EPA Region 5 Records Ctr.
202466

1995
STATE RESPONSE

DOCUMENTS 23 & 24

KALAMAZOO RIVER

SITE

INVESTIGATION

DOCUMENTS #23 & 24

SOLID WASTE STREAM CHARACTERIZA-TION TESTS

DOCUMENT #23

MEN00285

STATE OF MICHIGAN

WILLIAM G. MILLIKEN, Governor

DEPARTMENT OF NATURAL RESOURCES

HOWARD A. TANNER, Director

NATURAL RESOURCES COMMISSION
JACOB A. HOEFER
CARL T JOHNSON
E.M LAITALA
HILARY F SNELL
HARRY H. WHITELEY
JOAN L. WOLFE
CHARLES G. YOUNGLOVE

RESOURCE RECOVERY COMMISSION
THOMAS J. BLESSING, JR.
ALBERT M. BORKIN
WILLIAM A. CILLUFFO
ANN ESKRIDGE
PAMELA A. FRUCCI
C ERNEST KEMP
JOHN W. LAYMAN
STUART B. PADNOS
ROGER RASMUSSEN
MICHAEL L. WALKINGTON

RESOURCE RECOVERY DIVISION
SECONDARY COMPLEX
BOX 30028
LANSING, MI 48909

517-322-1315

October 29, 1979

Mr. John Blauwkamp
Menasha Corporation
320 North Farmer Street
Otsego, Michigan 49078

Dear Mr. Blauwkamp:

A copy of the ASTM "A" method is enclosed, which we would recommend be used as the extraction procedure for flyash. The parameters to be analyzed are listed below:

Lead	Copper
Arsenic	pH
Cadmium	Total Dissolved Solids
Chromium	Nitrates
Selenium	Sulfates
Iron	Chlorides
Zinc	

Please submit a copy of the results to this office.

If you have any questions concerning the extraction procedure or the list of parameters, please contact this office.

Sincerely,

RESOURCE RECOVERY DIVISION

Randal Senger

Randal S. Senger
Hazardous Waste Section

RSS:kp

Enclosure

cc: Gerald Heyt

MICHIGAN
THE GREAT LAKE STATE

R1026-6 5/79

LEACHING ANALYSIS - ASTM A METHOD

I. Scope - This method covers the shaking of a known weight of waste with water of specified composition and the separation of the aqueous phase for analysis.

II. Apparatus - Agitation Equipment - Agitation equipment of any type that will produce constant movement of the aqueous phase equivalent to that of a reciprocating platform shaker operated at 60 to 70 one-inch (25 mm) strokes per minute without incorporation of air is suitable. Equipment used shall be designed for continuous operation without heating the samples being agitated.

Membrane Filter Assembly - A borosilicate glass of stainless steel funnel with a flat fritted base of the same material and membrane filters.

Containers - Round, wide-mouth bottles of composition suitable to the nature of the waste and the analyses to be performed. One-gallon (or 4-litre) bottles should be used with 700-g samples and 1/2 gal(or 2-litre) bottles with 350-g samples. Multiples of these sizes may be used for larger samples. These sizes were selected to establish suitable geometry and provide that the samples plus liquid would occupy approximately 80 to 90% of the container. Bottles must have a watertight closure. Containers for samples where gases may be released should be provided with a venting mechanism. Containers should be cleaned in a manner consistent with the analyses to be performed.

III. Reagents - Test Water - Reagent water, Type IV, (specification D 1193) at 20 ± 2°C. (Deionized water)

IV. Procedure

1. Record the physical description of the sample to be tested including particle size so far as it is known.

a) Dry two dishes or pans of size suitable to the waste being tested at 104 ± 2°C. Cool in a desiccator and weigh. Record the value to ± 0.1 g.

b) Put an appropriately sized portion of sample of the waste to be tested into each pan. The weight used should be scaled to the physical form of the waste tested. Use a minimum of 50 g but use larger samples where particles larger than 10 mm in average diameter are being tested. Weigh. Record the weight to ± 0.1 g.

c) Dry 18 ± 2h at 104 ± 2°C.

d) Cool to room temperature in a desiccator and reweigh. Record the weight to ± 0.1 g.

2. Shake Procedure - Weigh or tare the containers to be used in the shake test to 1 g.

3. Add to the container approximately 700 g of waste and determine and record the weight of sample used to 1 g. If weights other than 700 g are used, note in the report.

4. Add to the container a volume of test water equal in milliliters to four times the weight in grams of the sample used in 3.

5. Close the container and place it on the agitation equipment.

6. Agitate continuously for 48 h ± 0.5 h at 20 ± 2°C.

7. Open the containers. Observe and record any changes in the sample and leaching solution.

8. Separate the bulk of the aqueous phase from any solid or non-aqueous phase by decantation, centrifugation, or filtration through filter paper as appropriate. Vacuum filter the aqueous phase through a 0.45 micron membrane filter. For oily wastes such as those from API separators, use a 8 micron filter. Retain any nonaqueous liquid separately.

9. Transfer the filtrated to sample bottles of a size such that the entire bottle is filled. Close and label. Preserve the filtrated in a manner consistent with the chemical analyses to be performed.

10. Analyze the filtrate for specific constituents or properties as desired using appropriate ASTM or other standard methods where nonaqueous liquid is present, analyze it also.

V. Report - The report shall include the following:

1. Source of the waste and sampling information.

2. Description of the waste including physical characteristics and particle size.

3. Solids content
4. Sample weight if other than 700 g.
5. Results of specific analyses calculated in appropriate units.
6. Observation of changes in test material or leaching solution.

FROM GER.

TO JRB

SUBJECT: Leaching tests for Flyash.

FOLD HERE

DATE 5 Nov 79.

MESSAGE

Please find a lab that can do the leaching analysis ~~as~~ on our fly ash. Copy of the required procedure is attached.

Please arrange for this to be done as ~~soon~~ as possible. 11/6/79

SIGNED JRB

DATE

test set of samples 11/6/79

REPLY

Found lab (Vulcan) will be sending them the samples of fly ash. John these will be sent O/N on Monday 11/19/79.

SIGNED

Gary Roys

CLOW HYDRO RESEARCH SERVICES
Water Management Division
Clow Corporation

Menasha Corporation
320 N. Farmer St.
Otsego, MI 49078
Attn: Gary Roys

Date: 12-21-79

MEN00290

ASTM "A" Method

HYDRO NO:	34859
CUST. ID:	Fly Ash
pH	8.28
Solids, Total, Diss., mg/l	400
Nitrogen, Nitrate, N, mg/l	<0.02
Sulfate, SO_4, mg/l	193
Chloride, Cl, mg/l	<4
Lead, Total, Pb, mg/l	<0.01
Arsenic, Total, As, ug/l	128
Cadmium, Total, Cd, mg/l	<0.002
Chromium, Total, Cr, mg/l	<0.002
Selenium, Total, Se, ug/l	<2.5
Iron, Total, Fe, mg/l	0.01
Zinc, Total, Zn, mg/l	0.080
Copper, Total, Cu, mg/l	0.007
Solids, Total, %	63.7

Observations: The sample as received was a gritty, dark gray, moist material with white particles interspersed throughout. Particle size was 1/16" or less except for several large chunks approximately ½" in diameter.

500 grams of sample was used for leaching. The leachate was a silvery gray color which was almost transparent.

Linda Deans

CLOW
HYDRO RESEARCH SERVICES
Water Management Division
Clow Corporation

Menasha Corporation
320 N. Farmer St.
Otsego, MI 49078
Attn: Gary Roys

Date: 12-21-79

EPA Leachate Method

HYDRO NO:	34859
CUST. ID:	Fly Ash
Nitrogen, Nitrate, N, mg/l	<0.02
Sulfate, SO_4, mg/l	50
Chloride, Cl, mg/l	<4
Lead, Total, Pb, mg/l	<0.01
Arsenic, Total, As, ug/l	8.0
Cadmium, Total, Cd, mg/l	<0.002
Chromium, Total, Cr, mg/l	<0.002
Iron, Total, Fe, mg/l	<0.01
Zinc, Total, Zn, mg/l	0.11
Copper, Total, Cu, mg/l	0.020
Selenium, Total, Se, ug/l	<0.6

Note 1: TDS was not included because the addition of acetic acid necessary to maintain the sample pH at 5.0 adds dissolved solids.

Note 2: pH was maintained at 5.0 for 24 hours during leaching.

CLOW
HYDRO RESEARCH SERVICES
Water Management Division
Clow Corporation

Menasha Corporation
320 N. Farmer St.
Otsego, MI 49078
Attn: Gary Roys

Date: 2-13-80

ASTM-A
Leachate Procedure

Sample received 2-1-80

HYDRO NO:	357675
CUST. ID:	Fly Ash 1232580
pH	6.82
Solids, Total, Diss., mg/l	213
Nitrogen, Nitrate, N, mg/l	0.20
Sulfate, SO_4, mg/l	120
Chlorides, Cl, mg/l	6
Lead, Pb, mg/l	< 0.05
Arsenic, As, ug/l	15
Cadmium, Cd, mg/l	< 0.002
Chromium, Total, Cr, mg/l	< 0.002
Selenium, Se, ug/l	9.6
Iron, Fe, mg/l	< 0.02
Zinc, Zn, mg/l	0.12
Copper, Cu, mg/l	< 0.002
Solids, Total, % (on fly ash as received)	73.5

Observations: The sample as received was a gritty, dark gray, moist material with white particles interspersed throughout. Particle size was 1/16" or less.

700 grams of sample was used for leaching. The leachate was a silvery gray color which was almost transparent.

Scott

MEN00293

CLOW HYDRO RESEARCH SERVICES
Water Management Division
Clow Corporation

Menasha Corporation
320 N. Farmer St.
Otsego, MI 49078
Attn: Gary Roys

Date: 2-13-80

EPA Leachate Procedure

Sample received 2-1-80

HYDRO NO:	35765
CUST. ID:	Fly Ash 1232580
Nitrogen, Nitrate, N, mg/l	1.0
Sulfate, SO_4, mg/l	22
Chloride, Cl, mg/l	< 2
Lead, Pb, mg/l	< 0.05
Arsenic, As, ug/l	11
Cadmium, Cd, mg/l	< 0.002
Chromium, Total, Cr, mg/l	< 0.002
Selenium, Se, ug/l	24
Iron, Fe, mg/l	0.22
Zinc, Zn, mg/l	0.19
Copper, Cu, mg/l	< 0.002

Note 1: TDS was not included because the addition of acetic acid necessary to maintain the sample pH at 5.0 adds dissolved solids.

Note 2: pH was maintained at 5.0 for 24 hours during leaching.

Gary

MEN00294

STATE OF MICHIGAN

WILLIAM G. MILLIKEN, Governor

DEPARTMENT OF NATURAL RESOURCES

HOWARD A. TANNER, Director

NATURAL RESOURCES COMMISSION
OB A. HOEFER
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JAMES STORNANT
MICHAEL L. WALKINGTON

RESOURCE RECOVERY DIVISION
Region III
Secondary Complex
Box 30028
Lansing, MI 48909
517/322-1300

December 17, 1981

Mr. John Blauwkamp, Technical Manager
Menasha Corporation
Otsego Paperboard Mill
Farmer Street
Otsego, Michigan 48078

Re: Menasha Corporation Landfill
Allegan County

Dear Mr. Klauwkamp:

Pursuant to our December 15, 1981, meeting regarding the above captioned landfill, this letter summarizes our basic points of discussion.

Your landfill is currently licensed as a Type II facility. Wastes currently accepted for disposal at the site are fly ash, a fly ash-lime sludge mixture, a hydro-pulper scrap waste, a wood waste consisting of very fine fragments of wood, and waste from your waste paper baskets. Upon your next licensing, Menasha Corporation plans to seek approval to license the facility as a Type III site. This will necessitate verifying, through leach testing, a Type III classification for the first three wastes listed above. In addition, waste paper, as a Type II material, will no longer be an accepted waste for disposal.

The following time frame was established for submitting leach test results to this office:

1) Prior to January 15, 1982, Menasha Corporation will submit a letter to this office detailing leach test procedures and parameters for each waste to be tested.

2) Approval or denial from our office will be supplied to the company no later than January 31, 1982.

3) Leach test results will then be submitted to our office no later than March 1, 1982.

4) A decision by our office as to Waste Classification will be provided no later than March 15, 1982.

MICHIGAN
THE GREAT LAKE STATE

Based upon the nature of the wastes involved, a monitor program for the landfill will need to be established. Attempts to install groundwater monitor wells in the past led to many problems since the water table is over 100 feet below ground elevation. If your site obtains licensure as a Type III Facility, it may be possible to develop a monitor program around monitoring the wastes entering the site rather than orienting around the establishment of a network of groundwater monitor wells. In either case, a monitor proposal must be submitted to our office for review prior to your June license renewal date.

Should you have any questions or comments, please feel free to contact me at (517) 373-0907.

Very truly yours,

Virginia L. Loselle

Virginia L. Loselle
Geologist

VLL:sl

Enclosure

cc: E. Bols, RRD
Region III
B. Curry, RRD

FLY ASH AND BOTTOM ASH

The following is a minimum parameter list for leach testing performed upon fly ash and/or bottom ash. Additional parameters may be required depending upon the particular waste stream process involved.

pH

Total Dissolved Solids

Hardness (as Calcium Carbonate)

Sulfate

Chloride

Chemical Oxygen Demand

Total Organic Carbon

Total Phosphorus

Nitrate-N

Lead

Arsenic

Cadmium

Chromium (total)

Mercury

Selenium

Iron

Calcium

Sodium

PCB

MEN00297

memo / MENASHA CORPORATION

TO: Bruce Buchanan

DATE: 18 December 1981

SUBJECT: December 15th meeting with Region III RCRA Staff.

FROM: John Blauwkamp

JRB

On December 15, 1981, we had a meeting with Elizabeth Boles from the Region III RCRA Staff and Ginney LaSalle, the geologist from Lansing. Also present at the meeting were Gary Roys, and the writer.

The main topic of conversation was the necessary monitoring of our landfill. Because our monitoring well system is essentially nonfunctional, the DNR proposed an alternate means of monitoring the landfill. The law requires at a Class II landfill have ground water samples taken quarterly but the law requires that a Class III landfill be monitored quarterly. The law does allow for monitoring of a Class III landfill by testing the materials going into the landfill rather than ground water monitoring. The DNR suggested that since our landfill will soon become a Class III we discontinue trying to use the test wells and establish a program of monitoring materials that would be going into the Class III landfill. When our Class II license expires in June of 1982, the license can be reissued only as a Class III landfill. The Class III landfill license would only be for specific materials that we have had classified as Class III material and would not be able to accept any material that others may have had classified as Class III material. For example, if we want to put our hydrapulper rejects into the Class III landfill, we must have them tested to determine they are suitable for a Class III landfill. The mere fact that Mead down the street may have had their hydrapulper rejects tested and found them suitable for a Class III landfill does not eliminate the need for us having to test our rejects. It also does not allow us to accept the Class III materials from Mead even though it has been tested.

When the Class III license is reissued in June, we would either have to done the necessary engineering to develop the closure plans for the site or we will have to establish a schedule of compliance before the license can be reissued. The following time table was laid out for gathering the necessary information and establishing the testing program required to allow the landfill to be licensed as Class III landfill.

1. Menasha would immediately begin collecting composite samples of its hydrapulper rejects, its fly ash and its ash lime slurry so that when the testing parameters had been established, the necessary samples would be available.

2. By January 15, 1982, Menasha would submitt to the DNR a proposed list of parameters that we would have the leachate from the various materials for. This suggested list would then be either modifed

or approved by the DNR before 30 January 1982.

3. As soon as the parameters to be tested for has been established the samples would be sent out for the required analysis.

4. By March 1, 1982, the results of the tests would be sent to the DNR.

5. By the 15th of March 1982, the DNR would send us their decision as to whether or not the various materials were acceptable for Class III landfill.

6. Early next year, Menasha should request a license renewal package and begin the necessary engineering work such that the new license can be reissued without the need for a schedule of compliance.

cc: Gary Roys
Tom Clemmons

JB/kj

MEN00299

MENASHA CORPORATION

14 January 1982

Elizabeth A. Bols
DNR
350 Ottawa Avenue, N..W
Grand Rapids, MI 49504

Dear Ms. Boles;

This letter is being sent to detail the test procedures and parameters that we propose to use for the wastes that will be disposed of in our landfill. The following are those.

1. Fly Ash and fly ash-lime sludge mixture will be tested using the ASTM"A" leachate method. Parameters to be tested for are on Table I.

2. Hydrapulper scrap waste will be tested using ASTM"A" leachate method. Parameters to be tested for are on Table II.

Should you have any questions or comments, please feel free to contact John Blauwkamp or myself.

Sincerely,

Menasha Corporation
Otsego Paperboard Division

Gary E. Roys

Gary E. Roys
Process Chemist &
Group Leader

cc: John Blauwkamp

OTSEGO PAPERBOARD MILL FARMER STREET • OTSEGO, MICHIGAN 49078 • PHONE 616-692-61

TABLE I

pH
Total dissolved solids
Hardness (as calcium carbonate)
sulfate
Chloride
Chemical oxygen demand
Total organic carbon
Total phosphorus
Nitrate-N

Lead
Arsenic
Cadmium
Chromium (total)
Mercury
Selenium
Iron
Calcium
Sodium
P.C.B.
Mg
Cu

TABLE II

Arsenic
Barium
Cadmium
Chromium (total)
Lead

Mercury
Selenium
Silver
Total organic carbon

Copper
Zinc

MEN00301

TO John Blauwkamp

FROM Gary Roys

SUBJECT: Land fill return Letter from D.N.R.

FOLD HERE

DATE 2/3/82

MESSAGE

Spoke with Elizabeth Boles of DNR and asked her about a letter from them to approve or disapprove the testing to be done on material that will be going to the land fill. She said that Virginia Loselle will be the one to reply and that she is on vacation to return tomorrow. I also informed her that this testing takes a minimum of 4 weeks. She sh said she would make note of that.

SIGNED

DATE

REPLY

GER

SIGNED

FORM 11003 REGENT FORMS BELLMAWR N J 08031 **LETTER-LIMINATOR** RECIPIENT: RETAIN WHITE COPY, RETURN PINK COPY

MEN00302

STATE OF MICHIGAN

WILLIAM G. MILLIKEN, Governor

DEPARTMENT OF NATURAL RESOURCES

HOWARD A. TANNER, Director

NATURAL RESOURCES COMMISSION
JACOB A. HOEFER
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JAMES STORNANT
MICHAEL L. WALKINGTON

RESOURCE RECOVERY DIVISION
P.O. BOX 30028
LANSING, MI 48909

ADMINISTRATION/RESOURCE RECOVERY SECTION
517/373-0540

PLANNING SECTION/ HAZARDOUS WASTE SECTION
517/373-1818

GEOLOGY SECTION
517/373-0907

February 22, 1982

Mr. Gary E. Roys, Process Chemist
Menasha Corporation
Farmer Street
Otsego, Michigan 49078

RE: Leach Analyses
Menasha Corporation Landfill
Allegan County

Dear Mr. Roys:

In response to your latest correspondence addressing proposed parameters for analyses when conducting leach testing for Type III verification of several materials generated by your company, our comments are as follow:

1. ASTM Procedure D-3987 is the currently recommended method for leach analyses. Please note that this procedure is an updated version of the ASTM water shake extraction procedure which was your proposed leach test methodology.

2. Include testing for MG and CU when performing your leach testing on the fly-ash/lime sludge waste material.

3. The following parameter list should be used when leach testing your hydropulper-scrap waste:

TDS	nitrate-N	Fe	Zn	K
TOC	nitrite-N	Total Cr	Mg	
COD	organic N	Pb	Ca	
pH	SO_4	Cu	Na	

Due to delays by this office in responding to your proposal, the due date for submittal of leach test results is hereby extended until April 9, 1982.

Should you have any questions or comments, please feel free to contact me.

Very truly yours,

RESOURCE RECOVERY DIVISION

Virginia Loselle

Virginia Loselle, Geologist

R-1026-6 10/80 VL:nm

MEN00303

MENASHA CORPORATION

14 April 1982

Department of Natural Resources
Region III, Secondary Complex
P.O. Box 30028
Lansing, MI 48909
Attn: Virginia Loselle

Dear Virginia;

Please find enclosed the results of the leachate analysis on fly ash, ash-lime sludge, hydrapulper rejects, and hydrapulper tail.

The samples were collected over a months time. The fly ash samples 2382, 3082, and 2182, were days when only coal from one supplier was used.

The ASTM Procedure D-3987 was used for all the leachate analysis.

If you have any questions, please feel free to call John Blauwkamp or myself.

Sincerely,

Menasha Corporation
Otsego Paperboard Division

Gary E. Roys
Process Chemist &
Group Leader

Enclosure

GR/kj

cc: John Blauwkamp
Elizabeth Bols

Parameter	Composite Fly Ash	2382 Fly Ash	3082 Fly Ash	2182 Fly Ash	Ash Lime Sludge	Hydrapulper Rejects	Hydrapulper Tail
pH	8.6	8.4	8.9	9.6	9.9	6.7	7.8
Suspended Solids mg/l 1*	N.D	N.D.	N.D.	N.D.	N.D.	N.D.	28
Total Hardness mg/l	150	130	130	120	17	--	--
Sulfate mg/l	270	340	460	360	40	10	< 5
Chloride mg/l	31	59	125	135	13	--	--
COD mg/l	2	6	7	8	14	1000	660
Total Phosphorus mg/l	0.26	0.56	0.33	0.25	0.13	--	--
Nitrate-N mg/l	0.20	0.68	0.23	0.26	1.1	0.06	0.03
Lead mg/l	0.026	< .010	< .010	< .010	< .010	0.11	0.019
Arsenic mg/l	0.054	0.040	0.069	.063	.033	--	--
Cadmium 2* mg/l	N.D	N.D.	N.D.	N.D.	N.D.	--	--
Total 3* Chromium mg/l	N.D.	N.D.	N.D.	N.D.	< .005	.012	N.D.
Mercury 4* mg/l	N.D.	< 0.0002	0.0004	N.D.	.0003	--	--
Selenium mg/l	0.025	0.15	0.11	0.11	0.007	--	--
Iron mg/l	< .010	< .010	0.010	0.013	< .010	.52	21
Calcium mg/l	45	32	33	44	3.4	2[illegible]	4.7
Sodium mg/l	64	100	230	190	49	260	150
Copper mg/l	0.005	< 0.005	0.006	0.006	.005	0.053	0.077

MEN00304

Parameter	Composite Fly Ash	2382 Fly Ash	3082 Fly Ash	2182 Fly Ash	Ash Lime Sludge	Hydrapulper Rejects	Hydrapulper Tail
PCB mg/l 5*	N.D.	N.D.	N.D.	N.D.	N.D.	--	--
TOC mg/l	<1	1	1	1	5	340	280
Magnesium mg/l	4.2	5	6.6	8.2	1.2	3.4	1.5
Total Organic Nitrogen mg/l						3.4	1.4
Nitrite-N mg/l						0.07	0.02
Zinc mg/l						0.52	0.19
Potassium mg/l						8.3	5.4

N.D. - None Detected

1* Detection limit <2 mg/l
2* Detection limit <.003 mg/l
3* Detection limit <.005 mg/l
4* Detection limit <.0002 mg/l
5* Detection limit <0.2 mg/l

MEN00305

MEN00306

ENVIRONMENTAL RESEARCH GROUP, INC.

117 N. First Ann Arbor, Michigan 48104 (313) 662-3104

RE: HAZARDOUS WASTES

Dear Client:

Enclosed are results of analyses recently performed for you. If you are evaluating your wastes to determine hazardous components, the attached information may be useful.

Resource Conservation Recovery Act (RCRA) defines limits which are published in 40 CFR Part 261, et al. For your convenience, we have copied pages which define some of the criteria for evaluating wastes.

ERG suggests that you familiarize yourself with RCRA rules and appropriate state regulations concerning hazardous wastes. Additional information may be provided through your ERG sales representative.

Thank you for your order.

Sincerely,

ENVIRONMENTAL RESEARCH GROUP, INC.

APR 1982
RECEIVED

to being used, re-used, recycled or reclaimed is subject to the following requirements with respect to such transportation or storage:

(1) Notification requirements under Section 3010 RCRA.

(2) Part 262 of this Chapter.

(3) Part 263 of this Chapter.

(4) Subparts A, B, C, D and E of Part 264 of this Chapter.

(5) Subparts A, B, C, D, E, G, H, I, J and L of Part 265 of this Chapter.

(6) Parts 122 and 124 of this Chapter, with respect to storage facilities.

Subpart B—Criteria for Identifying the Characteristics of Hazardous Waste and for Listing Hazardous Waste

§ 261.10 Criteria for identifying the characteristics of hazardous waste.

(a) The Administrator shall identify and define a characteristic of hazardous waste in Subpart C only upon determining that:

(1) A solid waste that exhibits the characteristic may:

(i) Cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or

(ii) Pose a substantial present or potential hazard to human health or the environment when it is improperly treated, stored, transported, disposed of or otherwise managed; and

(2) The characteristic can be:

(i) Measured by an available standardized test method which is reasonably within the capability of generators of solid waste or private sector laboratories that are available to serve generators of solid waste; or

(ii) Reasonably detected by generators of solid waste through their knowledge of their waste.

§ 261.11 Criteria for listing hazardous waste.

(a) The Administrator shall list a solid waste as a hazardous waste only upon determining that the solid waste meets one of the following criteria:

(1) It exhibits any of the characteristics of hazardous waste identified in Subpart C.

(2) It has been found to be fatal to humans in low doses or, in the absence of data on human toxicity, it has been shown in studies to have an oral LD 50 toxicity (rat) of less than 50 milligrams per kilogram, an inhalation LC 50 toxicity (rat) of less than 2 milligrams per liter, or a dermal LD 50 toxicity (rabbit) of less than 200 milligrams per kilogram or is otherwise capable of causing or significantly contributing to an increase in serious irreversible, or incapacitating reversible, illness. (Waste listed in accordance with these criteria will be designated Acute Hazardous Waste.)

(3) It contains any of the toxic constituents listed in Appendix VIII unless, after considering any of the following factors, the Administrator concludes that the waste is not capable of posing a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported or disposed of, or otherwise managed:

(i) The nature of the toxicity presented by the constituent.

(ii) The concentration of the constituent in the waste.

(iii) The potential of the constituent or any toxic degradation product of the constituent to migrate from the waste into the environment under the types of improper management considered in paragraph (a)(3)(vii) of this section.

(iv) The persistence of the constituent or any toxic degradation product of the constituent.

(v) The potential for the constituent or any toxic degradation product of the constituent to degrade into non-harmful constituents and the rate of degradation.

(vi) The degree to which the constituent or any degradation product of the constituent bioaccumulates in ecosystems.

(vii) The plausible types of improper management to which the waste could be subjected.

(viii) The quantities of the waste generated at individual generation sites or on a regional or national basis.

(ix) The nature and severity of the human health and environmental damage that has occurred as a result of the improper management of wastes containing the constituent.

(x) Action taken by other governmental agencies or regulatory programs based on the health or environmental hazard posed by the waste or waste constituent.

(xi) Such other factors as may be appropriate.

Substances will be listed on Appendix VIII only if they have been shown in scientific studies to have toxic, carcinogenic, mutagenic or teratogenic effects on humans or other life forms.

(Wastes listed in accordance with these criteria will be designated Toxic wastes.)

(b) The Administrator may list classes or types of solid waste as hazardous waste if he has reason to believe that individual wastes, within the class or type of waste, typically or frequently are hazardous under the definition of hazardous waste found in Section 1004(5) of the Act.

(c) The Administrator will use the criteria for listing specified in this section to establish the exclusion limits referred to in § 261.5(c).

Subpart C—Characteristics of Hazardous Waste

§ 261.20 General.

(a) A solid waste, as defined in § 261.2, which is not excluded from regulation as a hazardous waste under § 261.4(b), is a hazardous waste if it exhibits any of the characteristics identified in this Subpart.

[Comment: § 262.11 of this Chapter sets forth the generator's responsibility to determine whether his waste exhibits one or more of the characteristics identified in this Subpart]

(b) A hazardous waste which is identified by a characteristic in this subpart, but is not listed as a hazardous waste in Subpart D, is assigned the EPA Hazardous Waste Number set forth in the respective characteristic in this Subpart. This number must be used in complying with the notification requirements of Section 3010 of the Act and certain recordkeeping and reporting requirements under Parts 262 through 265 and Part 122 of this Chapter.

(c) For purposes of this Subpart, the Administrator will consider a sample obtained using any of the applicable sampling methods specified in Appendix I to be a representative sample within the meaning of Part 260 of this Chapter.

[Comment: Since the Appendix I sampling methods are not being formally adopted by the Administrator, a person who desires to employ an alternative sampling method is not required to demonstrate the equivalency of his method under the procedures set forth in §§ 260.20 and 260.21.]

§ 261.21 Characteristic of ignitability.

(a) A solid waste exhibits the characteristic of ignitability if a representative sample of the waste has any of the following properties:

(1) It is a liquid, other than an aqueous solution containing less than 24 percent alcohol by volume, and has a flash point less than 60°C (140°F), as determined by a Pensky-Martens Closed Cup Tester, using the test method specified in ASTM Standard D-93-79, or a Setaflash Closed Cup Tester, using the test method specified in ASTM standard D-3278-78, or as determined by an equivalent test method approved by the Administrator under the procedures set forth in §§ 260.20 and 260.21.[1]

[1] ASTM Standards are available from ASTM, 1916 Race Street, Philadelphia, PA 19103.

MEN00308

ENVIRONMENTAL RESEARCH GROUP

117 N. FIRST . ANN ARBOR, MICHIGAN 48104
(313) 662-3104

SAMPLES RECVD BY : 03-15-82
CLIENT P.O. : 20706
REPORT DATE : 04-14-82
REPORT NO. : 5845

FINAL REPORT ON
ERG PROJECT NO. 8478

RESIDUAL SAMPLES WILL BE HELD TWO WEEKS

FOR :

MENASHA CORPORATION
OTSEGO PAPERBOARD MILL
FARMER STREET
OTSEGO, MI 49078

ATTENTION: GARY ROYS

APPROVED BY : John Wilson /kgs

REFER TECHNICAL QUESTIONS TO : JOHN WILSON

CLIENT ID / PARAMETER & MATRIX	DATE COLLECTED	RESULT	UNIT	ERG SAMPLE NUMBER
AL-ASHLIME ASTM-LEACHATE (LEACH)	3/26/82			072664
LEACHATE OF ASHLIME pH IN E.P. TOX. LEACHATE		9.9	S.U.	072665
LEACHATE OF ASHLIME SOLIDS, SUSPENDED IN E. P. TOX LEACHATE		ND (2)	mg/L	
LEACHATE OF ASHLIME HARDNESS IN E. P. TOX LEACHATE				
TOTAL HARDNESS		17	mg/L	
CALCIUM HARDNESS		NA		
MAGNESIUM HARDNESS		NA		
LEACHATE OF ASHLIME SULFATE IN LEACHATE		40	mg/L	
LEACHATE OF ASHLIME CHLORIDE IN E. P. TOX LEACHATE		13	mg/L	
LEACHATE OF ASHLIME CHEMICAL OXYGEN DEMAND IN E.P. TOX.		14	mg/L	
LEACHATE OF ASHLIME PHOSPHORUS, TOTAL IN EP-TOX LEACHATE		0.18	mg/L	
LEACHATE OF ASHLIME NITROGEN, NITRATE IN E. P. TOX LEACHATE		1.1	mg/L	
LEACHATE OF ASHLIME LEAD, TOTAL IN EP-TOX LEACHATE		<0.010	mg/L	
LEACHATE OF ASHLIME ARSENIC, (BY FURNACE AA) TOTAL IN EP-TOX LEACHATE		0.033	mg/L	
LEACHATE OF ASHLIME CADMIUM, TOTAL IN EP-TOX LEACHATE		ND (0.003)	mg/L	
LEACHATE OF ASHLIME CHROMIUM, TOTAL IN EP-TOX LEACHATE		<0.005	mg/L	
LEACHATE OF ASHLIME MERCURY, TOTAL IN E.P. TOX LEACHATE		0.0003	mg/L	
LEACHATE OF ASHLIME SELENIUM, (BY FURNACE AA) TOTAL IN E.P. TOX LEACHA		0.007	mg/L	

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OTSEGO PAPERBOARD MILL
FARMER STREET
OTSEGO, MI 49078

ATTENTION: GARY ROYS

REFER TECHNICAL QUESTIONS TO : JOHN WILSON

CLIENT ID / PARAMETER & MATRIX	DATE COLLECTED	RESULT	UNIT	ERG SAMPLE NUMBER
LEACHATE OF ASHLIME				
IRON, TOTAL IN EP-TOX LEACHATE		<0.010	mg/L	
LEACHATE OF ASHLIME				
CALCIUM, TOTAL IN E. P. TOX LEACHATE		3.4	mg/L	
LEACHATE OF ASHLIME				
SODIUM, TOTAL IN E. P. TOX LEACHATE		49	mg/L	
LEACHATE OF ASHLIME				
COPPER, TOTAL IN EP-TOX LEACHATE		<0.005	mg/L	
LEACHATE OF ASHLIME				
MAGNESIUM, TOTAL IN E. P. TOX LEACHATE		1.2	mg/L	
LEACHATE OF ASHLIME				
PCB IN E. P. TOX LEACHATE				
TOTAL PCB		ND (0.20)	ug/L	
PCB 1242		ND (0.20)	ug/L	
PCB 1248		ND (0.20)	ug/L	
PCB 1254		ND (0.20)	ug/L	
PCB 1260		ND (0.20)	ug/L	
LEACHATE OF ASHLIME				
CARBON, TOTAL ORGANIC, IN E. P. TOX LEACHATE		5	mg/L	
COMP FLY ASH				072666
ASTM-LEACHATE (LEACH)	3/26/82			
LEACHATE OF FLY ASH				072667
pH IN E.P. TOX. LEACHATE		8.6	S.U.	
LEACHATE OF FLY ASH				
SOLIDS, SUSPENDED IN E. P. TOX LEACHATE		ND (2)	mg/L	
LEACHATE OF FLY ASH				
HARDNESS IN E. P. TOX LEACHATE				
TOTAL HARDNESS		150	mg/L	
CALCIUM HARDNESS		NA		
MAGNESIUM HARDNESS		NA		
LEACHATE OF FLY ASH				
SULFATE IN LEACHATE		270	mg/L	
LEACHATE OF FLY ASH				
CHLORIDE IN E. P. TOX LEACHATE		31	mg/L	
LEACHATE OF FLY ASH				
CHEMICAL OXYGEN DEMAND IN E.P. TOX.		2	mg/L	

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FARMER STREET
OTSEGO, MI 49078

ATTENTION: GARY ROYS

REFER TECHNICAL QUESTIONS
TO : JOHN WILSON

CLIENT ID / PARAMETER & MATRIX	DATE COLLECTED	RESULT	UNIT	ERG SAMPLE NUMBER
LEACHATE OF FLY ASH PHOSPHORUS, TOTAL IN EP-TOX LEACHATE		0.26	mg/L	
LEACHATE OF FLY ASH NITROGEN, NITRATE IN E. P. TOX LEACHATE		0.20	mg/L	
LEACHATE OF FLY ASH LEAD, TOTAL IN EP-TOX LEACHATE		0.026	mg/L	
LEACHATE OF FLY ASH ARSENIC, (BY FURNACE AA) TOTAL IN EP-TOX LEACHATE		0.054	mg/L	
LEACHATE OF FLY ASH CADMIUM, TOTAL IN EP-TOX LEACHATE		ND (0.003)	mg/L	
LEACHATE OF FLY ASH CHROMIUM, TOTAL IN EP-TOX LEACHATE		ND (0.005)	mg/L	
LEACHATE OF FLY ASH MERCURY, TOTAL IN E.P. TOX LEACHATE		ND(0.0002)	mg/L	
LEACHATE OF FLY ASH SELENIUM, (BY FURNACE AA) TOTAL IN E.P. TOX LEACHA		0.025	mg/L	
LEACHATE OF FLY ASH IRON, TOTAL IN EP-TOX LEACHATE		<0.010	mg/L	
LEACHATE OF FLY ASH CALCIUM, TOTAL IN E. P. TOX LEACHATE		45	mg/L	
LEACHATE OF FLY ASH SODIUM, TOTAL IN E. P. TOX LEACHATE		64	mg/L	
LEACHATE OF FLY ASH COPPER, TOTAL IN EP-TOX LEACHATE		0.005	mg/L	
LEACHATE OF FLY ASH MAGNESIUM, TOTAL IN E. P. TOX LEACHATE		4.2	mg/L	
LEACHATE OF FLY ASH PCB IN E. P. TOX LEACHATE				
TOTAL PCB		ND (0.20)	ug/L	
PCB 1242		ND (0.20)	ug/L	
PCB 1248		ND (0.20)	ug/L	
PCB 1254		ND (0.20)	ug/L	
PCB 1260		ND (0.20)	ug/L	
LEACHATE OF FLY ASH CARBON, TOTAL ORGANIC, IN E. P. TOX LEACHATE		<1	mg/L	

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FOR :

MENASHA CORPORATION
OTSEGO PAPERBOARD MILL
FARMER STREET
OTSEGO, MI 49078

ATTENTION: GARY RUYS

REFER TECHNICAL QUESTIONS
TO : JOHN WILSON

CLIENT ID / PARAMETER & MATRIX	DATE COLLECTED	RESULT	UNIT	ERG SAMPLE NUMBER
2382-IF ASH				072668
ASTM-LEACHATE (LEACH)	3/26/82			
LEACHATE OF 2382 ASH				072669
pH IN E.P. TOX. LEACHATE		8.4	S.U.	
LEACHATE OF 2382 ASH				
SOLIDS, SUSPENDED IN E. P. TOX LEACHATE		ND (2)	mg/L	
LEACHATE OF 2382 ASH				
HARDNESS IN E. P. TOX LEACHATE				
TOTAL HARDNESS		130	mg/L	
CALCIUM HARDNESS		NA		
MAGNESIUM HARDNESS		NA		
LEACHATE OF 2382 ASH				
SULFATE IN LEACHATE		340	mg/L	
LEACHATE OF 2382 ASH				
CHLORIDE IN E. P. TOX LEACHATE		59	mg/L	
LEACHATE OF 2382 ASH				
CHEMICAL OXYGEN DEMAND IN E.P. TOX.		6	mg/L	
LEACHATE OF 2382 ASH				
PHOSPHORUS, TOTAL IN EP-TOX LEACHATE		0.56	mg/L	
LEACHATE OF 2382 ASH				
NITROGEN, NITRATE IN E. P. TOX LEACHATE		0.68	mg/L	
LEACHATE OF 2382 ASH				
LEAD, TOTAL IN EP-TOX LEACHATE		<0.010	mg/L	
LEACHATE OF 2382 ASH				
ARSENIC, (BY FURNACE AA) TOTAL IN EP-TOX LEACHATE		0.040	mg/L	
LEACHATE OF 2382 ASH				
CADMIUM, TOTAL IN EP-TOX LEACHATE		ND (0.003)	mg/L	
LEACHATE OF 2382 ASH				
CHROMIUM, TOTAL IN EP-TOX LEACHATE		ND (0.005)	mg/L	
LEACHATE OF 2382 ASH				
MERCURY, TOTAL IN E.P TOX LEACHATE		<0.0002	mg/L	
LEACHATE OF 2382 ASH				
SELENIUM, (BY FURNACE AA) TOTAL IN E.P. TOX LEACHA		0.15	mg/L	

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FARMER STREET
OTSEGO, MI 49078

ATTENTION: GARY RUYS

REFER TECHNICAL QUESTIONS TO : JOHN WILSON

CLIENT ID / PARAMETER & MATRIX	DATE COLLECTED	RESULT	UNIT	ERG SAMPLE NUMBER
LEACHATE OF 2382 ASH				
IRON, TOTAL IN EP-TOX LEACHATE		<0.010	mg/L	
LEACHATE OF 2382 ASH				
CALCIUM, TOTAL IN E. P. TOX LEACHATE		32	mg/L	
LEACHATE OF 2382 ASH				
SODIUM, TOTAL IN E. P. TOX LEACHATE		100	mg/L	
LEACHATE OF 2382 ASH				
COPPER, TOTAL IN EP-TOX LEACHATE		<0.005	mg/L	
LEACHATE OF 2382 ASH				
MAGNESIUM, TOTAL IN E. P. TOX LEACHATE		5	mg/L	
LEACHATE OF 2382 ASH				
PCB IN E. P. TOX LEACHATE				
TOTAL PCB		ND (0.20)	ug/L	
PCB 1242		ND (0.20)	ug/L	
PCB 1248		ND (0.20)	ug/L	
PCB 1254		ND (0.20)	ug/L	
PCB 1260		ND (0.20)	ug/L	
LEACHATE OF 2382 ASH				
CARBON, TOTAL ORGANIC, IN E. P. TOX LEACHATE		1	mg/L	
2182-IF ASH				072670
ASTM-LEACHATE (LEACH)	3/26/82			
LEACHATE OF 2182 ASH				072671
pH IN E.P. TOX. LEACHATE		9.6	S.U.	
LEACHATE OF 2182 ASH				
SOLIDS, SUSPENDED IN E. P. TOX LEACHATE		ND (2)	mg/L	
LEACHATE OF 2182 ASH				
HARDNESS IN E. P. TOX LEACHATE				
TOTAL HARDNESS		170	mg/L	
CALCIUM HARDNESS		NA		
MAGNESIUM HARDNESS		NA		
LEACHATE OF 2182 ASH				
SULFATE IN LEACHATE		360	mg/L	
LEACHATE OF 2182 ASH				
CHLORIDE IN E. P. TOX LEACHATE		135	mg/L	
LEACHATE OF 2182 ASH				
CHEMICAL OXYGEN DEMAND IN E.P. TOX.		8	mg/L	

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FARMER STREET
OTSEGO, MI 49078

ATTENTION: GARY RUYS

REFER TECHNICAL QUESTIONS TO : JOHN WILSON

CLIENT ID	DATE COLLECTED	PARAMETER & MATRIX	RESULT	UNIT	ERG SAMPLE NUMBER
LEACHATE OF 2182 ASH		PHOSPHORUS, TOTAL IN EP-TOX LEACHATE	0.25	mg/L	
LEACHATE OF 2182 ASH		NITROGEN, NITRATE IN E. P. TOX LEACHATE	0.26	mg/L	
LEACHATE OF 2182 ASH		LEAD, TOTAL IN EP-TOX LEACHATE	<0.010	mg/L	
LEACHATE OF 2182 ASH		ARSENIC, (BY FURNACE AA) TOTAL IN EP-TOX LEACHATE	0.063	mg/L	
LEACHATE OF 2182 ASH		CADMIUM, TOTAL IN EP-TOX LEACHATE	ND (0.003)	mg/L	
LEACHATE OF 2182 ASH		CHROMIUM, TOTAL IN EP-TOX LEACHATE	ND (0.005)	mg/L	
LEACHATE OF 2182 ASH		MERCURY, TOTAL IN E.P. TOX LEACHATE	ND(0.0002)	mg/L	
LEACHATE OF 2182 ASH		SELENIUM, (BY FURNACE AA) TOTAL IN E.P. TOX LEACHA	0.11	mg/L	
LEACHATE OF 2182 ASH		IRON, TOTAL IN EP-TOX LEACHATE	0.013	mg/L	
LEACHATE OF 2182 ASH		CALCIUM, TOTAL IN E. P. TOX LEACHATE	44	mg/L	
LEACHATE OF 2182 ASH		SODIUM, TOTAL IN E. P. TOX LEACHATE	190	mg/L	
LEACHATE OF 2182 ASH		COPPER, TOTAL IN EP-TOX LEACHATE	0.006	mg/L	
LEACHATE OF 2182 ASH		MAGNESIUM, TOTAL IN E. P. TOX LEACHATE	8.2	mg/L	
LEACHATE OF 2182 ASH		PCB IN E. P. TOX LEACHATE			
		TOTAL PCB	ND (0.20)	ug/L	
		PCB 1242	ND (0.20)	ug/L	
		PCB 1248	ND (0.20)	ug/L	
		PCB 1254	ND (0.20)	ug/L	
		PCB 1260	ND (0.20)	ug/L	
LEACHATE OF 2182 ASH		CARBON, TOTAL ORGANIC, IN E. P. TOX LEACHATE	1	mg/L	

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FARMER STREET
OTSEGO, MI 49078

ATTENTION: GARY RUYS

REFER TECHNICAL QUESTIONS
TO : JOHN WILSON

CLIENT ID / PARAMETER & MATRIX	DATE COLLECTED	RESULT UNIT	ERG SAMPLE NUMBER
B082-IF ASH			072672
ASTM-LEACHATE (LEACH)		3/26/82	
LEACHATE OF B082 ASH			072673
pH IN E.P. TOX. LEACHATE		8.9 S.U.	
LEACHATE OF B082 ASH			
SOLIDS, SUSPENDED IN E. P. TOX LEACHATE		ND (2) mg/L	
LEACHATE OF B082 ASH			
HARDNESS IN E. P. TOX LEACHATE			
TOTAL HARDNESS		130 mg/L	
CALCIUM HARDNESS		NA	
MAGNESIUM HARDNESS		NA	
LEACHATE OF B082 ASH			
SULFATE IN LEACHATE		460 mg/L	
LEACHATE OF B082 ASH			
CHLORIDE IN E. P. TOX LEACHATE		125 mg/L	
LEACHATE OF B082 ASH			
CHEMICAL OXYGEN DEMAND IN E.P. TOX.		7 mg/L	
LEACHATE OF B082 ASH			
PHOSPHORUS, TOTAL IN EP-TOX LEACHATE		0.33 mg/L	
LEACHATE OF B082 ASH			
NITROGEN, NITRATE IN E. P. TOX LEACHATE		0.23 mg/L	
LEACHATE OF B082 ASH			
LEAD, TOTAL IN EP-TOX LEACHATE		<0.010 mg/L	
LEACHATE OF B082 ASH			
ARSENIC, (BY FURNACE AA) TOTAL IN EP-TOX LEACHATE		0.069 mg/L	
LEACHATE OF B082 ASH			
CADMIUM, TOTAL IN EP-TOX LEACHATE		ND (0.003) mg/L	
LEACHATE OF B082 ASH			
CHROMIUM, TOTAL IN EP-TOX LEACHATE		ND (0.005) mg/L	
LEACHATE OF B082 ASH			
MERCURY, TOTAL IN E.P. TOX LEACHATE		0.0004 mg/L	
LEACHATE OF B082 ASH			
SELENIUM, (BY FURNACE AA) TOTAL IN E.P. TOX LEACHA		0.11 mg/L	

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CLIENT ID	DATE COLLECTED PARAMETER & MATRIX	RESULT UNIT	ERG SAMPLE NUMBER
LEACHATE OF B082 ASH	IRON, TOTAL IN EP-TOX LEACHATE	0.010 mg/L	
LEACHATE OF B082 ASH	CALCIUM, TOTAL IN E. P. TOX LEACHATE	33 mg/L	
LEACHATE OF B082 ASH	SODIUM, TOTAL IN E. P. TOX LEACHATE	230 mg/L	
LEACHATE OF B082 ASH	COPPER, TOTAL IN EP-TOX LEACHATE	0.006 mg/L	
LEACHATE OF B082 ASH	MAGNESIUM, TOTAL IN E. P. TOX LEACHATE	6.6 mg/L	
LEACHATE OF B082 ASH	PCB IN E. P. TOX LEACHATE		
	TOTAL PCB	ND (0.20) ug/L	
	PCB 1242	ND (0.20) ug/L	
	PCB 1248	ND (0.20) ug/L	
	PCB 1254	ND (0.20) ug/L	
	PCB 1260	ND (0.20) ug/L	
LEACHATE OF B082 ASH	CARBON, TOTAL ORGANIC, IN E. P. TOX LEACHATE	1 mg/L	
HP2-TAIL	ASTM-LEACHATE (LEACH)	3/26/82	072674
LEACHATE OF HP2-TAIL	pH IN E.P. TOX. LEACHATE	7.8 S.U.	072675
LEACHATE OF HP2-TAIL	SOLIDS, SUSPENDED IN E. P. TOX LEACHATE	28 mg/L	
LEACHATE OF HP2-TAIL	SULFATE IN LEACHATE	<5 mg/L	
	COMMENTS: HIGHER DETECTION LIMIT DUE TO MATRIX INTERFERENCE.		
LEACHATE OF HP2-TAIL	CHEMICAL OXYGEN DEMAND IN E.P. TOX.	660 mg/L	
LEACHATE OF HP2-TAIL	NITROGEN, NITRATE IN E. P. TOX LEACHATE	0.03 mg/L	
LEACHATE OF HP2-TAIL	LEAD, TOTAL IN EP-TOX LEACHATE	0.019 mg/L	

ENVIRONMENTAL RESEARCH GROUP, INC.

SD = SAMPLE DAMAGED
NA = NOT APPLICABLE TO TEST REQUESTED
FR = SEE FIELD REPORT FOR RESULT
SR = SEE ATTACHED REPORT FOR RESULT
< = POSITIVE RESULT BUT AT AN UNQUANTIFIABLE CONCENTRATION BELOW INDICATED LEVEL
ND = NONDETECTED, DETECTION LIMIT IN ()

CONTINUED

ENVIRONMENTAL RESEARCH GROUP

MEN00316

117 N. FIRST . ANN ARBOR, MICHIGAN 48104
(313) 662-3104

SAMPLES RECVD BY : 03-15-82
CLIENT P.O. : 20706
REPORT DATE : 04-14-82
REPORT NO. : 5845

FINAL REPORT ON
ERG PROJECT NO. 8478

RESIDUAL SAMPLES WILL BE HELD TWO WEEKS

FOR :

MENASHA CORPORATION
OTSEGO PAPERBOARD MILL
FARMER STREET
OTSEGO, MI 49078

ATTENTION: GARY RUYS

REFER TECHNICAL QUESTIONS TO : JOHN WILSON

CLIENT ID / PARAMETER & MATRIX	DATE COLLECTED	RESULT UNIT	ERG SAMPLE NUMBER
LEACHATE OF HP2-TAIL CHROMIUM, TOTAL IN EP-TOX LEACHATE		ND (0.005) mg/L	
LEACHATE OF HP2-TAIL CALCIUM, TOTAL IN E. P. TOX LEACHATE		4.7 mg/L	
LEACHATE OF HP2-TAIL SODIUM, TOTAL IN E. P. TOX LEACHATE		150 mg/L	
LEACHATE OF HP2-TAIL COPPER, TOTAL IN EP-TOX LEACHATE		0.077 mg/L	
LEACHATE OF HP2-TAIL MAGNESIUM, TOTAL IN E. P. TOX LEACHATE		1.5 mg/L	
LEACHATE OF HP2-TAIL NITROGEN, NITRITE IN E. P. TOX LEACHATE		0.02 mg/L	
LEACHATE OF HP2-TAIL NITROGEN, TOTAL ORGANIC IN E. P. TOX LEACHATE		1.4 mg/L	
LEACHATE OF HP2-TAIL ZINC, TOTAL IN EP-TOX LEACHATE		0.19 mg/L	
LEACHATE OF HP2-TAIL POTASSIUM, TOTAL IN E. P. TOX LEACHATE		5.4 mg/L	
LEACHATE OF HP2-TAIL IRON, TOTAL IN EP-TOX LEACHATE		21 mg/L	
LEACHATE OF HP2-TAIL CARBON, TOTAL ORGANIC, IN E. P. TOX LEACHATE		280 mg/L	
HP1-REJECTS ASTM-LEACHATE (LEACH)	3/26/82		072676
LEACHATE OF REJECTS pH IN E.P. TOX. LEACHATE		6.7 S.U.	072677
LEACHATE OF REJECTS SOLIDS, SUSPENDED IN E. P. TOX LEACHATE		ND (2) mg/L	
LEACHATE OF REJECTS SULFATE IN LEACHATE		10 mg/L	
LEACHATE OF REJECTS CHEMICAL OXYGEN DEMAND IN E.P. TOX.		1000 mg/L	

ENVIRONMENTAL RESEARCH GROUP INC

SD = SAMPLE DAMAGED
NA = NOT APPLICABLE TO TEST REQUESTED
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ND = NONDETECTED, DETECTION LIMIT IN ()

ENVIRONMENTAL RESEARCH GROUP

MEN00317

117 N. FIRST . ANN ARBOR, MICHIGAN 48104
(313) 662-3104

SAMPLES RECVD BY : 03-15-82
CLIENT P.O. : 20706
REPORT DATE : 04-14-82
REPORT NO. : 5845

FINAL REPORT ON
ERG PROJECT NO. 8478

RESIDUAL SAMPLES WILL BE
HELD TWO WEEKS

FOR :

MENASHA CORPORATION
OTSEGO PAPERBOARD MILL
FARMER STREET
OTSEGO, MI 49078

ATTENTION: GARY ROYS

REFER TECHNICAL QUESTIONS
TO : JOHN WILSON

CLIENT ID	DATE COLLECTED PARAMETER & MATRIX	RESULT	UNIT	ERG SAMPLE NUMBER
LEACHATE OF REJECTS	NITROGEN, NITRATE IN E. P. TOX LEACHATE	0.06	mg/L	
LEACHATE OF REJECTS	LEAD, TOTAL IN EP-TOX LEACHATE	0.11	mg/L	
LEACHATE OF REJECTS	CHROMIUM, TOTAL IN EP-TOX LEACHATE	0.012	mg/L	
LEACHATE OF REJECTS	CALCIUM, TOTAL IN E. P. TOX LEACHATE	27	mg/L	
LEACHATE OF REJECTS	SODIUM, TOTAL IN E. P. TOX LEACHATE	260	mg/L	
LEACHATE OF REJECTS	COPPER, TOTAL IN EP-TOX LEACHATE	0.053	mg/L	
LEACHATE OF REJECTS	MAGNESIUM, TOTAL IN E. P. TOX LEACHATE	3.4	mg/L	
LEACHATE OF REJECTS	NITROGEN, NITRITE IN E. P. TOX LEACHATE	0.07	mg/L	
LEACHATE OF REJECTS	NITROGEN, TOTAL ORGANIC IN E. P. TOX LEACHATE	3.4	mg/L	
LEACHATE OF REJECTS	ZINC, TOTAL IN EP-TOX LEACHATE	0.52	mg/L	
LEACHATE OF REJECTS	POTASSIUM, TOTAL IN E. P. TOX LEACHATE	8.3	mg/L	
LEACHATE OF REJECTS	IRON, TOTAL IN EP-TOX LEACHATE	0.52	mg/L	
LEACHATE OF REJECTS	CARBON, TOTAL ORGANIC, IN E. P. TOX LEACHATE	340	mg/L	

D = SAMPLE DAMAGED NA = NOT APPLICABLE TO TEST REQUESTED
FR = SEE FIELD REPORT FOR RESULT SR = SEE ATTACHED REPORT FOR RESULT
< = POSITIVE RESULT BUT AT AN UNQUANTIFIABLE CONCENTRATION
BELOW INDICATED LEVEL ND = NONDETECTED, DETECTION LIMIT IN ()

ENVIRONMENTAL RESEARCH GROUP INC.

THANK YOU FOR YOUR BUSINESS !

MEN00318

CLOW
HYDRO RESEARCH SERVICES
Water Management Division
Clow Corporation
313/334-4747

[illegible]

Menasha Corporation
320 North Farmer St.,
Otsego, MI 49078
Attn: Mr. Gary [illegible]

Sample received: 5-10-83

Hydro Number: 64033

Client I.S. ASTM-D3987 Leachate procedure on #5683 Lime Ash

Leachate:

Lead, Pb, mg/l	<0.05
Arsenic, As, mg/l	0.18 →
Cadmium, Cd, mg/l	<0.01
Total Chromium, Cr, mg/l	<0.02
Selenium, Se, mg/l	<0.005
Iron, Fe, mg/l	<0.02
Zinc, Zn, mg/l	<0.02
Copper, Cu, mg/l	<0.02
Total Dissolved Solids, TDS, mg/l	256
Nitrogen Nitrate, N, mg/l	0.96
Sulfate, SO_4, mg/l	25
Chloride, Cl, mg/l	18

As received.

pH	7.7
Total Solids, TS %,	79.0
Calcium Carbonate, %	9.5

700 grams of solids were leached with 2800 mls of deionized water for [illegible] hours. The final pH was 7.7.

Linda Deans
General Laboratory Manager

CLOW
HYDRO RESEARCH SERVICES
Water Management Division
Clow Corporation
408 Auburn Avenue
Pontiac, MI 48058
313 33
313 334-4/47

July 28, 1983

Menasha Corporation
320 North Farmer Street
Otsego, MI 49078
Attn: Mr. Gary Roys

Sample received: 7-20-83

Hydro Number: 66524

Client I.D. 71983 Lime Ash
ASTM-D 3987 Leachate Procedure

Arsenic, As, mg/l 0.19

700 grams of solids were leached with 2800 mls of deionized water for 48 hours.

Linda Deans
General Laboratory Manager

MEN00320

MENASHA CORPORATION

8 November 1983

Rick Sadowski
Department of Natural Resources
350 Ottawa Ave. N.W.
Grand Rapids, MI 49503

Dear Rick:

Attached are the latest leachate analysis of the secondary fiber system rejects going to our landfill. The samples were composited over a weeks period of time and were analyzed by the ASTM-D leachate procedure. If you have any questions concerning this matter, please contact either Gary Roys or the writer.

Sincerely,

Menasha Corporation
Otsego Paperboard Division

John R Blauwkamp P.E.

John R. Blauwkamp, P.E.
Technical Manager

cc G.Roys

j

OTSEGO PAPERBOARD MILL FARMER STREET • OTSEGO, MICHIGAN 49078 • PHONE 616-692-

CLOW
HYDRO RESEARCH SERVICES
Water Management Division
Clow Corporation
408 Auburn Avenue
Pontiac, MI 48058
313 33
313 33

MEN00321

10-24-83

Rejects from Secondary filter

Menasha Corporation
320 North Farmer Street
Otsego, MI 49078
Attn: Mr. Gary Roys

Sample received: 10-7-83

Hydro Number: 69967

Client I.D. REJ-2nd-100683
ASTM-D3987 Leachate Procedure

Lead, Pb, mg/l	0.07
Arsenic, As, mg/l	<0.005
Cadmium, Cd, mg/l	<0.01
Total Chromium, Cr, mg/l	0.05
Selenium, Se, mg/l	<0.005
Iron, Fe, mg/l	0.60
ZZnc, Zn, mg/l	0.25
Copper, Cu, mg/l	0.08
Nitrogen, Nitrate, N, mg/l	0.29
Sulfate, SO_4, mg/l	32
Chloride, Cl, mg/l	2.4
pH	7.43
Total Dissolved Solids, mg/l	1600

700 grams of sample were leached with 2800 mls of deionized water for 48 hours.

Linda Deans
Linda Deans
General Laboratory Manager

MEN00322

MENASHA CORPORATION

19 July 1984

Jim DeKroyter
Michigan Disposal Service
100 East North
Kalamazoo, MI 49001

Dear Jim:

Please find attached copies of the leachate analysis of the materials that are presently being put in our landfill.

The materials labeled Junker, Tail, Jonnson S., and HDC are from our secondary fiber system. The fly ash is a two week composite from the powerhouse.

If you have any questions, please contact John Blauwkamp or myself.

Sincerely,

Menasha Corporation
Otsego Paperboard Division

Gary E. Roys

Gary E. Roys
Process Chemist &
Group Leader

Attachment

j

OTSEGO PAPERBOARD MILL FARMER STREET • OTSEGO, MICHIGAN 49078 • PHONE 616-692-614

MEN00323

MENASHA CORPORATION

19 July 1984

Rick Sadowski
Department of Natural Resources
350 Ottawa, N.W.
Grand Rapids, MI 49503

Dear Rick:

Please find enclosed copies of the leachate analysis of the materials that are going to our landfill.

If you have any questions, please call John Blauwkamp or myself.

Sincerely,

Menasha Corporation
Otsego Paperboard Division

Gary E. Roys

Gary E. Roys
Process Chemist &
Group Leader

j

Enclosure

OTSEGO PAPERBOARD MILL FARMER STREET • OTSEGO, MICHIGAN 49078 • PHONE 616-692-61

CLOW
HYDRO RESEARCH SERVICES
Water Management Division
Clow Corporation
408 Auburn Avenue
Pontiac, MI 48058
313 334-1630
313 334-4747

July 6, 1984

Menasha Corporation
320 North Farmer Street
Otsego, MI 49078
Attn: Mr. John Blauwkamp

Samples Received: 6-6-84

Hydro Numbers:	79286	79287
Client I.D.:	Junker	Tail
ASTM Leachate		
Lead, Pb, mg/l	<0.05	0.10
Arsenic, As, mg/l	<0.005	<0.005
Cadmium, Cd, mg/l	<0.01	0.02
Total Chromium, TCr, mg/l	<0.02	<0.02
Selenium, Se, mg/l	<0.005	<0.005
Iron, Fe, mg/l	0.07	50
Zinc, Zn, mg/l	<0.02	2.7
Copper, Cu, mg/l	<0.02	0.12
Total Dissolved Solids, TDS, mg/l	130	1,200
Nitrogen, Nitrate, NO_3/N, mg/l	0.02	<0.02
Sulfate, SO_4, mg/l	5	64
Chloride, Cl, mg/l	15	4
pH	6	6

Linda Carey, Mgr

Linda Carey, Manager
Analytical Services

CLOW
HYDRO RESEARCH SERVICES
Water Management Division
Clow Corporation
408 Auburn Avenue
Pontiac, MI 48058
313 334-1630
313 334-4747

July 6, 1984

Menasha Corporation
320 North Farmer Street
Otsego, MI 49078
Attn: Mr. John Blauwkamp

Samples Received: 6-6-84

Hydro Numbers:	79288	79289
Client I.D.:	Jonnsson S.	HDC
ASTM Leachate		
Lead, Pb, mg/l	0.20	<0.05
Arsenic, As, mg/l	<0.005	<0.005
Cadmium, Cd, mg/l	0.01	0.01
Total Chromium, TCr, mg/l	0.05	<0.02
Selenium, Se, mg/l	<0.005	<0.005
Iron, Fe, mg/l	0.92	0.25
Zinc, Zn, mg/l	0.33	0.11
Copper, Cu, mg/l	0.05	<0.02
Total Dissolved Solids, TDS, mg/l	1,800	340
Nitrogen, Nitrate, NO_3/N, mg/l	<0.02	0.12
Sulfate, SO_4, mg/l	73	16
Chloride, Cl, mg/l	5	7
pH	7.56	8.09

Linda Carey, Mgr

Linda Carey, Manager
Analytical Services

CLOW
HYDRO RESEARCH SERVICES
Water Management Division
Clow Corporation
408 Auburn Avenue
Pontiac, MI 48058
313 334-1630
313 334-4747

July 6, 1984

Mensasha Corporation
320 North Farmer Street
Otsego, MI 49078
Attn: Mr. John Blauwkamp

Samples Received: 6-6-84

Hydro Numbers:	79290	79291
Client I.D.:	Krofta	Fly Ash
ASTM Leachate		
Lead, Pb, mg/l	0.09	<0.05
Arsenic, As, mg/l	<0.005	0.033
Cadmium, Cd, mg/l	0.01	<0.01
Total Chromium, TCr, mg/l	0.15	0.02
Selenium, Se, mg/l	<0.005	0.010
Iron, Fe, mg/l	2.2	0.06
Zinc, Zn, mg/l	0.32	0.09
Copper, Cu, mg/l	0.15	<0.02
Total Dissolved Solids, TDS, mg/l	2,000	310
Nitrogen, Nitrate, NO_3/N, mg/l	<0.02	0.23
Sulfate, SO_4, mg/l	73	190
Chloride, Cl, mg/l	17	5
pH	6.43	7.61

Linda Carey/mj

Linda Carey, Manager
Analytical Services

CLOW
HYDRO RESEARCH SERVICES
Water Management Division
Clow Corporation
408 Auburn Avenue
Pontiac, MI 48058
313 334-1630
313 334-4747

September 26, 1984

Menasha Corporation
320 North Farmer Street
Otsego, MI 49078
Attn: Mr. Gary Roys

Samples Received:	8/22/84	
Hydro Numbers:	82340	82341
Client I.D.:	HDC-JSR-884	Junk Tail 8/84

HIGH DENSITY & JOHNSSON SCREEN REJECTS

JUNKER & PULPER TAIL

ASTM Leachate

Total Dissolved Solids, mg/l	580	530
Lead, mg/l Pb,	<0.05	<0.05
Arsenic, As, mg/l	<0.005	<0.005
Cadmium, Cd, mg/l	<0.01	<0.01
Selenium, Se, mg/l	<0.005	<0.005
Iron, Fe, mg/l	0.50	14
Zinc Zn, mg/l	0.16	0.99
Copper, Cu, mg/l	0.05	0.10
Total Chromium, Cr, mg/l	<0.02	<0.02
Nitrogen , Nitrate, N, mg/l	0.21	0.50
Sulfate, SO_4, mg/l	47	21
Chloride, Cl, mg/l	31	14
pH	7.0	8.4

Susan K Scott
Laboratory Supervisor

MICHIGAN

September 21, 1984

John Barkel
Menasha Corporation
320 North Farmer
Otsego, Michigan 49078

Dear John:

We have good news in that D.N.R. has given us permission to use our Cork Street Class III Landfill for secondary fiber and junk-tail. The bad news is that samples must be taken in December 1984 and tests rerun.

If you have any questions, please call.

Sincerely yours,

MICHIGAN DISPOSAL SERVICE CORP.

James DeKruyter,
Vice President

JDK/ym

✓Enclosures

✓cc: John Blaukamp

MEN00329

KALAMAZOO COUNTY GOVERNMENT

HUMAN SERVICES DEPARTMENT
Public Health Division

418 WEST KALAMAZOO AVENUE•KALAMAZOO, MICHIGAN 49007
PHONE (616) 383-8888

September 18, 1984

James DeKruyter
Michigan Disposal Service
100 E. North Street
Kalamazoo, Michigan 49007

Re: Menasha Waste

Dear Mr. DeKruyter:

This office has reviewed the results of samples designated HDC-JS884-2 and junk-tail - 8-84-2 originating from the Menasha Plant. Based on these results this office would find no objection to the placing of these materials in the Cork Street Type III Landfill. However, based upon other reports received previously, we will require that additional samples be taken under our supervision at the landfill after a period of three months to confirm these last analyses.

Sincerely,

James E. Akers,
Director
Environmental Health Bureau

JEA:rd

MEN00330

ASTM LEACHATE STUDY
OF
WASTE MATERIALS
(JDC-JS884-2 and Junk-tail-884-2)

for

MENASHA CORPORATION
(Otsego Mill)

Project # 84718
September 6, 1984

Performed by:

KAR Laboratories, Inc.
219 Peekstok Road
Kalamazoo, MI 49001

INTRODUCTION

The purpose of this study was to evaluate the potential for component leaching from waste residues under conditions as specified in ASTM D3987. Two samples were received from Mr. Gary Roys on August 22, 1984 and evaluated. Sample # 1 was identified as HDC-JS884-2 and Sample #2 was identified as Junk-tail-884-2.

The study involved production of a leachate from each of the waste materials. The leachates were then analyzed for a variety of parameters specified by Michigan Department of Natural Resources staff.

SAMPLE DESCRIPTIONS

Sample #1 (HDC-JS884-2):

Nearly three pounds of sample were received in a tightly wrapped plastic bag. Sample #1 consisted of a mixture of pieces of paper, plastic and cardboard of various shapes and colors. The pieces were mostly smaller than 4 inches in the longest dimension. The sample was well mixed. Total solids comprised 59.81 percent of the sample.

Sample #2 (Junk-tail-884-2):

Nearly three pounds of sample were received in a tightly wrapped plastic bag. Sample #2 consisted of various metal pieces including wire, bottle caps, fasteners, parts of metal cans and other unidentified chunks, bits and pieces of metal. Additionally, small pieces of glass, styrofoam and plastic were present in small amounts. Generally pieces ranged in size from 1/4 inch to 3 or 4 inches. Total solids comprised 86.25 percent of the sample.

PROCEDURE

The production of the leachates followed the ASTM D3987 "Shake Extraction of Solid Waste with Water", as given in the Annual Book of ASTM Standards.

A 700 gram portion of sample was used in both cases. Distilled water with a volume of 2800 milliliters was added to each. The materials were thoroughly mixed and placed on a shaker for forty-eight hours. Filtration through 0.45 ug filters was performed to yield the final solution for analysis.

The filtrates from the ASTM procedure were analyzed for a variety of parameters. Methods of analysis followed either Methods for Analysis of Water and Wastes by the Environmental Protection Agency of the United States or Standard Methods for the Examination of Water and Wastewater by the American Public Health Association.

DISCUSSION OF RESULTS

The analytical results are listed in the Table of Results on the following page. Levels found of the various components are consistently low, indicating that the material is relatively inert.

TABLE OF RESULTS

Leachate Concentrations

(expressed as mg/L except where noted)

PARAMETER	Sample #1 (HDC-JS884-2)	Sample #2 (Junk-tail-884-2)
Total Dissolved Solids	1320	5310
Total Chromium	<0.05	<0.05
Lead	<0.05	<0.05
Arsenic	<0.02	<0.02
Cadmium	<0.05	<0.05
Selenium	<0.02	<0.02
Iron	0.59	0.85
Zinc	0.21	0.07
Copper	0.07	0.01
Nitrates	0.1	<0.1
Sulfates	11	9
Chlorides	<5	6
pH (s.u.)	6.9	7.4

FORM 561

MEN00335

memo / M... CORPORATION

TO: Bill Shepard

DATE: January 14, 1985

SUBJECT: Leachate Analyses - Secondary Fiber Rejects

FROM: Gary Roys
GER

Secondary fiber reject samples were obtained mid December for leachate analysis.

The sample labeled HDC-JS-12-84 was a composite from the high density cleaners and the Jonnson screen. The sample labeled TAIL-JKR-12-84 was from the pulper tail and junker.

Attached are the results forthe leachate tests.

cc: J. Blauwkamp

kj

ENVIRONMENTAL RESEARCH GROUP

MEN00336

117 N. FIRST . ANN ARBOR, MICHIGAN 48104
(313) 662-3104

SAMPLES RECVD BY : 03-15-82
CLIENT P.O. : 20706
REPORT DATE : 04-14-82
REPORT NO. : 5845

FINAL REPORT ON
ERG PROJECT NO. 8478

RESIDUAL SAMPLES WILL BE
HELD TWO WEEKS

FOR :

MENASHA CORPORATION
OTSEGO PAPERBOARD MILL
FARMER STREET
OTSEGO, MI 49078

APPROVED BY : John Wilson /Ags

ATTENTION: GARY ROYS

REFER TECHNICAL QUESTIONS
TO : JOHN WILSON

CLIENT ID	DATE COLLECTED / PARAMETER & MATRIX	RESULT UNIT	ERG SAMPLE NUMBER
AL-ASHLIME	ASTM-LEACHATE (LEACH)	3/26/82	072664
LEACHATE OF ASHLIME	pH IN E.P. TOX. LEACHATE	9.9 S.U.	072665
LEACHATE OF ASHLIME	SOLIDS, SUSPENDED IN E. P. TOX LEACHATE	ND (2) mg/L	
LEACHATE OF ASHLIME	HARDNESS IN E. P. TOX LEACHATE		
	TOTAL HARDNESS	17 mg/L	
	CALCIUM HARDNESS	NA	
	MAGNESIUM HARDNESS	NA	
LEACHATE OF ASHLIME	SULFATE IN LEACHATE	40 mg/L	
LEACHATE OF ASHLIME	CHLORIDE IN E. P. TOX LEACHATE	13 mg/L	
LEACHATE OF ASHLIME	CHEMICAL OXYGEN DEMAND IN E.P. TOX.	14 mg/L	
LEACHATE OF ASHLIME	PHOSPHORUS, TOTAL IN EP-TOX LEACHATE	0.18 mg/L	
LEACHATE OF ASHLIME	NITROGEN, NITRATE IN E. P. TOX LEACHATE	1.1 mg/L	
LEACHATE OF ASHLIME	LEAD, TOTAL IN EP-TOX LEACHATE	<0.010 mg/L	
LEACHATE OF ASHLIME	ARSENIC, (BY FURNACE AA) TOTAL IN EP-TOX LEACHATE	0.033 mg/L	
LEACHATE OF ASHLIME	CADMIUM, TOTAL IN EP-TOX LEACHATE	ND (0.003) mg/L	
LEACHATE OF ASHLIME	CHROMIUM, TOTAL IN EP-TOX LEACHATE	<0.005 mg/L	
LEACHATE OF ASHLIME	MERCURY, TOTAL IN E.P. TOX LEACHATE	0.0003 mg/L	
LEACHATE OF ASHLIME	SELENIUM, (BY FURNACE AA) TOTAL IN E.P. TOX LEACHA	0.007 mg/L	

APR 1982
RECEIVED

ENVIRONMENTAL RESEARCH GROUP, INC.

SD = SAMPLE DAMAGED
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ND = NONDETECTED, DETECTION LIMIT IN ()

CONTINUED

ENVIRONMENTAL RESEARCH GROUP

MEN00337

117 N. FIRST , ANN ARBOR, MICHIGAN 48104
(313) 662-3104

SAMPLES RECVD BY : 03-15-82
CLIENT P.O. : 20706
REPORT DATE : 04-14-82
REPORT NO. : 5845

FINAL REPORT ON
ERG PROJECT NO. 8478

RESIDUAL SAMPLES WILL BE HELD TWO WEEKS

FOR :

MENASHA CORPORATION
OTSEGO PAPERBOARD MILL
FARMER STREET
OTSEGO, MI 49078

ATTENTION: GARY ROYS

REFER TECHNICAL QUESTIONS TO : JOHN WILSON

CLIENT ID	DATE COLLECTED PARAMETER & MATRIX	RESULT UNIT	ERG SAMPLE NUMBER
LEACHATE OF ASHLIME	IRON, TOTAL IN EP-TOX LEACHATE	<0.010 mg/L	
LEACHATE OF ASHLIME	CALCIUM, TOTAL IN E. P. TOX LEACHATE	3.4 mg/L	
LEACHATE OF ASHLIME	SODIUM, TOTAL IN E. P. TOX LEACHATE	49 mg/L	
LEACHATE OF ASHLIME	COPPER, TOTAL IN EP-TOX LEACHATE	<0.005 mg/L	
LEACHATE OF ASHLIME	MAGNESIUM, TOTAL IN E. P. TOX LEACHATE	1.2 mg/L	
LEACHATE OF ASHLIME	PCB IN E. P. TOX LEACHATE		
	TOTAL PCB	ND (0.20) ug/L	
	PCB 1242	ND (0.20) ug/L	
	PCB 1248	ND (0.20) ug/L	
	PCB 1254	ND (0.20) ug/L	
	PCB 1260	ND (0.20) ug/L	
LEACHATE OF ASHLIME	CARBON, TOTAL ORGANIC, IN E. P. TOX LEACHATE	5 mg/L	
COMP FLY ASH	ASTM-LEACHATE (LEACH)	3/26/82	072666
LEACHATE OF FLY ASH	pH IN E.P. TOX. LEACHATE	8.6 S.U.	072667
LEACHATE OF FLY ASH	SOLIDS, SUSPENDED IN E. P. TOX LEACHATE	ND (2) mg/L	
LEACHATE OF FLY ASH	HARDNESS IN E. P. TOX LEACHATE		
	TOTAL HARDNESS	150 mg/L	
	CALCIUM HARDNESS	NA	
	MAGNESIUM HARDNESS	NA	
LEACHATE OF FLY ASH	SULFATE IN LEACHATE	270 mg/L	
LEACHATE OF FLY ASH	CHLORIDE IN E. P. TOX LEACHATE	31 mg/L	
LEACHATE OF FLY ASH	CHEMICAL OXYGEN DEMAND IN E.P. TOX.	2 mg/L	

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CONTINUED

ENVIRONMENTAL RESEARCH GROUP

MEN00338

117 N. FIRST . ANN ARBOR, MICHIGAN 48104
(313) 662-3104

SAMPLES RECVD BY : 03-15-82
CLIENT P.O. : 20706
REPORT DATE : 04-14-82
REPORT NO. : 5845

FINAL REPORT ON
ERG PROJECT NO. 8478

RESIDUAL SAMPLES WILL BE HELD TWO WEEKS

FOR :

MENASHA CORPORATION
OTSEGO PAPERBOARD MILL
FARMER STREET
OTSEGO, MI 49078

ATTENTION: GARY ROYS

REFER TECHNICAL QUESTIONS TO : JOHN WILSON

CLIENT ID / DATE COLLECTED / PARAMETER & MATRIX	RESULT	UNIT	ERG SAMPLE NUMBER
LEACHATE OF FLY ASH PHOSPHORUS, TOTAL IN EP-TOX LEACHATE	0.26	mg/L	
LEACHATE OF FLY ASH NITROGEN, NITRATE IN E. P. TOX LEACHATE	0.20	mg/L	
LEACHATE OF FLY ASH LEAD, TOTAL IN EP-TOX LEACHATE	0.026	mg/L	
LEACHATE OF FLY ASH ARSENIC, (BY FURNACE AA) TOTAL IN EP-TOX LEACHATE	0.054	mg/L	
LEACHATE OF FLY ASH CADMIUM, TOTAL IN EP-TOX LEACHATE	ND (0.003)	mg/L	
LEACHATE OF FLY ASH CHROMIUM, TOTAL IN EP-TOX LEACHATE	ND (0.005)	mg/L	
LEACHATE OF FLY ASH MERCURY, TOTAL IN E.P. TOX LEACHATE	ND(0.0002)	mg/L	
LEACHATE OF FLY ASH SELENIUM, (BY FURNACE AA) TOTAL IN E.P. TOX LEACHA	0.025	mg/L	
LEACHATE OF FLY ASH IRON, TOTAL IN EP-TOX LEACHATE	<0.010	mg/L	
LEACHATE OF FLY ASH CALCIUM, TOTAL IN E. P. TOX LEACHATE	45	mg/L	
LEACHATE OF FLY ASH SODIUM, TOTAL IN E. P. TOX LEACHATE	64	mg/L	
LEACHATE OF FLY ASH COPPER, TOTAL IN EP-TOX LEACHATE	0.005	mg/L	
LEACHATE OF FLY ASH MAGNESIUM, TOTAL IN E. P. TOX LEACHATE	4.2	mg/L	
LEACHATE OF FLY ASH PCB IN E. P. TOX LEACHATE			
TOTAL PCB	ND (0.20)	ug/L	
PCB 1242	ND (0.20)	ug/L	
PCB 1248	ND (0.20)	ug/L	
PCB 1254	ND (0.20)	ug/L	
PCB 1260	ND (0.20)	ug/L	
LEACHATE OF FLY ASH CARBON, TOTAL ORGANIC, IN E. P. TOX LEACHATE	<1	mg/L	

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MEN00339

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(313) 662-3104

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FOR :

MENASHA CORPORATION
OTSEGO PAPERBOARD MILL
FARMER STREET
OTSEGO, MI 49078

ATTENTION: GARY RUYS

REFER TECHNICAL QUESTIONS
TO : JOHN WILSON

CLIENT ID / PARAMETER & MATRIX	DATE COLLECTED	RESULT	UNIT	ERG SAMPLE NUMBER
2382-IF ASH				072668
ASTM-LEACHATE (LEACH)	3/26/82			
LEACHATE OF 2382 ASH				072669
pH IN E.P. TOX. LEACHATE		8.4	S.U.	
LEACHATE OF 2382 ASH				
SOLIDS, SUSPENDED IN E. P. TOX LEACHATE		ND (2)	mg/L	
LEACHATE OF 2382 ASH				
HARDNESS IN E. P. TOX LEACHATE				
TOTAL HARDNESS		130	mg/L	
CALCIUM HARDNESS		NA		
MAGNESIUM HARDNESS		NA		
LEACHATE OF 2382 ASH				
SULFATE IN LEACHATE		340	mg/L	
LEACHATE OF 2382 ASH				
CHLORIDE IN E. P. TOX LEACHATE		59	mg/L	
LEACHATE OF 2382 ASH				
CHEMICAL OXYGEN DEMAND IN E.P. TOX.		6	mg/L	
LEACHATE OF 2382 ASH				
PHOSPHORUS, TOTAL IN EP-TOX LEACHATE		0.56	mg/L	
LEACHATE OF 2382 ASH				
NITROGEN, NITRATE IN E. P. TOX LEACHATE		0.68	mg/L	
LEACHATE OF 2382 ASH				
LEAD, TOTAL IN EP-TOX LEACHATE		<0.010	mg/L	
LEACHATE OF 2382 ASH				
ARSENIC, (BY FURNACE AA) TOTAL IN EP-TOX LEACHATE		0.040	mg/L	
LEACHATE OF 2382 ASH				
CADMIUM, TOTAL IN EP-TOX LEACHATE		ND (0.003)	mg/L	
LEACHATE OF 2382 ASH				
CHROMIUM, TOTAL IN EP-TOX LEACHATE		ND (0.005)	mg/L	
LEACHATE OF 2382 ASH				
MERCURY, TOTAL IN E.P. TOX LEACHATE		<0.0002	mg/L	
LEACHATE OF 2382 ASH				
SELENIUM, (BY FURNACE AA) TOTAL IN E.P. TOX LEACHA		0.15	mg/L	

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ENVIRONMENTAL RESEARCH GROUP

MEN00340

117 N. FIRST . ANN ARBOR, MICHIGAN 48104
(313) 662-3104

SAMPLES RECVD BY : 03-15-82
CLIENT P.O. : 20706
REPORT DATE : 04-14-82
REPORT NO. : 5845

FINAL REPORT ON
ERG PROJECT NO. 8478

RESIDUAL SAMPLES WILL BE HELD TWO WEEKS

FOR :

MENASHA CORPORATION
OTSEGO PAPERBOARD MILL
FARMER STREET
OTSEGO, MI 49078

ATTENTION: GARY RUYS

REFER TECHNICAL QUESTIONS TO : JOHN WILSON

CLIENT ID / PARAMETER & MATRIX	DATE COLLECTED	RESULT	UNIT	ERG SAMPLE NUMBER
LEACHATE OF 2382 ASH				
IRON, TOTAL IN EP-TOX LEACHATE		<0.010	mg/L	
LEACHATE OF 2382 ASH				
CALCIUM, TOTAL IN E. P. TOX LEACHATE		32	mg/L	
LEACHATE OF 2382 ASH				
SODIUM, TOTAL IN E. P. TOX LEACHATE		100	mg/L	
LEACHATE OF 2382 ASH				
COPPER, TOTAL IN EP-TOX LEACHATE		<0.005	mg/L	
LEACHATE OF 2382 ASH				
MAGNESIUM, TOTAL IN E. P. TOX LEACHATE		5	mg/L	
LEACHATE OF 2382 ASH				
PCB IN E. P. TOX LEACHATE				
TOTAL PCB		ND (0.20)	ug/L	
PCB 1242		ND (0.20)	ug/L	
PCB 1248		ND (0.20)	ug/L	
PCB 1254		ND (0.20)	ug/L	
PCB 1260		ND (0.20)	ug/L	
LEACHATE OF 2382 ASH				
CARBON, TOTAL ORGANIC, IN E. P. TOX LEACHATE		1	mg/L	
2182-IF ASH				072670
ASTM-LEACHATE (LEACH)	3/26/82			
LEACHATE OF 2182 ASH				072671
pH IN E.P. TOX. LEACHATE		9.6	S.U.	
LEACHATE OF 2182 ASH				
SOLIDS, SUSPENDED IN E. P. TOX LEACHATE		ND (2)	mg/L	
LEACHATE OF 2182 ASH				
HARDNESS IN E. P. TOX LEACHATE				
TOTAL HARDNESS		170	mg/L	
CALCIUM HARDNESS		NA		
MAGNESIUM HARDNESS		NA		
LEACHATE OF 2182 ASH				
SULFATE IN LEACHATE		360	mg/L	
LEACHATE OF 2182 ASH				
CHLORIDE IN E. P. TOX LEACHATE		135	mg/L	
LEACHATE OF 2182 ASH				
CHEMICAL OXYGEN DEMAND IN E.P. TOX.		8	mg/L	

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ENVIRONMENTAL RESEARCH GROUP

MEN00341

117 N. FIRST . ANN ARBOR, MICHIGAN 48104
(313) 662-3104

SAMPLES RECVD BY : 03-15-82
CLIENT P.O. : 20706
REPORT DATE : 04-14-82
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FINAL REPORT ON
ERG PROJECT NO. 8478

RESIDUAL SAMPLES WILL BE
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FOR :

MENASHA CORPORATION
OTSEGO PAPERBOARD MILL
FARMER STREET
OTSEGO, MI 49078

ATTENTION: GARY RUYS

REFER TECHNICAL QUESTIONS
TO : JOHN WILSON

CLIENT ID	DATE COLLECTED PARAMETER & MATRIX	RESULT UNIT	ERG SAMPLE NUMBER
LEACHATE OF 2182 ASH	PHOSPHORUS, TOTAL IN EP-TOX LEACHATE	0.25 mg/L	
LEACHATE OF 2182 ASH	NITROGEN, NITRATE IN E. P. TOX LEACHATE	0.26 mg/L	
LEACHATE OF 2182 ASH	LEAD, TOTAL IN EP-TOX LEACHATE	<0.010 mg/L	
LEACHATE OF 2182 ASH	ARSENIC, (BY FURNACE AA) TOTAL IN EP-TOX LEACHATE	0.063 mg/L	
LEACHATE OF 2182 ASH	CADMIUM, TOTAL IN EP-TOX LEACHATE	ND (0.003) mg/L	
LEACHATE OF 2182 ASH	CHROMIUM, TOTAL IN EP-TOX LEACHATE	ND (0.005) mg/L	
LEACHATE OF 2182 ASH	MERCURY, TOTAL IN E.P. TOX LEACHATE	ND(0.0002) mg/L	
LEACHATE OF 2182 ASH	SELENIUM, (BY FURNACE AA) TOTAL IN E.P. TOX LEACHA	0.11 mg/L	
LEACHATE OF 2182 ASH	IRON, TOTAL IN EP-TOX LEACHATE	0.013 mg/L	
LEACHATE OF 2182 ASH	CALCIUM, TOTAL IN E. P. TOX LEACHATE	44 mg/L	
LEACHATE OF 2182 ASH	SODIUM, TOTAL IN E. P. TOX LEACHATE	190 mg/L	
LEACHATE OF 2182 ASH	COPPER, TOTAL IN EP-TOX LEACHATE	0.006 mg/L	
LEACHATE OF 2182 ASH	MAGNESIUM, TOTAL IN E. P. TOX LEACHATE	8.2 mg/L	
LEACHATE OF 2182 ASH	PCB IN E. P. TOX LEACHATE		
	TOTAL PCB	ND (0.20) ug/L	
	PCB 1242	ND (0.20) ug/L	
	PCB 1248	ND (0.20) ug/L	
	PCB 1254	ND (0.20) ug/L	
	PCB 1260	ND (0.20) ug/L	
LEACHATE OF 2182 ASH	CARBON, TOTAL ORGANIC, IN E. P. TOX LEACHATE	1 mg/L	

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ENVIRONMENTAL RESEARCH GROUP

MEN00342

117 N. FIRST . ANN ARBOR, MICHIGAN 48104
(313) 662-3104

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FOR :

MENASHA CORPORATION
OTSEGO PAPERBOARD MILL
FARMER STREET
OTSEGO, MI 49078

ATTENTION: GARY RUYS

REFER TECHNICAL QUESTIONS
TO : JOHN WILSON

CLIENT ID	DATE COLLECTED PARAMETER & MATRIX	RESULT UNIT	ERG SAMPLE NUMBER
B082-IF ASH			072672
	ASTM-LEACHATE (LEACH)	3/26/82	
LEACHATE OF B082 ASH			072673
	pH IN E.P. TOX. LEACHATE	8.9 S.U.	
LEACHATE OF B082 ASH			
	SOLIDS, SUSPENDED IN E. P. TOX LEACHATE	ND (2) mg/L	
LEACHATE OF B082 ASH			
	HARDNESS IN E. P. TOX LEACHATE		
	TOTAL HARDNESS	130 mg/L	
	CALCIUM HARDNESS	NA	
	MAGNESIUM HARDNESS	NA	
LEACHATE OF B082 ASH			
	SULFATE IN LEACHATE	460 mg/L	
LEACHATE OF B082 ASH			
	CHLORIDE IN E. P. TOX LEACHATE	125 mg/L	
LEACHATE OF B082 ASH			
	CHEMICAL OXYGEN DEMAND IN E.P. TOX.	7 mg/L	
LEACHATE OF B082 ASH			
	PHOSPHORUS, TOTAL IN EP-TOX LEACHATE	0.33 mg/L	
LEACHATE OF B082 ASH			
	NITROGEN, NITRATE IN E. P. TOX LEACHATE	0.23 mg/L	
LEACHATE OF B082 ASH			
	LEAD, TOTAL IN EP-TOX LEACHATE	<0.010 mg/L	
LEACHATE OF B082 ASH			
	ARSENIC, (BY FURNACE AA) TOTAL IN EP-TOX LEACHATE	0.069 mg/L	
LEACHATE OF B082 ASH			
	CADMIUM, TOTAL IN EP-TOX LEACHATE	ND (0.003) mg/L	
LEACHATE OF B082 ASH			
	CHROMIUM, TOTAL IN EP-TOX LEACHATE	ND (0.005) mg/L	
LEACHATE OF B082 ASH			
	MERCURY, TOTAL IN E.P. TOX LEACHATE	0.0004 mg/L	
LEACHATE OF B082 ASH			
	SELENIUM, (BY FURNACE AA) TOTAL IN E.P. TOX LEACHA	0.11 mg/L	

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MEN00343

117 N. FIRST . ANN ARBOR, MICHIGAN 48104
(313) 662-3104

SAMPLES RECVD BY : 03-15-82
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REPORT DATE : 04-14-82
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FOR :

MENASHA CORPORATION
OTSEGO PAPERBOARD MILL
FARMER STREET
OTSEGO, MI 49078

ATTENTION: GARY RUYS

REFER TECHNICAL QUESTIONS TO : JOHN WILSON

CLIENT ID / PARAMETER & MATRIX	DATE COLLECTED	RESULT UNIT	ERG SAMPLE NUMBER
LEACHATE OF B082 ASH IRON, TOTAL IN EP-TOX LEACHATE		0.010 mg/L	
LEACHATE OF B082 ASH CALCIUM, TOTAL IN E. P. TOX LEACHATE		33 mg/L	
LEACHATE OF B082 ASH SODIUM, TOTAL IN E. P. TOX LEACHATE		230 mg/L	
LEACHATE OF B082 ASH COPPER, TOTAL IN EP-TOX LEACHATE		0.006 mg/L	
LEACHATE OF B082 ASH MAGNESIUM, TOTAL IN E. P. TOX LEACHATE		6.6 mg/L	
LEACHATE OF B082 ASH PCB IN E. P. TOX LEACHATE			
TOTAL PCB		ND (0.20) ug/L	
PCB 1242		ND (0.20) ug/L	
PCB 1248		ND (0.20) ug/L	
PCB 1254		ND (0.20) ug/L	
PCB 1260		ND (0.20) ug/L	
LEACHATE OF B082 ASH CARBON, TOTAL ORGANIC, IN E. P. TOX LEACHATE		1 mg/L	
HP2-TAIL ASTM-LEACHATE (LEACH)		3/26/82	072674
LEACHATE OF HP2-TAIL pH IN E.P. TOX. LEACHATE		7.8 S.U.	072675
LEACHATE OF HP2-TAIL SOLIDS, SUSPENDED IN E. P. TOX LEACHATE		28 mg/L	
LEACHATE OF HP2-TAIL SULFATE IN LEACHATE		<5 mg/L	
	COMMENTS: HIGHER DETECTION LIMIT DUE TO MATRIX INTERFERENCE.		
LEACHATE OF HP2-TAIL CHEMICAL OXYGEN DEMAND IN E.P. TOX.		660 mg/L	
LEACHATE OF HP2-TAIL NITROGEN, NITRATE IN E. P. TOX LEACHATE		0.03 mg/L	
LEACHATE OF HP2-TAIL LEAD, TOTAL IN EP-TOX LEACHATE		0.019 mg/L	

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CLIENT ID / DATE COLLECTED / PARAMETER & MATRIX	RESULT UNIT	ERG SAMPLE NUMBER
LEACHATE OF HP2-TAIL CHROMIUM, TOTAL IN EP-TOX LEACHATE	ND (0.005) mg/L	
LEACHATE OF HP2-TAIL CALCIUM, TOTAL IN E. P. TOX LEACHATE	4.7 mg/L	
LEACHATE OF HP2-TAIL SODIUM, TOTAL IN E. P. TOX LEACHATE	150 mg/L	
LEACHATE OF HP2-TAIL COPPER, TOTAL IN EP-TOX LEACHATE	0.077 mg/L	
LEACHATE OF HP2-TAIL MAGNESIUM, TOTAL IN E. P. TOX LEACHATE	1.5 mg/L	
LEACHATE OF HP2-TAIL NITROGEN, NITRITE IN E. P. TOX LEACHATE	0.02 mg/L	
LEACHATE OF HP2-TAIL NITROGEN, TOTAL ORGANIC IN E. P. TOX LEACHATE	1.4 mg/L	
LEACHATE OF HP2-TAIL ZINC, TOTAL IN EP-TOX LEACHATE	0.19 mg/L	
LEACHATE OF HP2-TAIL POTASSIUM, TOTAL IN E. P. TOX LEACHATE	5.4 mg/L	
LEACHATE OF HP2-TAIL IRON, TOTAL IN EP-TOX LEACHATE	21 mg/L	
LEACHATE OF HP2-TAIL CARBON, TOTAL ORGANIC, IN E. P. TOX LEACHATE	280 mg/L	
HP1-REJECTS ASTM-LEACHATE (LEACH)	3/26/82	072676
LEACHATE OF REJECTS pH IN E.P. TOX. LEACHATE	6.7 S.U.	072677
LEACHATE OF REJECTS SOLIDS, SUSPENDED IN E. P. TOX LEACHATE	ND (2) mg/L	
LEACHATE OF REJECTS SULFATE IN LEACHATE	10 mg/L	
LEACHATE OF REJECTS CHEMICAL OXYGEN DEMAND IN E.P. TOX.	1000 mg/L	

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TO : JOHN WILSON

CLIENT ID	DATE COLLECTED	PARAMETER & MATRIX	RESULT	UNIT	ERG SAMPLE NUMBER
LEACHATE OF REJECTS		NITROGEN, NITRATE IN E. P. TOX LEACHATE	0.06	mg/L	
LEACHATE OF REJECTS		LEAD, TOTAL IN EP-TOX LEACHATE	0.11	mg/L	
LEACHATE OF REJECTS		CHROMIUM, TOTAL IN EP-TOX LEACHATE	0.012	mg/L	
LEACHATE OF REJECTS		CALCIUM, TOTAL IN E. P. TOX LEACHATE	27	mg/L	
LEACHATE OF REJECTS		SODIUM, TOTAL IN E. P. TOX LEACHATE	260	mg/L	
LEACHATE OF REJECTS		COPPER, TOTAL IN EP-TOX LEACHATE	0.053	mg/L	
LEACHATE OF REJECTS		MAGNESIUM, TOTAL IN E. P. TOX LEACHATE	3.4	mg/L	
LEACHATE OF REJECTS		NITROGEN, NITRITE IN E. P. TOX LEACHATE	0.07	mg/L	
LEACHATE OF REJECTS		NITROGEN, TOTAL ORGANIC IN E. P. TOX LEACHATE	3.4	mg/L	
LEACHATE OF REJECTS		ZINC, TOTAL IN EP-TOX LEACHATE	0.52	mg/L	
LEACHATE OF REJECTS		POTASSIUM, TOTAL IN E. P. TOX LEACHATE	8.3	mg/L	
LEACHATE OF REJECTS		IRON, TOTAL IN EP-TOX LEACHATE	0.52	mg/L	
LEACHATE OF REJECTS		CARBON, TOTAL ORGANIC, IN E. P. TOX LEACHATE	340	mg/L	

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ENVIRONMENTAL RESEARCH GROUP, INC.

