nr. 8606

Material	Influent	3 min	5 min
Benzin	21	<1	<1
Bromdichloromethan	69	<1	<1
Chloroform	19	2	<1
1,2 Dichlorobenzin	33	<1	<1
1,1 Dichloroethan	2722	1467	1
1,1 Dichloroethen	2930	14	14
Ethyl Benzin	154	31	<1
Methylen Chlorid	18450	46	48
Tetrachlorethan	4370	1625	2
Toluen	670	101	<1
Trichloroethen	2803	<1	<1
Xylene	1147	<3	<3

Burlington
Environmental

Test Method
EPA 624/8260
Test Nr. TK1603

Material	Influent	Effluent
Carbon Disulid	29,0 mg/l	not detectable
Methylen Chlorid	310,0 ug/l	not detectable
1,1 Dichloroethan	27,0 ug/l	not detectable
2-Butan (MEK)	770,0 ug/l	not detectable
1,1Trichloroethan	250,0 ug/l	not detectable
1,2 Dichloroethan	28,0 ug/l	not detectable
Benzin	780,0 ug/l	not detectable
4-Methyl-2Pentanon	260,0 ug/l	not detectable
1,1,2,2Tetrachloroethan	180,0 ug/l	not detectable
2- Chlorotoluen	150,0 ug/l	not detectable
1,3 Dichlorobenzin	5,0 ug/l	not detectable
1,4 Dichlorobenzin	10,0 ug/l	not detectable
P-Isopropytoluen	320,0 ug/l	not detectable
1,2,3Trichlorobenzin	7,0 ug/l	not detectable