Guide To Waste Disposal

BPD010A

Introduction

This booklet is a guide to automotive repair shop owners and managers to:

1) assist them in understanding hazardous waste regulations in general
2) provide a guide for identifying, obtaining and interpreting regulations governing their individual shops
3) to encourage shop owners to handle waste responsibly and, where possible, to minimize hazardous waste generated by their shops.

This document is designed as an outline and interpretive guide to understanding, generally, the regulatory setting which may apply to the use of Bird Bath™ brake washing equipment.

IT IS NOT A SUBSTITUTE FOR SITE-SPECIFIC LEGAL ANALYSIS AND IS NOT OFFERED AS A LEGAL OPINION ON THE SUBJECT OF WASTE DISPOSAL. WHERE APPROPRIATE, LEGAL COUNCIL SHOULD BE CONSULTED TO MAKE DETERMINATIONS IN THIS REGARD.

Business owners and managers are the persons responsible for complying with the federal, state and local regulations governing the handling of waste generated by their businesses.

Generally speaking, insofar as waste from brake cleaning operations is concerned, using Bird Bath™ brake washing equipment and the Dispos*ALL* System™ according to the instructions provided, waste products from the brake washers can be disposed of in a simple, inexpensive manner in compliance with federal, state and local regulations.

Testing referred to in this guidebook was performed at various certified laboratories on samples which were obtained over a period of several years from numerous shops. Complete laboratory reports are available upon request.

Overview

ENVIRONMENTAL REGULATIONS

Wastewater

Protecting streams, rivers, lakes and oceans from contamination due to hazardous and toxic substances is a major responsibility of the federal Environmental Protection Agency (EPA). The US Congress has legislated numerous laws directing "EPA to take measures protecting the Nation's waters to safeguard public health, aquatic life, recreational uses and aesthetics".[1] The federal Clean Water Act empowers EPA to regulate the discharge of pollutants into the waters of the United States which it does through the National Pollutant Discharge Elimination System (NPDES). The NPDES program is the basis on which the states permit and regulate Publicly Owned Treatment Works (POTW's).

In cities throughout North America, wastewater flows through the sewer system to POTW's which process the wastewater to a level of purity required by EPA. In areas where wastewater goes into septic tanks, these tanks are periodically pumped and the contents taken to a POTW for processing.

At the local level, the POTW's issue ordinances to regulate pollutants in wastewater discharged into the sewer system. It is these local ordinances which govern wastewater discharged by auto repair shops and other businesses using the sanitary sewer. Across the nation, there are large variations in these local regulations; some are more strict than the federal standards while others are more lenient.

Solid Waste

Protecting groundwater from hazardous substances which might seep or leach from solid wastes is a further responsibility of the EPA. Landfilled solid waste which is wet or becomes wet can leach metals and other poisons into underground streams thereby contaminating them. The EPA Resource Conservation and Recovery Act (RCRA) is the basis for federal regulation which has been adopted in full, or by reference by the states. California, however has extended the scope of its regulation significantly beyond that mandated by the federal government.

HAZARDOUS TO WHAT?...TO WHOM?

Understand that "hazardous" may refer to humans, to the environment or to both. Some things may be hazardous to the environment while not directly hazardous to humans (although damage to the environment and to the ecosystem we live in will eventually have a negative impact on us humans).

[1] BNA Environmental Reporter, Federal Laws 51:1630

Freon is an example of a substance which is generally thought not to be a hazard to man, although it can damage the ozone layer. On the other hand, asbestos is hazardous to man but is not hazardous to the environment; indeed, it is a mineral derived from the environment.

SHOP MANAGER AND/OR OWNER'S RESPONSIBILITY

Shop owner/managers have sole responsibility to determine if waste generated at the shop is or is not a hazardous waste. This responsibility extends to all waste generated at the site. Owner/managers may have waste materials tested or they may make their determination by "applying knowledge of the hazard characteristic of the waste in light of the materials or processes used".[2] Thus, owners/managers may rely upon testing performed by Bird Bath™ on samples of waste from vehicle repair shops instead of incurring the cost of testing to characterize their own waste.

Shops electing to rely upon Bird Bath's™ testing should assure that 1) Bird Bath™ equipment is being used according to the manufacturer's operation and maintenance procedures, and 2) Bird Bath™ filters and cleaning solution are being used in the equipment.

Hazardous waste may be recycled, treated on site to convert it to non–hazardous waste, or simply removed in its hazardous state by a company specializing in off–site treatment or disposal of hazardous waste. Since the shop owner's responsibility for hazardous waste has no time limit, even when it has been carted away by someone else, it is best to stop generating hazardous waste whenever possible.

Cleaning brakes with Bird Bath™ brake washers eliminates the hazardous waste which is generated by customer–owned and rental brake cleaners using toxic, combustible solvents.

[2] 40 CFR 262.11 (c)(2)

Disposal of Brake Washer Wastewater

Numerous tests performed over a two (2) year period affirms that wastewater from Bird Bath™ brake washers may be properly disposed of in sanitary sewers and septic systems throughout North America.

OVERVIEW

The federal National Pollutant Discharge Elimination System sets standards for the quality of water which may be released into lakes, streams, rivers and oceans by Publicly Owned Treatment Works (POTW's). To meet these standards imposed upon them, POTW's pass ordinances to regulate users of the sewer system. Some POTW's require all or certain designated customers to obtain permits which expressly define the limits of pollutants in wastewater discharged into the sewer.

Sewer use regulations vary considerably throughout the nation. Generally speaking, allowable levels of pollutants will depend upon the constitution of sewage flowing into the POTW and the physical capability and capacity of the POTW to treat the sewage. Thus, without the benefit of examining the thousands of such regulations nationwide, one cannot make unqualified statements as to allowable procedures and standards in every community and city. However, based on a sampling of regulations from 65 cities and regions in the USA and testing provided herewith, **one may predict that wastewater from Bird Bath™ brake washers may be legally and properly disposed of into the sanitary sewer system or into a local septic tank.**

NOT ALL POLLUTANTS ARE TOXIC OR HAZARDOUS

Wastewater contains pollutants which may or may not be toxic or hazardous. Vinegar, for example, is an acidic pollutant which falls outside the acceptable pH range allowed by POTW's. A business, even a restaurant, would be prohibited from discharging vinegar into the public sewer system if all of its discharge consisted of vinegar. However, vinegar and other pollutants are naturally diluted as they mix with wastewater from the many other wastewater sources at the business, e.g., washing dishes, hands and floors, and of course, the use of toilets. Thus, disposing of vinegar and other pollutants into the sanitary sewer drain still results in the business being able to remain within its allowable discharge limits.

While cleaning solution from auto or truck brake washers have been tested to prove that they are non–hazardous and non–toxic, they do contain pollutants.

However, a review of wastewater discharge limits for 65 cities and regions in the USA has shown that wastewater from Bird Bath™ brake washers, after one month's use in a busy brake shop, would be within allowable discharge limits in 40 of the 65 areas examined even in its concentrated state.

In the 25 areas examined where pollutant limits were exceeded, one can confidently say that disposing of brake washer cleaning solution should not cause the shop to exceed allowable limits since discharge limits govern water quality at the point water enters the public sewer system and the cleaning solution will be further diluted by other water also being discharged from the site. As mentioned above, this dilution of wastewater from the brake washer naturally occurs as it moves through the drain and mixes with other water from toilets, wash basins, floor drains, car washing, floor washing etc.

It is important to keep in mind that tests were performed on the solution in Bird Bath™ brake washers prior to disposal and not performed on the stream of wastewater leaving the shop which is the object of regulation. Were the shop's discharge into the sewer system tested while disposing of cleaning solution, pollutant levels would have been far lower than that recorded for the concentrate itself.

CONSIDER THE SMALL QUANTITY

The Wall New Jersey sewer and water department reports that the three auto repair shops in its service area had the following average daily water consumption (and presumably discharge into sewers) last year:

Firestone	250 gallons per day
Gulf	135 gallons per day
Citgo	260 gallons per day

When viewed in the context of these figures, **the volume of brake washer cleaning solution being disposed of is minuscule** since it is changed only once every four to eight weeks and then yields only eight to ten gallons of wastewater. This is the equivalent of two to three flushes of a toilet over a two month period.

METALS

The federal government lists 8 principal metals which are regulated as environmental hazards. These are arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver. For the purpose of establishing a worst case scenario, in February 1993 cleaning solution was sampled and tested after being used in a very busy shop to clean brakes for a three month period.[3] **Even in this extreme case, metal concentrations were either not**

[3] AnalytiKEM Test Report No. A29929, April 14, 1993, page 6

detected, or if detected, were far below federal and state standards for metals in hazardous waste.