THANK YOU FOR YOUR BUSINESS !

CLOW
HYDRO RESEARCH SERVICES
Water Management Division
Clow Corporation
313/334-4747

[illegible]

Menasha Corporation
321 North Farmer St.,
Osseo, WI 54027
Attn: Mr. Gary [illegible]

Sample received: 5-10-83

Hydro Number: 64033

Client I.S. ASTM-D3987 Leachate procedure on #5683 Lime Ash

Leachate:

Lead, Pb, mg/l	<0.05
Arsenic, As, mg/l	0.18 →
Cadmium, Cd, mg/l	<0.01
Total Chromium, Cr, mg/l	<0.02
Selenium, Se, mg/l	<0.005
Iron, Fe, mg/l	<0.02
Zinc, Zn, mg/l	<0.02
Copper, Cu, mg/l	<0.02
Total Dissolved Solids, TDS, mg/l	256
Nitrogen Nitrate, N, mg/l	0.96
Sulfate, SO_4, mg/l	25
Chloride, Cl, mg/l	18

As received.

pH	7.7
Total Solids, TS %,	79.0
Calcium Carbonate, %	9.5

[illegible] grams of solids were leached with 2000 mls of deionized water for [illegible] hours. The final pH was 7.7.

Linda Deans
General Laboratory Manager

CLOW
HYDRO RESEARCH SERVICES
Water Management Division
Clow Corporation
408 Auburn Avenue
Pontiac, MI 48058
313 334-1630
313 334-4747

MEN00347

July 28, 1983

Menasha Corporation
320 North Farmer Street
Otsego, MI 49078
Attn: Mr. Gary Roys

Sample received: 7-20-83

Hydro Number: 66524

Client I.D. 71983 Lime Ash
ASTM-D 3987 Leachate Procedure

Arsenic, As, mg/l 0.19

700 grams of solids were leached with 2800 mls of deionized water for 48 hours.

Linda Deans
General Laboratory Manager

MEN00348

MENASHA CORPORATIO

8 November 1983

Rick Sadowski
Department of Natural Resources
350 Ottawa Ave. N.W.
Grand Rapids, MI 49503

Dear Rick:

Attached are the latest leachate analysis of the secondary fiber system rejects going to our landfill. The samples were composited over a weeks period of time and were analyzed by the ASTM-D leachate procedure. If you have any questions concerning this matter, please contact either Gary Roys or the writer.

Sincerely,

Menasha Corporation
Otsego Paperboard Division

John R Blauwkamp P.E.

John R. Blauwkamp, P.E.
Technical Manager

cc G.Roys

j

OTSEGO PAPERBOARD MILL FARMER STREET • OTSEGO, MICHIGAN 49078 • PHONE 616-69

CLOW
HYDRO RESEARCH SERVICES
Water Management Division
Clow Corporation
408 Auburn Avenue
Pontiac, MI 48058
313 334-1630
313 334-4747

MEN00349

10-24-83

Rejects from Secondary filter

Menasha Corporation
320 North Farmer Street
Otsego, MI 49078
Attn: Mr. Gary Roys

Sample received: 10-7-83

Hydro Number: 69967

Client I.D. REJ-2nd-100683
ASTM-D3987 Leachate Procedure

Lead, Pb, mg/l	0.07
Arsenic, As, mg/l	<0.005
Cadmium, Cd, mg/l	<0.01
Total Chromium, Cr, mg/l	0.05
Selenium, Se, mg/l	<0.005
Iron, Fe, mg/l	0.60
ZZnc, Zn, mg/l	0.25
Copper, Cu, mg/l	0.08
Nitrogen, Nitrate, N, mg/l	0.29
Sulfate, SO_4, mg/l	32
Chloride, Cl, mg/l	2.4
pH	7.43
Total Dissolved Solids, mg/l	1600

700 grams of sample were leached with 2800 mls of deionized water for 48 hours.

Linda Deans
General Laboratory Manager

MEN00350

MENASHA CORPORATION

19 July 1984

Jim DeKroyter
Michigan Disposal Service
100 East North
Kalamazoo, MI 49001

Dear Jim:

Please find attached copies of the leachate analysis of the materials that are presently being put in our landfill.

The materials labeled Junker, Tail, Jonnson S., and HDC are from our secondary fiber system. The fly ash is a two week composite from the powerhouse.

If you have any questions, please contact John Blauwkamp or myself.

Sincerely,

Menasha Corporation
Otsego Paperboard Division

Gary E. Roys

Gary E. Roys
Process Chemist &
Group Leader

Attachment

j

OTSEGO PAPERBOARD MILL FARMER STREET • OTSEGO, MICHIGAN 49078 • PHONE 616-692-6

MEN00351

MENASHA CORPORATION

19 July 1984

Rick Sadowski
Department of Natural Resources
350 Ottawa, N.W.
Grand Rapids, MI 49503

Dear Rick:

Please find enclosed copies of the leachate analysis of the materials that are going to our landfill.

If you have any questions, please call John Blauwkamp or myself.

Sincerely,

Menasha Corporation
Otsego Paperboard Division

Gary E. Roys

Gary E. Roys
Process Chemist &
Group Leader

j

Enclosure

OTSEGO PAPERBOARD MILL FARMER STREET • OTSEGO, MICHIGAN 49078 • PHONE 616-692-

CLOW
HYDRO RESEARCH SERVICES
Water Management Division
Clow Corporation
408 Auburn Avenue
Pontiac, MI 48058
313 334-1630
313 334-4747

MEN00352

July 6, 1984

Menasha Corporation
320 North Farmer Street
Otsego, MI 49078
Attn: Mr. John Blauwkamp

Samples Received: 6-6-84

Hydro Numbers:	79286	79287
Client I.D.:	Junker	Tail
ASTM Leachate		
Lead, Pb, mg/l	<0.05	0.10
Arsenic, As, mg/l	<0.005	<0.005
Cadmium, Cd, mg/l	<0.01	0.02
Total Chromium, TCr, mg/l	<0.02	<0.02
Selenium, Se, mg/l	<0.005	<0.005
Iron, Fe, mg/l	0.07	50
Zinc, Zn, mg/l	<0.02	2.7
Copper, Cu, mg/l	<0.02	0.12
Total Dissolved Solids, TDS, mg/l	130	1,200
Nitrogen, Nitrate, NO_3/N, mg/l	0.02	<0.02
Sulfate, SO_4, mg/l	5	64
Chloride, Cl, mg/l	15	4
pH	6	6

Linda Carey, Manager
Analytical Services

CLOW
HYDRO RESEARCH SERVICES
Water Management Division
Clow Corporation
408 Auburn Avenue
Pontiac, MI 48058
313 334-1630
313 334-4747

July 11, 1984

Menasha Corporation
320 North Farmer Street
Otsego, MI 49078
Attn: Mr. John Blauwkamp

Samples Received: 6-6-84

Hydro Numbers:	79288	79289
Client I.D.:	Jonnsson S.	HDC
ASTM Leachate		
Lead, Pb, mg/l	0.20	<0.05
Arsenic, As, mg/l	<0.005	<0.005
Cadmium, Cd, mg/l	0.01	0.01
Total Chromium, TCr, mg/l	0.05	<0.02
Selenium, Se, mg/l	<0.005	<0.005
Iron, Fe, mg/l	0.92	0.25
Zinc, Zn, mg/l	0.33	0.11
Copper, Cu, mg/l	0.05	<0.02
Total Dissolved Solids, TDS, mg/l	1,800	340
Nitrogen, Nitrate, NO_3/N, mg/l	<0.02	0.12
Sulfate, SO_4, mg/l	73	16
Chloride, Cl, mg/l	5	7
pH	7.56	8.09

Linda Carey, Manager
Analytical Services

CLOW
HYDRO RESEARCH SERVICES
Water Management Division
Clow Corporation
408 Auburn Avenue
Pontiac, MI 48058
313 334-1030
313 334-4747

July 6, 1984

Mensamina Corporation
320 North Farmer Street
Otsego, MI 49078
Attn: Mr. John Blauwkamp

Samples Received: 6-6-84

Hydro Numbers:	79290	79291
Client I.D.:	Krofta	Fly Ash
ASTM Leachate		
Lead, Pb, mg/l	0.09	<0.05
Arsenic, As, mg/l	<0.005	0.033
Cadmium, Cd, mg/l	0.01	<0.01
Total Chromium, TCr, mg/l	0.15	0.02
Selenium, Se, mg/l	<0.005	0.010
Iron, Fe, mg/l	2.2	0.06
Zinc, Zn, mg/l	0.32	0.09
Copper, Cu, mg/l	0.15	<0.02
Total Dissolved Solids, TDS, mg/l	2,000	310
Nitrogen, Nitrate, NO_3/N, mg/l	<0.02	0.23
Sulfate, SO_4, mg/l	73	190
Chloride, Cl, mg/l	17	5
pH	6.43	7.61

Linda Carey, Manager
Analytical Services

CLOW
HYDRO RESEARCH SERVICES
Water Management Division
Clow Corporation
408 Auburn Avenue
Pontiac, MI 48058
313 3
313 334-4747

September 26, 1984

Menasha Corporation
320 North Farmer Street
Otsego, MI 49078
Attn: Mr. Gary Roys

Samples Received: 8/22/84

	HIGH DENSITY & JOHNSSON SILICA REJECTS	JUNKER & PULPER TAIL
Hydro Numbers:	82340	82341
Client I.D.:	HDC-JSR-884	Junk Tail 8/84

ASTM Leachate

Total Dissolved Solids, mg/l	580	530
Lead, mg/l Pb,	<0.05	<0.05
Arsenic, As, mg/l	<0.005	<0.005
Cadmium, Cd, mg/l	<0.01	<0.01
Selenium, Se, mg/l	<0.005	<0.005
Iron, Fe, mg/l	0.50	14
Zinc Zn, mg/l	0.16	0.99
Copper, Cu, mg/l	0.05	0.10
Total Chromium, Cr, mg/l	<0.02	<0.02
Nitrogen , Nitrate, N, mg/l	0.21	0.50
Sulfate, SO_4, mg/l	47	21
Chloride, Cl, mg/l	31	14
pH	7.0	8.4

Susan K Scott
Laboratory Supervisor

MICHIGAN

MEN00356

September 21, 1984

John Barkel
Menasha Corporation
320 North Farmer
Otsego, Michigan 49078

Dear John:

We have good news in that D.N.R. has given us permission to use our Cork Street Class III Landfill for secondary fiber and junk-tail. The bad news is that samples must be taken in December 1984 and tests rerun.

If you have any questions, please call.

Sincerely yours,

MICHIGAN DISPOSAL SERVICE CORP.

James DeKruyter,
Vice President

JDK/ym

✓Enclosures

✓cc: John Blaukamp

MEN00357

KALAMAZOO COUNTY GOVERNMENT

HUMAN SERVICES DEPARTMENT
Public Health Division

418 WEST KALAMAZOO AVENUE•KALAMAZOO, MICHIGAN 49007
PHONE (616) 383-8888

September 18, 1984

James DeKruyter
Michigan Disposal Service
100 E. North Street
Kalamazoo, Michigan 49007

Re: Menasha Waste

Dear Mr. DeKruyter:

This office has reviewed the results of samples designated HDC-JS884-2 and junk-tail - 8-84-2 originating from the Menasha Plant. Based on these results this office would find no objection to the placing of these materials in the Cork Street Type III Landfill. However, based upon other reports received previously, we will require that additional samples be taken under our supervision at the landfill after a period of three months to confirm these last analyses.

Sincerely,

James E. Akers,
Director
Environmental Health Bureau

JEA:rd

MEN00358

ASTM LEACHATE STUDY
OF
WASTE MATERIALS
(JDC-JS884-2 and Junk-tail-884-2)

for

MENASHA CORPORATION
(Otsego Mill)

Project # 84718
September 6, 1984

Performed by:

KAR Laboratories, Inc.
219 Peekstok Road
Kalamazoo, MI 49001

INTRODUCTION

The purpose of this study was to evaluate the potential for component leaching from waste residues under conditions as specified in ASTM D3987. Two samples were received from Mr. Gary Roys on August 22, 1984 and evaluated. Sample # 1 was identified as HDC-JS884-2 and Sample #2 was identified as Junk-tail-884-2.

The study involved production of a leachate from each of the waste materials. The leachates were then analyzed for a variety of parameters specified by Michigan Department of Natural Resources staff.

SAMPLE DESCRIPTIONS

Sample #1 (HDC-JS884-2):

Nearly three pounds of sample were received in a tightly wrapped plastic bag. Sample #1 consisted of a mixture of pieces of paper, plastic and cardboard of various shapes and colors. The pieces were mostly smaller than 4 inches in the longest dimension. The sample was well mixed. Total solids comprised 59.81 percent of the sample.

Sample #2 (Junk-tail-884-2):

Nearly three pounds of sample were received in a tightly wrapped plastic bag. Sample #2 consisted of various metal pieces including wire, bottle caps, fasteners, parts of metal cans and other unidentified chunks, bits and pieces of metal. Additionally, small pieces of glass, styrofoam and plastic were present in small amounts. Generally pieces ranged in size from 1/4 inch to 3 or 4 inches. Total solids comprised 86.25 percent of the sample.

PROCEDURE

The production of the leachates followed the ASTM D3987 "Shake Extraction of Solid Waste with Water", as given in the Annual Book of ASTM Standards.

A 700 gram portion of sample was used in both cases. Distilled water with a volume of 2800 milliliters was added to each. The materials were thoroughly mixed and placed on a shaker for forty-eight hours. Filtration through 0.45 ug filters was performed to yield the final solution for analysis.

The filtrates from the ASTM procedure were analyzed for a variety of parameters. Methods of analysis followed either Methods for Analysis of Water and Wastes by the Environmental Protection Agency of the United States or Standard Methods for the Examination of Water and Wastewater by the American Public Health Association.

DISCUSSION OF RESULTS

The analytical results are listed in the Table of Results on the following page. Levels found of the various components are consistently low, indicating that the material is relatively inert.

TABLE OF RESULTS

Leachate Concentrations

(expressed as mg/L except where noted)

PARAMETER	Sample #1 (HDC-JS884-2)	Sample #2 (Junk-tail-884-2)
Total Dissolved Solids	1320	5310
Total Chromium	<0.05	<0.05
Lead	<0.05	<0.05
Arsenic	<0.02	<0.02
Cadmium	<0.05	<0.05
Selenium	<0.02	<0.02
Iron	0.59	0.85
Zinc	0.21	0.07
Copper	0.07	0.01
Nitrates	0.1	<0.1
Sulfates	11	9
Chlorides	<5	6
pH (s.u.)	6.9	7.4

FORM 561

memo / MENASHA CORP

MEN00363

O: Bill Shepard

DATE: January 14, 1985

SUBJECT: Leachate Analyses - Secondary Fiber Rejects

FROM: Gary Roys GER

Secondary fiber reject samples were obtained mid December for leachate analysis.

The sample labeled HDC-JS-12-84 was a composite from the high density cleaners and the Jonnson screen. The sample labeled TAIL-JKR-12-84 was from the pulper tail and junker.

Attached are the results forthe leachate tests.

cc: J. Blauwkamp

kj

MEN00364

ASTM LEACHATE STUDY
OF
WASTE MATERIALS
(HDC-JS-12-84 and TAIL-JKR-12-84)

for

MENASHA CORPORATION
(Otsego Mill)

Project # 841050

January 9, 1985

Performed by:

KAR Laboratories, Inc.
219 Peekstok Road
Kalamazoo, MI 49001

INTRODUCTION

The purpose of this study was to evaluate the potential for component leaching from waste residues under conditions as specified in ASTM D3987. Two samples were received from Mr. Gary Roys on December 21, 1984 and evaluated. Sample #1 was identified as HDC-JS-12-84 and Sample #2 was identified as TAIL-JKR-12-84.

The study involved production of a leachate from each of the waste materials. The leachates were then analyzed for a variety of parameters specified by Michigan Department of Natural Resources staff.

SAMPLE DESCRIPTIONS

Sample #1 (HDC-JS-12-84):

Approximately 2.7 kilograms (6 pounds) of sample were received in a tightly wrapped plastic bag. Sample #1 consisted of a mixture of pieces of paper, plastic and cardboard of various shapes and colors. The pieces were mostly smaller than 4 inches in the longest dimension. The sample was well mixed, but clumped together due to being very damp. Total solids comprised 27.1 percent of the sample.

Sample #2 (TAIL-JKR-12-84):

Approximately 2.2 kilograms (5 pounds) of sample were received in a tightly wrapped plastic bag. Sample #2 consisted of various metal pieces including wire, bottle caps, numerous fasteners, parts of metal cans and other unidentified chunks, bits and pieces of metal. Small pieces of glass and plastic were present in small amounts. Generally pieces ranged in size from 1/4 inch to 3 or 4 inches. Total solids comprised 98.4 percent of the sample.

PROCEDURE

The production of the leachates followed the ASTM D3987 "Shake Extraction of Solid Waste with Water", as given in the Annual Book of ASTM Standards.

A 700 gram portion of sample was used in both cases. Distilled water with a volume of 2800 milliliters was added to each. The materials were thoroughly mixed and placed on a shaker for forty-eight hours. Filtration through a 0.45 ug filter was performed to yield the final solution for analysis.

The filtrates from the ASTM procedure were analyzed for a variety of parameters. Methods of analysis followed either Methods for Analysis of Water and Wastes by the Environmental Protection Agency of the United States or Standard Methods for the Examination of Water and Wastewater by the American Public Health Association.

DISCUSSION OF RESULTS

The analytical results are listed in the Table of Results on the following page. Levels found of the various components are consistently low, indicating that the materials were relatively inert.

TABLE OF RESULTS

Leachate Concentrations

(expressed as mg/L except where noted)

12/21/84

PARAMETER	Sample #1 (HDC-JS-12-84)	Sample #2 (TAIL -JKR-12-84)
Total Dissolved Solids	1440	292
Total Chromium	0.05	<0.05
Lead	<0.05	<0.05
Arsenic	<0.05	<0.05
Cadmium	<0.02	<0.02
Selenium	<0.02	<0.02
Iron	1.1	0.1
Zinc	1.0	<0.1
Copper	0.04	<0.02
Nitrate Nitrogen	2.3	<1.0
Sulfate	30	12
Chloride	13	4
pH (s.u.)	7.4	7.4

MEN00369

MENASHA CORPORATIOI

September 17, 1985 381-2226

Jim DeKruyter
Michigan Disposal Service
100 E. North Street
Kalamazoo, MI 49007

Dear Jim:

Enclosed are the results of the leachate analysis of our HDC and tail rejects samples taken in June. The samples were sent out for analysis in June but the testing was not completed until just recently. The lab had some problems completing the test - I apologize for the delay.

If you have any questions, please call.

Sincerely,

Menasha Corporation
Otsego Paperboard Division

Mark T. Reed

Mark T. Reed
Technical Manager

cc: J. Blauwkamp
B. Buchanan
G. Roys

kj

MEN00370

CLOW
HYDRO RESEARCH SERVICES
Water Management Division
Clow Corporation
408 Auburn Avenue
Pontiac, MI 48058
313 334-1630
313 334-4747

September 3, 1985

Menasha Corporation
320 N. Farmer Street
Otsego, MI 49078
Attn: Gary Roys

Samples Received: June 20, 1985

Hydro Number:	94127	94128
Client I.D.:	Junk Tail 61885	HDC JSR 61885

ASTM Leach: (D3987)		
Lead, Pb, mg/l	<0.05	<0.05
Cadmium, Cd, mg/l	<0.01	<0.01
Arsenic, As, mg/l	<0.005	<0.005
Total Chromium, Cr, mg/l	0.03	<0.02
Selenium, Se, mg/l	0.01	<0.005
Iron, Fe, mg/l	0.90	1.9
Zinc, Zn, mg/l	0.80	0.50
Copper, Cu, mg/l	0.04	1.0
Total Dissolved Solids, mg/l	2060	330
Nitroten, Nitrate, NO_3/N, mg/l	63.5	10.5
Sulfate, SO_4, mg/l	11	13
Chloride, Cl, mg/l	<1	<1
pH	5.4	6.2

Susan K. Scott
Laboratory Supervisor

MEN00371

MENASHA CORPORATION

November 1, 1985

Jim DeKruyter
Michigan Disposal Service
100 E. North Street
Kalamazoo, MI 49007

Dear Jim:

Enclosed are the results of leachate analysis of fiber and plastic material floating on our aeration pond. These are being sent to you to determine if this material can be taken to a Class III landfill.

If you have any questions, please call the writer or Mark Reed.

Sincerely,

Menasha Corporation
Otsego Paperboard Division

Gary E. Roys
Process Chemist & Group Leader

kj

ANALYTICAL REPORT

ENVIRONMENTAL RESEARCH GROUP, INC.
117 N. FIRST
ANN ARBOR, MICHIGAN 48104 (313) 662-3104

Project: A3379
Report Date: 10-08-85

Client P.O. 488297
Report: 14783

Samples Recvd: 09-11-85
Refer Questions To:
RICHARD HUCKINS

Client:
MENASHA CORPORATION
OTSEGO PAPERBOARD MILL
FARMER STREET
OTSEGO, MI 49078
Attention: GARY RAYS

Approved: Barbara Scribner

***
Residual Samples Will Be Held
TWO WEEKS
***

Client I.D.: 985-PONDFLT
ERG Sample No.: 09/136408
Matrix: SLUDGE

Parameter	Result	Units
ASTM-LEACHATE	DONE	

Client I.D.: 985-PONDFLT LEACHATE
ERG Sample No.: 09/136409
Matrix: EP-TOX LEACHATE

Parameter	Result	Units
ARSENIC, TOTAL	ND (0.01)	mg/L
HIGHER DETECTION LIMIT DUE TO MATRIX INTERFERENCE.		
CADMIUM, TOTAL	<0.01	mg/L
CHLORIDE	6	mg/L
CHROMIUM, TOTAL	<0.02	mg/L
COPPER, TOTAL	0.06	mg/L
IRON, TOTAL	0.35	mg/L
LEAD, TOTAL	<0.05	mg/L
NITRATE NITROGEN	18	mg/L
SELENIUM, TOTAL	ND (0.001)	mg/L
SOLIDS, TOTAL, DISSOLVED	960	mg/L
SULFATE	ND (1)	mg/L
ZINC	0.34	mg/L
pH	7.4	S.U.

SD-Sample damaged
FR-See field report for result
SR-See attached report
NA-Result not applicable to test

ND-Nondetected, Detection limit in ()
<-Positive result at an unquantifiable concentration below indicated level

Thank you for your business.

PREIN & NEWHOF, P.C.
ENGINEERS — SURVEYORS
ENVIRONMENTAL & SOILS LABORATORIES
3000 EAST BELT LINE N E, GRAND RAPIDS, MICHIGAN 49505
285 JAMES STREET, SUITE E, HOLLAND, MICHIGAN 49423

TELEPHONE (616) 364 8491
TELEPHONE (616) 399-9218

H EDWARD PREIN PE, R L S
THOMAS NEWHOF PE
WILSON D McQUEEN PE
LARRY D WILSON PE
MICHAEL S FULLER PE
PHILIP C GLUPKER PE
JAMES A COOK PE
ROBERT J VANDER MALE PE
ROBERT J REIMINK PE
RICHARD L SERBOWICZ PE
ARTHUR W BRINTNALL R L S
REX A MILLIRON R L S

June 5, 1987
77129

Mr. John Bonham
Menasha Corporation
P O Box 155
Otsego, Michigan 49078

RE: Samples received 5/12/87

LABORATORY RESULTS

"Shake Extraction of Solid Waste with Water"
ASTM # D3987

SAMPLE: ASH 5/87
SOLIDS CONTENT: 82.08 o/o

Parameter	Leachate Concentration mg/L	mg Leached per gm of dry sample
Arsenic	<0.008	<0.0004
Cadmium	<0.02	<0.00010
Calcium	73.2	0.357
Total Chromium	0.2	0.001
Copper	<0.2	<0.001
Iron	0.04	0.0002
Lead	0.16	0.00078
Magnesium	9.01	0.0439
Potassium	16.0	0.0780
Selenium	<0.03	<0.0001
Sodium	13.7	0.067
Zinc	0.37	0.0018

Menasha Corp.
June 5, 1987
ASTM Leachate on ASH 5/87
Page two

Parameter	Leachate Concentration mg/L	mg Leached per gm of dry sample
ph (units)	5.5	
Chloride	<2	<0.01
COD	14	0.068
Nitrite Nitrogen	0.01	<0.00005
Nitrate Nitrogen	0.14	0.00068
Ammonia Nitrogen	0.96	0.0047
Organic Nitrogen	5.50	0.0268
Total Kjeldahl Nitrogen (Ammonia plus Organic)	6.49	0.0316
Sulfate	353	1.72
Total Dissolved Solids	680	3.31
TOC	4	0.02

PREIN & NEWHOF

Jane Hoch

Jane Hoch
Chemist

Lab Log No. 1013
JH:sa

PREIN & NEWHOF, P.C.
ENGINEERS — SURVEYORS
ENVIRONMENTAL & SOILS LABORATORIES
3000 EAST BELT LINE N.E., GRAND RAPIDS, MICHIGAN 49505
285 JAMES STREET, SUITE E, HOLLAND, MICHIGAN 49423

TELEPHONE (616) 364-8491
TELEPHONE (616) 399-9218

MEN00375

H EDWARD PREIN PE RLS
THOMAS NEWHOF PE
WILSON D McQUEEN PE
LARRY D WILSON PE
MICHAEL S FULLER PE
PHILIP C GLUPKER PE
JAMES A COOK PE
ROBERT J VANDER MALE PE
ROBERT J REIMINK PE
RICHARD L SERBOWICZ PE
ARTHUR W BRINTNALL RLS
REX A MILLIRON RLS

June 5, 1987
77129

Mr. John Bonham
Menasha Corporation
P O Box 155
Otsego, Michigan 49078

RE: Samples received 5/12/87

LABORATORY RESULTS

"Shake Extraction of Solid Waste with Water"
ASTM # D3987

SAMPLE: FIBER 5/87
SOLIDS CONTENT: 46.04 o/o

Parameter	Leachate Concentration mg/L	mg Leached per gm of dry sample
Arsenic	<0.008	<0.00007
Cadmium	<0.02	<0.00017
Calcium	46.6	0.405
Total Chromium	<0.2	<0.002
Copper	<0.2	<0.002
Iron	0.30	0.0026
Lead	0.12	0.0010
Magnesium	9.49	0.0824
Potassium	69.3	0.602
Selenium	<0.03	<0.00026
Sodium	119	1.03
Zinc	0.40	0.0035

Menasha Corp.
June 5, 1987
ASTM Leachate on FIBER 5/87
Page two

Parameter	Leachate Concentration mg/L	mg Leached per gm of dry sample
ph (units)	8.6	
Chloride	<6	<0.05
COD	640	5.56
Nitrite Nitrogen	<0.01	<0.00009
Nitrate Nitrogen	0.10	0.0009
Ammonia Nitrogen	0.70	0.006
Organic Nitrogen	3.12	0.0271
Total Kjeldahl Nitrogen (Ammonia plus Organic)	3.82	0.0332
Sulfate	11	0.0956
Total Dissolved Solids	1300	11.3
TOC	208	1.81

PREIN & NEWHOF

Jane Hoch

Jane Hoch
Chemist

Lab Log No. 1014
JH:sa

PREIN & NEWHOF, P.C.
ENGINEERS — SURVEYORS
ENVIRONMENTAL & SOILS LABORATORIES
3000 EAST BELT LINE N E, GRAND RAPIDS, MICHIGAN 49505
285 JAMES STREET, SUITE E, HOLLAND, MICHIGAN 49423

TELEPHONE (616) 364-8491
TELEPHONE (616) 399-9218

MEN00377

H EDWARD PREIN PE, R L S
THOMAS NEWHOF PE
WILSON D McQUEEN PE
LARRY D WILSON PE
MICHAEL S FULLER PE
PHILIP C GLUPKER PE
JAMES A COOK PE
ROBERT J VANDER MALE PE
ROBERT J REIMINK PE
RICHARD L SERBOWICZ PE
ARTHUR W BRINTNALL R L S
REX A MILLIRON R L S

June 5, 1987
77129

Mr. John Bonham
Menasha Corporation
P O Box 155
Otsego, Michigan 49078

RE: Samples received 5/12/87

LABORATORY RESULTS

"Shake Extraction of Solid Waste with Water"
ASTM # D3987

SAMPLE: TAIL 5/87
SOLIDS CONTENT: 100 o/o

Parameter	Leachate Concentration mg/L	mg Leached per gm of dry sample
Arsenic	<0.008	<0.00003
Cadmium	<0.02	<0.00008
Calcium	10.6	0.0424
Total Chromium	<0.2	<0.0008
Copper	<0.2	<0.0008
Iron	10.2	0.0428
Lead	0.10	0.0004
Magnesium	1.49	0.00596
Potassium	12.9	0.0516
Selenium	<0.03	<0.00012
Sodium	461	1.84
Zinc	0.13	0.00052

Menasha Corp.
June 5, 1987
ASTM Leachate TAIL - 5/87
Page two

Parameter	Leachate Concentration mg/L	mg Leached per gm of dry sample
ph (units)	7.8	
Chloride	7	0.03
COD	693	2.77
Nitrite Nitrogen	<0.01	<0.00004
Nitrate Nitrogen	<0.01	<0.00004
Ammonia Nitrogen	1.10	0.0040
Organic Nitrogen	2.29	0.00916
Total Kjeldahl Nitrogen (Ammonia plus Organic)	3.39	0.01356
Sulfate	22	0.0880
Total Dissolved Solids	1460	5.84
TOC	226	0.904

PREIN & NEWHOF

Jane Hoch

Jane Hoch
Chemist

Lab Log No. 1012
JH:sa

MEN00379

PREIN & NEWHOF, P.C.
ENGINEERS — SURVEYORS
ENVIRONMENTAL & SOILS LABORATORIES
3000 EAST BELT LINE N.E., GRAND RAPIDS, MICHIGAN 49505
285 JAMES STREET, SUITE E, HOLLAND, MICHIGAN 49423

TELEPHONE (616) 364-8491
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JAMES A COOK PE
ROBERT J. VANDER MALE PE
ROBERT J. REIMINK PE.
RICHARD L. SERBOWICZ PE
ARTHUR W BRINTNALL R.L.S
REX A MILLIRON R.L.S.

June 5, 1987
77129

Mr. John Bonham
Menasha Corporation
P O Box 155
Otsego, Michigan 49078

RE: Samples received 5/12/87

LABORATORY RESULTS

"Shake Extraction of Solid Waste with Water"
ASTM # D3987

SAMPLE: HDC-. JONSCN 5-87
SOLIDS CONTENT: 26.05 o/o

Parameter	Leachate Concentration mg/L	mg Leached per gm of dry sample
Arsenic	<0.008	<0.00012
Cadmium	<0.02	<0.00031
Calcium	22.4	0.344
Total Chromium	<0.2	<0.003
Copper	<0.2	<0.003
Iron	5.35	0.082
Lead	0.10	0.0015
Magnesium	4.55	0.0699
Potassium	22.7	0.349
Selenium	<0.03	<0.0005
Sodium	261	4.01
Zinc	0.95	0.014

Menasha Corp.
June 5, 1987
ASTM Leachate on HDC- JONSCN 5/87
Page two

Parameter	Leachate Concentration mg/L	mg Leached per gm of dry sample
ph (units)	7.9	
Chloride	13	0.20
COD	1070	16
Nitrite Nitrogen	<0.01	<0.0001
Nitrate Nitrogen	<0.01	<0.0001
Ammonia Nitrogen	1.38	0.0212
Organic Nitrogen	4.22	0.0648
Total Kjeldahl Nitrogen (Ammonia plus Organic)	5.60	0.0860
Sulfate	22	0.34
Total Dissolved Solids	1640	25
TOC	508	7.80

PREIN & NEWHOF

Jane Hoch
Chemist

Lab Log No. 1011
JH:sa

Jane

MEN00381

PREIN & NEWHOF, P.C.
ENGINEERS — SURVEYORS
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ROBERT J REIMINK PE
RICHARD L SERBOWICZ PE
ARTHUR W BRINTNALL R L S
REX A MILLIRON R L S

June 9, 1987
77129

Mr. John Bonham
Menasha Corporation
P O Box 155
Otsego, Michigan 49078

RE: Flyash-487, Sample received 5/1/87

LABORATORY RESULTS

pH	5.8
o/o Solids	81.7
o/o Carbon	32.2
BTU per lb.	2954

	mg/kg as received	mg/kg dry wt.
Arsenic	3.50	4.28
Cadmium	<0.5	<0.6
Chromium	6.5	8.0
Copper	35.1	40.3
Lead	8.9	11
Mercury	<0.25	0.306
Nickel	33.9	41.5
Selenium	0.67	0.82
Zinc	33.9	41.5
Cyanide	0.4	0.5
Sulfide	<10	<12

PREIN & NEWHOF
Jane Hoch
Jane Hoch

Burmah

Burmah Technical Services, Inc.
Analytical Laboratories Division

408 Auburn Avenue
Pontiac, MI 48058
313/334-4747

MEN00382

214, Search

Menasha Corporation
320 North Farmer Street
Otsego, MI 49078
Attn: John Bonham

August 28, 1987

Sample Received: 8-10-87

Sample Number: 25441

Client I.D.: HDC
Johnson Screen Rejects
8-6-87

Physical Description: 100% White & Brown Paper

ASTM Leachate:

pH	6.70
Solids, Total Dissolved, mg/l	1480
Chloride, Cl, mg/l	<6
Sulfate, SO4, mg/l	10
Nitrogen, Nitrate, N, mg/l	0.11
Arsenic, As, mg/l	<0.005
Cadmium, Cd, mg/l	<0.01
Chromium, Total, Cr, mg/l	0.02
Copper, Cu, mg/l	0.04
Iron, Fe, mg/l	0.48
Lead, Pb, mg/l	<0.05
Selenium, Se, mg/l	<0.005
Zinc, Zn, mg/l	0.08

700 grams of solid was leached into 2,800 mls of deionized water. Final pH after 48 hours of leaching was 6.7.

J/4r

Burmah

Burmah Technical Services, Inc.
Analytical Laboratories Division

408 Auburn Avenue
Pontiac, MI 48058
313/334-4747

MEN00383

Menasha Corporation
320 North Farmer Street
Otsego, MI 49078
Attn: John Sonham

August 28, 1987

Sample Received: 8-10-87

Sample Number:	25440
Client I.D.:	Hydropulper Tail 8-6-87
Physical Description:	100% Solids- paper, tape, plastic

ASTM Leachate:

pH	7.60
Solids, Total Dissolved, mg/l	1600
Chloride, Cl, mg/l	<6
Sulfate, SO4, mg/l	8.5
Nitrogen, Nitrate, N, mg/l	<0.02
Arsenic, As, mg/l	<0.01
Cadmium, Cd, mg/l	<0.01
Chromium, Total, Cr, mg/l	0.09
Copper, Cu, mg/l	0.04
Iron, Fe, mg/l	2.3
Lead, Pb, mg/l	0.09
Selenium, Se, mg/l	<0.01
Zinc, Zn, mg/l	0.23

298.4 grams of solid was leached into 1,194 mls of deionized water. Final pH after 48 hours of leaching was 7.6.

W/sr

Burmah

Burmah Technical Services, Inc.
Analytical Laboratories Division

408 Auburn Avenue
Pontiac, MI 48058
313/334-4747

MEN00384

Menasha Corporation
320 North Farmer Street
Otsego, MI 49078
Attn: John Bonham

August 28, 1987

Sample Received: 8-10-87

Sample Number:	25439
Client I.D.:	Squeezings Water Rejects 8-6-87
Physical Description:	100% Brown Sawdust

ASTM Leachate:

pH	6.10
Solids, Total Dissolved, mg/l	460
Chloride, Cl, mg/l	<6
Sulfate, SO_4, mg/l	7.0
Nitrogen, Nitrate, N, mg/l	0.80
Arsenic, As, mg/l	<0.005
Cadmium, Cd, mg/l	<0.01
Chromium, Total, Cr, mg/l	0.04
Copper, Cu, mg/l	0.02
Iron, Fe, mg/l	0.57
Lead, Pb, mg/l	<0.05
Selenium, Se, mg/l	<0.005
Zinc, Zn, mg/l	0.04

700 grams of solid was leached into 2,600 mls of deionized water. Final pH after 48 hours of leaching was 6.1.

./2r

Burmah

Burmah Technical Services, Inc.
Analytical Laboratories Division

408 Auburn Avenue
Pontiac, MI 48058
313/334-4747

MEN00385

Menasha Corporation
320 North Farmer Street
Otsego, MI 49078
Attn: John Bonham

August 28, 1987

Sample Received: 8-10-87

Sample Number: 25438

Client I.D.: Fly Ash
8-6-87

Physical Description: 100% Black Fine Solids

ASTM Leachate:

pH	7.10
Solids, Total Dissolved, mg/l	510
Chloride, Cl, mg/l	<6
Sulfate, SO4, mg/l	280
Nitrogen, Nitrate, N, mg/l	0.06
Arsenic, As, mg/l	<0.005
Cadmium, Cd, mg/l	<0.01
Chromium, Total, Cr, mg/l	0.03
Copper, Cu, mg/l	<0.02
Iron, Fe, mg/l	<0.02
Lead, Pb, mg/l	<0.05
Selenium, Se, mg/l	0.009
Zinc, Zn, mg/l	0.06

700 grams of solid was leached into 2,800 mls of deionized water. Final pH after 48 hours of leaching was 7.1.

w/lr

MENASHA CORPORATION
PAPERBOARD GROUP

January 14, 1988

Mr. James DeKruyter
Michigan Disposal Service
100 E. North Street
Kalamazoo, MI. 49007

Dear Mr. DeKruyter:

Enclosed please find the results of our fourth quarter testing on fly ash, squeezing water rejects, Jonsson screen rejects, and hydrapulper tail. This testing was done to fulfill the conditions outlined in the letter from Patrick Krause to yourself, dated September 17, 1987. Please contact me if you have any questions.

Sincerely,

Otsego Paperboard Division

John T. Bonham
Technical Manager

/ac

Dear Pat

Please respond to this request.

OTSEGO MILL BOX 155 • 320 N. FARMER STREET • OTSEGO, MICHIGAN 49078 • PHONE 616-652-6141

Burman Technical Services, Inc.
Analytical Laboratories Division
408 Auburn Avenue
Pontiac, Michigan 48058
313-334-4747

MEN00387

Menasha Corporation
320 North Farmer Street
Otsego, MI 49078
Attn: John Bonham

January 8, 1988

PROGRAM: ASTM LEACHATE - 112087

Sample Received: 11-25-87

Sample Number:	30748
Client I.D.:	Jonsson Screen Rejects
Physical description:	100% Solids (paper, styrofoam, plastic)

ASTM Leachate

pH	6.69
Total Dissolved Solids, mg/l	1400
Chloride, mg/l	12
Sulfate, SO_4, mg/l	25
Nitrate Nitrogen, as N, mg/l	<0.02
Arsenic, As, mg/l	<0.005
Cadmium, Cd, mg/l	<0.01
Chromium, Cr, mg/l	<0.02
Copper, Cu, mg/l	0.02
Iron, Fe, mg/l	1.0
Lead, Pb, mg/l	<0.05
Selenium, Se, mg/l	<0.005
Zinc, Zn, mg/l	0.21

700 grams of solid was leached into 2800 mls of deionized water. Final pH after 48 hours of leaching was 6.00.

PP/1L

Burman

Burman Technical Services Inc
Analytical Laboratories Division

408 Auburn Avenue
Pontiac, Michigan 48058

313-334-4747

MEN00388

Menasha Corporation
320 North Farmer Street
Otsego, MI 49078
Attn: John Bonham

January 8, 1988

PROGRAM: ASTM LEACHATE - 112087

Sample Received: 11-25-87

Sample Number: 30749

Client I.D.: Sample no. Tail

Physical description: 100% Brown paper scraps

ASTM Leachate

pH	7.69
Total Dissolved Solids, mg/l	1300
Chloride, mg/l	11
Sulfate, SO_4, mg/l	22
Nitrate Nitrogen, as N, mg/l	0.15
Arsenic, As, mg/l	<0.005
Cadmium, Cd, mg/l	<0.01
Chromium, Cr, mg/l	0.02
Copper, Cu, mg/l	0.04
Iron, Fe, mg/l	7.0
Lead, Pb, mg/l	<0.05
Selenium, Se, mg/l	<0.005
Zinc, Zn, mg/l	3.5

630.3 grams of solid was leached into 2521 mls of deionized water. Final pH after 48 hours of leaching was 6.8.

PP/2L

Burmah

Burmah Technical Services, Inc
Analytical Laboratories Division

-03 Auburn Avenue
Pontiac, Michigan -8033

313-334--747

MEN00389

Menasha Corporation
320 North Farmer Street
Otsego, MI 49078
Attn: John Bonham

January 8, 1988

PROGRAM: ASTM LEACHATE - 112087

Sample Received: 11-25-87

Sample Number:	30750
Client I.D.:	Sample no. Fly Ash
Physical description:	100% Black, fine ash

ASTM Leachate

pH	9.01
Total Dissolved Solids, mg/l	590
Chloride, mg/l	4
Sulfate, SO_4, mg/l	380
Nitrate Nitrogen, as N, mg/l	0.62
Arsenic, As, mg/l	<0.005
Cadmium, Cd, mg/l	<0.01
Chromium, Cr, mg/l	<0.02
Copper, Cu, mg/l	<0.02
Iron, Fe, mg/l	0.04
Lead, Pb, mg/l	<0.05
Selenium, Se, mg/l	0.053
Zinc, Zn, mg/l	<0.02

700 grams of solid was leached into 2800 mls of deionized water. Final pH after 48 hours of leaching was 9.1.

PP/3L

Burman

Burman Technical Services Inc
Analytical Laboratories Division

408 Auburn Avenue
Pontiac, Michigan 48058

MEN00390

Menasha Corporation
320 North Farmer Street
Otsego, MI 49078
Attn: John Bonham

January 8, 1988

PROGRAM: ASTM LEACHATE - 112087

Sample Received: 11-25-87

Sample Number: 30751

Client I.D.: Sample No. SQZ-WTR-REJ

Physical description: 100% Dark Brown Moist Solids (Sawdust/soil)

ASTM Leachate

pH	5.38
Total Dissolved Solids, mg/l	1300
Chloride, mg/l	15
Sulfate, SO_4, mg/l	15
Nitrate Nitrogen, as N, mg/l	4.4
Arsenic, As, mg/l	<0.005
Cadmium, Cd, mg/l	<0.01
Chromium, Cr, mg/l	<0.02
Copper, Cu, mg/l	<0.02
Iron, Fe, mg/l	0.40
Lead, Pb, mg/l	<0.05
Selenium, Se, mg/l	<0.005
Zinc, Zn, mg/l	0.07

700 grams of solid was leached into 2800 mls of deionized water. Final pH after 48 hours of leaching was 5.2.

Susan K Scott
Laboratory Supervisor

PP/4L

Burmah

Burmah Technical Services Inc
Analytical Laboratories Division

408 Auburn Avenue
Pontiac, Michigan 48058

313-334-4747

MEN00391

Menasha Corporation
Attn: Gary Roys

April 7, 1988

PROGRAM: ASTM LEACHATE - 030788

Date Received: 3-8-88

ALD Number: 34776

Client I.D.: Tail
3-7-88

Physical Description: 100% Plastic and Cloth Debris

ASTM Leachate

pH	6.7
Total Dissolved Solids, mg/l	2500
Chloride, mg/l	<4
Sulfate, SO_4, mg/l	20
Nitrate Nitrogen, as N, mg/l	0.09
Arsenic, As, mg/l	<0.005
Barium, Ba, mg/l	0.14
Cadmium, Cd, mg/l	<0.01
Chromium, Cr, mg/l	0.02
Copper, Cu, mg/l	0.04
Iron, Fe, mg/l	5.9
Lead, Pb, mg/l	<0.05
Manganese, Mn, mg/l	0.64
Mercury, Hg, mg/l	0.0005
Selenium, Se, mg/l	<0.005
Silver, Ag, mg/l	<0.02
Zinc, Zn, mg/l	0.23

700 grams of solid was leached into 2800 mls of deionized water. Final pH after 48 hours of leaching was 6.7.

PP/3r

Burmah

Burmah Technical Services, Inc
Analytical Laboratories Division

408 Auburn Avenue
Pontiac, Michigan 48058

313-334-4747

MEN00392

Menasha Corporation
Attn: Gary Roys

April 7, 1988

PROGRAM: ASTM LEACHATE - 030788

Date Received: 3-8-88

ALD Number: 34775

Client I.D.: SQZ-WTR-Res
3-7-88

Physical Description: 100% Brown Moist Wood Fibers

ASTM Leachate

pH	5.0
Total Dissolved Solids, mg/l	2200
Chloride, mg/l	<8
Sulfate, SO_4, mg/l	13
Nitrate Nitrogen, as N, mg/l	0.18
Arsenic, As, mg/l	<0.005
Barium, Ba, mg/l	0.25
Cadmium, Cd, mg/l	<0.01
Chromium, Cr, mg/l	<0.02
Copper, Cu, mg/l	0.03
Iron, Fe, mg/l	0.24
Lead, Pb, mg/l	<0.05
Manganese, Mn, mg/l	2.4
Mercury, Hg, mg/l	<0.0005
Selenium, Se, mg/l	<0.005
Silver, Ag, mg/l	<0.02
Zinc, Zn, mg/l	0.16

700 grams of solid was leached into 2800 mls of deionized water. Final pH after 48 hours of leaching was 5.0.

PP/2r

Burmah

Burman Technical Services Inc
Analytical Laboratories Division

408 Auburn Avenue
Pontiac, Michigan 48058

313-334-4747

MEN00393

Menasha Corporation
320 North Farmer Street
Otsego, MI 49078
Attn: Gary Roys

April 7, 1988

PROGRAM: ASTM LEACHATE - 030788

Date Received: 3-8-88

ALD Number: 34774

Client I.D.: Jonsson Screen Res.
3-7-88

Physical Description: 100% Brown, Tan, Green, Orange, Paper Debris

ASTM Leachate

pH	6.7
Total Dissolved Solids, mg/l	1500
Chloride, mg/l	<4
Sulfate, SO_4, mg/l	19
Nitrate Nitrogen, as N, mg/l	0.47
Arsenic, As, mg/l	<0.005
Barium, Ba, mg/l	0.11
Cadmium, Cd, mg/l	<0.01
Chromium, Cr, mg/l	<0.02
Copper, Cu, mg/l	0.03
Iron, Fe, mg/l	0.28
Lead, Pb, mg/l	<0.05
Manganese, Mn, mg/l	0.40
Mercury, Hg, mg/l	<0.0005
Selenium, Se, mg/l	<0.005
Silver, Ag, mg/l	<0.02
Zinc, Zn, mg/l	0.12

700 grams of solid was leached into 2800 mls of deionized water. Final pH after 48 hours of leaching was 6.7.

PP/lr

Burmah

Burmah Technical Services, Inc.
Analytical Laboratories Division

408 Auburn Avenue
Pontiac, Michigan 48058

313-334-4747

MEN00394

Menasha Corporation
Attn: Gary Roys

April 7, 1988

PROGRAM: ASTM LEACHATE - 030788

Date Received: 3-8-88

ALD Number: 34777

Client I.D.: Fly Ash
3-7-88

Physical Description: 100% Black Granular Solids

ASTM Leachate

pH	5.6
Total Dissolved Solids, mg/l	510
Chloride, mg/l	<4
Sulfate, SO_4, mg/l	340
Nitrate Nitrogen, as N, mg/l	0.09
Arsenic, As, mg/l	<0.005
Barium, Ba, mg/l	0.12
Cadmium, Cd, mg/l	<0.01
Chromium, Cr, mg/l	<0.02
Copper, Cu, mg/l	<0.02
Iron, Fe, mg/l	0.05
Lead, Pb, mg/l	<0.05
Manganese, Mn, mg/l	0.24
Mercury, Hg, mg/l	<0.0005
Selenium, Se, mg/l	<0.005
Silver, Ag, mg/l	<0.02
Zinc, Zn, mg/l	1.5

700 grams of solid was leached into 2800 mls of deionized water. Final pH after 48 hours of leaching was 5.6.

Susan K. Scott
Laboratory Supervisor

PP/4r

Burmah

Burmah Technical Services, Inc
Analytical Laboratories Division

408 Auburn Avenue
Pontiac, Michigan 48058

313-334-4747

MEN00395

Menasha Corporation
320 North Farmer Street
Otsego, MI 49078
Attn: Gary Roys

July 27, 1988

PROGRAM: ASTM LEACHATE - 688

Date Received: 6-28-88

ALD Number: 40314

Client I.D.: Fly Ash
688

Physical Description: 100% Black Granular Solids

ASTM Leachate:

Total Dissolved Solids, mg/l	420
pH	3.7
Chloride, mg/l	<4
Sulfate, SO_4, mg/l	260
Nitrate Nitrogen, as N, mg/l	3.4
Arsenic, As, mg/l	<0.005
Cadmium, Cd, mg/l	<0.01
Chromium, Cr, mg/l	<0.02
Copper, Cu, mg/l	<0.02
Iron, Fe, mg/l	0.03
Lead, Pb, mg/l	<0.05
Selenium, Se, mg/l	0.018
Zinc, Zn, mg/l	0.21

700 grams of solid was leached into 2800 mls of deionized water. Final pH after 48 hours of leaching was 3.7.

Ana/1L

Susan K. Scott
Laboratory Supervisor

Burmah

Menasha Corporation
Attn: Gary Roys

July 27, 1988

PROGRAM: ASTM LEACHATE - 688

Date Received: 6-28-88

ALD Number: 40315

Client I.D.: Tail

Physical Description: 100% Brown Mixed Plastic & Paper Debris

ASTM Leachate:

Total Dissolved Solids, mg/l	2300
pH	7.5
Chloride, mg/l	<12
Sulfate, SO_4, mg/l	17
Nitrate Nitrogen, as N, mg/l	0.72
Arsenic, As, mg/l	<0.005
Cadmium, Cd, mg/l	<0.01
Chromium, Cr, mg/l	<0.02
Copper, Cu, mg/l	0.14
Iron, Fe, mg/l	4.8
Lead, Pb, mg/l	<0.05
Selenium, Se, mg/l	<0.005
Zinc, Zn, mg/l	0.16

500 grams of solid was leached into 2000 mls of deionized water. Final pH after 48 hours of leaching was 7.5.

Ana/2L

Susan K. Scott
Laboratory Supervisor

Burmah

Menasha Corporation
Attn: Gary Roys

July 27, 1988

PROGRAM: ASTM LEACHATE - 688

Date Received: 6-28-88

ALD Number: 40316

Client I.D.: Jonsson Screen Rejects

Physical Description: 100% Plastic & Brown Paper Debris

ASTM Leachate:

Total Dissolved Solids, mg/l	2200
pH	6.6
Chloride, mg/l	<12
Sulfate, SO_4, mg/l	16
Nitrate Nitrogen, as N, mg/l	0.19
Arsenic, As, mg/l	<0.005
Cadmium, Cd, mg/l	<0.01
Chromium, Cr, mg/l	0.02
Copper, Cu, mg/l	0.04
Iron, Fe, mg/l	1.0
Lead, Pb, mg/l	<0.05
Selenium, Se, mg/l	<0.005
Zinc, Zn, mg/l	0.09

700 grams of solid was leached into 2800 mls of deionized water. Final pH after 48 hours of leaching was 6.6.

Ana/3L

Susan K. Scott
Laboratory Supervisor

Burmah

Menasha Corporation
Attn: Gary Roys

July 27, 1988

PROGRAM: ASTM LEACHATE - 688

Date Received: 6-28-88

ALD Number: 40317

Client I.D.: Sqz Wtr
Rej

Physical Description: 100% Brown Moist Solid Fibers

ASTM Leachate:

Total Dissolved Solids, mg/l	350
pH	6.8
Chloride, mg/l	<12
Sulfate, SO_4, mg/l	18
Nitrate Nitrogen, as N, mg/l	0.44
Arsenic, As, mg/l	<0.005
Cadmium, Cd, mg/l	<0.01
Chromium, Cr, mg/l	<0.02
Copper, Cu, mg/l	0.08
Iron, Fe, mg/l	1.0
Lead, Pb, mg/l	<0.05
Selenium, Se, mg/l	<0.005
Zinc, Zn, mg/l	0.15

700 grams of solid was leached into 2800 mls of deionized water. Final pH after 48 hours of leaching was 6.3.

Ana/4L

Susan K. Scott
Laboratory Supervisor

ORM 561

memo / ME CORPORATION MEN00399

TO: John Bonham

DATE: October 26, 1988

SUBJECT: Type III Approval

FROM: Gary E. Roys

GR

Spoke with Kim Paksi, of the DNR Waste Management Division in Lansing, concerning our mill waste that is hauled to the Kalamazoo Cork Street Class III landfill. A committee of DNR representatives have made it division policy to require EP toxic analysis on every waste stream going to a Class III landfill. This analysis differs from the previous one in that a sample from the stream is placed in an acidic (4.5 pH) bath to leach out materials, rather than one that is neutral. This, according to Kim, gives them the "Worst Case Scenario". I mentioned to her that the worst case is not reality, but she also said the neutral test is not, and again she mentioned that the change is division policy. The leachate from this test will be analyzed for arsenic, barium, cadmium, copper, chromium, lead, silver, mercury, selenium, and zinc. We will also have to send in two sets of composite samples of our secondary due to its variability.

I also asked her what criteria will the test results be judged against. The previous tests were compared with three times the drinking standards. She indicated there are NO set numbers to compare our test results with. Each site will be looked at using generic modeling, the other waste they receive, type of liner, and any past problems they have experienced. They then look at our numbers, and they may also look at the drinking water standards, and decide if we can place our waste in the landfill.

We are in the process of gathering samples for these tests.

cc: Keith Kling

/ac

MEN00400

EVALUATION OF
EXTRACTION PROCEDURE TOXICITY STUDY
OF
SOLID WASTE SAMPLES
FOR
WASTE MANAGEMENT OF MICHIGAN - SW
SPRINGFIELD, MICHIGAN

ESI #8810121

November, 1988

Western Michigan Environmental
Services, Inc.
245 East Lakewood Boulevard
Holland, Michigan 49424
(616) 396-1209

PURPOSE

The purpose of this study is to evaluate the solid waste samples submitted by Waste Management of Michigan, SW, Springfield, Michigan, to determine the nature of the leachable constituents for waste disposal. This evaluation will define the possible waste classification in accordance with the criteria set forth in the May 19, 1980, Federal Register, Volume 45, Number 98, 40 CFR Part 261.24, Characteristics of EP Toxicity, Appendix II to that Subpart, and the Michigan Department of Natural Resources (MDNR), Act No. 64, of the Public Acts of 1979, as amended.

The extraction procedure specified in the regulations is designed to simulate the leaching a waste will undergo if disposed of in a sanitary landfill. The test is designed to simulate leaching that occurs in a sanitary landfill only.

PROCEDURE

The solid waste samples from Waste Management of Michigan, SW, Springfield, Michigan were prepared for analysis in accordance with the procedures set forth in the Environmental Protection Agency (EPA) Test Methods for Evaluating Solid Waste, Second Edition, Revised, Physical/Chemical Methods, April, 1984, EP Toxicity Test. If a representative sample of the waste in question contains more than 0.5% solids, the solid phase is extracted with deionized water maintained at a pH of 5.0 ± 0.2, using 0.5N acetic acid. The extract is analyzed to determine if any of the specified maximum contaminant levels are exceeded. Wastes that contain less than 0.5% solids are not subjected to extraction, but filtered, and the filtrate is analyzed directly and evaluated in a manner identical to that of extracts.

The equipment utilized was an ESI Extraction Procedure Toxicity 6 solid waste rotary extractor operating as specified by the procedure. The analytical procedures and/or instruments utilized, where applicable, are as follows:

Solids, all forms	EPA Methods 160.3 and 160.4.
Metals, general	Methods for Chemical Analysis of Water and Wastes, Section 4.1.1-4.1.4, EPA 600/4-79-020 Atomic Absorption Spectrophotometer[1]
Arsenic	EPA Method 206.2.
Barium	EPA Method 208.1.
Cadmium	EPA Method 213.1.
Chromium	EPA Method 218.2.
Copper	EPA Method 220.1.
Lead	EPA Method 239.2.
Mercury	Cold Vapor Procedure, EPA Method 245.1.
Nickel	EPA Method 249.1.
Selenium	EPA Method 270.2.
Silver	EPA Method 272.1.
Zinc	EPA Method 289.1.

[1]Atomic Absorption Spectrophotometer
Perkin Elmer Model 1100B
Perkin Elmer Model 5000 with an HGA 500 Graphite Furnace, AS-40 Autosampler

DESCRIPTION

ESI #8810121-1 Fly Ash

This sample consisted of black fine particles (as soil) uniform. The sample required the addition of 0.38% of the maximum allowable amount of 0.5N acetic acid to adjust the pH from 6.5. The original sample contained 61.6% total solids, of which 24.2% were volatile and 75.8% were ash.

ESI #8810121-1 Secondary Fibre Compactor

This sample consisted of brown wet pulpy cardboard pieces with some clear and white plastic. The sample required the addition of 3.6% of the maximum allowable amount of 0.5N acetic acid to adjust the pH from 7.4. The original sample contained 25.5% total solids, of which 96.9% were volatile and 3.1% were ash.

ESI #8810121-1 Tails

This sample consisted of brown, wet fiber with hard colored plastic strips. The sample required the addition of 4.8% of the maximum allowable amount of 0.5N acetic acid to adjust the pH from 8.2. The original sample contained 36.0% total solids, of which 97.8% were volatile and 2.2% were ash.

EP TOXICITY - TABLE OF RESULTS

Leachate Concentration
of
H87739 Fly Ash
Submitted By
Waste Management of Michigan, SW
Springfield, Michigan

Expressed as milligrams per liter (mg/ℓ).

Parameter	Concentration	Maximum Concentration	
		EPA	DNR
Arsenic	<0.005	5.0	5.0
Barium	<1.0	100.0	100.0
Cadmium	<0.01	1.0	1.0
Chromium	<0.05	5.0	5.0
Copper	0.031	---	100.0
Lead	<0.005	5.0	5.0
Mercury	<0.0005	0.2	0.2
Nickel	<0.1	20.0*	---
Selenium	0.0044	1.0	1.0
Silver	<0.01	5.0	5.0
Zinc	0.13	---	500.0

Original Sample:

Total Solids	61.6% of sample
Volatile Solids	24.2% of total solids
Ash	75.8% of total solids

ESI #8810121-1

*Proposed EPA Maximum Concentration.

CONCLUSION

Based on this study, none of the parameters evaluated were present at levels exceeding the maximum contaminant levels specified by the EPA and MDNR for Extraction Procedure Toxicity. Therefore, this waste does not exhibit characteristics of EP Toxicity, as set forth in the May 19, 1980 Federal Register, Volume 45, No. 98, 40 CFR, Part 261.24, Characteristic of EP Toxicity, Appendix II to that Subpart, and the MDNR Act No. 64, of the Public Acts of 1979, as amended.

EP TOXICITY - TABLE OF RESULTS

Leachate Concentration
of
H87741 Secondary Fibre Compactor
Submitted By
Waste Management of Michigan, SW
Springfield, Michigan

Expressed as milligrams per liter (mg/ℓ).

Parameter	Concentration	Maximum Concentration	
		EPA	DNR
Arsenic	<0.005	5.0	5.0
Barium	<1.0	100.0	100.0
Cadmium	<0.01	1.0	1.0
Chromium	<0.05	5.0	5.0
Copper	<0.02	---	100.0
Lead	<0.005	5.0	5.0
Mercury	0.00052	0.2	0.2
Nickel	<0.1	20.0*	---
Selenium	0.0045	1.0	1.0
Silver	<0.01	5.0	5.0
Zinc	0.24	---	500.0

Original Sample:

Total Solids	25.5% of sample
Volatile Solids	96.9% of total solids
Ash	3.1% of total solids

ESI #8810121-2

*Proposed EPA Maximum Concentration.

CONCLUSION

Based on this study, none of the parameters evaluated were present at levels exceeding the maximum contaminant levels specified by the EPA and MDNR for Extraction Procedure Toxicity. Therefore, this waste does not exhibit characteristics of EP Toxicity, as set forth in the May 19, 1980 Federal Register, Volume 45, No. 98, 40 CFR, Part 261.24, Characteristic of EP Toxicity, Appendix II to that Subpart, and the MDNR Act No. 64, of the Public Acts of 1979, as amended.

EP TOXICITY - TABLE OF RESULTS

Leachate Concentration
of
H87743 Tails
Submitted By
Waste Management of Michigan, SW
Springfield, Michigan

Expressed as milligrams per liter (mg/ℓ).

Parameter	Concentration	Maximum Concentration	
		EPA	DNR
Arsenic	<0.005	5.0	5.0
Barium	<1.0	100.0	100.0
Cadmium	<0.01	1.0	1.0
Chromium	<0.05	5.0	5.0
Copper	<0.02	---	100.0
Lead	<0.005	5.0	5.0
Mercury	0.0011	0.2	0.2
Nickel	<0.1	20.0*	---
Selenium	0.0059	1.0	1.0
Silver	<0.01	5.0	5.0
Zinc	2.8	---	500.0

Original Sample:

Total Solids	36.0% of sample
Volatile Solids	97.8% of total solids
Ash	2.2% of total solids

ESI #8810121-3

*Proposed EPA Maximum Concentration.

CONCLUSION

Based on this study, none of the parameters evaluated were present at levels exceeding the maximum contaminant levels specified by the EPA and MDNR for Extraction Procedure Toxicity. Therefore, this waste does not exhibit characteristics of EP Toxicity, as set forth in the May 19, 1980 Federal Register, Volume 45, No. 98, 40 CFR, Part 261.24, Characteristic of EP Toxicity, Appendix II to that Subpart, and the MDNR Act No. 64, of the Public Acts of 1979, as amended.

Burmah

Menasha Corporation
Attn: Gary Roys

December 13, 1988

PROGRAM: WASTE ANALYSIS

Date Received: 11-10-88

ALD Number: 48065

Client I.D.: 1NOVSQZ88

Physical Description: 100% Brown wet fiberous solid

EP Toxicity:

Arsenic, As, mg/l	<0.005
Barium, Ba, mg/l	0.02
Cadmium, Cd, mg/l	<0.01
Chromium, Cr, mg/l	<0.02
Lead, Pb, mg/l	<0.05
Mercury, Hg, mg/l	<0.0005
Selenium, Se, mg/l	<0.005
Silver, Ag, mg/l	<0.02
Copper, Cu, mg/l	0.67
Zinc, Zn, mg/l	0.03

100 grams of sample was leached into 1600 mls of deionized water and brought to a final volume of 2000 mls. After the addition of 4 mls of 0.5 N. acetic acid, the final pH was 4.9.

WA/3r

Burmah

Menasha Corporation
Attn: Gary Roys

December 13, 1988

PROGRAM: WASTE ANALYSIS

Date Received: 11-10-88

ALD Number: 48066

Client I.D.: 1NOVJON88

Physical Description: 100% Multi-colored wet pieces of plastic & fiber

EP Toxicity:

Arsenic, As, mg/l	<0.005
Barium, Ba, mg/l	0.07
Cadmium, Cd, mg/l	<0.01
Chromium, Cr, mg/l	<0.02
Lead, Pb, mg/l	<0.05
Mercury, Hg, mg/l	<0.0005
Selenium, Se, mg/l	<0.005
Silver, Ag, mg/l	<0.02
Copper, Cu, mg/l	0.52
Zinc, Zn, mg/l	0.50

100 grams of sample was leached into 1600 mls of deionized water and brought to a final volume of 2000 mls. After the addition of 10 mls of 0.5 N. acetic acid, the final pH was 5.1.

Christopher P. Jack
Laboratory Manager

WA/4r

Burmah

Burmah Technical Services, Inc.
Analytical Laboratories Division

408 Auburn Avenue
Pontiac, Michigan 48058

313-334-4747

Menasha Corporation
320 N. Farmer Street
Otsego, MI 49078
Attn: Gary Roys

December 13, 1988

PROGRAM: WASTE ANALYSIS

Date Received: 11-10-88

ALD Number: 48063

Client I.D.: 1NOVTAIL88

Physical Description: Multi-colored wet pieces of plastic & fiber

EP Toxicity:

Arsenic, As, mg/l	<0.005
Barium, Ba, mg/l	0.15
Cadmium, Cd, mg/l	<0.01
Chromium, Cr, mg/l	<0.02
Lead, Pb, mg/l	<0.05
Mercury, Hg, mg/l	<0.0005
Selenium, Se, mg/l	<0.005
Silver, Ag, mg/l	0.02
Copper, Cu, mg/l	0.70
Zinc, Zn, mg/l	0.73

100 grams of sample was leached into 1600 mls of deionized water and brought to a final volume of 2000 mls. After the addition of 18 mls of 0.5 N. acetic acid, the final pH was 5.0.

WA/1r

Burmah

Menasha Corporation
Attn: Gary Roys

December 13, 1988

PROGRAM: WASTE ANALYSIS

Date Received: 11-10-88

ALD Number: 48064

Client I.D.: 1NOVASH88

Physical Description: 100% Black Gritty Solids

EP Toxicity:

Arsenic, As, mg/l	<0.005
Barium, Ba, mg/l	0.23
Cadmium, Cd, mg/l	<0.01
Chromium, Cr, mg/l	<0.02
Lead, Pb, mg/l	<0.05
Mercury, Hg, mg/l	<0.0005
Selenium, Se, mg/l	<0.005
Silver, Ag, mg/l	<0.02
Copper, Cu, mg/l	0.78
Zinc, Zn, mg/l	0.15

100 grams of sample was leached into 1600 mls of deionized water and brought to a final volume of 2000 mls. After the addition of 1 mls of 0.5 N. acetic acid, the final pH was 5.0.

WA/2r

Burman

Burman Technical Services, Inc.
Analytical Laboratories Division

408 Auburn Avenue
Pontiac, Michigan 48058

313-334-4747

Menasha Corporation
320 N. Farmer Street
Otsego, MI 49078
Attn: Gary Roys

December 27, 1988

PROGRAM: WASTE ANALYSIS

Date Received: 11-22-88

ALD Number:	48851
Client I.D.:	20NOVTAIL88
Physical Description:	Moist Paper and Plastic Debris

As Received:

Total Solids @ 104°C, %	89

EP Toxicity:

Arsenic, As, mg/l	<0.005
Barium, Ba, mg/l	0.14
Cadmium, Cd, mg/l	<0.01
Chromium, Cr, mg/l	<0.02
Lead, Pb, mg/l	<0.05
Mercury, Hg, mg/l	<0.0005
Selenium, Se, mg/l	<0.005
Silver, Ag, mg/l	<0.02
Copper, Cu, mg/l	0.08
Zinc, Zn, mg/l	0.28

100 grams of sample was leached into 1600 mls of deionized water and brought to a final volume of 2000 mls. After the addition of 24 mls of 0.5 N. acetic acid, the final pH was 5.1.

WA/5r

Burmah

Menasha Corporation
Attn: Gary Roys

December 27, 1988

PROGRAM: WASTE ANALYSIS

Date Received: 11-22-88

ALD Number: 48852

Client I.D.: 20NOVJONRJ88

Physical Description: Moist Paper and Plastic Debris

As Received:

Total Solids @ 104°C, % 21

EP Toxicity:

Arsenic, As, mg/l	<0.005
Barium, Ba, mg/l	0.12
Cadmium, Cd, mg/l	<0.01
Chromium, Cr, mg/l	<0.02
Lead, Pb, mg/l	<0.05
Mercury, Hg, mg/l	<0.0005
Selenium, Se, mg/l	<0.005
Silver, Ag, mg/l	<0.02
Copper, Cu, mg/l	0.04
Zinc, Zn, mg/l	0.10

100 grams of sample was leached into 1600 mls of deionized water and brought to a final volume of 2000 mls. After the addition of 20 mls of 0.5 N. acetic acid, the final pH was 5.0.

WA/6r

MEN00413

Burmah

Menasha Corporation
Attn: Gary Roys

December 27, 1988

PROGRAM: WASTE ANALYSIS

Date Received: 11-22-88

ALD Number:	48853
Client I.D.:	20NOVASH88
Physical Description:	Moist Black Gritty Granular Solid

As Received:

Total Solids @ 104°C, %	69

EP Toxicity:

Arsenic, As, mg/l	<0.005
Barium, Ba, mg/l	0.21
Cadmium, Cd, mg/l	<0.01
Chromium, Cr, mg/l	<0.02
Lead, Pb, mg/l	<0.05
Mercury, Hg, mg/l	<0.0005
Selenium, Se, mg/l	<0.005
Silver, Ag, mg/l	<0.02
Copper, Cu, mg/l	<0.02
Zinc, Zn, mg/l	0.14

100 grams of sample was leached into 1600 mls of deionized water and brought to a final volume of 2000 mls. After the addition of 2 mls of 0.5 N. acetic acid, the final pH was 5.1.

WA/7r

MEN00414

Burmah

Menasha Corporation
Attn: Gary Roys

December 27, 1988

PROGRAM: WASTE ANALYSIS

Date Received: 11-22-88

ALD Number: 48854

Client I.D.: 20NOVSQZRJ88

Physical Description: Moist Brown Fibrous

As Received:

Total Solids @ 104°C, % 33

EP Toxicity:

Arsenic, As, mg/l	<0.005
Barium, Ba, mg/l	0.05
Cadmium, Cd, mg/l	<0.01
Chromium, Cr, mg/l	<0.02
Lead, Pb, mg/l	<0.05
Mercury, Hg, mg/l	<0.0005
Selenium, Se, mg/l	<0.005
Silver, Ag, mg/l	<0.02
Copper, Cu, mg/l	0.04
Zinc, Zn, mg/l	0.03

100 grams of sample was leached into 1600 mls of deionized water and brought to a final volume of 2000 mls. After the addition of 7 mls of 0.5 N. acetic acid, the final pH was 5.0.

WA/8r

Christopher P. Gill
Laboratory Manager

RMT INC

Great Lakes Office
325 S. Clinton Street
P.O. Box 447
Grand Ledge, MI 48837
Phone: 517-627-4044
FAX: 517-627-1284

July 25, 1989

Mr. Keith Kling
Menasha Corporation
320 North Farmer Street
Otsego, MI 49078

Dear Keith:

Enclosed are the results of analysis of samples provided by you to RMT's laboratory in Madison, Wisconsin. No evaluation of the results is provided. We can discuss these at our meeting on Thursday, July 27, 1989 at your facility in Otsego.

Please call me at 517-627-4044 if you have any questions.

Sincerely,

Daniel C. O'Neill
Project Manager

DCO/kab

1677.01 MENASHA D#17

TCLP Extraction

MEN00416

RMT INC
LABORATORIES

CLIENT: MICHIGAN DISPOSAL
SAMPLE #: 38789
PROJECT #: 01569.05
WORK ORDER #: 050489-0156905
REPORT DATE: 05/16/89
COLLECTION DATE: 05/03/89
STATION ID: MENASHA-RESID.A
SAMPLE COLLECTOR: CLIENT

VOLATILE ORGANIC COMPOUNDS REPORT - METHOD 8010

PARAMETER	RESULT	UNITS
CHLOROMETHANE	<0.50	ug/kg dry wt.
BROMOMETHANE	<0.50	ug/kg dry wt.
VINYL CHLORIDE	<0.50	ug/kg dry wt.
DICHLORODIFLUOROMETHANE	<1.0	ug/kg dry wt.
CHLOROETHANE	<0.50	ug/kg dry wt.
METHYLENE CHLORIDE	8.2	ug/kg dry wt.
FLUOROTRICHLOROMETHANE	4.7	ug/kg dry wt.
1,1-DICHLOROETHYLENE	4.2	ug/kg dry wt.
1,1-DICHLOROETHANE	<0.50	ug/kg dry wt.
TRANS-1,2-DICHLOROETHYLENE	<1.0	ug/kg dry wt.
CHLOROFORM	<0.50	ug/kg dry wt.
1,2-DICHLOROETHANE	<0.50	ug/kg dry wt.
1,1,1-TRICHLOROETHANE	54	ug/kg dry wt.
CARBON TETRACHLORIDE	<0.50	ug/kg dry wt.
BROMODICHLOROMETHANE	<0.50	ug/kg dry wt.
1,2-DICHLOROPROPANE	<1.0	ug/kg dry wt.
CIS-1,3-DICHLOROPROPYLENE	<1.0	ug/kg dry wt.
TRICHLOROETHYLENE	<1.0	ug/kg dry wt.
1,1,2-TRICHLOROETHANE	<0.50	ug/kg dry wt.
TRANS-1,3-DICHLOROPROPYLENE	<1.0	ug/kg dry wt.
CHLORODIBROMOMETHANE	<1.0	ug/kg dry wt.
2-CHLOROETHYLVINYL ETHER	<2.0	ug/kg dry wt.
BROMOFORM	<1.0	ug/kg dry wt.
TETRACHLOROETHYLENE	8.6	ug/kg dry wt.
1,1,2,2-TETRACHLOROETHANE	<1.0	ug/kg dry wt.
CHLOROBENZENE	<0.50	ug/kg dry wt.
1,3-DICHLOROBENZENE	<1.0	ug/kg dry wt.
1,2-DICHLOROBENZENE	<1.0	ug/kg dry wt.
1,4-DICHLOROBENZENE	<1.0	ug/kg dry wt.

Alan Doughty, Ph.D., Laboratory Director

RMT INC.
LABORATORIES

CLIENT: MICHIGAN DISPOSAL
SAMPLE #: 38789
PROJECT #: 01569.05
WORK ORDER #: 050489-0156905

REPORT DATE: 05/16/89
COLLECTION DATE: 05/03/89
STATION ID: MENASHA-RESID.A
SAMPLE COLLECTOR: CLIENT

VOLATILE ORGANIC COMPOUNDS REPORT - METHOD 8020

PARAMETER	RESULT	UNITS
BENZENE	<1.0	ug/kg dry wt.
TOLUENE	89	ug/kg dry wt.
CHLOROBENZENE	<0.50	ug/kg dry wt.
ETHYLBENZENE	<1.0	ug/kg dry wt.
XYLENES	<3.0	ug/kg dry wt.
1,3-DICHLOROBENZENE	<1.0	ug/kg dry wt.
1,2-DICHLOROBENZENE	<1.0	ug/kg dry wt.
1,4-DICHLOROBENZENE	<1.0	ug/kg dry wt.

Alan Doughty, Ph.D., Laboratory Director

RMT Inc
LABORATORIES

CLIENT: MICHIGAN DISPOSAL
SAMPLE #: 38789
PROJECT #: 01559.05
WORK ORDER #: 050489-0156905
REPORT DATE: 05/12/89
COLLECTION DATE: 05/03/89
STATION ID: MENASHA-RESID.A
SAMPLE COLLECTOR: CLIENT

ASTM ANALYSIS REPORT

PARAMETER	RESULT	UNITS
Arsenic	<0.003	mg/l
Barium	0.039	mg/l
Cadmium	<0.005	mg/l
Chromium, Total	<0.01	mg/l
Copper	<0.02	mg/l
Iron	0.21	mg/l
Lead	<0.1	mg/l
Mercury	0.0006	mg/l
Selenium	<0.003	mg/l
Silver	<0.01	mg/l
Zinc	0.07	mg/l
Sample Wt.	400.0	grams
Initial pH	7.4	pH units
Final pH	7.0	pH units

Alan Doughty, Ph.D., Laboratory Director

RMT LABORATORIES

CLIENT: MICHIGAN DISPOSAL
SAMPLE #: 38791
PROJECT #: 01569.05
WORK ORDER #: 050439-0156905

REPORT DATE: 05/15/89
COLLECTION DATE: 05/03/89
STATION ID: MENASHA-RESID.B
SAMPLE COLLECTOR: CLIENT

VOLATILE ORGANIC COMPOUNDS REPORT - METHOD 8010

PARAMETER	RESULT	UNITS
CHLOROMETHANE	<0.50	ug/kg dry wt.
BROMOMETHANE	<0.50	ug/kg dry wt.
VINYL CHLORIDE	16*	ug/kg dry wt.
DICHLORODIFLUOROMETHANE	27*	ug/kg dry wt.
CHLOROETHANE	<0.50	ug/kg dry wt.
METHYLENE CHLORIDE	<1.0	ug/kg dry wt.
FLUOROTRICHLOROMETHANE	240	ug/kg dry wt.
1,1-DICHLOROETHYLENE	174	ug/kg dry wt.
1,1-DICHLOROETHANE	2.8	ug/kg dry wt.
TRANS-1,2-DICHLOROETHYLENE	<1.0	ug/kg dry wt.
CHLOROFORM	<0.50	ug/kg dry wt.
1,2-DICHLOROETHANE	<0.50	ug/kg dry wt.
1,1,1-TRICHLOROETHANE	550	ug/kg dry wt.
CARBON TETRACHLORIDE	<0.50	ug/kg dry wt.
BROMODICHLOROMETHANE	[illegible]	ug/kg dry wt.
1,2-DICHLOROPROPANE	[illegible]	ug/kg dry wt.
CIS-1,3-DICHLOROPROPYLENE	<1.0	ug/kg dry wt.
TRICHLOROETHYLENE	330	ug/kg dry wt.
1,1,2-TRICHLOROETHANE	<0.50	ug/kg dry wt.
TRANS-1,3-DICHLOROPROPYLENE	<1.0	ug/kg dry wt.
CHLORODIBROMOMETHANE	<1.0	ug/kg dry wt.
2-CHLOROETHYLVINYL ETHER	<2.0	ug/kg dry wt.
BROMOFORM	<1.0	ug/kg dry wt.
TETRACHLOROETHYLENE	57	ug/kg dry wt.
1,1,2,2-TETRACHLOROETHANE	<1.0	ug/kg dry wt.
CHLOROBENZENE	<0.50	ug/kg dry wt.
1,3-DICHLOROBENZENE	<1.0	ug/kg dry wt.
1,2-DICHLOROBENZENE	<1.0	ug/kg dry wt.
1,4-DICHLOROBENZENE	<1.0	ug/kg dry wt.

* Vinyl chloride and Dichlorodifluoromethane co-elute.

Alan Doughty, Ph.D., Laboratory Director

RMT INC
LABORATORIES

CLIENT: MICHIGAN DISPOSAL
SAMPLE #: 38790
PROJECT #: 01869.05
WORK ORDER #: 050489-0156908
REPORT DATE: 05/16/89
COLLECTION DATE. 05/03/89
STATION ID: MENASHA-RESID.B
SAMPLE COLLECTOR: CLIENT

VOLATILE ORGANIC COMPOUNDS REPORT - METHOD 8020

PARAMETER	RESULT	UNITS
BENZENE	<1.0	ug/kg dry wt.
TOLUENE	230	ug/kg dry wt.
CHLOROBENZENE	<0.50	ug/kg dry wt.
ETHYLBENZENE	26	ug/kg dry wt.
XYLENES	68	ug/kg dry wt.
1,3-DICHLOROBENZENE	<1.0	ug/kg dry wt.
1,2-DICHLOROBENZENE	<1.0	ug/kg dry wt.
1,4-DICHLOROBENZENE	<1.0	ug/kg dry wt.

Alan Doughty, Ph.D., Laboratory Director

MEN00421

RMT INC

LABORATORIES

CLIENT: MICHIGAN DISPOSAL
SAMPLE #: 38790
PROJECT #: 01563.05
WORK ORDER #: 050489-0156905

REPORT DATE: 05/12/89
COLLECTION DATE: 05/03/89
STATION ID: MENASHA-RESID.B
SAMPLE COLLECTOR: CLIENT

ASTM ANALYSIS REPORT

PARAMETER	RESULT	UNITS
Arsenic	<0.003	mg/l
Barium	0.033	mg/l
Cadmium	<0.005	mg/l
Chromium, Total	<0.01	mg/l
Copper	<0.02	mg/l
Iron	0.16	mg/l
Lead	<0.1	mg/l
Mercury	<0.0002	mg/l
Selenium	<0.003	mg/l
Silver	<0.01	mg/l
Zinc	0.06	mg/l
Sample Wt.	400.0	grams
Initial pH	7.7	pH units
Final pH	7.3	pH units

Alan Doughty, Ph.D., Laboratory Director

MEN00422

RMT INC
LABORATORIES

CLIENT: MICHIGAN DISPOSAL
SAMPLE #: 38786
PROJECT #: 01569.05
WORK ORDER #: 050489-0156905

REPORT DATE: 05/16/89
COLLECTION DATE: 05/03/89
STATION ID: MENASHA ASH
SAMPLE COLLECTOR: CLIENT

VOLATILE ORGANIC COMPOUNDS REPORT - METHOD 8010

PARAMETER	RESULT		UNITS
CHLOROMETHANE	<0.50		ug/kg dry wt.
BROMOMETHANE	<0.50		ug/kg dry wt.
VINYL CHLORIDE	3.0*		ug/kg dry wt.
DICHLORODIFLUOROMETHANE	4.5*		ug/kg dry wt.
CHLOROETHANE	<0.50		ug/kg dry wt.
METHYLENE CHLORIDE	4.4	4	ug/kg dry wt.
FLUOROTRICHLOROMETHANE refrigerant + solvent (not in groundwater)	45	ND	ug/kg dry wt.
1,1-DICHLOROETHYLENE	<0.50		ug/kg dry wt.
1,1-DICHLOROETHANE	<0.50		ug/kg dry wt.
TRANS-1,2-DICHLOROETHYLENE	<1.0		ug/kg dry wt.
CHLOROFORM	<0.50		ug/kg dry wt.
1,2-DICHLOROETHANE	<0.50		ug/kg dry wt.
1,1,1-TRICHLOROETHANE	1.5		ug/kg dry wt.
CARBON TETRACHLORIDE	<0.50		ug/kg dry wt.
BROMODICHLOROMETHANE	<0.50		ug/kg dry wt.
1,2-DICHLOROPROPANE	<1.0		ug/kg dry wt.
CIS-1,3-DICHLOROPROPYLENE	<1.0		ug/kg dry wt.
TRICHLOROETHYLENE	<1.0		ug/kg dry wt.
1,1,2-TRICHLOROETHANE	<0.50		ug/kg dry wt.
TRANS-1,3-DICHLOROPROPYLENE	<1.0		ug/kg dry wt.
CHLORODIBROMOMETHANE	<1.0		ug/kg dry wt.
2-CHLOROETHYLVINYL ETHER	<2.0		ug/kg dry wt.
BROMOFORM	<1.0		ug/kg dry wt.
TETRACHLOROETHYLENE	<1.0		ug/kg dry wt.
1,1,2,2-TETRACHLOROETHANE	<1.0		ug/kg dry wt.
CHLOROBENZENE	<0.50		ug/kg dry wt.
1,3-DICHLOROBENZENE	<1.0		ug/kg dry wt.
1,2-DICHLOROBENZENE	<1.0		ug/kg dry wt.
1,4-DICHLOROBENZENE	<1.0		ug/kg dry wt.

