NATIONAL WATER RESEARCH INSTITUTE, HYDRAULICS RESEARCH DIVISION
TECHNICAL NOTE.

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HYDRAULICS DIVISION

Technical Note

DATE: April 2, 1980 REPORT NO. 80-18

TITLE: Erosion at the tip of Long Point near the Long Point Lighthouse, Lake Erie

AUTHOR: T.M. Dick

REASON FOR REPORT: This report is a sequel to a previous report No. 78-15 on the erosion and groynes at the tip of Lake Erie.

CORRESPONDENCE FILE NO:
1324-1

1. Aerial Photographs

A set of high quality aerial photographs have been obtained. These photographs have a scale of around 1:2 000 and were taken in the Spring of 1979. They cover all of Long Point.

Enlargements of the end 4000 meters of the Point have been produced by Northway at a scale of close to 1:5000. The enlargements show the end of the Point in 1955, 1973 and 1979 and have been made to have the same scale. To date no ground control survey has been done. A check on the scales is possible by measuring the groynes in the 1979 photographs and relating the groyne length on the photographs to the known lengths.

There is no doubt from the series of photographs that the north shore of the Point near the tip continues to erode.

2. Ground Survey

Attached to the Technical Note, as an Appendix, is a short report by J.R. Shaw and W.S. Haras in the Department of Fisheries and Oceans. Their report confirms the recession of the beach as noted above.

In a previous Technical Note (No. 78-15) continuing erosion was predicted and from the sections taken by OAS there has been a decline in beach volume in the surveyed region. Also, the outer edges of the groynes are being undermined.

3. Photographs

T.M. Dick and C. Bishop visited the lighthouse and beach on August 30, 1979. Several photographs were taken as a record and those of interest are attached.

Picture #1 shows a grove of trees, some of which have toppled into the lake. About one year previously this grove was clear of the water's edge.

Picture #2 shows the groynes and the beach pattern. Obviously, the house is at hazard. Two parallel bars can also be seen which run offshore of the north beach and start near the tip. It is interesting that random wave processes should produce such a well-organized result.

Picture #3 shows the longshore current generated by the waves on the south shore. This current and its load of sediment continue on into the lake for several kilometers past the end of the Point.

Picture #4 is a general view looking towards the end of the Point. The tree to the immediate right has obviously been free from erosion for some time as it has quite a large diameter of trunk. Note also that the groynes are awash so that their ability to trap and build up sand is limited. The groynes seem to be quite stable but are of insufficient height to trap large volumes of sand. The lighthouse-keeper added the culvert pipe in the foreground.

Picture #5. In this close-up the low elevation of the groyne can be seen. A low berm of fine gravel has accumulated which is insufficient for any significant resistance to erosion.

4. Trends and Implications

The erosion trend identified before seems to be continuing and the protection afforded by the groynes is likely to fail in 1980 or 1981.

A possible short-term solution is to pump up large quantities of sand along the affected section by using a suction dredge moved offshore. A longer-term solution probably requires moving the house and facilities.

5. Research Activities

The long-term sediment balance and behaviour of Long Point Spit are significant for the preservation of federal lands of ecological interest. Research studies to investigate the physical processes at work are underway in the Division.

A study of the Point as a whole is required as well as a focussed study of the shore processes near the tip of the Point in order to assess the future behaviour of the tip. Work on the research study to date has shown that the Point is not a static feature.

6. Conclusions

Long Point is of considerable interest to wild life and recreational concerns. A complete understanding of the long-term process is essential for long-term management and strategies.

In the shorter term the lighthouse and support services at the tip of Long Point are threatened and plans are required to preserve these facilities.

Surveillance should continue. The groynes have had some local effect but erosion continues.

APPENDIX

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MEMORANDUM **NOTE DE SERVICE**

TO / A: DISTRIBUTION

FROM / DE: Environmental Impact Assessment Officer,
Research and Development Division,
Ocean and Aquatic Sciences, Central Region.

