Publication No. 75-e50
WA-15-0100

MEMORANDUM

September 25, 1975

To: Glen Fiedler and John Spencer

From: Ron Pine

Subject: Liberty Bay Heavy Metal Problem - Status Report

As you are aware, there appears to be a water quality problem in Liberty Bay evidenced by oyster larvae mortalities at Sea Farms, Inc., the largest oyster spat hatchery in the state. The mortalities have been sufficient to force closure of the hatchery facility. The owner of Sea Farms, a Mr. Hanson, employed Laucks Laboratories to analyze a number of samples from his intake water for various heavy metals. The results show high concentrations of Mercury and other toxic metals.

The source of these high concentrations of heavy metals is not known, however, the Navy torpedo station at Keyport is suspected because they have a metal plating plant that is supposed to pretreat their waste and then discharge to the sewer system. EPA made an inspection of the Keyport facility and a receiving water survey the week of September 15, 1975. They found an illegal overflow connection discharging directly to the storm sewer upstream of the pretreatment plant. Plant records show three overflows in September. They also sampled all of the waste streams on the base that could conceivably contribute to the problem.

Analysis of samples collected in the receiving water did not show concentrations of Mercury as high as those found by Laucks laboratory; in fact, they were considerably lower, according to Dick Bauer of EPA.

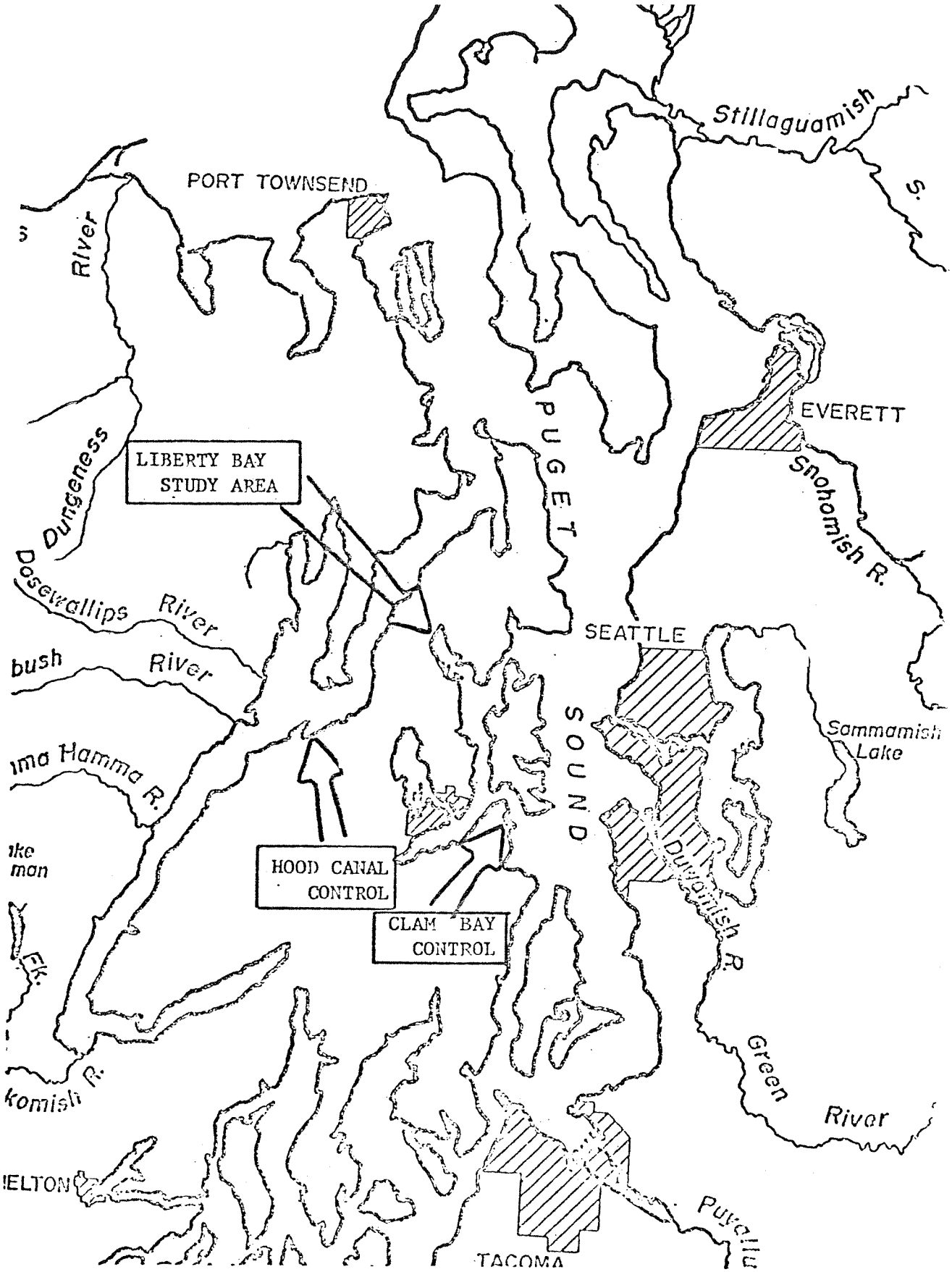
During EPA's survey a discussion was held with a local sand and gravel operator, Mr. Lanning, concerning a situation that has the potential of becoming an explosive issue. According to Mr. Lanning he used to raise oysters in Liberty Bay and in 1948 through 1950 they applied Mercuric oxide in granular form to the oyster beds for oyster drill control. This was apparently practiced throughout Puget Sound. Subsequent discussions with Cedric Lindsley, Washington Department of Fisheries, established that WDF approved the use of mercuric chloride solution for drill control on an experimental basis, in Toten Inlet, Oyster Bay, Liberty Bay, Samish Bay and at Quilcene during this same period. The then U. S. Public Health Service suggested they discontinue the practice because analysis of oyster meat showed increasing Mercury concentrations. Officially the practice was discontinued in 1950. I can see the headlines now, "We looked and looked to see who the enemy was and found out it was us!"