Analysis of wastewater from a brake washer after one month's use in a New Jersey shop featuring brake repair[4] ,yielded **data showing very low levels of metals in the solution—levels that were far below the federal and state standards.**

California has even tougher standards for metals in wastewater. To determine whether wastewater is or is not a California hazardous waste, additional tests must be performed by a laboratory certified by the State of California. Using state prescribed procedures, a Total Threshold Limit Concentration (TTLC) value is determined for the waste.[5]

Tests performed by a California certified laboratory on waste from a brake washer placed in service in a busy shop for one month, proved that the wastewater was non–hazardous according to California hazardous waste criteria. [6]

Toxicity to aquatic life, specifically fish, is one of the criteria used to gauge the hazardous potential of a waste in California. A Static Acute Bioassay Procedure must be performed on the waste to establish a LC–50 value .[7] This is the concentration at which 50% of the fish tested die when exposed to the wastewater for 96 hours. A 96–hour LC–50 value of less than 500 mg/liter classifies the waste as a California hazardous waste.

Tests performed by a California certified laboratory on wastewater from a brake washer placed in service for one month in a busy shop, resulted in a LC–50 value of more than 1,000 mg/liter.[8]

Based on the Static Acute Bioassay Procedure, Bird Bath™ brake washer wastewater is non–hazardous California waste.

When selecting a cleaner for brakes, one must take into consideration that the chemistry of the cleaning solution will affect the amount of metals held in solution.

SuperSolv™ is specially formulated to minimize dissolved metals in the solution thus improving the likelihood that the waste solution will be non hazardous in California and throughout the USA. Customers using alternate cleaners may not achieve similar test results on their waste and should not rely upon Bird Bath's™ testing to characterize their waste.

[4] American Environmental Network Test Report No. A32955-3, May 17, 1994, page 2
[5] Title 22, California Code of Regulations, 66261.24 (a)(2)
[6] American Environmental Network, AEN Work Order 9405180, June 1, 1994, page 4
[7] Title 22, California Code of Regulations, 66261.24 (a)(2)
[8] Sequoia Analytical, Lab Numbers 405-1166 and 405-1167, June 8, 1994

ASBESTOS

There is presently no federal standard for asbestos content in wastewater, nor to the writer's belief are there state regulations to this effect. Lacking a standard by which to judge the acceptability of wastewater containing asbestos, one may look to the federal Safe Drinking Water Act of 1993. This act sets an upper limit of seven million fibers of asbestos ten microns or longer in size per liter of drinking water.[9]

Again, seeking to establish a worst case scenario, four samples of wastewater from shops in New Jersey and in California were sampled and tested after three months of use cleaning brakes with a brake washer. The laboratory reported "In fact the levels detected are less than the most stringent Drinking Water Regulations (NPDWR under the Safe Drinking Water Act : EPA 1976 and 1993)" [10]

One need not be concerned about disposal because the used cleaning solution passes the federal standard for asbestos in drinking water.

PETROLEUM HYDROCARBONS— GREASE AND OIL

Wastewater discharged to the sanitary sewer is regulated as to the quantity of grease and oil, and occasionally, the amount of petroleum hydrocarbons allowable in the discharge. Many areas of the country have no specified limits for petroleum hydrocarbons, however, most will regulate grease and oil content.

Of the 65 cities and regions examined, only 6 regulate petroleum hydrocarbon content in wastewater. West Palm Beach Florida has the lowest standard of 15 mg/liter (parts per million) with New York City the next lowest with a limit of 50 mg/liter. For oil and grease content, Fort Lauderdale has the lowest limit of 5 mg/liter while Boston has a limit of 15 mg/liter. The remaining 63 of 65 examined had limits of 50 mg/liter or greater.

Laboratory analysis of brake washer cleaning solution in 1994 showed that it contained 1.1 mg/liter [11] , far below the limit in the cities and regions examined. Another test of used cleaning solution detected no petroleum hydrocarbons.[12] while one sample from a California brake shop in 1992 contained 12 mg/liter.[13] A test for grease and oil in brake washer solution determined that the solution contained 24 mg/liter.[14]

Thus, even in its concentrated state, wastewater from the Bird Bath™ brake washer was within the discharge limits of all 65 areas for petroleum hydrocarbons and 63 of 65 cities and regions for oil and grease. Once the cleaning solution mixes with other wastewater at the facility the discharge from the facility will be within acceptable limits for oil and grease in all areas.

9 40 CFR 141.23 (a)(4)(i)
10 International Asbestos Testing Laboratories' Analysis Report Project 92-439-01; June 16, 1992
11 American Environmental Test Report No. A32955-3, May 17, 1994, page 3
12 AnalytiKEM Test Report No. A32884-A, May 24, 1994, page 1
13 AnalytiKEM Test Report No. A27477, May 13, 1992, page 5
14 American Environmental Network Test Report No. A32955-3, May 17, 1994, page 3

Truck brake washing typically results in greater amounts of grease and oil in the solution because of the frequency of cleaning brakes contaminated with oil from leaking axle seals. With increasing frequency, truck repair shops will have an oil–water separator to remove oil and grease which may have exceeded the capacity of the Oil–Sorb™ to remove oil from the solution.

Tests on wastewater from a brake washer after one month's use in a commercial truck repair garage showed that the petroleum hydrocarbon level was 54 mg/liter and the oil and grease content was 260 mg/liter.[15] In cities and regions with discharge limits below the test levels, shops using the brake washer should pass the used cleaning solution through an oil-water separator before discharging it into the sanitary sewer.

A practice of pouring the brake washer solution slowly down the drain and passing it through an oil–water separator, when coupled with the natural dilution occurring from other wastewater sources, will keep the oil and grease content of the shop's discharge at acceptable levels.

EMULSIFICATION

SuperSolv™ is a formula of powerful cleaning agents using Tarksol-97™, a patented terpene solvent which is non-toxic, biodegradable, non-combustible, and non hazardous. Due to its unique chemical composition and the relatively small amount of cleaner entering the oil–water separator, SuperSolv™ is not expected to effect the operation of separators.

PCB'S, PESTICIDES AND HERBICIDES

No tests were performed for these chemicals. PCB's, pesticides and herbicides are regulated by the EPA; however, one would not expect to encounter these chemicals in friction products, brake hardware or in automotive brake assemblies.

VOLATILE AND SEMIVOLATILE CHEMICALS

No tests were performed for these chemicals since they are not found in Bird Bath's™ SuperSolv™ cleaner nor are they found in brake assemblies or decomposed friction products. Volatile and/or semivolatile chemicals will only occur in wastewater if the equipment is misused. Always follow Bird Bath™ operating and maintenance instructions when using the equipment.

pH

Sewer ordinances generally allow for a broad range of acceptable pH readings with a range of 5.5 to 11.0 being common. Bird Bath's™ SuperSolv™ brake washing cleaner is an alkaline formula which, when diluted with water to concentrations ranging from 2.5% to 33% has a pH of between 8 and 9. A sample of wastewater from a brake washer in service for one month in a busy repair shop tested at 8.30.[16]

[15] American Environmental Network Test Report No. A33084, June 1, 1994, page 3
[16] AnalytiKEM Test Report No. A32887, April 28, 1994, page 2

Thus, generally, wastewater from Bird Bath™ brake washers, based on testing provided herewith, should be within pH limits set by typical POTW's .

Brake Fluid

Brake fluid may be a hazardous waste due to the concentrations of heavy metals in the used fluid. Technicians should never use the brake washer to dispose of used brake fluid nor should they use the Brake Washer to capture brake fluid during brake bleeding.

Small amounts of brake fluid may be introduced into the used cleaning solution as a result of cleaning brakes with leaking wheel cylinders. This small amount of brake fluid is considerably diluted in the ten gallons of brake washer cleaning solution and should not pose a problem regarding disposal. All brake washer testing has been performed on waste taken from machines in active use in busy repair shops. One can reasonably expect that technicians in these shops had occasion to clean brakes with leaking seals as often as technicians in any other shop might do.

CONCLUSION

Wastewater from Bird Bath™ Brake Washers using the Dispos*ALL* System™ can be legally and properly disposed of into the sanitary sewer system or into a local septic tank.

In the unlikely event that a shop is monitored and found to exceed discharge limits for pollutants, one can expect to be notified by letter from the sewer department advising of the inspection results, asking for an explanation of what caused the excess, and what steps the shop will take to correct the situation. Sewer departments will typically provide customers with ample opportunity to comply with discharge limits prior to resorting to fines and penalties.

Disposal of Brake Washer Solid Waste

Tests performed on filters and solid waste from brake washers used according to Bird Bath™ operating and maintenance instructions, affirms that the waste may be properly disposed of as non-hazardous, ordinary shop waste, without special handling or treatment.

