

① 1st Sunday & Jesus
ply to C. D.

41-LFS-3



April 20, 1978

Mr. Dennis Robichaud
Cedar Lake District
Route #1
Kiel, WI 53042

Re: Cedar Lake Sediment Sampling

Dear Mr. Robichaud:

In accordance with the agreement between our office and the Cedar Lake District, we are respectfully submitting this letter report of the findings of our sediment sampling of Cedar Lake, Manitowoc County, Wisconsin.

Introduction

The purpose of this report is to present the data gathered on Cedar Lake and to determine the approximate volume of sediments in the lake.

Lake bottom sediments in Cedar Lake were sampled on March 7 and 8, 1978. Sampling included the determination of the depth of soft sediments and the collection of soft sediment samples. All sampling locations are illustrated on Map 1.

Depth of Sediment Analysis

The depth to the soft sediments was determined by lowering a probe to the surface of the sediments. The thickness of the soft sediments was determined by forcing a probe into the soft sediment to the point of refusal. The data collected is presented in the following table:

	<u>Depth To Sediments</u>	<u>Thickness Of Sediments</u>
# 1	~7 feet	11 feet
# 2	25	21
# 3	8	10
# 4	17	17
# 5	17	21
# 6	8	37
# 7	5	0
# 7A	5	22
# 7B	7	20
# 7C	12	15
# 8	21	29
# 9	18	10
#10	20	25

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This data was then used to construct a sediment isopach map (Map 2) which illustrates the approximate thickness of soft sediments. The isopach map was then used to calculate the approximate volume of soft sediments. The method used was as follows:

1. The total area of each contour was determined.
2. The volume of sediments was calculated using the following equation:

$$\frac{43560 \text{ ft}^2/\text{acre} \times \text{depth of sediments}}{27 \text{ ft}^3/\text{Yd}^3} \times \text{No. of acres} = \text{Yd}^3 \text{ of Sediment}$$

The areas and volumes of sediment contours are as follows:

5 foot contour	52.0 acres	419,500 Yd ³
15 foot contour	39.1 acres	946,200 Yd ³
25 foot contour	14.8 acres	596,900 Yd ³
35 foot contour	2.7 acres	152,500 Yd ³
TOTAL	108.4 acres	2,115,100 Yd ³

The total surface area of the lake is approximately 139 acres. Approximately 22 percent of this area appears to be free of soft sediments.

Soft Sediment Analysis

Samples of the soft sediments were collected using a core sampler. A sample was collected at each point with the exception of point number seven where soft sediments were not present.

The samples were composited and chemical and physical analyses were conducted. The sample was approximately 8 percent total dry solids. The results of a chemical analysis of the dry solids is shown in the following table:

Total nitrogen-----	15,700	mg/kg
Ammonia-----	5,800	"
Total Phosphorus-----	440	"
Total Potassium-----	245	"
Arsenic-----	15.579	"
Cadmium-----	0.002	"
Chromium-----	16.3727	"
Copper-----	19.6473	"
Lead-----	65.4911	"
Mercury-----	0.0126	"
Nickel-----	13.0982	"
Zinc-----	136.2216	"

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A physical analysis was also run on the sediment sample and the percent of organic material was determined. The sample was approximately 50% to 60% organic material. The organic portion of the sample was then oxidized and a sieve analysis using Nos. 18, 25, 40, 80, and 200 mesh sieves was run on the remaining inorganic portion. The results of the sieve analysis are as follows:

% larger than sand-----	0
% coarse sand-----	0
% medium sand-----	3
% fine sand-----	22
% silt and clay-----	75

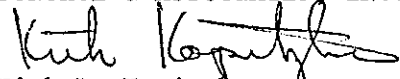
Conclusions

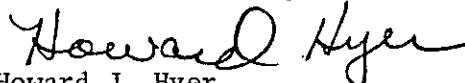
Based on the results of this study the approximate volume of sediments in Cedar Lake was found to be 2,115,100 cubic yards. The analyses of these sediments indicates that the concentrations of metals found in the sample were not restrictive to land application of the sediments.

Should you have any questions regarding this report, please contact our office.

Very truly yours,

DONOHUE & ASSOCIATES, INC.