Liberty Bay Heavy
Metal Problem

EPA took a number of core samples of the sediment in Liberty Bay and will be analyzing these for Mercury. Depending on the results additional cores may be taken in the bays and inlets mentioned above. I indicated to Bauer that if this should occur we would want to be involved in any such decision, and if it was decided to go ahead to participate in the fieldwork.

REP:ee

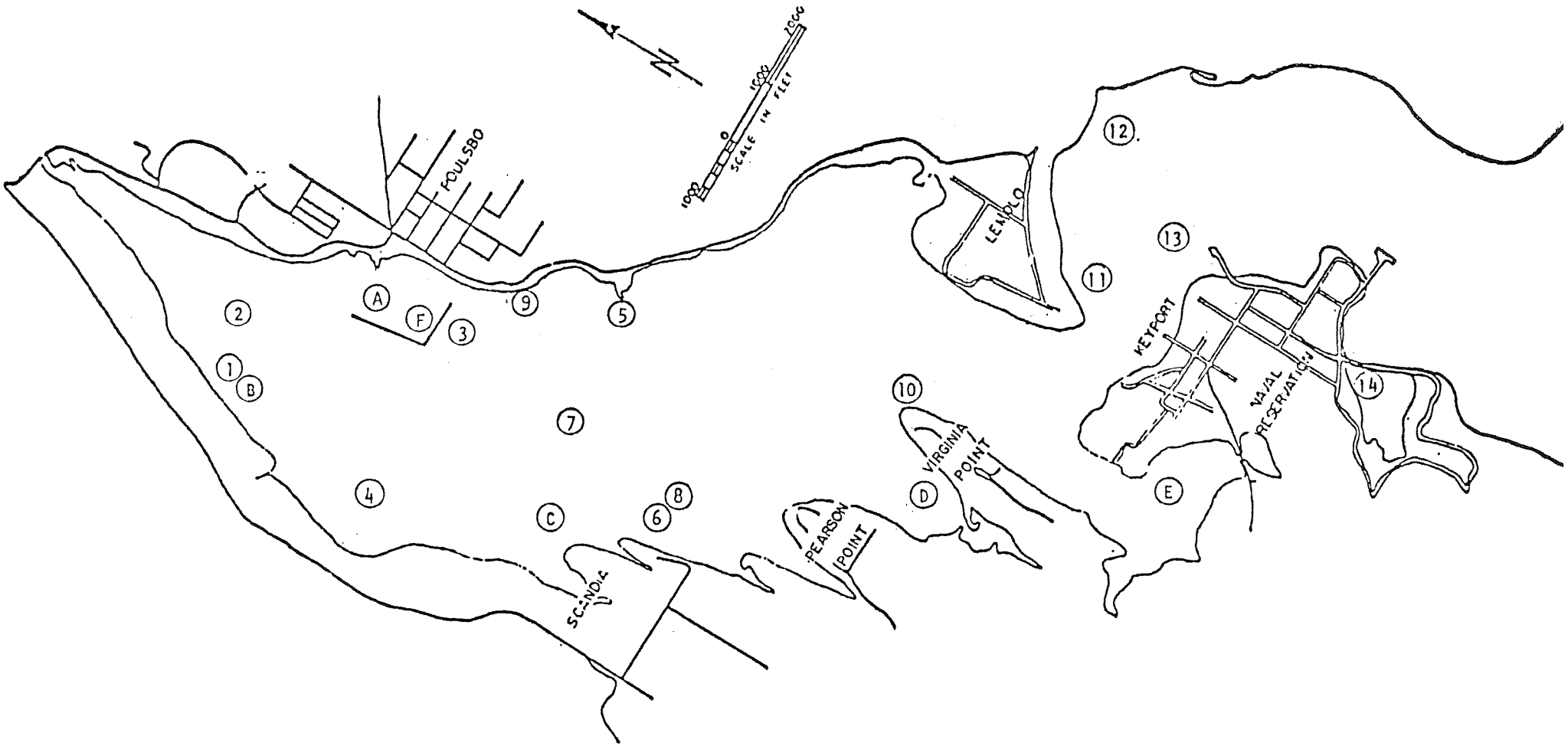
cc: Larry Lewis, DOE, Redmond



LIBERTY BAY STUDY AREA AND CONTROL SITE LOCATIONS

LIBERTY BAY STATION LOCATIONS

A-F = Core Samples 1-14 = Water and sediment grab samples



LIBERTY BAY WATER COLUMN METALS ANALYSIS
EPA INTENSIVE SURVEY

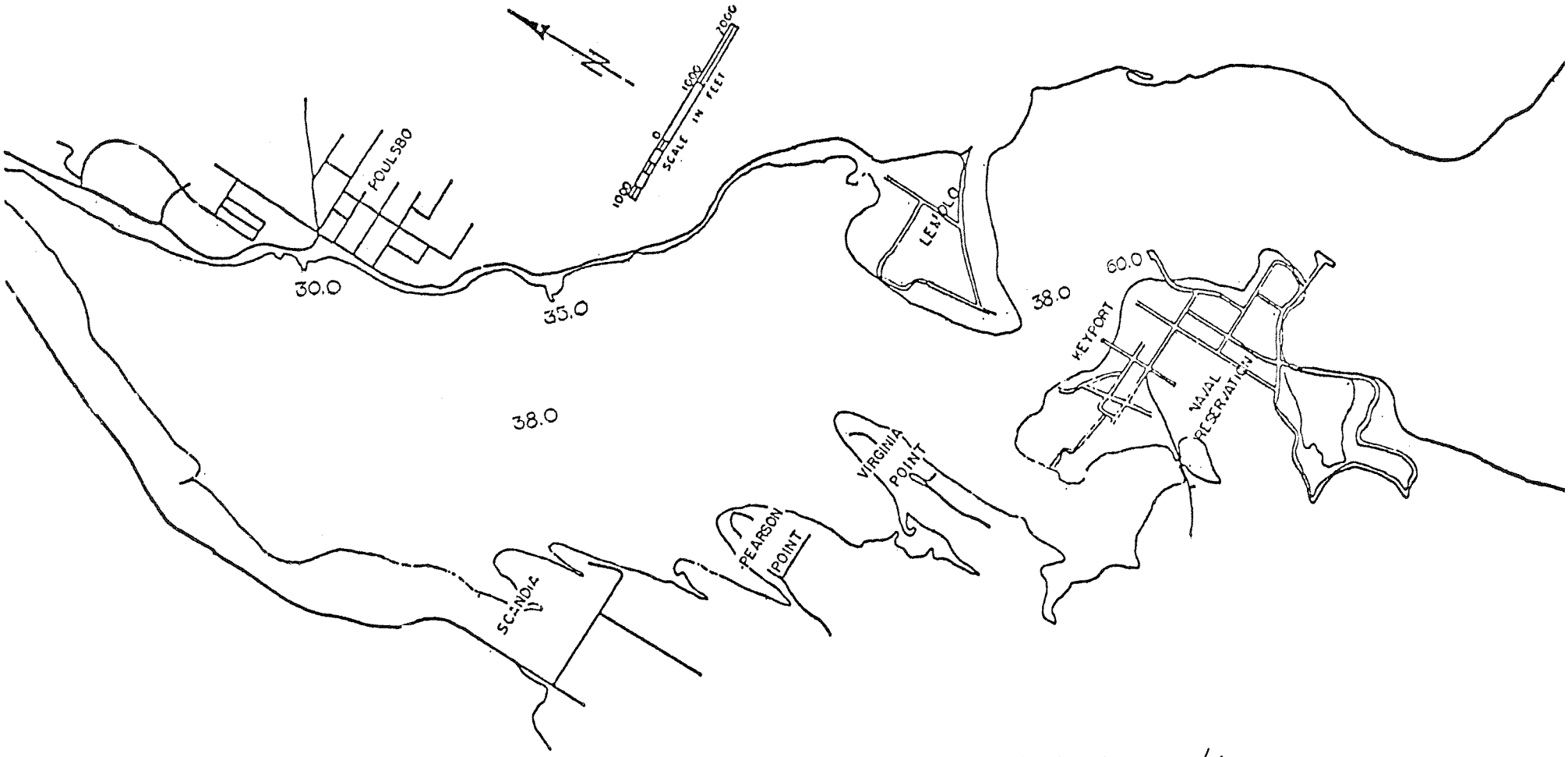
Station	Date	Tidal Stage	Depth Feet	As µg/l	Cd µg/l	Cr µg/l	Cu µg/l	Hg µg/l	Ni µg/l	Se µg/l	Zn µg/l	Pb µg/l
3	Sep. 15	High Slack	1	0.7	3.0	4.0	12.0	.03	15.0		30.0	10.0
			15	0.7	13.0	2.0	7.0	.03	20.0		30.0	10.0
			30	1.1	6.0	2.0	8.0	.03	20.0		30.0	10.0
3	Sep. 15	Low Slack	1	0.5	2.0	2.0	6.0	0.1	15.0		35.0	10.0
			10	0.4	2.0	2.0	5.0	0.1	10.0		25.0	20.0