OVERVIEW

The diversity of regulations governing wastewater is not found in solid waste regulations. EPA's Resource Conservation and Recovery Act (RCRA) is the federal regulation which has generally been adopted in full, or by reference by the states. RCRA sets the standard by which the disposal of solid waste is regulated throughout the US however, California has expanded the scope of its hazardous waste regulation significantly beyond that of RCRA. Local governments may establish tougher regulations although they commonly do not do so.

WHAT IS HAZARDOUS WASTE?

RCRA Hazardous Waste— Applicable to all states

40 CFR 261 Subpart C of RCRA defines the characteristics of hazardous waste. These characteristics are **ignitability, corrosivity, reactivity and toxicity.** Of these, toxicity is the characteristic which might reasonably apply to solid waste from the brake washer.

Toxicity is analyzed by Method 1311 Toxicity Characteristic Leaching Procedure (TCLP) which determines the mobility of various constituents which may be present in the waste.[17] Mobility is the key word. EPA does not object to these wastes being disposed of in landfills, it simply does not want them going anywhere once they are buried. This might occur if the contaminates were to seep or leach into groundwater.

Laboratory analysis of a brake washer filter taken from a busy tire and repair shop after one month's service showed it to be non–hazardous based on testing for TCLP criteria.[18]

The Oil–Sorb™ floats in the brake washer tank to absorb oil keeping the cleaning solution oil–free. With every change of the Primary Microfilter, the Oil–Sorb™ is wrung out to release trapped oil which is then disposed of with the shop's waste oil. After many uses, generally after 12 to 18 months of service, the Oil–Sorb™ can be wrung out one last time and disposed of as ordinary non-hazardous shop waste.

[17] 40 CFR 261 Appendix II
[18] AnalytiKEM Test Report No. A32887, April 28, 1994, page 1

Laboratory analysis of an Oil–Sorb™ prior to disposal demonstrated that it did not exhibit toxic characteristics based on TCLP metals nor on volatile or semivolatile chemicals.[19]

California Hazardous Waste—California Only

The definition of toxicity has a broader meaning in California whereupon waste may be classified as "California hazardous waste" in spite of the fact that it is not a "RCRA hazardous waste". To determine whether a waste is or is not a California hazardous waste, additional testing must be performed by a laboratory certified by the State of California. Using the state prescribed "Wet Extraction Test " (WET), a Soluble Threshold Limit Concentration (STLC) value and Total Threshold Limit Concentration (TTLC) value are determined for the waste.[20]

To determine compliance with these criteria, tests were performed by a California certified laboratory on waste from a brake washer placed in service in a busy shop for one month. Laboratory analysis proved that the solid waste was non–hazardous according to California hazardous waste criteria for metals.[21]

As mentioned above in the Wastewater Metals section, California also requires that waste be tested to determine its 96–hour LC–50 value. In this regard, tests performed by a California certified laboratory on solid waste taken from a brake washer after one month in service in a busy shop, resulted in a LC–50 value of more 1,000 mg/liter.[22]

Based on the criteria established for the Static Acute Bioassay Procedure, Bird Bath™ brake washer solid waste is non–hazardous California waste.

Asbestos

Throughout the US with the exception of California, asbestos and asbestos-containing-waste with 1% or more of asbestos by weight, are classified as non–hazardous, industrial wastes which are nonetheless regulated requiring special handling, packaging and disposal. Asbestos and asbestos-containing-waste with 1% or more of asbestos by weight in a friable or potentially friable state, is a hazardous waste in California.[23]

Numerous tests of brake washer filters has shown that asbestos content is well below the 1% threshold meaning that the filter and the waste it contains are not regulated as asbestos–containing–materials in any state.[24] **As far as asbestos is concerned, Bird Bath™ filters may be disposed of as ordinary, non-hazardous waste in California and all other states.**

19 AnalytiKEM Test Report No. A27238-1, April 29, 1992, pages 7-10; No. A27238-2 Supplemental, May 8, 1992, page 8
20 Title 22, California Code of Regulations, 66261.24 (a)(2)
21 American Environmental Network, AEN Work Order 9405180, June 1, 1994
22 Sequoia Analytical, Lab Numbers 405-1166 and 405 1167, June 8, 1994
23 Title 22, California Code of Regulations, 66261.24
24 AWI Lab Projects 92-1311/1312, Dec. 12, 1991, page 4; International Asbestos Testing Laboratory Project 92-P381-001, January 29, 1992, 3 pages

DISPOSING OF WASTE FROM BIRD BATH™ BRAKE WASHERS

Numerous tests of waste brake washers used in busy brake repair shops according to the manufacturer's operation and maintenance instructions, prove that the filters and solid waste may be disposed of as ordinary, non–hazardous waste. Simply toss them into the trash.

THE POTENTIAL FOR HAZARDOUS WASTE CAN INCREASE WITH USE

Cadmium and chromium, two of the metals which are regulated under RCRA, are used to plate metal brake parts. One would not generally think of plated parts as being hazardous waste and, indeed, the part itself would not be classified as a hazardous waste if it were to be discarded. However, if the concentration of minute particles of these plating metals collected in the filter is high enough, it can trigger a hazardous waste situation under RCRA.

At least trace amounts of metals will always be present in brake washer solid waste. The likelihood that this waste might be classified as hazardous under RCRA is largely dependent on the number of brake cleanings it is used on.

A test of a Primary Microfilter in service for one month in a busy repair shop showed only a trace of barium, less than one–tenth the RCRA limit.[25] Thus the Primary Microfilter and its contents were not classified as RCRA hazardous waste and should be disposed of as ordinary, non–hazardous, shop waste.

On the other hand, tests performed on a Primary Microfilter after three months of use, showed that the concentration of arsenic, barium, cadmium, chromium and lead was higher than the RCRA limit. This filter would have to be managed as RCRA hazardous waste.

Clearly, shops wishing to avoid having to manage filters as hazardous waste should change filters often, even when they are not filled to capacity, and follow maintenance and operation instructions provided with Bird Bath™ brake cleaning equipment.

[25] AnalytiKEM Test Report No. A32887, April 28, 1994, page 1

PROCEDURE

A good management practice would be to 1) change filters once a month or after cleaning brakes on 150 vehicles and, 2) assure that no solvents, or other chemicals are introduced into the brake washer tank. Small amounts of brake fluid resulting from cleaning leaking wheel cylinders should pose no problem regarding disposal.

DOCUMENTATION

When it comes to regulatory compliance, shop owners/managers are in the strongest position if they can present inspectors with written documentation of the shop operating and maintenance procedures supported by a log listing activities which were performed to fulfill those procedural requirements

TRAINING

Apart from it being a good management practice, many regulations require that training be provided and records kept to document the training.

Bird Bath™ provides customers with a detailed operation and maintenance manual describing how the brake washers are used in brake servicing and how to properly change and dispose of filters and used cleaning solution.

Test Reports

Excerpts from laboratory analysis reports.
Complete lab reports with quality control data and chain of custody documents available on request by calling the DisposALL™ Hotline 800-242-4002, extension 3110

V. Analytical Results (Cont'd)

AnalytiKEM

Metals

	Sample Designation	
Parameter	Method Blank	A29929-1 Cleaning Solution After 3 Mon Use
Arsenic, total	10 U	5.4 J
Barium, total	200 U	15,000
Cadmium, total	10 U	80
Chromium, total	50 U	460
Lead, total	50 U	130
Mercury, total	2.0 U	2.0 U
Selenium, total	10 U	10 U
Silver, total	40 U	40 U
Units	(ug/l)	(ug/l)

Bird Bath™ Footnote No. 3.
AnalytiKEM Test Report No. A29929,
April 14, 1993, page 6

Analytical Results for Metals

Method Number	Parameter	Sample Designation: Method Blank		A32955-1 1	
200/200.7	Antimony, total	60	U	60	U
200/206.2	Arsenic, total	10	U	10	U;
				10	U*
200/200.7	Barium, total	200	U	3,000	
200/200.7	Beryllium, total	5.0	U	5.0	U
200/200.7	Boron, total	100	U	2,400	
200/200.7	Cadmium, total	10	U	18	
200/200.7	Chromium, total	50	U	120	
200/200.7	Cobalt, total	50	U	50	
200/200.7	Copper, total	50	U	300	
200/200.7	Lead, total	50	U	93	
200/200.7	Manganese, total	15	U	500	
200/245.1	Mercury, total	0.20	U	0.20	U
200/200.7	Molybdenum, total	100	U	310	
200/200.7	Nickel, total	40	U	250	
200/270.2	Selenium, total	10	U	10	U;
				10	U*
200/200.7	Silver, total	40	U	40	U
200/279.2	Thallium, total	10	U	10	U;
				10	U*
200/200.7	Zinc, total	20	U	1,700	
	Units	(ug/l)		(ug/l)	

U - Compound was analyzed for but not detected. The preceding number is the practical quantitation limit for the compound.