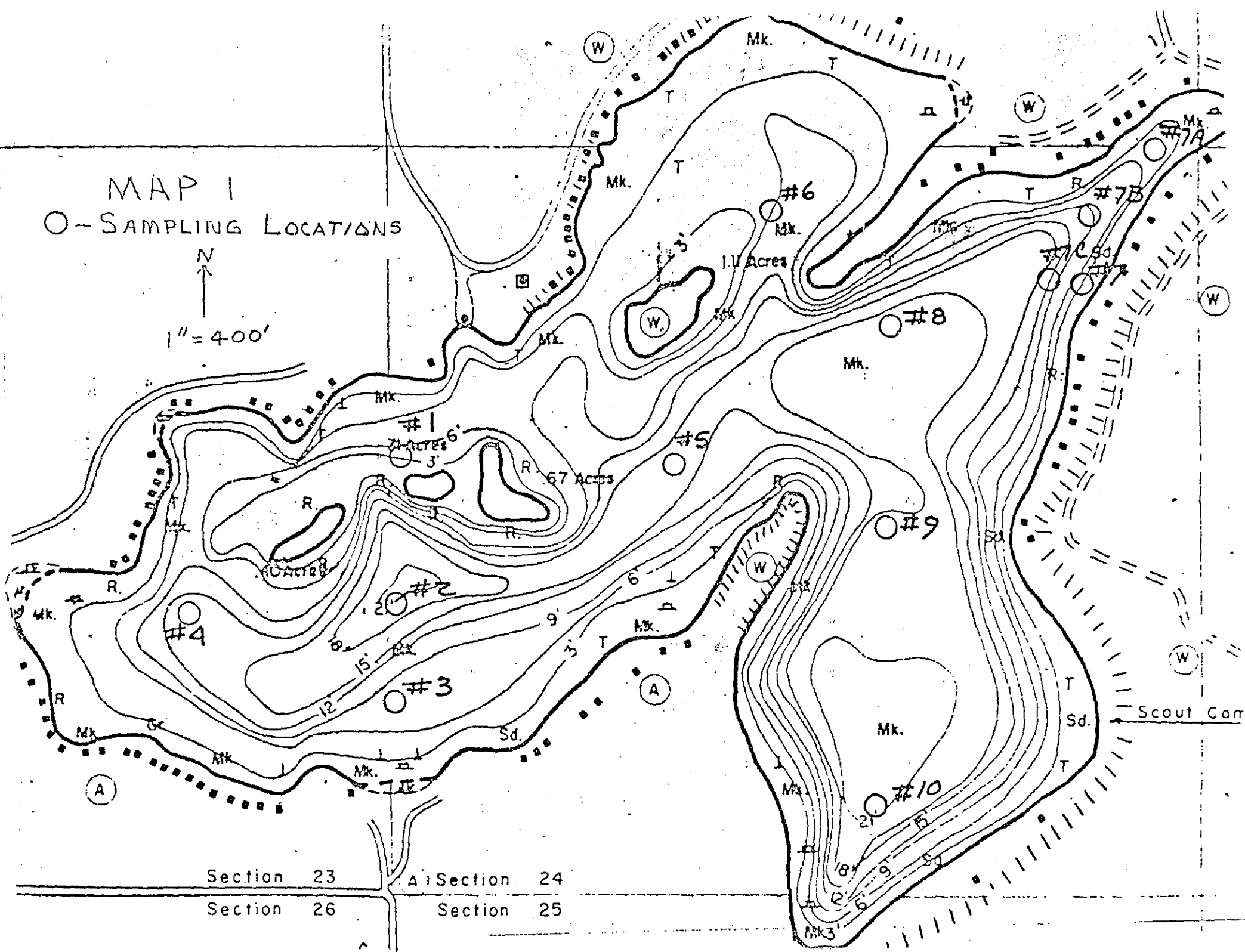

Kirk L. Kopitzke
Biologist & Geologist


Howard J. Hyer
Biologist

HJH/gh

MAP 1
O - SAMPLING LOCATIONS

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1" = 400'



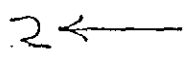
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MAP 2 ISOPACH CONTOURS



1" = 400'