* Vinyl chloride and Dichlorodifluoromethane co-elute.

Alan Doughty, Ph.D., Laboratory Director

MEN00423

RMT INC
LABORATORIES

CLIENT: MICHIGAN DISPOSAL
SAMPLE #: 38786
PROJECT #: 01569.05
WORK ORDER #: 050489-0156905

REPORT DATE: 05/16/89
COLLECTION DATE: 05/03/89
STATION ID: MENASHA ASH
SAMPLE COLLECTOR: CLIENT

ASTM ANALYSIS REPORT

PARAMETER	RESULT	UNITS
Arsenic	0.010	mg/l
Barium	0.12	mg/l
Cadmium	<0.005	mg/l
Chromium, Total	<0.01	mg/l
Copper	<0.02	mg/l
Iron	<0.04	mg/l
Lead	<0.1	mg/l
Mercury	<0.0002	mg/l
Selenium	0.010	mg/l
Silver	<0.01	mg/l
Zinc	<0.02	mg/l
Sample Wt.	400.0	grams
Initial pH	7.8	pH units
Final pH	7.8	pH units

Alan Doughty, Ph.D., Laboratory Director

MEN00424

RMT INC
LABORATORIES

CLIENT: MICHIGAN DISPOSAL
SAMPLE #: 38786
PROJECT #: 01569.05
WORK ORDER #: 050489-0156905

REPORT DATE: 05/16/89
COLLECTION DATE: 05/03/89
STATION ID: MENASHA ASH
SAMPLE COLLECTOR: CLIENT

VOLATILE ORGANIC COMPOUNDS REPORT - METHOD 8020

PARAMETER	RESULT	UNITS
BENZENE	<1.0	ug/kg dry wt.
TOLUENE	<1.0	ug/kg dry wt.
CHLOROBENZENE	<0.50	ug/kg dry wt.
ETHYLBENZENE	<1.0	ug/kg dry wt.
XYLENES	<3.0	ug/kg dry wt.
1,3-DICHLOROBENZENE	<1.0	ug/kg dry wt.
1,2-DICHLOROBENZENE	<1.0	ug/kg dry wt.
1,4-DICHLOROBENZENE	<1.0	ug/kg dry wt.

Alan Doughty, Ph.D., Laboratory Director

RMT INC.
LABORATORIES

CLIENT: MENASHA CORP.
SAMPLE #: 40297
PROJECT #: 01677.01
WORK ORDER #: C70589-0167701

REPORT DATE: 07/19/89
COLLECTION DATE: 06/28/89
STATION ID: RESIDUAL
SAMPLE COLLECTOR: CLIENT

VOLATILE ORGANIC COMPOUNDS REPORT - METHOD 8010

PARAMETER	RESULT	UNITS
CHLOROMETHANE	<2.0	ug/kg dry wt.
BROMOMETHANE	<2.0	ug/kg dry wt.
VINYL CHLORIDE	<2.0	ug/kg dry wt.
DICHLORODIFLUOROMETHANE	97	ug/kg dry wt.
CHLOROETHANE	<2.0	ug/kg dry wt.
METHYLENE CHLORIDE	<12*	ug/kg dry wt.
FLUOROTRICHLOROMETHANE	7.9	ug/kg dry wt.
1,1-DICHLOROETHYLENE	38	ug/kg dry wt.
1,1-DICHLOROETHANE	<2.0	ug/kg dry wt.
TRANS-1,2-DICHLOROETHYLENE	<4.0	ug/kg dry wt.
CHLOROFORM	<2.0	ug/kg dry wt.
1,2-DICHLOROETHANE	<2.0	ug/kg dry wt.
1,1,1-TRICHLOROETHANE	.820	ug/kg dry wt.
CARBON TETRACHLORIDE	<2.0	ug/kg dry wt.
BROMODICHLOROMETHANE	<2.0	ug/kg dry wt.
1,2-DICHLOROPROPANE	<4.0	ug/kg dry wt.
CIS-1,3-DICHLOROPROPYLENE	<4.0	ug/kg dry wt.
TRICHLOROETHYLENE	7.0	ug/kg dry wt.
1,1,2-TRICHLOROETHANE	<2.0	ug/kg dry wt.
TRANS-1,3-DICHLOROPROPYLENE	<4.0	ug/kg dry wt.
CHLORODIBROMOMETHANE	<4.0	ug/kg dry wt.
2-CHLOROETHYLVINYL ETHER	<8.0	ug/kg dry wt.
BROMOFORM	<4.0	ug/kg dry wt.
TETRACHLOROETHYLENE	67	ug/kg dry wt.
1,1,2,2-TETRACHLOROETHANE	<4.0	ug/kg dry wt.
CHLOROBENZENE	<2.0	ug/kg dry wt.
1,3-DICHLOROBENZENE	<4.0	ug/kg dry wt.
1,2-DICHLOROBENZENE	<4.0	ug/kg dry wt.
1,4-DICHLOROBENZENE	31	ug/kg dry wt.

* Raised detection limit because of high background.

Alan Doughty, Ph.D., Laboratory Director

1406 East Washington Ave., Madison, WI 53703, Phone: 608-255-2134

RMT INC.
LABORATORIES

CLIENT: MENASHA CORP.
SAMPLE #: 40297
PROJECT #: 01677.01
WORK ORDER #: 070589-0167701

REPORT DATE: 07/19/89
COLLECTION DATE: 06/28/89
STATION ID: RESIDUAL
SAMPLE COLLECTOR: CLIENT

VOLATILE ORGANIC COMPOUNDS REPORT - METHOD 8020

PARAMETER	RESULT	UNITS
BENZENE	<4.0	ug/kg dry wt.
TOLUENE	37	ug/kg dry wt.
CHLOROBENZENE	<2.0	ug/kg dry wt.
ETHYLBENZENE	5.1	ug/kg dry wt.
XYLENES	<12	ug/kg dry wt.
1,3-DICHLOROBENZENE	<4.0	ug/kg dry wt.
1,2-DICHLOROBENZENE	<4.0	ug/kg dry wt.
1,4-DICHLOROBENZENE	31	ug/kg dry wt.

Alan Doughty, Ph.D., Laboratory Director

1406 East Washington Ave., Madison, WI 53703, Phone: 608-255-2134

KBK

MEN00427

MENASHA CORPORATION

PAPERBOARD GROUP

March 10, 1989

Mr. Michael Tenenbaum
Michigan Disposal Service Corporation
100 East North Street
Kalamazoo, MI. 49007

Dear Mike:

Enclosed are test results from two laboratories for materials generated at Menasha, Otsego for disposal at Cork Street Landfill. Listed below is the additional information you requested to insure this material is appropriate for disposal in a Class III landfill.

1. All material from our Otsego plant is generated at:
   Menasha Corporation
   Paperboard Division
   320 N. Farmer Street
   Otsego, MI. 49078

   The contact person is Keith Kling. Office phone 692-6141, home phone 342-1659.

2. We generate four routine waste streams.

   a) Fly Ash This material is a granular, gray to black material. It is approximately 80% solids. We generate approximately 1460 oven dry tons of this material each month. This amounts to 17,520 O.D. tons per year. It is presently being landfilled at your Cork Street facility.

   b) Secondary Fiber Rejects This material is a mixture of wood fibers, plastics, wax, styrofoam, wet strength resins, metal and glass. Approximately 75% of the material is wood fibers. It is around 30% solids. We generate approximately 215 O.D. tons per month. This amounts to about 2600 O.D.tons per year. It is presently being landfilled at your Cork Street facility.

OTSEGO MILL • 320 N FARMER STREET • P O BOX 155 • OTSEGO, MICHIGAN 49078-0155 • PHONE 616 692-6141

c) Hydrapulper Tails This stream is a mixture of rope, plastic, wood fibers and metal banding. The amount of each component varies depending on what comes in with the recycled paper. It is approximately 35% solids. We generate about 38 O.D. tons per month of this material. This amounts to 460 O.D. tons per year. It is presently being landfilled at your Cork Street facility.

d) Squeezings Rejects This material is a combination of bark, sand, and grit. There is a wide variance in moisture but it is estimated at 30% solids. We generate approximately 16 O.D. tons per month. This amounts to 192 O.D. tons per year. We presently either sell this to nursery companies or dispose of it at your Cork Street facility.

3. The following process is used in the generation of the various waste streams.

A) Fly Ash We operate two stoker-fired coal boilers to produce our steam. Our present steam needs require consumption of about 450,000 Lb. of coal per day. A combustion aid is added to the coal at a rate of up to 1/2 Lb. per ton of coal. The additive is basically magnesium oxide, manganese oxide and calcium oxide. Hard ash is collected as it rolls off the boiler grate. Fly ash is collected in a multiclone mechanical collector. The final waste stream is about 50% of each type ash. The ash is showered with water as it is loaded into dumpsters to minimize release of dust.

B) Secondary Fiber Rejects Recyclable corrugated medium is brought into our mill in bales through a variety of suppliers. These bails are loaded into a hydrapulper where the fibers are broken down with hot process water and vigorous agitation. The repulped slurry is pumped through a series of cleaners where the fiber is accepted and non fibrous material is rejected. There are two basic types of cleaning. The first removes heavy material such as glass, stones, sand and staples. The second removes light material such as plastics, styrofoam and wet strength paper. These streams go through dewatering precesses and then to a compactor. The compactor removes additional water prior to disposal.

C) Hydrapulper Tails This material is generated from the hydrapulper tub. Ropes are hung into the tub as it is agitated. Large non fibrous material such as baling wire, long strands of plastics, rope and wood wrap up into a "tail." This is routinely removed to a dumpster.

D) Squeezings Rejects This material is generated at our digester building. As the raw wood chips are brought into the mill, they are washed. The sand, grit, fines and bark are removed. The washwater is run across a screen where the material is dewatered. It then goes to carts for further dewatering. It is then transferred to a dumpster for disposal.

4. As is indicated by test results from two independent laboratories, none of our waste materials are hazardous.

5. Our sampling techniques and strategies were developed based on recommendations of Kim Paksi of the MDNR. Each steam was sampled for 5 days. These samples were composited and sent in to be analyzed. This was done twice to insure the samples were representative of our typical waste stream. The samples were test by Burmah Technical Services Inc., Pontiac MI. and are attached. Gail Carr, their QA/QC Coordinator, has also included appropriate data on test methods and quality control.

   In addition, grab samples of fly ash, secondary fiber rejects and hydrapulper tails were sent to Western Michigan Environmental Services Inc. Their report, along with testing procedures, has also been included.

I believe the information contained within will be sufficient for determination of our waste as a Type III material. If you have further questions concerning this matter, feel free to call me.

Sincerely,

Keith B. Kling

Keith Kling
Environmental Supervisor

cc: John Bonham
Gary Roys

/ac

ANALYTICAL SERVICES
EDI LABORATORY REPORT

CLIENT: MENASHA CORP.
PROJECT NO.: 26598
LOCATION:
SAMPLED BY: JEN MYERS
DESCRIPTION: TCLP ANALYSIS

DATE SAMPLED: 09/11/89 TIME:
DATE RECEIVED: 09/12/89 TIME: 12:00 PM
DATE COMPLETED: 10/16/89
SCHEDULED COMPLETION: 10/03/89
ANALYST: PT,LKT,RDW
QUALITY CONTROL REVIEW BY: WH,RVB
WORKSHEET NO: 1

	POWER HSE. COAL	POWER HSE. BOTTOM ASH	POWER HSE. FLY ASH	SEC SCREEN REJECTS	DETECTION LIMIT	UNITS
EDI SAMPLE NO:	25205	25206	25207	25208		
ZERO HEADSPACE EXT.	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX		
ZHE-VOLATILES	ENCLOSED	ENCLOSED	ENCLOSED	ENCLOSED		
GC/MS 8240	ENCLOSED	ENCLOSED	ENCLOSED	ENCLOSED		
METHANOL	<0.8	<0.8	<0.8	2.0	0.8	mg/l
TCLP EXTRACTION	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX		
TCLP SEMIVOLATILES	ENCLOSED	ENCLOSED	ENCLOSED	ENCLOSED		
TIME SAMPLED:	10:00 AM	10:00 AM	10:00 AM	10:20 AM		

ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

VOLATILE FRACTION

CLIENT: *MENASHA CORP.* *DATE SAMPLED:* *09-11-1989* *TIME:* *10:00 AM*
PROJECT NO.: *26598* *DATE RECEIVED:* *09-12-1989* *TIME:* *12:00 PM*
SAMPLE: *POWERHOUSE BOTTOM ASH,ZHE EXT* *TEST DATE:* *09-22-1989*
SAMPLE NO. *25206*

COMPOUND	RESULT (mg/L)
Acetone	< 0.050
n-Butanol	< 0.50
Carbon Disulfide	< 0.005
Carbon Tetrachloride	< 0.004
Chlorobenzene	< 0.001
Cyclohexanone	< 0.10
Ethyl Acetate	< 0.010
Ethylbenzene	< 0.001
Ethyl Ether	< 0.010
Isobutanol	< 0.50
Methyl Ethyl Ketone	< 0.050
Methylene Chloride	< 0.005
4-Methyl-2-Pentanone	< 0.050
Pyridine	< 0.40
Tetrachloroethylene	< 0.002
Toluene	< 0.001
1,1,1-Trichloroethane	< 0.002
Trichloroethylene	< 0.002
Trichlorofluoromethane	< 0.003
Trichlorotrifluoroethane	< 0.010
Xylene	< 0.010

** *A less than (<) sign indicates that the compound was nondetectable at the specified detection limit.*

ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

VOLATILE FRACTION

CLIENT: MENASHA CORP.
PROJECT NO.: 26598
SAMPLE: POWERHOUSE BOTTOM ASH,ZHE EXT

DATE SAMPLED: 09-11-1989 TIME: 10:00 AM
DATE RECEIVED: 09-12-1989 TIME: 12:00 PM
TEST DATE: 09-22-1989
SAMPLE NO. 25206

COMPOUND	RESULT (mg/L)
Benzene	< 0.001
Bromodichloromethane	< 0.002
Bromoform	< 0.015
Bromomethane	< 0.010
Carbon Tetrachloride	< 0.004
Chlorobenzene	< 0.001
Chlorodibromomethane	< 0.003
Chloroethane	< 0.010
Chloroform	< 0.001
2-Chloroethyl Vinyl Ether	< 0.010
Chloromethane	< 0.010
1,2-Dichlorobenzene	< 0.015
1,3-Dichlorobenzene	< 0.015
1,4-Dichlorobenzene	< 0.015
1,1-Dichloroethane	< 0.002
1,2-Dichloroethane	< 0.002
1,1-Dichloroethylene	< 0.002
trans-1,2-Dichloroethylene	< 0.002
1,2-Dichloropropane	< 0.003
cis-1,3-Dichloropropylene	< 0.004
trans-1,3-Dichloropropylene	< 0.004
Ethylbenzene	< 0.001
Methylene Chloride	< 0.005
1,1,2,2-Tetrachloroethane	< 0.002
Tetrachloroethylene	< 0.002
Toluene	< 0.001
1,1,1-Trichloroethane	< 0.002
1,1,2-Trichloroethane	< 0.003
Trichloroethylene	< 0.002
Trichlorofluoromethane	< 0.003
Vinyl Chloride	< 0.010
Xylene	< 0.010

** A less than (<) sign indicates that the compound was nondetectable at the specified detection limit.

ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

SEMI VOLATILES FRACTION

CLIENT: *MENASHA CORP*
PROJECT NO.: *26598*
SAMPLE: *POWERHOUSE BOTTOM ASH TCLP*

DATE SAMPLED: *09-11-1989* *TIME:* *10:00 AM*
DATE RECEIVED: *09-12-1989* *TIME:* *12:00 PM*
TEST DATE: *10-02-1989*

SAMPLE NO. *25206*

COMPOUND	RESULT (mg/L)
1,2-Dichlorobenzene	< 0.003
2-Methylphenol	< 0.005
3-Methylphenol	< 0.005
4-Methylphenol	< 0.005
Nitrobenzene	< 0.004

** *A less than (<) sign indicates that the compound was nondetectable at the specified detection limit.*

ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

VOLATILE FRACTION

CLIENT: MENASHA CORP.
PROJECT NO.: 26598
SAMPLE: POWERHOUSE FLY ASH,ZHE EXT.

DATE SAMPLED: 09-11-1989 TIME: 10:00 AM
DATE RECEIVED: 09-12-1989 TIME: 12:00 PM
TEST DATE: 09-22-1989
SAMPLE NO. 25207

COMPOUND	RESULT (mg/L)
Acetone	< 0.050
n-Butanol	< 0.50
Carbon Disulfide	< 0.005
Carbon Tetrachloride	< 0.004
Chlorobenzene	< 0.001
Cyclohexanone	< 0.10
Ethyl Acetate	< 0.010
Ethylbenzene	< 0.001
Ethyl Ether	< 0.010
Isobutanol	< 0.50
Methyl Ethyl Ketone	< 0.050
Methylene Chloride	< 0.005
4-Methyl-2-Pentanone	< 0.050
Pyridine	< 0.40
Tetrachloroethylene	< 0.002
Toluene	< 0.001
1,1,1-Trichloroethane	< 0.002
Trichloroethylene	< 0.002
Trichlorofluoromethane	< 0.003
Trichlorotrifluoroethane	< 0.010
Xylene	< 0.010

** A less than (<) sign indicates that the compound was nondetectable at the specified detection limit.

ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

VOLATILE FRACTION

CLIENT: MENASHA CORP.
PROJECT NO.: 26598
SAMPLE: POWERHOUSE FLY ASH,ZHE EXT.

DATE SAMPLED: 09-11-1989 TIME: 10:00 AM
DATE RECEIVED: 09-12-1989 TIME: 12:00 PM
TEST DATE: 09-22-1989
SAMPLE NO. 25207

COMPOUND	RESULT (mg/L)
Benzene	< 0.001
Bromodichloromethane	< 0.002
Bromoform	< 0.015
Bromomethane	< 0.010
Carbon Tetrachloride	< 0.004
Chlorobenzene	< 0.001
Chlorodibromomethane	< 0.003
Chloroethane	< 0.010
Chloroform	< 0.001
2-Chloroethyl Vinyl Ether	< 0.010
Chloromethane	< 0.010
1,2-Dichlorobenzene	< 0.015
1,3-Dichlorobenzene	< 0.015
1,4-Dichlorobenzene	< 0.015
1,1-Dichloroethane	< 0.002
1,2-Dichloroethane	< 0.002
1,1-Dichloroethylene	< 0.002
trans-1,2-Dichloroethylene	< 0.002
1,2-Dichloropropane	< 0.003
cis-1,3-Dichloropropylene	< 0.004
trans-1,3-Dichloropropylene	< 0.004
Ethylbenzene	< 0.001
Methylene Chloride	< 0.005
1,1,2,2-Tetrachloroethane	< 0.002
Tetrachloroethylene	< 0.002
Toluene	< 0.001
1,1,1-Trichloroethane	< 0.002
1,1,2-Trichloroethane	< 0.003
Trichloroethylene	< 0.002
Trichlorofluoromethane	< 0.003
Vinyl Chloride	< 0.010
Xylene	< 0.010

** A less than (<) sign indicates that the compound was nondetectable at the specified detection limit.

ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

SEMI VOLATILES FRACTION

CLIENT: *MENASHA CORP* *DATE SAMPLED:* *09-11-1989* *TIME:* *10:00 AM*
PROJECT NO.: *26598* *DATE RECEIVED:* *09-12-1989* *TIME:* *12:00 PM*
SAMPLE: *POWERHOUSE FLY ASH TCLP/WASTE* *TEST DATE:* *10-02-1989*
SAMPLE NO. *25207*

COMPOUND	*RESULT (mg/L)*
1,2-Dichlorobenzene	*< 0.003*
2-Methylphenol	*< 0.005*
3-Methylphenol	*< 0.005*
4-Methylphenol	*< 0.005*
Nitrobenzene	*< 0.004*

** *A less than (<) sign indicates that the compound was nondetectable at the specified detection limit.*

ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

VOLATILE FRACTION

CLIENT: *MENASHA CORP.*
PROJECT NO.: *26598*
SAMPLE: *SEC. SCREEN REJECTS,ZHE EXT.*

DATE SAMPLED: *09-11-1989* *TIME:* *10:20 AM*
DATE RECEIVED: *09-12-1989* *TIME:* *12:00 PM*
TEST DATE: *09-22-1989*

SAMPLE NO. *25208*

COMPOUND	*RESULT (mg/L)*
Acetone	*< 2.5*
n-Butanol	*< 25.*
Carbon Disulfide	*< 0.25*
Carbon Tetrachloride	*< 0.20*
Chlorobenzene	*< 0.050*
Cyclohexanone	*< 5.0*
Ethyl Acetate	*< 0.50*
Ethylbenzene	*< 0.050*
Ethyl Ether	*< 0.50*
Isobutanol	*< 25.*
Methyl Ethyl Ketone	*< 2.5*
Methylene Chloride	*< 0.25*
4-Methyl-2-Pentanone	*< 2.5*
Pyridine	*< 20.*
Tetrachloroethylene	*< 0.10*
Toluene	*< 0.050*
1,1,1-Trichloroethane	*< 0.10*
Trichloroethylene	*< 0.10*
Trichlorofluoromethane	*< 0.15*
Trichlorotrifluoroethane	*< 0.50*
Xylene	*< 0.50*

** *A less than (<) sign indicates that the compound was nondetectable at the specified detection limit.*

ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

VOLATILE FRACTION

CLIENT: MENASHA CORP.
PROJECT NO.: 26598
SAMPLE: SEC. SCREEN REJECTS,ZHE EXT.

DATE SAMPLED: 09-11-1989 TIME: 10:20 AM
DATE RECEIVED: 09-12-1989 TIME: 12:00 PM
TEST DATE: 09-22-1989
SAMPLE NO. 25208

COMPOUND	RESULT (mg/L)
Benzene	< 0.050
Bromodichloromethane	< 0.10
Bromoform	< 0.75
Bromomethane	< 0.50
Carbon Tetrachloride	< 0.20
Chlorobenzene	< 0.050
Chlorodibromomethane	< 0.15
Chloroethane	< 0.50
Chloroform	< 0.050
2-Chloroethyl Vinyl Ether	< 0.50
Chloromethane	< 0.50
1,2-Dichlorobenzene	< 0.75
1,3-Dichlorobenzene	< 0.75
1,4-Dichlorobenzene	< 0.75
1,1-Dichloroethane	< 0.10
1,2-Dichloroethane	< 0.10
1,1-Dichloroethylene	< 0.10
trans-1,2-Dichloroethylene	< 0.10
1,2-Dichloropropane	< 0.15
cis-1,3-Dichloropropylene	< 0.20
trans-1,3-Dichloropropylene	< 0.20
Ethylbenzene	< 0.050
Methylene Chloride	< 0.25
1,1,2,2-Tetrachloroethane	< 0.10
Tetrachloroethylene	< 0.10
Toluene	< 0.050
1,1,1-Trichloroethane	< 0.10
1,1,2-Trichloroethane	< 0.15
Trichloroethylene	< 0.10
Trichlorofluoromethane	< 0.15
Vinyl Chloride	< 0.50
Xylene	< 0.50

** A less than (<) sign indicates that the compound was nondetectable at the specified detection limit.

ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

SEMI VOLATILES FRACTION

CLIENT: *MENASHA CORP* *DATE SAMPLED:* *09-11-1989* *TIME:* *10:20 AM*
PROJECT NO.: *26598* *DATE RECEIVED:* *09-12-1989* *TIME:* *12:00 PM*
SAMPLE: *SEC SCREEN REJECTS TCLP/WASTE* *TEST DATE:* *10-02-1989*
SAMPLE NO. *25208*

COMPOUND	*RESULT (mg/L)*
1,2-Dichlorobenzene	*< 0.003*
2-Methylphenol	*< 0.005*
3-Methylphenol	*< 0.005*
4-Methylphenol	*< 0.005*
Nitrobenzene	*< 0.004*

** *A less than (<) sign indicates that the compound was nondetectable at the specified detection limit.*

ANALYTICAL SERVICES
EDI LABORATORY REPORT

CLIENT: MENASHA CORP.
PROJECT NO.: 26598
LOCATION:
SAMPLED BY: JEN MYERS
DESCRIPTION: ORGANIC SCANS

DATE SAMPLED: 09/11/89 TIME:
DATE RECEIVED: 09/12/89 TIME: 12:00 PM
DATE COMPLETED: 10/16/89
SCHEDULED COMPLETION: 10/03/89
ANALYST: PT,LKT,RDW
QUALITY CONTROL REVIEW BY: RVB
WORKSHEET NO: 2

	POWER HSE. COAL	POWER HSE. BOTTOM ASH	POWER HSE. FLY ASH	SEC SCREEN REJECTS	DETECTION LIMIT	UNITS
EDI SAMPLE NO:	25205	25206	25207	25208		
F001-F005 VOA	ENCLOSED	ENCLOSED	ENCLOSED	ENCLOSED		
METHANOL	<0.8	<2.0	<2.0	28	varies	mg/kg
GC/MS 8240	ENCLOSED	ENCLOSED	ENCLOSED	ENCLOSED		
F001-F005 BNA	ENCLOSED	ENCLOSED	ENCLOSED	ENCLOSED		
TIME SAMPLED:	10:00 AM	10:00 AM	10:00 AM	10:20		

ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

VOLATILE FRACTION

CLIENT: MENASHA CORPORATION
PROJECT NO.: 26598
SAMPLE: POWERHOUSE BOTTOM ASH

DATE SAMPLED: 09-11-1989 TIME: 10:00 AM
DATE RECEIVED: 09-12-1989 TIME: 12:00 PM
TEST DATE: 09-18-1989
SAMPLE NO. 25206

COMPOUND	RESULT (mg/Kg)
Benzene	< 0.025
Bromodichloromethane	< 0.050
Bromoform	< 0.38
Bromomethane	< 0.25
Carbon Tetrachloride	< 0.10
Chlorobenzene	< 0.025
Chlorodibromomethane	< 0.075
Chloroethane	< 0.25
Chloroform	< 0.025
2-Chloroethyl Vinyl Ether	< 0.25
Chloromethane	< 0.25
1,2-Dichlorobenzene	< 0.38
1,3-Dichlorobenzene	< 0.38
1,4-Dichlorobenzene	< 0.38
1,1-Dichloroethane	< 0.050
1,2-Dichloroethane	< 0.050
1,1-Dichloroethylene	< 0.050
trans-1,2-Dichloroethylene	< 0.050
1,2-Dichloropropane	< 0.075
cis-1,3-Dichloropropylene	< 0.10
trans-1,3-Dichloropropylene	< 0.10
Ethylbenzene	< 0.025
Methylene Chloride	< 0.13
1,1,2,2-Tetrachloroethane	< 0.050
Tetrachloroethylene	< 0.050
Toluene	< 0.025
1,1,1-Trichloroethane	< 0.050
1,1,2-Trichloroethane	< 0.075
Trichloroethylene	< 0.050
Trichlorofluoromethane	< 0.075
Vinyl Chloride	< 0.25
Xylene	< 0.25

** A less than (<) sign indicates that the compound was nondetectable at the specified detection limit.

ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

VOLATILE FRACTION

CLIENT: MENASHA CORP.
PROJECT NO.: 26598
SAMPLE: POWERHOUSE BOTTOM ASH

DATE SAMPLED: 09-11-1989 TIME: 10:00 AM
DATE RECEIVED: 09-12-1989 TIME: 12:00 PM
TEST DATE: 09-18-1989
SAMPLE NO. 25206

COMPOUND	RESULT (mg/Kg)
Acetone	< 1.3
n-Butanol	< 13.
Carbon Disulfide	< 0.13
Carbon Tetrachloride	< 0.10
Chlorobenzene	< 0.025
Cyclohexanone	< 2.5
Ethyl Acetate	< 0.25
Ethylbenzene	< 0.025
Ethyl Ether	< 0.25
Isobutanol	< 13.
Methyl Ethyl Ketone	< 1.3
Methylene Chloride	< 0.13
4-Methyl-2-Pentanone	< 1.3
Pyridine	< 10.
Tetrachloroethylene	< 0.050
Toluene	< 0.025
1,1,1-Trichloroethane	< 0.050
Trichloroethylene	< 0.050
Trichlorofluoromethane	< 0.075
Trichlorotrifluoroethane	< 0.25
Xylene	< 0.25

** A less than (<) sign indicates that the compound was nondetectable at the specified detection limit.

ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

SEMI VOLATILES FRACTION

CLIENT: MENASHA CORP
PROJECT NO.: 26598
SAMPLE: POWER HOUSE BOTTOM ASH

DATE SAMPLED: 09-11-1989 TIME: 10:00 AM
DATE RECEIVED: 09-12-1989 TIME: 12:00 PM
TEST DATE: 10-12-1989
SAMPLE NO. 25206

COMPOUND	RESULT (mg/Kg)
1,2-Dichlorobenzene	< 0.30
2-Methylphenol	< 0.50
3-Methylphenol	< 0.50
4-Methylphenol	< 0.50
Nitrobenzene	< 0.40

** A less than (<) sign indicates that the compound was nondetectable at the specified detection limit.

ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

VOLATILE FRACTION

CLIENT: MENASHA CORPORATION
PROJECT NO.: 26598
SAMPLE: POWERHOUSE FLY ASH

DATE SAMPLED: 09-11-1989 TIME: 10:00 AM
DATE RECEIVED: 09-12-1989 TIME: 12:00 PM
TEST DATE: 09-18-1989
SAMPLE NO. 25207

COMPOUND	RESULT (mg/Kg)
Benzene	< 0.025
Bromodichloromethane	< 0.050
Bromoform	< 0.38
Bromomethane	< 0.25
Carbon Tetrachloride	< 0.10
Chlorobenzene	< 0.025
Chlorodibromomethane	< 0.075
Chloroethane	< 0.25
Chloroform	< 0.025
2-Chloroethyl Vinyl Ether	< 0.25
Chloromethane	< 0.25
1,2-Dichlorobenzene	< 0.38
1,3-Dichlorobenzene	< 0.38
1,4-Dichlorobenzene	< 0.38
1,1-Dichloroethane	< 0.050
1,2-Dichloroethane	< 0.050
1,1-Dichloroethylene	< 0.050
trans-1,2-Dichloroethylene	< 0.050
1,2-Dichloropropane	< 0.075
cis-1,3-Dichloropropylene	< 0.10
trans-1,3-Dichloropropylene	< 0.10
Ethylbenzene	< 0.025
Methylene Chloride	< 0.13
1,1,2,2-Tetrachloroethane	< 0.050
Tetrachloroethylene	< 0.050
Toluene	< 0.025
1,1,1-Trichloroethane	< 0.050
1,1,2-Trichloroethane	< 0.075
Trichloroethylene	< 0.050
Trichlorofluoromethane	< 0.075
Vinyl Chloride	< 0.25
Xylene	< 0.25

** A less than (<) sign indicates that the compound was nondetectable at the specified detection limit.

ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

VOLATILE FRACTION

CLIENT: MENASHA CORP.
PROJECT NO.: 26598
SAMPLE: POWERHOUSE FLY ASH

DATE SAMPLED: 09-11-1989 TIME: 10:00 AM
DATE RECEIVED: 09-12-1989 TIME: 12:00 PM
TEST DATE: 09-18-1989
SAMPLE NO. 25207

COMPOUND	RESULT (mg/Kg)
Acetone	< 1.3
n-Butanol	< 13.
Carbon Disulfide	< 0.13
Carbon Tetrachloride	< 0.10
Chlorobenzene	< 0.025
Cyclohexanone	< 2.5
Ethyl Acetate	< 0.25
Ethylbenzene	< 0.025
Ethyl Ether	< 0.25
Isobutanol	< 13.
Methyl Ethyl Ketone	< 1.3
Methylene Chloride	< 0.13
4-Methyl-2-Pentanone	< 1.3
Pyridine	< 10.
Tetrachloroethylene	< 0.050
Toluene	< 0.025
1,1,1-Trichloroethane	< 0.050
Trichloroethylene	< 0.050
Trichlorofluoromethane	< 0.075
Trichlorotrifluoroethane	< 0.25
Xylene	< 0.25

** A less than (<) sign indicates that the compound was nondetectable at the specified detection limit.

ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

SEMI VOLATILES FRACTION

CLIENT: *MENASHA CORP*
PROJECT NO.: *26598*
SAMPLE: *POWERHOUSE FLY ASH*

DATE SAMPLED: *09-11-1989* *TIME:* *10:00 AM*
DATE RECEIVED: *09-12-1989* *TIME:* *12:00 PM*
TEST DATE: *10-12-1989*
SAMPLE NO. *25207*

COMPOUND	RESULT (mg/Kg)
1,2-Dichlorobenzene	< 0.30
2-Methylphenol	< 0.50
3-Methylphenol	< 0.50
4-Methylphenol	< 0.50
Nitrobenzene	< 0.40

** *A less than (<) sign indicates that the compound was nondetectable at the specified detection limit.*

ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

VOLATILE FRACTION

CLIENT: MENASHA CORPORATION
PROJECT NO.: 26598
SAMPLE: SEC. SCREEN REJECTS

DATE SAMPLED: 09-11-1989 TIME: 10:20 AM
DATE RECEIVED: 09-12-1989 TIME: 12:00 PM
TEST DATE: 09-18-1989
SAMPLE NO. 25208

COMPOUND	RESULT (mg/Kg)
Benzene	< 5.0
Bromodichloromethane	< 10.
Bromoform	< 75.
Bromomethane	< 50.
Carbon Tetrachloride	< 20.
Chlorobenzene	< 5.0
Chlorodibromomethane	< 15.
Chloroethane	< 50.
Chloroform	< 5.0
2-Chloroethyl Vinyl Ether	< 50.
Chloromethane	< 50.
1,2-Dichlorobenzene	< 75.
1,3-Dichlorobenzene	< 75.
1,4-Dichlorobenzene	< 75.
1,1-Dichloroethane	< 10.
1,2-Dichloroethane	< 10.
1,1-Dichloroethylene	< 10.
trans-1,2-Dichloroethylene	< 10.
1,2-Dichloropropane	< 15.
cis-1,3-Dichloropropylene	< 20.
trans-1,3-Dichloropropylene	< 20.
Ethylbenzene	< 5.0
Methylene Chloride	< 25.
1,1,2,2-Tetrachloroethane	< 10.
Tetrachloroethylene	< 10.
Toluene	< 5.0
1,1,1-Trichloroethane	< 10.
1,1,2-Trichloroethane	< 15.
Trichloroethylene	< 10.
Trichlorofluoromethane	< 15.
Vinyl Chloride	< 50.
Xylene	< 50.

** A less than (<) sign indicates that the compound was nondetectable at the specified detection limit.

ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

VOLATILE FRACTION

CLIENT: MENASHA CORP.
PROJECT NO.: 26598
SAMPLE: SEC. SCREEN REJECTS

DATE SAMPLED: 09-11-1989 TIME: 10:20 AM
DATE RECEIVED: 09-12-1989 TIME: 12:00 PM
TEST DATE: 09-18-1989
SAMPLE NO. 25208

COMPOUND	RESULT (mg/Kg)
Acetone	< 250
n-Butanol	< 2500
Carbon Disulfide	< 25.
Carbon Tetrachloride	< 20.
Chlorobenzene	< 5.0
Cyclohexanone	< 500
Ethyl Acetate	< 50.
Ethylbenzene	< 5.0
Ethyl Ether	< 50.
Isobutanol	< 2500
Methyl Ethyl Ketone	< 250
Methylene Chloride	< 25.
4-Methyl-2-Pentanone	< 250
Pyridine	< 2000
Tetrachloroethylene	< 10.
Toluene	< 5.0
1,1,1-Trichloroethane	< 10.
Trichloroethylene	< 10.
Trichlorofluoromethane	< 15.
Trichlorotrifluoroethane	< 50.
Xylene	< 50.

** A less than (<) sign indicates that the compound was nondetectable at the specified detection limit.

ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

SEMI VOLATILES FRACTION

CLIENT: MENASHA CORP
PROJECT NO.: 26598
SAMPLE: SEC. SCREEN REJECTS

DATE SAMPLED: 09-11-1989 TIME: 10:20 AM
DATE RECEIVED: 09-12-1989 TIME: 12:00 PM
TEST DATE: 10-12-1989
SAMPLE NO. 25208

COMPOUND	RESULT (mg/Kg)
1,2-Dichlorobenzene	< 0.30
2-Methylphenol	< 0.50
3-Methylphenol	< 0.50
4-Methylphenol	< 0.50
Nitrobenzene	< 0.40

** A less than (<) sign indicates that the compound was nondetectable at the specified detection limit.

ANALYTICAL SERVICES
EDI LABORATORY REPORT

CLIENT: MENASHA CORP.
PROJECT NO.: 26598
LOCATION:
SAMPLED BY: JEN MYERS
DESCRIPTION: METALS ANALYSIS

DATE SAMPLED: 09/11/89 TIME:
DATE RECEIVED: 09/12/89 TIME: 12:00 PM
DATE COMPLETED: 10/16/89
SCHEDULED COMPLETION: 10/03/89
ANALYST: NB,CS
QUALITY CONTROL REVIEW BY: RVB
WORKSHEET NO: 3

	POWER HSE. BOTTOM ASH	POWER HSE. FLY ASH	SEC SCREEN REJECTS	DETECTION LIMIT	UNITS
EDI SAMPLE NO:	25206	25207	25208		
EP-TOXICITY LEACHATE	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX		
ARSENIC,TOTAL	<0.20	<0.20	<0.20	0.20	mg/l
BARIUM,TOTAL	0.08	0.31	0.4	0.02	mg/l
CADMIUM,TOTAL	<0.02	<0.02	<0.02	0.02	mg/l
CHROMIUM,TOTAL	<0.08	<0.08	<0.08	0.08	mg/l
COPPER,TOTAL	<0.03	<0.03	<0.03	0.03	mg/l
LEAD,TOTAL	<0.10	<0.10	<0.10	0.10	mg/l
MERCURY,TOTAL	<0.40	<0.40	<0.40	0.40	ug/l
SELENIUM,TOTAL	<0.20	<0.20	<0.20	0.20	mg/l
SILVER,TOTAL	<0.01	<0.01	<0.01	0.01	mg/l
ZINC,TOTAL	0.02	0.32	0.25	0.02	mg/l
TIME SAMPLED:	10:00 AM	10:00 AM	10:20 AM		

MEN00451

MICHIGAN

[illegible] EAST NORTH STREET KALAMAZOO MICHIGAN [illegible] 616 381-2228 [illegible]

April 3, 1990

Menasha Corporation
P.O. Box 155
320 N. Farmers St.
Otsego, MI 49078
Attn: Mr. Keith Kling

Re: Annual Waste Stream Characterization Requirements
Cork Street Type III Landfill, Kalamazoo, Michigan

Dear Sir or Madam:

As a result of new Michigan Department of Natural Resources (MDNR) guidelines for characterization of Type III waste, Michigan Disposal Services, Inc. (MDS) has developed a new waste characterization protocol for generators of Type III waste using the Cork Street landfill. Exhibits A and B attached to this letter present the new MDNR guidelines.

As soon as possible, MDS requests your firm provide a description of each process at your facility which generates Type III waste intended for disposal at the Cork Street Landfill. Also, MDS requests a brief written explanation of why the material generated is believed to be free of potentially polluting substances.

In addition, MDS requests that the following testing and analysis program be implemented for each generator using the Cork Street Landfill.

I. **Year 1 (1990 or First Year of Disposal of Specific Waste at Landfill)**

A. <u>First Quarter</u>

1. Collect two representative samples of each waste type (eg. ash, paper residuals). Each sample should represent a different period of operation at your facility (eg. one sample could represent morning operations and the other sample could represent afternoon operations; or one sample could represent operations on Monday and the other sample could represent Friday operations).

2. Analyze each sample as follows:
   a. Prepare half of each sample using the ASTM neutral leach procedure; analyze the resultant leachate for arsenic, barium, cadmium, chromium, copper, lead, mercury, selenium,

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b. Prepare the second half of each sample using the U.S. EPA TCLP procedure; analyze the resultant leachate for U.S. EPA Method 601 and 602 organics. #245

B. Second, Third and Fourth Quarters

1. Collect one composite sample representative of the Type III wastes generated.

2. Analyze the sample as described above for the first quarter analysis.

II. Year 2 and Thereafter (1991 or Second Year of Disposal at Landfill):
Each quarter collect one composite sample and analyze as described above under "Year 1 Second, Third and Fourth Quarters."

Exhibit B attached to this letter presents the required analytical detection limits for inorganic and for certain organic compounds.

MDS has negotiated a special discount with Ann Arbor Technical Services, Inc. (ATS) for the first year analytical work; and is prepared to offer your firm sampling and analytical services at reduced rates:

Service	Rate
ASTM Neutral Leach Preparation and analysis of leachate for the ten indicated metals and for chemical oxygen demand.	$365/sample
TCLP Leach Preparation and analysis of leachate for U.S. EPA Method 601/602 organics.	$250/sample

#192 ~~150~~ ~~210~~ #40 #20

If you choose to use our sampling and analytical services, we will bill your account.

We would like to conduct a joint sampling session before April 15, 1990. Please contact us to schedule a convenient date and time.

#1491

We appreciate your business and wish to assist you in whatever way we can in complying with this new program. Please do not hesitate to call us if you have any questions.

Sincerely,
MICHIGAN DISPOSAL SERIVCE

Daniel O. Cummins

Daniel O. Cummins
Landfill Manager

DOC

MEN00454

PAPERBOARD DIVISION

MENASHA CORPORATION

August 20, 1990

Daniel Cummins
Cork Street Type III Landfill
2800 E. Cork Street
Kalamazoo, MI. 49001

Dear Dan,

In order to provide Michigan Disposal Service with a clear characterization of the waste Menasha Corporation disposes of at the Cork Street Landfill, I have compiled a list of the testing performed on these materials since 1984. I have arranged these by date and by the materials tested. All results are in mg/l unless otherwise noted.

In order to meet the testing requirements of Act 641, P.A. 1978 as amended, I have also begun scheduling quarterly testing of our type III waste streams. The first of these will be collected on September 10, 1990 and tested in accordance with your letter of April 3. Past testing has indicated a very consistent, acceptable material. As such, testing under Act 641 need be conducted only once per year. I will contact you in January to discuss appropriate testing requirements for 1991.

If you have any questions concerning the attached information, please contact me at 692-6141.

Sincerely,

Keith B. Kling

Keith B. Kling
Environmental Supervisor

cc: John Bonham
Jim Porter
Len Myers
John Blauwkamp

Otsego Mill
320 N Farmer St
PO Box 155
Otsego MI 49078-0155
1-616-692-6141
1-616-692-2060 (Fax)

6/6/84 Test

PARAMETER	BOILER ASH ASTM LEACHATE	SECONADRY SCREEN REJECTS ASTM LEACHATE	TAILS ASTM LEACHATE
Lead	<.05	.20	.10
Arsenic	.033	<.005	<.005
Cadmium	<.01	.01	.02
Total Chromium	.02	.05	<.02
Selenium	.010	<.005	<.005
Iron	.06	.92	50
Zinc	.09	.33	2.7
Copper	<.02	.05	.12
Total Dissolved Solids	310	1800	1200
Nitrate Nitrogen	.23	<.02	<.02
Sulfate	190	73	64
Chloride	5	5	4
pH	7.61	7.56	6.0

MEN00455

12/21/84 Test

PARAMETER	SECONDARY SCREEN REJECTS ASTM LEACHATE	TAILS ASTM LEACHATE
Lead	<.05	<.05
Arsenic	<.05	<.05
Cadmium	<.02	<.02
Total Chromium	.05	<.05
Selenium	<.02	<.02
Iron	1.1	.1
Zinc	1.0	<.1
Copper	.04	<.02
Total Dissolved Solids	1440	292
Nitrate Nitrogen	2.3	<.01
Sulfate	30	12
Chloride	13	4
pH	7.4	7.4

MEN00456

6/20/85

PARAMETER	SECONDARY SCREEN REJECTS ASTM LEACHATE	TAILS ASTM LEACHATE
Lead	<.05	<.05
Cadmium	<.01	<.01
Total Chromium	<.02	.03
Selenium	<.005	.01
Iron	1.9	.90
Zinc	.50	.80
Copper	1.0	.04
Total Dissolved Solids	330	2060
Nitrate Nitrogen	10.5	63.5
Sulfate	13	11
Chloride	<1	<1
pH	6.2	5.4

MEN00457

PARAMETER	BOILER ASH BY ASTM LEACHATE	SQUEEZINGS WATER REJECTS BY ASTM LEACHATE	TAILS BY ASTM LEACHATE	SECONDARY SCREEN REJECTS BY ASTM LEACHATE
LEAD	.16	.12	.10	.10
CADMIUM	<.02	<.02	<.02	<.02
TOTAL CHROMIUM	.2	<.2	<.2	<.2
SELENIUM	<.03	<.03	<.03	<.03
IRON	.04	.30	10.2	5.35
ZINC	.37	.40	.13	.95
COPPER	<.2	<.2	<.2	<.2
TOTAL DISSOLVED SOLIDS	680	1300	1460	1640
NITRATE NITROGEN	.14	.10	<.01	<.01
SULFATE	353	11	22	22
CHLORIDE	<2	<6	7	13
pH	5.5	8.6	7.8	7.9
ARSENIC	<.008	<.008	<.008	<.008
CALCIUM	73.2	46.6	10.6	22.4
MAGNESIUM	9.01	9.49	1.49	4.55
POTASSIUM	16.0	69.3	12.9	22.7
SODIUM	13.7	119	461	261
COD	14	640	693	1070
NITRITE NITROGEN	.01	<.01	<.01	<.01
AMMONIA NITROGEN	.96	.70	1.10	1.38
ORGANIC NITROGEN	5.50	3.12	2.29	4.22
KJELDAHL NITROGEN	6.49	3.82	3.39	5.60
TOC	4	208	226	508

MEN00458

8/6/87

PARAMETER	BOILER ASH BY ASTM LEACHATE	SQUEEZINGS WATER REJECTS BY ASTM LEACHATE	TAILS BY ASTM LEACHATE	SECONDARY SCREEN REJECTS BY ASTM LEACHATE
LEAD	<.05	<.05	.09	<.05
CADMIUM	<.01	<.01	<.01	<.01
TOTAL CHROMIUM	.03	.04	.09	.02
SELENIUM	.009	<.005	<.01	<.005
IRON	<.02	.57	2.3	.48
ZINC	.06	.04	.23	.08
COPPER	<.02	.02	.04	.04
TOTAL DISSOLVED SOLIDS	510	460	1600	1480
NITRATE NITROGEN	.06	.80	<.02	.11
SULFATE	280	7.0	8.5	10
CHLORIDE	<6	<6	<6	<6
pH	7.1	6.1	7.6	6.7
ARSENIC	<.005	<.005	<.01	<.005

MEN00459

11/25/87

PARAMETER	BOILER ASH BY ASTM LEACHATE	SQUEEZINGS WATER REJECTS BY ASTM LEACHATE	TAILS BY ASTM LEACHATE	SECONDARY SCREEN REJECTS BY ASTM LEACHATE
LEAD	<.05	<.05	<.05	<.05
CADMIUM	<.01	<.01	<.01	<.01
TOTAL CHROMIUM	<.02	<.02	.02	<.02
SELENIUM	.053	<.005	<.005	<.005
IRON	.04	.40	7.0	1.0
ZINC	<.02	.07	3.5	.21
COPPER	<.02	<.02	.04	.02
TOTAL DISSOLVED SOLIDS	590	1300	1300	1400
NITRATE NITROGEN	.62	4.4	.15	<.02
SULFATE	380	15	22	25
CHLORIDE	4	15	11	12
pH	9.1	5.38	7.69	6.69
ARSENIC	<.005	<.005	<.005	<.005

MEN00460

3/7/88

PARAMETER	BOILER ASH BY ASTM LEACHATE	SQUEEZINGS WATER REJECTS BY ASTM LEACHATE	TAILS BY ASTM LEACHATE	SECONDARY SCREEN REJECTS BY ASTM LEACHATE
LEAD	<.05	<.05	<.05	<.05
CADMIUM	<.01	<.01	<.01	<.01
TOTAL CHROMIUM	<.02	<.02	.02	<.02
SELENIUM	<.005	<.005	<.005	<.005
IRON	.05	.24	5.9	.28
ZINC	1.5	.16	.23	.12
COPPER	<.02	.03	.04	.03
TOTAL DISSOLVED SOLIDS	510	2200	2500	1500
NITRATE NITROGEN	.09	.18	.09	.47
SULFATE	340	13	20	19
CHLORIDE	<4	<8	<4	<4
pH	5.6	5.0	6.7	6.7
ARSENIC	<.005	<.005	<.005	<.005
BARIUM	.12	.25	.14	.11
MANGANESE	.24	2.4	.64	.40
MERCURY	<.0005	<.0005	<.0005	<.0005
SILVER	<.02	<.02	<.02	<.02

MEN00461

6/28/88

PARAMETER	BOILER ASH BY ASTM LEACHATE	SQUEEZINGS WATER REJECTS BY ASTM LEACHATE	TAILS BY ASTM LEACHATE	SECONDARY SCREEN REJECTS BY ASTM LEACHATE
LEAD	<.05	<.05	<.05	<.05
CADMIUM	<.01	<.01	<.01	<.01
TOTAL CHROMIUM	<.02	<.02	<.02	.02
SELENIUM	.018	<.005	<.005	<.005
IRON	.03	1.0	4.8	1.0
ZINC	.21	.15	.16	.09
COPPER	<.02	.08	.14	.04
TOTAL DISSOLVED SOLIDS	420	350	2300	2200
NITRATE NITROGEN	3.4	.44	.72	.19
SULFATE	260	18	17	16
CHLORIDE	<4	<12	<12	<12
pH	3.7	6.8	7.5	6.6
ARSENIC	<.005	<.005	<.005	<.005

MEN00462

10/27/88

PARAMETER	BOILER ASH BY EP TOXICITY	TAILS BY EP TOXICITY	SECONDARY SCREEN REJECTS BY EP TOXICITY
LEAD	<.005	<.005	<.005
CADMIUM	<.01	<.01	<.01
TOTAL CHROMIUM	<.05	<.05	<.05
SELENIUM	.0044	.0059	.0045
ZINC	.13	2.8	.24
COPPER	.031	<.02	<.02
pH	5.4	7.8	7.3
ARSENIC	<.005	<.005	<.005
BARIUM	<1.0	<1.0	<1.0
MERCURY	<.0005	.0011	.00052
NICKEL	<.1	<.1	<.1
SILVER	<.01	<.01	<.01
CYANIDE	<.5	<.5	<.5
SULFIDE	<.5	<.5	<.5

MEN00463

11/10/88

PARAMETER	BOILER ASH BY EP TOXICITY	SQUEEZINGS WATER REJECTS BY EP TOXICITY	TAILS BY EP TOXICITY	SECONDARY SCREEN REJECTS BY EP TOXICITY
LEAD	<.05	<.05	<.05	<.05
CADMIUM	<.01	<.01	<.01	<.01
TOTAL CHROMIUM	<.02	<.02	<.02	<.02
SELENIUM	<.005	<.005	<.005	<.005
ZINC	.15	.03	.73	.50
COPPER	.78	.67	.70	.52
ARSENIC	<.005	<.005	<.005	<.005
BARIUM	.23	.02	.15	.07
MERCURY	<.0005	<.0005	<.0005	<.0005
SILVER	<.02	<.02	.02	<.02

MEN00464

11/22/88

PARAMETER	BOILER ASH BY EP TOXICITY	SQUEEZINGS WATER REJECTS BY EP TOXICITY	TAILS BY EP TOXICITY	SECONDARY SCREEN REJECTS BY EP TOXICITY
LEAD	<.05	<.05	<.05	<.05
CADMIUM	<.01	<.01	<.01	<.01
TOTAL CHROMIUM	<.02	<.02	<.02	<.02
SELENIUM	<.005	<.005	<.005	<.005
ZINC	.14	.03	.28	.10
COPPER	<.02	.04	.08	.04
ARSENIC	<.005	<.005	<.005	<.005
BARIUM	.21	.05	.14	.12
MERCURY	<.0005	<.0005	<.0005	<.0005
SILVER	<.02	<.02	<.02	<.02

5/3/89

PARAMETER	BOILER ASH ASTM LEACHATE	SECONDARY SCREEN REJECTS (SAMPLE A) BY ASTM LEACHATE	SECONDARY SCREEN REJECTS (SAMPLE B) BY ASTM LEACHATE
LEAD	<.1	<.1	<.1
CADMIUM	<.005	<.005	<.005
TOTAL CHROMIUM	<.01	<.01	<.01
SELENIUM	.010	<.003	<.003
IRON	<.04	.21	.16
ZINC	<.02	.07	.06
COPPER	<.02	<.02	<.02
ARSENIC	.010	<.003	<.003
BARIUM	.12	.039	.033
MERCURY	<.0002	.0006	<.0002
SILVER	<.01	<.01	<.01

MEN00466

6/28/89 *REPORTED IN μ/KG

PARAMETER	SEC. SCREEN REJECTS VOC-8010
Chloromethane	<2.0
Bromomethane	<2.0
Vinyl Chloride	<2.0
Dichlorodifluoromethane	97
Chloroethane	<2.0
Methyene Chloride	<12
Fluorotrichloromethane	7.9
1,1-Dichloroethylene	38
1,1-Dichloroethane	<2.0
Trans-1,2-Dichloroethylene	<4.0
Chloroform	<2.0
1,2-Dichloroethane	<2.0
1,1,1-Trichloroethane	.820
Carbon Tetrachloride	<2.0
Bromodichloromethane	<2.0
1,2-Dichloropropane	<4.0
CIS-1,3-Dichloropropylene	<4.0
Trichloroethylene	7.0
1,1,2-Trichloroethane	<2.0
TRANS-1,3-Dichloropropylene	<4.0
Chlorodibromomethane	<4.0
2-Chloroethylvinyl ether	<8.0
Bromoform	<4.0
Tetrachloroethylene	67
1,1,2,2-Tetrachloroethane	<4.0
Chlorobenzene	<2.0
1,3-Dichlorobenzene	<4.0
1,2-Dichlorobenzene	<4.0
1,4-Dichlorobenzene	31

9/11/89 - VOLATILE FRACTION
* TOTAL REPORTED IN MG/KG

MEN00468

PARAMETER	SECONDARY SCREEN REJECTS TCLP LEACHATE	SECONDARY SCREEN REJECTS TCLP TOTAL
BENZENE	<0.050	<5.0
BROMODICHLOROMETHANE	<0.10	<10
BROMOFORM	<0.75	<75
BROMOMETHANE	<0.50	<50
CARBON TETRACHLORIDE	<0.20	<20
CHLOROBENZENE	<0.050	<5.0
CHLORODIBROMOMETHANE	<0.15	<15
CHLOROETHANE	<0.50	<50
CHLOROFORM	<0.050	<5.0
2-CHLOROETHYL VINYL ETHER	<0.50	<50
CHLOROMETHANE	<0.50	<50
1,2-DICHLOROBENZENE	<0.75	<75
1,3-DICHLOROBENZENE	<0.75	<75
1,4-DICHLOROBENZENE	<0.75	<75
1,1-DICHLOROETHANE	<0.10	<10
1,2-DICHLOROETHANE	<0.10	<10
1,1-DICHLOROETHYLENE	<0.10	<10
TRANS-1,2-DICHLOROETHYLENE	<0.10	<10
1,2-DICHLOROPROPANE	<0.15	<15
CIS-1,3-DICHLOROPROPYLENE	<0.20	<20
TRANS-1,3-DICHLOROPROPYLENE	<0.20	<20
ETHYLBENZENE	<0.050	<5.0
METHYLENE CHLORIDE	<0.25	<25
1,1,2,2-TETRACHLOROETHANE	<0.10	<10
TETRACHLOROETHYLENE	<0.10	<10
TOLUENE	<0.050	<5.0
1,1,1-TRICHLOROETHANE	<0.10	<10
1,1,2-TRICHLOROETHANE	<0.15	<15
TRICHLOROETHYLENE	<0.10	<10
TRICHLOROFLUORMETHANE	<0.15	<15
VINYL CHLORIDE	<0.50	<50
XYLENE	<0.50	<50
ACETONE	<2.5	<250
N-BUTANOL	<25	<2500
CARBON DISULFIDE	<0.25	<25
CYCLOHEXANONE	<5.0	<500
ETHYL ACETATE	<0.50	<50
ETHYL ETHER	<0.50	<50
ISOBUTANOL	<25	<2500
METHYL ETHYL KETONE	<2.5	<250
4-METHYL-2-PENTANONE	<2.5	<250
PYRIDINE	<0.20	<2000
TRICHLOROTRIFLUOROETHANE	<0.50	<50

9/11/89 - VOLATILE FRACTION
* TOTAL REPORTED IN MG/KG

MEN00469

PARAMETER	POWERHOUSE BOTTOM ASH TCLP LEACHATE	POWERHOUSE BOTTOM ASH TCLP TOTAL
BENZENE	<0.001	<0.025
BROMODICHLOROMETHANE	<0.002	<0.050
BROMOFORM	<0.015	<0.38
BROMOMETHANE	<0.010	<0.25
CARBON TETRACHLORIDE	<0.004	<0.10
CHLOROBENZENE	<0.001	<0.025
CHLORODIBROMOMETHANE	<0.003	<0.075
CHLOROETHANE	<0.010	<0.25
CHLOROFORM	<0.001	<0.025
2-CHLOROETHYL VINYL ETHER	<0.010	<0.25
CHLOROMETHANE	<0.010	<0.25
1,2-DICHLOROBENZENE	<0.015	<0.38
1,3-DICHLOROBENZENE	<0.015	<0.38
1,4-DICHLOROBENZENE	<0.015	<0.38
1,1-DICHLOROETHANE	<0.002	<0.050
1,2-DICHLOROETHANE	<0.002	<0.050
1,1-DICHLOROETHYLENE	<0.002	<0.050
TRANS-1,2-DICHLOROETHYLENE	<0.002	<0.050
1,2-DICHLOROPROPANE	<0.003	<0.075
CIS-1,3-DICHLOROPROPYLENE	<0.004	<0.10
TRANS-1,3-DICHLOROPROPYLENE	<0.004	<0.10
ETHYLBENZENE	<0.001	<0.025
METHYLENE CHLORIDE	<0.005	<0.13
1,1,2,2-TETRACHLOROETHANE	<0.002	<0.050
TETRACHLOROETHYLENE	<0.002	<0.050
TOLUENE	<0.001	<0.025
1,1,1-TRICHLOROETHANE	<0.002	<0.050
1,1,2-TRICHLOROETHANE	<0.003	<0.075
TRICHLOROETHYLENE	<0.002	<0.050
TRICHLOROFLUORMETHANE	<0.003	<0.075
VINYL CHLORIDE	<0.010	<0.25
XYLENE	<0.010	<0.25
ACETONE	<0.050	<1.3
N-BUTANOL	<0.50	<13
CARBON DISULFIDE	<0.005	<0.13
CYCLOHEXANONE	<0.10	<2.5
ETHYL ACETATE	<0.010	<0.25
ETHYL ETHER	<0.010	<0.25
ISOBUTANOL	<0.50	<13
METHYL ETHYL KETONE	<0.050	<1.3
4-METHYL-2-PENTANONE	<0.050	<1.3
PYRIDINE	<0.40	<10
TRICHLOROTRIFLUOROETHANE	<0.010	<0.25

9/11/89 Test - Se[illegible]tiles Fraction
*Total Reported in mg/kg

PARAMETER	SECONDARY SCREEN REJECTS TCLP LEACHATE	SECONDARY SCREEN REJECTS TCLP TOTAL
1,2-Dichlorobenzene	<0.003	<0.30
2-Methylphenol	<0.005	<0.50
3-Methylphenol	<0.005	<0.50
4-Methylphenol	<0.005	<0.50
Nitrobenzene	<0.004	<0.40

9/11/89 Test - Semi-Volatiles Fraction
*Total Reported in mg/kg

PARAMETER	POWERHOUSE BOTTOM ASH TCLP LEACHATE	POWERHOUSE BOTTOM ASH TCLP TOTAL
1,2-Dichlorobenzene	<0.003	<0.30
2-Methylphenol	<0.005	<0.50
3-Methylphenol	<0.005	<0.50
4-Methylphenol	<0.005	<0.50
Nitrobenzene	<0.004	<0.40

9/11/89 Test - S[illegible]atiles Fraction
*Total Reported in mg/kg

PARAMETER	POWERHOUSE FLY ASH TCLP LEACHATE	POWERHOUSE FLY ASH TCLP TOTAL
1,2-Dichlorobenzene	<0.003	<0.30
2-Methylphenol	<0.005	<0.50
3-Methylphenol	<0.005	<0.50
4-Methylphenol	<0.005	<0.50
Nitrobenzene	<0.004	<0.40

6/28/89 Test
Reported in $\mu g/kg$

PARAMETER	SECONDARY SCREEN REJECTS VOC-8020
Benzene	<4.0
Toluene	37
Chlorobenzene	<2.0
Ethylbenzene	5.1
Xylenes	<12
1,3-Dichlorobenzene	<4.0
1,2-Dichlorobenzene	<4.0
1,4-Dichlorobenzene	31

5/3/89 Test
Reported in µg/kg

PARAMETER	BOILER ASH VOC-8020	SEC. SCREEN REJECTS (SAMPLE A) VOC-8020	SEC. SCREEN REJECTS (SAMPLE B) VOC-8020
Benzene	<1.0	<1.0	<1.0
Toluene	<1.0	89	230
Chlorobenzene	<0.50	<0.50	<0.50
Ethylbenzene	<1.0	<1.0	26
Xylenes	<3.0	<3.0	68
1,3-Dichlorobenzene	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	<1.0	<1.0	<1.0
1,4-Dichlorobenzene	<1.0	<1.0	<1.0

5/3/89 *REPORTED IN µG/KG

PARAMETER	BOILER ASH VOC-8010	SEC. SCREEN REJECTS (SAMPLE A) VOC-8010	SEC. SCREEN REJECTS (SAMPLE B) VOC-8010
Chloromethane	<0.50	<0.50	<0.50
Bromomethane	<0.50	<0.50	<0.50
Vinyl Chloride	3.0*	<0.50	16
Dichlorodifluoromethane	4.5*	<1.0	27
Chloroethane	<0.50	<0.50	<0.50
Methyene Chloride	4.4	8.2	<1.0
Fluorotrichloromethane	45	4.7	240
1,1-Dichloroethylene	<0.50	4.2	174
1,1-Dichloroethane	<0.50	<0.50	2.8
Trans-1,2-Dichloroethylene	<1.0	<1.0	<1.0
Chloroform	<0.50	<0.50	<0.50
1,2-Dichloroethane	<0.50	<0.50	<0.50
1,1,1-Trichloroethane	1.5	54	550
Carbon Tetrachloride	<0.50	<0.50	<0.50
Bromodichloromethane	<0.50	<0.50	<1.0
1,2-Dichloropropane	<1.0	<1.0	<1.0
CIS-1,3-Dichloropropylene	<1.0	<1.0	<1.0
Trichloroethylene	<1.0	<1.0	330
1,1,2-Trichloroethane	<0.50	<0.50	<0.50
TRANS-1,3-Dichloropropylene	<1.0	<1.0	<1.0
Chlorodibromomethane	<1.0	<1.0	<1.0
2-Chlotoethylvinyl ether	<2.0	<2.0	<2.0
Bromoform	<1.0	<1.0	<1.0
Tetrachloroethylene	<1.0	8.6	57
1,1,2,2-Tetrachloroethane	<1.0	<1.0	<1.0
Chlorobenzene	<0.50	<0.50	<0.50
1,3-Dichlorobenzene	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	<1.0	<1.0	<1.0
1,4-Dichlorobenzene	<1.0	<1.0	<1.0

9/11/89 - VOLATILE FRACTION
* TOTAL REPORTED IN MG/KG

MEN00476

PARAMETER	POWERHOUSE BOTTOM ASH TCLP LEACHATE	POWERHOUSE FLY ASH TCLP TOTAL
BENZENE	<0.001	<0.025
BROMODICHLOROMETHANE	<0.002	<0.050
BROMOFORM	<0.015	<0.38
BROMOMETHANE	<0.010	<0.25
CARBON TETRACHLORIDE	<0.004	<0.10
CHLOROBENZENE	<0.001	<0.025
CHLORODIBROMOMETHANE	<0.003	<0.075
CHLOROETHANE	<0.010	<0.25
CHLOROFORM	<0.001	<0.025
2-CHLOROETHYL VINYL ETHER	<0.010	<0.25
CHLOROMETHANE	<0.010	<0.25
1,2-DICHLOROBENZENE	<0.015	<0.38
1,3-DICHLOROBENZENE	<0.015	<0.38
1,4-DICHLOROBENZENE	<0.015	<0.38
1,1-DICHLOROETHANE	<0.002	<0.050
1,2-DICHLOROETHANE	<0.002	<0.050
1,1-DICHLOROETHYLENE	<0.002	<0.050
TRANS-1,2-DICHLOROETHYLENE	<0.002	<0.050
1,2-DICHLOROPROPANE	<0.003	<0.075
CIS-1,3-DICHLOROPROPYLENE	<0.004	<0.10
TRANS-1,3-DICHLOROPROPYLENE	<0.004	<0.10
ETHYLBENZENE	<0.001	<0.025
METHYLENE CHLORIDE	<0.005	<0.13
1,1,2,2-TETRACHLOROETHANE	<0.002	<0.050
TETRACHLOROETHYLENE	<0.002	<0.050
TOLUENE	<0.001	<0.025
1,1,1-TRICHLOROETHANE	<0.002	<0.050
1,1,2-TRICHLOROETHANE	<0.003	<0.075
TRICHLOROETHYLENE	<0.002	<0.050
TRICHLOROFLUORMETHANE	<0.003	<0.075
VINYL CHLORIDE	<0.010	<0.25
XYLENE	<0.010	<0.25
ACETONE	<0.050	<1.3
N-BUTANOL	<0.50	<13
CARBON DISULFIDE	<0.005	<0.13
CYCLOHEXANONE	<0.10	<2.5
ETHYL ACETATE	<0.010	<0.25
ETHYL ETHER	<0.010	<0.25
ISOBUTANOL	<0.50	<13
METHYL ETHYL KETONE	<0.050	<1.3
4-METHYL-2-PENTANONE	<0.050	<1.3
PYRIDINE	<0.40	<10
TRICHLOROTRIFLUOROETHANE	<0.010	<0.25

9/11/89 Test

PARAMETER	BOILER BOTTOM ASH EP TOXICITY	BOILER FLY ASH EP TOXICITY	SECONDARY SCREEN REJECTS EP TOXICITY
Lead	<.10	<.10	<.10
Cadmium	<.02	<.02	<.02
Total Chromium	<.08	<.08	<.08
Selenium	<.20	<.20	<.20
Zinc	.02	.32	.25
Copper	<.03	<.03	<.03
Arsenic	<.2	<.2	<.2
Barium	.08	.31	.4
Mercury	<.40	<.40	<.40
Silver	<.01	<.01	<.01

MEN00478

PAPERBOARD DIVISION

MENASHA CORPORATION

November 6, 1990

Daniel Cummins
Cork Street Landfill
2800 E. Cork Street
Kalamazoo, MI 49001

Dear Dan,

Enclosed are test results for our Type III wastes that are presently disposed of at the Cork Street Landfill. These samples were obtained on September 10, 1990 by compositing a morning and an afternoon sample for each sample type. As requested in your April 3, 1990 letter, metals were run by ASTM neutral leach and organics were tested by the TCLP procedure.

The results of the testing are very low and are consistent with previous test results.

If you have any questions concerning this matter, please feel free to contact me at 694-6141.

Sincerely,

Otsego Paperboard Division

Keith B. Kling

Keith B. Kling
Environmental Supervisor

KBK:amc

Otsego Mill
320 N Farmer St
PO Box 155
Otsego MI 49078 0155
1 616-692-6141
1 616 692-2060 (Fax)

esi

ENVIF MEN00479 HIGAI
S, INC
2.5 EAST LAKEWOOD BLVD
HOLLAND, MI 49424-208
PHONE 616-396-120

TO: Menasha Corporation
320 North Farmer
Otsego, Michigan 49078

Attn: Keith Kling

DATE: October 30, 1990

ANALYSIS: OF SOLID WASTE SAMPLES

REPORTED BY: Robert K. Zahray, Laboratory Manager

SAMPLING DATE: Received from client September 12, 1990.

RESULTS: Expressed as milligrams per liter (mg/ℓ) except where noted otherwise. These analyses were performed on an ASTM Leachate of the original sample except for the total solids.

Parameter	Ash Compactor Composite	Jonsson Screen Composite	Tail Ragger Composite
Silver	<0.01	<0.01	<0.01
Arsenic	0.070	<0.005	<0.005
Barium	0.12	0.21	0.23
Cadmium	<0.0001	<0.0001	<0.0001
COD	16	410	360
Chromium	<0.005	<0.005	<0.005
Copper	<0.02	<0.02	<0.02
Mercury	<0.0005	<0.0005	<0.0005
Lead	<0.005	<0.005	<0.005
Selenium	0.013	<0.005	<0.005
Total Solids (% of sample)	76.9	17.0	38.7
Zinc	0.041	0.14	0.16
ESI #9009121	-1	-2	-3

WESTERN MICHIGAN ENVIRONMENTAL SERVICES, INC.

TABLE 2
Results for Menasha Corporation
Received September 12, 1990. Reported October 30, 1990.
Expressed as micrograms per liter (μg/ℓ).
Limit of detection is 10 except where noted in parentheses.
These analyses were performed on a TCLP zero headspace
extract of the original sample.

Parameter	Ash Compactor Composite	Jonsson Screen Composite	Tail Ragger Composite
Bromodichloromethane	*	*	*
Bromoform (14)	*	*	*
Carbon Tetrachloride	*	*	*
Chlorobenzene	*	*	*
Chlorodibromomethane (15	*	*	*
Chloroform (12)	*	*	*
1,1-dichloroethane (15)	*	*	*
1,2-dichloroethane	*	*	*
1,1-dichloroethene (13)	*	*	*
1,2-dichloroethene (15)	*	*	*
1,2-dichloropropane	*	*	*
1,3-dichloropropene (20)	*	*	*
Methylene Chloride	*	*	*
1,1,2,2-Tetrachloroethane	*	*	*
Tetrachloroethene (11)	*	*	*
1,1,1-trichloroethane	*	*	*
1,1,2-trichloroethane	*	*	*
Trichloroethene	*	*	*
Benzene	*	*	*
Ethyl Benzene	*	*	*
Toluene	*	*	*
Styrene	*	*	*
Xylene Isomers	*	*	*
ESI #9009121	-1	-2	-3

* = Below Detection Limit

MEN00481

PAPERBOARD DIVISION

March 27, 1992

Daniel Cummins
Michigan Disposal Service
100 East North St.
Kalamazoo, MI 49007

Dear Dan,

Enclosed are test results for four waste products presently being landfilled at your Cork Street landfill. These are our 4th Quarter, 1991 results. The 1st Quarter, 1992 samples are being obtained this week.

Please note that for the attached results we included a test on the Rotary Screen Rejects. This waste stream has in the past been a portion of our Secondary Fiber Compactor sample. Both waste streams come from the hydropulper tub. We opted to do an additional one time test on this waste stream because recent equipment additions put the waste into separate containers. Comparison of test results show no difference in the wastes. Our 1992 sampling will include the Rotery Screen Rejects as a portion of the Secondary Fiber Compactor Composite.

In February of this year you sampled our wastes at the request of MDNR. When these results are available I would appreciate the opportunity to review them with you.

If you have any question or concerns call us at 616-692-6141.

Sincerely,

Otsego Paperboard Division

Keith B. Kling
Environmental Supervisor

cc: Paul Jachim
Len Myers
Gary Roys
Pete DeRossi

Otsego Mill
220 N Farmer St
PO Box 155
Otsego MI 49078-0155
616-692-6141
616-692-2060 (Fax)

esi
ENVIRONMEI
245 EAST LAKEWOOD BLVD.
HOLLAND, MI 49424-2066
PHONE 616-396-1209

MEN00482

4th Quarter 1991

TO: Menasha Corporation
320 North Farmer
Otsego, Michigan 49078

Attn: Gary Roys

DATE: February 26, 1992

ANALYSIS: OF WASTE SAMPLES

REPORTED BY: Robert K. Zahray, Laboratory Manager

SAMPLING DATE: Received from client January 20, 1992.

RESULTS: Expressed as milligrams per liter (mg/ℓ) except where noted in parentheses. These analyses were performed on an ASTM Leachate of the original sample.

Parameter	Ash Composite	Sec. F1B Compactor Composite	Rotary Screen Rejects	Tail Ragger Composite
Silver	<0.006	<0.006	<0.006	<0.006
Arsenic	0.106	<0.005	<0.005	<0.005
Barium	0.20	0.37	0.28	0.43
Cadmium	<0.0001	<0.0001	<0.0001	<0.0001
Chemical Oxygen Demand	<10	82	78	160
Chromium	<0.005	<0.005	<0.005	<0.005
Copper	<0.003	<0.003	0.022	0.014
Mercury	<0.0005	0.0008	<0.0005	<0.0005
Lead	<0.005	<0.005	0.008	<0.005
Selenium	0.017	<0.005	<0.005	<0.005
Total Solids (% of sample)	75.1	19.9	26.2	23.6
Zinc	0.096	0.17	0.22	0.48
ESI #9201157	-1	-2	-3	-4

TABLE 2
MDNR Scans 1 & 2
Results for Menasha Corporation
Received January 20, 1992. Reported February 26, 1992.
Expressed as micrograms per liter (μg/ℓ).
Limit of detection is 10 except where noted in parentheses.
These analyses were performed on a TCLP zero headspace extract of the original sample.

Parameter	Ash Composite	Sec. F1B Compactor Composite	Rotary Screen Rejects	Tail Ragger Composite
Bromodichloromethane	*	*	*	*
Bromcform	*	*	*	*
Carbon Tetrachloride	*	*	*	*
Chlorobenzene	*	*	*	*
Chlorodibromomethane	*	*	*	*
Chloroform	*	*	*	*
1,1-dichloroethane	*	*	*	*
1,2-dichloroethane	*	*	*	*
1,1-dichloroethene	*	*	*	*
cis-1,2-dichloroethene	*	*	*	*
trans-1,2-dichloroethene	*	*	*	*
1,2-dichloropropane	*	*	*	*
1,3-dichloropropene	*	*	*	*
Methylene Chloride (50)	*	*	*	*
1,1,2,2-Tetrachloroethane	*	*	*	*
Tetrachloroethene	*	*	*	*
1,1,1-trichloroethane	*	*	*	*
1,1,2-trichloroethane	*	*	*	*
Trichloroethene	*	*	*	*
Benzene	*	20	*	*
Ethyl Benzene	*	*	*	*
Toluene	*	*	*	*
Styrene	*	*	*	*
Xylene Isomers	*	19	*	*
ESI #9201157	-1	-2	-3	-4

* = Below Detection Limit

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MEN00484

MICHIGAN
Disposal Service

100 EAST NORTH STREET • KALAMAZOO, MICHIGAN 49007 • (616) 381-2226 • FAX (616) 381-9559

February 11, 1992

Mr. Keith Kling
Menasha Corp.
Otsego Paperboard Mill
P.O. Box 155
320 N. Farmer Street
Otsego, Michigan 49078

RE: Waste Stream Testing

Dear Mr. Kling,

Michigan Disposal Services desires to supplement the waste characterization data of your reject/tails and ash waste streams. This testing will be done at our expense. The analytical parameters were selected by the MDNR as a means to further classify the waste streams generated by your facility.

The sampling should be completed over the next couple of weeks. The laboratory testing will take approximately 1 month after all of the samples have been collected.

Thank you for your cooperation. I will contact Mr. Gary Roys to set up each of the sampling events. If there are any questions, please contact me at 381-2248, extension 132.

Sincerely,
MICHIGAN DISPOSAL SERVICES

Daniel O. Cummins

Daniel O. Cummins
Landfill Manager

cc: J. DeKruyter
G. Roys

(menasha7.m)

ASH - TCLP - 8010 8020
10 metals
Radium 226 & 228

TOTALS - 8010 8020
10 metals

TAILS/REJECTS

TCLP - 8010 & 8020
10 metals
PCBs, phenols, TOC, Fe

TOTALS SAME

PRINTED ON RECYCLED PAPER

MEN00485

Michigan Disposal Services

April 30, 1992

Mr. Keith B. Kling
Menasha Corporation
320 North Farmer Street
P.O. Box 155
Otsego, Michigan 49078-0155

RE: WASTE STREAM CHARACTERIZATION DATA

Dear Mr. Kling,

Enclosed is a summary of the waste characterization sampling results. These were the samples collected by Michigan Disposal Services. If there are any questions or comments regarding the data, please contact me at 381-2248, extension 132.

Sincerely,
MICHIGAN DISPOSAL SERVICES, CORPORATION

Daniel O. Cummins

Daniel O. Cummins
Landfill Manager

Enclosures

cc: J. DeKruyter

100 East North Street
Kalamazoo Michigan 49007
(616) 381-2226 • FAX (616) 381-9559

KAR Laboratories, Inc.

ANALYTICAL REPORT

To: Michigan Disposal Service
100 E. North St.
Kalamazoo MI 49007

Attn: D.O. Cummins

Project No.: 920495
Client No.: 1983
Project Date: 3/04/92
Date Promised: 3/25/92
Date Reported: 3/25/92
PO#:

Project Desc.: Analysis of seven waste samples.

Sample No.: 920495-03 Sample type: waste Rec'd on: 3/04/92
ID: "Composite of Menasha Ash, 2/12, 2/18, 2/26, & 3/02"

TCLP report	See attached
Arsenic, total	10 mg/kg
Barium, total	47 mg/kg
Cadmium, total	<0.5 mg/kg
Chromium, total	7 mg/kg
Copper, total	26 mg/kg
Lead, total	10 mg/kg
Mercury, total	<0.5 mg/kg
Selenium, total	0.8 mg/kg
Silver, total	<0.5 mg/kg
Zinc, total	21 mg/kg

KAR Laboratories, Inc.

ANALYTICAL RESULTS

To: Michigan Disposal Service

Project No: 920908
Report Date: 4/24/92

Project Desc.: Analysis of seven waste samples.

Sample No.:920908-03 Type:TCLP le. Rec'd: 3/04/92
ID: **TCLP Leachate of Composite of Menasha Ash, (920495-03T)**

Arsenic, total, low level	*0.011 mg/L*
Selenium, total, low level	*0.003 mg/L*

KAR Laboratories, Inc.

PURGEABLE HYDROCARBON ANALYSIS - Michigan DNR Scan 1 and/or 2

To: Michigan Disposal Service

Project No.: 920495
Report Date: 4/06/92

Proj. Desc.:Analysis of seven waste samples.

Sample No.: 920495-03 Sample type: waste Rec'd on: 3/04/92

Sample ID: **"Composite of Menasha Ash, 2/12, 2/18, 2/26, & 3/02"**

SCAN 1 - Purgeable Halocarbons

Bromodichloromethane	*ND*	*trans-1,2-Dichloroethene*	*ND*
Bromoform	*ND*	*1,2-Dichloropropane*	*ND*
Bromomethane	*ND*	*cis-1,3-Dichloropropene*	*ND*
Carbon tetrachloride	*ND*	*trans-1,3-Dichloropropene*	*ND*
Chlorobenzene	*ND*	*Methylene chloride*	*ND*
Chloroethane	*ND*	*1,1,2,2-Tetrachloroethane*	*ND*
Chloroform	*ND*	*Tetrachloroethene*	*ND*
Chloromethane	*ND*	*1,1,1-Trichloroethane*	*ND*
Dibromochloromethane	*ND*	*1,1,2-Trichloroethane*	*ND*
1,1-Dichloroethane	*ND*	*Trichloroethene*	*ND*
1,2-Dichloroethane	*ND*	*Trichlorofluoromethane*	*88*
1,1-Dichloroethene	*ND*	*Vinyl chloride*	*ND*
cis-1,2-Dichloroethene	*ND*		

SCAN 2 - Purgeable Aromatic Hydrocarbons

Benzene	*ND*	*m-and/or p-Xylene*	*ND*
Ethyl benzene	*ND*	*o-Xylene*	*ND*
Toluene	*ND*		

Concentrations are expressed as ug/kg dry sample.
--- indicated not analyzed.
"ND" means not detected. The limit of detection was 20 for all targets except Methylene chloride, which was 200.
U.S. EPA Method 8260.

KAR Laboratories, Inc.

ANALYTICAL REPORT

To: Michigan Disposal Service
100 E. North St.
Kalamazoo MI 49007

Attn: D.O. Cummins

Project No.: 920495
Client No.: 1983
Project Date: 3/04/92
Date Promised: 3/25/92
Date Reported: 3/25/92
PO#:

Project Desc.: Analysis of seven waste samples.

Sample No.: 920495-05 Sample type: waste Rec'd on: 3/04/92
ID: "Composite of Menasha Rejects, 2/12, 2/14, 2/18, & 2/26"

Phenols, total	2.64 mg/kg
PCB, total	<0.5 mg/kg
Sulfide	<25 mg/kg
TCLP report	See attached
Arsenic, total	<1 mg/kg
Barium, total	<5 mg/kg
Cadmium, total	<0.5 mg/kg
Chromium, total	10 mg/kg
Copper, total	2 mg/kg
Iron, total	180 mg/kg
Lead, total	2 mg/kg
Mercury, total	<0.5 mg/kg
Selenium, total	<0.5 mg/kg
Silver, total	<0.5 mg/kg
Zinc, total	6 mg/kg

KAR Laboratories, Inc.

ANALYTICAL RESULTS

To: Michigan Disposal Service

Project No: 920908
Report Date: 4/24/92

Project Desc.: Analysis of seven waste samples.

Sample No.:920908-05 Type:TCLP le. Rec'd: 3/04/92
ID: **TCLP Leachate of Composite of Menasha Rejects, (920495-05T)**

Arsenic, total, low level	*0.002 mg/L*
Selenium, total, low level	*<0.002 mg/L*

KAR Laboratories, Inc.

PURGEABLE HYDROCARBON ANALYSIS - Michigan DNR Scan 1 and/or 2

To: Michigan Disposal Service

Project No.: 920495
Report Date: 4/06/92

Proj. Desc.:Analysis of seven waste samples.

Sample No.: 920495-05 Sample type: waste Rec'd on: 3/04/92

Sample ID: **"Composite of Menasha Rejects, 2/12, 2/14, 2/18, & 2/26"**

SCAN 1 - Purgeable Halocarbons

Bromodichloromethane	*ND*	*trans-1,2-Dichloroethene*	*ND*
Bromoform	*ND*	*1,2-Dichloropropane*	*ND*
Bromomethane	*ND*	*cis-1,3-Dichloropropene*	*ND*
Carbon tetrachloride	*ND*	*trans-1,3-Dichloropropene*	*ND*
Chlorobenzene	*ND*	*Methylene chloride*	*19000*
Chloroethane	*ND*	*1,1,2,2-Tetrachloroethane*	*ND*
Chloroform	*ND*	*Tetrachloroethene*	*180*
Chloromethane	*ND*	*1,1,1-Trichloroethane*	*570*
Dibromochloromethane	*ND*	*1,1,2-Trichloroethane*	*ND*
1,1-Dichloroethane	*ND*	*Trichloroethene*	*ND*
1,2-Dichloroethane	*ND*	*Trichlorofluoromethane*	*ND*
1,1-Dichloroethene	*ND*	*Vinyl chloride*	*ND*
cis-1,2-Dichloroethene	*ND*		

SCAN 2 - Purgeable Aromatic Hydrocarbons

Benzene	*ND*	*m-and/or p-Xylene*	*68*
Ethyl benzene	*ND*	*o-Xylene*	*73*
Toluene	*830*		

Concentrations are expressed as ug/kg dry sample.
--- indicated not analyzed.
"ND" means not detected. The limit of detection was 50 for all targets except Methylene chloride, which was 500.
U.S. EPA Method 8260.

Keith, Please review these with me in our next 1-1.

MEN00490

TCLP Analysis for Type III

PAPERBOARD DIVISION

March 27, 1992

Thanks,

Paul

Daniel Cummins
Michigan Disposal Service
100 East North St.
Kalamazoo, MI 49007

Dear Dan,

Enclosed are test results for four waste products presently being landfilled at your Cork Street landfill. These are our 4th Quarter, 1991 results. The 1st Quarter, 1992 samples are being obtained this week.

Please note that for the attached results we included a test on the Rotary Screen Rejects. This waste stream has in the past been a portion of our Secondary Fiber Compactor sample. Both waste streams come from the hydropulper tub. We opted to do an additional one time test on this waste stream because recent equipment additions put the waste into separate containers. Comparison of test results show no difference in the wastes. Our 1992 sampling will include the Rotery Screen Rejects as a portion of the Secondary Fiber Compactor Composite.

In February of this year you sampled our wastes at the request of MDNR. When these results are available I would appreciate the opportunity to review them with you.

If you have any question or concerns call us at 616-692-6141.

Sincerely,

Otsego Paperboard Division

Keith B. Kling

Keith B. Kling
Environmental Supervisor

cc: Paul Jachim
Len Myers
Gary Roys
Pete DeRossi

Otsego Mill
220 N Farmer St
PO Box 155
Otsego MI 49078-0155
1-616-692-6141
1-616-692-2060 (Fax)

esi

ENVIROI MEN00491 SAI NC
245 EAST LAKEWOOD BLVD
HOLLAND, MI 49424-206
PHONE 616-396-120

4th Quarter 19

TO: Menasha Corporation
320 North Farmer
Otsego, Michigan 49078

Attn: Gary Roys

DATE: February 26, 1992

ANALYSIS: OF WASTE SAMPLES

REPORTED BY: Robert K. Zahray
Robert K. Zahray, Laboratory Manager

SAMPLING DATE: Received from client January 20, 1992.

RESULTS: Expressed as milligrams per liter (mg/ℓ) except where noted in parentheses. These analyses were performed on an ASTM Leachate of the original sample.

Parameter	Ash Composite	Sec. F1B Compactor Composite	Rotary Screen Rejects	Tail Ragger Composite
Silver	<0.006	<0.006	<0.006	<0.006
Arsenic	0.106	<0.005	<0.005	<0.005
Barium	0.20	0.37	0.28	0.43
Cadmium	<0.0001	<0.0001	<0.0001	<0.0001
Chemical Oxygen Demand	<10	82	78	160
Chromium	<0.005	<0.005	<0.005	<0.005
Copper	<0.003	<0.003	0.022	0.014
Mercury	<0.0005	0.0008	<0.0005	<0.0005
Lead	<0.005	<0.005	0.008	<0.005
Selenium	0.017	<0.005	<0.005	<0.005
Total Solids (% of sample)	75.1	19.9	26.2	23.6
Zinc	0.096	0.17	0.22	0.48
ESI #9201157	-1	-2	-3	-4

WESTERN MICHIGAN ENVIRONMENTAL SERVICES, INC.

TABLE 2
MDNR Scans 1 & 2
Results for Menasha Corporation
Received January 20, 1992. Reported February 26, 1992.
Expressed as micrograms per liter (µg/ℓ).
Limit of detection is 10 except where noted in parentheses.
These analyses were performed on a TCLP zero headspace
extract of the original sample.

Parameter	Ash Composite	Sec. F1B Compactor Composite	Rotary Screen Rejects	Tail Ragger Composite
Bromodichloromethane	*	*	*	*
Bromoform	*	*	*	*
Carbon Tetrachloride	*	*	*	*
Chlorobenzene	*	*	*	*
Chlorodibromomethane	*	*	*	*
Chloroform	*	*	*	*
1,1-dichloroethane	*	*	*	*
1,2-dichloroethane	*	*	*	*
1,1-dichloroethene	*	*	*	*
cis-1,2-dichloroethene	*	*	*	*
trans-1,2-dichloroethene	*	*	*	*
1,2-dichloropropane	*	*	*	*
1,3-dichloropropene	*	*	*	*
Methylene Chloride (50)	*	*	*	*
1,1,2,2-Tetrachloroethane	*	*	*	*
Tetrachloroethene	*	*	*	*
1,1,1-trichloroethane	*	*	*	*
1,1,2-trichloroethane	*	*	*	*
Trichloroethene	*	*	*	*
Benzene	*	20	*	*
Ethyl Benzene	*	*	*	*
Toluene	*	*	*	*
Styrene	*	*	*	*
Xylene Isomers	*	19	*	*
ESI #9201157	-1	-2	-3	-4

* = Below Detection Limit

MEN00493

PAPERBOARD DIVISION

MENASHA CORPORATION

June 30, 1992

Daniel Cummins
Michigan Disposal Service
100 East North Street
Kalamazoo, MI. 49007

Dear Dan,

Enclosed are the test results for the three waste products presently being landfilled at your Cork Street Facility. These results were obtained at the end of March. A series of grab samples were taken over a one week time period and composited for testing.

We have scheduled second quarter sampling of our Type III wastes for mid-July.

If you have any questions or concerns, call me at 692-6141.