* Duplicate Analysis

Bird Bath™ Footnote No. 4.
American Environmental Network Test Report No. A32955-3, May 17, 1994, page 2

COAST PROFESSIONAL

SAMPLE ID: BRAKEWATER WASTEWATER
AEN LAB NO: 9405180-02
AEN WORK ORDER: 9405180
CLIENT PROJ. ID: MIDAS PERALTA

DATE SAMPLED: 05/13/94
DATE RECEIVED: 05/13/94
REPORT DATE: 06/01/94

ANALYTE		METHOD/ CAS#	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED
CCR 17 Metals						
Ag	Silver	EPA 6010	ND	0.005	mg/L	05/18/94
As	Arsenic	EPA 7060	0.004 *	0.002	mg/L	05/18/94
Ba	Barium	EPA 6010	2.8 *	0.05	mg/L	05/18/94
Be	Beryllium	EPA 6010	ND	0.002	mg/L	05/18/94
Cd	Cadmium	EPA 6010	0.007 *	0.005	mg/L	05/18/94
Co	Cobalt	EPA 6010	ND	0.005	mg/L	05/18/94
Cr	Chromium	EPA 6010	0.05 *	0.01	mg/L	05/18/94
Cu	Copper	EPA 6010	0.18 *	0.01	mg/L	05/18/94
Hg	Mercury	EPA 7470	ND	0.0002	mg/L	05/18/94
Mo	Molybdenum	EPA 6010	0.04 *	0.01	mg/L	05/18/94
Ni	Nickel	EPA 6010	0.18 *	0.01	mg/L	05/18/94
Pb	Lead	EPA 6010	0.06 *	0.04	mg/L	05/18/94
Sb	Antimony	EPA 6010	0.02 *	0.02	mg/L	05/18/94
Se	Selenium	EPA 7740	ND	0.004	mg/L	05/18/94
Tl	Thallium	EPA 6010	ND	0.1	mg/L	05/18/94
V	Vanadium	EPA 6010	ND	0.005	mg/L	05/18/94
Zn	Zinc	EPA 6010	0.57 *	0.01	mg/L	05/18/94

ND = Not detected at or above the reporting limit
* = Value above reporting limit

Bird Bath™ Footnote No. 6.
American Environmental Network,
AEN Work Order 9405180,
June 1, 1994, page 4

Sequoia Analytical

680 Chesapeake Drive, Redwood City, CA 94063, (415) 364-9600, FAX (415) 364-9233
1900 Bates Avenue, Suite L, Concord, CA 94520, (510) 686-9600, FAX (510) 686-9689
819 Striker Avenue, Suite 8, Sacramento, CA 95834, (916) 921-9600, FAX (916) 921-0100

Coast Professional Products
2817 Williamsburg Dr.
Wall, NJ 07719
Attention:

Client Project ID: N/A
Sample Descript: Solid, Filter
Analysis Method: See below
Lab Number: 405-1167

Sampled: - -
Received: May 24, 1994

Reported: Jun 8, 1994

STATIC ACUTE HAZARDOUS WASTE BIOASSAY

Static [X]
Cont. Flow [ ]

Screening [ ]
Definitive [X]

Species: Pimephales promelas
Common Name: Fathead Minnow
Mean length: 25 mm (Min. length: 20, Max. length: 29)
Mean weight: 0.26 g (Min. weight: 0.13, Max. weight: 0.43)
Supplier: Sticklebacks Unlimited
Acclimation Temp.: 19 degrees C
Dilution Water: Synthetic Softwater

Organisms/Tank: 10
Replicates: 2
Organisms/Conc.: 20
Tank Depth: 13 cm
Tank Volume: 10 L

	Alkalinity, mg/L		Hardness, mg/L	
	Initial	Final	Initial	Final
Control	31	32	41	41
1000 ppm	42	60	51	72
Duplicate 1000 ppm	48	61	52	69

	Initial			24 Hr				48 Hr				72 Hr				96 Hr				Total
DATE	6/1/94			6/2/94				6/3/94				6/4/94				6/5/94				
	DO mg/L	C Temp	pH Units	DO mg/L	C Temp	pH Units	# M Dead	DO mg/L	C Temp	pH Units	# M Dead	DO mg/L	C Temp	pH Units	# M Dead	DO mg/L	C Temp	pH Units	# M Dead	Dead
Control	8.6	20	7.8	7.5	20	7.4	0	7.3	20	7.3	0	7.3	20	7.4	0	7.2	19	7.5	0	0
100 ppm	8.1	20	8.2	6.6	20	7.7	0	6.0	19	7.6	0	6.1	19	7.4	0	6.0	19	7.3	0	0
180 ppm	7.8	20	8.3	6.7	20	7.8	0	6.5	19	7.6	0	6.4	19	7.5	0	6.1	19	7.3	0	0
320 ppm	7.2	20	8.5	6.2	20	7.9	0	6.3	19	7.7	0	6.4	19	7.6	0	5.8	19	7.3	0	0
560 ppm	6.5	20	8.7	4.6	20	8.0	0	5.1	20	7.8	0	5.4	19	7.6	0	5.0	19	7.3	0	0
1000 ppm	6.1	20	8.6	5.1	20	7.8	1	4.0	20	7.8	1	4.8	19	7.6	1	4.8	19	7.4	1	1
Duplicate	DO mg/L	C Temp	pH Units	DO mg/L	C Temp	pH Units	# M Dead	DO mg/L	C Temp	pH Units	# M Dead	DO mg/L	C Temp	pH Units	# M Dead	DO mg/L	C Temp	pH Units	# M Dead	Total Dead
Control	8.6	20	7.8	7.5	20	7.4	0	7.3	20	7.3	0	7.3	20	7.4	0	7.2	19	7.5	0	0
100 ppm	8.3	20	8.1	7.2	20	7.7	0	6.5	20	7.5	0	6.5	19	7.4	0	6.2	19	7.3	0	0
180 ppm	7.9	20	8.3	7.0	20	7.7	0	6.5	19	7.6	0	6.4	19	7.5	0	5.9	19	7.3	0	0
320 ppm	7.3	20	8.4	5.8	20	7.8	2	5.8	19	7.7	2	6.2	19	7.6	2	5.4	19	7.3	2	2
560 ppm	6.7	20	8.7	4.4	20	8.0	0	4.8	19	7.8	0	5.0	19	7.6	0	4.9	19	7.3	0	0
1000 ppm	6.0	20	8.7	5.2	20	7.9	0	4.1	20	7.8	0	4.8	19	7.6	0	4.7	19	7.4	0	0

LC-50: > 1,000 ppm
LC-50 Dup: > 1,000 ppm

LC-50 Calculation Method: Moving average angle

Remarks:

Analyst: D. Newcomb

Method Reference: Static Acute Bioassay Procedures for Hazardous Waste Samples, September 1987, California Department of Fish and Game WPCL

SEQUOIA ANALYTICAL, #1271

Karen L. Enstrom
Project Manager

Bird Bath™ Footnotes Nos. 8 & 22.
Sequoia Analytical,
Lab Numbers 405-1166 and 405-1167,
June 8, 1994

Sequoia Analytical

680 Chesapeake Drive, Redwood City, CA 94063, (415) 364-9600, FAX (415) 364-9233
1900 Bates Avenue, Suite L, Concord, CA 94520, (510) 686-9600, FAX (510) 686-9689
819 Striker Avenue, Suite 8, Sacramento, CA 95834, (916) 921-9600, FAX (916) 921-0100

Coast Professional Products
2817 Williamsburg Dr.
Wall, NJ 07719
Attention:

Client Project ID: N/A
Sample Descript: Wastewater
Analysis Method: See below
Lab Number: 405-1166

Sampled: --
Received: May 24, 1994
Reported: Jun 8, 1994

STATIC ACUTE HAZARDOUS WASTE BIOASSAY

Static [X]
Cont. Flow [ ]

Screening [ ]
Definitive [X]

Species: Pimephales promelas
Common Name: Fathead Minnow
Mean length: 26 mm
Min. length: 21
Max. length: 32
Mean weight: 0.31 g
Min. weight: 0.12
Max. weight: 0.53
Supplier: Sticklebacks Unlimited
Acclimation Temp.: 19 degrees C
Dilution Water: Synthetic Softwater

Organisms/Tank: 10
Replicates: 2
Organisms/Conc.: 20
Tank Depth: 13 cm
Tank Volume: 10 L

	Alkalinity, mg/L		Hardness, mg/L	
	Initial	Final	Initial	Final
Control	32	31	41	41
1000 ppm	33	35	41	43
Duplicate 1000 ppm	32	34	41	44