SEC ... CLASSIFICATION ... DE SÉCURITÉ

OUR FILE/NOTRE RÉFÉRENCE

YOUR FILE/VOTRE RÉFÉRENCE

DATE: January 29, 1980

SUBJECT / OBJET: Long Point Erosion Protection Monitoring Program

Ocean and Aquatic Sciences has been monitoring changes in beach profile and plan where the MOT has installed groyne protection at their lighthouse facilities near the tip of Long Point. As a further update to beach response at the site, attached is material showing erosion losses and changes.

The attached table gives comparative volumes of beach material above a common datum (174.25 m above I.G.L.D.) for each survey at the four profile stations. Maximum erosion losses occurred during the spring of 1979 as a result of an easterly storm on April 6. Profiles P-1 and P-4, which are located to the west and east of the groyne system, respectively, lost twice the amount of beach material than did the protected beach profiles (P-2 and P-3). Some of this eroded material washed inshore. With the exception of P-4 (east beach), there are signs of subsequent beach recovery; however, as of the last survey taken in November 1979, it has been marginal. Comparing net changes over the entire survey period, August 1978 to November 1979, erosion at the outer profiles (P-1 and P-4) is twice that of protected beach stations.

Cross sections show a continuous recession of the beach at all four sites. This averaged 7.3 m for the survey period referenced to elevation 174.25. In addition, the attached plan of the groyne system shows water's edge positions as recorded on the first and last surveys. It indicates general recession in spite of a drop in lake level of 22 cm. Furthermore, the pattern of deposition indicates a reversal in littoral current. During the surveys, no predominant direction has been evidenced. This reversal in drift direction may be the cause for the lack of any overall infilling.

Because of continuing recession at P-4, east of the groyne protection, the baseline has been lengthened another 150 m to extend the coverage for better analysis.

Snow fencing did not accumulate any significant amounts of wind-blown sand prior to its complete destruction during the storm of April 6.

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It was further observed that the outer ends of the groynes have been undermined and have not accumulated any material. These sections may provide a better function if removed and placed as short groynes between the existing ones.

A report is currently in preparation which will provide full details of the survey results.