Sincerely,

Otsego Paperboard Division

Keith B. Kling

Keith B. Kling
Environmental Supervisor

cc: Paul Jachim
Len Myers
Gary Roys
Pete DeRossi

Otsego Mill
320 N Farmer St
PO Box 155
Otsego MI 49078-0155
1-616-692-6141
1-616-692-2060 (Fax)

WESTERN MICHIGAN
ENVIRONMENTAL SERVICES, INC.

3352 128th Avenue, Holland,
Phone: 616-399-6070 FAX: 616-597-0102

MEN00494

TO: Menasha Corporation
320 North Farmer
Otsego, Michigan 49078

Attn: Keith Kling

DATE: May 26, 1992

ANALYSIS: OF SOLID SAMPLES

REPORTED BY: Robert K. Zahray, Laboratory Manager

SAMPLING DATE: Received from client March 31, 1992.

RESULTS: Expressed as milligrams per liter (mg/ℓ). These analyses were performed on an ASTM Leachate of the original sample.

Parameter	TAILCOMPMAR92	COMPACTORCOMPMAR92	ASHCOMPMAR92
Silver	<0.01	<0.01	<0.01
Arsenic	<0.005	<0.005	<0.005
Barium	0.34	0.39	0.30
Cadmium	<0.0001	<0.0001	<0.0001
Chemical Oxygen Demand	170	200	<10
Chromium	<0.005	<0.005	<0.005
Copper	<0.01	<0.01	<0.01
Mercury	<0.00025	<0.00025	<0.00025
Lead	<0.005	<0.005	<0.005
Selenium	<0.005	<0.005	<0.005
Zinc	0.16	0.087	0.10
ESI #9203225	-1	-2	-3

Printed on Recycled Paper

TABLE 2
601 & 602 VOLATILES
Results for Menasha Corporation
Received March 31, 1992. Reported May 26, 1992.
Expressed as micrograms per liter (μg/ℓ).
Limit of detection is 1.0 except where noted in parentheses or otherwise.
These analyses were performed on a TCLP zero headspace extract of the original sample.

Parameter	TAILCOMPMAR92	COMPACTORCOMPMAR92	ASHCOMPMAR92
Benzene	*	*	*
Bromodichloromethane	*	*	*
Bromoform	*	*	*
Bromomethane	*	*[1]	*
Carbon Tetrachloride	*	*	*
Chlorobenzene	*	*	*
Chlorodibromomethane	*	*	*
Chloroethane	*	*	*
Chloroform (3.0)	*	*	*
2-Chloroethyl Vinyl Ether (1.8)	*	*	*
Chloromethane	*	5.1	*
1,2-Dichlorobenzene	*	*	*
1,3-Dichlorobenzene	*	*	*
1,4-Dichlorobenzene	*	*	*
Dichlorodifluoromethane	*	*	*
1,1-Dichloroethane	*	*	*
1,2-Dichloroethane	*	*	*
1,1-Dichloroethylene	*	*	*
cis-1,2-Dichloroethylene	*	*	*
trans-1,2-Dichloroethylene	*	*	*
1,2-Dichloropropane	*	*	*
cis-1,3-Dichloropropylene	*	*	*
trans-1,3-Dichloropropylene	*	*	*
Ethyl Benzene	*	*	*
Methylene Chloride (5.0)	*	*	*
1,1,2,2-Tetrachlorethane	*	*	*
Tetrachloroethylene	*	*	*
Toluene	*	2.8	*
1,1,1-Trichloroethane	*	57	*
1,1,2-Trichloroethane	*	*	*
Trichloroethylene	*	*	*
Trichlofluoromethane (1.3)	*	*	*
Vinyl Chloride	*	*	*
Xylene	*	2.2	*
ESI #9203225	-1	-2	-3

* = Below Detection Limit
[1] = Below detection limit which is 1.5

Printed on Recycled Paper

MEN00496

Michigan Disposal Services

September 14, 1992

Mr. Duane Roskoskey
Michigan Department of
Natural Resources
P.O. Box 30028
Lansing, Michigan 48910

RE: Type III Designations

Dear Mr. Roskosky,

Michigan Disposal Services (MDS) is seeking Type III designations for the paper residuals from the Menasha Corporation and Rock-Tenn Company, both of Otsego, Michigan. Enclosed are packages of information describing the process that generates the waste, the approximate annual volumes being generated, information about the respective generators, 4 sets of analytical data for each waste stream, and the proposed disposal location. Mr. Brad Venman of your office is familiar with these materials and may be of assistance in your review.

If there are any questions, please contact me at 616-381-2248, extension 132.

Sincerely,
MICHIGAN DISPOSAL SERVICES, CORP.

Daniel O. Cummins
Landfill Manager

Enclosures

cc: J. DeKruyter w/out enclosures
B. Venman w/out enclosures
T. Leep, w/enclosures
Menasha Corporation
Rock-Tenn Company

100 East North Street
Kalamazoo, Michigan 49007
(616) 381-2226 • FAX (616) 381-9559

MENASHA CORPORATION
Otsego Paperboard Mill
P.O. Box 155
320 N. Farmer Street
Otsego, Michigan 49078
Attention: Kieth Kling
tx: 616-692-6141

WASTE TYPE: Screen rejects, secondary fibers and tails. All of these are commonly called "**paper residuals**".

PROCESS GENERATING THE WASTE: Recycled materials are used as raw material in the manufacture of paperboard. Not all of the materials that end up in the recycled material/raw material waste stream can be used in the manufacturing process. These unacceptable materials are screened out of the process and disposed of as waste. Paper residuals commonly consist of cardboard, wood, paper, tape, plastic, polystyrene and metal.

VOLUME GENERATED: The annual volume of paper residuals generated by Menasha Corporation is approximately 34,500 cubic yards.

DISPOSAL SITE: Westside Type III Landfill in Three Rivers, Michigan is the proposed disposal site. The materials are currently being disposed of at the Westside Type II Landfill in Three Rivers.

ANALYTICAL DATA: (Attached)

(waste2.dan)

ROCK-TENN COMPANY
431 Helen Avenue
Otsego, Michigan 49078
Attention: Ms. Michelle Yiu
tx: 616-692-6211

WASTE TYPE: Screen rejects and tails, commonly referred to as paper residuals.

PROCESS GENERATING THE WASTE: Recycled materials are used in the manufacturing process as raw material. Not all of the materials that end up in the recycled material/raw material stream can be used in the manufacturing process. These unacceptable materials are removed for disposal. The paper residuals consist of cardboard, paper, wood, tape, plastic, polystyrene and metal.

VOLUME GENERATED: The annual volume of paper residuals generated by Rock-Tenn is approximately 16,500 cubic yards.

DISPOSAL SITE: Westside Type III Landfill in Three Rivers, Michigan is the proposed disposal site for these materials. The paper residuals are currently being disposed of at the Westside Type II Landfill in Three Rivers.

ANALYTICAL DATA: (Attached)

(waste2.dan)

Ann Arbor
Technical Services, Inc.
6540 Jackson Road • Ann Arbor, Michigan 48103 • 313-995-0995

USEPA METH(DATA SUMMARY SHEET

MEN00499

For: Mr. James Braithwaite
Braithwaite Consultants, Inc.
3928 Varsity Drive
Ann Arbor, MI 48108

Project Michigan Disposal #27013

Received by ATS 7/20/92

Sample I.D. / Sample Date

Parameter	Units		Menasha TCLP Extract 7/15/92	Rock Tenn TCLP Extract 7/15/92
Aroclor 1221	ug/L		<0.5	<0.5
Aroclor 1232	ug/L		<0.1	<0.1
Aroclor 1242	ug/L		<0.1	<0.1
Aroclor 1248	ug/L		<0.1	<0.1
Aroclor 1254	ug/L		<0.1	<0.1
Aroclor 1260	ug/L		<0.1	<0.1
Total PCB	ug/L		<1	<1

TCLP Extraction Procedure Reference 40 CFR Part 261, 3/29/90.

KAR Laboratories, Inc.

ANALYTICAL REPORT

To: Michigan Disposal Service
100 E. North St.
Kalamazoo MI 49007

Attn: D.O. Cummins

Project No.: 920495
Client No.: 1983
Project Date: 3/04/92
Date Promised: 3/25/92
Date Reported: 3/25/92
PO#:

Project Desc.: Analysis of seven waste samples.

Sample No.: 920495-05 Sample type: waste Rec'd on: 3/04/92
ID: "Composite of Menasha Rejects, 2/12, 2/14, 2/18, & 2/26"

Phenols, total	2.64 mg/kg
PCB, total	<0.5 mg/kg
Sulfide	<25 mg/kg
TCLP report	See attached
Arsenic, total	<1 mg/kg
Barium, total	<5 mg/kg
Cadmium, total	<0.5 mg/kg
Chromium, total	10 mg/kg
Copper, total	2 mg/kg
Iron, total	180 mg/kg
Lead, total	2 mg/kg
Mercury, total	<0.5 mg/kg
Selenium, total	<0.5 mg/kg
Silver, total	<0.5 mg/kg
Zinc, total	6 mg/kg

Sample No.: 920495-06 Sample type: waste Rec'd on: 3/04/92
ID: "Composite of Rock Tenn Rejects, 2/18, 2/26, 2/27, & 3/2"

Phenols, total	0.671 mg/kg
PCB, total	<0.5 mg/kg
TCLP report	See attached
Sulfide	<25 mg/kg
Arsenic, total	<1 mg/kg
Barium, total	<5 mg/kg
Cadmium, total	<0.5 mg/kg
Chromium, total	2 mg/kg
Copper, total	6 mg/kg
Iron, total	360 mg/kg
Lead, total	8 mg/kg
Mercury, total	<0.5 mg/kg
Selenium, total	<0.5 mg/kg
Silver, total	<0.5 mg/kg
Zinc, total	25 mg/kg

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MEN00501

DATA SUMMARY SHEET

For: Mr. James Braithwaite
Braithwaite Consultants, Inc.
3928 Varsity Drive
Ann Arbor, MI 48108

Project Michigan Disposal #27013

Received by ATS 7/20/92

Sample I.D. / Sample Date

Parameter	Units		Menasha Residual 7/15/92	Menasha Residual 7/16/92	Menasha Residual 7/17/92	Rock Tenn Residual 7/15/92	Rock Tenn Residual 7/16/92	Rock Tenn Residual 7/17/92
Total Solids	%(wt/wt)		27.3	27.4	26.5	29.2	27.0	25.4
Total Arsenic	mg/kg		<1	<1	<1	<1	<1	<1
Total Barium	mg/kg		7.2	12	9.7	140	10	30
Total Cadmium	mg/kg		<0.1	2.4	1.0	170	<0.1	1.0
Total Lead	mg/kg		<1	<1	<1	1100	<1	2
Total Mercury	mg/kg		-	-	-	-	-	-
Total Silver	mg/kg		-	-	-	0.6	<0.5	0.5
Total Selenium	mg/kg		<1	<1	1	-	-	-
Total Copper	mg/kg		3.4	4.6	6.0	8.0	15	11
Total Chromium	mg/kg		2.7	4.4	2.6	270	1.9	3.4
Total Zinc	mg/kg		13	17	16	80	39	67

0803921 NOTE All results except Total Solids reported on a dry-weight basis.

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TCLP DATA

MEN00502

For: Mr. James Braithwaite
Braithwaite Consultants, Inc.
3928 Varsity Drive
Ann Arbor, MI 48108

Project Michigan Disposal #27013

Received by ATS 7/20/92

Sample I.D. / Sample Date

Parameter	Units		Menasha Residual 7/16/92	Menasha Residual 7/17/92	Rock Tenn Residual 7/16/92	Rock Tenn Residual 7/17/92		
Cadmium	mg/L		0.01	0.01	<0.01	<0.01		
Chromium	mg/L		-	-	<0.01	-		
Lead	mg/L		-	-	0.01	-		

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DATA SUMMAR MEN00503

For: Mr. James Braithwaite
Braithwaite Consultants, Inc.
3928 Varsity Drive
Ann Arbor, MI 48108

Project Michigan Disposal #27013

Received by ATS 7/20/92

Sample I.D. / Sample Date

Parameter	Units		Menasha Residual 7/15/92	Menasha Residual 7/16/92	Menasha Residual 7/17/92	Rock Tenn Residual 7/15/92	Rock Tenn Residual 7/16/92	Rock Tenn Residual 7/17/92
Iron	mg/L		0.11	0.17	0.12	0.46	0.33	3.6
Sulfide	mg/L		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

TABLE 3A

RESULTS OF ANALYSES PERFORMED ON TCLP EXTRACT

KAR I.D. NO.: 921179-03

CLIENT I.D. : Menasha Residuals

(Concentrations are expressed as mg/L)

Purgeable Halocarbons-Method 601 Compounds

	Conc.		Conc.
Bromodichloromethane	<0.010	trans-1,2-Dichloroethene	<0.010
Bromoform	<0.010	1,2-Dichloropropane	<0.010
Bromomethane	<0.010	cis-1,3-Dichloropropene	<0.010
Carbon Tetrachloride	<0.010	trans-1,3-Dichloropropene	<0.010
Chlorobenzene	<0.010	Methylene Chloride	<0.010
Chloroethane	<0.010	1,1,2,2-Tetrachloroethane	<0.010
2-Chloroethylvinyl ether	<0.010	Tetrachloroethene	<0.010
Chloroform	<0.010	1,1,1-Trichloroethane	<0.010
Chloromethane	<0.010	1,1,2-Trichloroethane	<0.010
Dibromochloromethane	<0.010	Trichloroethene	<0.010
1,1-Dichloroethane	<0.010	Trichlorofluoromethane	<0.010
1,2-Dichloroethane	<0.010	Vinyl Chloride	<0.010
1,1-Dichloroethene	<0.010		

Purgeable Aromatics-Method 602 Compounds

	Conc.
Benzene	<0.010
Ethylbenzene	<0.010
Toluene	<0.010

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USEPA METHODS 8010 AND 8020
TCLP DATA SHEET

MEN00505

For: Mr. James Braithwaite
Braithwaite Consultants, Inc.
3928 Varsity Drive
Ann Arbor, MI 48108

Project	Michigan Disposal / 27013
Sample ID	Menasha TCLP Extraction
Collection Date	7/15/92
Received by ATS	7/20/92

Volatile Organics (CAS#)	Units	Concentration	Detection Limit
Benzene (71-43-2)	mg/L	<0.001	0.001
Bromodichloromethane (75-27-4)	mg/L	<0.001	0.001
Bromoform (75-25-2)	mg/L	<0.001	0.001
Bromomethane (74-83-9)	mg/L	<0.001	0.001
Carbon Tetrachloride (56-23-5)	mg/L	<0.001	0.001
Chlorobenzene (108-90-7)	mg/L	<0.001	0.001
Chloroethane (75-00-3)	mg/L	<0.001	0.001
2-Chloroethyl Vinyl Ether (110-75-8)	mg/L	<0.001	0.001
Chloroform (67-66-3)	mg/L	0.001	0.001
Chloromethane (74-87-3)	mg/L	<0.001	0.001
Dibromochloromethane (124-48-1)	mg/L	<0.001	0.001
1,2-Dichlorobenzene (95-50-1)	mg/L	<0.001	0.001
1,3-Dichlorobenzene (541-73-1)	mg/L	<0.001	0.001
1,4-Dichlorobenzene (106-46-7)	mg/L	<0.001	0.001
1,1-Dichloroethane (75-34-3)	mg/L	<0.001	0.001
1,2-Dichloroethane (107-06-2)	mg/L	<0.001	0.001
1,1-Dichloroethene (75-35-4)	mg/L	<0.001	0.001
cis + trans-1,2-Dichloroethene	mg/L	<0.001	0.001
1,2-Dichloropropane (78-87-5)	mg/L	<0.001	0.001
cis-1,3-Dichloropropene (10061-01-5)	mg/L	<0.001	0.001
trans-1,3-Dichloropropene (10061-02-6)	mg/L	<0.001	0.001
Ethylbenzene (100-41-4)	mg/L	0.001	0.001
Methylene Chloride (75-09-2)	mg/L	<0.001	0.001
1,1,2,2-Tetrachloroethane (79-34-5)	mg/L	<0.001	0.001
Tetrachloroethene (127-18-4)	mg/L	<0.001	0.001
Toluene (108-88-3)	mg/L	0.002	0.001
1,1,1-Trichloroethane (71-55-6)	mg/L	0.008	0.001
1,1,2-Trichloroethane (79-00-5)	mg/L	<0.001	0.001
Trichloroethene (79-01-6)	mg/L	<0.001	0.001
Trichlorofluoromethane (75-69-4)	mg/L	<0.001	0.001
Vinyl Chloride (75-01-4)	mg/L	<0.001	0.001
Total Xylenes (1330-20-7)	mg/L	0.003	0.001

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USEPA METHODS 8010 AND 8020
TCLP DATA SHEET

MEN00506

For: Mr. James Braithwaite
Braithwaite Consultants, Inc.
3928 Varsity Drive
Ann Arbor, MI 48108

Project	Michigan Disposal / 27013
Sample ID	Menasha TCLP Extraction
Collection Date	7/16/92
Received by ATS	7/20/92

Volatile Organics (CAS#)	Units	Concentration	Detection Limit
Benzene (71-43-2)	mg/L	<0.001	0.001
Bromodichloromethane (75-27-4)	mg/L	<0.001	0.001
Bromoform (75-25-2)	mg/L	<0.001	0.001
Bromomethane (74-33-9)	mg/L	<0.001	0.001
Carbon Tetrachloride (56-23-5)	mg/L	<0.001	0.001
Chlorobenzene (108-90-7)	mg/L	<0.001	0.001
Chloroethane (75-00-3)	mg/L	<0.001	0.001
2-Chloroethyl Vinyl Ether (110-75-8)	mg/L	<0.001	0.001
Chloroform (67-66-3)	mg/L	<0.001	0.001
Chloromethane (74-87-3)	mg/L	<0.001	0.001
Dibromochloromethane (124-48-1)	mg/L	<0.001	0.001
1,2-Dichlorobenzene (95-50-1)	mg/L	<0.001	0.001
1,3-Dichlorobenzene (541-73-1)	mg/L	<0.001	0.001
1,4-Dichlorobenzene (106-46-7)	mg/L	<0.001	0.001
1,1-Dichloroethane (75-34-3)	mg/L	<0.001	0.001
1,2-Dichloroethane (107-06-2)	mg/L	<0.001	0.001
1,1-Dichloroethene (75-35-4)	mg/L	<0.001	0.001
cis + trans-1,2-Dichloroethene	mg/L	<0.001	0.001
1,2-Dichloropropane (78-87-5)	mg/L	<0.001	0.001
cis-1,3-Dichloropropene (10061-01-5)	mg/L	<0.001	0.001
trans-1,3-Dichloropropene (10061-02-6)	mg/L	<0.001	0.001
Ethylbenzene (100-41-4)	mg/L	<0.001	0.001
Methylene Chloride (75-09-2)	mg/L	<0.001	0.001
1,1,2,2-Tetrachloroethane (79-34-5)	mg/L	<0.001	0.001
Tetrachloroethene (127-18-4)	mg/L	<0.001	0.001
Toluene (108-88-3)	mg/L	<0.001	0.001
1,1,1-Trichloroethane (71-55-6)	mg/L	<0.001	0.001
1,1,2-Trichloroethane (79-00-5)	mg/L	<0.001	0.001
Trichloroethene (79-01-6)	mg/L	<0.001	0.001
Trichlorofluoromethane (75-69-4)	mg/L	<0.001	0.001
Vinyl Chloride (75-01-4)	mg/L	<0.001	0.001
Total Xylenes (1330-20-7)	mg/L	<0.001	0.001

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USEPA METHODS 8010 AND 8020
TCLP DATA SHEET

MEN00507

For: Mr. James Braithwaite
Braithwaite Consultants, Inc.
3928 Varsity Drive
Ann Arbor, MI 48108

Project: Michigan Disposal - / 27013
Sample ID: Menasha TCLP Extraction
Collection Date: 7/17/92
Received by ATS: 7/20/92

Volatile Organics (CAS#)	Units	Concentration	Detection Limit
Benzene (71-43-2)	mg/L	<0.001	0.001
Bromodichloromethane (75-27-4)	mg/L	<0.001	0.001
Bromoform (75-25-2)	mg/L	<0.001	0.001
Bromomethane (74-83-9)	mg/L	<0.001	0.001
Carbon Tetrachloride (56-23-5)	mg/L	<0.001	0.001
Chlorobenzene (108-90-7)	mg/L	<0.001	0.001
Chloroethane (75-00-3)	mg/L	<0.001	0.001
2-Chloroethyl Vinyl Ether (110-75-8)	mg/L	<0.001	0.001
Chloroform (67-66-3)	mg/L	0.001	0.001
Chloromethane (74-87-3)	mg/L	0.001	0.001
Dibromochloromethane (124-48-1)	mg/L	<0.001	0.001
1,2-Dichlorobenzene (95-50-1)	mg/L	<0.001	0.001
1,3-Dichlorobenzene (541-73-1)	mg/L	<0.001	0.001
1,4-Dichlorobenzene (106-46-7)	mg/L	<0.001	0.001
1,1-Dichloroethane (75-34-3)	mg/L	<0.001	0.001
1,2-Dichloroethane (107-06-2)	mg/L	<0.001	0.001
1,1-Dichloroethene (75-35-4)	mg/L	<0.001	0.001
cis+trans-1,2-Dichloroethene	mg/L	<0.001	0.001
1,2-Dichloropropane (78-87-5)	mg/L	<0.001	0.001
cis-1,3-Dichloropropene (10061-01-5)	mg/L	<0.001	0.001
trans-1,3-Dichloropropene (10061-02-6)	mg/L	<0.001	0.001
Ethylbenzene (100-41-4)	mg/L	<0.001	0.001
Methylene Chloride (75-09-2)	mg/L	<0.001	0.001
1,1,2,2-Tetrachloroethane (79-34-5)	mg/L	<0.001	0.001
Tetrachloroethene (127-18-4)	mg/L	<0.001	0.001
Toluene (108-88-3)	mg/L	0.002	0.001
1,1,1-Trichloroethane (71-55-6)	mg/L	0.001	0.001
1,1,2-Trichloroethane (79-00-5)	mg/L	<0.001	0.001
Trichloroethene (79-01-6)	mg/L	<0.001	0.001
Trichlorofluoromethane (75-69-4)	mg/L	<0.001	0.001
Vinyl Chloride (75-01-4)	mg/L	<0.001	0.001
Total Xylenes (1330-20-7)	mg/L	0.002	0.001

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USEPA METHOD 8270
TCLP DATA SHEET

MEN00508

For: Mr. James Braithwaite
Braithwaite Consultants, Inc.
3928 Varsity Drive
Ann Arbor, MI 48108

Project: BCI/Michigan Disposa.
Sample ID: Menasha TCLP Extraction
Collection Date: 7/15/92
Received by ATS: 7/20/92

Acid Extractables (CAS#)	Units	Concentration	Detection Limit
4-Chloro-3-methylphenol (59-50-7)	mg/L	<0.01	0.01
2-Chlorophenol (95-57-8)	mg/L	<0.01	0.01
o-Cresol (95-48-7	mg/L	<0.01	0.01
p-Cresol (106-44-5)	mg/L	<0.01	0.01
2,4-Dichlorophenol (120-83-2)	mg/L	<0.01	0.01
2,6-Dichlorophenol (85-65-0)	mg/L	<0.01	0.01
2,4-Dimethylphenol (105-67-9)	mg/L	<0.01	0.01
4,6-Dinitro-2-methylphenol (534-52-1)	mg/L	<0.04	0.04
2,4-Dinitrophenol (51-28-5)	mg/L	<0.04	0.04
2-Nitrophenol (88-75-5)	mg/L	<0.01	0.01
4-Nitrophenol (100-02-7)	mg/L	<0.04	0.04
Pentachlorophenol (87-86-5)	mg/L	<0.04	0.04
Phenol (108-95-2)	mg/L	0.09	0.01
2,3,4,6-Tetrachlorophenol (58-90-2)	mg/L	<0.01	0.01
2,4,5-Trichlorophenol (95-95-4)	mg/L	<0.01	0.01
2,4,6-Trichlorophenol (88-06-2)	mg/L	<0.01	0.01

TCLP Extraction Procedure Reference 40 CFR Part 261, 3/29/90.

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USEPA METHOD 8270
TCLP DATA SHEET

MEN00509

For: Mr. James Braithwaite
Braithwaite Consultants, Inc.
3928 Varsity Drive
Ann Arbor, MI 48108

Project	BCI/Michigan Disposal / 2/013
Sample ID	Menasha TCLP Extraction
Collection Date	7/16/92
Received by ATS	7/20/92

Acid Extractables (CAS#)	Units	Concentration	Detection Limit
4-Chloro-3-methylphenol (59-50-7)	mg/L	<0.01	0.01
2-Chlorophenol (95-57-8)	mg/L	<0.01	0.01
o-Cresol (95-48-7	mg/L	<0.01	0.01
p-Cresol (100-44-5)	mg/L	<0.01	0.01
2,4-Dichlorophenol (120-83-2)	mg/L	<0.01	0.01
2,6-Dichlorophenol (85-65-0)	mg/L	<0.01	0.01
2,4-Dimethylphenol (105-67-9)	mg/L	<0.01	0.01
4,6-Dinitro-2-methylphenol (534-52-1)	mg/L	<0.04	0.04
2,4-Dinitrophenol (51-28-5)	mg/L	<0.04	0.04
2-Nitrophenol (88-75-5)	mg/L	<0.01	0.01
4-Nitrophenol (100-02-7)	mg/L	<0.04	0.04
Pentachlorophenol (87-86-5)	mg/L	<0.04	0.04
Phenol (108-95-2)	mg/L	0.06	0.01
2,3,4,6-Tetrachlorophenol (58-90-2)	mg/L	<0.01	0.01
2,4,5-Trichlorophenol (95-95-4)	mg/L	<0.01	0.01
2,4,6-Trichlorophenol (88-06-2)	mg/L	<0.01	0.01

TCLP Extraction Procedure Reference 40 CFR Part 261, 3/29/90

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USEPA METHOD 8270
TCLP DATA SHEET

MEN00510

For: Mr. James Braithwaite
Braithwaite Consultants, Inc.
3928 Varsity Drive
Ann Arbor, MI 48108

Project: BCI/Michigan Disposal
Sample ID: Menasha TCLP Extraction
Collection Date: 7/17/92
Received by ATS: 7/20/92

Acid Extractables (CAS#)	Units	Concentration	Detection Limit
4-Chloro-3-methylphenol (59-50-7)	mg/L	<0.01	0.01
2-Chlorophenol (95-57-8)	mg/L	<0.01	0.01
o-Cresol (95-48-7	mg/L	<0.01	0.01
p-Cresol (106-44-5)	mg/L	<0.01	0.01
2,4-Dichlorophenol (120-83-2)	mg/L	<0.01	0.01
2,6-Dichlorophenol (85-65-0)	mg/L	<0.01	0.01
2,4-Dimethylphenol (105-67-9)	mg/L	<0.01	0.01
4,6-Dinitro-2-methylphenol (534-52-1)	mg/L	<0.04	0.04
2,4-Dinitrophenol (51-28-5)	mg/L	<0.04	0.04
2-Nitrophenol (88-75-5)	mg/L	<0.01	0.01
4-Nitrophenol (100-02-7)	mg/L	<0.04	0.04
Pentachlorophenol (87-86-5)	mg/L	<0.04	0.04
Phenol (108-95-2)	mg/L	0.08	0.01
2,3,4,6-Tetrachlorophenol (58-90-2)	mg/L	<0.01	0.01
2,4,5-Trichlorophenol (95-95-4)	mg/L	<0.01	0.01
2,4,6-Trichlorophenol (88-06-2)	mg/L	<0.01	0.01

TCLP Extraction Procedure Reference 40 CFR Part 261, 3/29/90.

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USEPA METHOD 8270
TCLP DATA SHEET

MEN00511

For: Mr. James Braithwaite
Braithwaite Consultants, Inc.
3928 Varsity Drive
Ann Arbor, MI 48108

Project: BCI/Michigan Disposal / 27013
Sample ID: Menasha TCLP Extraction
Collection Date: 7/18/92
Received by ATS: 7/20/92

Acid Extractables (CAS#)	Units	Concentration	Detection Limit
4-Chloro-3-methylphenol (59-50-7)	mg/L	<0.01	0.01
2-Chlorophenol (95-57-8)	mg/L	<0.01	0.01
o-Cresol (95-48-7	mg/L	<0.01	0.01
p-Cresol (106-44-5)	mg/L	<0.01	0.01
2,4-Dichlorophenol (120-83-2)	mg/L	<0.01	0.01
2,6-Dichlorophenol (85-65-0)	mg/L	<0.01	0.01
2,4-Dimethylphenol (105-67-9)	mg/L	<0.01	0.01
4,6-Dinitro-2-methylphenol (534-52-1)	mg/L	<0.04	0.04
2,4-Dinitrophenol (51-28-5)	mg/L	<0.04	0.04
2-Nitrophenol (88-75-5)	mg/L	<0.01	0.01
4-Nitrophenol (100-02-7)	mg/L	<0.04	0.04
Pentachlorophenol (87-86-5)	mg/L	<0.04	0.04
Phenol (108-95-2)	mg/L	0.08	0.01
2,3,4,6-Tetrachlorophenol (58-90-2)	mg/L	<0.01	0.01
2,4,5-Trichlorophenol (95-95-4)	mg/L	<0.01	0.01
2,4,6-Trichlorophenol (88-06-2)	mg/L	<0.01	0.01

TCLP Extraction Procedure Reference 40 CFR Part 261, 3/29/90.

TABLE 4A

RESULTS OF ANALYSES PERFORMED ON TCLP EXTRACT

KAR I.D. NO.: 921179-04

CLIENT I.D. : Rock Ten Residuals

(Concentrations are expressed as mg/L)

Purgeable Halocarbons-Method 601 Compounds

	Conc.		Conc.
Bromodichloromethane	<0.010	trans-1,2-Dichloroethene	<0.010
Bromoform	<0.010	1,2-Dichloropropane	<0.010
Bromomethane	<0.010	cis-1,3-Dichloropropene	<0.010
Carbon Tetrachloride	<0.010	trans-1,3-Dichloropropene	<0.010
Chlorobenzene	<0.010	Methylene Chloride	<0.010
Chloroethane	<0.010	1,1,2,2-Tetrachloroethane	<0.010
2-Chloroethylvinyl ether	<0.010	Tetrachloroethene	<0.010
Chloroform	<0.010	1,1,1-Trichloroethane	<0.010
Chloromethane	<0.010	1,1,2-Trichloroethane	<0.010
Dibromochloromethane	<0.010	Trichloroethene	<0.010
1,1-Dichloroethane	<0.010	Trichlorofluoromethane	<0.010
1,2-Dichloroethane	<0.010	Vinyl Chloride	<0.010
1,1-Dichloroethene	<0.010		

Purgeable Aromatics-Method 602 Compounds

	Conc.
Benzene	<0.010
Ethylbenzene	<0.010
Toluene	0.016

Ann Arbor
Technical Services, Inc.
6540 Jackson Road • Ann Arbor, Michigan 48103 • 313-995-0995

USEPA METHODS 8010 AND 8020
TCLP DATA SHEET

MEN00513

For: Mr. James Braithwaite
Braithwaite Consultants, Inc.
3928 Varsity Drive
Ann Arbor, MI 48108

Project: Michigan Disposal
Sample ID: Rock Tenn TCLP Extraction
Collection Date: 7/15/92
Received by ATS: 7/20/92

Volatile Organics (CAS#)	Units	Concentration	Detection Limit
Benzene (71-43-2)	mg/L	<0.001	0.001
Bromodichloromethane (75-27-4)	mg/L	<0.001	0.001
Bromoform (75-25-2)	mg/L	<0.001	0.001
Bromomethane (74-83-9)	mg/L	<0.001	0.001
Carbon Tetrachloride (56-23-5)	mg/L	<0.001	0.001
Chlorobenzene (108-90-7)	mg/L	<0.001	0.001
Chloroethane (75-00-3)	mg/L	<0.001	0.001
2-Chloroethyl Vinyl Ether (110-75-8)	mg/L	<0.001	0.001
Chloroform (67-66-3)	mg/L	0.001	0.001
Chloromethane (74-87-3)	mg/L	0.001	0.001
Dibromochloromethane (124-48-1)	mg/L	<0.001	0.001
1,2-Dichlorobenzene (95-50-1)	mg/L	<0.001	0.001
1,3-Dichlorobenzene (541-73-1)	mg/L	<0.001	0.001
1,4-Dichlorobenzene (106-46-7)	mg/L	<0.001	0.001
1,1-Dichloroethane (75-34-3)	mg/L	<0.001	0.001
1,2-Dichloroethane (107-06-2)	mg/L	<0.001	0.001
1,1-Dichloroethene (75-35-4)	mg/L	<0.001	0.001
cis + trans-1,2-Dichloroethene	mg/L	<0.001	0.001
1,2-Dichloropropane (78-87-5)	mg/L	<0.001	0.001
cis-1,3-Dichloropropene (10061-01-5)	mg/L	<0.001	0.001
trans-1,3-Dichloropropene (10061-02-6)	mg/L	<0.001	0.001
Ethylbenzene (100-41-4)	mg/L	0.001	0.001
Methylene Chloride (75-09-2)	mg/L	<0.001	0.001
1,1,2,2-Tetrachloroethane (79-34-5)	mg/L	<0.001	0.001
Tetrachloroethene (127-18-4)	mg/L	<0.001	0.001
Toluene (108-88-3)	mg/L	0.009	0.001
1,1,1-Trichloroethane (71-55-6)	mg/L	0.014	0.001
1,1,2-Trichloroethane (79-00-5)	mg/L	<0.001	0.001
Trichloroethene (79-01-6)	mg/L	0.002	0.001
Trichlorofluoromethane (75-69-4)	mg/L	<0.001	0.001
Vinyl Chloride (75-01-4)	mg/L	<0.001	0.001
Total Xylenes (1330-20-7)	mg/L	0.005	0.001

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USEPA METHODS 8010 AND 8020
TCLP DATA SHEET

MEN00514

For: Mr. James Braithwaite
Braithwaite Consultants, Inc.
3928 Varsity Drive
Ann Arbor, MI 48108

Project	Michigan Disposal
Sample ID	Rock Tenn TCLP Extraction
Collection Date	7/16/92
Received by ATS	7/20/92

Volatile Organics (CAS#)	Units	Concentration	Detection Limit
Benzene (71-43-2)	mg/L	<0.001	0.001
Bromodichloromethane (75-27-4)	mg/L	<0.001	0.001
Bromoform (75-25-2)	mg/L	<0.001	0.001
Bromomethane (74-83-9)	mg/L	<0.001	0.001
Carbon Tetrachloride (56-23-5)	mg/L	<0.001	0.001
Chlorobenzene (108-90-7)	mg/L	<0.001	0.001
Chloroethane (75-00-3)	mg/L	<0.001	0.001
2-Chloroethyl Vinyl Ether (110-75-8)	mg/L	<0.001	0.001
Chloroform (67-66-3)	mg/L	0.003	0.001
Chloromethane (74-87-3)	mg/L	<0.001	0.001
Dibromochloromethane (124-48-1)	mg/L	<0.001	0.001
1,2-Dichlorobenzene (95-50-1)	mg/L	<0.001	0.001
1,3-Dichlorobenzene (541-73-1)	mg/L	<0.001	0.001
1,4-Dichlorobenzene (106-46-7)	mg/L	<0.001	0.001
1,1-Dichloroethane (75-34-3)	mg/L	<0.001	0.001
1,2-Dichloroethane (107-06-2)	mg/L	<0.001	0.001
1,1-Dichloroethene (75-35-4)	mg/L	<0.001	0.001
cis+trans-1,2-Dichloroethene	mg/L	<0.001	0.001
1,2-Dichloropropane (78-87-5)	mg/L	<0.001	0.001
cis-1,3-Dichloropropene (10061-01-5)	mg/L	<0.001	0.001
trans-1,3-Dichloropropene (10061-02-6)	mg/L	<0.001	0.001
Ethylbenzene (100-41-4)	mg/L	0.001	0.001
Methylene Chloride (75-09-2)	mg/L	<0.001	0.001
1,1,2,2-Tetrachloroethane (79-34-5)	mg/L	<0.001	0.001
Tetrachloroethene (127-18-4)	mg/L	<0.001	0.001
Toluene (108-88-3)	mg/L	0.022	0.001
1,1,1-Trichloroethane (71-55-6)	mg/L	0.018	0.001
1,1,2-Trichloroethane (79-00-5)	mg/L	<0.001	0.001
Trichloroethene (79-01-6)	mg/L	<0.001	0.001
Trichlorofluoromethane (75-69-4)	mg/L	<0.001	0.001
Vinyl Chloride (75-01-4)	mg/L	<0.001	0.001
Total Xylenes (1330-20-7)	mg/L	0.005	0.001

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USEPA METHODS 8010 AND 8020
TCLP DATA SHEET

MEN00515

For: Mr. James Braithwaite
Braithwaite Consultants, Inc.
3928 Varsity Drive
Ann Arbor, MI 48108

Project	Michigan Disposal
Sample ID	Rock Tenn TCLP Extraction
Collection Date	7/17/92
Received by ATS	7/20/92

Volatile Organics (CAS#)	Units	Concentration	Detection Limit
Benzene (71-43-2)	mg/L	<0.001	0.001
Bromodichloromethane (75-27-4)	mg/L	<0.001	0.001
Bromoform (75-25-2)	mg/L	<0.001	0.001
Bromomethane (74-83-9)	mg/L	<0.001	0.001
Carbon Tetrachloride (56-23-5)	mg/L	<0.001	0.001
Chlorobenzene (108-90-7)	mg/L	<0.001	0.001
Chloroethane (75-00-3)	mg/L	<0.001	0.001
2-Chloroethyl Vinyl Ether (110-75-8)	mg/L	<0.001	0.001
Chloroform (67-66-3)	mg/L	0.002	0.001
Chloromethane (74-87-3)	mg/L	<0.001	0.001
Dibromochloromethane (124-48-1)	mg/L	<0.001	0.001
1,2-Dichlorobenzene (95-50-1)	mg/L	<0.001	0.001
1,3-Dichlorobenzene (541-73-1)	mg/L	<0.001	0.001
1,4-Dichlorobenzene (106-46-7)	mg/L	<0.001	0.001
1,1-Dichloroethane (75-34-3)	mg/L	<0.001	0.001
1,2-Dichloroethane (107-06-2)	mg/L	<0.001	0.001
1,1-Dichloroethene (75-35-4)	mg/L	<0.001	0.001
cis + trans-1,2-Dichloroethene	mg/L	<0.001	0.001
1,2-Dichloropropane (78-87-5)	mg/L	<0.001	0.001
cis-1,3-Dichloropropene (10061-01-5)	mg/L	<0.001	0.001
trans-1,3-Dichloropropene (10061-02-6)	mg/L	<0.001	0.001
Ethylbenzene (100-41-4)	mg/L	0.001	0.001
Methylene Chloride (75-09-2)	mg/L	<0.001	0.001
1,1,2,2-Tetrachloroethane (79-34-5)	mg/L	<0.001	0.001
Tetrachloroethene (127-18-4)	mg/L	<0.001	0.001
Toluene (108-88-3)	mg/L	0.025	0.001
1,1,1-Trichloroethane (71-55-6)	mg/L	0.011	0.001
1,1,2-Trichloroethane (79-00-5)	mg/L	<0.001	0.001
Trichloroethene (79-01-6)	mg/L	<0.001	0.001
Trichlorofluoromethane (75-69-4)	mg/L	<0.001	0.001
Vinyl Chloride (75-01-4)	mg/L	<0.001	0.001
Total Xylenes (1330-20-7)	mg/L	0.008	0.001

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USEPA METHOD 8270
TCLP DATA SHEET

MEN00516

For: Mr. James Braithwaite
Braithwaite Consultants, Inc.
3928 Varsity Drive
Ann Arbor, MI 48108

Project: BCI/Michigan Disposal / 27013
Sample ID: Rock Tenn TCLP Extraction
Collection Date: 7/15/92
Received by ATS: 7/20/92

Acid Extractables (CAS#)	Units	Concentration	Detection Limit
4-Chloro-3-methylphenol (59-50-7)	mg/L	<0.01	0.01
2-Chlorophenol (95-57-8)	mg/L	<0.01	0.01
o-Cresol (95-48-7	mg/L	<0.01	0.01
p-Cresol (106-44-5)	mg/L	0.02	0.01
2,4-Dichlorophenol (120-83-2)	mg/L	<0.01	0.01
2,6-Dichlorophenol (85-65-0)	mg/L	<0.01	0.01
2,4-Dimethylphenol (105-67-9)	mg/L	<0.01	0.01
4,6-Dinitro-2-methylphenol (534-52-1)	mg/L	<0.04	0.04
2,4-Dinitrophenol (51-28-5)	mg/L	<0.04	0.04
2-Nitrophenol (88-75-5)	mg/L	<0.01	0.01
4-Nitrophenol (100-02-7)	mg/L	<0.04	0.04
Pentachlorophenol (87-86-5)	mg/L	<0.04	0.04
Phenol (108-95-2)	mg/L	0.04	0.01
2,3,4,6-Tetrachlorophenol (58-90-2)	mg/L	<0.01	0.01
2,4,5-Trichlorophenol (95-95-4)	mg/L	<0.01	0.01
2,4,6-Trichlorophenol (88-06-2)	mg/L	<0.01	0.01

TCLP Extraction Procedure Reference 40 CFR Part 261, 3/29/90

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USEPA METHOD 8270
TCLP DA

MEN00517

For: Mr. James Braithwaite
Braithwaite Consultants, Inc.
3928 Varsity Drive
Ann Arbor, MI 48108

Project: BCI/Michigan Disposal / 27013
Sample ID: Rock Tenn TCLP Extraction
Collection Date: 7/16/92
Received by ATS: 7/20/92

Acid Extractables (CAS#)	Units	Concentration	Detection Limit
4-Chloro-3-methylphenol (59-50-7)	mg/L	<0.01	0.01
2-Chlorophenol (95-57-8)	mg/L	<0.01	0.01
o-Cresol (95-48-7	mg/L	<0.01	0.01
p-Cresol (106-44-5)	mg/L	0.02	0.01
2,4-Dichlorophenol (120-83-2)	mg/L	<0.01	0.01
2,6-Dichlorophenol (85-65-0)	mg/L	<0.01	0.01
2,4-Dimethylphenol (105-67-9)	mg/L	<0.01	0.01
4,6-Dinitro-2-methylphenol (534-52-1)	mg/L	<0.04	0.04
2,4-Dinitrophenol (51-28-5)	mg/L	<0.04	0.04
2-Nitrophenol (88-75-5)	mg/L	<0.01	0.01
4-Nitrophenol (100-02-7)	mg/L	<0.04	0.04
Pentachlorophenol (87-86-5)	mg/L	<0.04	0.04
Phenol (108-95-2)	mg/L	0.04	0.01
2,3,4,6-Tetrachlorophenol (58-90-2)	mg/L	<0.01	0.01
2,4,5-Trichlorophenol (95-95-4)	mg/L	<0.01	0.01
2,4,6-Trichlorophenol (88-06-2)	mg/L	<0.01	0.01

TCLP Extraction Procedure Reference 40 CFR Part 261, 3/29/90

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USEPA METHOD 8270
TCLP DA

MEN00518

For: Mr. James Braithwaite
Braithwaite Consultants, Inc.
3928 Varsity Drive
Ann Arbor, MI 48108

Project	BCI/Michigan Disposal / 27013
Sample ID	Rock Tenn TCLP Extraction
Collection Date	7/17/92
Received by ATS	7/20/92

Acid Extractables (CAS#)	Units	Concentration	Detection Limit
4-Chloro-3-methylphenol (59-50-7)	mg/L	<0.01	0.01
2-Chlorophenol (95-57-8)	mg/L	<0.01	0.01
o-Cresol (95-48-7	mg/L	<0.01	0.01
p-Cresol (106-44-5)	mg/L	0.02	0.01
2,4-Dichlorophenol (120-83-2)	mg/L	<0.01	0.01
2,6-Dichlorophenol (85-65-0)	mg/L	<0.01	0.01
2,4-Dimethylphenol (105-67-9)	mg/L	<0.01	0.01
4,6-Dinitro-2-methylphenol (534-52-1)	mg/L	<0.04	0.04
2,4-Dinitrophenol (51-28-5)	mg/L	<0.04	0.04
2-Nitrophenol (88-75-5)	mg/L	<0.01	0.01
4-Nitrophenol (100-02-7)	mg/L	<0.04	0.04
Pentachlorophenol (87-86-5)	mg/L	<0.04	0.04
Phenol (108-95-2)	mg/L	0.04	0.01
2,3,4,6-Tetrachlorophenol (58-90-2)	mg/L	<0.01	0.01
2,4,5-Trichlorophenol (95-95-4)	mg/L	<0.01	0.01
2,4,6-Trichlorophenol (88-06-2)	mg/L	<0.01	0.01

TCLP Extraction Procedure Reference 40 CFR Part 261, 3/29/90.

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USEPA METHOD 8270
TCLP DA

MEN00519

For: Mr. James Braithwaite
Braithwaite Consultants, Inc.
3928 Varsity Drive
Ann Arbor, MI 48108

Project: BCI/Michigan Disposal / 27013
Sample ID: Rock Tenn TCLP Extraction
Collection Date: 7/18/92
Received by ATS: 7/20/92

Acid Extractables (CAS#)	Units	Concentration	Detection Limit
4-Chloro-3-methylphenol (59-50-7)	mg/L	<0.01	0.01
2-Chlorophenol (95-57-8)	mg/L	<0.01	0.01
o-Cresol (95-48-7	mg/L	<0.01	0.01
p-Cresol (106-44-5)	mg/L	0.02	0.01
2,4-Dichlorophenol (120-83-2)	mg/L	<0.01	0.01
2,6-Dichlorophenol (85-65-0)	mg/L	<0.01	0.01
2,4-Dimethylphenol (105-67-9)	mg/L	<0.01	0.01
4,6-Dinitro-2-methylphenol (534-52-1)	mg/L	<0.04	0.04
2,4-Dinitrophenol (51-28-5)	mg/L	<0.04	0.04
2-Nitrophenol (88-75-5)	mg/L	<0.01	0.01
4-Nitrophenol (100-02-7)	mg/L	<0.04	0.04
Pentachlorophenol (87-86-5)	mg/L	<0.04	0.04
Phenol (108-95-2)	mg/L	0.04	0.01
2,3,4,6-Tetrachlorophenol (58-90-2)	mg/L	<0.01	0.01
2,4,5-Trichlorophenol (95-95-4)	mg/L	<0.01	0.01
2,4,6-Trichlorophenol (88-06-2)	mg/L	<0.01	0.01

TCLP Extraction Procedure Reference 40 CFR Part 261, 3/29/90.

MEN00520

PAPERBOARD DIVISION

MENASHA CORPORATION

September 23, 1992

Mr. Daniel Cummins
Michigan Disposal Service
100 East North Street
Kalamazoo, MI 49007

Dear Dan,

Enclosed are test results for the three waste products presently landfilled at your Cork Street Landfill. These are the 2nd Quarter 1992 results.

If you have any questions or concerns, call me at 616-692-1641.

Sincerely,

Otsego Paperboard Division

Gary E. Roys
Laboratory Technician

Enclosure

cc: Keith Kling
Paul Jachim
Len Myers

GER:amc

Otsego Mill
320 N Farmer St
PO Box 155
Otsego MI 49078-0155
1-616-692-6141
1-616-692-2060 (Fax)

WESTERN MICHIGAN
ENVIRONMENTAL SERVICES, INC.

3352 128th Avenue, Holland, Michigan 49424-9263
Phone: 616-399-6070 FAX: 616-399-6185

MEN00521

TO: Menasha Corporation
320 North Farmer
Otsego, Michigan 49078

Attn: Keith Kling

DATE: August 17, 1992

ANALYSIS: OF WASTE SAMPLES

REPORTED BY: Robert K. Zahray, Laboratory Manager

SAMPLING DATE: Received from client July 10, 1992.

RESULTS: Expressed as milligrams per liter (mg/ℓ).

Parameter	TAIL070992	COMPACTOR070992	ASH070992
Silver	<0.01	<0.01	<0.01
Arsenic	<0.005	<0.005	0.017
Barium	0.42	0.45	0.12
Cadmium	0.0002	<0.0001	0.0002
Chemical Oxygen Demand	280	140	<10
Chromium	<0.005	<0.005	0.0054
Copper	<0.01	<0.01	<0.01
Mercury	<0.0005	<0.0005	<0.0005
Lead	<0.003	<0.003	<0.003
Selenium	<0.005	<0.005	0.012
Zinc	0.33	0.22	0.102
ESI #9207076	-1	-2	-3

Note: This analysis was done on an ASTM Leachate Extraction.

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TABLE 2
601 & 602 VOLATILES
Results for Menasha Corporation
Received July 10, 1992. Reported August 17, 1992.
Expressed as micrograms per liter (µg/ℓ).
Limit of detection is 10 except where noted in parentheses.
This analysis was run on a TCLP Leachate Extraction.

Parameter	TAIL070992	COMPACTOR070992	ASH070992
Benzene	10	*	*
Bromodichloromethane	*	*	*
Bromoform	*	*	*
Bromomethane	*	*	*
Carbon Tetrachloride	*	*	*
Chlorobenzene	*	*	*
Chlorodibromomethane	*	*	*
Chloroethane	*	*	*
Chloroform	*	*	*
2-Chloroethyl Vinyl Ether (21)	*	*	*
Chloromethane	*	*	*
1,2-Dichlorobenzene	*	*	*
1,3-Dichlorobenzene	*	*	*
1,4-Dichlorobenzene	*	*	*
Dichlorodifluoromethane	*	*	*
1,1-Dichloroethane	*	*	*
1,2-Dichloroethane	*	*	*
1,1-Dichloroethylene	*	*	*
cis-1,2-Dichloroethylene	*	*	*
trans-1,2-Dichloroethylene	*	*	*
1,2-Dichloropropane	*	*	*
cis-1,3-Dichloropropylene	*	*	*
trans-1,3-Dichloropropylene	*	*	*
Ethyl Benzene	26	17	*
Methylene Chloride (50)	*	*	*
1,1,2,2-Tetrachlorethane	*	*	*
Tetrachloroethylene	*	*	*
Toluene	*	*	*
1,1,1-Trichloroethane	*	*	*
1,1,2-Trichloroethane	*	*	*
Trichloroethylene	*	*	*
Trichlofluoromethane (13)	*	*	*
Vinyl Chloride	*	*	*
Xylene	96	74	*
ESI #9207076	-1	-2	-3

* = Below Detection Limit

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WESTERN MICHIGAN
ENVIRONMENTAL SERVICES, INC.

3352 128th Avenue, Holland, Michigan 49424-9263
Phone: 616-399-6070 FAX 616-399-6185

MEN00523

SENT TO: Menasha Corporation
320 North Farmer
Otsego, Michigan 49078

Attn: Keith Kling
Re: Waste Samples

DATE: December 2, 1992

ANALYSIS OF: Waste Samples

REPORTED BY: Robert K. Zahray, Laboratory Manager

DATE RECEIVED: Received from client on October 23, 1992.

Sample ID: 1093TAIL3Q Lab ID: 9210202-01

TEST	RESULT	LIMITS	UNITS	METHOD
Chemical Oxygen Demand	260		mg/L	EPA 410.4
Arsenic	<0.005		mg/L	EPA 7060
Barium	0.33		mg/L	EPA 6010
Cadmium	<0.0001		mg/L	EPA 7131
Chromium	<0.005		mg/L	EPA 7191
Copper	0.01		mg/L	EPA 6010
Lead	<0.003		mg/L	EPA 7421
Mercury	<0.0005		mg/L	EPA 7470
Selenium	<0.005		mg/L	EPA 7740
Silver	0.01		mg/L	EPA 6010
Zinc	0.34		mg/L	EPA 6010
Method 601 & 602 Volatiles				EPA 8240
Benzene	BDL	10	µg/L	
Bromodichloromethane	BDL	10	µg/L	
Bromoform	BDL	10	µg/L	
Bromomethane	BDL	10	µg/L	
Carbon Tetrachloride	BDL	10	µg/L	
Chlorobenzene	BDL	10	µg/L	
Chlorodibromomethane	BDL	10	µg/L	
Chloroethane	BDL	10	µg/L	
Chloroform	BDL	10	µg/L	
2-Chloroethyl Vinyl Ether	BDL	21	µg/L	
Chloromethane	BDL	10	µg/L	
1,2-Dichlorobenzene	BDL	10	µg/L	
1,3-Dichlorobenzene	BDL	10	µg/L	
1,4-Dichlorobenzene	BDL	10	µg/L	
Dichlorodifluoromethane	BDL	10	µg/L	
1,1-Dichloroethane	BDL	10	µg/L	
1,2-Dichloroethane	BDL	10	µg/L	
1,1-Dichloroethylene	BDL	10	µg/L	
cis-1,2-Dichloroethylene	BDL	10	µg/L	
trans-1,2-Dichloroethylene	BDL	10	µg/L	

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Sample ID: 1093TAIL3Q Lab ID: 9210202-01

TEST	RESULT	LIMITS	UNITS	METHOD
1,2-Dichloropropane	BDL	10	µg/L	
cis-1,3-Dichloropropylene	BDL	10	µg/L	
trans-1,3-Dichloropropylene	BDL	10	µg/L	
Ethyl benzene	BDL	10	µg/L	
Methylene Chloride	BDL	50	µg/L	
1,1,2,2-Tetrachloroethane	BDL	10	µg/L	
Tetrachloroethylene	BDL	10	µg/L	
Toluene	BDL	10	µg/L	
1,1,1-Trichloroethane	BDL	10	µg/L	
1,1,2-Trichloroethane	BDL	10	µg/L	
Trichloroethylene	BDL	10	µg/L	
Trichlorofluoromethane	BDL	13	µg/L	
Vinyl Chloride	BDL	10	µg/L	
Xylene	BDL	10	µg/L	

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Sample ID: 1093COMPACTOR3Q Lab ID: 9210202-02

TEST	RESULT	LIMITS	UNITS	METHOD
Chemical Oxygen Demand	250		mg/L	EPA 410.4
Arsenic	<0.005		mg/L	EPA 7060
Barium	0.24		mg/L	EPA 6010
Cadmium	<0.0001		mg/L	EPA 7131
Chromium	<0.005		mg/L	EPA 7191
Copper	0.02		mg/L	EPA 6010
Lead	<0.003		mg/L	EPA 7421
Mercury	<0.0005		mg/L	EPA 7470
Selenium	<0.005		mg/L	EPA 7740
Silver	0.01		mg/L	EPA 6010
Zinc	0.24		mg/L	EPA 6010
Method 601 & 602 Volatiles				EPA 8240
Benzene	BDL	10	µg/L	
Bromodichloromethane	BDL	10	µg/L	
Bromoform	BDL	10	µg/L	
Bromomethane	BDL	10	µg/L	
Carbon Tetrachloride	BDL	10	µg/L	
Chlorobenzene	BDL	10	µg/L	
Chlorodibromomethane	BDL	10	µg/L	
Chloroethane	BDL	10	µg/L	
Chloroform	BDL	10	µg/L	
2-Chloroethyl Vinyl Ether	BDL	21	µg/L	
Chloromethane	BDL	10	µg/L	
1,2-Dichlorobenzene	BDL	10	µg/L	
1,3-Dichlorobenzene	BDL	10	µg/L	
1,4-Dichlorobenzene	BDL	10	µg/L	
Dichlorodifluoromethane	BDL	10	µg/L	
1,1-Dichloroethane	BDL	10	µg/L	
1,2-Dichloroethane	BDL	10	µg/L	
1,1-Dichloroethylene	BDL	10	µg/L	
cis-1,2-Dichloroethylene	BDL	10	µg/L	
trans-1,2-Dichloroethylene	BDL	10	µg/L	
1,2-Dichloropropane	BDL	10	µg/L	
cis-1,3-Dichloropropylene	BDL	10	µg/L	
trans-1,3-Dichloropropylene	BDL	10	µg/L	
Ethyl benzene	BDL	10	µg/L	
Methylene Chloride	BDL	50	µg/L	
1,1,2,2-Tetrachloroethane	BDL	10	µg/L	
Tetrachloroethylene	BDL	10	µg/L	
Toluene	BDL	10	µg/L	
1,1,1-Trichloroethane	BDL	10	µg/L	
1,1,2-Trichloroethane	BDL	10	µg/L	
Trichloroethylene	BDL	10	µg/L	
Trichlorofluoromethane	BDL	13	µg/L	
Vinyl Chloride	BDL	10	µg/L	
Xylene	BDL	10	µg/L	

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Sample ID: 1093ASH3Q Lab ID: 9210202-03

TEST	RESULT	LIMITS	UNITS	METHOD
Chemical Oxygen Demand	33		mg/L	EPA 410.4
Arsenic	<0.005		mg/L	EPA 7060
Barium	0.14		mg/L	EPA 6010
Cadmium	<0.0001		mg/L	EPA 7131
Chromium	<0.005		mg/L	EPA 7191
Copper	<0.01		mg/L	EPA 6010
Lead	<0.003		mg/L	EPA 7421
Mercury	<0.0005		mg/L	EPA 7470
Selenium	<0.005		mg/L	EPA 7740
Silver	<0.01		mg/L	EPA 6010
Zinc	0.07		mg/L	EPA 6010
Method 601 & 602 Volatiles				EPA 8240
Benzene	BDL	10	µg/L	
Bromodichloromethane	BDL	10	µg/L	
Bromoform	BDL	10	µg/L	
Bromomethane	BDL	10	µg/L	
Carbon Tetrachloride	BDL	10	µg/L	
Chlorobenzene	BDL	10	µg/L	
Chlorodibromomethane	BDL	10	µg/L	
Chloroethane	BDL	10	µg/L	
Chloroform	BDL	10	µg/L	
2-Chloroethyl Vinyl Ether	BDL	21	µg/L	
Chloromethane	BDL	10	µg/L	
1,2-Dichlorobenzene	BDL	10	µg/L	
1,3-Dichlorobenzene	BDL	10	µg/L	
1,4-Dichlorobenzene	BDL	10	µg/L	
Dichlorodifluoromethane	BDL	10	µg/L	
1,1-Dichloroethane	BDL	10	µg/L	
1,2-Dichloroethane	BDL	10	µg/L	
1,1-Dichloroethylene	BDL	10	µg/L	
cis-1,2-Dichloroethylene	BDL	10	µg/L	
trans-1,2-Dichloroethylene	BDL	10	µg/L	
1,2-Dichloropropane	BDL	10	µg/L	
cis-1,3-Dichloropropylene	BDL	10	µg/L	
trans-1,3-Dichloropropylene	BDL	10	µg/L	
Ethyl benzene	BDL	10	µg/L	
Methylene Chloride	BDL	50	µg/L	
1,1,2,2-Tetrachloroethane	BDL	10	µg/L	
Tetrachloroethylene	BDL	10	µg/L	
Toluene	BDL	10	µg/L	
1,1,1-Trichloroethane	BDL	10	µg/L	
1,1,2-Trichloroethane	BDL	10	µg/L	
Trichloroethylene	BDL	10	µg/L	
Trichlorofluoromethane	BDL	13	µg/L	
Vinyl Chloride	BDL	10	µg/L	
Xylene	BDL	10	µg/L	

BDL = Below Detection Limit

Note: All analysis was done on ASTM Leachate

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MEN00527

PAPERBOARD DIVISION

MENASHA CORPORATION

March 29, 1993

Mr. Randy Blank
Michigan Disposal Services
100 East North Street
Kalamazoo, MI 49007

Dear Randy,

Enclosed are test results for our Type III wastes that are presently disposed of at the Cork Street Landfill. These samples were obtained on January 20, 1993, and represent the 4th Quarter of 1992. As requested in your April 3, 1990 letter, metals were run by ASTM neutral leach and organics were tested by the TCLP procedure.

Sample Codes are as follows:

1. COMPACTOR 120934th - Compactor
2. ASH12093 - Ash
3. TAIL12093 - Tail

If you have any questions concerning this matter, please contact the writer or Keith Kling.

Sincerely,

Otsego Paperboard Division

Keith B. Kling for GFR.

Gary Roys
Environmental Technician

Enclosures

cc: Keith Kling

Otsego M
320 N Farmer S
PO Box [illegible]
Otsego M 49078 0100
1-616-692-6141
1-616 692 2060 (Fax)

WESTERN MICHIGAN
ENVIRONMENTAL SERVICES, INC.

3352 128th Avenue, Holland, Michigan 49424-926
Phone: 616-399-6070 FAX 616-399-6185

MEN00528

SENT TO: Menasha Corporation
320 North Farmer
Otsego, Michigan 49078

Attn: Gary Roys
Re: Quarterly Report

DATE: February 11, 1993

ANALYSIS OF: Solid Samples

REPORTED BY: Robert K. Zahray, Laboratory Manager

DATE RECEIVED: Received from client on January 22, 1993.

Sample ID: COMPACTOR120934th Lab ID: 9301137-01

TEST	RESULT	UNITS	METHOD	MDL (1)
Chemical Oxygen Demand	290	mg/L	EPA 410.4	
Arsenic	<0.005	mg/L	EPA 7060	
Barium	2.6	mg/L	EPA 6010	
Cadmium	<0.0001	mg/L	EPA 7131	
Chromium	<0.005	mg/L	EPA 7191	
Copper	0.016	mg/L	EPA 6010	
Lead	<0.005	mg/L	EPA 7421	
Mercury	<0.0002	mg/L	EPA 7470	
Selenium	<0.001	mg/L	EPA 7740	
Silver	<0.01	mg/L	EPA 6010	
Zinc	1.9	mg/L	EPA 6010	

Note: This analysis was performed on an ASTM Leachate Extraction.

BDL = Below Detection Limit

(1) = Method Detection Limit

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Sample ID: COMPACTOR120934th Lab ID: 9301137-01

TEST	RESULT	UNITS	METHOD	MDL (1)
Method 601 & 602 Volatiles			EPA 8240	
Benzene	BDL	µg/L		1.0
Bromodichloromethane	BDL	µg/L		1.0
Bromoform	BDL	µg/L		1.0
Bromomethane	BDL	µg/L		1.0
Carbon Tetrachloride	BDL	µg/L		1.0
Chlorobenzene	BDL	µg/L		1.0
Chlorodibromomethane	BDL	µg/L		1.0
Chloroethane	BDL	µg/L		1.0
Chloroform	BDL	µg/L		1.0
2-Chloroethyl Vinyl Ether	BDL	µg/L		2.1
Chloromethane	BDL	µg/L		1.0
1,2-Dichlorobenzene	BDL	µg/L		1.0
1,3-Dichlorobenzene	BDL	µg/L		1.0
1,4-Dichlorobenzene	BDL	µg/L		1.0
Dichlorodifluoromethane	BDL	µg/L		1.0
1,1-Dichloroethane	BDL	µg/L		1.0
1,2-Dichloroethane	BDL	µg/L		1.0
1,1-Dichloroethylene	BDL	µg/L		1.0
cis-1,2-Dichloroethylene	BDL	µg/L		1.0
trans-1,2-Dichloroethylene	BDL	µg/L		1.0
1,2-Dichloropropane	BDL	µg/L		1.0
cis-1,3-Dichloropropylene	BDL	µg/L		1.0
trans-1,3-Dichloropropylene	BDL	µg/L		1.0
Ethyl benzene	BDL	µg/L		1.0
Methylene Chloride	BDL	µg/L		5.0
1,1,2,2-Tetrachloroethane	BDL	µg/L		1.0
Tetrachloroethylene	BDL	µg/L		1.0
Toluene	2.0	µg/L		1.0
1,1,1-Trichloroethane	13	µg/L		1.0
1,1,2-Trichloroethane	BDL	µg/L		1.0
Trichloroethylene	BDL	µg/L		1.0
Trichlorofluoromethane	BDL	µg/L		1.3
Vinyl Chloride	BDL	µg/L		1.0
Xylene	BDL	µg/L		1.0

Note: This analysis was performed on a TCLP ZHE Leachate Extraction.

BDL = Below Detection Limit

(1) = Method Detection Limit

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Sample ID: ASH12093 Lab ID: 9301137-02

TEST	RESULT	UNITS	METHOD	MDL (1)
Chemical Oxygen Demand	<10	mg/L	EPA 410.4	
Arsenic	<0.005	mg/L	EPA 7060	
Barium	1.8	mg/L	EPA 6010	
Cadmium	0.0017	mg/L	EPA 7131	
Chromium	<0.005	mg/L	EPA 7191	
Copper	0.023	mg/L	EPA 6010	
Lead	<0.005	mg/L	EPA 7421	
Mercury	<0.0002	mg/L	EPA 7470	
Selenium	<0.001	mg/L	EPA 7740	
Silver	<0.01	mg/L	EPA 6010	
Zinc	1.5	mg/L	EPA 6010	

Note: This analysis was performed on an ASTM Leachate Extraction.

BDL = Below Detection Limit

(1) = Method Detection Limit

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Sample ID: ASH12093 Lab ID: 9301137-02

TEST	RESULT	UNITS	METHOD	MDL (1)
Method 601 & 602 Volatiles			EPA 8240	
Benzene	BDL	µg/L		1.0
Bromodichloromethane	BDL	µg/L		1.0
Bromoform	BDL	µg/L		1.0
Bromomethane	BDL	µg/L		1.0
Carbon Tetrachloride	BDL	µg/L		1.0
Chlorobenzene	BDL	µg/L		1.0
Chlorodibromomethane	BDL	µg/L		1.0
Chloroethane	BDL	µg/L		1.0
Chloroform	BDL	µg/L		1.0
2-Chloroethyl Vinyl Ether	BDL	µg/L		2.1
Chloromethane	BDL	µg/L		1.0
1,2-Dichlorobenzene	BDL	µg/L		1.0
1,3-Dichlorobenzene	BDL	µg/L		1.0
1,4-Dichlorobenzene	BDL	µg/L		1.0
Dichlorodifluoromethane	BDL	µg/L		1.0
1,1-Dichloroethane	BDL	µg/L		1.0
1,2-Dichloroethane	BDL	µg/L		1.0
1,1-Dichloroethylene	BDL	µg/L		1.0
cis-1,2-Dichloroethylene	BDL	µg/L		1.0
trans-1,2-Dichloroethylene	BDL	µg/L		1.0
1,2-Dichloropropane	BDL	µg/L		1.0
cis-1,3-Dichloropropylene	BDL	µg/L		1.0
trans-1,3-Dichloropropylene	BDL	µg/L		1.0
Ethyl benzene	BDL	µg/L		1.0
Methylene Chloride	BDL	µg/L		5.0
1,1,2,2-Tetrachloroethane	BDL	µg/L		1.0
Tetrachloroethylene	BDL	µg/L		1.0
Toluene	BDL	µg/L		1.0
1,1,1-Trichloroethane	BDL	µg/L		1.0
1,1,2-Trichloroethane	BDL	µg/L		1.0
Trichloroethylene	BDL	µg/L		1.0
Trichlorofluoromethane	1.7	µg/L		1.3
Vinyl Chloride	BDL	µg/L		1.0
Xylene	BDL	µg/L		1.0

Note: This analysis was performed on a TCLP ZHE Leachate Extraction.

BDL = Below Detection Limit

(1) = Method Detection Limit

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Sample ID: TAIL12093 Lab ID: 9301137-03

TEST	RESULT	UNITS	METHOD	MDL (1)
Chemical Oxygen Demand	120	mg/L	EPA 410.4	
Arsenic	<0.005	mg/L	EPA 7060	
Barium	2.0	mg/L	EPA 6010	
Cadmium	<0.0001	mg/L	EPA 7131	
Chromium	<0.005	mg/L	EPA 7191	
Copper	0.021	mg/L	EPA 6010	
Lead	0.0058	mg/L	EPA 7421	
Mercury	<0.0002	mg/L	EPA 7470	
Selenium	<0.001	mg/L	EPA 7740	
Silver	<0.01	mg/L	EPA 6010	
Zinc	1.6	mg/L	EPA 6010	

Note: This analysis was performed on an ASTM Leachate Extraction.

BDL = Below Detection Limit

(1) = Method Detection Limit

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Sample ID: TAIL12093 Lab ID: 9301137-03

TEST	RESULT	UNITS	METHOD	MDL (1)
Method 601 & 602 Volatiles			EPA 8240	
Benzene	BDL	µg/L		1.0
Bromodichloromethane	BDL	µg/L		1.0
Bromoform	BDL	µg/L		1.0
Bromomethane	BDL	µg/L		1.0
Carbon Tetrachloride	BDL	µg/L		1.0
Chlorobenzene	BDL	µg/L		1.0
Chlorodibromomethane	BDL	µg/L		1.0
Chloroethane	BDL	µg/L		1.0
Chloroform	BDL	µg/L		1.0
2-Chloroethyl Vinyl Ether	BDL	µg/L		2.1
Chloromethane	BDL	µg/L		1.0
1,2-Dichlorobenzene	BDL	µg/L		1.0
1,3-Dichlorobenzene	BDL	µg/L		1.0
1,4-Dichlorobenzene	BDL	µg/L		1.0
Dichlorodifluoromethane	BDL	µg/L		1.0
1,1-Dichloroethane	BDL	µg/L		1.0
1,2-Dichloroethane	BDL	µg/L		1.0
1,1-Dichloroethylene	BDL	µg/L		1.0
cis-1,2-Dichloroethylene	BDL	µg/L		1.0
trans-1,2-Dichloroethylene	BDL	µg/L		1.0
1,2-Dichloropropane	BDL	µg/L		1.0
cis-1,3-Dichloropropylene	BDL	µg/L		1.0
trans-1,3-Dichloropropylene	BDL	µg/L		1.0
Ethyl benzene	BDL	µg/L		1.0
Methylene Chloride	BDL	µg/L		5.0
1,1,2,2-Tetrachloroethane	BDL	µg/L		1.0
Tetrachloroethylene	BDL	µg/L		1.0
Toluene	5.5	µg/L		1.0
1,1,1-Trichloroethane	BDL	µg/L		1.0
1,1,2-Trichloroethane	BDL	µg/L		1.0
Trichloroethylene	BDL	µg/L		1.0
Trichlorofluoromethane	BDL	µg/L		1.3
Vinyl Chloride	BDL	µg/L		1.0
Xylene	1.2	µg/L		1.0

Note: This analysis was performed on a TCLP ZHE Leachate Extraction.

BDL = Below Detection Limit

(1) = Method Detection Limit

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WESTERN MICHIGAN
ENVIRONMENTAL SERVICES, INC.

3352 128th Avenue, Holland, Michigan 49424-9263
Phone: 616-399-6070 FAX 616-399-6185

MEN00534

SENT TO: Menasha Corporation
320 North Farmer
Otsego, Michigan 49078

Attn: Gary Roys
Re: Quarterly Report

DATE: April 19, 1993

ANALYSIS OF: Waste Samples

REPORTED BY: Robert K. Zahray, Laboratory Manager

DATE RECEIVED: Received from client on April 2, 1993.

Sample ID: COMPACTOR 393 Lab ID: 9304008-01

TEST	RESULT	UNITS	ANALYZED	METHOD	MDL
Chemical Oxygen Demand	530	mg/L	04/08/93	EPA 410.4	10
Arsenic	0.0034	mg/L	04/08/93	EPA 7060	0.001
Barium	16	mg/L	04/14/93	EPA 6010	0.01
Cadmium	BDL	mg/L	04/14/93	EPA 7131	0.0001
Chromium	BDL	mg/L	04/13/93	EPA 7191	0.005
Copper	0.028	mg/L	04/14/93	EPA 6010	0.01
Lead	0.0056	mg/L	04/12/93	EPA 7421	0.001
Mercury	0.0004	mg/L	04/12/93	EPA 7470	0.0002
Selenium	BDL	mg/L	04/12/93	EPA 7740	0.001
Silver	0.011	mg/L	04/16/93	EPA 6010	0.01
Zinc	1.6	mg/L	04/14/93	EPA 6010	0.02

Note: This analysis was performed on an ASTM Leachate Extraction.

BDL = Below Detection Limit

MDL = Method Detection Limit

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Sample ID: COMPACTOR 393 Lab ID: 9304008-01

TEST	RESULT	UNITS	ANALYZED	METHOD	MDL
Method 601 & 602 Volatiles				EPA 8240	
Benzene	BDL	µg/L	04/06/93		1.0
Bromodichloromethane	BDL	µg/L	04/06/93		1.0
Bromoform	BDL	µg/L	04/06/93		1.0
Bromomethane	BDL	µg/L	04/06/93		1.0
Carbon Tetrachloride	BDL	µg/L	04/06/93		1.0
Chlorobenzene	BDL	µg/L	04/06/93		1.0
Chlorodibromomethane	BDL	µg/L	04/06/93		1.0
Chloroethane	BDL	µg/L	04/06/93		1.0
Chloroform	BDL	µg/L	04/06/93		1.0
2-Chloroethyl Vinyl Ether	BDL	µg/L	04/06/93		2.1
Chloromethane	BDL	µg/L	04/06/93		1.0
1,2-Dichlorobenzene	BDL	µg/L	04/06/93		1.0
1,3-Dichlorobenzene	BDL	µg/L	04/06/93		1.0
1,4-Dichlorobenzene	BDL	µg/L	04/06/93		1.0
Dichlorodifluoromethane	BDL	µg/L	04/06/93		1.0
1,1-Dichloroethane	BDL	µg/L	04/06/93		1.0
1,2-Dichloroethane	BDL	µg/L	04/06/93		1.0
1,1-Dichloroethylene	BDL	µg/L	04/06/93		1.0
cis-1,2-Dichloroethylene	BDL	µg/L	04/06/93		1.0
trans-1,2-Dichloroethylene	BDL	µg/L	04/06/93		1.0
1,2-Dichloropropane	BDL	µg/L	04/06/93		1.0
cis-1,3-Dichloropropylene	BDL	µg/L	04/06/93		35
trans-1,3-Dichloropropylene	BDL	µg/L	04/06/93		1.0
Ethyl benzene	1.3	µg/L	04/06/93		1.0
Methylene Chloride	BDL	µg/L	04/06/93		5.0
1,1,2,2-Tetrachloroethane	BDL	µg/L	04/06/93		1.0
Tetrachloroethylene	BDL	µg/L	04/06/93		1.0
Toluene	1.5	µg/L	04/06/93		1.0
1,1,1-Trichloroethane	BDL	µg/L	04/06/93		1.0
1,1,2-Trichloroethane	BDL	µg/L	04/06/93		1.0
Trichloroethylene	BDL	µg/L	04/06/93		1.0
Trichlorofluoromethane	BDL	µg/L	04/06/93		1.3
Vinyl Chloride	BDL	µg/L	04/06/93		1.0
Xylene	4.6	µg/L	04/06/93		1.0

Note: This analysis was performed on a TCLP ZHE Leachate Extraction.

BDL = Below Detection Limit

MDL = Method Detection Limit

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WESTERN MICHIGAN ENVIRONMENTAL SERVICES, INC.

MEN00536

Sample ID: ASH 393 Lab ID: 9304008-02

TEST	RESULT	UNITS	ANALYZED	METHOD	MDL
Chemical Oxygen Demand	BDL	mg/L	04/08/93	EPA 410.4	10
Arsenic	0.0038	mg/L	04/08/93	EPA 7060	0.001
Barium	1.6	mg/L	04/14/93	EPA 6010	0.01
Cadmium	BDL	mg/L	04/14/93	EPA 7131	0.0001
Chromium	BDL	mg/L	04/13/93	EPA 7191	0.005
Copper	BDL	mg/L	04/14/93	EPA 6010	0.01
Lead	BDL	mg/L	04/12/93	EPA 7421	0.001
Mercury	BDL	mg/L	04/12/93	EPA 7470	0.0002
Selenium	0.0024	mg/L	04/12/93	EPA 7740	0.001
Silver	BDL	mg/L	04/16/93	EPA 6010	0.01
Zinc	0.32	mg/L	04/14/93	EPA 6010	0.02

Note: This analysis was performed on an ASTM Leachate Extraction.

BDL = Below Detection Limit

MDL = Method Detection Limit

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Sample ID: ASH 393 Lab ID: 9304008-02

TEST	RESULT	UNITS	ANALYZED	METHOD	MDL
Method 601 & 602 Volatiles				EPA 8240	
Benzene	BDL	µg/L	04/06/93		1.0
Bromodichloromethane	BDL	µg/L	04/06/93		1.0
Bromoform	BDL	µg/L	04/06/93		1.0
Bromomethane	BDL	µg/L	04/06/93		1.0
Carbon Tetrachloride	BDL	µg/L	04/06/93		1.0
Chlorobenzene	BDL	µg/L	04/06/93		1.0
Chlorodibromomethane	BDL	µg/L	04/06/93		1.0
Chloroethane	BDL	µg/L	04/06/93		1.0
Chloroform	BDL	µg/L	04/06/93		1.0
2-Chloroethyl Vinyl Ether	BDL	µg/L	04/06/93		2.1
Chloromethane	BDL	µg/L	04/06/93		1.0
1,2-Dichlorobenzene	BDL	µg/L	04/06/93		1.0
1,3-Dichlorobenzene	BDL	µg/L	04/06/93		1.0
1,4-Dichlorobenzene	BDL	µg/L	04/06/93		1.0
Dichlorodifluoromethane	BDL	µg/L	04/06/93		1.0
1,1-Dichloroethane	BDL	µg/L	04/06/93		1.0
1,2-Dichloroethane	BDL	µg/L	04/06/93		1.0
1,1-Dichloroethylene	BDL	µg/L	04/06/93		1.0
cis-1,2-Dichloroethylene	BDL	µg/L	04/06/93		1.0
trans-1,2-Dichloroethylene	BDL	µg/L	04/06/93		1.0
1,2-Dichloropropane	BDL	µg/L	04/06/93		1.0
cis-1,3-Dichloropropylene	BDL	µg/L	04/06/93		5.0
trans-1,3-Dichloropropylene	BDL	µg/L	04/06/93		1.0
Ethyl benzene	BDL	µg/L	04/06/93		1.0
Methylene Chloride	BDL	µg/L	04/06/93		5.0
1,1,2,2-Tetrachloroethane	BDL	µg/L	04/06/93		1.0
Tetrachloroethylene	BDL	µg/L	04/06/93		1.0
Toluene	BDL	µg/L	04/06/93		1.0
1,1,1-Trichloroethane	BDL	µg/L	04/06/93		1.0
1,1,2-Trichloroethane	BDL	µg/L	04/06/93		1.0
Trichloroethylene	BDL	µg/L	04/06/93		1.0
Trichlorofluoromethane	BDL	µg/L	04/06/93		1.3
Vinyl Chloride	BDL	µg/L	04/06/93		1.0
Xylene	BDL	µg/L	04/06/93		1.0

Note: This analysis was performed on a TCLP ZHE Leachate Extraction.

BDL = Below Detection Limit

MDL = Method Detection Limit

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Sample ID: TAIL 393 Lab ID: 9304008-03

TEST	RESULT	UNITS	ANALYZED	METHOD	MDL
Chemical Oxygen Demand	200	mg/L	04/08/93	EPA 410.4	10
Arsenic	0.0014	mg/L	04/08/93	EPA 7060	0.001
Barium	11	mg/L	04/14/93	EPA 6010	0.01
Cadmium	BDL	mg/L	04/14/93	EPA 7131	0.0001
Chromium	BDL	mg/L	04/13/93	EPA 7191	0.005
Copper	0.012	mg/L	04/14/93	EPA 6010	0.01
Lead	0.0059	mg/L	04/12/93	EPA 7421	0.001
Mercury	0.0002	mg/L	04/12/93	EPA 7470	0.0002
Selenium	BDL	mg/L	04/12/93	EPA 7740	0.001
Silver	BDL	mg/L	04/16/93	EPA 6010	0.01
Zinc	1.0	mg/L	04/14/93	EPA 6010	0.02

Note: This analysis was performed on an ASTM Leachate Extraction.

BDL = Below Detection Limit

MDL = Method Detection Limit

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Sample ID: TAIL 393 Lab ID: 9304008-03

TEST	RESULT	UNITS	ANALYZED	METHOD	MDL
Method 601 & 602 Volatiles				EPA 8240	
Benzene	BDL	µg/L	04/06/93		1.0
Bromodichloromethane	BDL	µg/L	04/06/93		1.0
Bromoform	BDL	µg/L	04/06/93		1.0
Bromomethane	BDL	µg/L	04/06/93		1.0
Carbon Tetrachloride	BDL	µg/L	04/06/93		1.0
Chlorobenzene	BDL	µg/L	04/06/93		1.0
Chlorodibromomethane	BDL	µg/L	04/06/93		1.0
Chloroethane	BDL	µg/L	04/06/93		1.0
Chloroform	BDL	µg/L	04/06/93		1.0
2-Chloroethyl Vinyl Ether	BDL	µg/L	04/06/93		2.1
Chloromethane	BDL	µg/L	04/06/93		1.0
1,2-Dichlorobenzene	BDL	µg/L	04/06/93		1.0
1,3-Dichlorobenzene	BDL	µg/L	04/06/93		1.0
1,4-Dichlorobenzene	BDL	µg/L	04/06/93		1.0
Dichlorodifluoromethane	BDL	µg/L	04/06/93		1.0
1,1-Dichloroethane	BDL	µg/L	04/06/93		1.0
1,2-Dichloroethane	BDL	µg/L	04/06/93		1.0
1,1-Dichloroethylene	BDL	µg/L	04/06/93		1.0
cis-1,2-Dichloroethylene	BDL	µg/L	04/06/93		1.0
trans-1,2-Dichloroethylene	BDL	µg/L	04/06/93		1.0
1,2-Dichloropropane	BDL	µg/L	04/06/93		1.0
cis-1,3-Dichloropropylene	BDL	µg/L	04/06/93		35
trans-1,3-Dichloropropylene	BDL	µg/L	04/06/93		1.0
Ethyl benzene	BDL	µg/L	04/06/93		1.0
Methylene Chloride	BDL	µg/L	04/06/93		5.0
1,1,2,2-Tetrachloroethane	BDL	µg/L	04/06/93		1.0
Tetrachloroethylene	BDL	µg/L	04/06/93		1.0
Toluene	2.5	µg/L	04/06/93		1.0
1,1,1-Trichloroethane	5.9	µg/L	04/06/93		1.0
1,1,2-Trichloroethane	BDL	µg/L	04/06/93		1.0
Trichloroethylene	BDL	µg/L	04/06/93		1.0
Trichlorofluoromethane	BDL	µg/L	04/06/93		1.3
Vinyl Chloride	BDL	µg/L	04/06/93		1.0
Xylene	1.7	µg/L	04/06/93		1.0

Note: This analysis was performed on a TCLP ZHE Leachate Extraction.

BDL = Below Detection Limit

MDL = Method Detection Limit

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WESTERN MICHIGAN
ENVIRONMENTAL SERVICES, INC.

3352 128th Avenue, Holland, Michigan 49424-9263
Phone: 616-399-6070 FAX: 616-399-6185

MEN00540

SENT TO: Menasha Corporation
320 North Farmer
Otsego, Michigan 49078

Attn: Gary Roys
Re: Quarterly Report

DATE: August 2, 1993

ANALYSIS OF: Waste Samples

REPORTED BY: Robert K. Zahray, Laboratory Manager

DATE RECEIVED: Received from client on July 6, 1993.

Sample ID: Compactor 693 Lab ID: 9307029-01

TEST	RESULT	UNITS	ANALYZED	BY	METHOD	MDL
ASTM Leachate Extraction	07/09/93	date extracted		JA	D3987-85	
Chemical Oxygen Demand	410	mg/L	07/20/93	WS	EPA 410.4	10
Acid Digestion, Aqueous	07/13/93	date digested		CJK	EPA 3010	
Arsenic	BDL	mg/L	07/26/93	CJK	EPA 7060	0.001
Barium	0.53	mg/L	07/22/93	ST	EPA 6010	0.01
Cadmium	BDL	mg/L	07/21/93	CJK	EPA 7131	0.0001
Chromium	BDL	mg/L	07/20/93	CJK	EPA 7191	0.005
Copper	0.016	mg/L	07/22/93	ST	EPA 6010	0.01
Lead	0.0064	mg/L	07/23/93	CJK	EPA 7421	0.001
Mercury	BDL	mg/L	07/12/93	MBR	EPA 7470	0.0002
Selenium	BDL	mg/L	07/29/93	JA	EPA 7740	0.001
Silver	BDL	mg/L	07/22/93	ST	EPA 6010	0.01
Zinc	0.22	mg/L	07/22/93	ST	EPA 6010	0.02
Method 601 & 602 Volatiles					EPA 8240	
Benzene	BDL	µg/L	07/28/93	HL		1.0
Bromodichloromethane	BDL	µg/L	07/28/93	HL		1.0
Bromoform	BDL	µg/L	07/28/93	HL		1.0
Bromomethane	BDL	µg/L	07/28/93	HL		1.0
Carbon Tetrachloride	BDL	µg/L	07/28/93	HL		1.0
Chlorobenzene	BDL	µg/L	07/28/93	HL		1.0
Chlorodibromomethane	BDL	µg/L	07/28/93	HL		1.0
Chloroethane	BDL	µg/L	07/28/93	HL		1.0
Chloroform	BDL	µg/L	07/28/93	HL		1.0
2-Chloroethyl Vinyl Ether	BDL	µg/L	07/28/93	HL		2.1
Chloromethane	BDL	µg/L	07/28/93	HL		1.0
1,2-Dichlorobenzene	BDL	µg/L	07/28/93	HL		1.0
1,3-Dichlorobenzene	BDL	µg/L	07/28/93	HL		1.0
1,4-Dichlorobenzene	BDL	µg/L	07/28/93	HL		1.0
Dichlorodifluoromethane	BDL	µg/L	07/28/93	HL		1.0
1,1-Dichloroethane	BDL	µg/L	07/28/93	HL		1.0
1,2-Dichloroethane	BDL	µg/L	07/28/93	HL		1.0
1,1-Dichloroethylene	BDL	µg/L	07/28/93	HL		1.0
cis-1,2-Dichloroethylene	BDL	µg/L	07/28/93	HL		1.0
trans-1,2-Dichloroethylene	BDL	µg/L	07/28/93	HL		1.0
1,2-Dichloropropane	BDL	µg/L	07/28/93	HL		1.0
cis-1,3-Dichloropropylene	BDL	µg/L	07/28/93	HL		1.0

Note: The Method 601 & 602 Volatiles were run on a TCLP ZHE Extraction.

BDL = Below Detection Limit

MDL = Method Detection Limit

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Sample ID: Compactor 693 Lab ID: 9307029-01

TEST	RESULT	UNITS	ANALYZED	BY	METHOD	MDL
Method 601 & 602 Volatiles					EPA 8240	
trans-1,3-Dichloropropylene	BDL	µg/L	07/28/93	HL		1.0
Ethyl benzene	BDL	µg/L	07/28/93	HL		1.0
Methylene Chloride	BDL	µg/L	07/28/93	HL		5.0
1,1,2,2-Tetrachloroethane	BDL	µg/L	07/28/93	HL		1.0
Tetrachloroethylene	BDL	µg/L	07/28/93	HL		1.0
Toluene	BDL	µg/L	07/28/93	HL		1.0
1,1,1-Trichloroethane	1.3	µg/L	07/28/93	HL		1.0
1,1,2-Trichloroethane	BDL	µg/L	07/28/93	HL		1.0
Trichloroethylene	BDL	µg/L	07/28/93	HL		1.0
Trichlorofluoromethane	BDL	µg/L	07/28/93	HL		1.3
Vinyl Chloride	BDL	µg/L	07/28/93	HL		1.0
Xylene	BDL	µg/L	07/28/93	HL		1.0

Note: The Method 601 & 602 Volatiles were run on a TCLP ZHE Extraction.