	Initial			24 Hr				48 Hr				72 Hr				96 Hr				Total
DATE	6/1/94			6/2/94				6/3/94				6/4/94				6/5/94				
	DO mg/L	C Temp	pH Units	DO mg/L	C Temp	pH Units	# M Dead	DO mg/L	C Temp	pH Units	# M Dead	DO mg/L	C Temp	pH Units	# M Dead	DO mg/L	C Temp	pH Units	# M Dead	Dead
Control	8.4	21	7.8	7.1	20	7.4	0	6.9	20	7.3	0	7.0	20	7.4	0	7.0	19	7.5	0	0
100 ppm	8.8	20	7.7	7.8	20	7.4	0	7.5	20	7.3	0	7.6	20	7.4	0	7.0	19	7.5	0	0
180 ppm	8.5	20	7.6	7.0	20	7.3	0	7.0	20	7.3	0	6.7	19	7.3	0	6.6	19	7.4	0	0
320 ppm	8.7	20	7.7	7.6	20	7.3	0	6.7	20	7.2	0	7.1	19	7.4	0	6.9	19	7.4	0	0
560 ppm	8.7	20	7.6	7.4	20	7.3	0	6.7	20	7.1	0	6.9	19	7.3	1	6.8	19	7.4	1	1
1000 ppm	7.8	20	7.5	4.3	20	7.2	0	4.4	20	7.0	0	4.5	19	7.2	0	4.4	19	7.3	0	0

Duplicate	DO mg/L	C Temp	pH Units	DO mg/L	C Temp	pH Units	# M Dead	DO mg/L	C Temp	pH Units	# M Dead	DO mg/L	C Temp	pH Units	# M Dead	DO mg/L	C Temp	pH Units	# M Dead	Total Dead
Control	8.4	21	7.8	7.1	20	7.4	0	6.9	20	7.3	0	7.0	20	7.4	0	7.0	19	7.5	0	0
100 ppm	8.6	21	7.6	7.2	21	7.4	0	6.8	20	7.3	0	7.0	20	7.4	0	6.9	19	7.5	0	0
180 ppm	8.6	20	7.7	7.1	20	7.3	0	6.6	20	7.3	0	6.6	19	7.3	0	6.6	19	7.4	0	0
320 ppm	8.6	20	7.7	7.4	20	7.4	0	7.0	20	7.2	0	7.0	20	7.4	0	6.8	19	7.4	0	0
560 ppm	8.7	20	7.6	7.1	20	7.3	0	6.6	20	7.2	0	6.7	19	7.3	0	6.5	19	7.4	0	0
1000 ppm	8.0	20	7.5	5.1	20	7.2	0	4.7	20	7.0	0	4.8	19	7.2	0	4.5	19	7.4	0	0

LC-50: > 1,000 ppm
LC-50 Dup: > 1,000 ppm

LC-50 Calculation Method: Moving average angle

Remarks:

Analyst: D. Newcomb

Method Reference: Static Acute Bioassay Procedures for Hazardous Waste Samples, September 1987, California Department of Fish and Game WPCL

SEQUOIA ANALYTICAL, #1271

Karen L. Enstrom
Project Manager

TO: Bird Bath™, Inc.
P.O. Box 769
Bernardsville, NJ 07924-0769

FROM: F. Ehrenfeld III, Laboratory Director

RE: Project 92-439-01 **Date:** 06-02-92

Purpose:

This report is only relative to the Scope of Work approved for the above Project 92-439-01. This is a report of the SEM and TEM analysis of bulk samples that were performed in accordance with EPA 600/4-80-005 and EPA 600/4-84-043 for testing asbestos in water. Associated projects for TCLP and TPH are under seperate cover.

Client:

Bird Bath™, Inc.
Bernardsville, NJ 07924-0769

Site:

Various Commercial Car Brake
Replacement Facilities

Reference:

IATL Inv. 4774
IATL Pro. 022692
Probe Pro. 010992

Conclusion:

Though some asbestos and asbestiform materials were detected in the liquid matrix and the associated slurry material, none were determined to fit the definition of "asbestos-containing material" after morphological, electron diffraction, and x-ray microanalysis review by both SEM and TEM Analysis. In fact the levels detected are less than the most stringent Drinking Water Regulations (NPDWR under the Safe Drinking Water Act : EPA 1976 and 1993).

Analysis:

IATL's NVLAP and AIHA accreditied laboratory received several liquid samples from Bird Bath™. These were prepared in accordance with EPA 600/4-80-005 and EPA 600/4-84-043 for the determination of asbestos in water by TEM. The laboratory also performed the analysiss of materials using "Intermim Method for the Determination of Asbesots in Bulk Samples" by SEM in 40 CFR Part 763.

Gravimetric records (see Data Sumary) were kept of the material at each step of the prepartaion stages. The TEM and SEM preparation included ashing of the sample at ~550oC to remove organic material from the matrix. An aliquot (1-2ml diluted by 50ml) of the separated material was then used for the final

Bird Bath™ Footnote No. 10.
International Asbestos Testing Laboratories' Analysis Report Project 92-439-01; June 16, 1992

preparation unto TEM support film grids by replica methods described in EPA 600/M4-82-020. The analyses were performed on a representative portion of 0.001 - 0.003 grams of the material.

Analysis of the bulk materials that gravimetrically settled out of preparation were then completed. Further analyses by Analtyical SEM and TEM using Energy Dispersion X-Ray Microanalysis (EDXA), Selected Area Electron Diffraction (SAED), and other morpholocial methods, indicated the trace presence of asbestos in semi-quantifiable amounts.

Thus, in conclusion, the total liquid and residue sample did contain asbestos in a quantity that is considered safe and "non-asbestos containing".

Discussion

July 1976 marked the first attempt by the EPA to initiate asbestos controls in water. (Anderson & Long 1976 "EPA 600/4-80-005: Interim Method for Determining Asbestos in Water" The method called for Transmission Electron Microscopy (TEM) as the analytical tool of choice. Many facets of this first ruling have since changed with revised methods in 1980 and finally 1983, leaving only the instrumentational approach intact.

This brief description can in no way describe basic electron microscopy science nor its unique ability to discriminate asbestos minerals from non-asbestos minerals. This discussion will, therefore instead, attempt to give a basic interpretation of a) the Method, b) typical results along with their units, and c) the variables that effect such examinations.

The current method, authored by Eric Chatfield et al 1983 "EPA-600/4-84-043: Analytical Method for Determination of Asbestos Fibers in Water" was adopted because it increased analytical sensitivity. A strict definition of Analytical Sensitivity would be the calculated concentration in MFL (million fibers per liter) equivalent to counting one fiber. Analytical sensitivity differs from detection limit in that detection limit often applies to the most effective analytical scenario: devoid of obscuring variables such as instrumentation fluctuations, background interferences, and modern commercial laboratory pressures.

The method can be summarized as follows. A water sample (or liquid sample for disposal), representative of a specific source or spot location source, undergoes both filtration and dilution procedures. Dispersion of sample particulant is usually achieved by an ultrasonic bath. Any filtration process utilizes reagent quality de ionized and particle free water (adding substantial cost to these analyses) and even HgCl to preserve any archived samples to prevent bacterial buildup. Acid dissolution must be avoided to prevent optical characteristic degradation. Excessive turbidity and organic components requires ashing of diluted samples. The filtered particulant is then prepared for electron microscopy examination by carbon extraction replication followed by plasma ashing, solvent collapse and dissolution of the filter matrix. The thin carbon/particulant film is placed on a TEM support grid and examined. The examination takes place at 20,000X magnification.

*Qual*itative identification of the particluant is achieved through morphological examination, crystallographic determination through electron diffraction, and finally chemical composition of the suspected fibrous minerals via energy dispersion x-ray microanalysis.

*Quant*itative analysis is factored through a combination of the original sample volume, any dilution volumes, the area of filter material prepared, and the area of the carbon replicate examined.

Ideal analytical sensitivity or detection limit has been listed as 0.5MFL. Practical considerations however, place analytical sensitivity at between 0.5 to 15MFL. The variables effecting this range include the turbidity of the sample. If the water is 0.1 NTU (relatively clear), then analytical sensitivity

as low as 0.1 MFL might be reached with a diligent and lengthy examination. Frequently however, samples arrive as turbid as 50 to 200 NTU. The accompanying particulant must then be diminished by dilution and subsequent series filtration.

Asbestos structures (countable complex fiber aggregates) are counted over a known area and quantified using the formula below.

$$C = \frac{A_f \times R_d}{A \times V \times 1000}$$

where ..... C = asbestos fiber concentration
A = total area examined in mm2
A_f = effective filtration area of the filter membrane in mm2
V = original volume of the sample
R_d = dilution ratio of the original sample.