			20	0.5	6.0	2.0	10.9	0.2	20.0		30.0	10.0
5	Sep. 15	High Slack	1	0.7	2.0	2.0	7.0	0.2	30.0		30.0	10.0<
			20	0.7	7.0	4.0	9.0	0.2	45.0		30.0	20.0
			40	0.9	4.0	2.0	9.0	0.2	35.0		35.0	10.0
5	Sep. 15	Low Slack	1	0.5	2.0	2.0	12.0	0.2	20.0		45.0	20.0
			15	0.9	2.0	1.0	10.0	0.2	15.0		35.0	20.0
			30	0.5	7.0	2.0	9.0	0.2	60.0		30.0	20.0
7	Sep. 15	Low Slack	1	0.9	7.0	3.0	6.0	0.3	20.0		40.0	30.0
			10	1.2	5.0	2.0	5.0	0.2	20.0		35.0	20.0
			20	0.7	2.0	2.0	14.0	0.3	30.0		40.0	20.0
11	Sep. 15	High Slack	1	0.7	3.0	2.0	9.0	0.1	15.0		40.0	10.0
			20	1.2	5.0	3.0	13.0	0.3	75.0		45.0	10.0
			40	1.6	5.0	3.0	29.0	0.2	190.0		60.0	20.0
11	Sep. 15	Low Slack	1	0.9	5.0	2.0	5.0	0.4	15.0		30.0	30.0
			15	0.7	5.0	2.0	4.0	0.5	15.0		30.0	25.0
			30	0.9	6.0	2.0	6.0	0.4	30.0		20.0	20.0
13	Sep. 15	Low Slack	1	1.4	6.0	2.0	8.0	0.2	35.0		110.0	30.0
			20	1.1	7.0	3.0	4.0	0.3	30.0		35.0	30.0
			40	1.2	5.0	4.0	12.0	0.3	25.0		35.0	20.0
15	Sept 15		1	0.7	6.0	2.0	7.0	0.1	15.0		—	20.0
			25	0.5	3.0	2.0	9.0	0.3	15.0		—	20.0
16	Sept 15		1	—	—	—	—	0.7	—		—	—
			35	1.2	5.0	1.0	25.0	0.3	20.0		—	20.0