BDL = Below Detection Limit

MDL = Method Detection Limit

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Sample ID: Fly Ash 693 Lab ID: 9307029-02

TEST	RESULT	UNITS	ANALYZED	BY	METHOD	MDL
ASTM Leachate Extraction	07/09/93	date extracted		JA	D3987-85	
Chemical Oxygen Demand	BDL	mg/L	07/15/93	WS	EPA 410.4	10
Acid Digestion, Aqueous	07/13/93	date digested		CJK	EPA 3010	
Arsenic	0.019	mg/L	07/26/93	CJK	EPA 7060	0.001
Barium	0.14	mg/L	07/22/93	ST	EPA 6010	0.01
Cadmium	BDL	mg/L	07/21/93	CJK	EPA 7131	0.0001
Chromium	BDL	mg/L	07/20/93	CJK	EPA 7191	0.005
Copper	BDL	mg/L	07/22/93	ST	EPA 6010	0.01
Lead	0.0022	mg/L	07/23/93	CJK	EPA 7421	0.001
Mercury	BDL	mg/L	07/12/93	MBR	EPA 7470	0.0002
Selenium	0.0036	mg/L	07/29/93	JA	EPA 7740	0.001
Silver	BDL	mg/L	07/22/93	ST	EPA 6010	0.01
Zinc	0.058	mg/L	07/22/93	ST	EPA 6010	0.02
Method 601 & 602 Volatiles					EPA 8240	
Benzene	BDL	µg/L	07/28/93	HL		1.0
Bromodichloromethane	BDL	µg/L	07/28/93	HL		1.0
Bromoform	BDL	µg/L	07/28/93	HL		1.0
Bromomethane	BDL	µg/L	07/28/93	HL		1.0
Carbon Tetrachloride	BDL	µg/L	07/28/93	HL		1.0
Chlorobenzene	BDL	µg/L	07/28/93	HL		1.0
Chlorodibromomethane	BDL	µg/L	07/28/93	HL		1.0
Chloroethane	BDL	µg/L	07/28/93	HL		1.0
Chloroform	BDL	µg/L	07/28/93	HL		1.0
2-Chloroethyl Vinyl Ether	BDL	µg/L	07/28/93	HL		2.1
Chloromethane	BDL	µg/L	07/28/93	HL		1.0
1,2-Dichlorobenzene	BDL	µg/L	07/28/93	HL		1.0
3-Dichlorobenzene	BDL	µg/L	07/28/93	HL		1.0
4-Dichlorobenzene	BDL	µg/L	07/28/93	HL		1.0
ichlorodifluoromethane	BDL	µg/L	07/28/93	HL		1.0
1,1-Dichloroethane	BDL	µg/L	07/28/93	HL		1.0
1,2-Dichloroethane	BDL	µg/L	07/28/93	HL		1.0
1,1-Dichloroethylene	BDL	µg/L	07/28/93	HL		1.0
cis-1,2-Dichloroethylene	BDL	µg/L	07/28/93	HL		1.0
trans-1,2-Dichloroethylene	BDL	µg/L	07/28/93	HL		1.0
1,2-Dichloropropane	BDL	µg/L	07/28/93	HL		1.0
cis-1,3-Dichloropropylene	BDL	µg/L	07/28/93	HL		1.0
trans-1,3-Dichloropropylene	BDL	µg/L	07/28/93	HL		1.0
Ethyl benzene	BDL	µg/L	07/28/93	HL		1.0
Methylene Chloride	20	µg/L	07/28/93	HL		5.0
1,1,2,2-Tetrachloroethane	BDL	µg/L	07/28/93	HL		1.0
Tetrachloroethylene	BDL	µg/L	07/28/93	HL		1.0
Toluene	BDL	µg/L	07/28/93	HL		1.0
1,1,1-Trichloroethane	BDL	µg/L	07/28/93	HL		1.0
1,1,2-Trichloroethane	BDL	µg/L	07/28/93	HL		1.0
Trichloroethylene	BDL	µg/L	07/28/93	HL		1.0
Trichlorofluoromethane	BDL	µg/L	07/28/93	HL		1.3
Vinyl Chloride	BDL	µg/L	07/28/93	HL		1.0
Xylene	BDL	µg/L	07/28/93	HL		1.0

Note: The Method 601 & 602 Volatiles were run on a TCLP ZHE Extraction.

BDL = Below Detection Limit

MDL = Method Detection Limit

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Sample ID: Tail 693 Lab ID: 9307029-03

TEST	RESULT	UNITS	ANALYZED	BY	METHOD	MDL
ASTM Leachate Extraction	07/09/93	date extracted		JA	D3987-85	
Chemical Oxygen Demand	120	mg/L	07/15/93	WS	EPA 410.4	10
Acid Digestion, Aqueous	07/13/93	date digested		CJK	EPA 3010	
Arsenic	BDL	mg/L	07/26/93	CJK	EPA 7060	0.001
Barium	0.25	mg/L	07/22/93	ST	EPA 6010	0.01
Cadmium	BDL	mg/L	07/21/93	CJK	EPA 7131	0.0001
Chromium	BDL	mg/L	07/20/93	CJK	EPA 7191	0.005
Copper	BDL	mg/L	07/22/93	ST	EPA 6010	0.01
Lead	0.0057	mg/L	07/29/93	JA	EPA 7421	0.001
Mercury	BDL	mg/L	07/12/93	MBR	EPA 7470	0.0002
Selenium	BDL	mg/L	07/29/93	JA	EPA 7740	0.001
Silver	BDL	mg/L	07/22/93	ST	EPA 6010	0.01
Zinc	0.14	mg/L	07/22/93	ST	EPA 6010	0.02
Method 601 & 602 Volatiles					EPA 8240	
Benzene	BDL	µg/L	07/28/93	HL		1.0
Bromodichloromethane	BDL	µg/L	07/28/93	HL		1.0
Bromoform	BDL	µg/L	07/28/93	HL		1.0
Bromomethane	BDL	µg/L	07/28/93	HL		1.0
Carbon Tetrachloride	BDL	µg/L	07/28/93	HL		1.0
Chlorobenzene	BDL	µg/L	07/28/93	HL		1.0
Chlorodibromomethane	BDL	µg/L	07/28/93	HL		1.0
Chloroethane	BDL	µg/L	07/28/93	HL		1.0
Chloroform	BDL	µg/L	07/28/93	HL		1.0
2-Chloroethyl Vinyl Ether	BDL	µg/L	07/28/93	HL		2.1
Chloromethane	BDL	µg/L	07/28/93	HL		1.0
1,2-Dichlorobenzene	BDL	µg/L	07/28/93	HL		1.0
3-Dichlorobenzene	BDL	µg/L	07/28/93	HL		1.0
4-Dichlorobenzene	BDL	µg/L	07/28/93	HL		1.0
Dichlorodifluoromethane	BDL	µg/L	07/28/93	HL		1.0
1,1-Dichloroethane	BDL	µg/L	07/28/93	HL		1.0
1,2-Dichloroethane	BDL	µg/L	07/28/93	HL		1.0
1,1-Dichloroethylene	BDL	µg/L	07/28/93	HL		1.0
cis-1,2-Dichloroethylene	BDL	µg/L	07/28/93	HL		1.0
trans-1,2-Dichloroethylene	BDL	µg/L	07/28/93	HL		1.0
1,2-Dichloropropane	BDL	µg/L	07/28/93	HL		1.0
cis-1,3-Dichloropropylene	BDL	µg/L	07/28/93	HL		1.0
trans-1,3-Dichloropropylene	BDL	µg/L	07/28/93	HL		1.0
Ethyl benzene	BDL	µg/L	07/28/93	HL		1.0
Methylene Chloride	BDL	µg/L	07/28/93	HL		5.0
1,1,2,2-Tetrachloroethane	BDL	µg/L	07/28/93	HL		1.0
Tetrachloroethylene	BDL	µg/L	07/28/93	HL		1.0
Toluene	BDL	µg/L	07/28/93	HL		1.0
1,1,1-Trichloroethane	BDL	µg/L	07/28/93	HL		1.0
1,1,2-Trichloroethane	BDL	µg/L	07/28/93	HL		1.0
Trichloroethylene	BDL	µg/L	07/28/93	HL		1.0
Trichlorofluoromethane	BDL	µg/L	07/28/93	HL		1.3
Vinyl Chloride	BDL	µg/L	07/28/93	HL		1.0
Xylene	BDL	µg/L	07/28/93	HL		1.0

Note: The Method 601 & 602 Volatiles were run on a TCLP ZHE Extraction.

BDL = Below Detection Limit

MDL = Method Detection Limit

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WESTERN MICHIGAN
ENVIRONMENTAL SERVICES, INC.

3352 128th Avenue, Holland, Michigan 49424-9263
Phone: 616-399-6070 FAX: 616-399-6185

MEN00544

SENT TO: Menasha Corporation
320 North Farmer
Otsego, Michigan 49078

Attn: Gary Roys
Re: Quarterly Report

DATE: November 3, 1993

ANALYSIS OF: Waste Samples

REPORTED BY: Robert K. Zahray (FBB)
Robert K. Zahray, Laboratory Manager

DATE RECEIVED: Received from client on October 4, 1993.

Sample ID: 993 Compactor Lab ID: 9310011-01

TEST	RESULT	UNITS	ANALYZED	BY	METHOD	MDL
ASTM Leachate Extraction	10/09/93	date extracted	10/09/93	JA	D3987-85	
Chemical Oxygen Demand	190	mg/L	10/15/93	WS	EPA 410.4	5
Arsenic	BDL	mg/L	10/25/93	JA	EPA 7060	0.001
Barium	0.32	mg/L	10/17/93	JA	EPA 6010	0.01
Cadmium	BDL	mg/L	10/28/93	JA	EPA 7131	0.0001
Chromium	0.0021	mg/L	10/31/93	JA	EPA 7191	0.002
Copper	BDL	mg/L	10/17/93	JA	EPA 6010	0.01
Lead	0.0022	mg/L	10/20/93	JA	EPA 7421	0.001
Mercury	BDL	mg/L	10/11/93	MBR	EPA 7470	0.0002
Selenium	BDL	mg/L	10/29/93	JA	EPA 7740	0.001
Silver	BDL	mg/L	10/17/93	JA	EPA 6010	0.01
Zinc	0.14	mg/L	10/17/93	JA	EPA 6010	0.02

Note: This analysis was performed on an ASTM Leachate Extraction.

BDL = Below Detection Limit

MDL = Method Detection Limit

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Sample ID: 993 Compactor Lab ID: 9310011-01

TEST	RESULT	UNITS	ANALYZED	BY	METHOD	MDL
Method 601 & 602 Volatiles					EPA 8240	
Benzene	BDL	µg/L	10/27/93	HL		1.0
Bromodichloromethane	BDL	µg/L	10/27/93	HL		1.0
Bromoform	BDL	µg/L	10/27/93	HL		1.0
Bromomethane	BDL	µg/L	10/27/93	HL		1.0
Carbon Tetrachloride	BDL	µg/L	10/27/93	HL		1.0
Chlorobenzene	BDL	µg/L	10/27/93	HL		1.0
Chlorodibromomethane	BDL	µg/L	10/27/93	HL		1.0
Chloroethane	BDL	µg/L	10/27/93	HL		1.0
Chloroform	BDL	µg/L	10/27/93	HL		1.0
2-Chloroethyl Vinyl Ether	BDL	µg/L	10/27/93	HL		2.1
Chloromethane	BDL	µg/L	10/27/93	HL		1.0
1,2-Dichlorobenzene	BDL	µg/L	10/27/93	HL		1.0
1,3-Dichlorobenzene	BDL	µg/L	10/27/93	HL		1.0
1,4-Dichlorobenzene	BDL	µg/L	10/27/93	HL		1.0
Dichlorodifluoromethane	BDL	µg/L	10/27/93	HL		1.0
1,1-Dichloroethane	BDL	µg/L	10/27/93	HL		1.0
1,2-Dichloroethane	BDL	µg/L	10/27/93	HL		1.0
1,1-Dichloroethylene	BDL	µg/L	10/27/93	HL		1.0
cis-1,2-Dichloroethylene	BDL	µg/L	10/27/93	HL		1.0
trans-1,2-Dichloroethylene	BDL	µg/L	10/27/93	HL		1.0
1,2-Dichloropropane	BDL	µg/L	10/27/93	HL		1.0
cis-1,3-Dichloropropylene	BDL	µg/L	10/27/93	HL		1.0
trans-1,3-Dichloropropylene	BDL	µg/L	10/27/93	HL		1.0
Ethyl benzene	BDL	µg/L	10/27/93	HL		1.0
Methylene Chloride	BDL	µg/L	10/27/93	HL		5.0
1,1,2,2-Tetrachloroethane	BDL	µg/L	10/27/93	HL		1.0
Tetrachloroethylene	BDL	µg/L	10/27/93	HL		1.0
Toluene	2.1	µg/L	10/27/93	HL		1.0
1,1,1-Trichloroethane	1.6	µg/L	10/27/93	HL		1.0
1,1,2-Trichloroethane	BDL	µg/L	10/27/93	HL		1.0
Trichloroethylene	BDL	µg/L	10/27/93	HL		1.4
Trichlorofluoromethane	BDL	µg/L	10/27/93	HL		1.3
Vinyl Chloride	1.3	µg/L	10/27/93	HL		1.0
Xylene	2.9	µg/L	10/27/93	HL		1.0

Note: This analysis was performed on a TCLP Leachate Extraction.

BDL = Below Detection Limit

MDL = Method Detection Limit

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Sample ID: 993 Ash Lab ID: 9310011-02

T	RESULT	UNITS	ANALYZED	BY	METHOD	MDL
ASTM Leachate Extraction	10/09/93	date extracted	10/09/93	JA	D3987-85	
Chemical Oxygen Demand	BDL	mg/L	10/15/93	WS	EPA 410.4	5
Arsenic	0.044	mg/L	10/15/93	JA	EPA 7060	0.001
Barium	1.0	mg/L std. add.	10/15/93	CJK	EPA 7080	0.01
Cadmium	BDL	mg/L	10/28/93	JA	EPA 7131	0.0001
Chromium	0.0023	mg/L	10/16/93	JA	EPA 7191	0.002
Copper	BDL	mg/L	10/14/93	CJK	EPA 6010	0.01
Lead	BDL	mg/L	10/15/93	JA	EPA 7421	0.001
Mercury	BDL	mg/L	10/11/93	MBR	EPA 7470	0.0002
Selenium	0.0077	mg/L	10/29/93	JA	EPA 7740	0.001
Silver	0.023	mg/L	10/14/93	CJK	EPA 6010	0.01
Zinc	0.027	mg/L	10/14/93	CJK	EPA 6010	0.02

Note: This analysis was performed on an ASTM Leachate Extraction.

BDL = Below Detection Limit

MDL = Method Detection Limit

Printed on Recycled Paper

Sample ID: 993 Ash Lab ID: 9310011-02

TEST	RESULT	UNITS	ANALYZED	BY	METHOD	MDL
Method 601 & 602 Volatiles					EPA 8240	
Benzene	BDL	µg/L	10/27/93	HL		1.0
Bromodichloromethane	BDL	µg/L	10/27/93	HL		1.0
Bromoform	BDL	µg/L	10/27/93	HL		1.0
Bromomethane	BDL	µg/L	10/27/93	HL		1.0
Carbon Tetrachloride	BDL	µg/L	10/27/93	HL		1.0
Chlorobenzene	BDL	µg/L	10/27/93	HL		1.0
Chlorodibromomethane	BDL	µg/L	10/27/93	HL		1.0
Chloroethane	BDL	µg/L	10/27/93	HL		1.0
Chloroform	BDL	µg/L	10/27/93	HL		1.0
2-Chloroethyl Vinyl Ether	BDL	µg/L	10/27/93	HL		2.1
Chloromethane	BDL	µg/L	10/27/93	HL		1.0
1,2-Dichlorobenzene	BDL	µg/L	10/27/93	HL		1.0
1,3-Dichlorobenzene	BDL	µg/L	10/27/93	HL		1.0
1,4-Dichlorobenzene	BDL	µg/L	10/27/93	HL		1.0
Dichlorodifluoromethane	BDL	µg/L	10/27/93	HL		1.0
1,1-Dichloroethane	BDL	µg/L	10/27/93	HL		1.0
1,2-Dichloroethane	BDL	µg/L	10/27/93	HL		1.0
1,1-Dichloroethylene	BDL	µg/L	10/27/93	HL		1.0
cis-1,2-Dichloroethylene	BDL	µg/L	10/27/93	HL		1.0
trans-1,2-Dichloroethylene	BDL	µg/L	10/27/93	HL		1.0
1,2-Dichloropropane	BDL	µg/L	10/27/93	HL		1.0
cis-1,3-Dichloropropylene	BDL	µg/L	10/27/93	HL		1.0
trans-1,3-Dichloropropylene	BDL	µg/L	10/27/93	HL		1.0
Ethyl benzene	BDL	µg/L	10/27/93	HL		1.0
Methylene Chloride	BDL	µg/L	10/27/93	HL		5.0
1,1,2,2-Tetrachloroethane	BDL	µg/L	10/27/93	HL		1.0
Tetrachloroethylene	BDL	µg/L	10/27/93	HL		1.0
Toluene	BDL	µg/L	10/27/93	HL		1.0
1,1,1-Trichloroethane	BDL	µg/L	10/27/93	HL		1.0
1,1,2-Trichloroethane	BDL	µg/L	10/27/93	HL		1.0
Trichloroethylene	BDL	µg/L	10/27/93	HL		1.4
Trichlorofluoromethane	BDL	µg/L	10/27/93	HL		1.3
Vinyl Chloride	BDL	µg/L	10/27/93	HL		1.0
Xylene	BDL	µg/L	10/27/93	HL		1.0

Note: This analysis was performed on a TCLP Leachate Extraction.

BDL = Below Detection Limit

MDL = Method Detection Limit

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Sample ID: 993 Tail Compactor Lab ID: 9310011-03

TEST	RESULT	UNITS	ANALYZED	BY	METHOD	MDL
ASTM Leachate Extraction	10/09/93	date extracted	10/09/93	JA	D3987-85	
Chemical Oxygen Demand	150	mg/L	10/15/93	WS	EPA 410.4	5
Arsenic	BDL	mg/L	10/25/93	JA	EPA 7060	0.001
Barium	0.22	mg/L	10/17/93	JA	EPA 6010	0.01
Cadmium	0.0006	mg/L	10/28/93	JA	EPA 7131	0.0001
Chromium	BDL	mg/L	10/31/93	JA	EPA 7191	0.002
Copper	BDL	mg/L	10/17/93	JA	EPA 6010	0.01
Lead	0.0056	mg/L	10/20/93	JA	EPA 7421	0.001
Mercury	BDL	mg/L	10/11/93	MBR	EPA 7470	0.0002
Selenium	BDL	mg/L	10/29/93	JA	EPA 7740	0.001
Silver	BDL	mg/L	10/17/93	JA	EPA 6010	0.01
Zinc	0.14	mg/L	10/17/93	JA	EPA 6010	0.02

Note: This analysis was performed on an ASTM Leachate Extraction.

BDL = Below Detection Limit

MDL = Method Detection Limit

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Sample ID: 993 Tail Compactor Lab ID: 9310011-03

TEST	RESULT	UNITS	ANALYZED	BY	METHOD	MDL
Method 601 & 602 Volatiles					EPA 8240	
Benzene	BDL	µg/L	10/27/93	HL		1.0
Bromodichloromethane	BDL	µg/L	10/27/93	HL		1.0
Bromoform	BDL	µg/L	10/27/93	HL		1.0
Bromomethane	BDL	µg/L	10/27/93	HL		1.0
Carbon Tetrachloride	BDL	µg/L	10/27/93	HL		1.0
Chlorobenzene	BDL	µg/L	10/27/93	HL		1.0
Chlorodibromomethane	BDL	µg/L	10/27/93	HL		1.0
Chloroethane	BDL	µg/L	10/27/93	HL		1.0
Chloroform	BDL	µg/L	10/27/93	HL		1.0
2-Chloroethyl Vinyl Ether	BDL	µg/L	10/27/93	HL		2.1
Chloromethane	BDL	µg/L	10/27/93	HL		1.0
1,2-Dichlorobenzene	BDL	µg/L	10/27/93	HL		1.0
1,3-Dichlorobenzene	BDL	µg/L	10/27/93	HL		1.0
1,4-Dichlorobenzene	BDL	µg/L	10/27/93	HL		1.0
Dichlorodifluoromethane	BDL	µg/L	10/27/93	HL		1.0
1,1-Dichloroethane	BDL	µg/L	10/27/93	HL		1.0
1,2-Dichloroethane	BDL	µg/L	10/27/93	HL		1.0
1,1-Dichloroethylene	BDL	µg/L	10/27/93	HL		1.0
cis-1,2-Dichloroethylene	BDL	µg/L	10/27/93	HL		1.0
trans-1,2-Dichloroethylene	BDL	µg/L	10/27/93	HL		1.0
1,2-Dichloropropane	BDL	µg/L	10/27/93	HL		1.0
cis-1,3-Dichloropropylene	BDL	µg/L	10/27/93	HL		1.0
trans-1,3-Dichloropropylene	BDL	µg/L	10/27/93	HL		1.0
Ethyl benzene	BDL	µg/L	10/27/93	HL		1.0
Methylene Chloride	5.0	µg/L	10/27/93	HL		5.0
1,1,2,2-Tetrachloroethane	BDL	µg/L	10/27/93	HL		1.0
Tetrachloroethylene	BDL	µg/L	10/27/93	HL		1.0
Toluene	BDL	µg/L	10/27/93	HL		1.0
1,1,1-Trichloroethane	BDL	µg/L	10/27/93	HL		1.0
1,1,2-Trichloroethane	BDL	µg/L	10/27/93	HL		1.0
Trichloroethylene	BDL	µg/L	10/27/93	HL		1.4
Trichlorofluoromethane	BDL	µg/L	10/27/93	HL		1.3
Vinyl Chloride	BDL	µg/L	10/27/93	HL		1.0
Xylene	BDL	µg/L	10/27/93	HL		1.0

Note: This analysis was performed on a TCLP Leachate Extraction.

BDL = Below Detection Limit

MDL = Method Detection Limit

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WESTERN MICHIGAN
ENVIRONMENTAL SERVICES, INC.

3352 128th Avenue, Holland, Michigan 49424-9263
Phone: 616-399-6070 FAX: 616-399-6185

MEN00550

SENT TO: Menasha Corporation
320 North Farmer
Otsego, Michigan 49078

Attn: Gary Roys
Re: Waste Samples

DATE: January 12, 1994

ANALYSIS OF: Waste Samples

REPORTED BY: Robert K. Zahray, Laboratory Manager

DATE RECEIVED: Received from client on December 28, 1993.

Sample ID: 1293 Ash Lab ID: 9312165-01

TEST	RESULT	UNITS	ANALYZED	BY	METHOD	MDL
ASTM Leachate Extraction	01/04/94	date extracted	01/04/94	WS	D3987-85	
Chemical Oxygen Demand	11	mg/L	01/11/94	JA	EPA 410.4	5
Acid Digestion, Aqueous	01/04/94	date digested		JA	EPA 3010	
Arsenic	0.031	mg/L	01/12/94	JA	EPA 7060	0.001
Barium	BDL	mg/L	01/07/94	MBR	EPA 7080	0.5
Cadmium	BDL	mg/L	01/05/94	JA	EPA 7131	0.0001
Chromium	0.0032	mg/L	01/07/94	JA	EPA 7191	0.002
Copper	0.02	mg/L	01/06/94	MBR	EPA 7210	0.02
Lead	BDL	mg/L	01/07/94	JA	EPA 7421	0.001
Mercury	BDL	mg/L	01/10/94	WS	EPA 7470	0.0002
Selenium	0.0076	mg/L	01/11/94	JA	EPA 7740	0.001
Silver	BDL	mg/L	01/05/94	JA	EPA 7760	0.01
Zinc	0.062	mg/L	01/05/93	MBR	EPA 7950	0.01

Note: This analysis was performed on an ASTM Leachate Extraction.

BDL = Below Detection Limit

MDL = Method Detection Limit

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Sample ID: 1293 Ash Lab ID: 9312165-01

TEST	RESULT	UNITS	ANALYZED	BY	METHOD	MDL
601 & 602 Volatiles List					EPA 8260	
Benzene	BDL	µg/L	01/04/94	ST		1.0
Bromodichloromethane	BDL	µg/L	01/04/94	ST		1.0
Bromoform	BDL	µg/L	01/04/94	ST		1.0
Bromomethane	BDL	µg/L	01/04/94	ST		1.0
Carbon Tetrachloride	BDL	µg/L	01/04/94	ST		1.0
Chlorobenzene	BDL	µg/L	01/04/94	ST		1.0
Chlorodibromomethane	BDL	µg/L	01/04/94	ST		1.0
Chloroethane	BDL	µg/L	01/04/94	ST		1.0
Chloroform	BDL	µg/L	01/04/94	ST		1.0
2-Chloroethyl Vinyl Ether	BDL	µg/L	01/04/94	ST		2.1
Chloromethane	BDL	µg/L	01/04/94	ST		1.0
1,2-Dichlorobenzene	BDL	µg/L	01/04/94	ST		1.0
1,3-Dichlorobenzene	BDL	µg/L	01/04/94	ST		1.0
1,4-Dichlorobenzene	BDL	µg/L	01/04/94	ST		1.0
Dichlorodifluoromethane	BDL	µg/L	01/04/94	ST		1.0
1,1-Dichloroethane	BDL	µg/L	01/04/94	ST		1.0
1,2-Dichloroethane	BDL	µg/L	01/04/94	ST		1.0
1,1-Dichloroethylene	BDL	µg/L	01/04/94	ST		1.0
cis-1,2-Dichloroethylene	BDL	µg/L	01/04/94	ST		1.0
trans-1,2-Dichloroethylene	BDL	µg/L	01/04/94	ST		1.0
1,2-Dichloropropane	BDL	µg/L	01/04/94	ST		1.0
cis-1,3-Dichloropropylene	BDL	µg/L	01/04/94	ST		1.0
trans-1,3-Dichloropropylene	BDL	µg/L	01/04/94	ST		1.0
Ethyl benzene	BDL	µg/L	01/04/94	ST		1.0
Methylene Chloride	BDL	µg/L	01/04/94	ST		5.0
1,1,2,2-Tetrachloroethane	BDL	µg/L	01/04/94	ST		1.0
Tetrachloroethylene	BDL	µg/L	01/04/94	ST		1.0
Toluene	BDL	µg/L	01/04/94	ST		1.0
1,1,1-Trichloroethane	BDL	µg/L	01/04/94	ST		1.0
1,1,2-Trichloroethane	BDL	µg/L	01/04/94	ST		1.0
Trichloroethylene	BDL	µg/L	01/04/94	ST		1.0
Trichlorofluoromethane	BDL	µg/L	01/04/94	ST		1.3
Vinyl Chloride	BDL	µg/L	01/04/94	ST		1.0
Xylene	BDL	µg/L	01/04/94	ST		1.0

Note: This analysis was performed on a TCLP Leachate Extraction.

BDL = Below Detection Limit

MDL = Method Detection Limit

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Sample ID: 1293 South Compactor Lab ID: 9312165-02

ST	RESULT	UNITS	ANALYZED	BY	METHOD	MDL
ASTM Leachate Extraction	01/04/94	date extracted	01/04/94	WS	D3987-85	
Chemical Oxygen Demand	220	mg/L	01/11/94	JA	EPA 410.4	5
Acid Digestion, Aqueous	01/04/94	date digested		JA	EPA 3010	
Arsenic	0.0022	mg/L	01/11/94	JA	EPA 7060	0.001
Barium	BDL	mg/L	01/07/94	MBR	EPA 7080	0.5
Cadmium	BDL	mg/L	01/05/94	JA	EPA 7131	0.0001
Chromium	0.0062	mg/L	01/07/94	JA	EPA 7191	0.002
Copper	0.02	mg/L	01/06/94	MBR	EPA 7210	0.02
Lead	BDL	mg/L	01/07/94	JA	EPA 7421	0.001
Mercury	BDL	mg/L	01/10/94	WS	EPA 7470	0.0002
Selenium	BDL	mg/L	01/11/94	JA	EPA 7740	0.001
Silver	BDL	mg/L	01/05/94	JA	EPA 7760	0.01
Zinc	0.099	mg/L	01/05/93	MBR	EPA 7950	0.01

te: This analysis was performed on an ASTM Leachate Extraction

L = Below Detection Limit

L = Method Detection Limit

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Sample ID: 1293 South Compactor Lab ID: 9312165-02

TEST	RESULT	UNITS	ANALYZED	BY	METHOD	MDL
601 & 602 Volatiles List					EPA 8260	
Benzene	BDL	µg/L	01/06/94	ST		1.0
Bromodichloromethane	BDL	µg/L	01/06/94	ST		1.0
Bromoform	BDL	µg/L	01/06/94	ST		1.0
Bromomethane	BDL	µg/L	01/06/94	ST		1.0
Carbon Tetrachloride	BDL	µg/L	01/06/94	ST		1.0
Chlorobenzene	BDL	µg/L	01/06/94	ST		1.0
Chlorodibromomethane	BDL	µg/L	01/06/94	ST		1.0
Chloroethane	BDL	µg/L	01/06/94	ST		1.0
Chloroform	BDL	µg/L	01/06/94	ST		1.0
2-Chloroethyl Vinyl Ether	BDL	µg/L	01/06/94	ST		2.1
Chloromethane	BDL	µg/L	01/06/94	ST		1.0
1,2-Dichlorobenzene	BDL	µg/L	01/06/94	ST		1.0
1,3-Dichlorobenzene	BDL	µg/L	01/06/94	ST		1.0
1,4-Dichlorobenzene	BDL	µg/L	01/06/94	ST		1.0
Dichlorodifluoromethane	BDL	µg/L	01/06/94	ST		1.0
1,1-Dichloroethane	BDL	µg/L	01/06/94	ST		1.0
1,2-Dichloroethane	BDL	µg/L	01/06/94	ST		1.0
1,1-Dichloroethylene	BDL	µg/L	01/06/94	ST		1.0
cis-1,2-Dichloroethylene	BDL	µg/L	01/06/94	ST		1.0
trans-1,2-Dichloroethylene	BDL	µg/L	01/06/94	ST		1.0
1,2-Dichloropropane	BDL	µg/L	01/06/94	ST		1.0
cis-1,3-Dichloropropylene	BDL	µg/L	01/06/94	ST		1.0
trans-1,3-Dichloropropylene	BDL	µg/L	01/06/94	ST		1.0
Ethyl benzene	BDL	µg/L	01/06/94	ST		1.0
Methylene Chloride	9.3	µg/L	01/06/94	ST		5.0
1,1,2,2-Tetrachloroethane	BDL	µg/L	01/06/94	ST		1.0
Tetrachloroethylene	BDL	µg/L	01/06/94	ST		1.0
Toluene	1.2	µg/L	01/06/94	ST		1.0
1,1,1-Trichloroethane	BDL	µg/L	01/06/94	ST		1.0
1,1,2-Trichloroethane	BDL	µg/L	01/06/94	ST		1.0
Trichloroethylene	BDL	µg/L	01/06/94	ST		1.0
Trichlorofluoromethane	1.6	µg/L	01/06/94	ST		1.3
Vinyl Chloride	BDL	µg/L	01/06/94	ST		1.0
Xylene	BDL	µg/L	01/06/94	ST		1.0

Note: This analysis was performed on a TCLP Leachate Extraction.

BDL = Below Detection Limit

MDL = Method Detection Limit

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Sample ID: 1293 West Compactor Lab ID: 9312165-03

TEST	RESULT	UNITS	ANALYZED	BY	METHOD	MDL
ASTM Leachate Extraction	01/04/94	date extracted	01/04/94	WS	D3987-85	
Chemical Oxygen Demand	160	mg/L	01/11/94	JA	EPA 410.4	5
Acid Digestion, Aqueous	01/04/94	date digested		JA	EPA 301C	
Arsenic	BDL	mg/L	01/11/94	JA	EPA 706C	0.001
Barium	BDL	mg/L	01/07/94	MBR	EPA 7080	0.5
Cadmium	BDL	mg/L	01/05/94	JA	EPA 7131	0.0001
Chromium	0.013	mg/L	01/07/94	JA	EPA 7191	0.002
Copper	0.02	mg/L	01/06/94	MBR	EPA 7210	0.02
Lead	0.0023	mg/L	01/07/94	JA	EPA 7421	0.001
Mercury	BDL	mg/L	01/10/94	WS	EPA 7470	0.0002
Selenium	BDL	mg/L	01/11/94	JA	EPA 7740	0.001
Silver	BDL	mg/L	01/05/94	JA	EPA 7760	0.01
Zinc	0.14	mg/L	01/05/93	MBR	EPA 7950	0.01

Note: This analysis was performed on an ASTM Leachate Extraction

BDL = Below Detection Limit

MDL = Method Detection Limit

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Sample ID: 1293 West Compactor Lab ID: 9312165-03

TEST	RESULT	UNITS	ANALYZED	BY	METHOD	MDL
601 & 602 Volatiles List					EPA 8260	
Benzene	BDL	µg/L	01/06/94	ST		1.0
Bromodichloromethane	BDL	µg/L	01/06/94	ST		1.0
Bromoform	BDL	µg/L	01/06/94	ST		1.0
Bromomethane	BDL	µg/L	01/06/94	ST		1.0
Carbon Tetrachloride	BDL	µg/L	01/06/94	ST		1.0
Chlorobenzene	BDL	µg/L	01/06/94	ST		1.0
Chlorodibromomethane	BDL	µg/L	01/06/94	ST		1.0
Chloroethane	BDL	µg/L	01/06/94	ST		1.0
Chloroform	BDL	µg/L	01/06/94	ST		1.0
2-Chloroethyl Vinyl Ether	BDL	µg/L	01/06/94	ST		2.1
Chloromethane	BDL	µg/L	01/06/94	ST		1.0
1,2-Dichlorobenzene	BDL	µg/L	01/06/94	ST		1.0
1,3-Dichlorobenzene	BDL	µg/L	01/06/94	ST		1.0
1,4-Dichlorobenzene	4.7	µg/L	01/06/94	ST		1.0
Dichlorodifluoromethane	BDL	µg/L	01/06/94	ST		1.0
1,1-Dichloroethane	BDL	µg/L	01/06/94	ST		1.0
1,2-Dichloroethane	BDL	µg/L	01/06/94	ST		1.0
1,1-Dichloroethylene	BDL	µg/L	01/06/94	ST		1.0
cis-1,2-Dichloroethylene	BDL	µg/L	01/06/94	ST		1.0
trans-1,2-Dichloroethylene	BDL	µg/L	01/06/94	ST		1.0
1,2-Dichloropropane	BDL	µg/L	01/06/94	ST		1.0
cis-1,3-Dichloropropylene	BDL	µg/L	01/06/94	ST		1.0
trans-1,3-Dichloropropylene	BDL	µg/L	01/06/94	ST		1.0
Ethyl benzene	BDL	µg/L	01/06/94	ST		1.0
Methylene Chloride	7.6	µg/L	01/06/94	ST		5.0
1,1,2,2-Tetrachloroethane	BDL	µg/L	01/06/94	ST		1.0
Tetrachloroethylene	BDL	µg/L	01/06/94	ST		1.0
Toluene	4.7	µg/L	01/06/94	ST		1.0
1,1,1-Trichloroethane	11	µg/L	01/06/94	ST		1.0
1,1,2-Trichloroethane	BDL	µg/L	01/06/94	ST		1.0
Trichloroethylene	BDL	µg/L	01/06/94	ST		1.0
Trichlorofluoromethane	BDL	µg/L	01/06/94	ST		1.3
Vinyl Chloride	BDL	µg/L	01/06/94	ST		1.0
Xylene	BDL	µg/L	01/06/94	ST		1.0

Note: This analysis was performed on a TCLP Leachate Extraction.

BDL = Below Detection Limit

MDL = Method Detection Limit

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WESTERN MICHIGAN ENVIRONMENTAL SERVICES, INC.

MEN00556

Sample ID: 1293 Tail Lab ID: 9312165-04

TEST	RESULT	UNITS	ANALYZED	BY	METHOD	MDL
ASTM Leachate Extraction	01/04/94	date extracted	01/04/94	WS	D3987-85	
Chemical Oxygen Demand	160	mg/L	01/11/94	JA	EPA 410.4	5
Acid Digestion, Aqueous	01/04/94	date digested		JA	EPA 3010	
Arsenic	BDL	mg/L	01/11/94	JA	EPA 7060	0.001
Barium	0.54	mg/L	01/07/94	MBR	EPA 7080	0.5
Cadmium	0.0002	mg/L	01/05/94	JA	EPA 7131	0.0001
Chromium	0.0047	mg/L	01/07/94	JA	EPA 7191	0.002
Copper	0.03	mg/L	01/06/94	MBR	EPA 7210	0.02
Lead	0.0038	mg/L	01/07/94	JA	EPA 7421	0.001
Mercury	BDL	mg/L	01/10/94	WS	EPA 7470	0.0002
Selenium	BDL	mg/L	01/11/94	JA	EPA 7740	0.001
Silver	BDL	mg/L	01/05/94	JA	EPA 7760	0.01
Zinc	0.15	mg/L	01/05/93	MBR	EPA 7950	0.01

Note: This analysis was performed on an ASTM Leachate Extraction

BDL = Below Detection Limit

MDL = Method Detection Limit

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Sample ID: 1293 Tail Lab ID: 9312165-04

TEST	RESULT	UNITS	ANALYZED	BY	METHOD	MDL
601 & 602 Volatiles List					EPA 8260	
Benzene	BDL	µg/L	01/06/94	ST		1.0
Bromodichloromethane	BDL	µg/L	01/06/94	ST		1.0
Bromoform	BDL	µg/L	01/06/94	ST		1.0
Bromomethane	BDL	µg/L	01/06/94	ST		1.0
Carbon Tetrachloride	BDL	µg/L	01/06/94	ST		1.0
Chlorobenzene	BDL	µg/L	01/06/94	ST		1.0
Chlorodibromomethane	BDL	µg/L	01/06/94	ST		1.0
Chloroethane	BDL	µg/L	01/06/94	ST		1.0
Chloroform	BDL	µg/L	01/06/94	ST		1.0
2-Chloroethyl Vinyl Ether	BDL	µg/L	01/06/94	ST		2.1
Chloromethane	BDL	µg/L	01/06/94	ST		1.0
1,2-Dichlorobenzene	BDL	µg/L	01/06/94	ST		1.0
1,3-Dichlorobenzene	BDL	µg/L	01/06/94	ST		1.0
1,4-Dichlorobenzene	BDL	µg/L	01/06/94	ST		1.0
Dichlorodifluoromethane	BDL	µg/L	01/06/94	ST		1.0
1,1-Dichloroethane	BDL	µg/L	01/06/94	ST		1.0
1,2-Dichloroethane	BDL	µg/L	01/06/94	ST		1.0
1,1-Dichloroethylene	BDL	µg/L	01/06/94	ST		1.0
cis-1,2-Dichloroethylene	BDL	µg/L	01/06/94	ST		1.0
trans-1,2-Dichloroethylene	BDL	µg/L	01/06/94	ST		1.0
1,2-Dichloropropane	BDL	µg/L	01/06/94	ST		1.0
cis-1,3-Dichloropropylene	BDL	µg/L	01/06/94	ST		1.0
trans-1,3-Dichloropropylene	BDL	µg/L	01/06/94	ST		1.0
Ethyl benzene	BDL	µg/L	01/06/94	ST		1.0
Methylene Chloride	BDL	µg/L	01/06/94	ST		5.0
1,1,2,2-Tetrachloroethane	BDL	µg/L	01/06/94	ST		1.0
Tetrachloroethylene	BDL	µg/L	01/06/94	ST		1.0
Toluene	1.6	µg/L	01/06/94	ST		1.0
1,1,1-Trichloroethane	BDL	µg/L	01/06/94	ST		1.0
1,1,2-Trichloroethane	BDL	µg/L	01/06/94	ST		1.0
Trichloroethylene	BDL	µg/L	01/06/94	ST		1.0
Trichlorofluoromethane	BDL	µg/L	01/06/94	ST		1.3
Vinyl Chloride	BDL	µg/L	01/06/94	ST		1.0
Xylene	BDL	µg/L	01/06/94	ST		1.0

Note: This analysis was performed on a TCLP Leachate Extraction.

BDL = Below Detection Limit

MDL = Method Detection Limit

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WESTERN MICHIGAN
ENVIRONMENTAL SERVICES, INC.

3352 128th Avenue, Holland, Michigan 49424-9263
Phone: 616-399-6070 FAX: 616-399-6185

MEN00558

TO: Menasha Corporation
320 N. Farmer
Otsego, MI 49078

Attn: Gary Roys
Re: Waste Samples

DATE: March 31, 1994

ANALYSIS: Waste Samples

REPORTED BY: Robert K. Zahray, Laboratory Manager

SAMPLING DATE: Received from client on March 10, 1994.

LAB ID #9403104-01 SAMPLE I.D. Tail 394

TEST	RESULT	UNIT	ANALYZED	BY	METHOD	MDL
ASTM Leachate Extraction	03/15/94	date extracted		JA	D3987-85	
Chemical Oxygen Demand	250	mg/L	03/14/94	MBR	EPA 410.4	5
Total Solids	33.6	% of sample	03/15/94	WS	APHA 2540 B.	
Acid Digestion, Aqueous	03/16/94	date digested		JA	EPA 3010	
Arsenic	BDL	mg/L	03/28/94	JA	EPA 7060	0.001
Barium	0.025	mg/L	03/21/94	MBR	EPA6010	0.01
Cadmium	BDL	mg/L	03/21/94	JA	EPA 7131	0.000
Chromium	BDL	mg/L	03/18/94	JA	EPA 7191	0.002
Copper	BDL	mg/L	03/18/94	MBR	EPA 7210	0.02
Lead	0.0043	mg/L	03/18/94	JA	EPA 7421	0.001
Mercury	BDL	mg/L	03/17/94	WS	EPA 7470	0.000
Selenium	BDL	mg/L	03/23/94	JA	EPA 7740	0.01
Silver	BDL	mg/L	03/18/94	MBR	EPA 7760	0.01
Zinc	0.26	mg/L	03/18/94	MBR	EPA 7950	0.01

Note: This analysis was performed on an ASTM Leachate Extraction.

BDL = Below Detection Limit
MDL - Method Detection Limit

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.B ID #9403104-01 SAMPLE I.D. Tail 394

TEST	RESULT	UNIT	ANALYZED	BY	METHOD	MDL
601 & 602 Volatiles List					EPA 8260	
Benzene	BDL	µg/L	03/24/94	HL		1.0
Bromodichloromethane	BDL	µg/L	03/24/94	HL		1.0
Bromoform	BDL	µg/L	03/24/94	HL		1.0
Bromomethane	BDL	µg/L	03/24/94	HL		1.0
Carbon Tetrachloride	BDL	µg/L	03/24/94	HL		1.0
Chlorobenzene	BDL	µg/L	03/24/94	HL		1.0
Chlorodibromomethane	BDL	µg/L	03/24/94	HL		1.0
Chloroethane	BDL	µg/L	03/24/94	HL		1.0
Chloroform	BDL	µg/L	03/24/94	HL		1.0
2-Chloroethyl Vinyl Ether	BDL	µg/L	03/24/94	HL		1.0
Chloromethane	BDL	µg/L	03/24/94	HL		1.0
1,2-Dichlorobenzene	BDL	µg/L	03/24/94	HL		1.0
1,3-Dichlorobenzene	BDL	µg/L	03/24/94	HL		1.0
1,4-Dichlorobenzene	BDL	µg/L	03/24/94	HL		1.0
Dichlorodifluoromethane	BDL	µg/L	03/24/94	HL		1.0
1,1-Dichloroethane	BDL	µg/L	03/24/94	HL		1.0
1,2-Dichloroethane	BDL	µg/L	03/24/94	HL		1.0
1,1-Dichloroethylene	BDL	µg/L	03/24/94	HL		1.0
cis-1,2-Dichloroethylene	BDL	µg/L	03/24/94	HL		1.0
trans-1,2-Dichloroethylene	BDL	µg/L	03/24/94	HL		1.0
1,2-Dichloropropane	BDL	µg/L	03/24/94	HL		1.0
cis-1,3-Dichloroproprane	BDL	µg/L	03/24/94	HL		1.0
trans-1,3-Dichloropropane	BDL	µg/L	03/24/94	HL		1.0
Ethyl benzene	BDL	µg/L	03/24/94	HL		1.0
Methylene Chloride	BDL	µg/L	03/24/94	HL		5.0
1,1,2,2-Tetrachloroethane	BDL	µg/L	03/24/94	HL		1.0
etrachloroethylene	BDL	µg/L	03/24/94	HL		1.0
Toluene	17	µg/L	03/24/94	HL		1.0
1,1,1-Trichloroethane	BDL	µg/L	03/24/94	HL		1.0
1,1,2-Trichloroethane	BDL	µg/L	03/24/94	HL		1.0
Trichloroethylene	BDL	µg/L	03/24/94	HL		1.0
Trichlorofluoromethane	BDL	µg/L	03/24/94	HL		1.3
Vinyl Chloride	BDL	µg/L	03/24/94	HL		1.0
Xylene	1.1	µg/L	03/24/94	HL		1.0

Note: This analysis was performed on a TCLP Leachate Extraction.

BDL = Below Detection Limit
DL - Method Detection Limit

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'B ID #9403104-02 SAMPLE I.D. South Compactor 394

TEST	RESULT	UNIT	ANALYZED	BY	METHOD	MDL
ASTM Leachate Extraction	03/15/94	date extracted		JA	D3987-85	
Chemical Oxygen Demand	250	mg/L	03/14/94	MBR	EPA 410.4	5
Total Solids	46.9	% of sample	03/15/94	WS	APHA 2540 B.	
Acid Digestion, Aqueous	03/16/94	date digested		JA	EPA 3010	
Arsenic	BDL	mg/L	03/28/94	JA	EPA 7060	0.001
Barium	0.090	mg/L	03/21/94	MBR	EPA6010	0.01
Cadmium	BDL	mg/L	03/21/94	JA	EPA 7131	0.000
Chromium	BDL	mg/L	03/18/94	JA	EPA 7191	0.002
Copper	BDL	mg/L	03/18/94	MBR	EPA 7210	0.02
Lead	0.0024	mg/L	03/18/94	JA	EPA 7421	0.001
Mercury	BDL	mg/L	03/17/94	WS	EPA 7470	0.000
Selenium	BDL	mg/L	03/23/94	JA	EPA 7740	0.01
Silver	BDL	mg/L	03/18/94	MBR	EPA 7760	0.01
Zinc	0.86	mg/L	03/18/94	MBR	EPA 7950	0.01

Note: This analysis was performed on an ASTM Leachate Extraction.

BDL = Below Detection Limit
DL - Method Detection Limit

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B ID #9403104-02 SAMPLE I.D. South Compactor 394

TEST	RESULT	UNIT	ANALYZED	BY	METHOD	MDL
601 & 602 Volatiles List					EPA 8260	
Benzene	BDL	µg/L	03/24/94	HL		1.0
Bromodichloromethane	BDL	µg/L	03/24/94	HL		1.0
Bromoform	BDL	µg/L	03/24/94	HL		1.0
Bromomethane	BDL	µg/L	03/24/94	HL		1.0
Carbon Tetrachloride	BDL	µg/L	03/24/94	HL		1.0
Chlorobenzene	BDL	µg/L	03/24/94	HL		1.0
Chlorodibromomethane	BDL	µg/L	03/24/94	HL		1.0
Chloroethane	BDL	µg/L	03/24/94	HL		1.0
Chloroform	BDL	µg/L	03/24/94	HL		1.0
2-Chloroethyl Vinyl Ether	BDL	µg/L	03/24/94	HL		2.1
Chloromethane	BDL	µg/L	03/24/94	HL		1.0
1,2-Dichlorobenzene	BDL	µg/L	03/24/94	HL		1.0
1,3-Dichlorobenzene	BDL	µg/L	03/24/94	HL		1.0
1,4-Dichlorobenzene	BDL	µg/L	03/24/94	HL		1.0
Dichlorodifluoromethane	BDL	µg/L	03/24/94	HL		1.0
1,1-Dichloroethane	BDL	µg/L	03/24/94	HL		1.0
1,2-Dichloroethane	BDL	µg/L	03/24/94	HL		1.0
1,1-Dichloroethylene	BDL	µg/L	03/24/94	HL		1.0
cis-1,2-Dichloroethylene	BDL	µg/L	03/24/94	HL		1.0
trans-1,2-Dichloroethylene	BDL	µg/L	03/24/94	HL		1.0
1,2-Dichloropropane	BDL	µg/L	03/24/94	HL		1.0
cis-1,3-Dichloroproprane	BDL	µg/L	03/24/94	HL		1.0
trans-1,3-Dichloropropane	BDL	µg/L	03/24/94	HL		1.0
Ethyl benzene	BDL	µg/L	03/24/94	HL		1.0
Methylene Chloride	6.6	µg/L	03/24/94	HL		5.0
1,1,2,2-Tetrachloroethane	BDL	µg/L	03/24/94	HL		1.0
Tetrachloroethylene	BDL	µg/L	03/24/94	HL		1.0
Toluene	4.2	µg/L	03/24/94	HL		1.0
1,1,1-Trichloroethane	5.2	µg/L	03/24/94	HL		1.0
1,1,2-Trichloroethane	BDL	µg/L	03/24/94	HL		1.0
Trichloroethylene	BDL	µg/L	03/24/94	HL		1.0
Trichlorofluoromethane	BDL	µg/L	03/24/94	HL		1.3
Vinyl Chloride	BDL	µg/L	03/24/94	HL		1.0
Xylene	2.6	µg/L	03/24/94	HL		1.0

Note: This analysis was performed on a TCLP Leachate Extraction.

DL = Below Detection Limit
DL - Method Detection Limit

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MEN00562

\B ID #9403104-03 SAMPLE I.D. West Compactor 394

TEST	RESULT	UNIT	ANALYZED	BY	METHOD	MDL
ASTM Leachate Extraction	03/15/94	date extracted		JA	D3987-85	
Chemical Oxygen Demand	220	mg/L	03/14/94	MBR	EPA 410.4	5
Total Solids	46.7	% of sample	03/15/94	WS	APHA 2540 B.	
Acid Digestion, Aqueous	03/16/94	date digested		JA	EPA 3010	
Arsenic	BDL	mg/L	03/28/94	JA	EPA 7060	0.001
Barium	0.13	mg/L	03/21/94	MBR	EPA6010	0.01
Cadmium	BDL	mg/L	03/21/94	JA	EPA 7131	0.000
Chromium	BDL	mg/L	03/18/94	JA	EPA 7191	0.002
Copper	BDL	mg/L	03/18/94	MBR	EPA 7210	0.02
Lead	0.0024	mg/L	03/18/94	JA	EPA 7421	0.001
Mercury	BDL	mg/L	03/17/94	WS	EPA 7470	0.000
Selenium	BDL	mg/L	03/23/94	JA	EPA 7740	0.01
Silver	BDL	mg/L	03/18/94	MBR	EPA 7760	0.01
Zinc	0.11	mg/L	03/18/94	MBR	EPA 7950	0.01

Note: This analysis was performed on an ASTM Leachate Extraction.

DL = Below Detection Limit
DL - Method Detection Limit

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B ID #9403104-03 SAMPLE I.D. West Compactor 394

TEST	RESULT	UNIT	ANALYZED	BY	METHOD	MDL
601 & 602 Volatiles List					EPA 8260	
Benzene	BDL	µg/L	03/24/94	HL		1.0
Bromodichloromethane	BDL	µg/L	03/24/94	HL		1.0
Bromoform	BDL	µg/L	03/24/94	HL		1.0
Bromomethane	BDL	µg/L	03/24/94	HL		1.0
Carbon Tetrachloride	BDL	µg/L	03/24/94	HL		1.0
Chlorobenzene	BDL	µg/L	03/24/94	HL		1.0
Chlorodibromomethane	BDL	µg/L	03/24/94	HL		1.0
Chloroethane	BDL	µg/L	03/24/94	HL		1.0
Chloroform	BDL	µg/L	03/24/94	HL		1.0
2-Chloroethyl Vinyl Ether	BDL	µg/L	03/24/94	HL		2.1
Chloromethane	BDL	µg/L	03/24/94	HL		1.0
1,2-Dichlorobenzene	BDL	µg/L	03/24/94	HL		1.0
1,3-Dichlorobenzene	BDL	µg/L	03/24/94	HL		1.0
1,4-Dichlorobenzene	BDL	µg/L	03/24/94	HL		1.0
Dichlorodifluoromethane	BDL	µg/L	03/24/94	HL		1.0
1,1-Dichloroethane	BDL	µg/L	03/24/94	HL		1.0
1,2-Dichloroethane	BDL	µg/L	03/24/94	HL		1.0
1,1-Dichloroethylene	BDL	µg/L	03/24/94	HL		1.0
cis-1,2-Dichloroethylene	BDL	µg/L	03/24/94	HL		1.0
trans-1,2-Dichloroethylene	BDL	µg/L	03/24/94	HL		1.0
1,2-Dichloropropane	BDL	µg/L	03/24/94	HL		1.0
cis-1,3-Dichloroproprane	BDL	µg/L	03/24/94	HL		1.0
trans-1,3-Dichloropropane	BDL	µg/L	03/24/94	HL		1.0
Ethyl benzene	BDL	µg/L	03/24/94	HL		1.0
Methylene Chloride	BDL	µg/L	03/24/94	HL		5.0
1,1,2,2-Tetrachloroethane	BDL	µg/L	03/24/94	HL		1.0
Tetrachloroethylene	BDL	µg/L	03/24/94	HL		1.0
Toluene	1.2	µg/L	03/24/94	HL		1.0
1,1,1-Trichloroethane	BDL	µg/L	03/24/94	HL		1.0
1,1,2-Trichloroethane	BDL	µg/L	03/24/94	HL		1.0
Trichloroethylene	BDL	µg/L	03/24/94	HL		1.0
Trichlorofluoromethane	BDL	µg/L	03/24/94	HL		1.3
Vinyl Chloride	BDL	µg/L	03/24/94	HL		1.0
Xylene	BDL	µg/L	03/24/94	HL		1.0

Note: This analysis was performed on a TCLP Leachate Extraction.

BDL = Below Detection Limit
MDL - Method Detection Limit

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`B ID #9403104-04 SAMPLE I.D. Ash 394

TEST	RESULT	UNIT	ANALYZED	BY	METHOD	MDL
ASTM Leachate Extraction	03/15/94	date extracted		JA	D3987-85	
Chemical Oxygen Demand	BDL	mg/L	03/14/94	MBR	EPA 410.4	5
Total Solids	66.6	% of sample	03/15/94	WS	APHA 2540 B.	
Acid Digestion, Aqueous	03/16/94	date digested		JA	EPA 3010	
Arsenic	0.035	mg/L	03/28/94	JA	EPA 7060	0.001
Barium	0.16	mg/L	03/21/94	MBR	EPA6010	0.01
Cadmium	BDL	mg/L	03/21/94	JA	EPA 7131	0.000
Chromium	BDL	mg/L	03/18/94	JA	EPA 7191	0.002
Copper	0.021	mg/L	03/18/94	MBR	EPA 7210	0.02
Lead	BDL	mg/L	03/18/94	JA	EPA 7421	0.001
Mercury	BDL	mg/L	03/17/94	WS	EPA 7470	0.000
Selenium	0.0091	mg/L	03/23/94	JA	EPA 7740	0.01
Silver	BDL	mg/L	03/18/94	MBR	EPA 7760	0.01
Zinc	0.049	mg/L	03/18/94	MBR	EPA 7950	0.01

Note: This analysis was performed on an ASTM Leachate Extraction.

DL = Below Detection Limit
L - Method Detection Limit

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B ID #9403104-04 SAMPLE I.D. Ash 394

TEST	RESULT	UNIT	ANALYZED	BY	METHOD	MDL
601 & 602 Volatiles List					EPA 8260	
Benzene	BDL	µg/L	03/24/94	HL		1.0
Bromodichloromethane	BDL	µg/L	03/24/94	HL		1.0
Bromoform	BDL	µg/L	03/24/94	HL		1.0
Bromomethane	BDL	µg/L	03/24/94	HL		1.0
Carbon Tetrachloride	BDL	µg/L	03/24/94	HL		1.0
Chlorobenzene	BDL	µg/L	03/24/94	HL		1.0
Chlorodibromomethane	BDL	µg/L	03/24/94	HL		1.0
Chloroethane	BDL	µg/L	03/24/94	HL		1.0
Chloroform	BDL	µg/L	03/24/94	HL		1.0
2-Chloroethyl Vinyl Ether	BDL	µg/L	03/24/94	HL		2.1
Chloromethane	BDL	µg/L	03/24/94	HL		1.0
1,2-Dichlorobenzene	BDL	µg/L	03/24/94	HL		1.0
1,3-Dichlorobenzene	BDL	µg/L	03/24/94	HL		1.0
1,4-Dichlorobenzene	BDL	µg/L	03/24/94	HL		1.0
Dichlorodifluoromethane	BDL	µg/L	03/24/94	HL		1.0
1,1-Dichloroethane	BDL	µg/L	03/24/94	HL		1.0
1,2-Dichloroethane	BDL	µg/L	03/24/94	HL		1.0
1,1-Dichloroethylene	BDL	µg/L	03/24/94	HL		1.0
cis-1,2-Dichloroethylene	BDL	µg/L	03/24/94	HL		1.0
trans-1,2-Dichloroethylene	BDL	µg/L	03/24/94	HL		1.0
1,2-Dichloropropane	BDL	µg/L	03/24/94	HL		1.0
cis-1,3-Dichloroproprane	BDL	µg/L	03/24/94	HL		1.0
trans-1,3-Dichloropropane	BDL	µg/L	03/24/94	HL		1.0
Ethyl benzene	BDL	µg/L	03/24/94	HL		1.0
Methylene Chloride	14	µg/L	03/24/94	HL		5.0
1,1,2,2-Tetrachloroethane	BDL	µg/L	03/24/94	HL		1.0
etrachloroethylene	BDL	µg/L	03/24/94	HL		1.0
oluene	BDL	µg/L	03/24/94	HL		1.0
1,1,1-Trichloroethane	BDL	µg/L	03/24/94	HL		1.0
1,1,2-Trichloroethane	BDL	µg/L	03/24/94	HL		1.0
Trichloroethylene	BDL	µg/L	03/24/94	HL		1.0
Trichlorofluoromethane	BDL	µg/L	03/24/94	HL		1.3
Vinyl Chloride	BDL	µg/L	03/24/94	HL		1.0
Xylene	BDL	µg/L	03/24/94	HL		1.0

Note: This analysis was performed on a TCLP Leachate Extraction.

DL = Below Detection Limit
DL - Method Detection Limit

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WESTERN MICHIGAN
ENVIRONMENTAL SERVICES, INC.

3352 128th Avenue, Holland, Michigan 49424-9263
Phone: 616-399-6070 FAX: 616-399-6185

MEN00566

CLIENT: Menasha Corporation
320 North Farmer
Otsego, Michigan 49078

Attn: Gary Roys

DATE: June 29, 1994

ANALYSIS OF: Waste Samples

REPORTED BY: Robert K. Zahray, Laboratory Manager

DATE RECEIVED: Received from client on June 7, 1994.

Sample ID: Ash 694 Lab ID: 9406067-01 Collected: 06/06/94

TEST	RESULT	UNITS	ANALYZED	BY	METHOD	MDL
ASTM Leachate Extraction	06/09/94	date extracted	06/09/94	WS	D3987-85	
Chemical Oxygen Demand	20	mg/L	06/14/94	MBR	EPA 410.4	5
Total Solids	61.2	% of sample	06/13/94	WS	APHA 2540 B.	N/A
Acid Digestion, Aqueous	06/14/94	date digested		JA	EPA 3010	
Arsenic	0.034	mg/L	06/21/94	JA	EPA 7060	0.001
Barium	0.28	mg/L	06/23/94	CJK	EPA 7080	0.05
Cadmium	BDL	mg/L	06/20/94	JA	EPA 7131	0.0001
Chromium	BDL	mg/L	06/20/94	JA	EPA 7191	0.002
Copper	BDL	mg/L	06/27/94	MBR	EPA 6010	0.01
Lead	BDL	mg/L	06/20/94	JA	EPA 7421	0.001
Mercury	BDL	mg/L	06/14/94	WS	EPA 7470	0.0002
Selenium	0.0063	mg/L	06/21/94	JA	EPA 7740	0.001
Silver	BDL	mg/L	06/20/94	JA	EPA 7760	0.01
Zinc	0.036	mg/L	06/27/94	MBR	EPA 6010	0.02

Note: This analysis was performed on an ASTM Leachate Extraction.

BDL = Below Detection Limit
MDL = Method Detection Limit

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Sample ID: Ash 694 Lab ID: 9406067-01 Collected: 06/06/94

TEST	RESULT	UNITS	ANALYZED	BY	METHOD	MDL
601 & 602 Volatiles List					EPA 8260	
Benzene	BDL	µg/L	06/20/94	HL		1.0
Bromodichloromethane	BDL	µg/L	06/20/94	HL		1.0
Bromoform	BDL	µg/L	06/20/94	HL		1.0
Bromomethane	BDL	µg/L	06/20/94	HL		1.0
Carbon Tetrachloride	BDL	µg/L	06/20/94	HL		1.0
Chlorobenzene	BDL	µg/L	06/20/94	HL		1.0
Chlorodibromomethane	BDL	µg/L	06/20/94	HL		1.0
Chloroethane	BDL	µg/L	06/20/94	HL		1.0
Chloroform	BDL	µg/L	06/20/94	HL		1.0
2-Chloroethyl Vinyl Ether	BDL	µg/L	06/20/94	HL		2.1
Chloromethane	BDL	µg/L	06/20/94	HL		1.0
1,2-Dichlorobenzene	1.1	µg/L	06/20/94	HL		1.0
1,3-Dichlorobenzene	BDL	µg/L	06/20/94	HL		1.0
1,4-Dichlorobenzene	BDL	µg/L	06/20/94	HL		1.0
Dichlorodifluoromethane	BDL	µg/L	06/20/94	HL		1.0
1,1-Dichloroethane	BDL	µg/L	06/20/94	HL		1.0
1,2-Dichloroethane	BDL	µg/L	06/20/94	HL		1.0
1,1-Dichloroethylene	BDL	µg/L	06/20/94	HL		1.0
cis-1,2-Dichloroethylene	BDL	µg/L	06/20/94	HL		1.0
trans-1,2-Dichloroethylene	BDL	µg/L	06/20/94	HL		1.0
1,2-Dichloropropane	BDL	µg/L	06/20/94	HL		1.0
cis-1,3-Dichloropropylene	BDL	µg/L	06/20/94	HL		1.0
trans-1,3-Dichloropropylene	BDL	µg/L	06/20/94	HL		1.0
Ethyl benzene	1.0	µg/L	06/20/94	HL		1.0
Methylene Chloride	37	µg/L	06/20/94	HL		5.0
1,1,2,2-Tetrachloroethane	BDL	µg/L	06/20/94	HL		1.0
Tetrachloroethylene	BDL	µg/L	06/20/94	HL		1.0
Toluene	BDL	µg/L	06/20/94	HL		1.0
1,1,1-Trichloroethane	BDL	µg/L	06/20/94	HL		1.0
1,1,2-Trichloroethane	BDL	µg/L	06/20/94	HL		1.0
Trichloroethylene	BDL	µg/L	06/20/94	HL		1.0
Trichlorofluoromethane	2.7	µg/L	06/20/94	HL		1.3
Vinyl Chloride	BDL	µg/L	06/20/94	HL		1.0
Xylene	3.9	µg/L	06/20/94	HL		1.0

Note: This analysis was performed on a TCLP Leachate Extraction.

BDL = Below Detection Limit
MDL = Method Detection Limit

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WESTERN MICHIGAN ENVIRONMENTAL SERVICES, INC.

MEN00568

Sample ID: Tail 694 Lab ID: 9406067-02 Collected: 06/06/94

TEST	RESULT	UNITS	ANALYZED	BY	METHOD	MDL
ASTM Leachate Extraction	06/09/94	date extracted	06/09/94	WS	D3987-85	
Chemical Oxygen Demand	190	mg/L	06/14/94	MBR	EPA 410.4	5
Total Solids	64.5	% of sample	06/13/94	WS	APHA 2540 B.	N/A
Acid Digestion, Aqueous	06/14/94	date digested		JA	EPA 3010	
Arsenic	BDL	mg/L	06/21/94	JA	EPA 7060	0.001
Barium	0.58	mg/L	06/23/94	CJK	EPA 7080	0.05
Cadmium	0.00019	mg/L	06/20/94	JA	EPA 7131	0.0001
Chromium	BDL	mg/L	06/20/94	JA	EPA 7191	0.002
Copper	0.026	mg/L	06/27/94	MBR	EPA 6010	0.01
Lead	0.0061	mg/L	06/20/94	JA	EPA 7421	0.001
Mercury	BDL	mg/L	06/14/94	WS	EPA 7470	0.0002
Selenium	BDL	mg/L	06/21/94	JA	EPA 7740	0.001
Silver	BDL	mg/L	06/20/94	JA	EPA 7760	0.01
Zinc	0.90	mg/L	06/27/94	MBR	EPA 6010	0.02

Note: This analysis was performed on an ASTM Leachate Extraction.

BDL = Below Detection Limit
MDL = Method Detection Limit

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Sample ID: Tail 694 Lab ID: 9406067-02 Collected: 06/06/94

TEST	RESULT	UNITS	ANALYZED	BY	METHOD	MDL
601 & 602 Volatiles List					EPA 8260	
Benzene	BDL	µg/L	06/20/94	HL		1.0
Bromodichloromethane	BDL	µg/L	06/20/94	HL		1.0
Bromoform	BDL	µg/L	06/20/94	HL		1.0
Bromomethane	BDL	µg/L	06/20/94	HL		1.0
Carbon Tetrachloride	BDL	µg/L	06/20/94	HL		1.0
Chlorobenzene	BDL	µg/L	06/20/94	HL		1.0
Chlorodibromomethane	BDL	µg/L	06/20/94	HL		1.0
Chloroethane	BDL	µg/L	06/20/94	HL		1.0
Chloroform	BDL	µg/L	06/20/94	HL		1.0
2-Chloroethyl Vinyl Ether	BDL	µg/L	06/20/94	HL		2.1
Chloromethane	BDL	µg/L	06/20/94	HL		1.0
1,2-Dichlorobenzene	BDL	µg/L	06/20/94	HL		1.0
1,3-Dichlorobenzene	BDL	µg/L	06/20/94	HL		1.0
1,4-Dichlorobenzene	BDL	µg/L	06/20/94	HL		1.0
Dichlorodifluoromethane	BDL	µg/L	06/20/94	HL		1.0
1,1-Dichloroethane	BDL	µg/L	06/20/94	HL		1.0
1,2-Dichloroethane	BDL	µg/L	06/20/94	HL		1.0
1,1-Dichloroethylene	BDL	µg/L	06/20/94	HL		1.0
cis-1,2-Dichloroethylene	BDL	µg/L	06/20/94	HL		1.0
trans-1,2-Dichloroethylene	BDL	µg/L	06/20/94	HL		1.0
1,2-Dichloropropane	BDL	µg/L	06/20/94	HL		1.0
cis-1,3-Dichloropropylene	BDL	µg/L	06/20/94	HL		1.0
trans-1,3-Dichloropropylene	BDL	µg/L	06/20/94	HL		1.0
Ethyl benzene	BDL	µg/L	06/20/94	HL		1.0
Methylene Chloride	23	µg/L	06/20/94	HL		5.0
1,1,2,2-Tetrachloroethane	BDL	µg/L	06/20/94	HL		1.0
Tetrachloroethylene	BDL	µg/L	06/20/94	HL		1.0
Toluene	BDL	µg/L	06/20/94	HL		1.0
1,1,1-Trichloroethane	BDL	µg/L	06/20/94	HL		1.0
1,1,2-Trichloroethane	BDL	µg/L	06/20/94	HL		1.0
Trichloroethylene	BDL	µg/L	06/20/94	HL		1.0
Trichlorofluoromethane	BDL	µg/L	06/20/94	HL		1.3
Vinyl Chloride	BDL	µg/L	06/20/94	HL		1.0
Xylene	BDL	µg/L	06/20/94	HL		1.0

Note: This analysis was performed on a TCLP Leachate Extraction.

BDL = Below Detection Limit
MDL = Method Detection Limit

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Sample ID: East Compactor 694 Lab ID: 9406067-03 Collected: 06/06/94

TEST	RESULT	UNITS	ANALYZED	BY	METHOD	MDL
ASTM Leachate Extraction	06/09/94	date extracted	06/09/94	WS	D3987-85	
Chemical Oxygen Demand	200	mg/L	06/14/94	MBR	EPA 410.4	5
Total Solids	38.4	% of sample	06/13/94	WS	APHA 2540 B.	N/A
Acid Digestion, Aqueous	06/14/94	date digested		JA	EPA 3010	
Arsenic	BDL	mg/L	06/21/94	JA	EPA 7060	0.001
Barium	0.38	mg/L	06/23/94	CJK	EPA 7080	0.05
Cadmium	0.00018	mg/L	06/20/94	JA	EPA 7131	0.0001
Chromium	0.010	mg/L	06/20/94	JA	EPA 7191	0.002
Copper	0.025	mg/L	06/27/94	MBR	EPA 6010	0.01
Lead	0.0026	mg/L	06/20/94	JA	EPA 7421	0.001
Mercury	BDL	mg/L	06/14/94	WS	EPA 7470	0.0002
Selenium	BDL	mg/L	06/21/94	JA	EPA 7740	0.001
Silver	BDL	mg/L	06/20/94	JA	EPA 7760	0.01
Zinc	0.11	mg/L	06/27/94	MBR	EPA 6010	0.02

Note: This analysis was performed on an ASTM Leachate Extraction.

BDL = Below Detection Limit
MDL = Method Detection Limit

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WESTERN MICHIGAN ENVIRONMENTAL SERVICES, INC.

MEN00571

Sample ID: East Compactor 694 Lab ID: 9406067-03 Collected: 06/06/94

TEST	RESULT	UNITS	ANALYZED	BY	METHOD	MDL
601 & 602 Volatiles List					EPA 8260	
Benzene	BDL	µg/L	06/23/94	HL		1.0
Bromodichloromethane	BDL	µg/L	06/23/94	HL		1.0
Bromoform	BDL	µg/L	06/23/94	HL		1.0
Bromomethane	BDL	µg/L	06/23/94	HL		1.0
Carbon Tetrachloride	BDL	µg/L	06/23/94	HL		1.0
Chlorobenzene	BDL	µg/L	06/23/94	HL		1.0
Chlorodibromomethane	BDL	µg/L	06/23/94	HL		1.0
Chloroethane	BDL	µg/L	06/23/94	HL		1.0
Chloroform	BDL	µg/L	06/23/94	HL		1.0
2-Chloroethyl Vinyl Ether	BDL	µg/L	06/23/94	HL		2.1
Chloromethane	BDL	µg/L	06/23/94	HL		1.0
1,2-Dichlorobenzene	BDL	µg/L	06/23/94	HL		1.0
1,3-Dichlorobenzene	BDL	µg/L	06/23/94	HL		1.0
1,4-Dichlorobenzene	BDL	µg/L	06/23/94	HL		1.0
Dichlorodifluoromethane	BDL	µg/L	06/23/94	HL		1.0
1,1-Dichloroethane	BDL	µg/L	06/23/94	HL		1.0
1,2-Dichloroethane	BDL	µg/L	06/23/94	HL		1.0
1,1-Dichloroethylene	BDL	µg/L	06/23/94	HL		1.0
cis-1,2-Dichloroethylene	BDL	µg/L	06/23/94	HL		1.0
trans-1,2-Dichloroethylene	BDL	µg/L	06/23/94	HL		1.0
1,2-Dichloropropane	BDL	µg/L	06/23/94	HL		1.0
cis-1,3-Dichloropropylene	BDL	µg/L	06/23/94	HL		1.0
trans-1,3-Dichloropropylene	BDL	µg/L	06/23/94	HL		1.0
Ethyl benzene	1.1	µg/L	06/23/94	HL		1.0
Methylene Chloride	84	µg/L	06/23/94	HL		5.0
1,1,2,2-Tetrachloroethane	BDL	µg/L	06/23/94	HL		1.0
Tetrachloroethylene	BDL	µg/L	06/23/94	HL		1.0
Toluene	2.1	µg/L	06/23/94	HL		1.0
1,1,1-Trichloroethane	BDL	µg/L	06/23/94	HL		1.0
1,1,2-Trichloroethane	BDL	µg/L	06/23/94	HL		1.0
Trichloroethylene	BDL	µg/L	06/23/94	HL		1.0
Trichlorofluoromethane	BDL	µg/L	06/23/94	HL		1.3
Vinyl Chloride	BDL	µg/L	06/23/94	HL		1.0
Xylene	3.2	µg/L	06/23/94	HL		1.0

Note: This analysis was performed on a TCLP Leachate Extraction.

BDL = Below Detection Limit
MDL = Method Detection Limit

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WESTERN MICHIGAN ENVIRONMENTAL SERVICES, INC.

MEN00572

Sample ID: West Compactor 694 Lab ID: 9406067-04 Collected: 06/06/94

TEST	RESULT	UNITS	ANALYZED	BY	METHOD	MDL
ASTM Leachate Extraction	06/09/94	date extracted	06/09/94	WS	D3987-85	
Chemical Oxygen Demand	330	mg/L	06/14/94	MBR	EPA 410.4	5
Total Solids	54.3	% of sample	06/13/94	WS	APHA 2540 B.	N/A
Acid Digestion, Aqueous	06/14/94	date digested		JA	EPA 3010	
Arsenic	0.0012	mg/L	06/21/94	JA	EPA 7060	0.001
Barium	0.51	mg/L	06/23/94	CJK	EPA 7080	0.05
Cadmium	0.00051	mg/L	06/20/94	JA	EPA 7131	0.0001
Chromium	0.0071	mg/L	06/20/94	JA	EPA 7191	0.002
Copper	0.039	mg/L	06/27/94	MBR	EPA 6010	0.01
Lead	0.0054	mg/L	06/20/94	JA	EPA 7421	0.001
Mercury	BDL	mg/L	06/14/94	WS	EPA 7470	0.0002
Selenium	BDL	mg/L	06/21/94	JA	EPA 7740	0.001
Silver	BDL	mg/L	06/20/94	JA	EPA 7760	0.01
Zinc	0.17	mg/L	06/27/94	MBR	EPA 6010	0.02

Note: This analysis was performed on an ASTM Leachate Extraction.

BDL = Below Detection Limit
MDL = Method Detection Limit

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WESTERN MICHIGAN ENVIRONMENTAL SERVICES, INC.

MEN00573

Sample ID: West Compactor 694 Lab ID: 9406067-04 Collected: 06/06/94

TEST	RESULT	UNITS	ANALYZED	BY	METHOD	MDL
601 & 602 Volatiles List					EPA 8260	
Benzene	BDL	µg/L	06/20/94	HL		1.0
Bromodichloromethane	BDL	µg/L	06/20/94	HL		1.0
Bromoform	BDL	µg/L	06/20/94	HL		1.0
Bromomethane	BDL	µg/L	06/20/94	HL		1.0
Carbon Tetrachloride	BDL	µg/L	06/20/94	HL		1.0
Chlorobenzene	BDL	µg/L	06/20/94	HL		1.0
Chlorodibromomethane	BDL	µg/L	06/20/94	HL		1.0
Chloroethane	BDL	µg/L	06/20/94	HL		1.0
Chloroform	BDL	µg/L	06/20/94	HL		1.0
2-Chloroethyl Vinyl Ether	BDL	µg/L	06/20/94	HL		2.1
Chloromethane	BDL	µg/L	06/20/94	HL		1.0
1,2-Dichlorobenzene	BDL	µg/L	06/20/94	HL		1.0
1,3-Dichlorobenzene	BDL	µg/L	06/20/94	HL		1.0
1,4-Dichlorobenzene	BDL	µg/L	06/20/94	HL		1.0
Dichlorodifluoromethane	BDL	µg/L	06/20/94	HL		1.0
1,1-Dichloroethane	BDL	µg/L	06/20/94	HL		1.0
1,2-Dichloroethane	BDL	µg/L	06/20/94	HL		1.0
1,1-Dichloroethylene	BDL	µg/L	06/20/94	HL		1.0
cis-1,2-Dichloroethylene	BDL	µg/L	06/20/94	HL		1.0
trans-1,2-Dichloroethylene	BDL	µg/L	06/20/94	HL		1.0
1,2-Dichloropropane	BDL	µg/L	06/20/94	HL		1.0
cis-1,3-Dichloropropylene	BDL	µg/L	06/20/94	HL		1.0
trans-1,3-Dichloropropylene	BDL	µg/L	06/20/94	HL		1.0
Ethyl benzene	BDL	µg/L	06/20/94	HL		1.0
Methylene Chloride	16	µg/L	06/20/94	HL		5.0
`,1,2,2-Tetrachloroethane	BDL	µg/L	06/20/94	HL		1.0
etrachloroethylene	BDL	µg/L	06/20/94	HL		1.0
oluene	3.1	µg/L	06/20/94	HL		1.0
1,1,1-Trichloroethane	BDL	µg/L	06/20/94	HL		1.0
1,1,2-Trichloroethane	BDL	µg/L	06/20/94	HL		1.0
Trichloroethylene	BDL	µg/L	06/20/94	HL		1.0
Trichlorofluoromethane	BDL	µg/L	06/20/94	HL		1.3
Vinyl Chloride	BDL	µg/L	06/20/94	HL		1.0
Xylene	3.5	µg/L	06/20/94	HL		1.0

Note: This analysis was performed on a TCLP Leachate Extraction.

BDL = Below Detection Limit
MDL = Method Detection Limit

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WESTERN MICHIGAN
ENVIRONMENTAL SERVICES, INC.

3352 128th Avenue, Holland, Michigan 49424-9263
Phone: 616-399-6070 FAX: 616-399-6185

MEN00574

CLIENT: Menasha Corporation
320 North Farmer
Otsego, Michigan 49078

Attn: Gary Roys

DATE: October 19, 1994

ANALYSIS OF: Waste Samples

REPORTED BY: Robert K. Zahray (TBB)
Robert K. Zahray, Laboratory Manager

DATE RECEIVED: Received from client on October 3, 1994.

Sample ID: North Compactor 994 Lab ID: 9410007-01

TEST	RESULT	UNITS	ANALYZED	BY	METHOD	MDL
ASTM Leachate Extraction	10/07/94	date extracted		JA	D3987-85	
Chemical Oxygen Demand	440	mg/L	10/12/94	MBR	EPA 410.4	5
Total Solids	38.7	% of sample	10/06/94	WS	APHA 2540 B.	N/A
Acid Digestion, Aqueous	10/07/94	date digested		JA	EPA 3010	
rsenic	BDL	mg/L	10/14/94	JA	EPA 7060	0.001
arium	0.17	mg/L	10/12/94	MBR	EPA 6010	0.01
admium	0.00017	mg/L	10/11/94	JA	EPA 7131	0.0001
Chromium	0.0267	mg/L	10/17/94	JA	EPA 7191	0.002
Copper	BDL	mg/L	10/12/94	MBR	EPA 6010	0.01
Lead	0.0016	mg/L	10/11/94	JA	EPA 7421	0.001
Mercury	BDL	mg/L	10/10/94	WS	EPA 7470	0.0002
Selenium	BDL	mg/L	10/17/94	JA	EPA 7740	0.001
Silver	BDL	mg/L	10/12/94	MBR	EPA 7760	0.01
Zinc	0.15	mg/L	10/12/94	MBR	EPA 6010	0.02

Note: This analysis was performed on an ASTM Leachate Extraction.

BDL = Below Detection Limit
MDL = Method Detection Limit

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WESTERN MICHIGAN ENVIRONMENTAL SERVICES, INC.

MEN00575

Sample ID: North Compactor 994 Lab ID: 9410007-01

TEST	RESULT	UNITS	ANALYZED	BY	METHOD	MDL
601 & 602 Volatiles List					EPA 8260	
Benzene	BDL	µg/L	10/13/94	BC		1.0
Bromodichloromethane	BDL	µg/L	10/13/94	BC		1.0
Bromoform	BDL	µg/L	10/13/94	BC		1.0
Bromomethane	BDL	µg/L	10/13/94	BC		1.0
Carbon Tetrachloride	BDL	µg/L	10/13/94	BC		1.0
Chlorobenzene	BDL	µg/L	10/13/94	BC		1.0
Chlorodibromomethane	BDL	µg/L	10/13/94	BC		1.0
Chloroethane	BDL	µg/L	10/13/94	BC		1.0
Chloroform	BDL	µg/L	10/13/94	BC		1.0
2-Chloroethyl Vinyl Ether	BDL	µg/L	10/13/94	BC		2.1
Chloromethane	BDL	µg/L	10/13/94	BC		1.0
1,2-Dichlorobenzene	BDL	µg/L	10/13/94	BC		1.0
1,3-Dichlorobenzene	BDL	µg/L	10/13/94	BC		1.0
1,4-Dichlorobenzene	BDL	µg/L	10/13/94	BC		1.0
Dichlorodifluoromethane	BDL	µg/L	10/13/94	BC		1.0
1,1-Dichloroethane	BDL	µg/L	10/13/94	BC		1.0
1,2-Dichloroethane	BDL	µg/L	10/13/94	BC		1.0
1,1-Dichloroethylene	BDL	µg/L	10/13/94	BC		1.0
cis-1,2-Dichloroethylene	BDL	µg/L	10/13/94	BC		1.0
trans-1,2-Dichloroethylene	BDL	µg/L	10/13/94	BC		1.0
1,2-Dichloropropane	BDL	µg/L	10/13/94	BC		1.0
cis-1,3-Dichloropropylene	BDL	µg/L	10/13/94	BC		1.0
trans-1,3-Dichloropropylene	BDL	µg/L	10/13/94	BC		1.0
Ethyl benzene	4.8	µg/L	10/13/94	BC		1.0
Methylene Chloride	5.1	µg/L	10/13/94	BC		5.0
1,1,2,2-Tetrachloroethane	BDL	µg/L	10/13/94	BC		1.0
Tetrachloroethylene	BDL	µg/L	10/13/94	BC		1.0
Toluene	14	µg/L	10/13/94	BC		1.0
1,1,1-Trichloroethane	BDL	µg/L	10/13/94	BC		1.0
1,1,2-Trichloroethane	BDL	µg/L	10/13/94	BC		1.0
Trichloroethylene	1.7	µg/L	10/13/94	BC		1.0
Trichlorofluoromethane	BDL	µg/L	10/13/94	BC		1.3
Vinyl Chloride	BDL	µg/L	10/13/94	BC		1.0
Xylene	23	µg/L	10/13/94	BC		1.0

Note: This analysis was performed on an TCLP Leachate Extraction.

BDL = Below Detection Limit
MDL = Method Detection Limit

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WESTERN MICHIGAN ENVIRONMENTAL SERVICES, INC.

MEN00576

Sample ID: South Compactor 994 Lab ID: 9410007-02

TEST	RESULT	UNITS	ANALYZED	BY	METHOD	MDL
ASTM Leachate Extraction	10/07/94	date extracted		JA	D3987-85	
Chemical Oxygen Demand	250	mg/L	10/12/94	MBR	EPA 410.4	5
Total Solids	75.3	% of sample	10/06/94	WS	APHA 2540 B.	N/A
Acid Digestion, Aqueous	10/07/94	date digested		JA	EPA 3010	
Arsenic	BDL	mg/L	10/14/94	JA	EPA 7060	0.001
Barium	0.13	mg/L	10/12/94	MBR	EPA 6010	0.01
Cadmium	0.00012	mg/L	10/11/94	JA	EPA 7131	0.0001
Chromium	BDL	mg/L	10/17/94	JA	EPA 7191	0.002
Copper	BDL	mg/L	10/12/94	MBR	EPA 6010	0.01
Lead	BDL	mg/L	10/11/94	JA	EPA 7421	0.001
Mercury	BDL	mg/L	10/10/94	WS	EPA 7470	0.0002
Selenium	BDL	mg/L	10/17/94	JA	EPA 7740	0.001
Silver	BDL	mg/L	10/12/94	MBR	EPA 7760	0.01
Zinc	0.11	mg/L	10/12/94	MBR	EPA 6010	0.02

Note: This analysis was performed on an ASTM Leachate Extraction.

BDL = Below Detection Limit
MDL = Method Detection Limit

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WESTERN MICHIGAN ENVIRONMENTAL SERVICES, INC.

MEN00577

Sample ID: South Compactor 994 Lab ID: 9410007-02

TEST	RESULT	UNITS	ANALYZED	BY	METHOD	MDL
601 & 602 Volatiles List					EPA 8260	
Benzene	BDL	µg/L	10/13/94	BC		1.0
Bromodichloromethane	BDL	µg/L	10/13/94	BC		1.0
Bromoform	BDL	µg/L	10/13/94	BC		1.0
Bromomethane	BDL	µg/L	10/13/94	BC		1.0
Carbon Tetrachloride	BDL	µg/L	10/13/94	BC		1.0
Chlorobenzene	BDL	µg/L	10/13/94	BC		1.0
Chlorodibromomethane	BDL	µg/L	10/13/94	BC		1.0
Chloroethane	BDL	µg/L	10/13/94	BC		1.0
Chloroform	BDL	µg/L	10/13/94	BC		1.0
2-Chloroethyl Vinyl Ether	BDL	µg/L	10/13/94	BC		2.1
Chloromethane	BDL	µg/L	10/13/94	BC		1.0
1,2-Dichlorobenzene	BDL	µg/L	10/13/94	BC		1.0
1,3-Dichlorobenzene	BDL	µg/L	10/13/94	BC		1.0
1,4-Dichlorobenzene	BDL	µg/L	10/13/94	BC		1.0
Dichlorodifluoromethane	BDL	µg/L	10/13/94	BC		1.0
1,1-Dichloroethane	BDL	µg/L	10/13/94	BC		1.0
1,2-Dichloroethane	BDL	µg/L	10/13/94	BC		1.0
1,1-Dichloroethylene	BDL	µg/L	10/13/94	BC		1.0
cis-1,2-Dichloroethylene	BDL	µg/L	10/13/94	BC		1.0
trans-1,2-Dichloroethylene	BDL	µg/L	10/13/94	BC		1.0
1,2-Dichloropropane	BDL	µg/L	10/13/94	BC		1.0
cis-1,3-Dichloropropylene	BDL	µg/L	10/13/94	BC		1.0
trans-1,3-Dichloropropylene	BDL	µg/L	10/13/94	BC		1.0
Ethyl benzene	BDL	µg/L	10/13/94	BC		1.0
Methylene Chloride	6.2	µg/L	10/13/94	BC		5.0
1,1,2,2-Tetrachloroethane	BDL	µg/L	10/13/94	BC		1.0
Tetrachloroethylene	BDL	µg/L	10/13/94	BC		1.0
Toluene	4.6	µg/L	10/13/94	BC		1.0
1,1,1-Trichloroethane	BDL	µg/L	10/13/94	BC		1.0
1,1,2-Trichloroethane	BDL	µg/L	10/13/94	BC		1.0
Trichloroethylene	BDL	µg/L	10/13/94	BC		1.0
Trichlorofluoromethane	BDL	µg/L	10/13/94	BC		1.3
Vinyl Chloride	BDL	µg/L	10/13/94	BC		1.0
Xylene	1.1	µg/L	10/13/94	BC		1.0

Note: This analysis was performed on an TCLP Leachate Extraction.

BDL = Below Detection Limit
MDL = Method Detection Limit

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WESTERN MICHIGAN ENVIRONMENTAL SERVICES, INC.

MEN00578

Sample ID: Tail 994 Lab ID: 9410007-03

TEST	RESULT	UNITS	ANALYZED	BY	METHOD	MDL
ASTM Leachate Extraction	10/07/94	date extracted		JA	D3987-85	
Chemical Oxygen Demand	270	mg/L	10/12/94	MBR	EPA 410.4	5
Total Solids	50.5	% of sample	10/06/94	WS	APHA 2540 B.	N/A
Acid Digestion, Aqueous	10/07/94	date digested		JA	EPA 3010	
Arsenic	BDL	mg/L	10/14/94	JA	EPA 7060	0.001
Barium	0.25	mg/L	10/12/94	MBR	EPA 6010	0.01
Cadmium	0.00024	mg/L	10/11/94	JA	EPA 7131	0.0001
Chromium	BDL	mg/L	10/17/94	JA	EPA 7191	0.002
Copper	BDL	mg/L	10/12/94	MBR	EPA 6010	0.01
Lead	0.0021	mg/L	10/11/94	JA	EPA 7421	0.001
Mercury	0.00037	mg/L	10/10/94	WS	EPA 7470	0.0002
Selenium	BDL	mg/L	10/17/94	JA	EPA 7740	0.001
Silver	BDL	mg/L	10/12/94	MBR	EPA 7760	0.01
Zinc	0.39	mg/L	10/12/94	MBR	EPA 6010	0.02

Note: This analysis was performed on an ASTM Leachate Extraction.

BDL = Below Detection Limit
MDL = Method Detection Limit

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Sample ID: Tail 994 Lab ID: 9410007-03

LIST	RESULT	UNITS	ANALYZED	BY	METHOD	MDL
601 & 602 Volatiles List					EPA 8260	
Benzene	9.3	µg/L	10/13/94	BC		1.0
Bromodichloromethane	BDL	µg/L	10/13/94	BC		1.0
Bromoform	BDL	µg/L	10/13/94	BC		1.0
Bromomethane	BDL	µg/L	10/13/94	BC		1.0
Carbon Tetrachloride	BDL	µg/L	10/13/94	BC		1.0
Chlorobenzene	BDL	µg/L	10/13/94	BC		1.0
Chlorodibromomethane	BDL	µg/L	10/13/94	BC		1.0
Chloroethane	BDL	µg/L	10/13/94	BC		1.0
Chloroform	BDL	µg/L	10/13/94	BC		1.0
2-Chloroethyl Vinyl Ether	BDL	µg/L	10/13/94	BC		2.1
Chloromethane	BDL	µg/L	10/13/94	BC		1.0
1,2-Dichlorobenzene	BDL	µg/L	10/13/94	BC		1.0
1,3-Dichlorobenzene	BDL	µg/L	10/13/94	BC		1.0
1,4-Dichlorobenzene	2.1	µg/L	10/13/94	BC		1.0
Dichlorodifluoromethane	BDL	µg/L	10/13/94	BC		1.0
1,1-Dichloroethane	BDL	µg/L	10/13/94	BC		1.0
1,2-Dichloroethane	BDL	µg/L	10/13/94	BC		1.0
1,1-Dichloroethylene	BDL	µg/L	10/13/94	BC		1.0
cis-1,2-Dichloroethylene	BDL	µg/L	10/13/94	BC		1.0
trans-1,2-Dichloroethylene	BDL	µg/L	10/13/94	BC		1.0
1,2-Dichloropropane	BDL	µg/L	10/13/94	BC		1.0
cis-1,3-Dichloropropylene	BDL	µg/L	10/13/94	BC		1.0
trans-1,3-Dichloropropylene	BDL	µg/L	10/13/94	BC		1.0
Ethyl benzene	BDL	µg/L	10/13/94	BC		1.0
Methylene Chloride	100	µg/L	10/13/94	BC		5.0
1,1,2,2-Tetrachloroethane	BDL	µg/L	10/13/94	BC		1.0
Tetrachloroethylene	BDL	µg/L	10/13/94	BC		1.0
Toluene	27	µg/L	10/13/94	BC		1.0
1,1,1-Trichloroethane	BDL	µg/L	10/13/94	BC		1.0
1,1,2-Trichloroethane	BDL	µg/L	10/13/94	BC		1.0
Trichloroethylene	BDL	µg/L	10/13/94	BC		1.0
Trichlorofluoromethane	BDL	µg/L	10/13/94	BC		1.3
Vinyl Chloride	BDL	µg/L	10/13/94	BC		1.0
Xylene	1.2	µg/L	10/13/94	BC		1.0

Note: This analysis was performed on an TCLP Leachate Extraction.