Note that the counting rules and other quantitation parameters established for the National Primary Drinking Water Regulations (NPDWR) under the Safe Drinking Water Act (SDWA) have evolved so that these limiting factors have been recognized. Starting in January 1993, the threshold for drinking water will be 7.0 MFL. Off hand this sounds like a large amount when compared to other analytes typically found in environmental toxicology. Many organic analytes have regulatory limits in parts per million (ppm) or other seemingly minuscule quantities. Asbestos, an inorganic and visually discernible mineral has to be quantified using a different approach.

Again, citing the above formula, note that even the observance of one fiber in a sample could result in a reported value close to the regulatory limit if certain dilution factors are taken into consideration. EPA protocol also has established "counting rules" that segregate fiber size. Health studies (Potts 1978) have shown the deleterious effects of asbestos are optimal when fibers are close to 10μm in length. These counting criteria are therefore included in the calculations, noting other asbestos sizes, but not taking them into consideration for the regulated result.

Other result interpretation notes: Results of 100 F/mm2 should not be interpreted as directly observing 100 asbestos fibers. A square millimeter area might take an 8 hour day to analyze at 20,000X magnification. Instead the observed quantity is extrapolated up using the above and other formula. Similarly, a reported result of 10 MFL is not indicative of actually observing this quantity of material.

Note also that analytical sensitivities may vary from sample to sample depending again, on dilution factor, turbidity, and sample volume. Generally, whenever asbestos is detected in greater than 2-3 countable structures, reported results usually expand in non-linear factors. As the NPDWR is fully implemented in 1993, asbestos in water will increase in significance. To fall under the 7.0 MFL limit will require either cleaner source samples or more analytical time and energy: concerns both of public water facility administrators and laboratory professionals.

I have enclosed the frontispiece and abstracts of several referenced sources. Full copies are available through the National Technical Information Service.

Other materials detected in this analysis included trace amounts of Al, Cr, Ti, Fe, and Pb. These metals were probably in oxide form and most likely were a result of automible rust, brake drum alloy, road dirt, and/or lead-containing fuel.

Data Summary:

Number	Description:	Method:	% Asbestos (Mass)	Asbestos (MFL)
175462	Liquid	TEM	NA	0.5
	Residue	SEM	2%	NA
175463	Liquid	TEM	NA	1.25
	Residue	SEM	5%	NA
175464	Liquid	TEM	NA	0.5
	No Residue	SEM	NA	NA
175705	Liquid	TEM	NA	0.5
	Residue	SEM	<0.1%	NA
Composite	Liquid Only	TEM	2.6%	2.0

Documentation:

Wyeth, Robert. (1991) *"New Primary Drinking Water Regulations"*. Environmental Lab Magazine. September 1991.

Anderson & Long. (1980) *"Interim Method for Determining Asbestos in Water"* US EPA Method 600/4-80-005.

Webber et al (1988). *"Asbestos Contaminated Drinking Water: Its Impact on Household Air"* Environmental Research Journal 46, 153-167.

Webber et al (1989). *"Asbestos in Drinking Water Supplied Through Grossly Deteriorated A-C Pipe."* Research & Technology Journal February 1989

Chatfield et al (1983). *"Analytical Method for Determination of Asbestos in Water"*. US EPA Method 600/4-84-043

IATL International Asbestos Testing Laboratories

16000 Horizon Way Unit 100 Mt. Laurel, NJ 08054
Telephone: 609 231.9449 Fax: 609 231.9818

•CERTIFICATE OF ANALYSIS•

Client: Bird Bath™, Inc.
P.O. Box 769
Bernardsville, NJ 07924-0769

Report Date: May 18, 1992

Project No.: 92-439-01

Sampling Date: April, 1992

Facility: Various

Collected By:

WATER SAMPLE ANALYSIS SUMMARY

Lab No.	Custody No.	Sampling Location	Concentration
		% ASBESTOS (RESIDUE)	MILLION FIBERS/LITER (ASBESTOS)
175462	Bird Bath™, Inc. 1	2	0.5
175463	Bird Bath™, Inc. 2	5	1.25
175464	Bird Bath™, Inc. 3	N/A	0.5
175705	California	< 0.1	0.5

Member AIHA Analysts Registry — AIHA Lab No. 444 — NIST-NVLAP Accreditation No. 1165

This confidential report relates only to those item(s) tested and does not represent an endorsement by NIST-NVLAP or any agency of the U.S. government

X SEM

X TEM: EPA 600/4-80-005 Jan. 1980

Comments

Analysis Performed By: C. A. Liska/ J. H. Newton Date: 5/18/92 Approved By: [signature] Laboratory Director

A subsidiary of the [illegible] Environmental Control Group, Inc.

Analytical Results for General Chemistry

Method Number	Parameter	Sample Designation: Method Blank	A32955-1 1
7196	Chromium, hexavalent	10 U	100 U ǂ
335.3	Cyanide, total	25 U	25 U
335.1	Cyanide, amenable	25 U	25 U
413.1	Oil and Grease	--	24,000
150.1	pH, units	NA	8.72
420.2	Phenolics, total, as phenol	25 U	330
425.1	Surfactants (MBAS)	--	5,800
	Units	(ug/l)	(ug/l)

Method Number	Parameter	Sample Designation: Method Blank	A32955-3 Wastewater
418.1	Petroleum Hydrocarbons, by IR	1,000 U	1,100
	Units	(ug/l)	(ug/l)

U - Compound was analyzed for but not detected. The preceding number is the practical quantitation limit for the compound.

NA - Not Applicable

Note: The pH analysis was performed in the laboratory and is supplied for informational purposes only.

ǂ Detection limits increased due to matrix interference.

Bird Bath™ Footnotes Nos. 11 & 14
American Environmental Network Test Report No. A32955-3, May 17, 1994, page 3

Analytical Results for General Chemistry

Method Number	Parameter	Sample Designation: Method Blank	Sample Designation: A32884-1 Wastewater Sample
7196	Chromium, hexavalent	10 U	10 U
418.1	Petroleum Hydrocarbons, by IR	1,000 U	1,100 U ǂ
150.1	pH, units	NA	8.67
376.1	Sulfide	--	1,000 U
425.1	Surfactants (MBAS)	--	2,900
160.1	Total Dissolved Solids	10,000 U	1,500,000
160.2	Total Suspended Solids	10,000 U	240,000
	Units	(ug/l)	(ug/l)

U - Compound was analyzed for but not detected. The preceding number is the practical quantitation limit for the compound.

Note: The pH analysis was performed in the laboratory and is supplied for informational purposes only.

ǂ Detection limit elevated due to limited amount of sample.

NA - Not Applicable.

Bird Bath™ Footnote No. 12.
AnalytiKEM Test Report No. A32884-A, May 24, 1994, page 1

V. Analytical Results

AnalytiKEM

General Chemistry

	Sample Designation	
Parameter	Method Blank	A27477-1 1
Petroleum Hydrocarbons, by IR	1,000 U	12,000
Units	(ug/l)	(ug/l)

VI. Quality Control Data

General Chemistry

Nonaqueous Matrix Spike/Matrix Spike Duplicate Recovery Data

Sample Spiked DI Water

		Recovery			Control Limits	
Parameter	Amount of Spike	MS	MSD	RPD	Recovery	Max. RPD
Petroleum Hydrocarbons	5,000	83	85	2	54-121	25
Units	(ug)	(%)	(%)	(%)	(%)	(%)

Recovery: 0 out of 2 outside control limits

RPD: 0 out of 1 outside control limits

Bird Bath™ Footnote No. 13.
AnalytiKEM Test Report No. A27477,
May 13, 1992, page 5

Analytical Results for General Chemistry

Method Number	Parameter	Sample Designation: Method Blank	A33084-1 #1
335.1	Cyanide, total	10 U	18
335.1	Cyanide, amenable	10 U	10 U
413.1	Oil and Grease	--	260,000
418.1	Petroleum Hydrocarbons, by IR	1,000 U	54,000
9045	pH, units	NA	6.97
420.2	Phenolics	25 U	130
376.1	Sulfide	--	1,000 U
425.1	Surfactants, MBAS	--	14,000
	Units	(ug/l)	(ug/l)

Method Number	Parameter	Sample Designation: Method Blank	A33084-2 #2
9045	pH, units	NA	7.63
	Units	(ug/l)	(ug/l)

U - Compound was analyzed for but not detected. The preceding number is the practical quantitation limit for the compound.

NA - Not Applicable

Note 1: The pH analysis was performed in the laboratory and is supplied for informational purposes only.

Note 2: The Surfactants analysis was performed out of holding time.