15 = CONTROL - Hood Canal (Misery Point)
16 = CONTROL - Clam Bay - (Manchester)

LIBERTY BAY WATER COLUMN CHEMICAL ANALYSIS
EPA INTENSIVE SURVEY

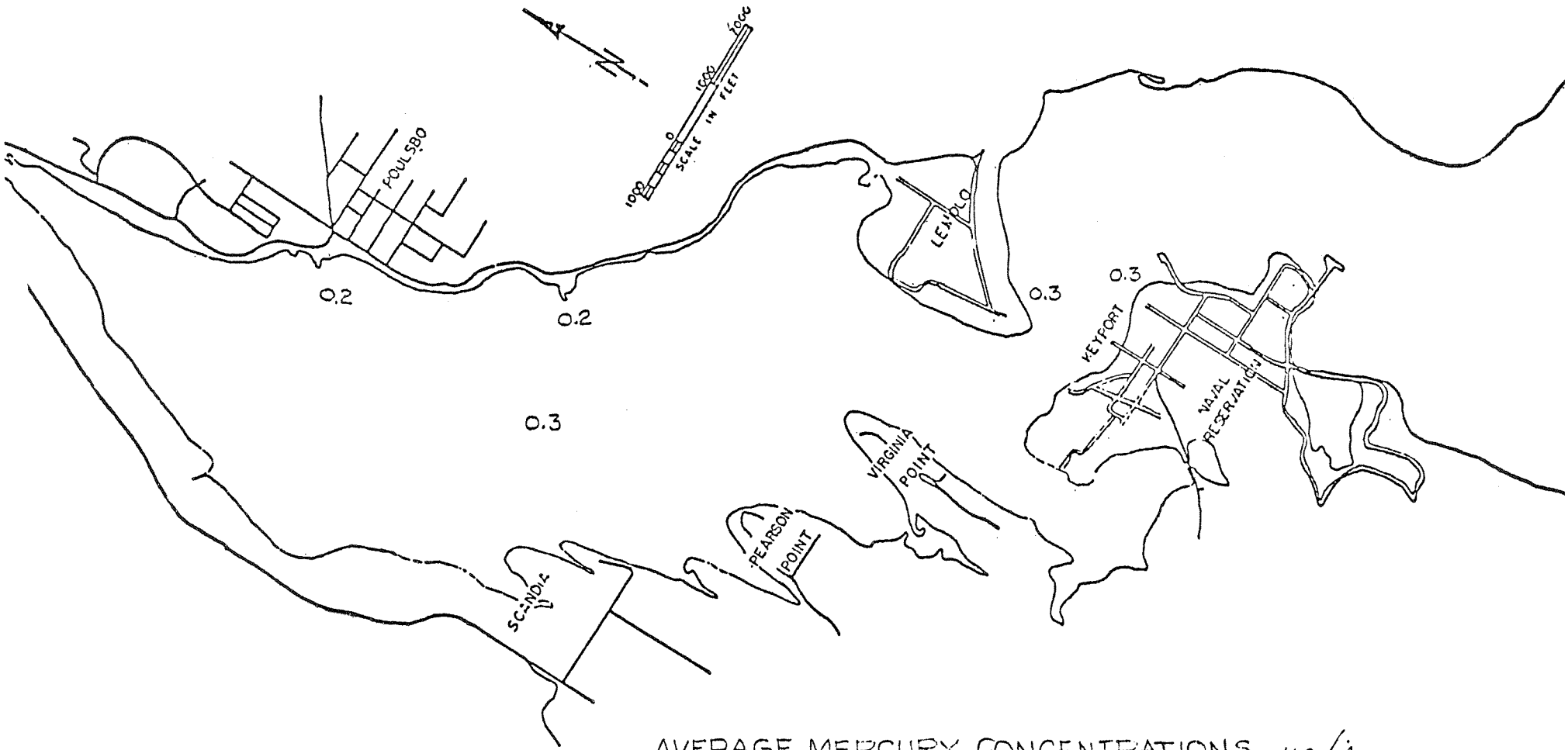
Station	Date	Tidal Stage	Depth Feet	Temp °C	Turbidity NTU	Dissolved Oxygen mg/l	N-NH_3 mg/l	T-Phos mg/l	SO_4 mg/l	PBI mg/l	TOC mg/l	LAS mg/l
3	Sep. 15	High Slack	1	14.9	2.6	12.5	.03	-	.02K	1.0	16.0	.100
			15	14.0	1.5	8.5	.05	-	.02K	2.0	3.0	.045
			30	13.5	1.8	4.8	.07	-	.02K	1.0	3.0	.045
3	Sep. 15	Low Slack	1	14.0	1.6	9.1	.12	-	.02K	3.0	9.0	.055
			10	13.8	1.4	7.0	.04	-	.02K	1.0	2.0	.030
			20	13.5	4.1	6.5	.03	-	.02K	1.0	3.0	.023
5	Sep. 15	High Slack	1	15.0	2.8	12.0	.03	-	.02K	1.0	17.0	.090
			20	14.6	1.2	8.3	.04	-	.02K	1.0	2.0	.013
			40	14.0	27.0	7.8	.06	-	.02K	9.0	2.0	.020
5	Sep. 15	Low Slack	1	14.5	1.2	10.0	.04	.280	.020K	3.0	4.0	.050
			15	14.0	1.2	7.8	.03	.032	.020K	1.0	3.0	.018
			30	14.0	2.8	7.3	.04	.074	.020K	2.0	3.0	.010
7	Sep. 15	Low Slack	1	17.0	7.5	10.5	.07	.20	.020K	3.0	50.0	.440
			10	13.5	1.7	7.2	.04	.11	.020K	3.0	3.0	.013
			20	13.5	2.4	6.8	.05	.22	.020K	1.0	3.0	.013
11	Sep. 15	High Slack	1	16.0	1.2	11.0	.02	-	.020K	1.0	4.0	.055
			20	15.0	1.3	8.5	.03	-	.020K	3.0	2.0	.020
			40	13.5	1.0	7.1	.04	-	.020K	1.0	2.0	.013
11	Sep. 15	Low Slack	1	16.5	0.9	10.0	.02	.090	.020K	1.0	2.0	.045
			15	16.5	1.2	8.1	.04	.100	.020K	1.0	3.0	.015
			30	16.0	2.3	7.1	.04	.098	.020K	2.0	3.0	.010
13	Sep. 15	Low Slack	1	17.0	1.1	11.9	.03	.082	.020K	1.0	3.0	.045
			20	17.0	1.0	7.8	.03	.080	.020K	1.0	3.0	.020
			40	14.7	0.8	7.2	.03	.550	.020K	1.0	3.0	.010