BDL = Below Detection Limit
MDL = Method Detection Limit

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WESTERN MICHIGAN ENVIRONMENTAL SERVICES, INC.

MEN00580

Sample ID: Ash 994 Lab ID: 9410007-04

TEST	RESULT	UNITS	ANALYZED	BY	METHOD	MDL
ASTM Leachate Extraction	10/07/94	date extracted		JA	D3987-85	
Chemical Oxygen Demand	73	mg/L	10/13/94	MBR	EPA 410.4	5
Total Solids	69.2	% of sample	10/06/94	WS	APHA 2540 B.	N/A
Acid Digestion, Aqueous	10/07/94	date digested		JA	EPA 3010	
Arsenic	0.040	mg/L	10/14/94	JA	EPA 7060	0.001
Barium	0.37	mg/L	10/12/94	MBR	EPA 6010	0.01
Cadmium	BDL	mg/L	10/11/94	JA	EPA 7131	0.0001
Chromium	0.0024	mg/L	10/17/94	JA	EPA 7191	0.002
Copper	BDL	mg/L	10/12/94	MBR	EPA 6010	0.01
Lead	0.0017	mg/L	10/11/94	JA	EPA 7421	0.001
Mercury	0.00024	mg/L	10/10/94	WS	EPA 7470	0.0002
Selenium	0.017	mg/L	10/17/94	JA	EPA 7740	0.001
Silver	BDL	mg/L	10/12/94	MBR	EPA 7760	0.01
Zinc	0.053	mg/L	10/12/94	MBR	EPA 6010	0.02

Note: This analysis was performed on an ASTM Leachate Extraction.

BDL = Below Detection Limit
MDL = Method Detection Limit

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Sample ID: Ash 994 Lab ID: 9410007-04

ST	RESULT	UNITS	ANALYZED	BY	METHOD	MDL
601 & 602 Volatiles List					EPA 8260	
Benzene	BDL	µg/L	10/13/94	BC		1.0
Bromodichloromethane	BDL	µg/L	10/13/94	BC		1.0
Bromoform	BDL	µg/L	10/13/94	BC		1.0
Bromomethane	BDL	µg/L	10/13/94	BC		1.0
Carbon Tetrachloride	BDL	µg/L	10/13/94	BC		1.0
Chlorobenzene	BDL	µg/L	10/13/94	BC		1.0
Chlorodibromomethane	BDL	µg/L	10/13/94	BC		1.0
Chloroethane	BDL	µg/L	10/13/94	BC		1.0
Chloroform	BDL	µg/L	10/13/94	BC		1.0
2-Chloroethyl Vinyl Ether	BDL	µg/L	10/13/94	BC		2.1
Chloromethane	BDL	µg/L	10/13/94	BC		1.0
1,2-Dichlorobenzene	BDL	µg/L	10/13/94	BC		1.0
1,3-Dichlorobenzene	BDL	µg/L	10/13/94	BC		1.0
1,4-Dichlorobenzene	BDL	µg/L	10/13/94	BC		1.0
Dichlorodifluoromethane	BDL	µg/L	10/13/94	BC		1.0
1,1-Dichloroethane	BDL	µg/L	10/13/94	BC		1.0
1,2-Dichloroethane	BDL	µg/L	10/13/94	BC		1.0
1,1-Dichloroethylene	BDL	µg/L	10/13/94	BC		1.0
cis-1,2-Dichloroethylene	BDL	µg/L	10/13/94	BC		1.0
trans-1,2-Dichloroethylene	BDL	µg/L	10/13/94	BC		1.0
1,2-Dichloropropane	BDL	µg/L	10/13/94	BC		1.0
cis-1,3-Dichloropropylene	BDL	µg/L	10/13/94	BC		1.0
trans-1,3-Dichloropropylene	BDL	µg/L	10/13/94	BC		1.0
Ethyl benzene	1.5	µg/L	10/13/94	BC		1.0
Methylene Chloride	46	µg/L	10/13/94	BC		5.0
1,1,2,2-Tetrachloroethane	BDL	µg/L	10/13/94	BC		1.0
etrachloroethylene	BDL	µg/L	10/13/94	BC		1.0
oluene	5.1	µg/L	10/13/94	BC		1.0
1,1,1-Trichloroethane	BDL	µg/L	10/13/94	BC		1.0
1,1,2-Trichloroethane	BDL	µg/L	10/13/94	BC		1.0
Trichloroethylene	BDL	µg/L	10/13/94	BC		1.0
Trichlorofluoromethane	1.7	µg/L	10/13/94	BC		1.3
Vinyl Chloride	BDL	µg/L	10/13/94	BC		1.0
Xylene	7.1	µg/L	10/13/94	BC		1.0

Note: This analysis was performed on an TCLP Leachate Extraction.

BDL = Below Detection Limit
MDL = Method Detection Limit

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MEN00582

WESTERN MICHIGAN
ENVIRONMENTAL SERVICES, INC.

3352 128th Avenue, Holland, Michigan 49424-9263
Phone: 616-399-6070 FAX. 616-399-6185

4th quarter 94

Should we communicate? By who? to who?

CLIENT: Menasha Corporation
320 North Farmer
Otsego, Michigan 49078

Attn: Gary Roys

DATE: January 13, 1995

ANALYSIS OF: Waste Samples

REPORTED BY: Robert K. Zahray, Laboratory Manager

DATE RECEIVED: Received from client on December 20, 1994.

Sample ID: TAIL 121994 Lab ID: 9412181-01 Collected: 12/19/94

TEST	RESULT	UNITS	ANALYZED	BY	METHOD	MDL
ASTM Leachate Extraction	12/27/94	date extracted		JA	D3987-85	
Chemical Oxygen Demand	260	mg/L	12/30/94	MBR	EPA 410.4	5
Total Solids	48.5	% of sample	12/22/94	GCB	APHA 2540 B.	NA
Acid Digestion, Aqueous	12/28/94	date digested		JA	EPA 3010	
-senic	BDL	mg/L	01/10/95	JA	EPA 7060	0.001
rium	0.35	mg/L	01/12/95	MBR	EPA 6010	0.01
dmium	0.00019	mg/L	01/12/95	JA	EPA 7131	0.0001
Chromium	0.0039	mg/L	01/11/95	JA	EPA 7191	0.002
Copper	BDL	mg/L	01/05/95	MBR	EPA 7210	0.02
Lead	0.0037	mg/L	01/10/95	JA	EPA 7421	0.001
Mercury	0.00055	mg/L	12/29/94	WS	EPA 7470	0.0002
Selenium	BDL	mg/L	01/10/95	JA	EPA 7740	0.001
Silver	BDL	mg/L	01/09/95	MBR	EPA 7760	0.01
Zinc	0.36	mg/L	01/03/95	MBR	EPA 7950	0.02

Note: The analysis for this sample was performed on an ASTM Leachate Extraction.

BDL = Below Detection Limit
MDL = Method Detection Limit

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Sample ID: TAIL 121994 Lab ID: 9412181-01 Collected: 12/19/94

ST	RESULT	UNITS	ANALYZED	BY	METHOD	MDL
601 & 602 Volatiles List					EPA 8260	
Benzene	2.3	µg/L	01/04/95	HL		1.0
Bromodichloromethane	BDL	µg/L	01/04/95	HL		1.0
Bromoform	BDL	µg/L	01/04/95	HL		1.0
Bromomethane	BDL	µg/L	01/04/95	HL		1.0
Carbon Tetrachloride	BDL	µg/L	01/04/95	HL		1.0
Chlorobenzene	BDL	µg/L	01/04/95	HL		1.0
Chlorodibromomethane	BDL	µg/L	01/04/95	HL		1.0
Chloroethane	BDL	µg/L	01/04/95	HL		1.0
Chloroform	BDL	µg/L	01/04/95	HL		1.0
2-Chloroethyl Vinyl Ether	BDL	µg/L	01/04/95	HL		2.1
Chloromethane	BDL	µg/L	01/04/95	HL		1.0
1,2-Dichlorobenzene	BDL	µg/L	01/04/95	HL		1.0
1,3-Dichlorobenzene	BDL	µg/L	01/04/95	HL		1.0
1,4-Dichlorobenzene	BDL	µg/L	01/04/95	HL		1.0
Dichlorodifluoromethane	BDL	µg/L	01/04/95	HL		1.0
1,1-Dichloroethane	BDL	µg/L	01/04/95	HL		1.0
1,2-Dichloroethane	BDL	µg/L	01/04/95	HL		1.0
1,1-Dichloroethylene	BDL	µg/L	01/04/95	HL		1.0
cis-1,2-Dichloroethylene	BDL	µg/L	01/04/95	HL		1.0
trans-1,2-Dichloroethylene	BDL	µg/L	01/04/95	HL		1.0
1,2-Dichloropropane	BDL	µg/L	01/04/95	HL		1.0
cis-1,3-Dichloropropylene	BDL	µg/L	01/04/95	HL		1.0
trans-1,3-Dichloropropylene	BDL	µg/L	01/04/95	HL		1.0
Ethyl benzene	BDL	µg/L	01/04/95	HL		1.0
Methylene Chloride	BDL	µg/L	01/04/95	HL		90
',1,2,2-Tetrachloroethane	BDL	µg/L	01/04/95	HL		1.0
etrachloroethylene	BDL	µg/L	01/04/95	HL		1.0
oluene	13	µg/L	01/04/95	HL		1.0
1,1,1-Trichloroethane	BDL	µg/L	01/04/95	HL		1.0
1,1,2-Trichloroethane	BDL	µg/L	01/04/95	HL		1.0
Trichloroethylene	BDL	µg/L	01/04/95	HL		1.0
Trichlorofluoromethane	BDL	µg/L	01/04/95	HL		1.3
Vinyl Chloride	BDL	µg/L	01/04/95	HL		1.0
Xylene	3.0	µg/L	01/04/95	HL		1.0

Note: The analysis for this sample was performed on a TCLP Leachate Extraction.

BDL = Below Detection Limit
MDL = Method Detection Limit

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Sample ID: ASH 121994 Lab ID: 9412181-02 Collected: 12/19/94

TEST	RESULT	UNITS	ANALYZED	BY	METHOD	MDL
ASTM Leachate Extraction	12/27/94	date extracted		JA	D3987-85	
Chemical Oxygen Demand	9.0	mg/L	01/05/95	MBR	EPA 410.4	5
Total Solids	69.9	% of sample	12/22/94	GCB	APHA 2540 B.	NA
Acid Digestion, Aqueous	12/28/94	date digested		JA	EPA 3010	
Arsenic	0.030	mg/L	01/10/95	JA	EPA 7060	0.001
Barium	0.11	mg/L	01/12/95	MBR	EPA 6010	0.01
Cadmium	0.00012	mg/L	01/12/95	JA	EPA 7131	0.0001
Chromium	BDL	mg/L	01/11/95	JA	EPA 7191	0.002
Copper	BDL	mg/L	01/05/95	MBR	EPA 7210	0.02
Lead	0.0013	mg/L	01/10/95	JA	EPA 7421	0.001
Mercury	BDL	mg/L	12/29/94	WS	EPA 7470	0.0002
Selenium	0.0052	mg/L	01/10/95	JA	EPA 7740	0.001
Silver	BDL	mg/L	01/09/95	MBR	EPA 7760	0.01
Zinc	0.057	mg/L	01/03/95	MBR	EPA 7950	0.02

Note: The analysis for this sample was performed on an ASTM Leachate Extraction.

BDL = Below Detection Limit
MDL = Method Detection Limit

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WESTERN MICHIGAN ENVIRONMENTAL SERVICES, INC.

MEN00585

Sample ID: ASH 121994 Lab ID: 9412181-02 Collected: 12/19/94

TEST	RESULT	UNITS	ANALYZED	BY	METHOD	MDL
601 & 602 Volatiles List					EPA 8260	
Benzene	BDL	µg/L	01/04/95	HL		1.0
Bromodichloromethane	BDL	µg/L	01/04/95	HL		1.0
Bromoform	BDL	µg/L	01/04/95	HL		1.0
Bromomethane	BDL	µg/L	01/04/95	HL		1.0
Carbon Tetrachloride	BDL	µg/L	01/04/95	HL		1.0
Chlorobenzene	BDL	µg/L	01/04/95	HL		1.0
Chlorodibromomethane	BDL	µg/L	01/04/95	HL		1.0
Chloroethane	BDL	µg/L	01/04/95	HL		1.0
Chloroform	BDL	µg/L	01/04/95	HL		1.0
2-Chloroethyl Vinyl Ether	BDL	µg/L	01/04/95	HL		2.1
Chloromethane	BDL	µg/L	01/04/95	HL		1.0
1,2-Dichlorobenzene	BDL	µg/L	01/04/95	HL		1.0
1,3-Dichlorobenzene	BDL	µg/L	01/04/95	HL		1.0
1,4-Dichlorobenzene	BDL	µg/L	01/04/95	HL		1.0
Dichlorodifluoromethane	BDL	µg/L	01/04/95	HL		1.0
1,1-Dichloroethane	BDL	µg/L	01/04/95	HL		1.0
1,2-Dichloroethane	BDL	µg/L	01/04/95	HL		1.0
1,1-Dichloroethylene	BDL	µg/L	01/04/95	HL		1.0
cis-1,2-Dichloroethylene	BDL	µg/L	01/04/95	HL		1.0
trans-1,2-Dichloroethylene	BDL	µg/L	01/04/95	HL		1.0
1,2-Dichloropropane	BDL	µg/L	01/04/95	HL		1.0
cis-1,3-Dichloropropylene	BDL	µg/L	01/04/95	HL		1.0
trans-1,3-Dichloropropylene	BDL	µg/L	01/04/95	HL		1.0
Ethyl benzene	BDL	µg/L	01/04/95	HL		1.0
Methylene Chloride	BDL	µg/L	01/04/95	HL		90
1,1,2,2-Tetrachloroethane	BDL	µg/L	01/04/95	HL		1.0
Tetrachloroethylene	BDL	µg/L	01/04/95	HL		1.0
Toluene	BDL	µg/L	01/04/95	HL		1.0
1,1,1-Trichloroethane	BDL	µg/L	01/04/95	HL		1.0
1,1,2-Trichloroethane	BDL	µg/L	01/04/95	HL		1.0
Trichloroethylene	BDL	µg/L	01/04/95	HL		1.0
Trichlorofluoromethane	BDL	µg/L	01/04/95	HL		1.3
Vinyl Chloride	BDL	µg/L	01/04/95	HL		1.0
Xylene	BDL	µg/L	01/04/95	HL		1.0

Note: The analysis for this sample was performed on a TCLP Leachate Extraction.

BDL = Below Detection Limit
MDL = Method Detection Limit

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Sample ID: **North Compactor 1294** Lab ID: 9412181-03 Collected: 12/19/94

TEST	RESULT	UNITS	ANALYZED	BY	METHOD	MDL
ASTM Leachate Extraction	12/27/94	date extracted		JA	D3987-85	
Chemical Oxygen Demand	240	mg/L	12/30/94	MBR	EPA 410.4	5
Total Solids	44.6	% of sample	12/22/94	GCB	APHA 2540 B.	NA
Acid Digestion, Aqueous	12/28/94	date digested		JA	EPA 3010	
Arsenic	BDL	mg/L	01/10/95	JA	EPA 7060	0.001
Barium	0.099	mg/L	01/12/95	MBR	EPA 6010	0.01
Cadmium	BDL	mg/L	01/12/95	JA	EPA 7131	0.0001
Chromium	BDL	mg/L	01/11/95	JA	EPA 7191	0.002
Copper	BDL	mg/L	01/05/95	MBR	EPA 7210	0.02
Lead	0.0013	mg/L	01/10/95	JA	EPA 7421	0.001
Mercury	BDL	mg/L	12/29/94	WS	EPA 7470	0.0002
Selenium	BDL	mg/L	01/10/95	JA	EPA 7740	0.001
Silver	BDL	mg/L	01/09/95	MBR	EPA 7760	0.01
Zinc	0.077	mg/L	01/03/95	MBR	EPA 7950	0.02

Note: The analysis for this sample was performed on an ASTM Leachate Extraction.

BDL = Below Detection Limit
MDL = Method Detection Limit

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Sample ID: North Compactor 1294 Lab ID: 9412181-03 Collected: 12/19/94

TEST	RESULT	UNITS	ANALYZED	BY	METHOD	MDL
601 & 602 Volatiles List					EPA 8260	
Benzene	BDL	µg/L	01/04/95	HL		1.0
Bromodichloromethane	BDL	µg/L	01/04/95	HL		1.0
Bromoform	BDL	µg/L	01/04/95	HL		1.0
Bromomethane	BDL	µg/L	01/04/95	HL		1.0
Carbon Tetrachloride	BDL	µg/L	01/04/95	HL		1.0
Chlorobenzene	BDL	µg/L	01/04/95	HL		1.0
Chlorodibromomethane	BDL	µg/L	01/04/95	HL		1.0
Chloroethane	BDL	µg/L	01/04/95	HL		1.0
Chloroform	BDL	µg/L	01/04/95	HL		1.0
2-Chloroethyl Vinyl Ether	BDL	µg/L	01/04/95	HL		2.1
Chloromethane	BDL	µg/L	01/04/95	HL		1.0
1,2-Dichlorobenzene	BDL	µg/L	01/04/95	HL		1.0
1,3-Dichlorobenzene	BDL	µg/L	01/04/95	HL		1.0
1,4-Dichlorobenzene	BDL	µg/L	01/04/95	HL		1.0
Dichlorodifluoromethane	BDL	µg/L	01/04/95	HL		1.0
1,1-Dichloroethane	BDL	µg/L	01/04/95	HL		1.0
1,2-Dichloroethane	BDL	µg/L	01/04/95	HL		1.0
1,1-Dichloroethylene	BDL	µg/L	01/04/95	HL		1.0
cis-1,2-Dichloroethylene	BDL	µg/L	01/04/95	HL		1.0
trans-1,2-Dichloroethylene	BDL	µg/L	01/04/95	HL		1.0
1,2-Dichloropropane	BDL	µg/L	01/04/95	HL		1.0
cis-1,3-Dichloropropylene	BDL	µg/L	01/04/95	HL		1.0
trans-1,3-Dichloropropylene	BDL	µg/L	01/04/95	HL		1.0
Ethyl benzene	BDL	µg/L	01/04/95	HL		1.0
Methylene Chloride	BDL	µg/L	01/04/95	HL		90
1,1,2,2-Tetrachloroethane	BDL	µg/L	01/04/95	HL		1.0
Tetrachloroethylene	BDL	µg/L	01/04/95	HL		1.0
Toluene	2.2	µg/L	01/04/95	HL		1.0
1,1,1-Trichloroethane	BDL	µg/L	01/04/95	HL		1.0
1,1,2-Trichloroethane	BDL	µg/L	01/04/95	HL		1.0
Trichloroethylene	BDL	µg/L	01/04/95	HL		1.0
Trichlorofluoromethane	BDL	µg/L	01/04/95	HL		1.3
Vinyl Chloride	BDL	µg/L	01/04/95	HL		1.0
Xylene	2.0	µg/L	01/04/95	HL		1.0

Note: The analysis for this sample was performed on a TCLP Leachate Extraction.

BDL = Below Detection Limit
MDL = Method Detection Limit

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WESTERN MICHIGAN ENVIRONMENTAL SERVICES, INC.

MEN00588

Sample ID: South Compactor 1294 Lab ID: 9412181-04 Collected: 12/19/94

TEST	RESULT	UNITS	ANALYZED	BY	METHOD	MDL
ASTM Leachate Extraction	12/27/94	date extracted		JA	D3987-85	
Chemical Oxygen Demand	280	mg/L	12/30/94	MBR	EPA 410.4	5
Total Solids	51.8	% of sample	12/22/94	GCB	APHA 2540 B.	NA
Acid Digestion, Aqueous	12/28/94	date digested		JA	EPA 3010	
Arsenic	BDL	mg/L	01/10/95	JA	EPA 7060	0.001
Barium	0.13	mg/L	01/12/95	MBR	EPA 6010	0.01
Cadmium	0.00062	mg/L	01/12/95	JA	EPA 7131	0.0001
Chromium	0.0029	mg/L	01/11/95	JA	EPA 7191	0.002
Copper	BDL	mg/L	01/05/95	MBR	EPA 7210	0.02
Lead	0.0047	mg/L	01/10/95	JA	EPA 7421	0.001
Mercury	BDL	mg/L	12/29/94	WS	EPA 7470	0.0002
Selenium	BDL	mg/L	01/10/95	JA	EPA 7740	0.001
Silver	BDL	mg/L	01/09/95	MBR	EPA 7760	0.01
Zinc	0.11	mg/L	01/03/95	MBR	EPA 7950	0.02

Note: The analysis for this sample was performed on an ASTM Leachate Extraction.

BDL = Below Detection Limit
MDL = Method Detection Limit

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Sample ID: South Compactor 1294 Lab ID: 9412181-04 Collected: 12/19/94

TEST	RESULT	UNITS	ANALYZED	BY	METHOD	MDL
601 & 602 Volatiles List					EPA 8260	
Benzene	BDL	µg/L	01/04/95	HL		1.0
Bromodichloromethane	BDL	µg/L	01/04/95	HL		1.0
Bromoform	BDL	µg/L	01/04/95	HL		1.0
Bromomethane	BDL	µg/L	01/04/95	HL		1.0
Carbon Tetrachloride	BDL	µg/L	01/04/95	HL		1.0
Chlorobenzene	BDL	µg/L	01/04/95	HL		1.0
Chlorodibromomethane	BDL	µg/L	01/04/95	HL		1.0
Chloroethane	BDL	µg/L	01/04/95	HL		1.0
Chloroform	BDL	µg/L	01/04/95	HL		1.0
2-Chloroethyl Vinyl Ether	BDL	µg/L	01/04/95	HL		2.1
Chloromethane	BDL	µg/L	01/04/95	HL		1.0
1,2-Dichlorobenzene	BDL	µg/L	01/04/95	HL		1.0
1,3-Dichlorobenzene	BDL	µg/L	01/04/95	HL		1.0
1,4-Dichlorobenzene	BDL	µg/L	01/04/95	HL		1.0
Dichlorodifluoromethane	BDL	µg/L	01/04/95	HL		1.0
1,1-Dichloroethane	BDL	µg/L	01/04/95	HL		1.0
1,2-Dichloroethane	BDL	µg/L	01/04/95	HL		1.0
1,1-Dichloroethylene	BDL	µg/L	01/04/95	HL		1.0
cis-1,2-Dichloroethylene	BDL	µg/L	01/04/95	HL		1.0
trans-1,2-Dichloroethylene	BDL	µg/L	01/04/95	HL		1.0
1,2-Dichloropropane	BDL	µg/L	01/04/95	HL		1.0
cis-1,3-Dichloropropylene	BDL	µg/L	01/04/95	HL		1.0
trans-1,3-Dichloropropylene	BDL	µg/L	01/04/95	HL		1.0
Ethyl benzene	BDL	µg/L	01/04/95	HL		1.0
Methylene Chloride	BDL	µg/L	01/04/95	HL		90
1,1,2,2-Tetrachloroethane	BDL	µg/L	01/04/95	HL		1.0
Tetrachloroethylene	BDL	µg/L	01/04/95	HL		1.0
Toluene	6.6	µg/L	01/04/95	HL		1.0
1,1,1-Trichloroethane	BDL	µg/L	01/04/95	HL		1.0
1,1,2-Trichloroethane	BDL	µg/L	01/04/95	HL		1.0
Trichloroethylene	BDL	µg/L	01/04/95	HL		1.0
Trichlorofluoromethane	BDL	µg/L	01/04/95	HL		1.3
Vinyl Chloride	BDL	µg/L	01/04/95	HL		1.0
Xylene	BDL	µg/L	01/04/95	HL		1.0

Note: The analysis for this sample was performed on a TCLP Leachate Extraction.

BDL = Below Detection Limit
MDL = Method Detection Limit

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Keith

WESTERN MICHIGAN
ENVIRONMENTAL SERVICES, INC.

3352 128th Avenue, Holland, Michigan 49424-9263
Phone: 616-399-6070 FAX: 616-399-6185

MEN00590

CLIENT: Menasha Corporation
320 North Farmer
Otsego, Michigan 49078

Attn: Gary Roys

DATE: April 25, 1995

ANALYSIS OF: Waste Samples

REPORTED BY: Robert K. Zahray, Laboratory Manager

DATE RECEIVED: Received from client on March 30, 1995.

Sample ID: Ash 0395 Lab ID: 9503222-01 Collected: 03/29/95

TEST	RESULT	UNITS	ANALYZED	BY	METHOD	MDL
ASTM Leachate Extraction	04/04/95	date extracted		MBR	D3987-85	
Chemical Oxygen Demand	BDL	mg/L	04/07/95	NW	EPA 410.4	5
Total Solids	75.0	% of sample	04/03/95	GCB	APHA 2540 B.	N/A
Acid Digestion, Aqueous	04/05/95	date digested		NW	EPA 3010	
Arsenic	0.046	mg/L	04/11/95	JA	EPA 7060	0.001
Barium	0.16	mg/L	04/18/95	MBR	EPA 6010	0.01
Cadmium	BDL	mg/L	04/10/95	JA	EPA 7131	0.0001
Chromium	BDL	mg/L	04/10/95	JA	EPA 7191	0.002
Copper	0.013	mg/L	04/18/95	MBR	EPA 6010	0.01
Lead	BDL	mg/L	04/09/95	JA	EPA 7421	0.001
Mercury	BDL	mg/L	04/05/95	NW	EPA 7470	0.0002
Selenium	0.012	mg/L	04/09/95	JA	EPA 7740	0.001
Silver	BDL	mg/L	04/10/95	MBR	EPA 7760	0.01
Zinc	0.032	mg/L	04/18/95	MBR	EPA 6010	0.02

Note: This sample was run on an ASTM Leachate Extraction.

BDL = Below Detection Limit
MDL = Method Detection Limit

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Sample ID: Ash 0395 Lab ID: 9503222-01 Collected: 03/29/95

TEST	RESULT	UNITS	ANALYZED	BY	METHOD	MDL
601 & 602 Volatiles List					EPA 8260	
Benzene	BDL	µg/L	04/06/95	WC		1.0
Bromodichloromethane	BDL	µg/L	04/06/95	WC		1.0
Bromoform	BDL	µg/L	04/06/95	WC		1.0
Bromomethane	BDL	µg/L	04/06/95	WC		1.0
Carbon Tetrachloride	BDL	µg/L	04/06/95	WC		1.0
Chlorobenzene	BDL	µg/L	04/06/95	WC		1.0
Chlorodibromomethane	BDL	µg/L	04/06/95	WC		1.0
Chloroethane	BDL	µg/L	04/06/95	WC		1.0
Chloroform	BDL	µg/L	04/06/95	WC		1.0
2-Chloroethyl Vinyl Ether	BDL	µg/L	04/06/95	WC		2.1
Chloromethane	BDL	µg/L	04/06/95	WC		1.0
1,2-Dichlorobenzene	BDL	µg/L	04/06/95	WC		1.0
1,3-Dichlorobenzene	BDL	µg/L	04/06/95	WC		1.0
1,4-Dichlorobenzene	BDL	µg/L	04/06/95	WC		1.0
Dichlorodifluoromethane	BDL	µg/L	04/06/95	WC		1.0
1,1-Dichloroethane	BDL	µg/L	04/06/95	WC		1.0
1,2-Dichloroethane	BDL	µg/L	04/06/95	WC		1.0
1,1-Dichloroethylene	BDL	µg/L	04/06/95	WC		1.0
cis-1,2-Dichloroethylene	BDL	µg/L	04/06/95	WC		1.0
trans-1,2-Dichloroethylene	BDL	µg/L	04/06/95	WC		1.0
1,2-Dichloropropane	BDL	µg/L	04/06/95	WC		1.0
cis-1,3-Dichloropropylene	BDL	µg/L	04/06/95	WC		1.0
trans-1,3-Dichloropropylene	BDL	µg/L	04/06/95	WC		1.0
Ethyl benzene	BDL	µg/L	04/06/95	WC		1.0
Methylene Chloride	BDL	µg/L	04/06/95	WC		5.0
1,1,2,2-Tetrachloroethane	BDL	µg/L	04/06/95	WC		1.0
Tetrachloroethylene	BDL	µg/L	04/06/95	WC		1.0
Toluene	BDL	µg/L	04/06/95	WC		1.0
1,1,1-Trichloroethane	BDL	µg/L	04/06/95	WC		1.0
1,1,2-Trichloroethane	BDL	µg/L	04/06/95	WC		1.0
Trichloroethylene	BDL	µg/L	04/06/95	WC		1.0
Trichlorofluoromethane	BDL	µg/L	04/06/95	WC		1.0
Vinyl Chloride	BDL	µg/L	04/06/95	WC		1.0
Xylene	BDL	µg/L	04/06/95	WC		1.0

Note: This sample was run on a TCLP ZHE Extraction.

BDL = Below Detection Limit
MDL = Method Detection Limit

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Sample ID: South Compactor 0395 Lab ID: 9503222-02 Collected: 03/29/95

TEST	RESULT	UNITS	ANALYZED	BY	METHOD	MDL
ASTM Leachate Extraction	04/04/95	date extracted		MBR	D3987-85	
Chemical Oxygen Demand	250	mg/L	04/11/95	NW	EPA 410.4	5
Total Solids	44.8	% of sample	04/03/95	GCB	APHA 2540 B.	N/A
Acid Digestion, Aqueous	04/05/95	date digested		NW	EPA 3010	
Arsenic	0.0029	mg/L	04/11/95	JA	EPA 7060	0.001
Barium	0.18	mg/L	04/18/95	MBR	EPA 6010	0.01
Cadmium	BDL	mg/L	04/10/95	JA	EPA 7131	0.0001
Chromium	BDL	mg/L	04/10/95	JA	EPA 7191	0.002
Copper	0.014	mg/L	04/18/95	MBR	EPA 6010	0.01
Lead	0.0027	mg/L	04/09/95	JA	EPA 7421	0.001
Mercury	BDL	mg/L	04/05/95	NW	EPA 7470	0.0002
Selenium	BDL	mg/L	04/09/95	JA	EPA 7740	0.001
Silver	BDL	mg/L	04/10/95	MBR	EPA 7760	0.01
Zinc	0.073	mg/L	04/18/95	MBR	EPA 6010	0.02

Note: This sample was run on an ASTM Leachate Extraction.

BDL = Below Detection Limit
MDL = Method Detection Limit

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Sample ID: South Compactor 0395 Lab ID: 9503222-02 Collected: 03/29/95

TEST	RESULT	UNITS	ANALYZED	BY	METHOD	MDL
601 & 602 Volatiles List					EPA 8260	
Benzene	BDL	µg/L	04/06/95	WC		1.0
Bromodichloromethane	BDL	µg/L	04/06/95	WC		1.0
Bromoform	BDL	µg/L	04/06/95	WC		1.0
Bromomethane	BDL	µg/L	04/06/95	WC		1.0
Carbon Tetrachloride	BDL	µg/L	04/06/95	WC		1.0
Chlorobenzene	BDL	µg/L	04/06/95	WC		1.0
Chlorodibromomethane	BDL	µg/L	04/06/95	WC		1.0
Chloroethane	BDL	µg/L	04/06/95	WC		1.0
Chloroform	BDL	µg/L	04/06/95	WC		1.0
2-Chloroethyl Vinyl Ether	BDL	µg/L	04/06/95	WC		2.1
Chloromethane	BDL	µg/L	04/06/95	WC		1.0
1,2-Dichlorobenzene	BDL	µg/L	04/06/95	WC		1.0
1,3-Dichlorobenzene	BDL	µg/L	04/06/95	WC		1.0
1,4-Dichlorobenzene	BDL	µg/L	04/06/95	WC		1.0
Dichlorodifluoromethane	BDL	µg/L	04/06/95	WC		1.0
1,1-Dichloroethane	BDL	µg/L	04/06/95	WC		1.0
1,2-Dichloroethane	BDL	µg/L	04/06/95	WC		1.0
1,1-Dichloroethylene	BDL	µg/L	04/06/95	WC		1.0
cis-1,2-Dichloroethylene	BDL	µg/L	04/06/95	WC		1.0
trans-1,2-Dichloroethylene	BDL	µg/L	04/06/95	WC		1.0
1,2-Dichloropropane	BDL	µg/L	04/06/95	WC		1.0
cis-1,3-Dichloropropylene	BDL	µg/L	04/06/95	WC		1.0
trans-1,3-Dichloropropylene	BDL	µg/L	04/06/95	WC		1.0
Ethyl benzene	5.0	µg/L	04/06/95	WC		1.0
Methylene Chloride	7.6	µg/L	04/06/95	WC		5.0
1,1,2,2-Tetrachloroethane	BDL	µg/L	04/06/95	WC		1.0
Tetrachloroethylene	BDL	µg/L	04/06/95	WC		1.0
Toluene	28	µg/L	04/06/95	WC		1.0
1,1,1-Trichloroethane	BDL	µg/L	04/06/95	WC		1.0
1,1,2-Trichloroethane	BDL	µg/L	04/06/95	WC		1.0
Trichloroethylene	BDL	µg/L	04/06/95	WC		1.0
Trichlorofluoromethane	BDL	µg/L	04/06/95	WC		1.0
Vinyl Chloride	BDL	µg/L	04/06/95	WC		1.0
Xylene	23	µg/L	04/06/95	WC		1.0

Note: This sample was run on a TCLP ZHE Extraction.

BDL = Below Detection Limit
MDL = Method Detection Limit

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Sample ID: West Compactor 0395 Lab ID: 9503222-03 Collected: 03/29/95

TEST	RESULT	UNITS	ANALYZED	BY	METHOD	MDL
ASTM Leachate Extraction	04/04/95	date extracted		MBR	D3987-85	
Chemical Oxygen Demand	250	mg/L	04/11/95	NW	EPA 410.4	5
Total Solids	46.2	% of sample	04/03/95	GCB	APHA 2540 B.	N/A
Acid Digestion, Aqueous	04/05/95	date digested		NW	EPA 3010	
Arsenic	BDL	mg/L	04/12/95	JA	EPA 7060	0.001
Barium	0.24	mg/L	04/18/95	MBR	EPA 6010	0.01
Cadmium	0.00013	mg/L	04/10/95	JA	EPA 7131	0.0001
Chromium	BDL	mg/L	04/10/95	JA	EPA 7191	0.002
Copper	0.014	mg/L	04/18/95	MBR	EPA 6010	0.01
Lead	0.0020	mg/L	04/09/95	JA	EPA 7421	0.001
Mercury	BDL	mg/L	04/05/95	NW	EPA 7470	0.0002
Selenium	BDL	mg/L	04/09/95	JA	EPA 7740	0.001
Silver	BDL	mg/L	04/10/95	MBR	EPA 7760	0.01
Zinc	0.073	mg/L	04/18/95	MBR	EPA 6010	0.02

Note: This sample was run on an ASTM Leachate Extraction.

BDL = Below Detection Limit
MDL = Method Detection Limit

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Sample ID: West Compactor 0395 Lab ID: 9503222-03 Collected: 03/29/95

TEST	RESULT	UNITS	ANALYZED	BY	METHOD	MDL
601 & 602 Volatiles List					EPA 8260	
Benzene	BDL	µg/L	04/07/95	WC		1.0
Bromodichloromethane	BDL	µg/L	04/07/95	WC		1.0
Bromoform	BDL	µg/L	04/07/95	WC		1.0
Bromomethane	BDL	µg/L	04/07/95	WC		1.0
Carbon Tetrachloride	BDL	µg/L	04/07/95	WC		1.0
Chlorobenzene	BDL	µg/L	04/07/95	WC		1.0
Chlorodibromomethane	BDL	µg/L	04/07/95	WC		1.0
Chloroethane	BDL	µg/L	04/07/95	WC		1.0
Chloroform	BDL	µg/L	04/07/95	WC		1.0
2-Chloroethyl Vinyl Ether	BDL	µg/L	04/07/95	WC		2.1
Chloromethane	BDL	µg/L	04/07/95	WC		1.0
1,2-Dichlorobenzene	BDL	µg/L	04/07/95	WC		1.0
1,3-Dichlorobenzene	BDL	µg/L	04/07/95	WC		1.0
1,4-Dichlorobenzene	BDL	µg/L	04/07/95	WC		1.0
Dichlorodifluoromethane	BDL	µg/L	04/07/95	WC		1.0
1,1-Dichloroethane	BDL	µg/L	04/07/95	WC		1.0
1,2-Dichloroethane	BDL	µg/L	04/07/95	WC		1.0
1,1-Dichloroethylene	BDL	µg/L	04/07/95	WC		1.0
cis-1,2-Dichloroethylene	BDL	µg/L	04/07/95	WC		1.0
trans-1,2-Dichloroethylene	BDL	µg/L	04/07/95	WC		1.0
1,2-Dichloropropane	BDL	µg/L	04/07/95	WC		1.0
cis-1,3-Dichloropropylene	BDL	µg/L	04/07/95	WC		1.0
trans-1,3-Dichloropropylene	BDL	µg/L	04/07/95	WC		1.0
Ethyl benzene	BDL	µg/L	04/07/95	WC		1.0
Methylene Chloride	5.1	µg/L	04/07/95	WC		5.0
1,1,2,2-Tetrachloroethane	BDL	µg/L	04/07/95	WC		1.0
Tetrachloroethylene	BDL	µg/L	04/07/95	WC		1.0
Toluene	4.1	µg/L	04/07/95	WC		1.0
1,1,1-Trichloroethane	BDL	µg/L	04/07/95	WC		1.0
1,1,2-Trichloroethane	BDL	µg/L	04/07/95	WC		1.0
Trichloroethylene	BDL	µg/L	04/07/95	WC		1.0
Trichlorofluoromethane	BDL	µg/L	04/07/95	WC		1.0
Vinyl Chloride	BDL	µg/L	04/07/95	WC		1.0
Xylene	21	µg/L	04/07/95	WC		1.0

Note: This sample was run on a TCLP ZHE Extraction.

BDL = Below Detection Limit
MDL = Method Detection Limit

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Sample ID: Tail 0395 Lab ID: 9503222-04 Collected: 03/29/95

TEST	RESULT	UNITS	ANALYZED	BY	METHOD	MDL
ASTM Leachate Extraction	04/04/95	date extracted		MBR	D3987-85	
Chemical Oxygen Demand	510	mg/L	04/11/95	NW	EPA 410.4	5
Total Solids	48.8	% of sample	04/03/95	GCB	APHA 2540 B.	N/A
Acid Digestion, Aqueous	04/05/95	date digested		NW	EPA 3010	
Arsenic	0.0020	mg/L	04/11/95	JA	EPA 7060	0.001
Barium	0.32	mg/L	04/18/95	MBR	EPA 6010	0.01
Cadmium	0.00079	mg/L	04/12/95	JA	EPA 7131	0.0001
Chromium	0.0044	mg/L	04/10/95	JA	EPA 7191	0.002
Copper	0.024	mg/L	04/18/95	MBR	EPA 6010	0.01
Lead	0.0097	mg/L	04/09/95	JA	EPA 7421	0.001
Mercury	BDL	mg/L	04/05/95	NW	EPA 7470	0.0002
Selenium	BDL	mg/L	04/09/95	JA	EPA 7740	0.001
Silver	BDL	mg/L	04/10/95	MBR	EPA 7760	0.01
Zinc	0.34	mg/L	04/18/95	MBR	EPA 6010	0.02

Note: This sample was run on an ASTM Leachate Extraction.

BDL = Below Detection Limit
MDL = Method Detection Limit

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Sample ID: Tail 0395 Lab ID: 9503222-04 Collected: 03/29/95

TEST	RESULT	UNITS	ANALYZED	BY	METHOD	MDL
601 & 602 Volatiles List					EPA 8260	
Benzene	BDL	µg/L	04/07/95	WC		1.0
Bromodichloromethane	BDL	µg/L	04/07/95	WC		1.0
Bromoform	BDL	µg/L	04/07/95	WC		1.0
Bromomethane	BDL	µg/L	04/07/95	WC		1.0
Carbon Tetrachloride	BDL	µg/L	04/07/95	WC		1.0
Chlorobenzene	BDL	µg/L	04/07/95	WC		1.0
Chlorodibromomethane	BDL	µg/L	04/07/95	WC		1.0
Chloroethane	BDL	µg/L	04/07/95	WC		1.0
Chloroform	BDL	µg/L	04/07/95	WC		1.0
2-Chloroethyl Vinyl Ether	BDL	µg/L	04/07/95	WC		2.1
Chloromethane	BDL	µg/L	04/07/95	WC		1.0
1,2-Dichlorobenzene	BDL	µg/L	04/07/95	WC		1.0
1,3-Dichlorobenzene	BDL	µg/L	04/07/95	WC		1.0
1,4-Dichlorobenzene	BDL	µg/L	04/07/95	WC		1.0
Dichlorodifluoromethane	BDL	µg/L	04/07/95	WC		1.0
1,1-Dichloroethane	BDL	µg/L	04/07/95	WC		1.0
1,2-Dichloroethane	BDL	µg/L	04/07/95	WC		1.0
1,1-Dichloroethylene	BDL	µg/L	04/07/95	WC		1.0
cis-1,2-Dichloroethylene	BDL	µg/L	04/07/95	WC		1.0
trans-1,2-Dichloroethylene	BDL	µg/L	04/07/95	WC		1.0
1,2-Dichloropropane	BDL	µg/L	04/07/95	WC		1.0
cis-1,3-Dichloropropylene	BDL	µg/L	04/07/95	WC		1.0
trans-1,3-Dichloropropylene	BDL	µg/L	04/07/95	WC		1.0
Ethyl benzene	BDL	µg/L	04/07/95	WC		1.0
Methylene Chloride	BDL	µg/L	04/07/95	WC		5.0
1,1,2,2-Tetrachloroethane	BDL	µg/L	04/07/95	WC		1.0
Tetrachloroethylene	BDL	µg/L	04/07/95	WC		1.0
Toluene	4.0	µg/L	04/07/95	WC		1.0
1,1,1-Trichloroethane	BDL	µg/L	04/07/95	WC		1.0
1,1,2-Trichloroethane	BDL	µg/L	04/07/95	WC		1.0
Trichloroethylene	BDL	µg/L	04/07/95	WC		1.0
Trichlorofluoromethane	BDL	µg/L	04/07/95	WC		1.0
Vinyl Chloride	BDL	µg/L	04/07/95	WC		1.0
Xylene	BDL	µg/L	04/07/95	WC		1.0

Note: This sample was run on a TCLP ZHE Extraction.

BDL = Below Detection Limit
MDL = Method Detection Limit

Printed on Recycled Paper

TOXICITY TESTS ON WASTE TREATMENT OUTFALLS

DOCUMENT #24

Appendix A

Report of a Toxicity Screening Test Conducted
on Wastewaters Discharged by
MENASHA CORPORATION
September 12-14, 1979

Summary

During September 12-14, 1979, a static toxicity screening test was conducted on a sample of Menasha Corporation process effluent, outfall 030171 (000). The sample was collected prior to mix with cooling water and discharge to the Kalamazoo River. The macroinvertebrate Daphnia magna was used as the test species during the toxicity evaluation.

The effluent sample from outfall 030171 (000) was toxic to daphnids on an acute (short term) basis. The 48-hour LC50 (effluent concentration lethal to 50 percent of the test organisms) was estimated at 9.6 percent effluent with 95 percent confidence limits of 5.5 and 14 percent effluent. The observed mortalities were probably due to the combination of heavy metals, phenolics and ammonia found in the sample. The toxicity of various components may have been enhanced by the reduced dissolved oxygen levels resulting from the effluent BOD.

Further testing is suggested at Menasha Corporation using lower effluent concentrations at 030171 (000) and combined process/cooling wastes as discharged to the Kalamazoo River.

Test Procedures

On September 10-11, 1979, Environmental Protection Bureau personnel collected a 24-hour composite sample of treated process effluent from outfall 030171 (000) at Menasha Corporation, Otsego. The effluent was sampled prior to mix with cooling water and discharge to the Kalamazoo River. The sample was transported at ambient temperature to the Lansing laboratory for toxicity testing.

A 48-hour static toxicity test using Daphnia magna (<48 hours old) was conducted according to procedures outlined in the U.S.-EPA publication, Methods for Acute Toxicity Tests with Fish, Macroinvertebrates and Amphibians. The following nominal concentrations were prepared using aged, dechlorinated, activated carbon filtered Lansing city water as the diluent: 100, 75, 50, 25, 10, and 5 percent effluent. Controls were provided using 100 percent diluent. Duplicate 250 ml glass beakers containing 200 mls of the test solution were prepared for each concentration and control to provide replication. Five daphnids were randomly assigned to each beaker marking the start of the test. The test solutions were held at ambient lab temperatures.

Identical beakers containing various effluent and control test solutions, but without daphnids were set aside for analysis of selected physical/chemical parameters. Table 1 presents the results of analyses run at the beginning and end of the 48-hour test.

A toxicity screening test gives a general indication of effluent toxicity. The data generated should not be used as a definitive criterion for evaluating effluent impact on receiving waters.

Results and Discussion

Menasha Corporation process effluent [outfall 030171 (000)] sampled prior to mixing with cooling water, was toxic to D. magna on an acute (short-term) basis (Table 2). The 48-hour LC50 was estimated at 9.6 percent effluent with 95 percent confidence limits of 5.5 and 14 percent effluent. Many of the survivors exposed to the effluent solutions were visibly stressed while the controls appeared unaffected.

The effluent was the color of strong coffee and had many suspended solids making it difficult to see the daphnids in test concentrations greater than 10%. The 24-hour mortality count was omitted to minimize the risk of injuring the animals while looking for them. When checked at 48 hours, one daphnid was missing from a 25% effluent container. The animal was not included in the LC50 calculations.

Several potential toxicants were measured in a preserved portion of the composite sample. Copper (0.09 mg/l), lead 0.19 mg/l), zinc (0.24 mg/l), phenolics (0.185 mg/l) and ammonia (1.34 mg/l as nitrogen-N) probably all contributed to the effluent toxicity. In addition, dissolved oxygen levels dropped markedly during the test period in the higher effluent concentrations due to the BOD of the effluent (BOD_5 = 100 mg/l). The low oxygen levels may have enhanced the effects of the other toxicants. Other toxicants may have been present but not measured in the composite sample.

Further study is suggested. At outfall 030171 (000) effluent concentrations lower than five percent should be tested to allow for better definition of an LC50. Tests using the combined process/cooling water effluent as discharged by Menasha Corporation would give a more representative indication of the waste impact on the Kalamazoo River. Flow-through testing may also be in order.

Table 1 Analyses run on control and effluent test solutions at the beginning and end of the 48-hour exposure period.

	Outfall 030171 (000)					
	9-12-79			9-14-79		
Parameter	Control	25%	100%	Control	25%	100%
Dissolved oxygen (mg/l)	7.8	7.3	6.4	7.3	4.8	1.9
Oxygen saturation (percent)	93	87	75	86	57	22
pH (S.U.)	7.5	8.3	8.4	7.5	8.7	9.0
Temperature (°C)	24	24	23	24.5	24.5	24.5
Conductivity (umhos)	600	1820	5200	600	1880	5500

Table 2 Percent mortality in each test concentration after 48 hours exposure to Menasha process effluent.

Percent Effluent	48-hour Percent Mortality
100	100
75	100
50	100
25	67
10	40
5	40
0 (control)	0

Samples Collected By: Joseph Hey, Water Quality Technician
James McDonald, Water Quality Investigator

Survey Engineer: Gary Boersen, Environmental Engineer

Toxicity Evaluation & Report By: Bonnie L. White, Aquatic Biologist
Point Source St dies Section
Environmental Services Division
Environmental Protection Bureau
Michigan Dept. of Natural Resources

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MEN00602

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DEPARTMENT OF NATURAL RESOURCES

HOWARD A. TANNER, Director

State Office Building
350 Ottawa Avenue, N. W.
Grand Rapids, Michigan 49503

RECEIVED

June 19, 1980

Mr. John Blauwkamp
Menasha Corporation
320 North Farmer Street
Otsego, Michigan 49078

Dear Mr. Blauwkamp:

Enclosed are two copies of the static toxicity screening tests utilizing effluent samples collected at Menasha Corporation, Otsego. Three different 48-hour tests were conducted with the effluent grab samples collected at the plant on December 17, 1979. The Kalamazoo River water to be used as diluent was collected above the dam. The effluent/diluent combinations for the three tests are given below:

	Effluent	Diluent/Control
Test A	Treated process prior to mixing with cooling water	Dechlorinated, active carbon filtered Lansing city water
Test B	Treated process prior to mixing with cooling water	Kalamazoo River water
Test C	Combined process and cooling waters	Kalamazoo River water

Daphnia magna served as the test species.

The combined process and cooling water effluent (Test C) caused some stress on the daphnids but none were killed. The process wastewater, prior to mixing with the cooling water, was toxic to the daphnids on a short-term basis in both Tests A and B. The 48-hour LC50 for both these tests was identical at 29% effluent. In September 1979, similar tests were conducted using Menasha effluent and *D. magna*. At that time, the 48-hour LC50 was estimated to be 9.6% effluent. The December tests indicate a decrease in toxicity due to process wastewater prior to mix and no mortality in the combination process/cooling water effluent.

Also enclosed is the summary from the compliance evaluation inspection report conducted by Mr. Willie Harris of the E.P.A. on February 12, 1980. Item #1 discusses the excursions of soluble orthophosphorus. According to

MICHIGAN
THE GREAT LAKE STATE
R1026-1 1/79

the minutes of the April 30, 1980 meeting with district staff, previous exceedances were due to sample preservation and preparation errors, not excess orthophosphorus discharges. Due to changes in sample preservation and preparation technique, Menasha should be in compliance with permit limitations for phosphorus.

Composite samples should be refrigerated during compositing. However, according to the recent Federal Register on proposed testing procedures, phenol samples for the 4 AAP method can be collected in either polyethylene or glass containers. For phenol analysis by gas chromotography, glass containers with a teflon-lined cap are required. Phenol samples for either method should be preserved with H_2SO_4 to a pH >2.

In response to your status report of May 30, 1980, I think the phosphorus and salt cake pile items have been covered and can be deleted from further reports. The phenol issue was addressed in a letter under separate cover, as was proposed winter sludge disposal. I have one question regarding CH_2M Hill's proposal - what will the effect of mixing fly ash with sludge be as far as land application goes? Any ill effects?

If you should have any questions or comments regarding the above-mentioned reports, feel free to contact me at this office.

Sincerely,

WATER QUALITY DIVISION

Marge Spruit,
Water Quality Specialist

MS/mc
Enclosures

cc: Scott Ross
Bonnie White
W.Q.D. Files, Lansing

JUN 1980
RECEIVED

Keith

MEN00604

NATURAL RESOURCES COMMISSION
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STATE OF MICHIGAN

JAMES J. BLANCHARD, Governor

DEPARTMENT OF NATURAL RESOURCES

GORDON GUYER, DIRECTOR
District 12 Headquarters
P.O. Box 355, Plainwell, Michigan 49080

April 15, 1987

John R. Blauwkamp, P.E.
Corporate Environmental Engineer
Menasha Corporation, Otsego Mill
320 North Farmer Street
Otsego, MI 49098

RE: Toxicity Assessment

Dear Mr. Blauwkamp:

Enclosed is a copy of a Staff Report on Aquatic Toxicity of outfall 000, the treatment pond outfall.

The report indicates that the effluent from 000 was found to be acutely toxic to D. magna. This toxicity of 000 can be mitigated prior to discharge from 003 by comingling with condenser cooling water.

The need for further testing is indicated.

If you have any questions in that matter, please contact me at this office.

Sincerely,

SURFACE WATER QUALITY DIVISION

John Bantjes
Plainwell District
616-685-9886

JB:cs

Enclosure

cc: B. Dimond

R1026-1

MICHIGAN DEPARTMENT OF NATURAL RESOURCES
SURFACE WATER QUALITY DIVISION
APRIL 3, 1987

STAFF REPORT

AQUATIC TOXICITY ASSESSMENT OF MENASHA CORPORATION 000 EFFLUENT, OTSEGO, MICHIGAN

NPDES PERMIT MI 0003824
SEPTEMBER 18-20, 1986

As part of a routine compliance inspection survey, staff of the Great Lakes and Environmental Assessment Section conducted an in-lab, Daphnia magna static acute toxicity test on a composite sample of Menasha Corporation's 000 (030171) effluent. The objective of the study was to determine the need for additional, more detailed toxicity evaluations at the facility.

The 000 effluent comprises Menasha Corporation's treated process wastewater. The 000 effluent is diluted by a variable amount of turbine condenser cooling water from outfall 00A before discharge to the Kalamazoo River thorugh outfall 003. Menasha Corporation personnel indicated that the range of dilution of the 000 effluent by cooling water has varied from at least 0x to 5X, depending on cooling water flow rates and river level. However, the degree to which the 000 effluent was diluted by cooling water during the September, 1986 compliance inspection survey is unknown.

The D. magna acute toxicity test was performed according to methods described in MDNR, Great Lakes and Environmental Assessment Section, Procedure #24, with the following exceptions:

1. Test concentrations were limited to 0, 50, and 100% effluent.

2. Ten D. magna were exposed, in a single replicate, to each concentration.

3. Early instar D. magna were used as test organisms.

4. Test duration was limited to 24 hours.

SUMMARY AND RECOMMENDATIONS

1. The toxicological and physical/chemical data generated in this study are presented in Tables 1, 2a, and 2b.

2. The 000 effluent exhibited high BOD and COD. Because of the high oxygen demand, it was necessary to aerate the bulk effluent sample before the test concentrations were prepared. Dissolved oxygen concentrations in the test solutions remained within acceptable ranges for aquatic toxicity testing throughout the test interval.

3. Menasha Corporation's 000 effluent was acutely toxic to D. magna during a 24-hour exposure interval. Using the binomial method of Stephan (1982), the 24 hour EC_{50} was estimated to be 59% effluent.

4. High concentrations of aluminum, copper and zinc were likely responsible for the acute toxicity of the 000 effluent. Concentrations of the three metals detected during analytical chemical characterization of the 000 effluent were above concentrations predicted to be acutely toxic to D. magna.

5. Because outfall 000 was diluted by an unknown volume of turbine condenser cooling water before discharge, no conclusions regarding Menasha Corporation's compliance with the aquatic toxicity-based requirements of Rule 82 of the Michigan Water Quality Standards can be drawn from the results of this test. However, because the 000 effluent was toxic, further acute D. magna toxicity tests are recommended. To best characterize the worst-case toxicity of the process effluent, future samples for toxicity evaluations should be collected from outfall 003 during intervals of low cooling water flow. The variability in the dilution of the 000 effluent should be characterized to identify the timing and duration of periods of low cooling water dilution.

LITERATURE CITED

Stephan, C. 1982. Letter to L. Bahner, Chairman, ASTM Task Group on Calculating LC_{50}'s. September 10, 1982. 57 pp.

Test and Report by: William F. Dimond, Aquatic Biologist
Great Lakes & Environmental Assessment Section

Table 1. Chemical characteristics of composite and grab samples of Menasha Corporation 000 effluent.

	Composite	Grab	Grab
date:	09/15/86	09/15/86	09/16/86
time:	1330	1345	1020
Parameter			
BOD-5 a	180	150	200
COD a	3200	3300	3300
Kjeldahl N a	36	37	36
Total NH3 a	0.8	0.9	1.0
Total NO2 + NO3 a	0.7	0.8	0.6
Orthophosphate a	0.32	0.35	0.25
Total Phenols	390	-	-
Total Phosphorus a	2.8	2.7	2.7
Suspended Solids a	480	400	510
Dissolved Solids a	4500	4300	4200
Total Organic Carbon a	790	770	740
Alkalinity a	1,950	-	-
Aluminum	6,610	6,646	6,610
Cadmium	<20b	<20	<20
Chloride(mg/l)	100	-	-
Chromium	80	65	65
Copper	100	90	95
Iron	3,600	3,700	3,700
Lead	50	<50	<50
Manganese	950	1,000	1,100
Nickel	<50	<50	<50
Sulfate a	220	-	-
Zinc	210	210	210

a: Units are mg/l; all other units are ug/l.
b: A "less than" symbol indicates that the substance was not detected; detection limit given to right of symbol.

Table 2a. Percent immobilization of *D. magna* exposed to Menasha Corporation 000 effluent during the period of September 18-20, 1986.

Percent Effluent	Percent Immobilization/Exposed Period 24 Hours
0	0
50	30
100	100

Table 2b. Test chamber water quality characteristics during the *Daphnia magna* acute toxicity test conducted on Menasha Corporation 000 effluent.

Parameter	control	50%	100%	control	50%	100%
Alkalinity(mg/l)	38	-	2490	-	-	-
Conductivity(mg/l)	339	2627	4567	340	2605	4570
Dissolved Oxygen(mg/l)	8.6	6.7	5.4	8.2	6.2	4.0
D.O. Saturation(%)	105	82	66	98	74	49
Hardness(mg/l)	82	-	2.6	-	-	-
pH(S.U.)	7.4	8.3	8.3	7.3	8.0	8.1
Temperature(C)	24	25	25	23	23	23

FORM 561

memo / AVAN CORPORATION MEN00609

TO: Bruce Buchanan

DATE: May 4, 1987

SUBJECT: Toxicity Survey Results

FROM: John Blauwkamp

The recent toxicity survey by the DNR indicated that Otsego's effluent was toxic to those species currently being used for acute toxicity studies. The report also indicated that additional testing was warranted and should be conducted on the effluent actually being discharged to the river as well as on the effluent from the aeration pond. The report indicated that high concentrations of aluminum, copper and zinc may be responsible for this toxicity. Table I attached shows that the concentrations of aluminum, copper and zinc in the effluent from outfall 000 have not changed substantially since 1977 when the system was changed to the carbonate cook. This is inspite of the increased production at the same effluent volume we had in 1977.

Based on the test results of the these three metals, the effluent does not appear to have increased in toxicity. The change in the results from previous toxicity screening is most likely due to a change in the methods being used rather than a change in our effluent characteristics. This however, does not mean that we will not have to possibility do something to reduce the acute toxicity of the effluent if subsequent testing has the same results. If the DNR refuses to accept our position that the point where the effluent is being discharged is a non-inhabitable portion of the mixing zone, then we may have to make modifications to the pipe so that more turbine condenser water can be added to the effluent before it is discharged to the river. If this is necessary, Otsego will have to do the long-range planning to insure that any changes made are compatible with the weir consolidation that we would like to make at the time the NPDES Permit must be renewed in 1990.

cc: S. Jones
J. Bonham
K. Kling

/kj

Table I

Date	Al (μg/l)	Cu (μg/l)	Zn (μg/l)
8/77		90	330
9/78		80	210
9/79		90	240
6/80		80	220
10/81		120	190
/82	8000	65	145
/83			
/84			
/85			
9/86	6622	95	210

FORM 561

MEN00611

memo / MENASHA CORPORATION

TO: John Bonham

DATE: March 30, 1987

SUBJECT: Toxic Metals in 000 Weir

FROM: Keith Kling KBK

On 3/24/87 John Bantjes, from the MDNR, called with some sample results from the September 1986 State survey. The results showed levels of copper, zinc and aluminum which put our discharge into the level of chronic toxicity. He stated that this would not be a problem if the mixture of 000 water with turbine cooling water was high enough to dilute the metals before they entered the river. Bill Diamond the MDNR biologist, feels that a mix of 4:1 would make the discharge acceptable. Rough measurements on 3/24 showed a total flow through 003 to be 1,414,000 gallons with 480,000 of this being 000 weir flow. This is only a 3:1 mixture. On 3/27, I make adjustments to the splitter box so more of the water going to 005 was diverted to 003. I redirected the maximum amount I could put to 003 without causing backpressure problems to 000 weir. Measurement of the flow now show a discharge of 2,476,000 gallons with 460,000 of this being 000 weir flow. This is a 5:1 mix. While this is acceptable, there are some built-in problems. As the flow at 000 weir is raised, more of the turbine cooling water would have to be put back into 005. This would quickly reduce the ratio below acceptable limits. Failure to do so would give falsely high readings at 000 weir, making permit violations likely.

I see two possible solutions to the problem. First, we may be able to consolidate all the weir discharges together when 002 weir is moved. The need for extra mixing may even help in getting quick approval of the weir consolidation. This will almost certainly require some changes in the line from the turbine to the river.

Second, the MDNR may be exceeding their authority in this matter. They are defining the area we are discharging into as a habitable zone in the river even though it is immediately below the dam. The levels of metals are quite low, meaning a fish would have to stay in the area of the discharge for days or weeks to be affected. At the rate the water in this area is moving, the fish would wear his fins off before he would be affected by our discharge. Past dealing with regulatory agencies has shown that they sometimes ask for changes that are not supported by their rules and regulations. My recommendation would be to check this before engineering any changes.

c: J. Blauwkamp

/kj

Report #MI/DNR/SWQ-88/070

MICHIGAN DEPARTMENT OF NATURAL RESOURCES
SURFACE WATER QUALITY DIVISION
AUGUST, 1988

STAFF REPORT

ACUTE TOXICITY ASSESSMENT OF MENASHA CORPORATION PROCESS EFFLUENTS OTSEGO, MICHIGAN APRIL 20-21, 1988 NPDES PERMIT #MI 0003824

As part of a routine compliance inspection survey, staff of the Great Lakes and Environmental Assessment Section (GLEAS), conducted fathead minnow static acute toxicity tests on composite samples of Menasha Corporation's outfalls 002 and 003 process effluent. The effluent samples were collected by SWQD-District staff during April 18-19, 1988. Menasha discharges 0.8 mgd via outfall 002 and 0.92 mgd via outfall 003 to the Kalamazoo River. Testing was conducted according to GLEAS Procedure #42. Chambers were aerated during the study.

SUMMARY

1. Toxicological and physical/chemical data generated during the study are presented in Tables 1a, 1b, 2a, and 2b.

2. The 002 and 003 effluents were not acutely toxic to fathead minnows.

3. The acute toxicity of 002 and 003 effluents to *Daphnia magna* could not be determined because of the extreme turbidity of these effluents.

Toxicity Testing and Report by: Megan McMahon, Aquatic Biologist
Great Lakes and Environmental Assessment Section
Water Quality Appraisal Unit

Table 1a. Percent survival of fathead minnows exposed to select concentrations of Menasha Corporation's outfall 002 effluent during the period of April 20-22, 1988.

Percent Effluent	Percent Survival/Exposed Period 24 Hours	48 Hours
control*	100	100
50	100	100
100	100	100

* Control was carbon-filtered Lansing City water

Table 1b. Test chamber water quality characteristics during the static, acute fathead minnow toxicity test conducted on Menasha Corporation's outfall 002 effluent.

	Initial: 4/20/88		Final: 4/22/88		
Parameter	control	100%	control	50%	100%
Temperature(C)	22.0	23.0	22.7	22.7	22.8
Dissolved Oxygen(mg/l)	8.5	6.9	8.7	7.5	8.3
pH(S.U.)	8.31	7.68	8.22	8.55	8.86
Conductivity(umhos)	478	837	526	595	837
Alkalinity(mg/l)	48	404	-	-	-
Hardness(mg/l)	88	CNR*	-	-	-
Total Residual Chlorine(mg/l)	-	ND**	-	-	-

* CNR indicates 'could not run' due to color of sample

** ND indicates 'non-detect' (detection level of 0.02 mg/l)

Table 2a. Percent survival of fathead minnows exposed to select concentrations of Menasha Corporation outfall 003 effluent during the period of April 20-22, 1988.

Percent Effluent	Percent Survival/ Exposed Period 24 Hours	48 Hours
control*	100	100
50	100	100
100	100	100

* Control was carbon-filtered Lansing City water

Table 2b. Test chamber water quality characteristics during the static, acute fathead minnow toxicity test conducted on Menasha Corporation outfall 003 effluent.

	Initial: 4/20/88		Final: 4/22/88		
Parameter	control	100%	control	50%	100%
Temperature(C)	22.0	23.0	23.1	23.0	22.9
Dissolved Oxygen(mg/l)	8.5	6.9	8.8	8.7	8.1
pH(S.U.)	8.31	8.69	8.94	8.91	8.90
Conductivity(umhos)	478	1620	491	1061	1630
Alkalinity(mg/l)	48	CNR*	-	-	-
Hardness(mg/l)	88	CNR*	-	-	-
Total Residual Chlorine(mg/l)	-	ND**	-	-	-

* CNR indicates 'count not run' due to color of sample

** ND indicates 'non-detect' (detection level of 0.02 mg/l)

MEN00615

STATE OF MICHIGAN

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DEPARTMENT OF NATURAL RESOURCES

DAVID F HALES, Director

District 12 Headquarters
P.O. Box 355, Plainwell, Michigan 49080

October 10, 1989

Keith Kling
Environmental Supervisor
Menasha Corporation
320 N. Farmer Street
Otsego, MI 49078-0155

Dear Mr. Kling:

SUBJECT: Aquatic Toxicity Test

Enclosed for your information is the report on aquatic toxicity testing done on water samples collected at outfalls 002 and 003.

Please review the report carefully and contact this office regarding any comments or questions you may have.

Sincerely,

SURFACE WATER QUALITY DIVISION

John M. Bantjes
Plainwell District
616-685-9886

cc: William F. Dimond, GLEAS

R 1026-1
5/88

RECYCLED PAPER

Report # MI/DNR/SWQ-89/059

MICHIGAN DEPARTMENT OF NATURAL RESOURCES
SURFACE WATER QUALITY DIVISION
SEPTEMBER, 1989
STAFF REPORT

ACUTE TOXICITY ASSESSMENT OF MENASHA CORPORATION COMBINED EFFLUENTS OTSEGO, MICHIGAN OCTOBER 12-14, 1988 NPDES PERMIT NO. MI 0003824

As part of a routine biomonitoring inspection, staff of the Great Lakes and Environmental Assessment Section conducted fathead minnow (Pimephales promelas) and Ceriodaphnia dubia in-lab, static acute toxicity tests on a grab sample of Menasha Corporation (Otsego) 003 effluent. In addition, an in-lab, static acute Daphnia magna toxicity test of the facility's 002 effluent was conducted. The tests were conducted to assess the acute toxicity of the effluents.

Effluent from outfall 002 consists of treated minimal contact process wastewater and cooling and seal water. Effluent from outfall 003 consists of treated process wastewater and a variable amount of non-contact cooling water.

SUMMARY

1. The 002 effluent was acutely toxic to D. magna. However, the level of toxicity did not exceed the toxicity-related requirements of Rule 82 of the Michigan Water Quality Standards (MWQS).

2. The 003 effluent was not acutely toxic to fathead minnows or C. dubia, suggesting that the effluent was meeting the aquatic toxicity-related requirements of the MWQS.

METHODS

Effluent Sampling

Grab samples of the 002 and 003 effluents were collected by MDNR Grand Rapids District staff on October 11, 1988 and transported to Lansing for toxicity testing.

Acute Toxicity Tests

From October 12-14, 1988, the acute toxicities of the effluents were evaluated in the MDNR Aquatic Toxicity Evaluation Laboratory. Test methods for the static acute D. magna test of the 002 effluent followed Great Lakes and Environmental Assessment Section (GLEAS) Procedure #24. The static acute fathead minnow and C. dubia toxicity tests of the 003 effluent followed GLEAS Procedures #42 and #24, respectively. Individual test conditions are described in Tables 1 (D. magna 002 test), 2 (C.

dubia 003 test) and 3 (fathead minnow 003 test). The 003 effluent sample was aerated for 24 hours before testing because of an oxygen demand.

RESULTS AND DISCUSSION

The 002 effluent was acutely toxic to D. magna (Table 4a). Thirty-five percent of the D. magna in the 75% effluent concentration and twenty-five percent of the D. magna in the 100% effluent concentration were immobilized. The decreased toxicity of the 100% effluent concentration relative to the 75% effluent concentration cannot be explained.

The level of toxicity observed did not exceed the aquatic toxicity-related requirements of Rule 82 of the Michigan Water Quality Standards (MWQS).

The 003 effluent was not acutely toxic to C. dubia (Table 5a) or fathead minnows (Table 6a). No immobilizations or mortality were observed at any effluent concentration, suggesting that the effluent was meeting the aquatic toxicity-related requirements of Rule 82 of the MWQS.

This test and previous toxicity tests of the 003 effluent have probably underestimated the potential acute toxicity of the effluent because process wastewater was diluted by condenser cooling water in the 003 effluent when the samples for the tests were collected. Process wastewater (Outfall 000) sampled before dilution with condenser cooling water has been acutely toxic to D. magna during previous MDNR tests (24h EC_{50} = 59%, 9/89; 48 h EC_{50} = 29%, 9/79). According to Menasha Corporation staff, undiluted process wastewater is discharged through outfall 003 during intervals when condenser cooling water is not generated. It seems likely that the potential for aquatic toxicity is greatest during these intervals.

Test chamber water quality characteristics remained within acceptable levels for acute toxicity testing throughout all three tests (Tables 4b, 5b, and 6b).

Toxicity tests by: Sharon Goble, Bruce Walker and William F. Dimond, Aquatic Biologists
Great Lakes & Environmental Assessment Section
Water Quality Appraisal Unit

Report by: William F. Dimond

Table 1. Test conditions of *Daphnia magna* toxicity test of Menasha Corporation (Otsego) 002 effluent.

1. Duration: 48 hours.
2. Test temperature: 25 +/- 1 °C.
3. Dilution water: dechlorinated, activated carbon-filtered Lansing city water.
4. Concentration range: 100, 75 and 0 (control) % effluent.
5. Number of replicates/concentration: 4.
6. Source of *D. magna*: MDNR cultures.
7. Number of *D. magna*/replicate: 5.
8. Age of *D. magna*: <24 hours.
9. Test endpoint: immobilization.

Table 2. Test conditions of *C. dubia* toxicity test of Menasha Corporation (Otsego) 003 effluent.

1. Duration: 48 hours.
2. Test temperature: 24 +/- 1 °C.
3. Dilution water: dechlorinated, activated carbon-filtered Lansing city water fortified with 10% mineral water.
4. Concentration range: 100, 75 and 0 (control) % effluent.
5. Number of replicates/concentration: 4.
6. Source of *C. dubia*: MDNR cultures.
7. Number of *C. dubia*/replicate: 5.
8. Age of *C. dubia*: <24 hours.
9. Test endpoint: immobilization.

Table 3. Test conditions of fathead minnow toxicity test of Menasha Corporation (Otsego) 003 effluent.

1. Duration: 48 hours.
2. Test temperature: 24 +/- 1 °C.
3. Dilution water: dechlorinated, activated carbon-filtered Lansing city water.
4. Concentration range: 100 and 0 (control) % effluent.
5. Number of replicates/concentration: 2.
6. Source of fathead minnows: MDNR cultures.
7. Number of minnows/replicate: 5.
8. Age of minnows: 2-3 weeks.
9. Test endpoint: mortality.

Table 4a. Percent immobilization of *Daphnia magna* exposed to select concentrations of Menasha Corporation (Otsego) 002 effluent from 10/12-14/88.

Percent Effluent	Percent Immobilization/Exposed Period* 24 Hours	48 Hours
0	0	0
75	0	35
100	0	25

Table 4b. Test chamber water quality characteristics.

Parameter	Initial control	Initial 100%	Final control	Final 100%
Temperature(°C)	24.9	24.8	24.5	25.0
Conductivity(umhos)	428	752	441	794
Dissolved Oxygen(mg/l)	9.8	9.8	7.5	7.4
pH(S.U.)	7.7	7.7	7.9	7.9
Alkalinity(mg/l)	84	328	-	-
Hardness(mg/l)	92	292	-	-
Total Residual Chlorine(mg/l)	<0.02	<0.02	-	-

Table 5a. Percent immobilization of *Ceriodaphnia dubia* exposed to select concentrations of Menasha Corporation (Otsego) 003 effluent from 10/12-14/88.

Percent Effluent	Percent Immobilization / Exposed Period 24 Hours	48 Hours
0(control)*	0	0
75	0	0
100	0	0

* Control was dechlorinated, activated carbon-filtered Lansing city water.

Table 5b. Test chamber water quality characteristics.

Parameter	INITIAL control	INITIAL 100%	FINAL control	FINAL 100%
Temperature (°C)	24.9	23.6	24.2	24.8
Conductivity (umhos)	428	2494	746	2728
Dissolved Oxygen (mg/l)	9.8	10.3	7.5	7.4
pH (S.U.)	7.7	8.3	8.1	8.5
Alkalinity (mg/l)	84	1320	-	-
Hardness (mg/l)	92	160	-	-
Total Residual Chlorine (mg/l)	<0.02	<0.02	-	-

Table 6a. Percent immobilization of fathead minnows exposed to select concentrations of Menasha Corporation (Otsego) 003 effluent from 10/12-14/88.

Percent Effluent	Percent Mortality/Exposed Period* 24 Hours	48 Hours
0	0	0
100	0	0

Table 6b. Test chamber water quality characteristics.

Parameter	Initial control	Initial 100%	Final control	Final 100%
Temperature(°C)	24.9	23.6	23.6	24.8
Conductivity(umhos)	428	2494	432	2728
Dissolved Oxygen(mg/l)	9.8	10.3	7.7	7.4
pH(S.U.)	7.7	8.3	8.1	8.5
Alkalinity(mg/l)	84	1320	-	-
Hardness(mg/l)	92	160	-	-
Total Residual Chlorine(mg/l)	<0.02	<0.02	-	-

ECKENFELDER INC.

September 20, 1989 6696

Keith Kling
Menasha Corporation
Box 155
Otsego, MI 49078-0155

Dear Keith:

The report on the toxicity tests conducted on your wastewaters is attached. Acute screening tests on Outfalls 000 to 002 were conducted using fathead minnows and Daphnia magna. The tests were 96 hr in duration with daily renewals for the fathead minnows and 48 hr in duration without renewals for D. magna. None of the tests resulted in significant mortality in 100 percent effluent.

If you have any questions, please contact me at (615) 255-2288.

Sincerely,

ECKENFELDER INC. (formerly AWARE Incorporated)

Richard J. Mirenda

Richard J. Mirenda, Ph.D.
Senior Aquatic Toxicologist

Attachment

227 French Landing Drive
Nashville, Tennessee 37228
615 255 2288
FAX 615 256.8332

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B	Raw Data Sheets

INTRODUCTION

Municipal and industrial dischargers are required, as part of the National Pollutant Discharge Elimination System (NPDES), to measure the toxicity of their wastewater. The permit requirement may be for monitoring purposes only or may contain toxicity limits. The type of tests required vary from state to state and may depend on flow conditions or dilution by the receiving water. The most common tests required are acute tests which measure the short-term toxicity of the wastewater. The test duration may vary from 24 hr to 96 hr, depending on the organism tested and the state requirements. More recently, mini-chronic tests have been utilized to look at longer-term toxicity. These tests involve more subtle effects on the organism, e.g., growth and reproduction, and last 7 days.

The organisms used in these tests have been limited to those that are easily cultured in the laboratory. This ensures that the quality and health of the organisms are consistent over time and does not affect the results of the test. Fish species most often used are the fathead minnow (*Pimephales promelas*) which is easily reared in the laboratory. The invertebrates used are the water fleas (*Daphnia pulex*, *Daphnia magna* and *Ceriodaphnia* sp.) which are freshwater crustaceans. The culturing methods for these organisms have been outlined by the U.S. Environmental Protection Agency and the American Society for Testing and Materials.

Menasha Corporation in Otsego, Michigan requested that acute screening tests be conducted on Outfalls 000 and 002. The tests exposed fathead minnows and *Daphnia magna* to 100 percent effluent from each outfall for 96 hr and 48 hr, respectively.

METHODS

Test procedures adhered to those outlined in the U.S. Environmental Protection Agency Manual, "Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms", EPA 600/4-85/013.

Samples were received from Menasha on September 12 and 14, 1989. The temperature of the samples was adjusted to 20°C prior to the start of the test. Water chemistry data were measured and recorded on the appropriate data sheet (Appendix C). Parameters measured were pH, dissolved oxygen, temperature, conductivity, hardness and alkalinity. In addition, a final dissolved oxygen concentration was measured on the test concentrations and control at the time of renewal and at the conclusion of the test.

The tests were started with 28 day old fathead minnows and <24 hr old Daphnia magna. The fathead test consisted of two replicates with ten fish in each test vessel. The D. magna test had four replicates with five organisms in each vessel. The effluent was tested at 100 percent along with controls of reconstituted water made according to USEPA procedures. The fathead minnow tests involved renewal of effluents and control water daily for the duration of the tests. The test chambers were checked every 24 hr for mortality and the number alive recorded on the data sheet (Appendix C). The test was terminated after 48 hr and was deemed acceptable if 90 percent of the control organisms survived.

QUALITY ASSURANCE

All of the organisms which were tested were obtained from cultures maintained by ECKENFELDER INC. The animal stocks were originally obtained from USEPA - Cincinnati and are cultured according to EPA recommended procedures (EPA 600/4-85/013 and EPA 600/4-85/014).

The control water used in the tests was reconstituted water made with glass distilled water to which is added appropriate amounts of KCl, $MgCl_2$, $NaHCO_3$ and $CaSO_4$. The pH, hardness and alkalinity of each batch of water is checked prior to use. Adjustments to these parameters are made if they fall outside the acceptable ranges. The water quality data for each batch of water is recorded in the Water Chemistry Log.

Reference toxicant tests are conducted every month on all of the organisms cultured in our laboratory. The tests are acute and the reference toxicant is cadmium chloride which is obtained from USEPA. Data sheets and LC50 values are kept in laboratory notebooks. The results of the most recent reference tests for the fathead minnow and Daphnia magna are available upon request.

RESULTS

There was no mortality observed in the test of Outfall 002 on the fathead minnows. The test of Outfall 000 resulted in 7 out of 20 fish dead or 35 percent mortality. This is not considered a significant effect since greater than 50 percent of the organisms survived the test. The control mortality was zero so the tests were acceptable.

The mortality observed in the tests with Daphnia magna was also deemed not significant. The test of Outfall 000 resulted in 30 percent mortality (6 out of 20 dead), while the test of Outfall 002 resulted in 20 percent mortality (4 out of 20 dead). The control had 10 percent mortality which is within acceptable limits.

APPENDIX A

ECKENFELDER INC. TOXICITY TEST REPORT

REPORT OF AQUATIC TOXICITY TEST RESULTS

I. GENERAL INFORMATION

A. PLANT INFORMATION

Industry: Menasha Corporation Permit No.:

Address: Paperboard Group
Box 155
Otsego, MI 49078-0155

Contact: Keith Kling

Phone Number: (616) 692-6141

Type of Plant: Paper

Plant Operating Schedule:

Receiving Stream: Kalamazoo River

B. SAMPLE(S)

Source(s): Outfall 002
Outfall 000

Collection Period: 9/11/89

Type of Collection: Grab

Collected by: Menasha personnel

	000	002
Alkalinity (mg/l as $CaCO_3$):	2,700	300
Conductivity (µmhos/cm):	3,950	690
Hardness (mg/l CaCO3):	240	300
pH (standard units):	8.4	7.8

II. DATA FOR FATHEAD MINNOW TESTS

A. TEST TYPE

X Renewal	24 hr	X Static	X Acute
Nonrenewal	48 hr	Flowthrough	Chronic
	X 96 hr		
	7 day		

B. TEST ORGANISM

Common Name: Fathead Minnow

Scientific Name: Pimephales promelas

Age: 28 days

Source: ECKENFELDER INC. cultures

Observed Diseases: None

Treatment: None

Acclimation: Held in control water prior to testing.

C. TEST METHOD - Reference Material

Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms, EPA, Third edition, March 1985.

Other:

D. DILUTION WATER

Source: Reconstituted water

Collection Period: 9/12/89

Type Collection: Grab

Pretreatment: None

Alkalinity (mg/l as $CaCO_3$): 100

Hardness (mg/l $CaCO_3$): 260

Conductivity (µmhos/cm): 700

pH (standard units): 8.2

REPORT OF AQUATIC TOXICITY TEST RESULTS (Cont'd)

E. TEST CHAMBERS

Composition: Glass

Depth: 195mm

Size: 1.0 L

Test Volume per Chamber: 750 ml

F. LOADING TECHNIQUE

Organisms per concentration: 20

Replicates per concentration: 2

Organisms per replicate: 10

G. TESTING DATES

Start: 9/12/89

Complete: 9/16/89

H. SUMMARY OF TEST OBSERVATIONS

1. Most sensitive index: no significant mortality observed in either test

LOEC:

NOEC:

ChV:

LC_{50}:

95 percent confidence limits:

Method:

2. Survival Rates (%)

Concentration (% Effluent)	Survival Rate (%)
1. Control	100
2. 100% - Outfall 000	65
3. 100% - Outfall 002	100
4.	
5.	
6.	
7.	
8.	
9.	
10.	

3. Comments:

I. ATTACHMENT

X Data Summary Sheets

____ Other:

By: Richard Maenda Date: 9/20/89

ECKENFELDER INC.
227 French Landing Drive
Nashville, TN 37228

(615) 255-2288

III. DATA FOR WATER FLEA TESTS

A. TEST TYPE

____ Renewal	____ 24 hr	X Static	X Acute
X Nonrenewal	X 48 hr	____ Flowthrough	____ Chronic
	____ 96 hr		
	____ 7 day		

B. TEST ORGANISM

Common Name: Water Flea

Scientific Name: Daphnia magna

Age: <24 hr

Source: ECKENFELDER INC. cultures

Observed Diseases: None

Treatment: None

Acclimation: Held in control water prior to testing

C. TEST METHOD - Reference Material

Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms, EPA, Third edition, March 1985.

Other:

D. DILUTION WATER

Source: Reconstituted water

Collection Period: 9/12/89

Type Collection: Grab

Pretreatment: None

Alkalinity (mg/l as $CaCO_3$): 100

Hardness (mg/l $CaCO_3$): 260

Conductivity (µmhos/cm): 700

pH (standard units): 8.2

E. TEST CHAMBERS

Composition: Plastic

Depth: 75mm

Size: 250 ml

Test Volume per Chamber: 50 ml

F. LOADING TECHNIQUE

Organisms per concentration: 20

Replicates per concentration: 4

Organisms per replicate: 5

G. TESTING DATES

Start: 9/12/89

Complete: 9/14/89

H. SUMMARY OF TEST OBSERVATIONS

1. Most sensitive index: no significant mortality observed in either test

LOEC:

NOEC:

ChV:

LC_{50}:

95 percent confidence limits:

Method:

2. Survival Rates (%)

Concentration (% Effluent)	Survival Rate (%)
1. Control	90
2. 100% - Outfall 000	70
3. 100% - Outfall 002	80
4.	
5.	
6.	
7.	
8.	
9.	
10.	

3. Comments:

I. ATTACHMENT

X Data Summary Sheets

____ Other:

By: Richard Muenda Date: 9/20/89

ECKENFELDER INC.
227 French Landing Drive
Nashville, TN 37228

(615) 255-2288

MEN00635

APPENDIX B

RAW DATA SHEETS

TOXICITY TEST DATA SHEET

CLIENT: Menasha PROJECT NO: _____ EFFLUENT: ✓ CHEMICAL (SPECIFY): _____
SAMPLE ID#: _____ GRAB _____ COMPOSITE _____ COLLECTED BY: _____
TEST STARTED: 9/7/2 ENDED: 9/16/89 TEST SPECIES: Pimephales promelas AGE: 28d WEIGHT/LENGTH: _____
ORGANISMS PER CONCENTRATION: 20 DILUTION WATER: Reconstituted Water TEST CONDUCTED BY: WSH
COMMENTS: _____
STATIC _____ STATIC RENEWAL ✓ FLOW-THROUGH _____ TOTAL VOLUME PER CHAMBER: 750 ml

CONC OR % EFF	REP	pH (standard unit) 0	24	48	72	96	DISSOLVED OXYGEN (mg/l) 0	24	48	72	96	CONDUCTIVITY (umho/cm) SALINITY (mg/l) 0	24	48	72	96	TOTAL ALKALINITY (mg/l CaCO3) 0	24	48	72	96	TOTAL HARDNESS (mg/l CaCO3) 0	24	48	72	96	OTHERS 0	24	48	72	96	CUMULATIVE MORTALITY 24	48	72	96
Control	A	8.2	7.9	8.1	8.1	8.3	8.3	7.9	8.5	7.9	8.1	700	720	730	600		100	85	90	100		260	240	260	210								0	0	0	0
	B																																0	0	0	0
100% Outfall 000	A	8.4	8.9	8.5	8.6	8.8	8.4	8.1	8.6	8.2	7.1	3950	4200	4050	4000		2700	2250	2500	2730		240	220	200	300								3	4	4	4
	B																																0	1	2	3
100% Outfall 002	A	7.8	7.9	7.8	7.7	8.1	8.5	7.9	7.5	7.6	7.1	690	750	720	680		300	300	260	285		300	250	405	300								0	0	0	0
	B																																0	0	0	0

TEST TEMPERATURES AND TIMES MEASURED: 20°C throughout test

_____ HOUR LC-50 = _____ 95 % CONFIDENCE LIMITS: _____ TO _____ METHOD OF CALCULATION: _____
_____ HOUR LC-50 = _____ 95 % CONFIDENCE LIMITS: _____ TO _____ METHOD OF CALCULATION: _____
_____ HOUR LC-50 = _____ 95 % CONFIDENCE LIMITS: _____ TO _____ METHOD OF CALCULATION: _____

MEN00636

TOXICITY TEST DATA SHEET

CLIENT: Menasha PROJECT NO: _____ EFFLUENT: ✓ CHEMICAL (SPECIFY): _____
SAMPLE ID#: _____ GRAB ✓ COMPOSITE _____ COLLECTED BY: _____
TEST STARTED: 9/12 ENDED: 9/14/89 TEST SPECIES: Daphnia magna AGE: <24h WEIGHT/LENGTH: _____
ORGANISMS PER CONCENTRATION: 20 DILUTION WATER: Reconstituted Water TEST CONDUCTED BY: WSH
COMMENTS:
STATIC ✓ STATIC RENEWAL _____ FLOW-THROUGH _____ TOTAL VOLUME PER CHAMBER: 50 ml

CONC OR % EFF	REP	pH (standard unit) 0	24	48	72	96	DISSOLVED OXYGEN (mg/l) 0	24	48	72	96	CONDUCTIVITY (umho/cm) SALINITY (mg/l) 0	24	48	72	96	TOTAL ALKALINITY (mg/l CaCO3) 0	24	48	72	96	TOTAL HARDNESS (mg/l CaCO3) 0	24	48	72	96	OTHERS 0	24	48	72	96	CUMULATIVE MORTALITY 24	48	72	96
Control	A	8.1		8.1			8.5		8.9			730					90					260											0	1		
	B																																	0	0		
	C																																	0	1		
	D																																	0	0		
100% Outfall 002	A	8.5		9.2			8.6		7.2			1050					230					260											–	1		
	B																																	–	4		
	C																																	–	1		
	D																																	–	0		
100% Outfall 002	A	7.8		8.2			6.4		8.6			720					260					400											0	0		
	B																																	1	1		
	C																																	1	2		
	D																																	0	1		

TEST TEMPERATURES AND TIMES MEASURED: 20°C throughout the test

_____ HOUR LC-50 = _____ 95 % CONFIDENCE LIMITS: _____ TO _____ METHOD OF CALCULATION: _____
_____ HOUR LC-50 = _____ 95 % CONFIDENCE LIMITS: _____ TO _____ METHOD OF CALCULATION: _____
_____ HOUR LC-50 = _____ 95 % CONFIDENCE LIMITS: _____ TO _____ METHOD OF CALCULATION: _____

MEN00637

REPORT FOR ACUTE TOXICITY TEST RESULTS FOR MENASHA CORPORATION

Prepared for:

MENASHA CORPORATION
Otsego, Michigan

Prepared by:

ECKENFELDER INC.
227 French Landing Drive
Nashville, Tennessee 37228
(615) 255-2288

November 1991

5200

MEN00639

ECKENFELDER INC.

November 14, 1991 5200

Keith Kling
Menasha Corporation
Box 155
Otsego, MI 49078-0155

Dear Keith:

The report on the toxicity tests conducted on your wastewaters is attached. Acute, definitive tests on Outfall 000 were conducted using fathead minnows and Daphnia magna. The tests were 96-hour in duration for the fathead minnows and 48-hour in duration for D. magna. None of the tests resulted in significant mortality to the organisms.

If you have any questions, please contact me at (615) 255-2288.

Sincerely,

ECKENFELDER INC.