Bird Bath™ Footnote No. 15.
American Environmental Network Test Report No. A33084, June 1, 1994, page 3

Analytical Results for General Chemistry

Method Number	Parameter	Sample Designation: Method Blank	Sample Designation: A32887-1 Filter Waste
150.1	pH, units	NA	8.30

NA - Not Applicable.

Note: The pH analysis was performed in the laboratory and is supplied for informational purposes only.

Bird Bath™ Footnote No. 16.
AnalytiKEM Test Report No. A32887
April 28, 1994, page 2

AnalytiKEM

Analytical Results for TCLP Metals - Methods 1311/3005/6010

EPA Number	Parameter	Sample Designation: Method Blank		A32887-1 Filter Waste		Regulatory Level
D004	Arsenic	0.50	U	0.50	U	5.0
D005	Barium	2.0	U	9.9		100
D006	Cadmium	0.10	U	0.10	U	1.0
D007	Chromium	0.50	U	0.50	U	5.0
D008	Lead	0.50	U	0.50	U	5.0
D009	Mercury	0.0020	U	0.0020	U	0.2
D010	Selenium	0.50	U	0.50	U	1.0
D011	Silver	0.40	U	0.40	U	5.0
	Units	(mg/l)		(mg/l)		(mg/l)

U - Compound was analyzed for but not detected. The preceding number is the practical quantitation limit for the compound.

Bird Bath™ Footnotes Nos. 18 & 25
AnalytiKEM Test Report A32887, April 28, 1994, page 1

AnalytiKEM

VII. Outlier Summary: Toxicity Characteristic Leachate Procedure (TCLP)

No Compounds were reported above the Regulatory Limits for the following samples:

A27238-1 175459
A27238-2 175461

Bird Bath™ Footnote No. 19.
AnalytiKEM Test Report A27238-1, April 29, 1992, pages 7-10; A27238-2 Supplemental, May 8, 1992, page 8.

VIII. Analytical Results

AnalytiKEM

TCLP Organic Analyses

AnalytiKEM Designation: A27238-1

Client Designation: 175459

EPA Number	Parameter	Method Blank	Sample Result	Regulatory Level
Volatile Organics				
D043	Vinyl Chloride	0.0093 U	0.046 U	0.2
D029	1,1-Dichloroethylene	0.010 U	0.050 U	0.7
D022	Chloroform	0.010 U	0.051 U	6.0
D028	1,2-Dichloroethane	0.010 U	0.051 U	0.5
D035	2-Butanone (MEK)	0.0074 U	0.037 U	200
D019	Carbon Tetrachloride	0.010 U	0.052 U	0.5
D040	Trichloroethylene	0.011 U	0.053 U	0.5
D018	Benzene	0.010 U	0.050 U	0.5
D039	Tetrachloroethylene	0.011 U	0.053 U	0.7
D021	Chlorobenzene	0.011 U	0.054 U	100
Semivolatile Organics				
D038	Pyridine	0.019 U	0.019 U	5.0
D027	1,4-Dichlorobenzene	0.015 U	0.015 U	7.5
D023	o-Cresol	0.007 U	0.007 U	200
D024,D025	m,p-Cresol	0.007 U	0.007 U	200
D034	Hexachloroethane	0.014 U	0.014 U	3.0
D036	Nitrobenzene	0.011 U	0.011 U	2.0
D033	Hexachlorobutadiene	0.017 U	0.017 U	0.5
D042	2,4,6-Trichlorophenol	0.010 U	0.010 U	2.0
D041	2,4,5-Trichlorophenol	0.071 U	0.071 U	400
D030	2,4-Dinitrotoluene	0.014 U	0.014 U	0.13
D032	Hexachlorobenzene	0.023 U	0.023 U	0.13
D037	Pentachlorophenol	0.050 U	0.050 U	100
Units		(mg/l)	(mg/l)	(mg/l)

VIII. Analytical Results (Cont'd)

AnalytiKEM

TCLP Metals

AnalytiKEM Designation: A27238-1

Client Designation: 175459

EPA Number	Parameter	Method Blank	Sample Result	Regulatory Level
D004	Arsenic	0.47 U	0.47 U	5.0
D005	Barium	1.9 U	2.6	100
D006	Cadmium	0.096 U	0.060 J	1.0
D007	Chromium	0.48 U	0.48 U	5.0
D008	Lead	0.49 U	0.49 U	5.0
D009	Mercury	0.022 U	0.022 U	0.2
D010	Selenium	0.46 U	0.46 U	1.0
D011	Silver	0.40 U	0.40 U	5.0
Units		(mg/l)	(mg/l)	(mg/l)

Note: All results are corrected for spike recoveries.

VIII. Analytical Results

AnalytiKEM

TCLP Organic Analyses

AnalytiKEM Designation: A27238-2

Client Designation: 175461

EPA Number	Parameter	Method Blank	Sample Result	Regulatory Level
Volatile Organics				
D043	Vinyl Chloride	0.0073 U	0.036 U	0.2
D029	1,1-Dichloroethylene	0.0092 U	0.046 U	0.7
D022	Chloroform	0.0098 U	0.049 U	6.0
D028	1,2-Dichloroethane	0.0098 U	0.049 U	0.5
D035	2-Butanone (MEK)	0.0082 U	0.041 U	200
D019	Carbon Tetrachloride	0.010 U	0.051 U	0.5
D040	Trichloroethylene	0.010 U	0.050 U	0.5
D018	Benzene	0.0093 U	0.046 U	0.5
D039	Tetrachloroethylene	0.010 U	0.051 U	0.7
D021	Chlorobenzene	0.011 U	0.053 U	100
Units		(mg/l)	(mg/l)	(mg/l)

TCLP Metals

EPA Number	Parameter	Method Blank	Sample Result	Regulatory Level
D004	Arsenic	0.52 U	0.52 U	5.0
D005	Barium	2.2 U	0.59 J	100
D006	Cadmium	0.11 U	0.11 U	1.0
D007	Chromium	0.54 U	0.54 U	5.0
D008	Lead	0.55 U	0.55 U	5.0
D009	Mercury	0.017 U	0.017 U	0.2
D010	Selenium	0.56 U	0.56 U	1.0
D011	Silver	0.48 U	0.48 U	5.0
Units		(mg/l)	(mg/l)	(mg/l)

Note: All results are corrected for spike recoveries.

VIII. Analytical Results

AnalytiKEM

TCLP Organic Analyses

AnalytiKEM Designation: A27238-2

Client Designation: 175461

EPA Number	Parameter	Method Blank	Sample Result	Regulatory Level
Semivolatile Organics				
D038	Pyridine	0.019 U	0.094 U	5.0
D027	1,4-Dichlorobenzene	0.015 U	0.077 U	7.5
D023	o-Cresol	0.0072 U	0.036 U	200
D024,D025	m,p-Cresol	0.0074 U	0.037 U	200
D034	Hexachloroethane	0.014 U	0.072 U	3.0
D036	Nitrobenzene	0.011 U	0.056 U	2.0
D033	Hexachlorobutadiene	0.017 U	0.083 U	0.5
D042	2,4,6-Trichlorophenol	0.010 U	0.048 U	2.0
D041	2,4,5-Trichlorophenol	0.071 U	0.36 U	400
D030	2,4-Dinitrotoluene	0.014 U	0.072 U	0.13
D032	Hexachlorobenzene	0.023 U	0.11 U	0.13
D037	Pentachlorophenol	0.050 U	0.25 U	100
Units		(mg/l)	(mg/l)	(mg/l)