*K= less than



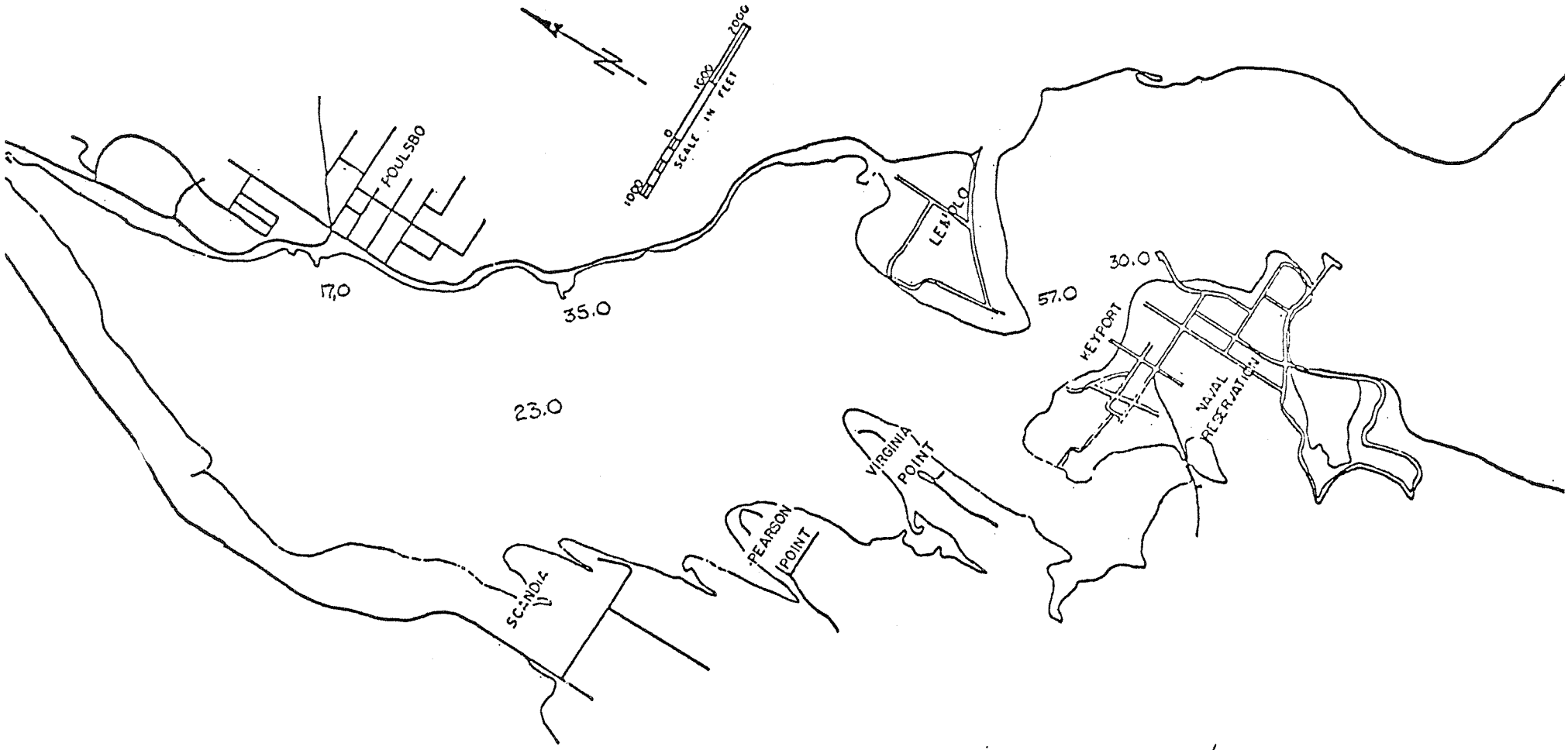
AVERAGE ZINC CONCENTRATIONS µg/l

WATER N

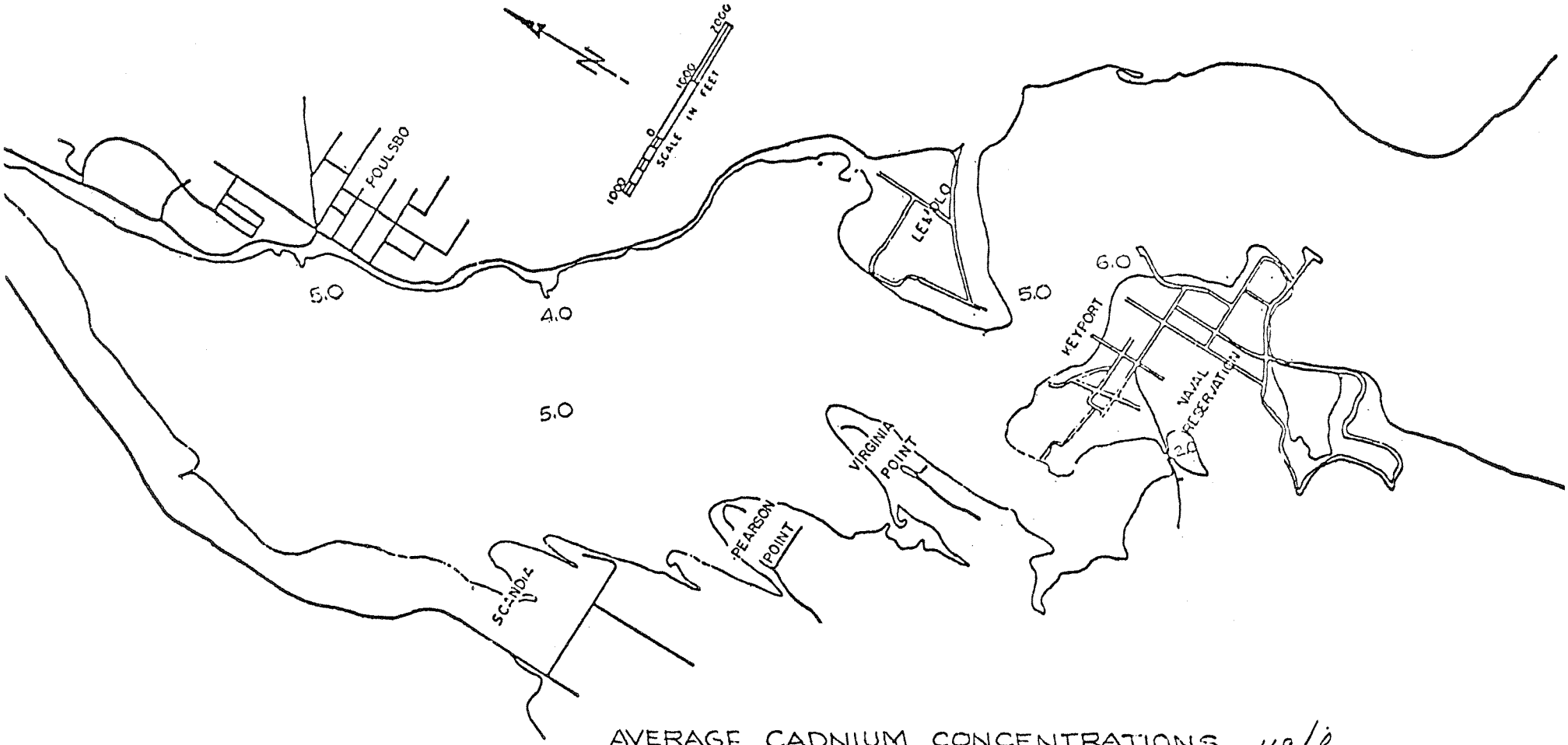


AVERAGE MERCURY CONCENTRATIONS μg/l.

WATER COLUMN



AVERAGE NICKEL CONCENTRATIONS μg/l.
WATER COLUMN



AVERAGE CADMIUM CONCENTRATIONS µg/l.
WATER COLUMN

LIBERTY BAY SURFACE SEDIMENT METALS ANALYSIS 1)

EPA INTENSIVE SURVEY SEPTEMBER 15, 1975

Station	As	Cd	Cr	Cu	Pb	Hg	Ni	Zn
2	12.0	4.2	52.0	39.0	25.0	.137	58.0	104.0
3	8.0	2.8	33.0	29.0	18.0	.107	51.0	65.0
4	11.0	3.1	50.0	31.0	25.0	.138	56.0	92.0
5	11.0	3.0	52.0	65.0	93.0	.183	110.0	237.0
7	13.0	3.6	52.0	45.0	46.0	.158	64.0	123.0
8	10.0	3.1	42.0	31.0	31.0	.130	59.0	94.0
9	5.0	1.2	17.0	7.9	12.0	.047	24.0	33.0
13	5.0	1.7	21.0	13.0	23.0	.077	23.0	52.0

1) All Values Reported as ug/g (ppm)

Dry Weight Basis

15 = CONTROL — Hood Canal (Misery Pt.)