Richard J. Mirenda

Richard J. Mirenda, Ph.D.
Senior Manager
Aquatic Toxicology Laboratory/Consulting Services

Attachment

227 French Landing Drive
Nashville, Tennessee 37228
615 255 2288
FAX 615 256 8332

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B	Raw Data Sheets
C	Reference Toxicant Control Charts

INTRODUCTION

Municipal and industrial dischargers are required" as part of the National Pollutant Discharge Elimination System (NPDES), to measure the toxicity of their wastewater. The permit requirement may be for monitoring purposes only or may contain toxicity limits. The type of tests required vary from state to state and may depend on flow conditions or dilution by the receiving water. The most common tests required are acute tests which measure the short-term toxicity of the wastewater. The test duration may vary from 24-hour to 96 hour, depending on the organism tested and the state requirements. More recently, mini-chronic tests have been utilized to look at longer-term toxicity. These tests involve more subtle effects on the organism, e.g., growth and reproduction, and last seven days.

The organisms used in these tests have been limited to those that are easily cultured in the laboratory. This ensures that the quality and health of the organisms are consistent over time and does not affect the results of the test. Fish species most often used are the fathead minnow (Pimephales promelas) which is easily reared in the laboratory. The invertebrates used are the water fleas (Daphnia pulex, Daphnia magna and Ceriodaphnia sp.) which are freshwater crustaceans. The culturing methods for these organisms have been outlined by the U.S. Environmental Protection Agency and the American Society for Testing and Materials.

Menasha Corporation in Otsego, Michigan has been issued a NPDES permit which requires that toxicity tests be conducted on Outfall 000. The tests required are acute, definitive tests which expose the fathead minnows and Daphnia magna to a serial dilution of the effluent for 96 hour and 48 hour, respectively.

METHODS

Test procedures adhered to those outlined in the U.S. Environmental Protection Agency Manual, "Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms", EPA 600/4-85/013.

A sample was received from Menasha Corporation on November 5, 1991. The permit stipulates that the fathead minnow test be a daily renewal which would require fresh samples each day. However, due to a misunderstanding only one sample was sent so that the test was a 96-hour nonrenewal test. The temperature of the samples was adjusted to 20°C prior to the start of the test. Water chemistry data were measured and recorded on the appropriate data sheet (Appendix C). Parameters measured were pH, dissolved oxygen, temperature, conductivity, hardness and alkalinity. In addition, a final dissolved oxygen concentration was measured on the test concentrations and control at the time of renewal and at the conclusion of the test.

The tests were started with 18 day old fathead minnows and <24-hour old Daphnia magna . The fathead test consisted of two replicates with ten fish in each test vessel. The D. magna test had four replicates with five organisms in each vessel. The effluent was tested at 6.25, 12.5, 25, 50 and 100 percent. The sample was diluted with Kalamazoo River water which is the receiving stream. A control of river water as well as laboratory reconstituted water made according to USEPA procedures were also tested. The test chambers were checked every 24-hour for mortality and the number alive recorded on the data sheet (Appendix C). The test was terminated after 96-hours (fathead minnows) and 48-hour (D. magna) and was deemed acceptable if 90 percent of the control organisms survived.

QUALITY ASSURANCE

All of the organisms which were tested were obtained from cultures maintained by ECKENFELDER INC. The animal stocks were originally obtained from USEPA - Cincinnati and are cultured according to EPA recommended procedures (EPA 600/4-85/013 and EPA 600/4-85/014).

The control water used in the tests was reconstituted water made with glass distilled water to which is added appropriate amounts of KCl, $MgCl_2$, $NaHCO_3$ and $CaSO_4$. The pH, hardness and alkalinity of each batch of water is checked prior to use. Adjustments to these parameters are made if they fall outside the acceptable ranges. The water quality data for each batch of water is recorded in the Water Chemistry Log.

Reference toxicant tests are conducted every month on all of the organisms cultured in our laboratory. The tests are acute and the reference toxicant is cadmium chloride which is obtained from USEPA. Data sheets and LC50 values are kept in laboratory notebooks. The control charts of the reference toxicant tests for the fathead minnow and Daphnia magna are provided in Appendix C.

RESULTS

There was no significant mortality observed in the test of Outfall 000 on the fathead minnows. The test resulted in 100 percent survival in all of the test concentrations except 25 percent which had 85 percent survival. The river control also had 100 percent survival, while the laboratory control had 95 percent survival.

There was also no significant mortality observed in the test with Daphnia magna. The test of Outfall 000 resulted in 95 percent survival in 25 percent and 100 percent effluent and 100 percent survival in the other test concentrations. The river control had 95 percent survival as well and the laboratory control had 100 percent survival.

APPENDIX A

ECKENFELDER INC. TOXICITY TEST REPORT

REPORT OF AQUATIC TOXICITY TEST RESULTS

I. GENERAL INFORMATION

A. Plant Information

Industry: Menasha Corporation

Permit No.:

Address: Paperboard Group
Box 155
Otsego, MI 49078-0155

Contact: Keith Kling

Phone Number: (615) 692-6141

Type of Plant: Paper

Plant Operating Schedule:

Receiving Stream: Kalamazoo River

B. Sample(s)

Source(s): Outfall 000

Collection Period: 11/4/91

Type of Collection: 24 hour composite

Collected by: Menasha personnel

	000
Alkalinity (mg/l as $CaCO_3$):	1,100
Conductivity (μmhos/cm):	2,040
Hardness (mg/l $CaCO_3$):	160
pH (standard units):	8.6

REPORT OF AQUATIC TOXICITY TEST RESULTS (Cont'd)

II. DATA FOR FATHEAD MINNOW TESTS

A. Test Type

___ Renewal	___ 24 hr	X Static	X Acute
X Nonrenewal	___ 48 hr	___ Flowthrough	___ Chronic
	X 96 hr		
	___ 7 day		

B. Test Organism

Common Name: Fathead Minnow Scientific Name: Pimephales promelas

Age: 18 days Source: ECKENFELDER INC. cultures

Observed Diseases: None

Treatment: None

Acclimation: Held in control water prior to testing

C. Test Method - Reference Material

Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms, EPA, Third edition, March 1985.

Other:

D. Dilution Water

Source: Kalamazoo River Collection Period: 11/4/91

Type Collection: Grab Pretreatment: None

Alkalinity (mg/l as $CaCO_3$): 215 Hardness (mg/l $CaCO_3$): 280

Conductivity (μmhos/cm): 572 pH (standard units): 8.0

REPORT OF AQUATIC TOXICITY TEST RESULTS (Cont'd)

E. Test Chambers

Composition: Glass

Depth: 195 mm

Size: 1.0 L

Test Volume per Chamber: 750 ml

F. Loading Technique

Organisms per concentration: 20

Replicates per concentration: 2

Organisms per replicate: 10

G. Testing Dates

Start: 11/5/91

Complete: 11/9/91

H. Summary Of Test Observations

1. Most sensitive index: no significant mortality observed

   LOEC:

   NOEC:

   ChV:

   LC50:

   95 percent confidence limits:

   Method:

REPORT OF AQUATIC TOXICITY TEST RESULTS (Cont'd)

2. Survival Rates (%)

Concentration	Survival Rate (%)
1. Lab Control	95
2. River Control	100
3. 6.25	100
4. 12.5	100
5. 25	85
6. 50	100
7. 100	100
8.	
9.	

3. Comments:

I. Attachment

_X_ Data Summary Sheets

___ Other:

By: Richard Muenda Date: 11/13/91

ECKENFELDER INC.
227 French Landing Drive
Nashville, TN 37228

(615) 255-2288

REPORT OF AQUATIC TOXICITY TEST RESULTS (Cont'd)

III. DATA FOR WATER FLEA TESTS

A. Test Type

__ Renewal	__ 24 hr	_X_ Static	_X_ Acute
_X_ Nonrenewal	_X_ 48 hr	__ Flowthrough	__ Chronic
	__ 96 hr		
	__ 7 day		

B. Test Organism

Common Name: Water Flea

Scientific Name: Daphnia magna

Age: <24 hr

Source: ECKENFELDER INC. cultures

Observed Diseases: None

Treatment: None

Acclimation: Held in control water prior to testing

C. Test Method - Reference Material

Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms, EPA, Third edition, March 1985.

Other:

D. Dilution Water

Source: Kalamazoo River

Collection Period: 11/4/91

Type Collection: Grab

Pretreatment: None

Alkalinity (mg/l as $CaCO_3$): 215

Hardness (mg/l $CaCO_3$): 280

Conductivity (μmhos/cm): 572

pH (standard units): 8.0

REPORT OF AQUATIC TOXICITY TEST RESULTS (Cont'd)

E. Test Chambers

Composition: Plastic

Depth: 75 mm

Size: 250 ml

Test Volume per Chamber: 50 ml

F. Loading Technique

Organisms per concentration: 20

Replicates per concentration: 4

Organisms per replicate: 5

G. Testing Dates

Start: 11/5/91

Complete: 11/7/91

H. Summary Of Test Observations

1. Most sensitive index: no significant mortality observed

   LOEC:

   NOEC:

   ChV:

   LC50:

   95 percent confidence limits:

   Method:

REPORT OF AQUATIC TOXICITY TEST RESULTS (Cont'd)

2. Survival Rates (%)

Concentration	Survival Rate (%)
1. Lab Control	100
2. River Control	95
3. 6.25	100
4. 12.5	100
5. 25	95
6. 50	100
7. 100	95
8.	
9.	

3. Comments:

I. Attachment

_X_ Data Summary Sheets

___ Other:

By: Richard Miranda Date: 11/13/91

ECKENFELDER INC.
227 French Landing Drive
Nashville, TN 37228

(615) 255-2288

APPENDIX B

RAW DATA SHEETS

ACUTE TOXICITY DATA SHEET

CLIENT: Menasha PROJECT NO: _____ EFFLUENT: ✓ CHEMICAL (SPECIFY): _____

SAMPLE ID: _____ GRAB: _____ COMPOSITE: ✓ COLLECTED BY: _____

TEST STARTED: (Date/Time) 11/15/91 12:30 Pm ENDED: (Date/Time) 11/19/91 11:15 Pm TEST SPECIES: P. promelas AGE: 18 days WEIGHT/LENGTH: _____

ORGANISMS PER CONCENTRATION: 20 DILUTION WATER: Kalamazoo River Water TEST CONDUCTED BY: JE

STATIC: ✓ STATIC RENEWAL: _____ FLOW - THROUGH: _____ TOTAL VOLUME PER CHAMBER: 750 ml

CONC. OR % EFF.	REP	pH (standard unit) 0 (VF)	24 (VF)	48 (VF)	72 (VF)	96 (VF)	DISSOLVED OXYEN (mg/l) 0 (VF)	24 (VF)	48 (VF)	72 (VF)	96 (VF)	CONDUCTIVITY (umho/cm) SALINITY (mg/l) 0	24	48	72	96	TOTAL ALKALINITY (mg/l CaCO3) 0	24	48	72	96	TOTAL HARDNESS (mg/l CaCO3) 0	24	48	72	96	TEMPERATURE (°C) 0	24	48	72	96	CUMULATIVE MORTALITY 24	48	72	96
Lab	A	8.5	7.8	7.8	8.0	8.1	8.7	8.2	8.0	8.7	8.4	519					120					160					20.8					0	0	0	1
Control	B																																0	0	0	0
River	A	8.0	8.2	8.3	8.4	8.3	9.8	8.2	8.0	8.6	8.6	572					215										20.8					0	0	0	0
Control	B																																0	0	0	0
6.25	A	8.1	8.3	8.4	8.5	8.4	9.3	8.3	7.9	8.5	8.6	661															20.8					0	0	0	0
	B																																0	0	0	0
12.5	A	8.2	8.3	8.4	8.5	8.4	9.2	8.8	7.6	8.5	8.0	748															20.8					0	0	0	0
	B																																0	0	0	0
25	A	8.3	8.4	8.5	8.5	8.4	9.2	8.5	8.4	7.9	7.7	943															20.6					1	1	2	3
	B																																0	0	0	0
50	A	8.5	8.5	8.5	8.5	8.4	8.7	7.9	8.0	8.4	6.4	1269															20.5					0	0	0	0
	B																																0	0	0	0
100	A	8.6	8.6	8.6	8.7	8.6	8.1	8.0	8.3	8.1	8.4	2070					1100					1600					20.2					0	0	0	0
	B																																0	0	0	0

96 HOUR LC - 50 = > 100% 95% CONFIDENCE LIMITS: _____ TO _____ METHOD OF CALCULATION: _____

COMMENTS: _____

I/F - REPRESENTS INITIAL/FINAL

MEN00653

ACUTE TOXICITY DATA SHEET

CLIENT: Menasha PROJECT NO: ____ EFFLUENT: ✓ CHEMICAL (SPECIFY): ____

SAMPLE ID: ____ GRAB: ____ COMPOSITE: ✓ COLLECTED BY: ____

TEST STARTED: (Date/Time) 11/5/91 12:30 Pm ENDED: (Date/Time) 11/7/91 12:20 Pm TEST SPECIES: D. magna AGE: <24h WEIGHT/LENGTH: ____

ORGANISMS PER CONCENTRATION: 20 DILUTION WATER: Kalamazoo River Water TEST CONDUCTED BY: JF + SB

STATIC: ✓ STATIC RENEWAL: ____ FLOW - THROUGH: ____ TOTAL VOLUME PER CHAMBER: 50ml

CONC. OR % EFF.	REP	pH (standard unit) 0	24 (I/F)	48 (I/F)	72 (I/F)	96 (I/F)	DISSOLVED OXYGEN (mg/l) 0 (I/F)	24 (I/F)	48 (I/F)	72 (I/F)	96 (I/F)	CONDUCTIVITY (umho/cm) SALINITY (mg/l) 0	24	48	72	96	TOTAL ALKALINITY (mg/l CaCO3) 0	24	48	72	96	TOTAL HARDNESS (mg/l CaCO3) 0	24	48	72	96	TEMPERATURE (°C) 0	24	48	72	96	CUMULATIVE MORTALITY 24	48	72	96
Lab	A	8.4		8.4			8.7		8.5			591					120					160					20.8					0/0	0/0		
	B																																			
Control	C																															0/0	0/0		
	D																																			
River	A	8.0		8.6			9.8		8.5			572					215					280					20.8					0/0	0/1		
	B																																			
Control	C																															0/0	0/0		
	D																																			
6.25	A	8.1		8.5			9.0		8.5			668															20.8					0/0	0/0		
	B																																			
	C																															0/0	0/0		
	D																																			
12.5	A	8.2		8.5			9.1		8.3			759															20.7					0/0	0/0		
	B																																			
	C																															0/0	0/0		
	D																																			
25	A	8.3		8.6			9.1		8.0			943															20.7					0/0	1/0		
	B																																			
	C																															0/0	0/0		
	D																																			
50	A	8.5		8.8			9.7		7.9			1295															20.6					0/0	0/0		
	B																																			
	C																															0/0	0/0		
	D																																			
100	A	8.6		9.0			8.1		6.4			2049					1100					160					20.2					0/0	1/1		
	B																																			
	C																															0/0	0/0		
	D																																			

48 HOUR LC - 50 = >100% 95% CONFIDENCE LIMITS: ____ TO ____ METHOD OF CALCULATION: ____

COMMENTS: ____

I/F - REPRESENTS INITIAL/FINAL

MEN00654

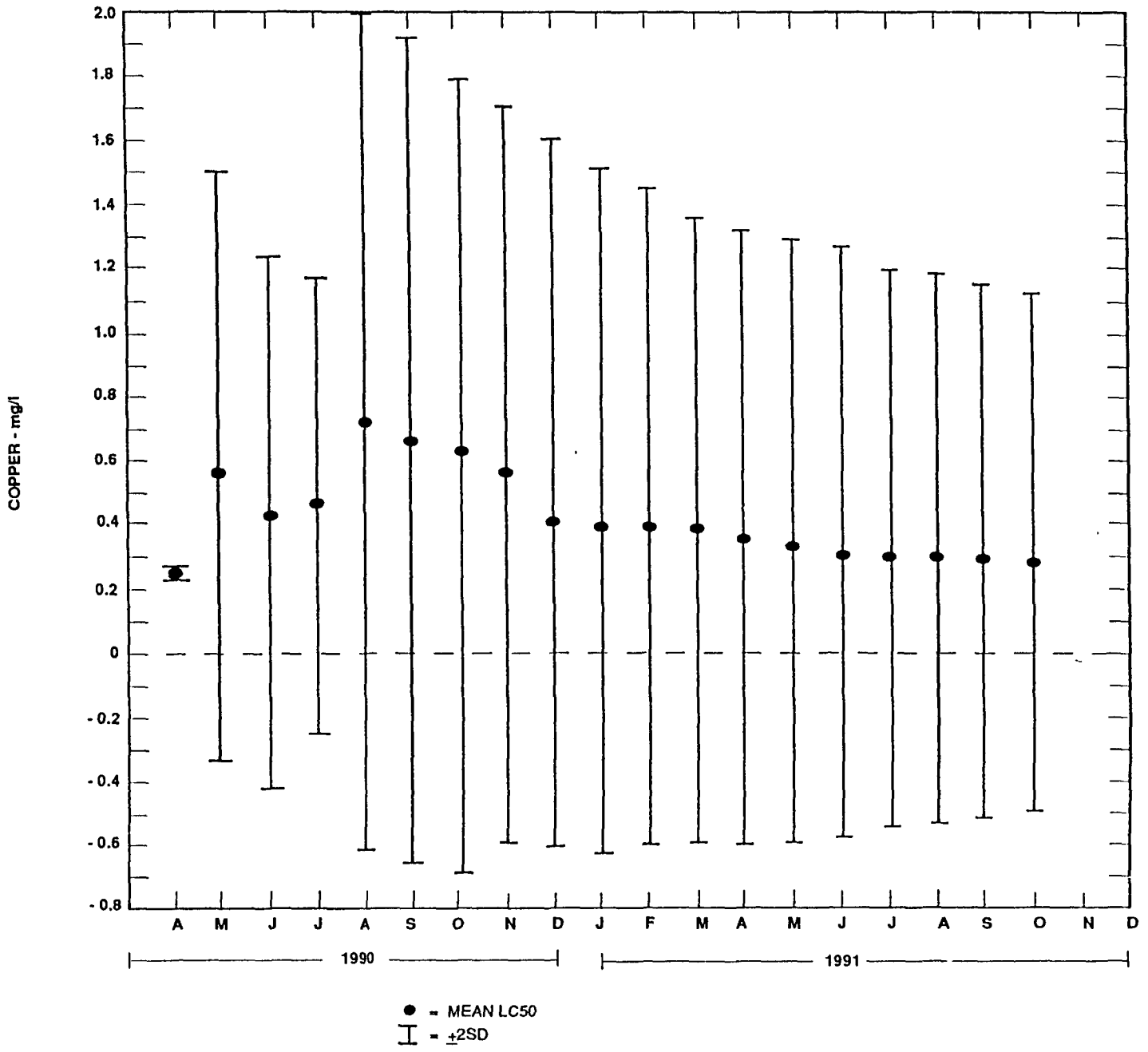
APPENDIX C

REFERENCE TOXICANT CONTROL CHARTS

P. PROMELAS

DATE	LC 50	STANDARD DEVIATION	AVERAGE	-2SD	+2SD
APR 90	0.240	0.00	- - - -	- - - -	- - - -
MAY 90	0.890	0.460	0.565	-0.354	1.484
JUN 90	0.110	0.418	0.413	-0.422	1.249
JUL 90	0.630	0.358	0.468	-0.248	1.183
AUG 90	0.790	0.668	0.732	-0.604	2.068
SEPT 90	0.090	0.652	0.625	-0.679	1.929
OCT 90	0.110	0.626	0.551	-0.701	1.804
NOV 90	0.320	0.586	0.523	-0.649	1.694
DEC 90	0.209	0.558	0.488	-0.628	1.603
JAN 91	0.051	0.544	0.444	-0.643	1.531
FEB 91	0.200	0.521	0.422	-0.620	1.464
MAR 91	0.231	0.500	0.406	-0.594	1.406
APR 91	0.050	0.489	0.379	-0.599	1.356
MAY 91	0.120	0.474	0.360	-0.589	1.309
JUNE 91	0.100	0.459	0.347	-0.571	1.266
JULY 91	0.340	0.444	0.347	-0.541	1.234
AUG 91	0.110	0.433	0.333	-0.534	1.200
SEPT 91	0.218	0.421	0.327	-0.516	1.169
OCT 91	0.124	0.412	0.316	-0.508	1.140

FATHEADS ACUTE REFERENCE TOXICANT DATA, COPPER SULFATE
APRIL 1990 - OCTOBER 1991



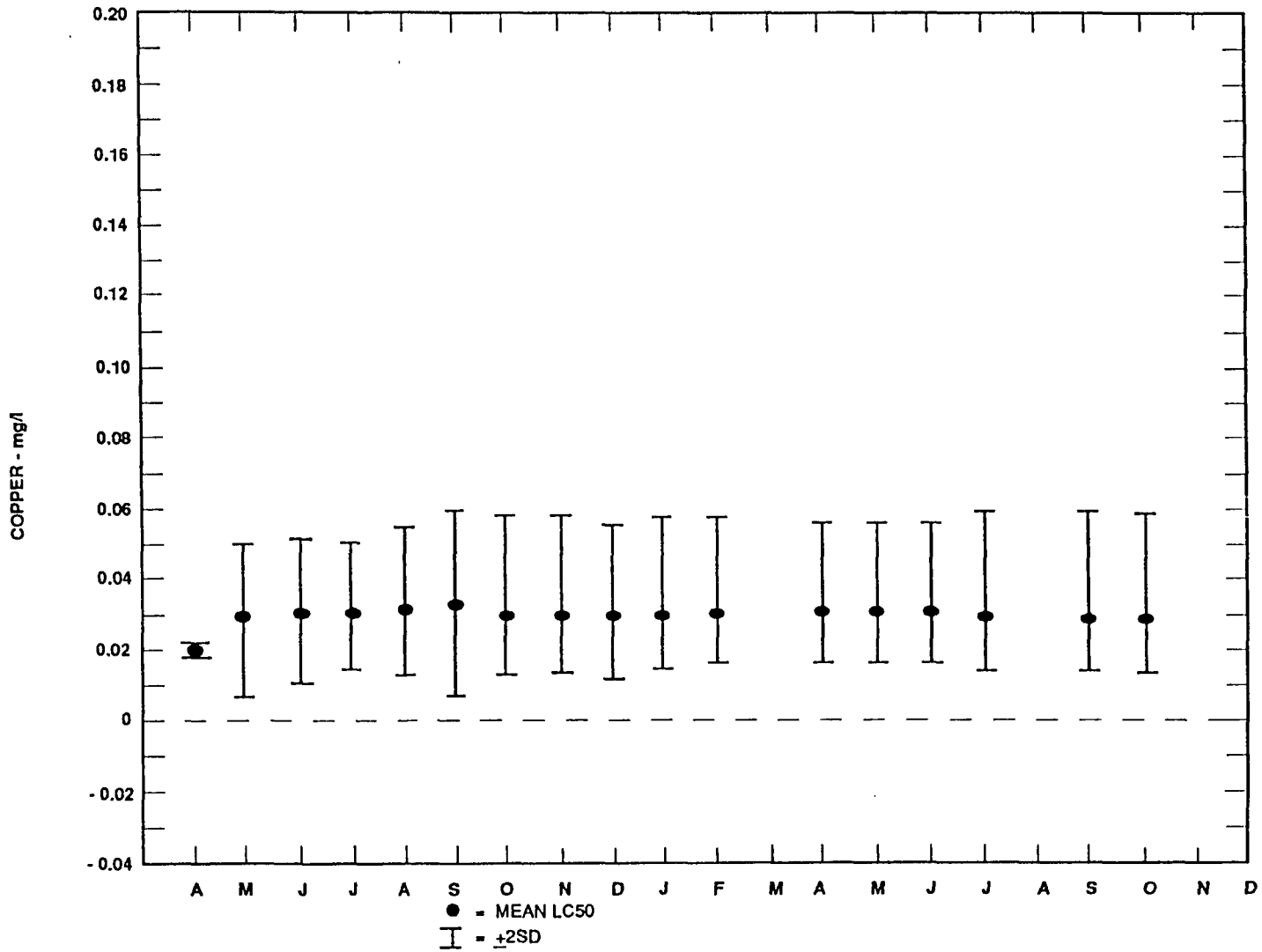
MEN00657

D. MAGNA

DATE	LC 50	STANDARD DEVIATION	AVERAGE	-2SD	+2SD
APR 90	0.020	- - - -	- - - -	- - - -	- - - -
MAY 90	0.035	0.011	0.028	0.006	0.049
JUN 90	0.040	0.010	0.032	0.011	0.052
JUL 90	0.035	0.009	0.033	0.015	0.050
AUG 90	0.048	0.010	0.036	0.015	0.056
SEPT 90	0.015	0.012	0.032	0.007	0.057
OCT 90	0.039	0.012	0.033	0.010	0.056
NOV 90	0.034	0.011	0.033	0.012	0.055
DEC 90	0.025	0.010	0.032	0.011	0.053
JAN 91	0.041	0.010	0.033	0.013	0.054
FEB 91	0.042	0.010	0.034	0.014	0.054
APR 91	0.030	0.010	0.034	0.014	0.053
MAY 91	0.030	0.009	0.033	0.015	0.052
JUNE 91	0.030	0.009	0.033	0.015	0.051
JULY 91	0.010	0.011	0.032	0.011	0.053
SEPT 91	0.017	0.011	0.031	0.009	0.052
OCT 91	0.044	0.011	0.031	0.010	0.053

MEN00658

DAPHNIA MAGNA ACUTE REFERENCE TOXICANT DATA, $CuSO_4$
APRIL 1990 - OCTOBER 1991



MEN00659

MEN00660

REPORT FOR ACUTE TOXICITY TEST RESULTS FOR MENASHA CORPORATION

Prepared for:

MENASHA CORPORATION
Otsego, Michigan

Prepared by:

ECKENFELDER INC.
227 French Landing Drive
Nashville, Tennessee 37228
(615) 255-2288

January 1992

5204

ECKENFELDER INC.

January 28, 1992 5204

Keith Kling
Menasha Corporation
Box 155
Otsego, MI 49078-0155

Dear Keith:

The report on the toxicity tests conducted on your effluent is attached. Acute, definitive tests on Outfall 000 were conducted using fathead minnows and Daphnia magna. The tests were acute 96-hour static, renewal using the fathead minnows and acute 48-hour non-renewal using D. magna. None of the tests resulted in significant mortality to the organisms.

If you have any questions, please contact me at (615) 255-2288.

Sincerely,

ECKENFELDER INC.

Richard J. Mirenda

Richard J. Mirenda, Ph.D.
Senior Manager
Aquatic Toxicology Laboratory/Consulting Services

Attachment

227 French Landing Drive
Nashville, Tennessee 37228
615.255.2288
FAX 615 256.8332

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A	ECKENFELDER INC. Toxicity Test Report
B	Raw Data Sheets
C	Reference Toxicant Control Charts

INTRODUCTION

Municipal and industrial dischargers are required" as part of the National Pollutant Discharge Elimination System (NPDES), to measure the toxicity of their wastewater. The permit requirement may be for monitoring purposes only or may contain toxicity limits. The type of tests required vary from state to state and may depend on flow conditions or dilution by the receiving water. The most common tests required are acute tests which measure the short-term toxicity of the wastewater. The test duration may vary from 24-hour to 96 hour, depending on the organism tested and the state requirements. More recently, mini-chronic tests have been utilized to look at longer-term toxicity. These tests involve more subtle effects on the organism, e.g., growth and reproduction, and last seven days.

The organisms used in these tests have been limited to those that are easily cultured in the laboratory. This ensures that the quality and health of the organisms are consistent over time and does not affect the results of the test. Fish species most often used are the fathead minnow (Pimephales promelas) which is easily reared in the laboratory. The invertebrates used are the water fleas (Daphnia pulex, Daphnia magna and Ceriodaphnia sp.) which are freshwater crustaceans. The culturing methods for these organisms have been outlined by the U.S. Environmental Protection Agency and the American Society for Testing and Materials.

Menasha Corporation in Otsego, Michigan has been issued a NPDES permit which requires that toxicity tests be conducted on Outfall 000. The tests required are acute, definitive tests which exposed the fathead minnows and Daphnia magna to a serial dilution of the effluent for 96 hour and 48 hour, respectively.

METHODS

Test procedures adhered to those outlined in the U.S. Environmental Protection Agency Manual, "Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms", EPA 600/4-85/013.

A sample was received from Menasha Corporation on January 7, 1992. The permit stipulates that the fathead minnow test is a daily renewal which requires fresh samples each day. The temperature of the samples was adjusted to 20°C prior to the start of the test. Water chemistry data were measured and recorded on the appropriate data sheet (Appendix C). Parameters measured were pH, dissolved oxygen, temperature, conductivity, hardness and alkalinity. In addition, a final dissolved oxygen concentration and pH were measured on the test concentrations and control at the time of renewal and at the conclusion of the test.

The tests were started with 21 day old fathead minnows and <24-hour old Daphnia magna . The fathead test consisted of two replicates with ten fish in each test vessel. The D. magna test had four replicates with five organisms in each vessel. The effluent was tested at 6.25, 12.5, 25, 50 and 100 percent. The sample was diluted with Kalamazoo River water which is the receiving stream. A control of river water as well as laboratory reconstituted water made according to USEPA procedures were also tested. The test chambers were checked every 24-hour for mortality and the number dead recorded on the data sheet (Appendix B). The tests were terminated after 96-hours (fathead minnows) and 48-hour (D. magna) and were deemed acceptable if 90 percent of the control organisms survived.

QUALITY ASSURANCE

All of the organisms which were tested were obtained from cultures maintained by ECKENFELDER INC. The animal stocks were originally obtained from USEPA - Cincinnati and are cultured according to EPA recommended procedures (EPA 600/4-85/013 and EPA 600/4-85/014).

The control water used in the tests was reconstituted water made with glass distilled water to which is added appropriate amounts of KCl, $MgCl_2$, $NaHCO_3$ and $CaSO_4$. The pH, hardness and alkalinity of each batch of water is checked prior to use. Adjustments to these parameters are made if they fall outside the acceptable ranges. The water quality data for each batch of water is recorded in the Water Chemistry Log.

Reference toxicant tests are conducted every month on all of the organisms cultured in our laboratory. The tests are acute and the reference toxicant is cadmium chloride

which is obtained from USEPA. Data sheets and LC50 values are kept in laboratory notebooks. The control charts of the reference toxicant tests for the fathead minnow and Daphnia magna are provided in Appendix C.

RESULTS

There was no significant mortality observed in the test of Outfall 000 on the fathead minnows. The test resulted in 100 percent survival in all of the test concentrations. The river control and laboratory control also had 100 percent survival.

There was also no significant mortality observed in the test with Daphnia magna. The test of Outfall 000 resulted in 100 percent survival in 100 percent effluent as well as in the other test concentrations. The river control had 100 percent survival as well and the laboratory control had 95 percent survival.

APPENDIX A

ECKENFELDER INC. TOXICITY TEST REPORT

REPORT OF AQUATIC TOXICITY TEST RESULTS

I. GENERAL INFORMATION

A. Plant Information

Industry: Menasha Corporation

Permit No.:

Address: Paperboard Group
Box 155
Otsego, MI 49078-0155

Contact: Keith Kling

Phone Number: (615) 692-6141

Type of Plant: Paper

Plant Operating Schedule:

Receiving Stream: Kalamazoo River

B. Sample(s)

Source(s): Outfall 000

Collection Period: 1/5/92 - 1/9/92

Type of Collection: 24 hour composite

Collected by: Menasha personnel

	000
Alkalinity (mg/l as $CaCO_3$):	1,060
Conductivity (μmhos/cm):	2,020
Hardness (mg/l $CaCO_3$):	238
pH (standard units):	8.3

REPORT OF AQUATIC TOXICITY TEST RESULTS (Cont'd)

II. DATA FOR FATHEAD MINNOW TESTS

A. Test Type

___ Renewal	___ 24 hr	_X_ Static	_X_ Acute
_X_ Nonrenewal	___ 48 hr	___ Flowthrough	___ Chronic
	_X_ 96 hr		
	___ 7 day		

B. Test Organism

Common Name: Fathead Minnow Scientific Name: Pimephales promelas

Age: 21 days Source: ECKENFELDER INC. cultures

Observed Diseases: None

Treatment: None

Acclimation: Held in control water prior to testing

C. Test Method - Reference Material

Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms, EPA, Third edition, March 1985.

Other:

D. Dilution Water

Source: Kalamazoo River Collection Period: 1/6/92

Type Collection: Grab Pretreatment: None

Alkalinity (mg/l as $CaCO_3$): 210 Hardness (mg/l $CaCO_3$): 210

Conductivity (μmhos/cm): 565 pH (standard units): 8.0

REPORT OF AQUATIC TOXICITY TEST RESULTS (Cont'd)

E. Test Chambers

Composition: Glass

Depth: 195 mm

Size: 1.0 L

Test Volume per Chamber: 750 ml

F. Loading Technique

Organisms per concentration: 20

Replicates per concentration: 2

Organisms per replicate: 10

G. Testing Dates

Start: 1/7/92

Complete: 1/11/92

H. Summary Of Test Observations

1. Most sensitive index: no significant mortality observed

   LOEC:

   NOEC:

   ChV:

   LC50:

   95 percent confidence limits:

   Method:

REPORT OF AQUATIC TOXICITY TEST RESULTS (Cont'd)

2. Survival Rates (%)

Concentration	Survival Rate (%)
1. Lab Control	100
2. River Control	100
3. 6.25	100
4. 12.5	100
5. 25	100
6. 50	100
7. 100	100
8.	
9.	

3. Comments:

I. Attachment

_X_ Data Summary Sheets

___ Other:

By: Richard Mueller Date: 1/27/92

ECKENFELDER INC.
227 French Landing Drive
Nashville, TN 37228

(615) 255-2288

REPORT OF AQUATIC TOXICITY TEST RESULTS (Cont'd)

III. DATA FOR WATER FLEA TESTS

A. Test Type

__ Renewal	__ 24 hr	X Static	X Acute
X Nonrenewal	X 48 hr	__ Flowthrough	__ Chronic
	__ 96 hr		
	__ 7 day		

B. Test Organism

Common Name: Water Flea

Scientific Name: Daphnia magna

Age: <24 hr

Source: ECKENFELDER INC. cultures

Observed Diseases: None

Treatment: None

Acclimation: Held in control water prior to testing

C. Test Method - Reference Material

Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms, EPA, Third edition, March 1985.

Other:

D. Dilution Water

Source: Kalamazoo River

Collection Period: 11/6/92

Type Collection: Grab

Pretreatment: None

Alkalinity (mg/l as $CaCO_3$): 210

Hardness (mg/l $CaCO_3$): 210

Conductivity (μmhos/cm): 565

pH (standard units): 8.0

REPORT OF AQUATIC TOXICITY TEST RESULTS (Cont'd)

E. Test Chambers

Composition: Plastic

Depth: 75 mm

Size: 250 ml

Test Volume per Chamber: 50 ml

F. Loading Technique

Organisms per concentration: 20

Replicates per concentration: 4

Organisms per replicate: 5

G. Testing Dates

Start: 1/7/92

Complete: 1/9/92

H. Summary Of Test Observations

1. Most sensitive index: no significant mortality observed

   LOEC:

   NOEC:

   ChV:

   LC50:

   95 percent confidence limits:

   Method:

REPORT OF AQUATIC TOXICITY TEST RESULTS (Cont'd)

2. Survival Rates (%)

Concentration	Survival Rate (%)
1. Lab Control	95
2. River Control	100
3. 6.25	100
4. 12.5	100
5. 25	100
6. 50	100
7. 100	100
8.	
9.	

3. Comments:

I. Attachment

_X_ Data Summary Sheets

___ Other:

By: Richard Meeder Date: 1/27/92

ECKENFELDER INC.
227 French Landing Drive
Nashville, TN 37228

(615) 255-2288

APPENDIX B

RAW DATA SHEETS

ACUTE TOXICITY DATA SHEET

CLIENT: nasha PROJECT NO: _____ EFFLUENT: ✓ CHEMICAL (SPECIFY): _____

SAMPLE ID: _____ GRAB: _____ COMPOSITE: ✓ COLLECTED BY: Menasha

TEST STARTED: (Date/Time) 1/7/92 11:30PM ENDED: (Date/Time) 1/11/92 11:45 Pm TEST SPECIES: P. promelas AGE: 19 days WEIGHT/LENGTH: _____

ORGANISMS PER CONCENTRATION: 20 DILUTION WATER: Kalamazoo River TEST CONDUCTED BY: SB

STATIC: _____ STATIC RENEWAL: ✓ FLOW - THROUGH: _____ TOTAL VOLUME PER CHAMBER: 750 ml

CONC. OR % EFF.	REP	pH (standard unit) 0	24 (I/F)	48 (I/F)	72 (I/F)	96 (I/F)	DISSOLVED OXYEN (mg/l) 0 (I/F)	24 (I/F)	48 (I/F)	72 (I/F)	96 (I/F)	CONDUCTIVITY (umho/cm) SALINITY (mg/l) 0	24	48	72	96	TOTAL ALKALINITY (mg/l CaCO3) 0	24	48	72	96	TOTAL HARDNESS (mg/l CaCO3) 0	24	48	72	96	TEMPERATURE (°C) 0	24	48	72	96	CUMULATIVE MORTALITY 24	48	72	96
Lab	A	8.4	8.5 / 7.9	8.4 / 8.0	8.3 / 8.1	8.2	7.8	7.9 / 8.0	7.9 / 8.0	7.9 / 8.1	8.0	566	570	568	572		115	115	120	115		160	164	162	166		20.5	20.3	20.5	20.6		0	0	0	0
Control	B																																0	0	0	0
River	A	8.0	8.0 / 8.3	8.0 / 8.2	7.7 / 8.3	8.2	9.7	9.4 / 8.3	9.7 / 8.2	9.8 / 8.0	7.9	568	555	565	538		235	210	205	190		270	268	278	252		21.5	21.6	21.6	20.8		0	0	0	0
Control	B																																0	0	0	0
6.25%	A	8.0	8.1 / 8.3	8.1 / 8.2	8.1 / 8.3	8.2	9.5	9.0 / 7.2	8.2 / 7.0	8.9 / 7.4	7.5	684	648	670	626												21.2	20.8	21.0	21.3		0	0	0	0
	B																																0	0	0	0
12.5%	A	8.1	8.2 / 8.3	8.2 / 8.2	8.3 / 8.3	8.2	9.3	8.8 / 6.2	8.4 / 6.0	8.7 / 5.9	5.8	761	749	745	763												21.2	21.6	21.2	20.9		0	0	0	0
	B																																0	0	0	0
25%	A	8.1	8.3 / 8.3	8.3 / 8.3	8.4 / 8.3	8.2	8.5	8.6 / 4.3	8.8 / 4.0	8.6 / 4.2	4.5	967	964	943	974												21.2	20.8	21.0	20.7		0	0	0	0
	B																																0	0	0	0
50%	A	8.2	8.4 / 8.4	8.5 / 8.3	8.3 / 8.3	8.3	7.9	7.4 / 2.1	7.9 / 2.3	8.0 / 2.7	2.2	1300	1353	1304	1288												21.3	21.8	21.1	21.0		0	0	0	0
	B																																0	0	0	0
100%	A	8.3	8.7 / 8.6	8.5 / 8.5	8.4 / 8.5	8.6	7.5	6.5 / 0.3	7.1 / 0.9	8.0 / 0.3	0.6	2020	2126	2000	1957		1060	1165	1140	1080		238	168	168	160		21.6	21.4	21.6	21.7		0	0	0	0
	B																																0	0	0	0

_____ HOUR LC - 50 = _____ 95% CONFIDENCE LIMITS: _____ TO _____ METHOD OF CALCULATION: _____

COMMENTS: _____

I/F - REPRESENTS INITIAL/FINAL

MEN00675

ACUTE TOXICITY DATA SHEET

CLIENT: Menasha PROJECT NO: _____ EFFLUENT: ✓ CHEMICAL (SPECIFY): _____

SAMPLE ID: _____ GRAB: _____ COMPOSITE: ✓ COLLECTED BY: Menasha

TEST STARTED: (Date/Time) 1/7/92 / 11:30Am ENDED: (Date/Time) 1/9/92 / 11:50Am TEST SPECIES: D. magna AGE: <24hr WEIGHT/LENGTH: _____

ORGANISMS PER CONCENTRATION: 20 DILUTION WATER: Kalamazoo River TEST CONDUCTED BY: JE

STATIC: ✓ STATIC RENEWAL: _____ FLOW - THROUGH: _____ TOTAL VOLUME PER CHAMBER: 50ml

CONC. OR % EFF.	REP	pH (standard unit) 0	24 (VF)	48 (VF)	72 (VF)	96 (VF)	DISSOLVED OXYEN (mg/l) 0 (VF)	24 (VF)	48 (VF)	72 (VF)	96 (VF)	CONDUCTIVITY (umho/cm) SALINITY (mg/l) 0	24	48	72	96	TOTAL ALKALINITY (mg/l CaCO3) 0	24	48	72	96	TOTAL HARDNESS (mg/l CaCO3) 0	24	48	72	96	TEMPERATURE (°C) 0	24	48	72	96	CUMULATIVE MORTALITY 24	48	72	96
Lab Control	A																																	0/0	0/0		
	B	8.4		8.4			7.8		7.6			566					115					160					20.5					1/0	1/0		
	C																																	0/0	0/1		
	D																																				
River Control	A																																	0/0	0/0		
	B	8.0		8.2			9.7		8.7			568					1235					1270					21.5					0/0	0/0		
	C																																	0/0	0/0		
	D																																				
6.25%	A																											21.2						0/0	0/0		
	B	8.0		8.2			9.5		8.6			684																									
	C																																	0/0	0/0		
	D																																				
12.5%	A																																	0/0	0/0		
	B	18		8.2			9.31		.7			761																21.21						0/0	0/0		
	C																																	0/0	0/0		
	D																																				
25%	A																											21.2						0/0	0/0		
	B	8.1		8.3			8.5		.4			767																									
	C																																	0/0	0/0		
	D																																				
50%	A																											21.3						0/0	0/0		
	B	8.2		8.3			7.9		.2			1300																									
	C																																	0/0	0/0		
	D																																				
100%	A																											21.6						0/0	0/0		
	B	8.3		8.5			7.55		.91			2020					1060					2381														
	C																																	0/0	0/0		
	D																																				

_____ HOUR LC - 50 = _____ 95% CONFIDENCE LIMITS: _____ TO _____ METHOD OF CALCULATION: _____

COMMENTS: _____

VF - REPRESENTS INITIAL/FINAL

MEN00676

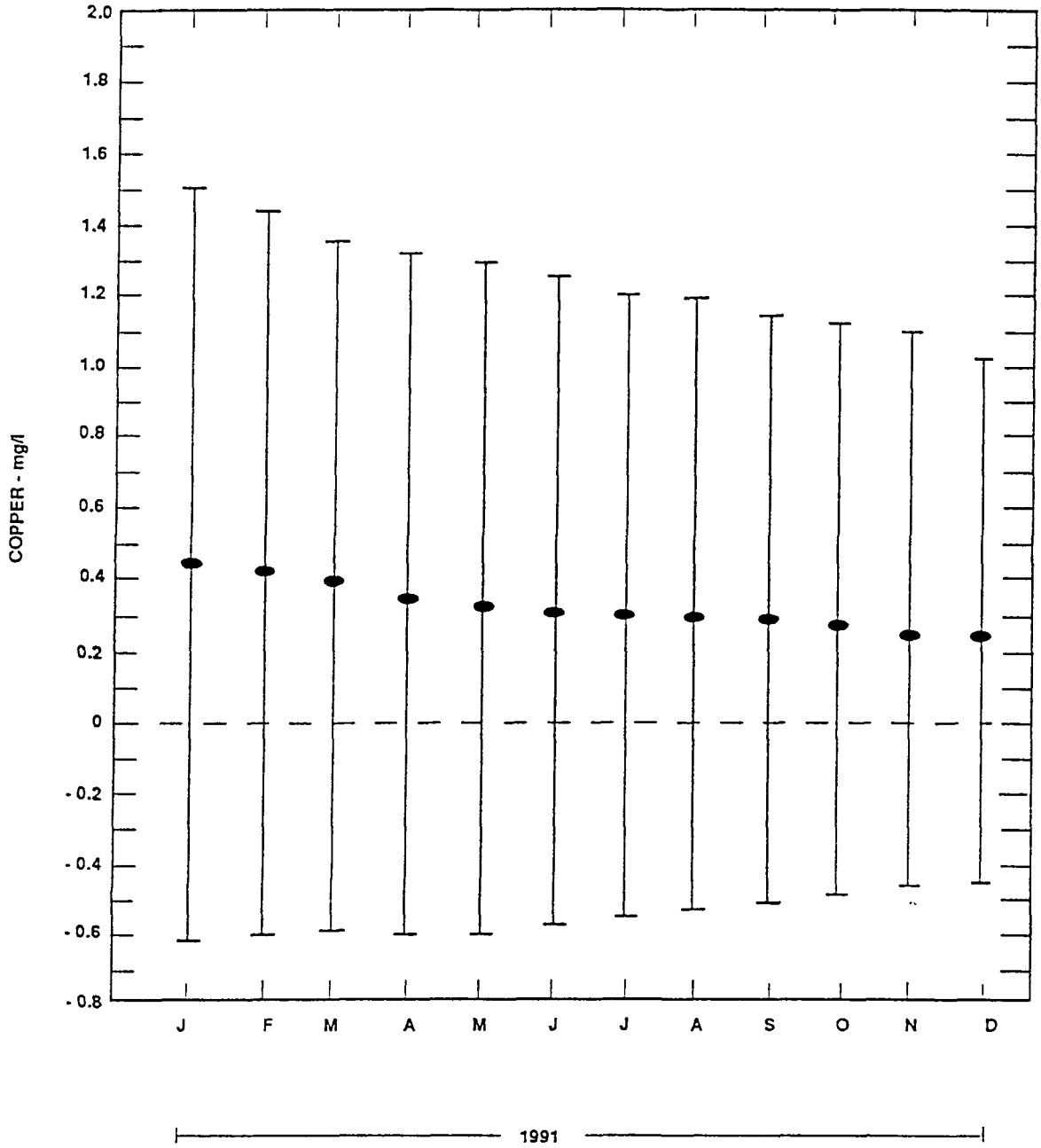
APPENDIX C

REFERENCE TOXICANT CONTROL CHARTS

P. PROMELAS

DATE	LC 50	STANDARD DEVIATION	AVERAGE	-2SD	+2SD
JAN 91	0.051	0.544	0.444	-0.643	1.531
FEB 91	0.200	0.521	0.422	-0.620	1.464
MAR 91	0.231	0.500	0.406	-0.594	1.406
APR 91	0.050	0.489	0.379	-0.599	1.356
MAY 91	0.120	0.474	0.360	-0.589	1.309
JUNE 91	0.100	0.459	0.347	-0.571	1.266
JULY 91	0.340	0.444	0.347	-0.541	1.234
AUG 91	0.110	0.433	0.333	-0.534	1.200
SEPT 91	0.218	0.421	0.327	-0.516	1.169
OCT 91	0.124	0.412	0.316	-0.508	1.140
NOV 91	0.164	0.403	0.308	-0.497	1.114
DEC 91	0.244	0.393	0.305	-0.480	1.091

FATHEADS ACUTE REFERENCE TOXICANT DATA, COPPER SULFATE

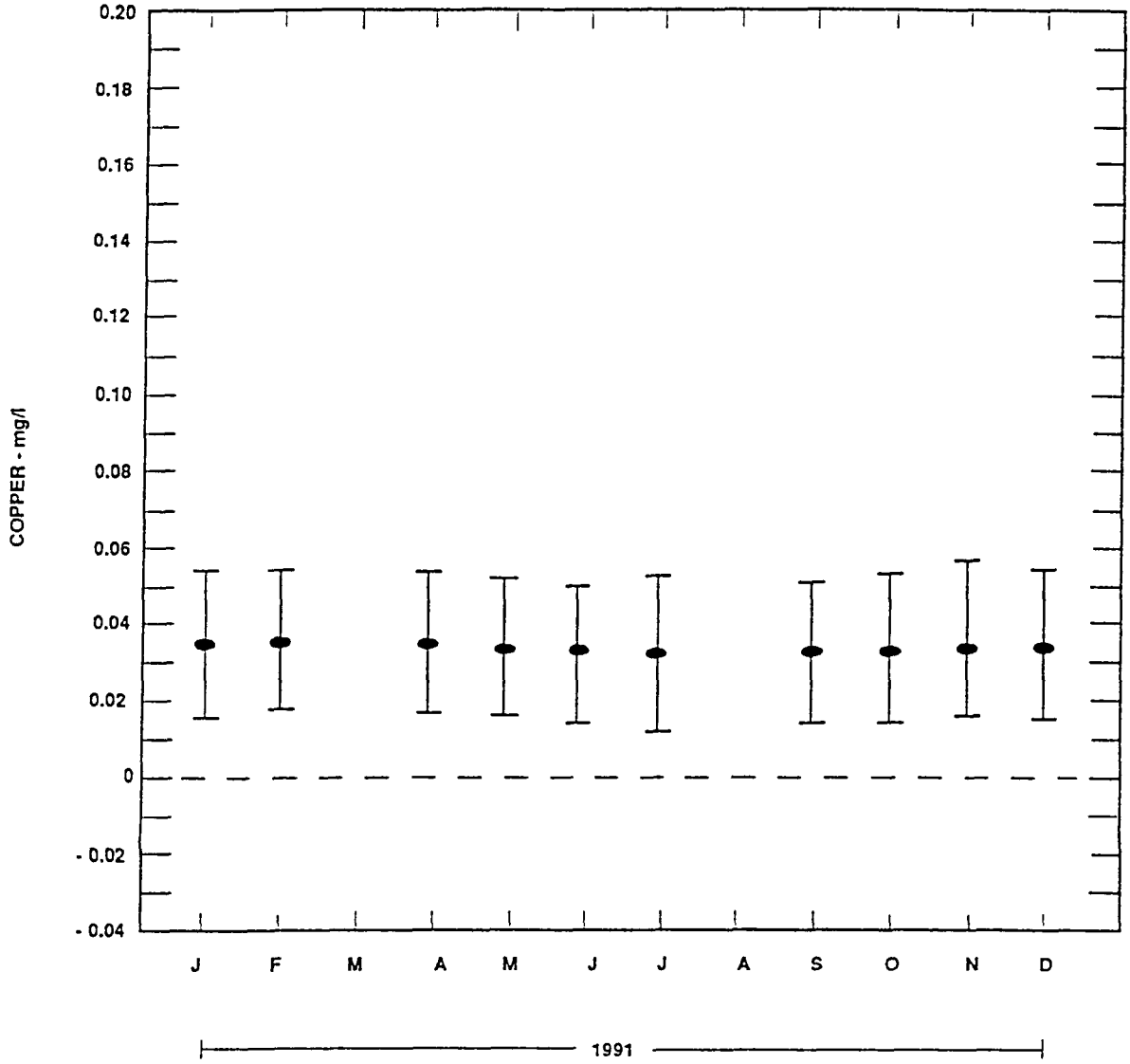


● = MEAN LC50
I = ±2SD

D. MAGNA

DATE	LC 50	STANDARD DEVIATION	AVERAGE	-2SD	+2SD
JAN 91	0.041	0.010	0.033	0.013	0.054
FEB 91	0.042	0.010	0.034	0.014	0.054
APR 91	0.030	0.010	0.034	0.014	0.053
MAY 91	0.030	0.009	0.033	0.015	0.052
JUNE 91	0.030	0.009	0.033	0.015	0.051
JULY 91	0.010	0.011	0.032	0.011	0.053
SEPT 91	0.017	0.011	0.031	0.009	0.052
OCT 91	0.044	0.011	0.031	0.010	0.053
NOV 91	0.048	0.011	0.033	0.010	0.055
DEC 91	0.042	0.011	0.033	0.010	0.055

DAPHNIA MAGNA ACUTE REFERENCE TOXICANT DATA, $CuSO_4$



● = MEAN LC50
I = +2SD

REPORT FOR ACUTE TOXICITY TEST RESULTS FOR MENASHA CORPORATION

Prepared for:

MENASHA CORPORATION
Otsego, Michigan

Prepared by:

ECKENFELDER INC.
227 French Landing Drive
Nashville, Tennessee 37228
(615) 255-2288

February 1992

5204

ECKENFELDER INC.

March 12, 1992 5204

Keith Kling
Menasha Corporation
Box 155
Otsego, MI 49078-0155

Dear Keith:

The report on the toxicity tests conducted on your effluent is attached. Acute, definitive tests on Outfall 000 were conducted using fathead minnows and Daphnia magna. The tests were acute 96-hour static, renewal using the fathead minnows and acute 48-hour non-renewal using D. magna. None of the tests resulted in significant mortality to the organisms.

If you have any questions, please contact me at (615) 255-2288.

Sincerely,

ECKENFELDER INC.

Richard J. Mirenda

Richard J. Mirenda, Ph.D.
Senior Manager
Aquatic Toxicology Laboratory/Consulting Services

Attachment

227 French Landing Drive
Nashville, Tennessee 37228
615.255.2288
FAX 615.256.8332

TABLE OF CONTENTS

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Letter of Transmittal	
Table of Contents	
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RESULTS	3

Appendices	Title
A	ECKENFELDER INC. Toxicity Test Report
B	Raw Data Sheets
C	Reference Toxicant Control Charts

INTRODUCTION

Municipal and industrial dischargers are required" as part of the National Pollutant Discharge Elimination System (NPDES), to measure the toxicity of their wastewater. The permit requirement may be for monitoring purposes only or may contain toxicity limits. The type of tests required vary from state to state and may depend on flow conditions or dilution by the receiving water. The most common tests required are acute tests which measure the short-term toxicity of the wastewater. The test duration may vary from 24-hour to 96 hour, depending on the organism tested and the state requirements. More recently, mini-chronic tests have been utilized to look at longer-term toxicity. These tests involve more subtle effects on the organism, e.g., growth and reproduction, and last seven days.

The organisms used in these tests have been limited to those that are easily cultured in the laboratory. This ensures that the quality and health of the organisms are consistent over time and does not affect the results of the test. Fish species most often used are the fathead minnow (Pimephales promelas) which is easily reared in the laboratory. The invertebrates used are the water fleas (Daphnia pulex, Daphnia magna and Ceriodaphnia sp.) which are freshwater crustaceans. The culturing methods for these organisms have been outlined by the U.S. Environmental Protection Agency and the American Society for Testing and Materials.

Menasha Corporation in Otsego, Michigan has been issued a NPDES permit which requires that toxicity tests be conducted on Outfall 000. The tests required are acute, definitive tests which exposed the fathead minnows and Daphnia magna to a serial dilution of the effluent for 96 hour and 48 hour, respectively.

METHODS

Test procedures adhered to those outlined in the U.S. Environmental Protection Agency Manual, "Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms", EPA 600/4-85/013.

A sample was received from Menasha Corporation on March 3, 1992. The permit stipulates that the fathead minnow test is a daily renewal which requires fresh samples each day. The temperature of the samples was adjusted to 20°C prior to the start of the test. Water chemistry data were measured and recorded on the appropriate data sheet (Appendix C). Parameters measured were pH, dissolved oxygen, temperature, conductivity, hardness and alkalinity. In addition, a final dissolved oxygen concentration and pH were measured on the test concentrations and control at the time of renewal and at the conclusion of the test.

The tests were started with 14 day old fathead minnows and <24-hour old Daphnia magna . The fathead test consisted of two replicates with ten fish in each test vessel. The D. magna test had four replicates with five organisms in each vessel. The effluent was tested at 6.25, 12.5, 25, 50 and 100 percent. The sample was diluted with Kalamazoo River water which is the receiving stream. A control of river water as well as laboratory reconstituted water made according to USEPA procedures were also tested. The test chambers were checked every 24-hour for mortality and the number dead recorded on the data sheet (Appendix B). The tests were terminated after 96-hours (fathead minnows) and 48-hour (D. magna) and were deemed acceptable if 90 percent of the control organisms survived.

QUALITY ASSURANCE

All of the organisms which were tested were obtained from cultures maintained by ECKENFELDER INC. The animal stocks were originally obtained from USEPA - Cincinnati and are cultured according to EPA recommended procedures (EPA 600/4-85/013 and EPA 600/4-85/014).

The control water used in the tests was reconstituted water made with glass distilled water to which is added appropriate amounts of KCl, $MgCl_2$, $NaHCO_3$ and $CaSO_4$. The pH, hardness and alkalinity of each batch of water is checked prior to use. Adjustments to these parameters are made if they fall outside the acceptable ranges. The water quality data for each batch of water is recorded in the Water Chemistry Log.

Reference toxicant tests are conducted every month on all of the organisms cultured in our laboratory. The tests are acute and the reference toxicant is cadmium chloride

which is obtained from USEPA. Data sheets and LC50 values are kept in laboratory notebooks. The control charts of the reference toxicant tests for the fathead minnow and Daphnia magna are provided in Appendix C.

RESULTS

There was no significant mortality observed in the test of Outfall 000 on the fathead minnows. The test resulted in 95-100 percent survival in all of the test concentrations. The river control and laboratory control also had 100 percent survival.

There was also no significant mortality observed in the test with Daphnia magna. The test of Outfall 000 resulted in 100 percent survival in 100 percent effluent as well as in the other test concentrations. The river control and the laboratory control had 100 percent survival.

APPENDIX A

ECKENFELDER INC. TOXICITY TEST REPORT

REPORT OF AQUATIC TOXICITY TEST RESULTS

I. GENERAL INFORMATION

A. Plant Information

Industry: Menasha Corporation

Permit No.:

Address: Paperboard Group
Box 155
Otsego, MI 49078-0155

Contact: Keith Kling

Phone Number: (615) 692-6141

Type of Plant: Paper

Plant Operating Schedule:

Receiving Stream: Kalamazoo River

B. Sample(s)

Source(s): Outfall 000

Collection Period: 3/1/92 - 3/5/92

Type of Collection: 24 hour composite

Collected by: Menasha personnel

	000
Alkalinity (mg/l as $CaCO_3$):	790
Conductivity (μmhos/cm):	1,543
Hardness (mg/l $CaCO_3$):	230
pH (standard units):	8.5

REPORT OF AQUATIC TOXICITY TEST RESULTS (Cont'd)

II. DATA FOR FATHEAD MINNOW TESTS

A. Test Type

X Renewal	___ 24 hr	X Static	X Acute
___ Nonrenewal	___ 48 hr	___ Flowthrough	___ Chronic
	X 96 hr		
	___ 7 day		

B. Test Organism

Common Name: Fathead Minnow Scientific Name: Pimephales promelas

Age: 14 days Source: ECKENFELDER INC. cultures

Observed Diseases: None

Treatment: None

Acclimation: Held in control water prior to testing

C. Test Method - Reference Material

Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms, EPA, Third edition, March 1985.

Other:

D. Dilution Water

Source: Kalamazoo River Collection Period: 3/2-3/5/92

Type Collection: Grab Pretreatment: None

Alkalinity (mg/l as $CaCO_3$): 235 Hardness (mg/l $CaCO_3$): 264

Conductivity (μmhos/cm): 532 pH (standard units): 8.1

REPORT OF AQUATIC TOXICITY TEST RESULTS (Cont'd)

E. Test Chambers

Composition: Glass

Depth: 195 mm

Size: 1.0 L

Test Volume per Chamber: 750 ml

F. Loading Technique

Organisms per concentration: 20

Replicates per concentration: 2

Organisms per replicate: 10

G. Testing Dates

Start: 3/3/92

Complete: 3/7/92

H. Summary Of Test Observations

1. Most sensitive index: no significant mortality observed

   LOEC:

   NOEC:

   ChV:

   LC50:

   95 percent confidence limits:

   Method:

REPORT OF AQUATIC TOXICITY TEST RESULTS (Cont'd)

2. Survival Rates (%)

Concentration	Survival Rate (%)
1. Lab Control	100
2. River Control	100
3. 6.25	100
4. 12.5	100
5. 25	100
6. 50	95
7. 100	95
8.	
9.	

3. Comments:

I. Attachment

_X_ Data Summary Sheets

___ Other:

By: Richard Muenda Date: 3/11/92

ECKENFELDER INC.
227 French Landing Drive
Nashville, TN 37228

(615) 255-2288

REPORT OF AQUATIC TOXICITY TEST RESULTS (Cont'd)

III. DATA FOR WATER FLEA TESTS

A. Test Type

__ Renewal	__ 24 hr	X Static	X Acute
X Nonrenewal	X 48 hr	__ Flowthrough	__ Chronic
	__ 96 hr		
	__ 7 day		

B. Test Organism

Common Name: Water Flea

Scientific Name: Daphnia magna

Age: <24 hr

Source: ECKENFELDER INC. cultures

Observed Diseases: None

Treatment: None

Acclimation: Held in control water prior to testing

C. Test Method - Reference Material

Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms, EPA, Third edition, March 1985.

Other:

D. Dilution Water

Source: Kalamazoo River

Collection Period: 3/2/92

Type Collection: Grab

Pretreatment: None

Alkalinity (mg/l as $CaCO_3$): 235

Hardness (mg/l $CaCO_3$): 264

Conductivity (μmhos/cm): 532

pH (standard units): 8.1

REPORT OF AQUATIC TOXICITY TEST RESULTS (Cont'd)

E. Test Chambers

Composition: Plastic

Depth: 75 mm

Size: 250 ml

Test Volume per Chamber: 50 ml

F. Loading Technique

Organisms per concentration: 20

Replicates per concentration: 4

Organisms per replicate: 5

G. Testing Dates

Start: 3/3/92

Complete: 3/5/92

H. Summary Of Test Observations

1. Most sensitive index: no significant mortality observed

   LOEC:

   NOEC:

   ChV:

   LC50:

   95 percent confidence limits:

   Method:

REPORT OF AQUATIC TOXICITY TEST RESULTS (Cont'd)

2. Survival Rates (%)

Concentration	Survival Rate (%)
1. Lab Control	100
2. River Control	100
3. 6.25	100
4. 12.5	100
5. 25	100
6. 50	100
7. 100	100
8.	
9.	

3. Comments:

I. Attachment

_X_ Data Summary Sheets

___ Other:

By: Richard Mercado Date: 3/1/92

ECKENFELDER INC.
227 French Landing Drive
Nashville, TN 37228

(615) 255-2288

APPENDIX B

RAW DATA SHEETS

APPENDIX C

REFERENCE TOXICANT CONTROL CHARTS

ACUTE TOXICITY DATA SHEET

CLIENT: Menasha PROJECT NO: _____ EFFLUENT: ✓ CHEMICAL (SPECIFY): _____

SAMPLE ID: _____ GRAB: _____ COMPOSITE: ✓ COLLECTED BY: A. Switzenburg

TEST STARTED: (Date/Time) 3/3/92 12:15 PM ENDED: (Date/Time) 3/7/92 1:30 PM TEST SPECIES: P. promelas AGE: 14d WEIGHT/LENGTH: _____

ORGANISMS PER CONCENTRATION: 20 DILUTION WATER: Kalamazoo River TEST CONDUCTED BY: SB/LS

STATIC: _____ STATIC RENEWAL: ✓ FLOW - THROUGH: _____ TOTAL VOLUME PER CHAMBER: 750 ml

CONC. OR % EFF.	REP	pH (standard unit) 0	24 (VF)	48 (VF)	72 (VF)	96 (VF)	DISSOLVED OXYGEN (mg/l) 0 (VF)	24 (VF)	48 (VF)	72 (VF)	96 (VF)	CONDUCTIVITY (umho/cm) SALINITY (mg/l) 0	24	48	72	96	TOTAL ALKALINITY (mg/l CaCO3) 0	24	48	72	96	TOTAL HARDNESS (mg/l CaCO3) 0	24	48	72	96	TEMPERATURE (°C) 0	24	48	72	96	CUMULATIVE MORTALITY 24	48	72	96
Control	A	8.3	8.3	8.3	8.4		7.9	7.9	7.3	7.5	7.5	567	572	576	564		115	115	120	115		170	162	178	166		21.2	21.4	21.1	21.6		0	0	0	0
	B																																0	0	0	0
River	A	8.0	8.2	8.3	8.3	8.1	9.5	9.3	9.4	9.2	7.6	534	536	532	529		250	238	210	215		264	264	262	264		21.5	21.4	22.6	24.8		0	0	0	0
Control	B																																0	0	0	0
6.25	A	8.0	8.1	8.0	8.2	8.1	8.8	7.3	8.9	8.8	6.9	592	591	592	599												21.5	21.4	22.0	21.1		0	0	0	0
	B																																0	0	0	0
12.5	A	8.1	8.2	8.1	8.5	8.1	8.7	7.3	6.9	7.9	5.3	646	647	661	656												21.4	21.4	22.0	24.1		0	0	0	0
	B																																0	0	0	0
25	A	8.1	8.1	8.1	8.1	8.1	8.4	9.1	8.7	7.4	4.7	769	779	781	800												21.2	21.3	22.0	21.0		0	0	0	0
	B																																0	0	0	0
50	A	8.2	8.1	8.2	8.0	8.2	7.3	7.8	8.1	6.9	4.0	1020	1015	1063	1052												21.0	21.3	22.0	21.0		1	1	1	1
	B																																0	0	0	0
100	A	8.2	8.2	8.3	8.3	8.3	6.1	4.0	3.3	3.3	3.2	1497	1524	1577	1586		780	775	785	825		220	230	220	240		20.7	20.7	21.0	21.0		0	1	1	1
	B																																0	0	0	0

96 HOUR LC - 50 = >100 % 95% CONFIDENCE LIMITS: _____ TO _____ METHOD OF CALCULATION: _____

COMMENTS: _____

MEN00698

ACUTE TOXICITY DATA SHEET

CLIENT: Menasha PROJECT NO: _____ EFFLUENT: ✓ CHEMICAL (SPECIFY): _____

SAMPLE ID: _____ GRAB: _____ COMPOSITE: ✓ COLLECTED BY: A. Switzenburg

TEST STARTED: (Date/Time) 3/3/92 12:30 PM ENDED: (Date/Time) 3/5/92 1:50 PM TEST SPECIES: D. magna AGE: <24 hr WEIGHT/LENGTH: _____

ORGANISMS PER CONCENTRATION: 20 DILUTION WATER: Kalamazoo River TEST CONDUCTED BY: SB/LS

STATIC: ✓ STATIC RENEWAL: _____ FLOW - THROUGH: _____ TOTAL VOLUME PER CHAMBER: 50 ml

CONC. OR % EFF.	REP	pH (standard unit) 0	24 (VF)	48 (VF)	72 (VF)	96 (VF)	DISSOLVED OXYGEN (mg/l) 0	24 (VF)	48 (VF)	72 (VF)	96 (VF)	CONDUCTIVITY (umho/cm) SALINITY (mg/l) 0	24	48	72	96	TOTAL ALKALINITY (mg/l CaCO3) 0	24	48	72	96	TOTAL HARDNESS (mg/l CaCO3) 0	24	48	72	96	TEMPERATURE (°C) 0	24	48	72	96	CUMULATIVE MORTALITY 24	48	72	96
Lab Control	A/B	8.3					7.9			8.1		567					115					170					21.2					0/0	0/0		
	C/D																															0/0	0/0		
River Control	A/B	8.0					9.5			8.1		534					250					264					21.5					0/0	0/0		
	C/D																															0/0	0/0		
6.25	A/B	8.0					8.8			7.8		592																21.5				0/0	0/0		
	C/D																															0/0	0/0		
12.5	A/B	8.1					8.7			7.0		616																21.4				0/0	0/0		
	C/D																															0/0	0/0		
25	A/B	8.1					8.4			7.4		764																21.2				0/0	0/0		
	C/D																															0/0	0/0		
50	A/B	8.4					7.3			5.8		1020																21.0				0/0	0/0		
	C/D																															0/0	0/0		
100	A/B	8.2					6.1			4.9		1497					780					220					20.9					0/0	0/0		
	C/D																															0/0	0/0		

48 HOUR LC - 50 = >100 % 95% CONFIDENCE LIMITS: _____ TO _____ METHOD OF CALCULATION: _____

COMMENTS: _____

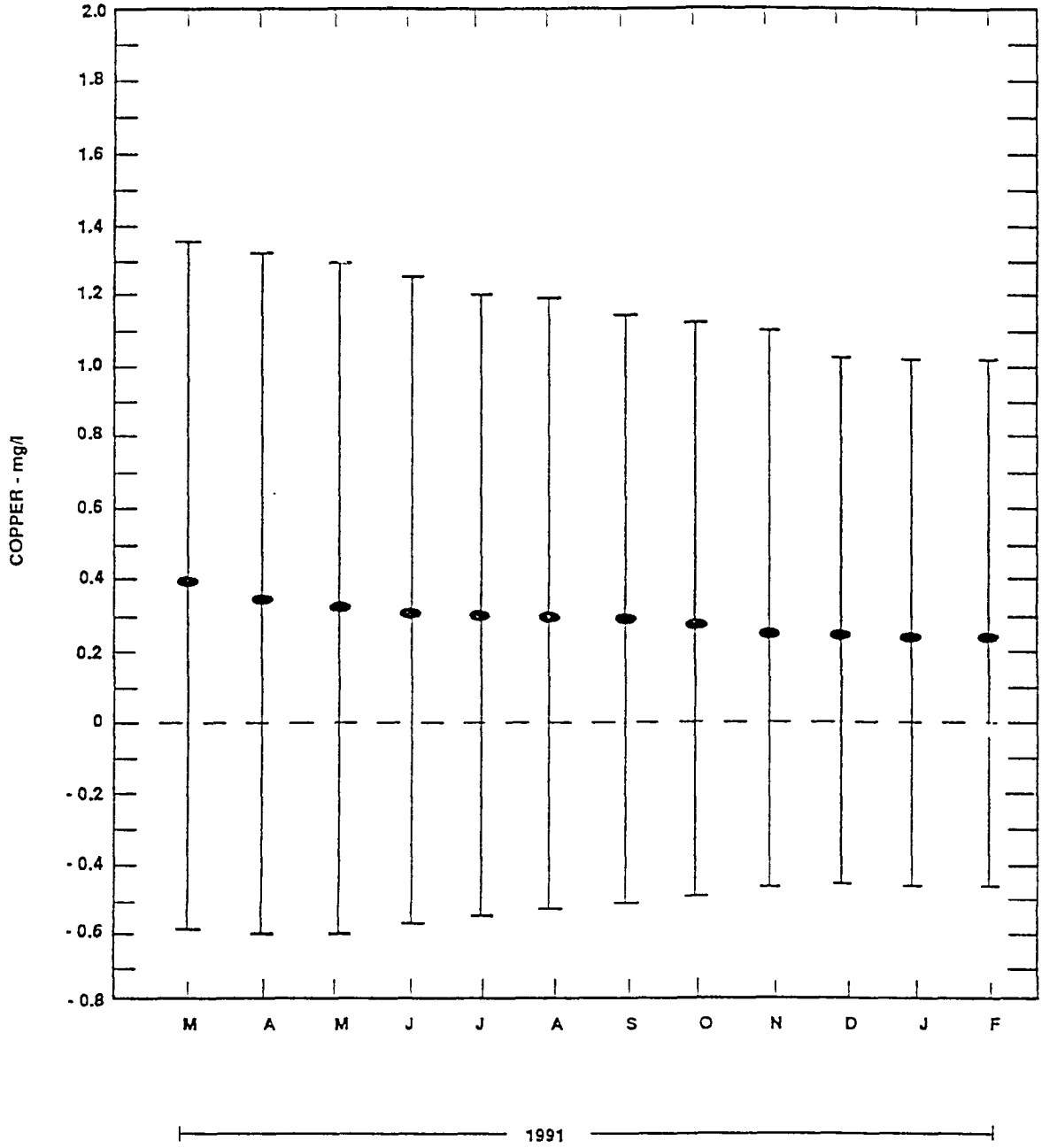
MEN00699

P. PROMELAS

DATE	LC 50	STANDARD DEVIATION	AVERAGE	-2SD	+2SD
MAR 91	0.231	0.500	0.406	-0.594	1.406
APR 91	0.050	0.489	0.379	-0.599	1.356
MAY 91	0.120	0.474	0.360	-0.589	1.309
JUNE 91	0.100	0.459	0.347	-0.571	1.266
JULY 91	0.340	0.444	0.347	-0.541	1.234
AUG 91	0.110	0.433	0.333	-0.534	1.200
SEPT 91	0.218	0.421	0.327	-0.516	1.169
OCT 91	0.124	0.412	0.316	-0.508	1.140
NOV 91	0.164	0.403	0.308	-0.497	1.114
DEC 91	0.244	0.393	0.305	-0.480	1.091
JAN 92	0.205	0.384	0.301	-0.467	1.068
FEB 92	0.130	0.377	0.293	-0.460	1.047

MEN00700

FATHEADS ACUTE REFERENCE TOXICANT DATA, COPPER SULFATE

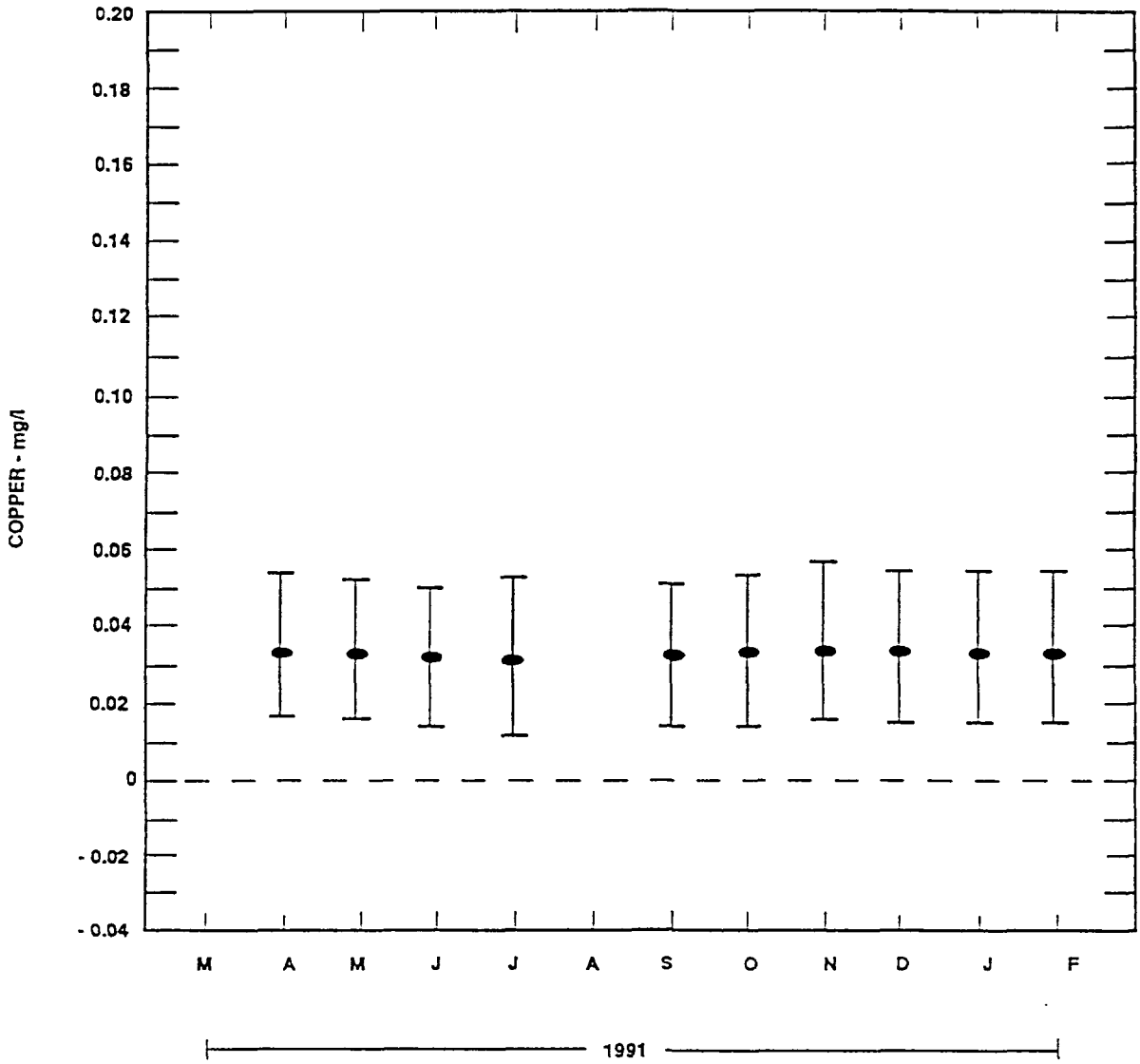


● = MEAN LC50
I = ±2SD

D. MAGNA

DATE	LC 50	STANDARD DEVIATION	AVERAGE	-2SD	+2SD
APR 91	0.030	0.010	0.034	0.014	0.053
MAY 91	0.030	0.009	0.033	0.015	0.052
JUNE 91	0.030	0.009	0.033	0.015	0.051
JULY 91	0.010	0.011	0.032	0.011	0.053
SEPT 91	0.017	0.011	0.031	0.009	0.052
OCT 91	0.044	0.011	0.031	0.010	0.053
NOV 91	0.048	0.011	0.033	0.010	0.055
DEC 91	0.042	0.011	0.033	0.010	0.055
JAN 92	0.028	0.011	0.033	0.011	0.055
FEB 92	0.038	0.011	0.033	0.011	0.054

DAPHNIA MAGNA ACUTE REFERENCE TOXICANT DATA, Cu SO_4



● = MEAN LC50
I = +2SD

REPORT FOR ACUTE TOXICITY TEST RESULTS FOR MENASHA CORPORATION

Prepared for:

MENASHA CORPORATION
Otsego, Michigan

Prepared by:

ECKENFELDER INC.
227 French Landing Drive
Nashville, Tennessee 37228
(615) 255-2288

March 1992

5204

March 11, 1992 5204

Keith Kling
Menasha Corporation
Box 155
Otsego, MI 49078-0155

Dear Keith:

The report on the toxicity tests conducted on your effluent is attached. Acute, definitive tests on Outfall 000 were conducted using fathead minnows and Daphnia magna. The tests were acute 96-hour static, renewal using the fathead minnows and acute 48-hour non-renewal using D. magna. None of the tests resulted in significant mortality to the organisms.

If you have any questions, please contact me at (615) 255-2288.

Sincerely,

ECKENFELDER INC.

Richard J. Mirenda

Richard J. Mirenda, Ph.D.
Senior Manager
Aquatic Toxicology Laboratory/Consulting Services

Attachment

TABLE OF CONTENTS

Title	Page No.
REPORT ORGANIZATION	
Letter of Transmittal	
Table of Contents	
INTRODUCTION	1
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QUALITY ASSURANCE	2
RESULTS	3

Appendices	Title
A	ECKENFELDER INC. Toxicity Test Report
B	Raw Data Sheets
C	Reference Toxicant Control Charts

INTRODUCTION

Municipal and industrial dischargers are required" as part of the National Pollutant Discharge Elimination System (NPDES), to measure the toxicity of their wastewater. The permit requirement may be for monitoring purposes only or may contain toxicity limits. The type of tests required vary from state to state and may depend on flow conditions or dilution by the receiving water. The most common tests required are acute tests which measure the short-term toxicity of the wastewater. The test duration may vary from 24-hour to 96 hour, depending on the organism tested and the state requirements. More recently, mini-chronic tests have been utilized to look at longer-term toxicity. These tests involve more subtle effects on the organism, e.g., growth and reproduction, and last seven days.

The organisms used in these tests have been limited to those that are easily cultured in the laboratory. This ensures that the quality and health of the organisms are consistent over time and does not affect the results of the test. Fish species most often used are the fathead minnow (Pimephales promelas) which is easily reared in the laboratory. The invertebrates used are the water fleas (Daphnia pulex, Daphnia magna and Ceriodaphnia sp.) which are freshwater crustaceans. The culturing methods for these organisms have been outlined by the U.S. Environmental Protection Agency and the American Society for Testing and Materials.

Menasha Corporation in Otsego, Michigan has been issued a NPDES permit which requires that toxicity tests be conducted on Outfall 000. The tests required are acute, definitive tests which exposed the fathead minnows and Daphnia magna to a serial dilution of the effluent for 96 hour and 48 hour, respectively.

METHODS

Test procedures adhered to those outlined in the U.S. Environmental Protection Agency Manual, "Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms", EPA 600/4-85/013.

A sample was received from Menasha Corporation on March 3, 1992. The permit stipulates that the fathead minnow test is a daily renewal which requires fresh samples each day. The temperature of the samples was adjusted to 20°C prior to the start of the test. Water chemistry data were measured and recorded on the appropriate data sheet (Appendix C). Parameters measured were pH, dissolved oxygen, temperature, conductivity, hardness and alkalinity. In addition, a final dissolved oxygen concentration and pH were measured on the test concentrations and control at the time of renewal and at the conclusion of the test.

The tests were started with 14 day old fathead minnows and <24-hour old Daphnia magna . The fathead test consisted of two replicates with ten fish in each test vessel. The D. magna test had four replicates with five organisms in each vessel. The effluent was tested at 6.25, 12.5, 25, 50 and 100 percent. The sample was diluted with Kalamazoo River water which is the receiving stream. A control of river water as well as laboratory reconstituted water made according to USEPA procedures were also tested. The test chambers were checked every 24-hour for mortality and the number dead recorded on the data sheet (Appendix B). The tests were terminated after 96-hours (fathead minnows) and 48-hour (D. magna) and were deemed acceptable if 90 percent of the control organisms survived.

QUALITY ASSURANCE

All of the organisms which were tested were obtained from cultures maintained by ECKENFELDER INC. The animal stocks were originally obtained from USEPA - Cincinnati and are cultured according to EPA recommended procedures (EPA 600/4-85/013 and EPA 600/4-85/014).

The control water used in the tests was reconstituted water made with glass distilled water to which is added appropriate amounts of KCl, $MgCl_2$, $NaHCO_3$ and $CaSO_4$. The pH, hardness and alkalinity of each batch of water is checked prior to use. Adjustments to these parameters are made if they fall outside the acceptable ranges. The water quality data for each batch of water is recorded in the Water Chemistry Log.

Reference toxicant tests are conducted every month on all of the organisms cultured in our laboratory. The tests are acute and the reference toxicant is cadmium chloride

which is obtained from USEPA. Data sheets and LC50 values are kept in laboratory notebooks. The control charts of the reference toxicant tests for the fathead minnow and Daphnia magna are provided in Appendix C.

RESULTS

There was no significant mortality observed in the test of Outfall 000 on the fathead minnows. The test resulted in 95-100 percent survival in all of the test concentrations. The river control and laboratory control also had 100 percent survival.

There was also no significant mortality observed in the test with Daphnia magna. The test of Outfall 000 resulted in 100 percent survival in 100 percent effluent as well as in the other test concentrations. The river control and the laboratory control had 100 percent survival.

APPENDIX A

ECKENFELDER INC. TOXICITY TEST REPORT

REPORT OF AQUATIC TOXICITY TEST RESULTS

I. GENERAL INFORMATION

A. Plant Information

Industry: Menasha Corporation

Permit No.:

Address: Paperboard Group
Box 155
Otsego, MI 49078-0155

Contact: Keith Kling

Phone Number: (615) 692-6141

Type of Plant: Paper

Plant Operating Schedule:

Receiving Stream: Kalamazoo River

B. Sample(s)

Source(s): Outfall 000

Collection Period: 3/1/92 - 3/5/92

Type of Collection: 24 hour composite

Collected by: Menasha personnel

	000
Alkalinity (mg/l as $CaCO_3$):	790
Conductivity (μmhos/cm):	1,543
Hardness (mg/l $CaCO_3$):	230
pH (standard units):	8.5

REPORT OF AQUATIC TOXICITY TEST RESULTS (Cont'd)

II. DATA FOR FATHEAD MINNOW TESTS

A. Test Type

X Renewal	___ 24 hr	X Static	X Acute
___ Nonrenewal	___ 48 hr	___ Flowthrough	___ Chronic
	X 96 hr		
	___ 7 day		

B. *Test Organism*

Common Name: Fathead Minnow Scientific Name: Pimephales promelas

Age: 14 days Source: ECKENFELDER INC. cultures

Observed Diseases: None

Treatment: None

Acclimation: Held in control water prior to testing

C. Test Method - Reference Material

Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms, EPA, Third edition, March 1985.

Other:

D. Dilution Water

Source: Kalamazoo River Collection Period: 3/2-3/5/92

Type Collection: Grab Pretreatment: None

Alkalinity (mg/l as $CaCO_3$): 235 Hardness (mg/l $CaCO_3$): 264

Conductivity (μmhos/cm): 532 pH (standard units): 8.1

REPORT OF AQUATIC TOXICITY TEST RESULTS (Cont'd)

E. Test Chambers

Composition: Glass

Depth: 195 mm

Size: 1.0 L

Test Volume per Chamber: 750 ml

F. Loading Technique

Organisms per concentration: 20

Replicates per concentration: 2

Organisms per replicate: 10

G. Testing Dates

Start: 3/3/92

Complete: 3/7/92

H. Summary Of Test Observations

1. Most sensitive index: no significant mortality observed

   LOEC:

   NOEC:

   ChV:

   LC50:

   95 percent confidence limits:

   Method:

REPORT OF AQUATIC TOXICITY TEST RESULTS (Cont'd)

2. Survival Rates (%)

Concentration	Survival Rate (%)
1. Lab Control	100
2. River Control	100
3. 6.25	100
4. 12.5	100
5. 25	100
6. 50	95
7. 100	95
8.	
9.	

3. Comments:

I. Attachment

_X_ Data Summary Sheets

___ Other:

By: Richard Munde Date: 3/11/92

ECKENFELDER INC.
227 French Landing Drive
Nashville, TN 37228

(615) 255-2288

REPORT OF AQUATIC TOXICITY TEST RESULTS (Cont'd)

III. DATA FOR WATER FLEA TESTS

A. Test Type

__ Renewal	__ 24 hr	_X_ Static	_X_ Acute
_X_ Nonrenewal	_X_ 48 hr	__ Flowthrough	__ Chronic
	__ 96 hr		
	__ 7 day		

B. Test Organism

Common Name: Water Flea

Scientific Name: Daphnia magna

Age: <24 hr

Source: ECKENFELDER INC. cultures

Observed Diseases: None

Treatment: None

Acclimation: Held in control water prior to testing

C. Test Method - Reference Material

Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms, EPA, Third edition, March 1985.

Other:

D. Dilution Water

Source: Kalamazoo River

Collection Period: 3/2/92

Type Collection: Grab

Pretreatment: None

Alkalinity (mg/l as $CaCO_3$): 235

Hardness (mg/l $CaCO_3$): 264

Conductivity (μmhos/cm): 532

pH (standard units): 8.1

REPORT OF AQUATIC TOXICITY TEST RESULTS (Cont'd)

E. Test Chambers

Composition: Plastic

Depth: 75 mm

Size: 250 ml

Test Volume per Chamber: 50 ml

F. Loading Technique

Organisms per concentration: 20

Replicates per concentration: 4

Organisms per replicate: 5

G. Testing Dates

Start: 3/3/92

Complete: 3/5/92

H. Summary Of Test Observations

1. Most sensitive index: no significant mortality observed

   LOEC:

   NOEC:

   ChV:

   LC50:

   95 percent confidence limits:

   Method:

REPORT OF AQUATIC TOXICITY TEST RESULTS (Cont'd)

2. Survival Rates (%)

Concentration	Survival Rate (%)
1. Lab Control	100
2. River Control	100
3. 6.25	100
4. 12.5	100
5. 25	100
6. 50	100
7. 100	100
8.	
9.	