J. R. Shaw,
Environmental Impact Assessment Officer.

W. S. Haras,
Head, Shore Properties Studies.

JRS:sj

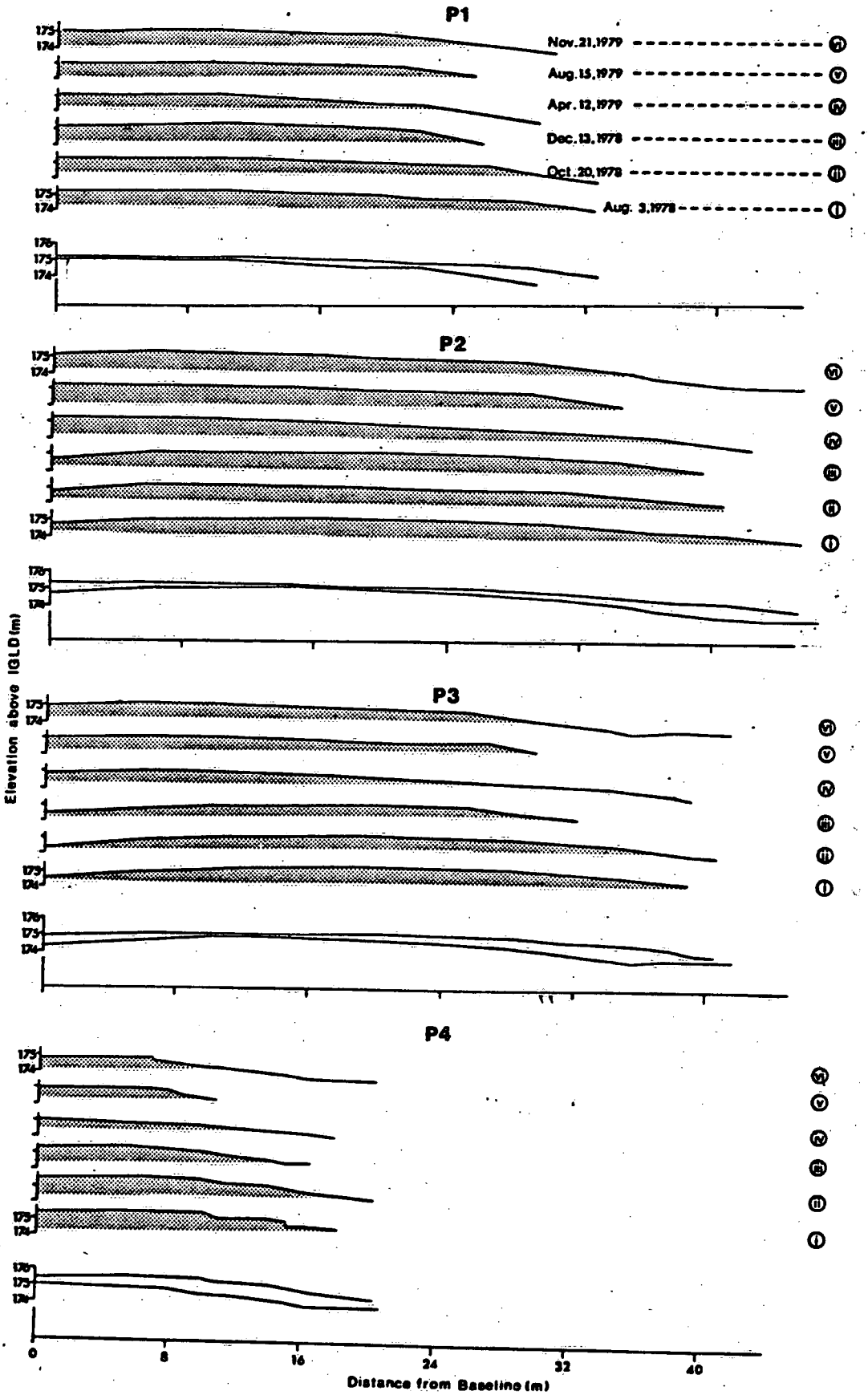
Attachment

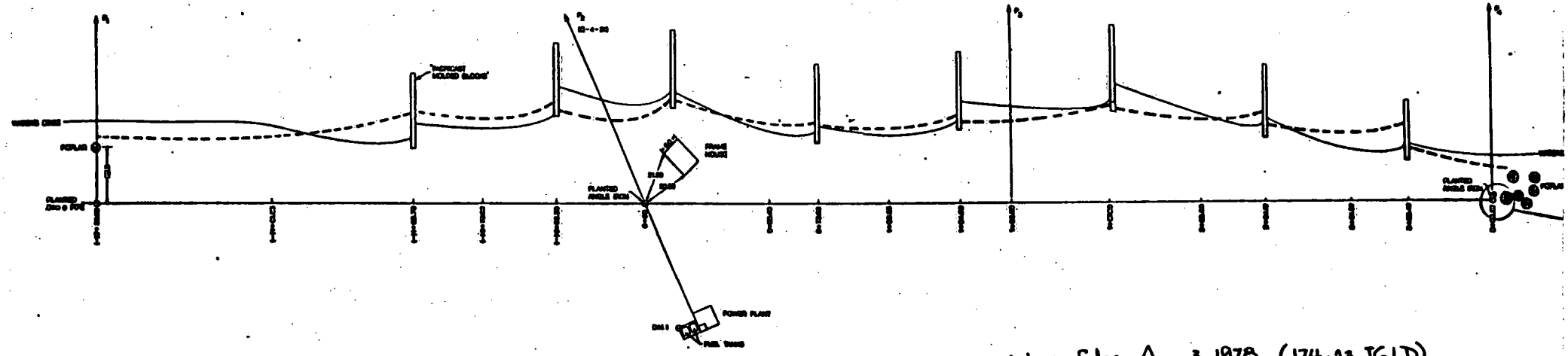
Distribution:

R. L. Wentzell, MOT
R. W. Ansley, MOT
T. M. Dick, EMS
P. Crook, MNR
J. Bryant, CWS
J. Carriero, CWS
I. Orchard, EPS
R. S. Boulden, EPS

Volumetric Changes in Beach Profile

Profile	Pre-construction						Post-construction					
	Aug 73	Oct 74	Aug 75	Aug 76	June 77	July 78	Aug 78	Oct 78	Dec 78	Apr 79	Aug 79	Nov 79
P-1							27.3	26.3	21.2	16.5	18.5	19.1
P-2 (E-4-21)	36.6	34.1	24.0	22.5	20.1	32.0	36.4	34.4	34.9	31.1	30.5	32.1
P-3							27.4	27.0	23.2	21.6	23.5	23.6
P-4							15.8	16.5	12.6	6.5	5.8	6.5


P1
Nov. 21, 1979
Aug. 15, 1979
Apr. 12, 1979
Dec. 13, 1978
Oct. 20, 1978
Aug. 3, 1978
P2
P3
P4
Elevation above IGLD (m)
Distance from Baseline (m)
0
8
16
24
32
40



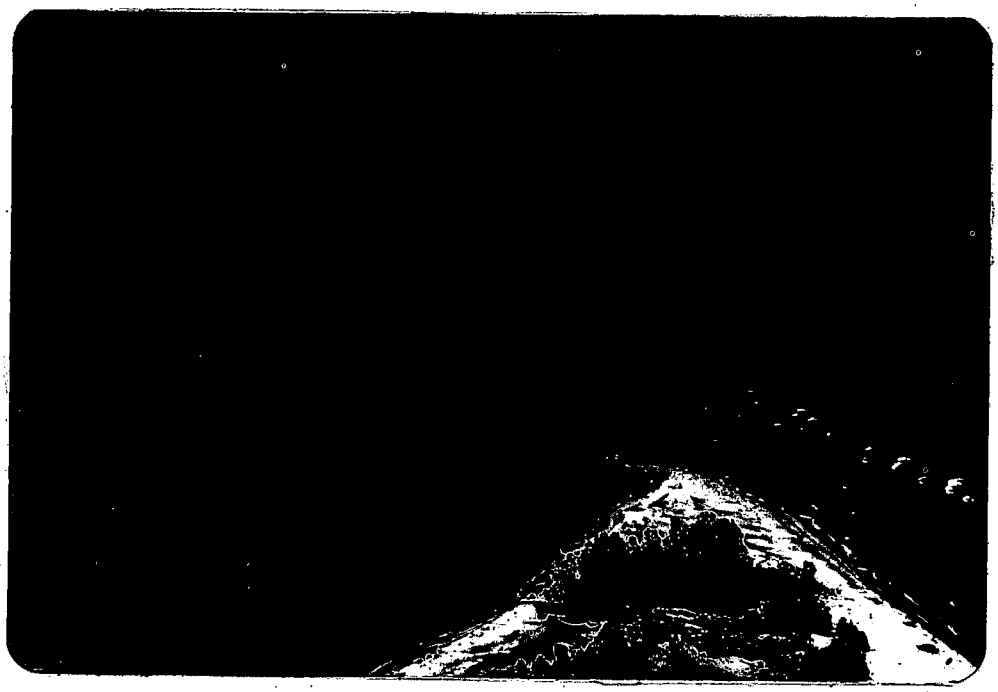
—— Water's Edge Aug. 3, 1978 (174.23 IGLD)

----- Water's Edge Nov. 21, 1979 (174.01 IGLD)

PHOTOGRAPHS

#1

#2



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