16 = " — Clam Bay (Manchester)

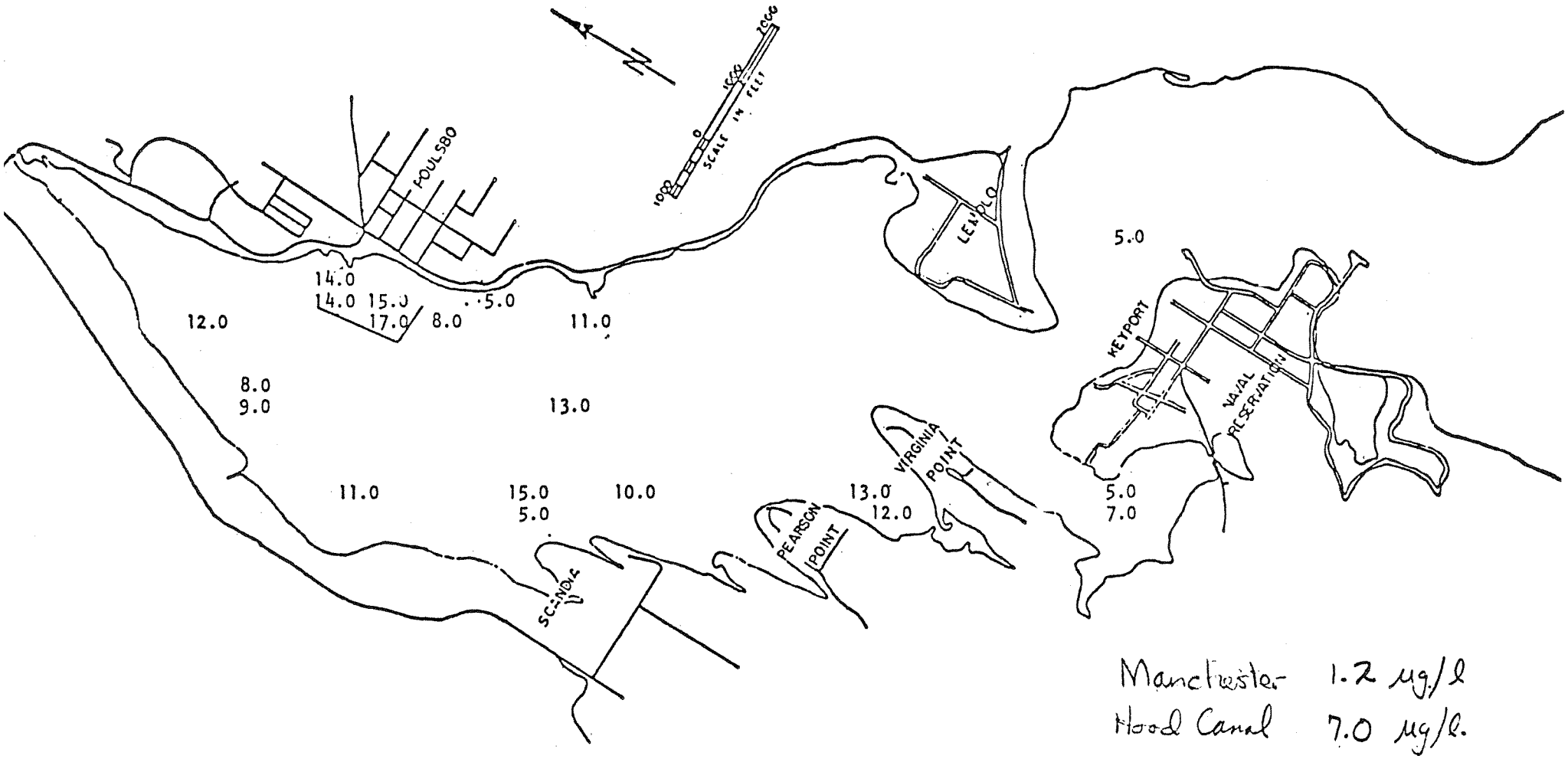
15	7.0	1.2	28.0	21.0	6.0	.026	51.0	54.0
16	4.0	1.0	22.0	21.0	31.0	.097	30.0	58.0