3. Comments:

I. Attachment

_X_ Data Summary Sheets

___ Other:

By: Richard Menendez Date: 3/11/92

ECKENFELDER INC.
227 French Landing Drive
Nashville, TN 37228

(615) 255-2288

APPENDIX B

RAW DATA SHEETS

ACUTE TOX. DATA SHEET

CLIENT: Menasha PROJECT NO: EFFLUENT: ✓ CHEMICAL (SPECIFY):
SAMPLE ID: GRAB: COMPOSITE: ✓ COLLECTED BY: A. Switzenburg
TEST STARTED: (Date/Time) 3/3/92 12:15 PM ENDED: (Date/Time) 3/7/92 1:30 PM TEST SPECIES: P. promelas AGE: 14d WEIGHT/LENGTH:
ORGANISMS PER CONCENTRATION: 20 DILUTION WATER: Kalamazoo River TEST CONDUCTED BY: SB/LS
STATIC: STATIC RENEWAL: ✓ FLOW - THROUGH: TOTAL VOLUME PER CHAMBER: 750 ml

CONC. OR % EFF.	REP	pH (standard unit) 0	24	48	72	96	DISSOLVED OXYGEN (mg/l) 0	24	48	72	96	CONDUCTIVITY (umho/cm) SALINITY (mg/l) 0	24	48	72	96	TOTAL ALKALINITY (mg/l CaCO3) 0	24	48	72	96	TOTAL HARDNESS (mg/l CaCO3) 0	24	48	72	96	TEMPERATURE (°C) 0	24	48	72	96	CUMULATIVE MORTALITY 24	48	72	96
		(VF)	(VF)	(VF)	(VF)		(VF)	(VF)	(VF)	(VF)																											
Control	A	8.3	8.3	8.2	8.4	8.1	8.2	7.9	8.1	7.9	7.5	567	572	576	564		115	115	120	115		170	162	178	166		21.2	21.4	21.1	21.6		0	0	0	0
	B																																0	0	0	0
River	A	8.0	8.1	8.2	8.3	8.3	8.1	9.5	9.3	9.4	9.2	7.6	534	536	532	529		250	238	210	215		264	264	262	264		21.5	21.4	22.0	24.8		0	0	0	0
Control	B																																0	0	0	0
6.25	A	8.0	8.1	8.0	8.2	8.1	8.1	8.8	7.3	8.9	8.8	5.7	592	591	592	599												21.5	21.4	22.0	21.1		0	0	0	0
	B																																0	0	0	0
12.5	A	8.1	8.2	8.1	8.5	8.1	8.1	8.7	9.3	9.9	7.9	5.3	646	647	661	656												21.4	21.4	22.0	21.1		0	0	0	0
	B																																0	0	0	0
25	A	8.1	8.3	8.1	8.4	8.1	8.1	8.4	9.1	8.7	7.4	4.7	769	779	781	800												21.2	21.3	22.0	21.0		0	0	0	0
	B																																0	0	0	0
50	A	8.2	8.5	8.1	8.5	8.0	8.2	7.3	8.8	8.1	6.9	4.0	1020	1015	1063	1052												21.0	21.3	22.0	21.0		1	1	1	1
	B																																0	0	0	0
100	A	8.2	8.6	8.2	8.8	8.5	8.3	6.1	9.1	8.7	6.8	3.2	1497	1524	1577	1556		780	775	785	825		220	230	220	210		20.7	21.1	21.0	21.0		0	1	1	1
	B																																0	0	0	0

96 HOUR LC - 50 = >100 % 95% CONFIDENCE LIMITS: TO METHOD OF CALCULATION:

COMMENTS:

MEN00719

ACUTE TOXICITY DATA SHEET

CLIENT: Menasha PROJECT NO: _____ EFFLUENT: ✓ CHEMICAL (SPECIFY): _____

SAMPLE ID: _____ GRAB: _____ COMPOSITE: ✓ COLLECTED BY: A. Switzenburg

TEST STARTED: (Date/Time) 3/3/92 12:30 PM ENDED: (Date/Time) 3/5/92 1:50 PM TEST SPECIES: D. magna AGE: <24 hr WEIGHT/LENGTH: _____

ORGANISMS PER CONCENTRATION: 20 DILUTION WATER: Kalamazoo River TEST CONDUCTED BY: SB/LS

STATIC: ✓ STATIC RENEWAL: _____ FLOW - THROUGH: _____ TOTAL VOLUME PER CHAMBER: 50 ml

CONC. OR % EFF.	REP	pH (standard unit) 0	24 (VF)	48 (VF)	72 (VF)	96 (VF)	DISSOLVED OXYGEN (mg/l) 0 (VF)	24 (VF)	48 (VF)	72 (VF)	96 (VF)	CONDUCTIVITY (umho/cm) SALINITY (mg/l) 0	24	48	72	96	TOTAL ALKALINITY (mg/l CaCO3) 0	24	48	72	96	TOTAL HARDNESS (mg/l CaCO3) 0	24	48	72	96	TEMPERATURE (°C) 0	24	48	72	96	CUMULATIVE MORTALITY 24	48	72	96
Lab	A/B	8.3					7.9		8.1			567					1115					1170					22					0/0	0/0		
Control	C/D																															0/0	0/0		
Rivers	A/B	8.0					7.5		8.1			534					1250					1264					21.5					0/0	0/0		
Control	C/D																															0/0	0/0		
6.25	A/B	8.0					8.8		7.8			592															21.5					0/0	0/0		
	C/D																															0/0	0/0		
12.5	A/B	8.1					8.7		7.8			616															21.4					0/0	0/0		
	C/D																															0/0	0/0		
25	A/B	8.1					8.4		7.4			764															21.2					0/0	0/0		
	C/D																															0/0	0/0		
50	A/B	8.24					7.3		5.8			1020															21.6					0/0	0/0		
	C/D																															0/0	0/0		
100	A/B	8.21					6.1		4.9			1497					1780					1220					20.9					0/0	0/0		
	C/D																															0/0	0/0		

48 HOUR LC - 50 = >100 % 95% CONFIDENCE LIMITS: _____ TO _____ METHOD OF CALCULATION: _____

COMMENTS: _____

NE - REPRESENTS INDIVIDUAL

MEN00720

P. PROMELAS

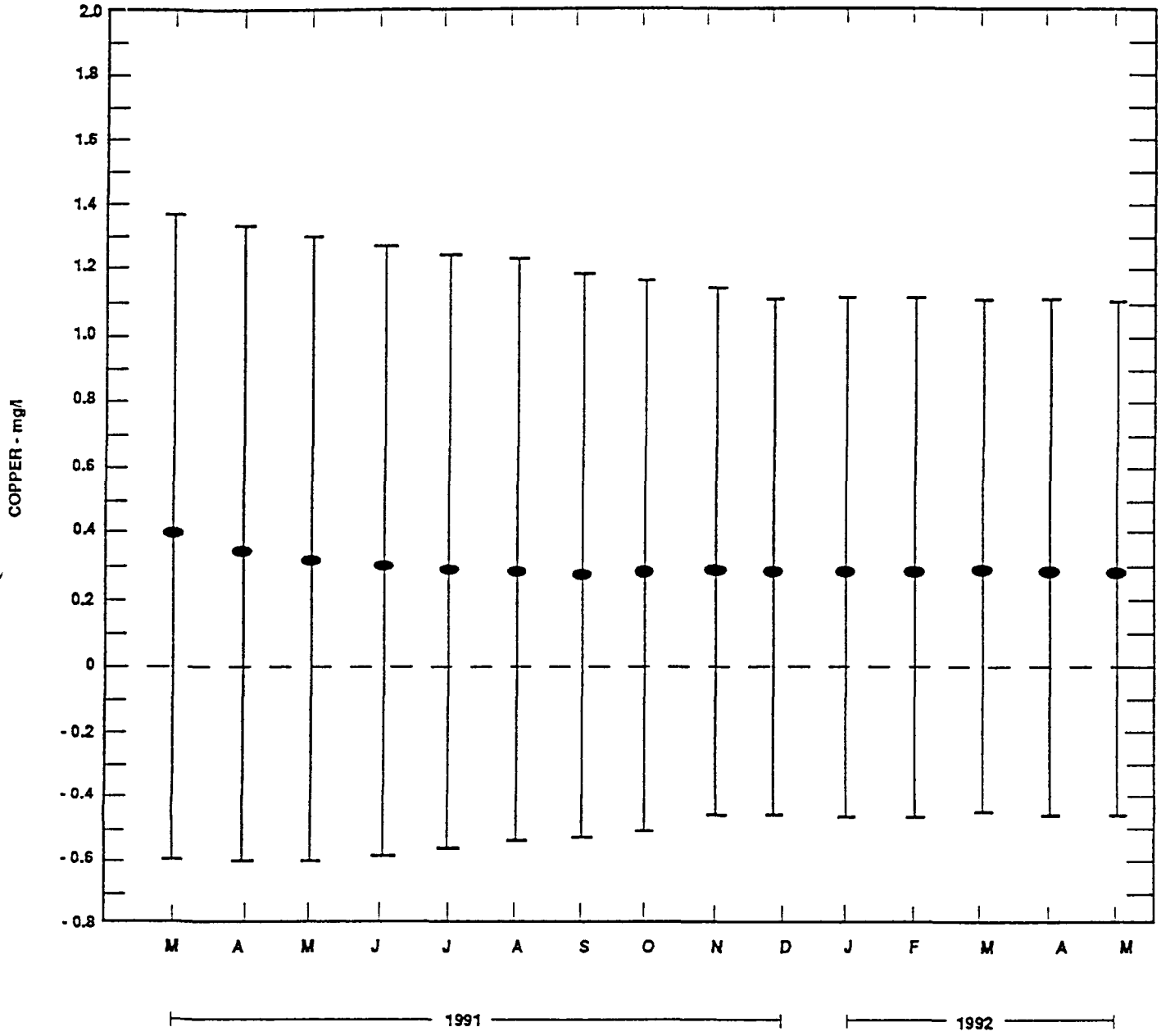
DATE	LC 50	STANDARD DEVIATION	AVERAGE	-2SD	+2SD
MAR 91	0.231	0.500	0.406	-0.594	1.406
APR 91	0.050	0.489	0.379	-0.599	1.356
MAY 91	0.120	0.474	0.360	-0.589	1.309
JUNE 91	0.100	0.459	0.347	-0.571	1.266
JULY 91	0.340	0.444	0.347	-0.541	1.234
AUG 91	0.110	0.433	0.333	-0.534	1.200
SEPT 91	0.218	0.421	0.327	-0.516	1.169
OCT 91	0.124	0.412	0.316	-0.508	1.140
NOV 91	0.164	0.403	0.308	-0.497	1.114
DEC 91	0.244	0.393	0.305	-0.480	1.091
JAN 92	0.205	0.384	0.301	-0.467	1.068
FEB 92	0.130	0.377	0.293	-0.460	1.047
MAR 92	0.150	0.370	0.287	-0.452	1.026
APR 92	0.140	0.366	0.276	-0.455	1.008
MAY 92	0.067	0.361	0.268	-0.453	0.990

MEN00721

APPENDIX C

REFERENCE TOXICANT CONTROL CHARTS

FATHEADS ACUTE REFERENCE TOXICANT DATA, COPPER SULFATE



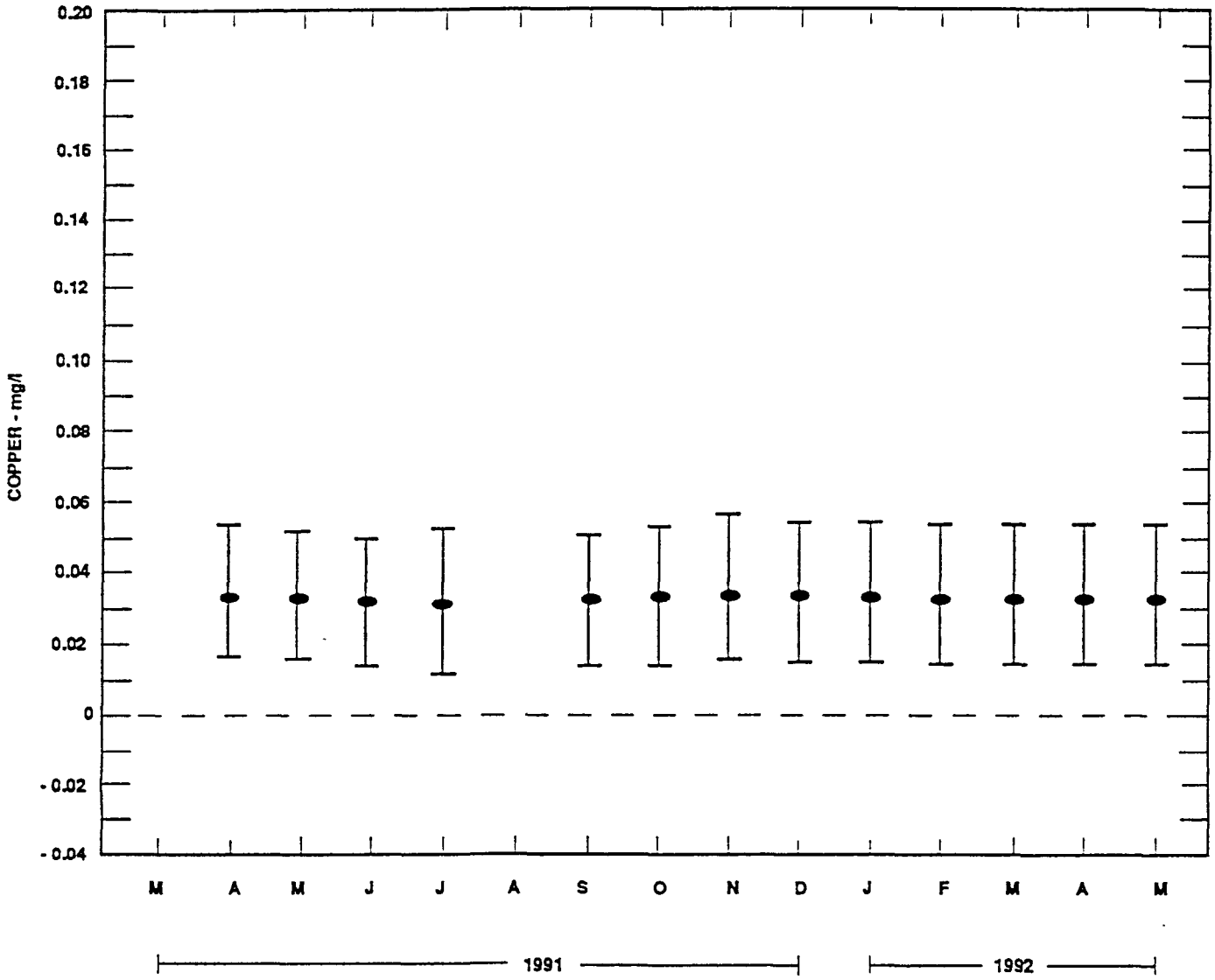
● = MEAN LC50
I = ±2SD

D. MAGNA

DATE	LC 50	STANDARD DEVIATION	AVERAGE	-2SD	+2SD
APR 91	0.030	0.010	0.034	0.014	0.053
MAY 91	0.030	0.009	0.033	0.015	0.052
JUNE 91	0.030	0.009	0.033	0.015	0.051
JULY 91	0.010	0.011	0.032	0.011	0.053
SEPT 91	0.017	0.011	0.031	0.009	0.052
OCT 91	0.044	0.011	0.031	0.010	0.053
NOV 91	0.048	0.011	0.033	0.010	0.055
DEC 91	0.042	0.011	0.033	0.010	0.055
JAN 92	0.028	0.011	0.033	0.011	0.055
FEB 92	0.038	0.011	0.033	0.011	0.054
MAR 92	0.044	0.011	0.033	0.012	0.055
APR 92	0.048	0.011	0.034	0.012	0.056
MAY 92	0.059	0.012	0.035	0.011	0.059

MEN00724

DAPHNIA MAGNA ACUTE REFERENCE TOXICANT DATA, Cu SO_4



● = MEAN LC50
I = +2SD

REPORT FOR ACUTE TOXICITY TEST RESULTS FOR MENASHA CORPORATION

Prepared for:

MENASHA CORPORATION
Otsego, Michigan

Prepared by:

ECKENFELDER INC.
227 French Landing Drive
Nashville, Tennessee 37228
(615) 255-2288

June 1992

5204

ECKENFELDER INC

June 2, 1992 5204

Keith Kling
Menasha Corporation
Box 155
Otsego, MI 49078-0155

Dear Keith:

The report on the toxicity tests conducted on your effluent is attached. Acute, definitive tests on Outfall 001 were conducted using fathead minnows and Daphnia magna. The tests were acute 96-hour static, renewal using the fathead minnnows and acute 48-hour non-renewal using D. magna. None of the tests resulted in no significant mortality to the organisms.

If you have any questions, please contact me at (615) 255-2288.

Sincerely,

ECKENFELDER INC.

Richard J. Mirenda

Richard J. Mirenda, Ph.D.
Senior Manager
Aquatic Toxicology Laboratory/Consulting Services

Attachment

Q:\5204\JUN92\02R.204

[illegible] Harding Drive
Nashville, Tennessee 37228
615 255 2288
FAX 615 256 8332

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INTRODUCTION

Municipal and industrial dischargers are required" as part of the National Pollutant Discharge Elimination System (NPDES), to measure the toxicity of their wastewater. The permit requirement may be for monitoring purposes only or may contain toxicity limits. The type of tests required vary from state to state and may depend on flow conditions or dilution by the receiving water. The most common tests required are acute tests which measure the short-term toxicity of the wastewater. The test duration may vary from 24-hour to 96 hour, depending on the organism tested and the state requirements. More recently, mini-chronic tests have been utilized to look at longer-term toxicity. These tests involve more subtle effects on the organism, e.g., growth and reproduction, and last seven days.

The organisms used in these tests have been limited to those that are easily cultured in the laboratory. This ensures that the quality and health of the organisms are consistent over time and does not affect the results of the test. Fish species most often used are the fathead minnow (Pimephales promelas) which is easily reared in the laboratory. The invertebrates used are the water fleas (Daphnia pulex, Daphnia magna and Ceriodaphnia sp.) which are freshwater crustaceans. The culturing methods for these organisms have been outlined by the U.S. Environmental Protection Agency and the American Society for Testing and Materials.

Menasha Corporation in Otsego, Michigan has been issued a NPDES permit which requires that toxicity tests be conducted on Outfall 000. The tests required are acute, definitive tests which expose the fathead minnows and Daphnia magna to a serial dilution of the effluent for 96 hours and 48 hours, respectively.

METHODS

Test procedures adhered to those outlined in the U.S. Environmental Protection Agency Manual, "Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms", EPA 600/4-90/027.

A sample was received from Menasha Corporation on May 20, 1992. The permit stipulates that the fathead minnow test is a daily renewal which requires fresh samples each day. The temperature of the samples was adjusted to 20°C prior to the start of the test. Water chemistry data were measured and recorded on the appropriate data sheet (Appendix C). Parameters measured were pH, dissolved oxygen, temperature, conductivity, hardness and alkalinity. In addition, a final dissolved oxygen concentration and pH were measured on the test concentrations and control at the time of renewal and at the conclusion of the test.

The tests were started with 14 day old fathead minnows and <24-hour old Daphnia magna. The fathead test consisted of two replicates with ten fish in each test vessel. The D. magna test had four replicates with five organisms in each vessel. The effluents was tested at 6.25, 12.5, 25, 50 and 100 percent. The sample was diluted with Kalamazoo River water which is the receiving stream. A control of river water as well as laboratory reconstituted water made according to USEPA procedures were also tested. The test chambers were checked every 24-hour for mortality and the number dead recorded on the data sheet (Appendix B). The tests were terminated after 96-hours (fathead minnows) and 48-hour (D. magna) and were deemed acceptable if 90 percent of the control organisms survived.

QUALITY ASSURANCE

All of the organisms which were tested were obtained from cultures maintained by ECKENFELDER INC. The animal stocks were originally obtained from USEPA - Cincinnati and are cultured according to EPA recommended procedures (EPA 600/4-85/013 and EPA 600/4-85/014).

The control water used in the tests was reconstituted water made with glass distilled water to which is added appropriate amounts of KCl, $MgCl_2$, $NaHCO_3$ and $CaSO_4$. The pH, hardness and alkalinity of each batch of water is checked prior to use. Adjustments to these parameters are made if they fall outside the acceptable ranges. The water quality data for each batch of water is recorded in the Water Chemistry Log.

Reference toxicant tests are conducted every month on all of the organisms cultured in our laboratory. The tests are acute and the reference toxicant is copper sulfate

which is obtained from USEPA. Data sheets and LC50 values are kept in laboratory notebooks. The control charts of the reference toxicant tests for the fathead minnow and D. magna are provided in Appendix C.

RESULTS

There was no significant mortality observed in the test of Outfall 000 with the fathead minnows. The test resulted in 95 to 100 percent survival in the effluent concentrations. The river control and laboratory control had 100 percent survival. There was also no significant mortality observed in the test with D. magna. The test of Outfall 000 resulted in 100 percent survival in the test concentrations and the controls.

APPENDIX A

ECKENFELDER INC. TOXICITY TEST REPORT

REPORT OF AQUATIC TOXICITY TEST RESULTS

I. GENERAL INFORMATION

A. Plant Information

Industry: Menasha Corporation

Permit No.:

Address: Paperboard Group
Box 155
Otsego, MI 49078-0155

Contact: Keith Kling

Phone Number: (615) 692-6141

Type of Plant: Paper

Plant Operating Schedule:

Receiving Stream: Kalamazoo River

B. Sample(s)

Source(s): Outfall 000

Collection Period: 5/18 to 5/19/92

Type of Collection: Grab

Collected by: Menasha personnel

Alkalinity (mg/l as $CaCO_3$): 805

Conductivity (μmhos/cm): 1,652

Hardness (mg/l $CaCO_3$): 80

pH (standard units): 8.8

REPORT OF AQUATIC TOXICITY TEST RESULTS (Cont'd)

II. DATA FOR FATHEAD MINNOW TESTS

A. Test Type

X Renewal	___ 24 hr	X Static	X Acute
___ Nonrenewal	___ 48 hr	___ Flowthrough	___ Chronic
	X 96 hr		
	___ 7 day		

B. Test Organism

Common Name: Fathead Minnow Scientific Name: Pimephales promelas

Age: 14 days Source: ECKENFELDER INC. cultures

Observed Diseases: None

Treatment: None

Acclimation: Held in control water prior to testing

C. Test Method - Reference Material

Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms, EPA, Fourth edition, September 1991.

Other:

D. Dilution Water

Source: Kalamazoo River Collection Period: Daily

Type Collection: Grab Pretreatment: None

Alkalinity (mg/l as $CaCO_3$): 205 Hardness (mg/l $CaCO_3$): 278

Conductivity (μmhos/cm): 590 pH (standard units): 8.1

REPORT OF AQUATIC TOXICITY TEST RESULTS (Cont'd)

E. Test Chambers

Composition: Glass

Depth: 195 mm

Size: 1.0 L

Test Volume per Chamber: 750 mL

F. Loading Technique

Organisms per concentration: 20

Replicates per concentration: 2

Organisms per replicate: 10

G. Testing Dates

Start: 5/20/92

Complete: 5/24/92

H. Summary Of Test Observations

1. Most sensitive index: no significant mortality observed

   LOEC:

   NOEC:

   ChV:

   LC50: 100%

   95 percent confidence limits:

   Method:

REPORT OF AQUATIC TOXICITY TEST RESULTS (Cont'd)

2. Survival Rates (%)

Concentration	Survival Rate (%)
1. Lab Control	100
2. River Control	100
3. 6.25	100
4. 12.5	100
5. 25	100
6. 50	95
7. 100	95
8.	
9.	

3. Comments:

I. Attachment

_X_ Data Summary Sheets

___ Other:

By: Richard Muenda Date: 5/29/92

ECKENFELDER INC.
227 French Landing Drive
Nashville, TN 37228

(615) 255-2288

REPORT OF AQUATIC TOXICITY TEST RESULTS (Cont'd)

III. DATA FOR WATER FLEA TESTS

A. Test Type

___ Renewal	___ 24 hr	X Static	X Acute
X Nonrenewal	X 48 hr	___ Flowthrough	___ Chronic
	___ 96 hr		
	___ 7 day		

B. Test Organism

Common Name: Water Flea

Scientific Name: Daphnia magna

Age: <24 hours

Source: ECKENFELDER INC. cultures

Observed Diseases: None

Treatment: None

Acclimation: Held in control water prior to testing

C. Test Method - Reference Material

Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms, EPA, Fourth edition, September 1991.

Other:

D. Dilution Water

Source: Kalamazoo River

Collection Period: 5/20/92

Type Collection: Grab

Pretreatment: None

Alkalinity (mg/l as $CaCO_3$): 190

Hardness (mg/l $CaCO_3$): 270

Conductivity (μmhos/cm): 579

pH (standard units): 8.0

REPORT OF AQUATIC TOXICITY TEST RESULTS (Cont'd)

E. Test Chambers

Composition: Plastic

Depth: 75 mm

Size: 250 mL

Test Volume per Chamber: 50 mL

F. Loading Technique

Organisms per concentration: 20

Replicates per concentration: 4

Organisms per replicate: 5

G. Testing Dates

Start: 5/20/92

Complete: 5/22/92

H. Summary Of Test Observations

1. Most sensitive index: no significant mortality observed

   LOEC:

   NOEC:

   ChV:

   LC50: >100%

   95 percent confidence limits:

   Method:

REPORT OF AQUATIC TOXICITY TEST RESULTS (Cont'd)

2. Survival Rates (%)

Concentration	Survival Rate (%)
1. Lab Control	100
2. River Control	100
3. 6.25	100
4. 12.5	100
5. 25	100
6. 50	100
7. 100	100
8.	
9.	

3. Comments:

I. Attachment

_X_ Data Summary Sheets

___ Other:

By: Richard Muenda Date: 5/29/92

ECKENFELDER INC.
227 French Landing Drive
Nashville, TN 37228

(615) 255-2288

APPENDIX B

RAW DATA SHEETS

ACUTE TOXICITY DATA SHEET

CLIENT: Menasha PROJECT NO: _____ EFFLUENT: ✓ CHEMICAL (SPECIFY): _____

SAMPLE ID: _____ GRAB: _____ COMPOSITE: ✓ COLLECTED BY: _____

TEST STARTED: (Date/Time) 5/20/92 12:00 Am ENDED: (Date/Time) 5/24/92 10:00 Am TEST SPECIES: Pimephales promelas AGE: 14 days WEIGHT/LENGTH: _____

ORGANISMS PER CONCENTRATION: 20 (2x10) DILUTION WATER: moderately hard Ctr TEST CONDUCTED BY: JE / SG

STATIC: _____ STATIC RENEWAL: ✓ FLOW - THROUGH: River Dilution TOTAL VOLUME PER CHAMBER: 750ml

CONC. OR % EFF.	REP	pH (standard unit) 0	24 (VF)	48 (VF)	72 (VF)	96 (VF)	DISSOLVED OXYGEN (mg/l) 0	24 (VF)	48 (VF)	72 (VF)	96 (VF)	CONDUCTIVITY (umho/cm) SALINITY (mg/l) 0	24	48	72	96	TOTAL ALKALINITY (mg/l CaCO3) 0	24	48	72	96	TOTAL HARDNESS (mg/l CaCO3) 0	24	48	72	96	TEMPERATURE (°C) 0	24	48	72	96	CUMULATIVE MORTALITY 24	48	72	96
Control	A	7.91	8.28	7.97	7.99		7.8	7.6	7.7			337	336	336	338		160	160	165	160		192	190	190	192		21.6	21.0	22.0	21.9		0	0	0	0
	B																																0	0	0	0
River	A	7.96	8.27	8.24	8.20		8.1	8.0	8.0	7.8		579	583	606	587		190	205	220	210		270	270	274	274		21.6	21.2	20.5	22.0		0	0	0	0
	B																																0	0	0	0
6.25%	A	8.27	8.33	8.31	8.31		8.1	8.0	7.7	7.8		640	645	662	653												21.3	21.2	21.9	22.2		0	0	0	0
	B																																0	0	0	0
12.5%	A	8.35	8.42	8.45	8.45		8.1	7.8	7.7	7.8		718	710	724	717												21.1	21.0	21.8	22.3		0	0	0	0
	B																																0	0	0	0
25%	A	8.51	8.43	8.57	8.59		8.1	7.8	7.7	7.8		830	841	853	855												21.0	20.9	21.8	22.3		0	0	0	0
	B																																0	0	0	0
50%	A	8.65	8.511	8.73	8.71		8.1	7.7	7.6	7.7		1071	1103	1106	1123												21.8	20.6	21.5	22.3		0	0	0	0
	B																																			
100%	A	8.81	8.67	8.90	8.87		8.31	7.51	7.6	7.8		1652	1641	1636	1666		805	795	800	805		180	194	164	164		20.3	20.1	21.3	22.4		0	1	1	1
	B																																0	0	0	0

HOUR LC - 50 = _____ 95% CONFIDENCE LIMITS: _____ TO _____ METHOD OF CALCULATION: _____

COMMENTS: 5/21 D.O. was 0.3 upon arrival. After aerating for 2.5 hours the D.O. was 8.3.

5/22 D.O. was 0.3 upon arrival. After [illegible]

MEN00741

ACUTE TOXICITY DATA SHEET

CLIENT: Menasha PROJECT NO: _____ EFFLUENT: ✓ CHEMICAL (SPECIFY): _____

SAMPLE ID: _____ GRAB: _____ COMPOSITE: ✓ COLLECTED BY: _____

TEST STARTED: (Date/Time) 5/20/92 11:00 p.m. ENDED: (Date/Time) 5/22/92 10:20 am TEST SPECIES: Daphnia magna AGE: <24hr WEIGHT/LENGTH: _____

ORGANISMS PER CONCENTRATION: 20 (4x5) DILUTION WATER: River water / Hard water control TEST CONDUCTED BY: SE / TS

STATIC: ✓ STATIC RENEWAL: _____ FLOW - THROUGH: _____ TOTAL VOLUME PER CHAMBER: 50 ml

CONC. OR % EFF.	REP	pH (standard unit) 0	24 (VF)	48 (VF)	72 (VF)	96 (VF)	DISSOLVED OXYGEN (mg/l) 0 (VF)	24 (VF)	48 (VF)	72 (VF)	96 (VF)	CONDUCTIVITY (umho/cm) SALINITY (mg/l) 0	24	48	72	96	TOTAL ALKALINITY (mg/l CaCO3) 0	24	48	72	96	TOTAL HARDNESS (mg/l CaCO3) 0	24	48	72	96	TEMPERATURE (°C) 0	24	48	72	96	CUMULATIVE MORTALITY 24	48	72	96
Control	A																																0/0	0/0		
	B	8.25					7.6		8.3			587					110					170					21.3									
	C																																0/0	0/0		
	D																																0/0	0/0		
River	A																																0/0	0/0		
	B	7.96					8.1		8.2			579					190					170					21.6									
	C																																0/0	0/0		
	D																																0/0	0/0		
6.25%	A																																0/0	1/0		
	B	8.27					8.1		8.1			640																								
	C																																0/0	0/0		
	D																																0/0	0/0		
12.5%	A																																0/0	0/0		
	B	8.35					8.1		8.11			703																								
	C																																0/0	0/0		
	D																																0/0	0/0		
25%	A																																0/0	0/0		
	B	8.51					8.1		7.8			830																								
	C																																0/0	0/0		
	D																																0/0	0/0		
50%	A																																0/0	0/0		
	B	8.65					8.1		7.4			1071																								
	C																																0/0	0/0		
	D																																0/0	0/0		
100%	A																																0/0	0/0		
	B	8.81					8.3		5.9			1159					805					180					20.31									
	C																																0/0	0/0		
	D																																0/0	0/0		

HOUR LC - 50 = _____ 95% CONFIDENCE LIMITS: _____ TO _____ METHOD OF CALCULATION: _____

COMMENTS: 5/21 D.O. was 0.3 upon arrival. After aerating for 2.5 hours the D.O. was 8.3.

MEN00742

APPENDIX C

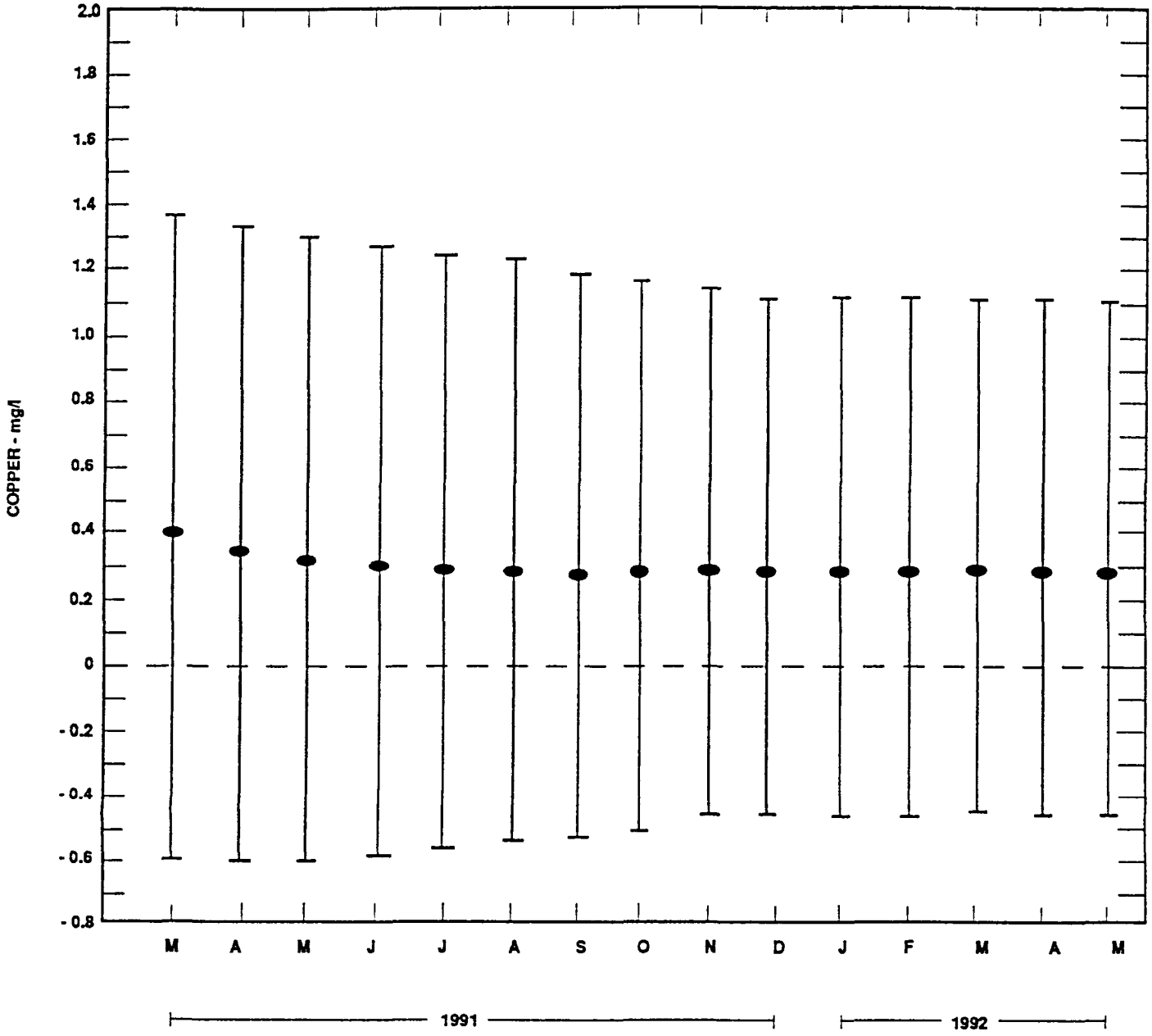
REFERENCE TOXICANT CONTROL CHARTS

P. PROMELAS

DATE	LC 50	STANDARD DEVIATION	AVERAGE	-2SD	+2SD
MAR 91	0.231	0.500	0.406	-0.594	1.406
APR 91	0.050	0.489	0.379	-0.599	1.356
MAY 91	0.120	0.474	0.360	-0.589	1.309
JUNE 91	0.100	0.459	0.347	-0.571	1.266
JULY 91	0.340	0.444	0.347	-0.541	1.234
AUG 91	0.110	0.433	0.333	-0.534	1.200
SEPT 91	0.218	0.421	0.327	-0.516	1.169
OCT 91	0.124	0.412	0.316	-0.508	1.140
NOV 91	0.164	0.403	0.308	-0.497	1.114
DEC 91	0.244	0.393	0.305	-0.480	1.091
JAN 92	0.205	0.384	0.301	-0.467	1.068
FEB 92	0.130	0.377	0.293	-0.460	1.047
MAR 92	0.150	0.370	0.287	-0.452	1.026
APR 92	0.140	0.366	0.276	-0.455	1.008
MAY 92	0.067	0.361	0.268	-0.453	0.990

MEN00744

FATHEADS ACUTE REFERENCE TOXICANT DATA, COPPER SULFATE



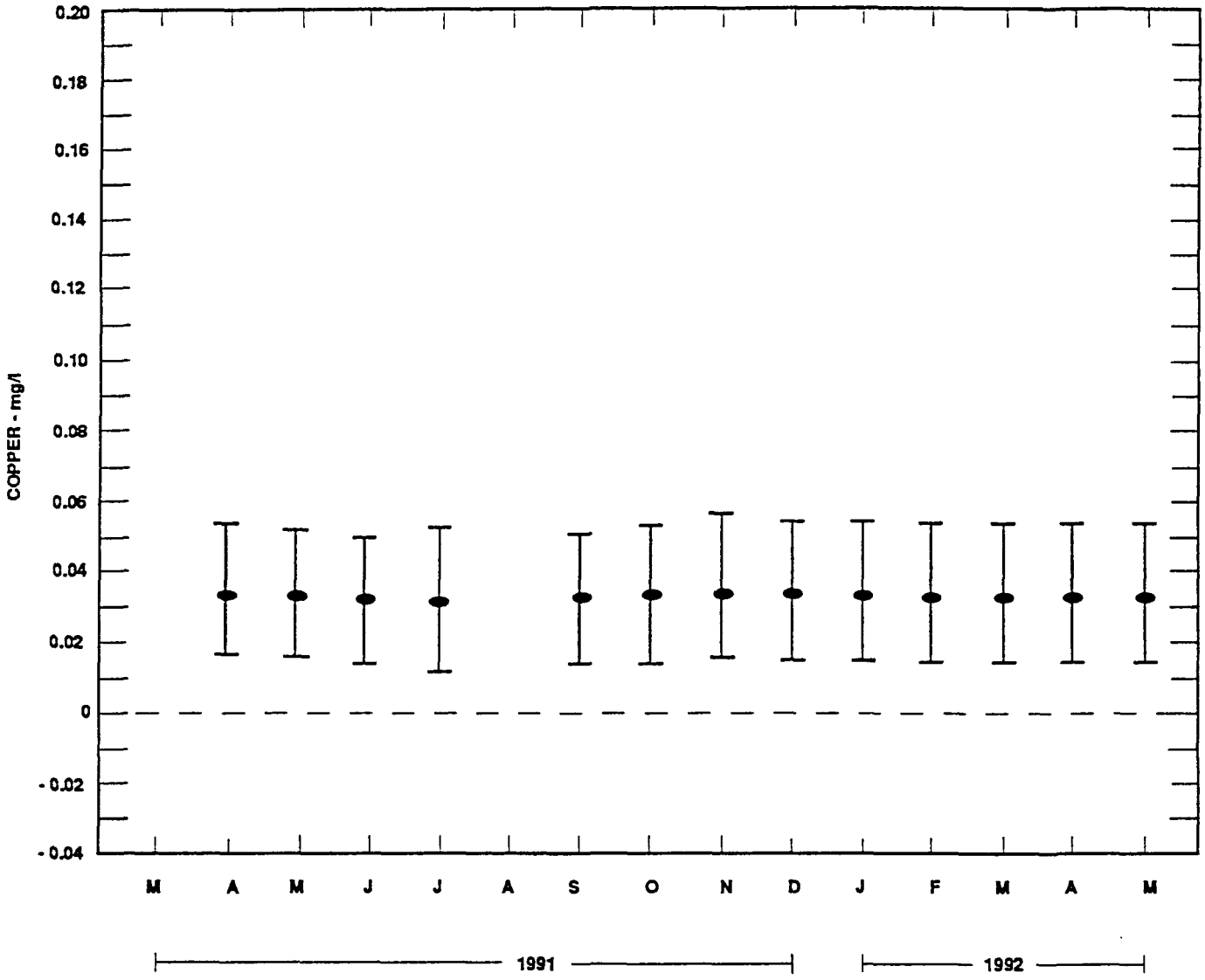
● = MEAN LC50
I = ±2SD

D. MAGNA

DATE	LC 50	STANDARD DEVIATION	AVERAGE	-2SD	+2SD
APR 91	0.030	0.010	0.034	0.014	0.053
MAY 91	0.030	0.009	0.033	0.015	0.052
JUNE 91	0.030	0.009	0.033	0.015	0.051
JULY 91	0.010	0.011	0.032	0.011	0.053
SEPT 91	0.017	0.011	0.031	0.009	0.052
OCT 91	0.044	0.011	0.031	0.010	0.053
NOV 91	0.048	0.011	0.033	0.010	0.055
DEC 91	0.042	0.011	0.033	0.010	0.055
JAN 92	0.028	0.011	0.033	0.011	0.055
FEB 92	0.038	0.011	0.033	0.011	0.054
MAR 92	0.044	0.011	0.033	0.012	0.055
APR 92	0.048	0.011	0.034	0.012	0.056
MAY 92	0.059	0.012	0.035	0.011	0.059

MEN00746

DAPHNIA MAGNA ACUTE REFERENCE TOXICANT DATA, Cu SO_4



● = MEAN LC50
I = +2SD

MEN00748

PAPERBOARD DIVISION

MEAD-A CORPORATION

May 20, 1992

Mr. Scott Hanshue
Michigan Dept. of Natural Resources
P.O. Box 355
Plainwell, MI 49080

Dear Scott,

The report I sent to you on May 6, 1992 concerning toxicity testing during a polymer trial contained a discrepancy. The test on fathead minnows was listed as both a renewal and a non-renewal test in the report. The test on this species was a renewal and the enclosed corrected copy reflects this. Please discard the incorrect copy.

If you have further questions feel free to contact me at 692-6141.

Sincerely,

Otsego Paperboard Division

Keith B. Kling

Keith B. Kling
Environmental Supervisor

cc: Pete DeRossi
Al Switzenberg
Len Myers
Paul Jachim
Gary Roys
Sylvia Heaton

KBK:amc

Otsego Mill
320 N Farmer St
PO Box 155
Otsego MI 49078-0155

PAPERBOARD DIVISION

MENASHA CORPORATION

May 6, 1992

Mr. Scott Hanshue
Michigan Department of Natural Resources
P.O. Box 355
Plainwell, MI 49080

Dear Scott,

On March 17, 1992 I sent a proposal to your office which would allow us to use a combination of polymers to reduce suspended solids in our 003 discharge. The trial was to be accompanied by a toxicity test to insure polymer was not carrying over and reaching the river. The results of the testing are now complete and I am happy to inform you that there was no significant mortality to the organisms. I have enclosed a copy of the test results from Eckenfelder Inc. for your review.

Treatment for TSS with polymer was conducted from 3\20 - 3\23 with sample collection for toxicity testing taking place during the final 24 hours of the test. The samples were grabs evenly spaced over the 24 hour period. During the first 24 hours of the trial the chemical feed rates were varied to find optimum levels. For the duration of the trial 1195 was fed at 190 ppm and 2198 was fed at 10 ppm. Toxicity studies were completed with the chemicals being fed at these rates.

The use of these products was largely responsible for the fact that we were able to meet our monthly average TSS limit during March. I am appreciative of the quick response given to our request to trial this product. Sylvia Heaton was especially helpful in completing her review of our proposal on such short notice.

If you have any questions or concerns, please call the writer at 692-6141.

Sincerely,

Otsego Paperboard Division

Keith B. Kling

Keith B. Kling
Environmental Supervisor

Enclosure

cc: Paul Jachim
Len Myers
Al Switzenberg
Sylvia Heaton
Gary Roys
Pete DeRossi

Otsego Mill
320 N Farmer St
PO Box 155
Otsego MI 49078-0155
1-616-692-6141
1-616-692-2060 (Fax)

MEN00750

PAPERBOARD DIVISION

MENASHA CORPORATION

320 N. Farmer Street • PO Box 155 • Otsego, Michigan 49078

1-616-692-6141
(Fax) 1-616-692-2060

FAX LETTER

DATE: 3/17/92

FAX NUMBER: 517/373-9958

TO: Sylvia Heaton

COMPANY: MDNR

FROM: Keith Kling

TOTAL PAGES: 12
(INCLUDING THIS PAGE)

COMMENTS: Sylvia,
I should be in my office this afternoon if you have questions. If I am not available you can leave a message with Angie Cronen or our operator.

Keith.

MEN00751

PAPERBOARD DIVISION

March 17, 1992

Mr. Scott Hanshue
Michigan Department of Natural Resources
P.O. Box 355
Plainwell, MI 49080

Dear Scott,

The present settling rate within our waste treatment system clarifiers has slowed to the point that we are in danger of not meeting our March suspended solids average limit. We have looked at numerous treatment options including dozens of polymers. The only family of polymers which is effective at this time are the cationic polyelectrolytes. The chemicals, in a free state, are very toxic to fish. They are however, easily bound to suspended solids while still in the waste treatment system, effectively "neutralizing" them.

We propose to use Betz 1195 at a rate of 80-100 PPM followed by Betz 2198 at a rate of 20-30 PPM. The polymers will be added ahead of the clarifiers. From the clarifiers the water will be sent to a polishing lagoon to allow for additional solids contact. The total retention of the clarifiers and pond is 810,000 gallons or about 16 hours based on a 1.2 million gallon flow. Laboratory tests indicate that at those rates TSS will be reduced from 600 PPM to 150 PPM. The polymer companies we have been working with have indicated that polymer removal will be 99.9%+ as long as solids remain to tie up the chemical.

In order to ensure that this creates no significant toxicity, the following application plan would be followed.

1. Application would begin on Friday, at only the small clarifier. This would allow us to set proper feed rates with any initial carryover being captured in the downstream polishing lagoon.

2. After appropriate feed rates are determined both clarifiers will be treated with the discharge going to the downstream lagoon.

3. On Sunday, water samples will be taken at the discharge every 6 hours for a 24 hour period. These samples will be sent to Eckenfelder Inc. for toxicity testing using fathead minnows.

I have enclosed MSD sheets for the two proposed chemicals as well as a statement from Betz on the toxicity potential for these chemicals. I will call Sylvia Heaton on Wednesday to discuss questions she may have on this treatment.

Sincerely,

Otsego Paperboard Division

Keith B. Kling
Environmental Supervisor

Enclosures

cc: Jim Porter
Paul Jachim
Gary Roys
Len Myers
Pete DeRossi
Al Switzenberg
Sylvia Heaton

KBK:amc

BETZ LABORATORIES,INC.
4636 SOMERTON ROAD, TREVOSE, PA. 19053
BETZ MATERIAL SAFETY DATA SHEET
EMERGENCY TELEPHONE (HEALTH/ACCIDENT) 800-877-1940

PRODUCT : POLYMER 1195

EFFECTIVE DATE 10-07-91
PRINTED: 7-Oct-1991
REVISIONS TO SECTIONS: APPENDIX

PRODUCT APPLICATION : COAGULANT.

-----SECTION 1----------HAZARDOUS INGREDIENTS----------

INFORMATION ON PHYSICAL HAZARDS, HEALTH HAZARDS, PEL'S AND TLV'S FOR SPECIFIC PRODUCT INGREDIENTS AS REQUIRED BY THE OSHA HAZARD COMMUNICATIONS STANDARD IS LISTED. REFER TO SECTION 4 (PAGE 2) FOR OUR ASSESSMENT OF THE POTENTIAL ACUTE AND CHRONIC HAZARDS OF THIS FORMULATION.

THIS PRODUCT IS NOT HAZARDOUS AS DEFINED BY OSHA REGULATIONS.

-----SECTION 2----------TYPICAL PHYSICAL DATA----------

PH: AS IS	(APPROX.) 5.1	ODOR: AMINE	
FL.PT.(DEG.F): >200	SETA(CC)	SP.GR.(70F)OR DENSITY: 1.152	
VAPOR PRESSURE(mmHG): ND		VAPOR DENSITY(AIR=1): ND	
VISC cps70F: 4100		%SOLUBILITY(WATER): 100	
EVAP.RATE: <1	ETHER=1	APPEARANCE: AMBER	
PHYSICAL STATE: LIQUID		FREEZE POINT(DEG.F): 15	

-----SECTION 3----------REACTIVITY DATA----------

STABLE.MAY REACT WITH STRONG OXIDIZERS.DO NOT CONTAMINATE.BETZ TANK CLEAN-OUT CATEGORY 'A'

THERMAL DECOMPOSITION (DESTRUCTIVE FIRES) YIELDS ELEMENTAL OXIDES.

PRODUCT: POLYMER 1195

-----SECTION 4----------HEALTH HAZARD EFFECTS----------

ACUTE SKIN EFFECTS *** PRIMARY ROUTE OF EXPOSURE
SLIGHTLY IRRITATING TO THE SKIN

ACUTE EYE EFFECTS ***
SLIGHTLY IRRITATING TO THE EYES

ACUTE RESPIRATORY EFFECTS ***
MISTS/AEROSOLS MAY CAUSE IRRITATION TO UPPER RESPIRATORY TRACT

CHRONIC EFFECTS OF OVEREXPOSURE***
NO EVIDENCE OF POTENTIAL CHRONIC EFFECTS.

MEDICAL CONDITIONS AGGRAVATED ***
NOT KNOWN

SYMPTOMS OF EXPOSURE ***
MAY CAUSE REDNESS OR ITCHING OF SKIN.

-----SECTION 5----------FIRST AID INSTRUCTIONS----------

SKIN CONTACT***
REMOVE CONTAMINATED CLOTHING.WASH EXPOSED AREA WITH A LARGE QUANTITY OF SOAP SOLUTION OR WATER FOR 15 MINUTES

EYE CONTACT***
IMMEDIATELY FLUSH EYES WITH WATER FOR 15 MINUTES.IMMEDIATELY CONTACT A PHYSICIAN FOR ADDITIONAL TREATMENT

INHALATION EXPOSURE***
REMOVE VICTIM FROM CONTAMINATED AREA TO FRESH AIR.APPLY APPROPRIATE FIRST AID TREATMENT AS NECESSARY

INGESTION***
DO NOT FEED ANYTHING BY MOUTH TO AN UNCONSCIOUS OR CONVULSIVE VICTIM
DILUTE CONTENTS OF STOMACH.INDUCE VOMITING BY ONE OF THE STANDARD METHODS.IMMEDIATELY CONTACT A PHYSICIAN

-----SECTION 6----------SPILL,DISPOSAL AND FIRE INSTRUCTIONS---------

SPILL INSTRUCTIONS***
VENTILATE AREA,USE SPECIFIED PROTECTIVE EQUIPMENT.CONTAIN AND ABSORB ON ABSORBENT MATERIAL.PLACE IN WASTE DISPOSAL CONTAINER. THE WASTE CHARACTERISTICS OF THE ABSORBED MATERIAL,OR ANY CONTAMINATED SOIL, SHOULD BE DETERMINED IN ACCORDANCE WITH RCRA REGULATIONS.
FLUSH AREA WITH WATER. WET AREA MAY BE SLIPPERY. SPREAD SAND/GRIT.

DISPOSAL INSTRUCTIONS***
WATER CONTAMINATED WITH THIS PRODUCT MAY BE SENT TO A SANITARY SEWER TREATMENT FACILITY,IN ACCORDANCE WITH ANY LOCAL AGREEMENT,A PERMITTED WASTE TREATMENT FACILITY OR DISCHARGED UNDER A NPDES PERMIT
PRODUCT(AS IS)-
INCINERATE OR BURY IN APPROVED LANDFILL

FIRE EXTINGUISHING INSTRUCTIONS***
FIREFIGHTERS SHOULD WEAR POSITIVE PRESSURE SELF-CONTAINED BREATHING APPARATUS(FULL FACE-PIECE TYPE).PROPER FIRE EXTINGUISHING MEDIA: DRY CHEMICAL/CO2/FOAM OR WATER. SLIPPERY CONDITION. USE SAND/GRIT

BETZ MATERIAL SAFETY DATA SHEET (PAGE 3 OF 3)

PRODUCT: POLYMER 1195

-----SECTION 7----------SPECIAL PROTECTIVE EQUIPMENT----------

USE PROTECTIVE EQUIPMENT IN ACCORDANCE WITH 29CFR SECTION 1910.132-134. USE RESPIRATORS WITHIN USE LIMITATIONS OR ELSE USE SUPPLIED AIR RESPIRATORS.

VENTILATION PROTECTION***

ADEQUATE VENTILATION

RECOMMENDED RESPIRATORY PROTECTION***

IF VENTILATION IS INADEQUATE OR SIGNIFICANT PRODUCT EXPOSURE IS LIKELY, USE A RESPIRATOR WITH DUST/MIST FILTERS.

RECOMMENDED SKIN PROTECTION***

RUBBER GLOVES

WASH OFF AFTER EACH USE.REPLACE AS NECESSARY

RECOMMENDED EYE PROTECTION***

SPLASH PROOF CHEMICAL GOGGLES

-----SECTION 8----------STORAGE AND HANDLING PRECAUTIONS----------

STORAGE INSTRUCTIONS***

KEEP DRUMS & PAILS CLOSED WHEN NOT IN USE.

PROTECT FROM FREEZING

HANDLING INSTRUCTIONS***

NORMAL CHEMICAL HANDLING

****

THIS MSDS WAS WRITTEN TO COMPLY WITH THE OSHA HAZARD COMMUNICATION STANDARD

****

APPENDIX: REGULATORY INFORMATION

THE CONTENT OF THIS APPENDIX REPRESENTS INFORMATION KNOWN TO BETZ ON THE EFFECTIVE DATE OF THIS MSDS. THIS INFORMATION IS BELIEVED TO BE ACCURATE. ANY CHANGES IN REGULATIONS WILL RESULT IN UPDATED VERSIONS OF THIS DOCUMENT.

...TSCA: ALL COMPONENTS OF THIS PRODUCT ARE LISTED ON THE TSCA INVENTORY

..CLEARANCE FOR POTABLE WATER USE:

EPA UP TO 20PPM

...REPORTABLE QUANTITY(RQ) FOR UNDILUTED PRODUCT:

NOT APPLICABLE

...RCRA: IF THIS PRODUCT IS DISCARDED AS A WASTE,THE RCRA HAZARDOUS WASTE IDENTIFICATION NUMBER IS: NOT APPLICABLE

...DOT HAZARD/UN#/ER GUIDE# IS: NOT APPLICABLE

...CALIFORNIA SAFE DRINKING WATER ACT (PROPOSITION 65) MATERIALS: NONE

...SARA SECTION 302 CHEMICALS: NONE

...SARA SECTION 313 CHEMICALS: NONE

...SARA SECTION 312 HAZARD CLASS: PRODUCT IS NONHAZARDOUS UNDER SECTION 311/312

...MICHIGAN CRITICAL MATERIALS: NONE

NFPA/HMIS : HEALTH - 1 ; FIRE - 1 ; REACTIVITY - 0 ; SPECIAL - NONE ; PE - B

BETZ LABORATORIES,INC.
4636 SOMERTON ROAD, TREVOSE, PA. 19053
BETZ MATERIAL SAFETY DATA SHEET
EMERGENCY TELEPHONE (HEALTH/ACCIDENT) 800-877-1940

PRODUCT : POLYMER 2198

EFFECTIVE DATE 08-26-91
PRINTED: 26-Aug-1991
REVISIONS TO SECTIONS: 2;EDIT:6,8,APP/9

PRODUCT APPLICATION : DEWATERING AID.

-----SECTION 1----------HAZARDOUS INGREDIENTS----------

INFORMATION ON PHYSICAL HAZARDS, HEALTH HAZARDS, PEL'S AND TLV'S FOR SPECIFIC PRODUCT INGREDIENTS AS REQUIRED BY THE OSHA HAZARD COMMUNICATIONS STANDARD IS LISTED. REFER TO SECTION 4 (PAGE 2) FOR OUR ASSESSMENT OF THE POTENTIAL ACUTE AND CHRONIC HAZARDS OF THIS FORMULATION.

ISOPARAFFINIC PETROLEUM DISTILLATE***CAS#64742-47-8;COMBUSTIBLE LIQUID; IRRITANT;PEL:400PPM;TLV:NONE.

-----SECTION 2----------TYPICAL PHYSICAL DATA----------

PH: 0.5% SOL. (APPROX.) 4.4	ODOR: SLIGHT HYDROCARBON
FL.PT.(DEG.F): >200 P-M(CC)	SP.GR.(70F)OR DENSITY: 1.080
VAPOR PRESSURE(mmHG): 18	VAPOR DENSITY(AIR=1): >1
VISC cps70F: 1498	%SOLUBILITY(WATER): 0
EVAP.RATE: <1 ETHER=1	APPEARANCE: OFF WHITE,YELLOW
PHYSICAL STATE: EMULSION	FREEZE POINT(DEG.F): 10

-----SECTION 3----------REACTIVITY DATA----------

STABLE.MAY REACT WITH STRONG OXIDIZERS.DO NOT CONTAMINATE.BETZ TANK CLEAN-OUT CATEGORY 'B'

THERMAL DECOMPOSITION (DESTRUCTIVE FIRES) YIELDS ELEMENTAL OXIDES.

A

MEN00757

BETZ MATERIAL SAFETY DATA SHEET (PAGE 2 OF 3)

PRODUCT: POLYMER 2198

----SECTION 4----------HEALTH HAZARD EFFECTS----------

ACUTE SKIN EFFECTS *** PRIMARY ROUTE OF EXPOSURE
MODERATELY IRRITATING TO THE SKIN

ACUTE EYE EFFECTS ***
MODERATELY IRRITATING TO THE EYES

ACUTE RESPIRATORY EFFECTS *** PRIMARY ROUTE OF EXPOSURE
VAPORS,GASES,MISTS OR AEROSOLS MAY CAUSE IRRITATION TO UPPER RESPIRATORY TRACT.PROLONGED EXPOSURE MAY CAUSE DIZZINESS AND HEADACHE.

CHRONIC EFFECTS OF OVEREXPOSURE***
NO EVIDENCE OF POTENTIAL CHRONIC EFFECTS.

MEDICAL CONDITIONS AGGRAVATED ***
NOT KNOWN

SYMPTOMS OF EXPOSURE ***
EXCESSIVE SKIN CONTACT MAY CAUSE DEFATTING OR DRYING OF SKIN;EXCESSIVE INHALATION OF VAPORS MAY CAUSE DIZZINESS,HEADACHE AND NAUSEA.

-----SECTION 5----------FIRST AID INSTRUCTIONS----------

SKIN CONTACT***
REMOVE CONTAMINATED CLOTHING.WASH EXPOSED AREA WITH A LARGE QUANTITY OF SOAP SOLUTION OR WATER FOR 15 MINUTES

EYE CONTACT***
IMMEDIATELY FLUSH EYES WITH WATER FOR 15 MINUTES.IMMEDIATELY CONTACT A PHYSICIAN FOR ADDITIONAL TREATMENT

INHALATION EXPOSURE***
REMOVE VICTIM FROM CONTAMINATED AREA TO FRESH AIR.APPLY APPROPRIATE FIRST AID TREATMENT AS NECESSARY

INGESTION***
DO NOT FEED ANYTHING BY MOUTH TO AN UNCONSCIOUS OR CONVULSIVE VICTIM
DO NOT INDUCE VOMITING.IMMEDIATELY CONTACT PHYSICIAN. DILUTE CONTENTS OF STOMACH USING 3-4 GLASSES MILK OR WATER

-----SECTION 6----------SPILL,DISPOSAL AND FIRE INSTRUCTIONS---------

SPILL INSTRUCTIONS***
VENTILATE AREA,USE SPECIFIED PROTECTIVE EQUIPMENT.CONTAIN AND ABSORB ON ABSORBENT MATERIAL.PLACE IN WASTE DISPOSAL CONTAINER. THE WASTE CHARACTERISTICS OF THE ABSORBED MATERIAL,OR ANY CONTAMINATED SOIL, SHOULD BE DETERMINED IN ACCORDANCE WITH RCRA REGULATIONS.
FLUSH AREA WITH WATER. WET AREA MAY BE SLIPPERY. SPREAD SAND/GRIT.

DISPOSAL INSTRUCTIONS***
WATER CONTAMINATED WITH THIS PRODUCT MAY BE SENT TO A SANITARY SEWER TREATMENT FACILITY,IN ACCORDANCE WITH ANY LOCAL AGREEMENT,A PERMITTED WASTE TREATMENT FACILITY OR DISCHARGED UNDER A NPDES PERMIT
PRODUCT(AS IS)-
INCINERATE OR BURY IN APPROVED LANDFILL

FIRE EXTINGUISHING INSTRUCTIONS***
FIREFIGHTERS SHOULD WEAR POSITIVE PRESSURE SELF-CONTAINED BREATHING APPARATUS(FULL FACE-PIECE TYPE).PROPER FIRE EXTINGUISHING MEDIA: DRY CHEMICAL,CARBON DIOXIDE,FOAM OR WATER

A7

MEN00758

BETZ MATERIAL SAFETY DATA SHEET (PAGE 3 OF 3)

PRODUCT: POLYMER 2198

---SECTION 7----------SPECIAL PROTECTIVE EQUIPMENT----------

E PROTECTIVE EQUIPMENT IN ACCORDANCE WITH 29CFR SECTION 1910.132-134. USE RESPIRATORS WITHIN USE LIMITATIONS OR ELSE USE SUPPLIED AIR RESPIRATORS.

VENTILATION PROTECTION***

ADEQUATE VENTILATION TO MAINTAIN AIR CONTAMINANTS BELOW EXPOSURE LIMITS

RECOMMENDED RESPIRATORY PROTECTION***

IF VENTILATION IS INADEQUATE OR SIGNIFICANT PRODUCT EXPOSURE IS LIKELY, USE A RESPIRATOR WITH ORGANIC VAPOR CARTRIDGES.

RECOMMENDED SKIN PROTECTION***

NEOPRENE GLOVES

WASH OFF AFTER EACH USE.REPLACE AS NECESSARY

RECOMMENDED EYE PROTECTION***

SPLASH PROOF CHEMICAL GOGGLES

-----SECTION 8----------STORAGE AND HANDLING PRECAUTIONS----------

STORAGE INSTRUCTIONS***

KEEP DRUMS & PAILS CLOSED WHEN NOT IN USE.

STORE IN COOL VENTILATED LOCATION.STORE AWAY FROM OXIDIZERS

HANDLING INSTRUCTIONS***

NORMAL CHEMICAL HANDLING

****

THIS MSDS WAS WRITTEN TO COMPLY WITH THE OSHA HAZARD COMMUNICATION STANDARD

****

APPENDIX: REGULATORY INFORMATION

THE CONTENT OF THIS APPENDIX REPRESENTS INFORMATION KNOWN TO BETZ ON THE EFFECTIVE DATE OF THIS MSDS. THIS INFORMATION IS BELIEVED TO BE ACCURATE. ANY CHANGES IN REGULATIONS WILL RESULT IN UPDATED VERSIONS OF THIS DOCUMENT.

.TSCA: ALL COMPONENTS OF THIS PRODUCT ARE LISTED ON THE TSCA INVENTORY

...REPORTABLE QUANTITY(RQ) FOR UNDILUTED PRODUCT:

TREAT AS OIL SPILL

...RCRA: IF THIS PRODUCT IS DISCARDED AS A WASTE,THE RCRA HAZARDOUS WASTE IDENTIFICATION NUMBER IS: NOT APPLICABLE

...DOT HAZARD/UN#/ER GUIDE# IS: NOT APPLICABLE

...CALIFORNIA SAFE DRINKING WATER ACT (PROPOSITION 65) MATERIALS: NONE

...SARA SECTION 302 CHEMICALS: NONE

...SARA SECTION 313 CHEMICALS: NONE

...SARA SECTION 312 HAZARD CLASS: IMMEDIATE(ACUTE)

...MICHIGAN CRITICAL MATERIALS: NONE

NFPA/HMIS : HEALTH - 2 ; FIRE - 1 ; REACTIVITY - 0 ; SPECIAL - NONE ; PE - B

Betz Industrial
The Water Management Division of Betz Laboratories, Inc.

1 Quality Way
Trevose PA 19047-6783
215-355-3300
Telex 173-148
Fax: 215-355-2869

UNDERSTANDING AQUATIC TOXICITY TESTING RESULTS FOR CATIONIC POLYELECTROLYTES

Many cationic polymers in their free state cause toxicity to fish at relatively low levels. This is because the positively charged polymer attaches to the negatively charged gill epithelium (a cellular membrane), blocking passage of oxygen into the fish and causing asphyxiation. Standard EPA and ASTM aquatic testing procedures are designed to measure the toxicity level of free cationic polymer in clean water which does not contain suspended solids. However, studies indicate that in normal treatment processes, the polymer does not exist in its free form but instead is bound to the suspended solids which are present in the system. Any toxicity of the resultant water that might be attributed to free polymer is sharply reduced or eliminated since these bound polymers have been "neutralized" and cannot attach to the gill epithelium.

If the polymers were severely overdosed, free residual cationic polyelectrolytes might be released to the aquatic environment due to the presence of significantly more polymer than can be bound to the available suspended solids. Such an occurrence is unlikely since problems in the water clarification process (namely dispersion) would become apparent before the polymer reached a toxic level. In addition, if such a release would occur, there should be sufficient silt and other suspended solids present in the receiving stream to buffer or neutralize the effects on the aquatic environment. Therefore, when reviewing aquatic toxicology data for cationic polyelectrolytes, it should be remembered that these results refer to the presence of free (not bound) cationic polymers in the clean water and that the amount of free polymer entering the environment is negligible when used in accordance with safe and practical operating parameters.

MEN00760

BETZ LABORATORIES, INC.
4636 SOMERTON ROAD, TREVOSE, PA. 19047

PRODUCT: POLYMER 1195

3/06/92 AQUATIC TOXICOLOGY

RAINBOW TROUT

0% MORTALITY: 0.24 MG/L
96 HR. LC50: 0.4 MG/L

BLUEGILL SUNFISH

0% MORTALITY: - MG/L
96 HR. LC50: 0.5 MG/L

DAPHNIA MAGNA

0% MORTALITY: 0.24 MG/L
48 HR. LC50: 0.6 MG/L

3/06/92 MAMMALIAN TOXICOLOGY

ORAL LD50 - RAT : 7070 MG/KG

DERMAL LD50 - RABBIT : 11500.0 MG/KG

SKIN IRRITATION SCORE-NO DATA

EYE IRRITATION SCORE-NO DATA

INHALATION-NO DATA

BETZ LABORATORIES, INC.
4636 SOMERTON ROAD, TREVOSE, PA. 19047

PRODUCT: POLYMER 2198

3/06/92 AQUATIC TOXICOLOGY

DAPHNIA MAGNA

0% MORTALITY:		MG/L
48 HR. LC50:	8.4	MG/L

RAINBOW TROUT

0% MORTALITY:		MG/L
96 HR. LC50:	0.9	MG/L

BLUEGILL SUNFISH

0% MORTALITY:		MG/L
96 HR. LC50:	2.5	MG/L

3/06/92 MAMMALIAN TOXICOLOGY

ORAL LD50 -NO DATA

DERMAL LD50 -NO DATA

SKIN IRRITATION SCORE-NO DATA

EYE IRRITATION SCORE-NO DATA

INHALATION-NO DATA

REPORT FOR ACUTE TOXICITY TEST RESULTS FOR MENASHA CORPORATION

Prepared for:

MENASHA CORPORATION
Otsego, Michigan

Prepared by:

ECKENFELDER INC.
227 French Landing Drive
Nashville, Tennessee 37228
(615) 255-2288

April 1992

5204

ECKENFELDER INC.

April 6, 1992 5204

Keith Kling
Menasha Corporation
Box 155
Otsego, MI 49078-0155

Dear Keith:

The report on the toxicity tests conducted on your effluent is attached. Acute, definitive tests on samples of effluent were conducted using fathead minnows. The tests were acute 96-hour static, renewals on four grab samples taken over a 24-hour period. None of the tests resulted in no significant mortality to the organisms.

If you have any questions, please contact me at (615) 255-2288.

Sincerely,

ECKENFELDER INC.

Richard J. Mirenda

Richard J. Mirenda, Ph.D.
Senior Manager
Aquatic Toxicology Laboratory/Consulting Services

Attachment

Q:\5204\APR92\06R.204

227 French Landing Drive
Nashville Tennessee 37228
615 255 2288
FAX 615 256.8332

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RESULTS	3

Appendices	Title
A	ECKENFELDER INC. Toxicity Test Report
B	Raw Data Sheets

INTRODUCTION

Municipal and industrial dischargers are required" as part of the National Pollutant Discharge Elimination System (NPDES), to measure the toxicity of their wastewater. The permit requirement may be for monitoring purposes only or may contain toxicity limits. The type of tests required vary from state to state and may depend on flow conditions or dilution by the receiving water. The most common tests required are acute tests which measure the short-term toxicity of the wastewater. The test duration may vary from 24-hour to 96 hour, depending on the organism tested and the state requirements. More recently, mini-chronic tests have been utilized to look at longer-term toxicity. These tests involve more subtle effects on the organism, e.g., growth and reproduction, and last seven days.

The organisms used in these tests have been limited to those that are easily cultured in the laboratory. This ensures that the quality and health of the organisms are consistent over time and does not affect the results of the test. Fish species most often used are the fathead minnow (Pimephales promelas) which is easily reared in the laboratory. The invertebrates used are the water fleas (Daphnia pulex, Daphnia magna and Ceriodaphnia sp.) which are freshwater crustaceans. The culturing methods for these organisms have been outlined by the U.S. Environmental Protection Agency and the American Society for Testing and Materials.

Menasha Corporation in Otsego, Michigan requested that a series of acute toxicity tests be conducted on four grab samples of plant effluent. The tests conducted were acute, definitive tests which exposed the fathead minnows to a serial dilution of the effluents for 96 hour.

METHODS

Test procedures adhered to those outlined in the U.S. Environmental Protection Agency Manual, "Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms", EPA 600/4-85/013.

Samples of effluent and river water were received from Menasha Corporation on March 23, 1992. The samples were used to conduct four acute fathead minnow tests with daily renewals. The temperature of the samples was adjusted to 20°C prior to the start of the test. Water chemistry data were measured and recorded on the appropriate data sheet (Appendix C). Parameters measured were pH, dissolved oxygen, temperature, conductivity, hardness and alkalinity. In addition, a final dissolved oxygen concentration and pH were measured on the test concentrations and control at the time of renewal and at the conclusion of the test.

The tests were started with 12 day old fathead minnows obtained from the ECKENFELDER INC. cultures. The fathead test consisted of two replicates with ten fish in each test vessel. The effluents were tested at 6.25, 12.5, 25, 50 and 100 percent and used the Kalamazoo River water as the diluent. A control of river water as well as laboratory reconstituted water made according to USEPA procedures were also tested. The test chambers were checked every 24-hour for mortality and the number dead recorded on the data sheet (Appendix B). The tests were terminated after 96-hours and were deemed acceptable if 90 percent of the control organisms survived.

QUALITY ASSURANCE

All of the organisms which were tested were obtained from cultures maintained by ECKENFELDER INC. The animal stocks were originally obtained from USEPA - Cincinnati and are cultured according to EPA recommended procedures (EPA 600/4-85/013 and EPA 600/4-85/014).

The control water used in the tests was reconstituted water made with glass distilled water to which is added appropriate amounts of KCl, $MgCl_2$, $NaHCO_3$ and $CaSO_4$. The pH, hardness and alkalinity of each batch of water is checked prior to use. Adjustments to these parameters are made if they fall outside the acceptable ranges. The water quality data for each batch of water is recorded in the Water Chemistry Log.

Reference toxicant tests are conducted every month on all of the organisms cultured in our laboratory. The tests are acute and the reference toxicant is cadmium chloride which is obtained from USEPA. Data sheets and LC50 values are kept in laboratory

notebooks. The control charts of the reference toxicant tests for the fathead minnow are available upon request.

RESULTS

There was no significant mortality observed in any of the tests with the fathead minnows. The test resulted in 90 to 100 percent survival in the 100 percent effluent concentrations. The river control and laboratory control also had 100 percent survival. The LC50 value for the samples was >100 percent.

APPENDIX A

ECKENFELDER INC. TOXICITY TEST REPORT

REPORT OF AQUATIC TOXICITY TEST RESULTS

I. GENERAL INFORMATION

A. Plant Information

Industry: Menasha Corporation

Permit No.:

Address: Paperboard Group
Box 155
Otsego, MI 49078-0155

Contact: Keith Kling

Phone Number: (615) 692-6141

Type of Plant: Paper

Plant Operating Schedule:

Receiving Stream: Kalamazoo River

B. Sample(s)

Source(s): Outfall 000

Collection Period: 3/22 to 3/23/92

Type of Collection: Grab

Collected by: Menasha personnel

	1 p.m.	7 p.m.	1 a.m.	7 a.m.
Alkalinity (mg/l as $CaCO_3$):	570	574	670	695
Conductivity (μmhos/cm):	1,208	1,255	1,438	1,209
Hardness (mg/l $CaCO_3$):	268	280	255	275
pH (standard units):	8.6	8.5	8.6	8.6

REPORT OF AQUATIC TOXICITY TEST RESULTS (Cont'd)

II. DATA FOR FATHEAD MINNOW TESTS

A. Test Type

_X_ Renewal	___ 24 hr	_X_ Static	_X_ Acute
___ Nonrenewal	___ 48 hr	___ Flowthrough	___ Chronic
	_X_ 96 hr		
	___ 7 day		

B. Test Organism

Common Name: Fathead Minnow Scientific Name: Pimephales promelas

Age: 12 days Source: ECKENFELDER INC. cultures

Observed Diseases: None

Treatment: None

Acclimation: Held in control water prior to testing

C. Test Method - Reference Material

Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms, EPA, Third edition, March 1985.

Other:

D. Dilution Water

Source: Kalamazoo River Collection Period: 3/23/92

Type Collection: Grab Pretreatment: None

Alkalinity (mg/l as $CaCO_3$): 214 Hardness (mg/l $CaCO_3$): 260

Conductivity (μmhos/cm): 539 pH (standard units): 8.2

REPORT OF AQUATIC TOXICITY TEST RESULTS (Cont'd)

E. Test Chambers

Composition: Glass

Depth: 195 mm

Size: 1.0 L

Test Volume per Chamber: 750 ml

F. Loading Technique

Organisms per concentration: 20

Replicates per concentration: 2

Organisms per replicate: 10

G. Testing Dates

Start: 3/24/92

Complete: 3/28/92

H. Summary Of Test Observations

1. Most sensitive index: no significant mortality observed

   LOEC:

   NOEC:

   ChV:

   LC50:

   95 percent confidence limits:

   Method:

REPORT OF AQUATIC TOXICITY TEST RESULTS (Cont'd)

2. Survival Rates (%)

Concentration	Survival Rate (%)			
	1 p.m.	7 p.m.	1 a.m.	7 a.m.
1. Lab Control	100	100	100	100
2. River Control	100	100	95	100
3. 6.25	100	100	100	100
4. 12.5	100	100	100	100
5. 25	100	100	100	100
6. 50	100	95	100	100
7. 100	100	90	95	100
8.				
9.				

3. Comments:

I. Attachment

X Data Summary Sheets

___ Other:

By: Richard Menendez Date: 4/3/92

ECKENFELDER INC.
227 French Landing Drive
Nashville, TN 37228

(615) 255-2288

APPENDIX B

RAW DATA SHEETS

ACUTE TOXICITY DATA SHEET

CLIENT: Menasha - 1Pm PROJECT NO: _____ EFFLUENT: ✓ CHEMICAL (SPECIFY): _____

SAMPLE ID: _____ GRAB: ✓ COMPOSITE: _____ COLLECTED BY: _____

TEST STARTED: (Date/Time) 3/24/92 3pm ENDED: (Date/Time) 3/28/92 1:45pm TEST SPECIES: P. promelas AGE: 12days WEIGHT/LENGTH: _____

ORGANISMS PER CONCENTRATION: 20 DILUTION WATER: Kalamazoo River TEST CONDUCTED BY: SB/LS

STATIC: _____ STATIC RENEWAL: ✓ FLOW - THROUGH: _____ TOTAL VOLUME PER CHAMBER: 750 ml

CONC. OR % EFF.	REP	pH (standard unit) 0	24 (VF)	48 (VF)	72 (VF)	96 (VF)	DISSOLVED OXYGEN (mg/l) 0 (VF)	24 (VF)	48 (VF)	72 (VF)	96 (VF)	CONDUCTIVITY (umho/cm) SALINITY (mg/l) 0	24	48	72	96	TOTAL ALKALINITY (mg/l CaCO3) 0	24	48	72	96	TOTAL HARDNESS (mg/l CaCO3) 0	24	48	72	96	TEMPERATURE (°C) 0	24	48	72	96	CUMULATIVE MORTALITY 24	48	72	96
Lab	A	8.2	8.2 / 7.8	8.2 / 7.9	8.2 / 8.1	/ 8.1	8.1	8.1 / 8.1	8.2 / 7.8	8.3 / 7.9	/ 8.2	333	334	359	342		65	65	65	65		90	90	90	96		21.5	21.9	21.6	22.9		0	0	0	0
Control	B																																0	0	0	0
River	A	8.5	8.2 / 8.3	8.1 / 8.3	8.2 / 8.4	/ 8.3	10.5	10.6 / 8.5	10.5 / 8.0	10.4 / 8.1	/ 8.5	540	539	541	536		220	210	220	205		264	258	258	260		20.9	21.4	22.0	20.2		0	0	0	0
Control	B																																0	0	0	0
6.25	A	8.5	8.2 / 8.3	8.3 / 8.3	8.2 / 8.4	/ 8.3	10.4	10.2 / 7.9	10.2 / 7.4	10.4 / 7.3	/ 7.7	589	574	589	584												20.8	20.6	20.6	20.4		0	0	0	0
	B																																0	0	0	0
12.5	A	8.6	8.3 / 8.3	8.3 / 8.3	8.2 / 8.4	/ 8.3	9.8	10.0 / 7.6	10.0 / 6.9	10.2 / 6.9	/ 7.2	630	627	626	628												20.6	20.4	21.4	20.3		0	0	0	0
	B																																0	0	0	0
25	A	8.6	8.3 / 8.3	8.4 / 8.3	8.2 / 8.4	/ 8.3	9.1	9.7 / 6.8	9.9 / 6.1	10.0 / 6.1	/ 6.5	721	701	683	708												20.6	20.2	21.2	20.6		0	0	0	0
	B																																0	0	0	0
50	A	8.7	8.4 / 8.3	8.5 / 8.3	8.3 / 8.4	/ 8.2	8.9	16.6 / 5.2	17.7 / 4.3	19.8 / 4.2	/ 4.6	908	865	824	870												20.6	20.8	20.4	20.4		0	0	0	0
	B																																0	0	0	0
100	A	8.8	8.5 / 8.4	8.7 / 8.3	8.4 / 8.5	/ 8.3	7.5	8.3 / 2.0	8.3 / 2.1	8.6 / 2.0	/ 2.0	1424	1192	1185	1202		605	585	525	565		260	279	272	280		20.6	20.4	20.5	20.1		0	0	0	0
	B																																0	0	0	0

96 hr. HOUR LC - 50 = >100% 95% CONFIDENCE LIMITS: _____ TO _____ METHOD OF CALCULATION: _____

COMMENTS: _____

VF - REPRESENTS INITIAL/FINAL

MEN00774

ACUTE TO. Y DATA SHEET

CLIENT: Menasha - 7 pm PROJECT NO: _____ EFFLUENT: ✓ CHEMICAL (SPECIFY): _____

SAMPLE ID: _____ GRAB: ✓ COMPOSITE: _____ COLLECTED BY: _____

TEST STARTED: (Date/Time) 3/24/92 1 3:15 ENDED: (Date/Time) 3/28/92 3 Pm TEST SPECIES: P. promelas AGE: 12 days WEIGHT/LENGTH: _____

ORGANISMS PER CONCENTRATION: 20 DILUTION WATER: Kalamazoo River TEST CONDUCTED BY: SB / LS

STATIC: _____ STATIC RENEWAL: ✓ FLOW - THROUGH: _____ TOTAL VOLUME PER CHAMBER: 750 ml

CONC. OR % EFF.	REP	pH (standard unit) 0	24 (VF)	48 (VF)	72 (VF)	96 (VF)	DISSOLVED OXYGEN (mg/l) 0 (VF)	24 (VF)	48 (VF)	72 (VF)	96 (VF)	CONDUCTIVITY (umho/cm) SALINITY (mg/l) 0	24	48	72	96	TOTAL ALKALINITY (mg/l CaCO3) 0	24	48	72	96	TOTAL HARDNESS (mg/l CaCO3) 0	24	48	72	96	TEMPERATURE (°C) 0	24	48	72	96	CUMULATIVE MORTALITY 24	48	72	96
Lab	A	8.2	8.2	8.2	8.2		8.1	8.2		8.3		331	334	359	342		65	65	65	65		90	90	90	96		21.5	21.0	21.6	22.0		0	0	0	0
			7.8	7.9	8.1	8.1	8.1	8.1	7.8	7.9	8.2																								
Control	B																																		
River	A	8.5	8.2	8.1	8.2		10.5	10.6		10.4		540	539	541	536		220	210	220	205		264	256	258	260		20.9	21.4	22.0	20.2		0	0	0	0
			8.3	8.3	8.4	8.3		8.5	8.0	8.1	8.5																								
Control	B																																		
6.25	A	8.5	8.2	8.3	8.2		10.2	10.2		10.4		587	574	585	574												20.7	20.2	21.7	20.5		0	0	0	0
			8.4	8.3	8.4	8.4		8.0	7.5	7.8	7.8																								
	B																																		
12.5	A	8.6	8.3	8.4	8.2		9.8	10.0		10.2		635	628	626	633												20.8	20.2	21.7	20.5		0	0	0	0
			8.3	8.3	8.4	8.3		7.6	7.1	7.1	7.2																								
	B																																		
25	A	8.6	8.3	8.5	8.2		9.1	10.0		10.0		720	713	723	727												20.9	20.2	21.3	20.5		0	0	0	0
			8.3	8.2	8.4	8.3		7.0	5.6	6.4	5.8																								
	B																																		
50	A	8.7	8.4	8.6	8.3		8.5	8.9	8.7	8.7		907	876	920	908												20.9	20.5	20.6	20.2		0	0	0	0
			8.3	8.2	8.4	8.3		6.5	4.3	4.3	4.1																								
	B																																		
100	A	8.8	8.5	8.7	8.3		7.3	6.7	7.6	8.0		1270	1229	1256	1264		610	585	535	585		260	270	280	300		21.2	20.4	20.8	20.9		/	/	/	/
			8.3	8.3	8.4	8.3		4.0	2.6	2.4	2.2																								
	B																																		

_____ HOUR LC - 50 = _____ 95% CONFIDENCE LIMITS: _____ TO _____ METHOD OF CALCULATION: _____

COMMENTS: _____

VF - REPRESENTS INITIAL/FINAL

MEN00775

ACUTE TOX. DATA SHEET

CLIENT: Menasha - 1Am
PROJECT NO: _____ EFFLUENT: ✓ CHEMICAL (SPECIFY): _____
SAMPLE ID: _____ GRAB: ✓ COMPOSITE: _____ COLLECTED BY: _____
TEST STARTED: (Date/Time) 3/24/921 3:30 pm ENDED: (Date/Time) 3/28/921 3:15 pm TEST SPECIES: P. promelas AGE: 12 days WEIGHT/LENGTH: _____
ORGANISMS PER CONCENTRATION: 20 DILUTION WATER: Kalamazoo River TEST CONDUCTED BY: SB / LS
STATIC: _____ STATIC RENEWAL: ✓ FLOW - THROUGH: _____ TOTAL VOLUME PER CHAMBER: 750 ml

CONC. OR % EFF.	REP	pH (standard unit) 0	24	48	72	96	DISSOLVED OXYGEN (mg/l) 0	24	48	72	96	CONDUCTIVITY (umho/cm) SALINITY (mg/l) 0	24	48	72	96	TOTAL ALKALINITY (mg/l CaCO3) 0	24	48	72	96	TOTAL HARDNESS (mg/l CaCO3) 0	24	48	72	96	TEMPERATURE (°C) 0	24	48	72	96	CUMULATIVE MORTALITY 24	48	72	96
Lab	A	8.2	8.2 (VF)	8.2 (VF)	8.2 (VF)	8.2 (VF)	8.1	8.1 (VF)	8.2 (VF)	8.3 (VF)	8.2 (VF)	333	334	359	342		65	65	65	65		90	90	90	96		21.5	21.0	21.6	22.9		0	0	0	0
Control	B																																				
River	A	8.5	8.2	8.1	8.2		10.6	10.5	10.4			540	539	541	536		220	210	220	205		264	252	258	260		20.9	21.4	22.2	20.2		0	0	0	0
Control	B		8.3	8.3	8.4	8.3	10.5	8.5	8.0	8.1	8.5																										
6.25	A	8.6	8.3	8.2	8.3		10.1	10.1	10.3	10.2		592	582	594	589												21.2	20.1	22.0	20.7		0	0	0	0
	B		8.4	8.3	8.4	8.4		7.8	7.4	7.5	7.9																										
12.5	A	8.6	8.3	8.4	8.3		10.3	10.1	10.0			654	654	652	654												21.2	20.3	21.7	20.7		0	0	0	0
	B		8.4	8.3	8.4	8.4	9.6	7.6	6.9	7.0	7.2																										
25	A	8.7	8.4	8.6	8.4		9.1	9.9	10.3	9.9		766	765	759	772												21.3	20.9	21.5	20.8		0	0	0	0
	B		8.4	8.4	8.4	8.4	9.1	7.6	5.6	6.2	6.4																										
50	A	8.8	8.5	8.7	8.5		8.4	9.0	9.6	9.8		990	992	979	990												21.4	20.9	20.9	20.4		0	0	0	0
	B		8.4	8.3	8.5	8.4		4.6	4.2	4.2	4.4																										
100	A	8.9	8.6	8.7	8.2		7.3	7.5	7.7	8.3		1451	1433	1481	1447		675	660	660	670		250	250	260	250		22.9	20.9	20.9	20.4		0	0	0	0
	B		8.5	8.4	8.5	8.4		2.9	2.4	1.6	1.8																										

96 HOUR LC - 50 = >100% 95% CONFIDENCE LIMITS: _____ TO _____ METHOD OF CALCULATION: _____

COMMENTS: _____

VF - REPRESENTS INITIAL/FINAL

MEN00776

ACUTE T[illegible] DATA SHEET

CLIENT: Menasha Dam PROJECT NO: _____ EFFLUENT: ✓ CHEMICAL (SPECIFY): _____

SAMPLE ID: _____ GRAB: ✓ COMPOSITE: _____ COLLECTED BY: _____

TEST STARTED: (Date/Time) 3/24/92 13:45 ENDED: (Date/Time) 3/28/92 3:30 TEST SPECIES: P. promelas AGE: 12 days WEIGHT/LENGTH: _____

ORGANISMS PER CONCENTRATION: 20 DILUTION WATER: Kalamazoo River TEST CONDUCTED BY: SB / LS

STATIC: _____ STATIC RENEWAL: ✓ FLOW - THROUGH: _____ TOTAL VOLUME PER CHAMBER: 750 ml

CONC. ON % EFF.	REP	pH (standard unit) 0	24	48	72	96	DISSOLVED OXYGEN (mg/l) 0	24	48	72	96	CONDUCTIVITY (umho/cm) SALINITY (mg/l) 0	24	48	72	96	TOTAL ALKALINITY (mg/l CaCO3) 0	24	48	72	96	TOTAL HARDNESS (mg/l CaCO3) 0	24	48	72	96	TEMPERATURE (°C) 0	24	48	72	96	CUMULATIVE MORTALITY 24	48	72	96
		(VF)	(VF)	(VF)	(VF)		(VF)	(VF)	(VF)	(VF)																											
Lab	A	8.2	8.2	8.2			8.1	8.3	8.3																												
		18.2	7.9	7.9	8.1	8.1	18.1	8.1	7.8	7.9	8.2	331	334	339	342		65	65	65	65		90	90	90	96		21.5	21.0	21.0	22.9		0	0	0	0
Control	B																																0	0	0	0
River	A	8.2	8.3	8.3	8.4	8.3	10.5	10.6	10.6	10.4	8.5	540	539	541	536		220	210	220	205		264	256	258	260		26.7	24.4	22.0	20.2		0	0	0	0
Control	B																																0	0	0	0
6.25	A	8.2	8.4	8.2	8.4	8.3	10.2	10.2	10.1	10.0	7.7	586	575	578	575												20.6	19.9	21.5	20.1		0	0	0	0
	B																																0	0	0	0
12.5	A	8.2	8.4	8.3	8.4	8.3	10.0	9.2	9.8	7.1	7.5	632	613	620	632												20.8	19.9	21.5	19.8		0	0	0	0
	B																																0	0	0	0
25	A	8.3	8.4	8.3	8.4	8.3	9.8	10.3	9.2	9.1	6.5	719	696	688	720												20.8	19.8	21.5	19.6		0	0	0	0
	B																																0	0	0	0
50	A	8.4	8.4	8.2	8.4	8.3	8.6	9.6	9.4	9.4	5.1	890	851	882	916												20.8	19.9	21.2	19.5		0	0	0	0
	B																																0	0	0	0
100	A	8.4	8.5	8.3	8.4	8.4	7.5	7.4	7.6	7.7	2.4	1247	1148	1182	1269		605	585	600	585		279	289	289	280		20.9	20.4	20.9	19.2		0	0	0	0
	B																																0	0	0	0

96 HOUR LC - 50 = >100 % 95% CONFIDENCE LIMITS: _____ TO _____ METHOD OF CALCULATION: _____

COMMENTS: _____

I/F - REPRESENTS INITIAL/FINAL

MEN00777

MEN00778

PAPERBOARD DIVISION

MENASHA CORPORATION

June 29, 1992

Mr. Scott Hanshue
Michigan Dept. of Natural Resources
621 10th Street
P.O. Box 355
Plainwell, MI 49080

Dear Scott,

In accordance with our NPDES Permit #MI0003824 biomonitoring tests have been completed in Outfall 000. The attached results, completed between November 1991 and June 1992, clearly indicate that there is no significant toxicity from our outfall.

If you have any questions concerning the enclosed test results, feel free to contact me at 692-6141.

Sincerely,

Otsego Paperboard Division

Keith B. Kling

Keith B. Kling
Environmental Supervisor

cc: Pete DeRossi
Al Switzenberg
Len Myers
Paul Jachim
Gary Roys

ac

Otsego Mill
320 N Farmer St
PO Box 155
Otsego MI 49078-0155
1-616-692-6141
1-616-692-2060 (Fax)