COAST PROFESSIONAL

SAMPLE ID: BRAKEWATER FILTER SLUDGE
AEN LAB NO: 9405180-01
AEN WORK ORDER: 9405180
CLIENT PROJ. ID: MIDAS PERALTA

DATE SAMPLED: 05/13/94
DATE RECEIVED: 05/13/94
REPORT DATE: 06/01/94

ANALYTE		METHOD/ CAS#	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED
#CA Waste Extraction		CA Title 22	-		Extrn Date	05/17/94
CCR 17 Metals						
Ag	Silver	EPA 6010	ND	1	mg/kg	05/23/94
As	Arsenic	EPA 7060	5 *	1	mg/kg	05/23/94
Ba	Barium	EPA 6010	2,400 *	30	mg/kg	05/23/94
Be	Beryllium	EPA 6010	ND	1	mg/kg	05/23/94
Cd	Cadmium	EPA 6010	3 *	1	mg/kg	05/23/94
Co	Cobalt	EPA 6010	7 *	3	mg/kg	05/23/94
Cr	Chromium	EPA 6010	82 *	10	mg/kg	05/23/94
Cu	Copper	EPA 6010	140 *	5	mg/kg	05/23/94
Hg	Mercury	EPA 7471	ND	0.06	mg/kg	05/20/94
Mo	Molybdenum	EPA 6010	11 *	3	mg/kg	05/23/94
Ni	Nickel	EPA 6010	95 *	10	mg/kg	05/23/94
Pb	Lead	EPA 6010	95 *	10	mg/kg	05/23/94
Sb	Antimony	EPA 6010	ND	10	mg/kg	05/23/94
Se	Selenium	EPA 7740	ND	2	mg/kg	05/23/94
Tl	Thallium	EPA 6010	ND	10	mg/kg	05/23/94
V	Vanadium	EPA 6010	ND	10	mg/kg	05/23/94
Zn	Zinc	EPA 6010	630 *	10	mg/kg	05/23/94
CCR Metals in WET Extract						
Ag	Silver	EPA 6010	ND	0.05	mg/L	05/19/94
As	Arsenic	EPA 7060	0.10 *	0.05	mg/L	05/19/94
Ba	Barium	EPA 6010	58 *	0.5	mg/L	05/19/94
Be	Beryllium	EPA 6010	ND	0.02	mg/L	05/19/94
Cd	Cadmium	EPA 6010	0.08 *	0.05	mg/L	05/19/94
Co	Cobalt	EPA 6010	0.57 *	0.05	mg/L	05/19/94
Cr	Chromium	EPA 6010	3.1 *	0.1	mg/L	05/19/94
Cu	Copper	EPA 6010	1.0 *	0.1	mg/L	05/19/94
Hg	Mercury	EPA 7470	ND	0.002	mg/L	05/19/94
Mo	Molybdenum	EPA 6010	ND	0.1	mg/L	05/19/94
Ni	Nickel	EPA 6010	4.7 *	0.1	mg/L	05/19/94
Pb	Lead	EPA 6010	ND	0.4	mg/L	05/19/94
Sb	Antimony	EPA 6010	ND	0.2	mg/L	05/19/94
Se	Selenium	EPA 7740	ND	0.1	mg/L	05/19/94
Tl	Thallium	EPA 6010	ND	1	mg/L	05/19/94
V	Vanadium	EPA 6010	ND	0.05	mg/L	05/19/94
Zn	Zinc	EPA 6010	57 *	0.5	mg/L	05/19/94

Bird Bath™ Footnote No. 21.
American Environmental Network,
AEN Work Order 9405180,
June 1, 1994

DATA SUMMARY:

Bulk # / TEM #	Gravimetric (grms) Initial	Final	Material Present Fibrous	Non-Fibrous	Conclusion:
92-1312					
A-00X / T00X	1.122	0.135	FeO, CuO, Kaolin, and Polyester		Asbestos Content <0.1%
A-001 / T001	1.651	0.229	Organics (polyester & hydrocarbons)		No Asbestos Detected
A-002 / T002	1.674	1.227	"		"
A-003 / T003	1.766	0.881	"		Asbestos Content <0.1%
A-004 / T004	1.570	1.088	"		No Asbestos Detected
B-001 / NA	1.774	0.372	"		"
B-002 / NA	1.640	1.427	"		"
B-003 / NA	1.691	0.977	"		Asbestos Content <0.1%
B-004 / NA	1.788	1.339	"		Asbestos Content <0.1%
C-001 / NA	1.598	0.577	"		Asbestos Content <0.1%
C-002 / NA	1.801	1.471	Organics (polyester & hydrocarbons)		No Asbestos Detected
C-003 / NA	1.675	0.911	"		Asbestos Content <0.1%
C-004 / NA	1.629	1.011	"		Asbestos Content <0.1%
D-001 / T005	0.458	0.081	Polyester Material		No Asbestos Detected
D-002*/ T006	0.472	0.473	"		No Asbestos Deteted

* Blind QC sample provided to assure detection limit and analytical sensitivity compliance.

Bird Bath™ Footnote No. 24.
AWI Laboratory Projects 92-1311/1312,
December 12, 1991 page 4;

IATL International Asbestos Testing Laboratories

16000 Horizon Way Unit 100 Mt. Laurel, NJ 08054
Telephone: 609.231.9449 Fax: 609.231.9818

•CERTIFICATE OF ANALYSIS•

Client: Probe Environmental, Inc.
16000 Horizon Way, Unit 100
Mt. Laurel, NJ 08054

Report Date: January 29, 1992
Project No.: P381-001
Sampling Date: January 14, 1992
Collected By:

Facility:

BULK SAMPLE ANALYSIS SUMMARY

Sample No.	Lab No.	Location	Sample Composition	
115512	167958	Small Filter Midas Muffler Water Filter	Asbestos:	None Detected
			Fibrous Material:	None Detected
			Non-Fibrous Material:	100%
115512	167958A	Large Filter Midas Muffler Water Filter	Asbestos:	None Detected
			Fibrous Material:	None Detected
			Non-Fibrous Material:	100%
115512	167959B	Brown Sludge Midas Muffler Water Filter	Asbestos:	< 1% Chrysotile
			Fibrous Material:	None Detected
			Non-Fibrous Material:	100%
115512	167958C	Ashed Sludge Midas Muffler Water Filter	Asbestos:	None Detected
			Fibrous Material:	None Detected
			Non-Fibrous Material:	100%

NIST-NVLAP Accreditation No. 1165

This confidential report relates only to those item(s) tested and does not represent an endorsement by NIST-NVLAP or any agency of the U.S. government.

— Polarized Light Microscopy Dispersion Staining (PLM) EPA 600/M4-82-020-J0, Dec. 1982

— Scanning Electron Microscopy Energy Dispersive X-ray Microanalysis (SEM EDX)

— Transmission Electron Microscopy (TEM EDX)

Comments:

Analysis Performed By: J. H. Newton Date: 1/20/92 Approved By: _____ Laboratory Director

IATL International Asbestos Testing Laboratories

16000 Horizon Way Unit 100 Mt. Laurel, NJ 08054
Telephone: 609.231.9449 Fax: 609.231.9818

•CERTIFICATE OF ANALYSIS•

Client: Probe Environmental, Inc.
16000 Horizon Way, Unit 100
Mt. Laurel, NJ 08054

Facility:

Report Date: January 29, 1992
Project No.: P381-001
Sampling Date:
Collected By: January 14, 1992

BULK SAMPLE ANALYSIS SUMMARY

Sample No.	Lab No.	Location	Sample Composition	
115512	167958D	Brown Slurry Water Midas Muffler Water Filter	Asbestos:	< 1% Chrysotile
			Fibrous Material:	None Detected
			Non-Fibrous Material:	100%
115512	167958E	Ashed Slurry Water Midas Muffler Water Filter	Asbestos:	None Detected
			Fibrous Material:	None Detected
			Non-Fibrous Material:	100%
115513	167959	Brown Water Midas Muffler Water	Asbestos:	None Detected
			Fibrous Material:	None Detected
			Non-Fibrous Material:	100%
115513	167959A	Ashed Water Midas Muffler Water	Asbestos:	None Detected
			Fibrous Material:	None Detected
			Non-Fibrous Material:	100%

NIST-NVLAP Accreditation No. 1165

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☐ Polarized Light Microscopy: Dispersion Staining (PLM) EPA 600/M4-82/020-20, Dec. 1982

☒ Scanning Electron Microscopy: Energy Dispersive X-ray Microanalysis (SEM/EDX)

☒ Transmission Electron Microscopy (TEM/EDX)

Comments:

Analysis Performed By: J. H. Newton Date: 1/20/92 Approved By: _____ Laboratory Director

IATL International Asbestos Testing Laboratories

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Client: Probe Environmental, Inc.
16000 Horizon Way, Unit 100
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Report Date: January 29, 1992
Project No.: P381-001
Sampling Date: January 14, 1992
Collected By:

Facility:

BULK SAMPLE ANALYSIS SUMMARY

Sample No.	Lab No.	Location	Sample Composition	
115512	167958	Black Sludge Midas Muffler Water Filter	Asbestos:	< 1% Chrysotile
			Fibrous Material:	< 1% Cellulose < 1% Fibrous Glass < 1% Synthetic Fibers
			Non-Fibrous Material:	100%
			Asbestos:	
			Fibrous Material:	
			Non-Fibrous Material:	
			Asbestos:	
			Fibrous Material:	
			Non-Fibrous Material:	
			Asbestos:	
			Fibrous Material:	
			Non-Fibrous Material:	

NIST-NVLAP Accreditation No. 1165

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☑ Polarized Light Microscopy: Dispersion Staining (PLM) EPA 600/M4-82/020-20, Dec. 1982

— Scanning Electron Microscopy: Energy Dispersive X-ray Microanalysis (SEM/EDX)

— Transmission Electron Microscopy (TEM/EDX)

Comments:

Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore negative PLM results cannot be guaranteed. Electron Microscopy can be used as a confirming technique.

Analysis Performed By: J. H. Newton Date: 1/20/92 Approved By: _____ Laboratory Director