Liberty Bay Sediment Core Analysis [1]
EPA Intensive Survey Sept. 15, 1975

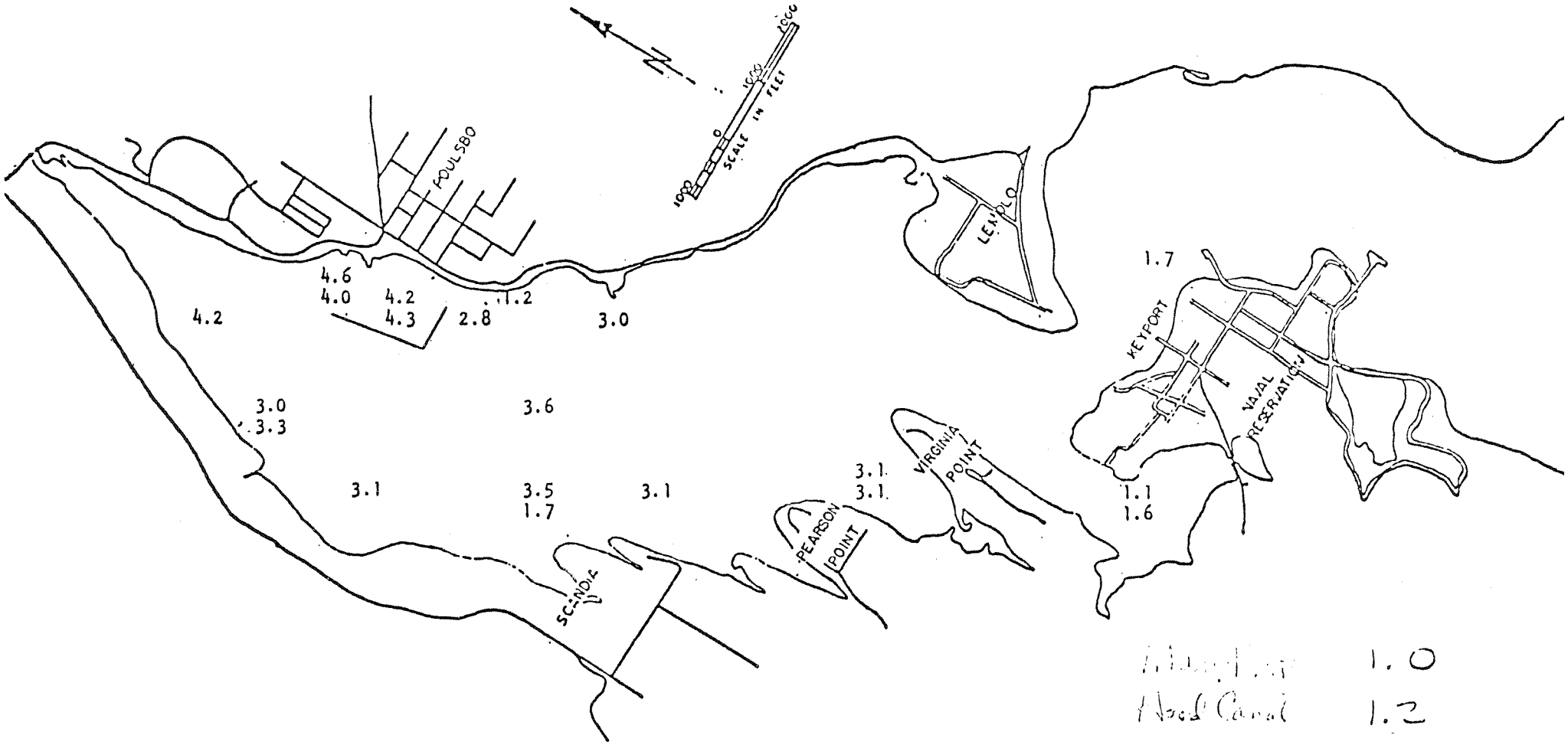
Station	Core No.	Core [2] Sample location	As	Cd	Cr	Cu	Pb	Hg	Ni	Sb	Zn	Core length inches	Sediment Penetration inches
A	1	T	9.0	4.6	73.0	54.0	80.0	.225	69.0		149.0	10.5	19.5
		M	14.0	4.0	64.0	58.0	61.0	.264	77.0		158.0		
		B	18.0	4.6	69.0	60.0	54.0	.358	113.0		154.0		
	2	T	14.0	4.0	64.0	53.0	66.0	.302	59.0		296.0	9.5	19.0
		M	12.0	4.1	64.0	60.0	60.0	.298	50.0		251.0		
		B	12.0	4.9	78.0	55.0	59.0	.197	93.0		147.0		
B	1	T	8.0	3.0	40.0	23.0	22.0	.101	79.0		76.0	5.5	10.0
		M	9.0	2.8	41.0	23.0	22.0	.119	51.0		83.0		
		B	7.0	3.3	41.0	19.0	19.0	.123	62.0		55.0		
	2	T	9.0	3.3	44.0	24.0	32.0	.125	36.0		73.0	6.5	13.0
		M	10.0	2.9	42.0	24.0	29.0	.130	75.0		86.0		
		B	8.0	2.6	41.0	17.0	19.0	.112	77.0		54.0		
C	1	T	15.0	3.5	60.0	41.0	35.0	.154	76.0		111.0	10.0	12.0
		M	14.0	3.5	51.0	39.0	35.0	.124	82.0		156.0		
		B	10.0	3.3	44.0	32.0	33.0	.153	40.0		86.0		
	2	T	5.0	1.7	21.0	13.0	12.0	.082	46.0		44.0	7.5	10.0
		M	10.0	1.7	21.0	12.0	17.0	.087	31.0		51.0		
		B	5.0	1.3	26.0	11.0	14.0	.059	18.0		41.0		
D	1	T	13.0	3.1	57.0	43.0	43.0	.173	107.0		118.0	9.5	19.5
		M	10.0	2.7	46.0	34.0	36.0	.208	100.0		105.0		
		B	10.0	3.4	44.0	20.0	14.0	.054	38.0		102.0		
	2	T	12.0	3.1	59.0	37.0	41.0	.167	61.7		113.0	9.5	20.0
		M	9.0	3.7	49.0	36.0	28.0	.154	80.0		104.0		
		B	9.0	3.7	48.0	28.0	15.0	.203	40.0		77.0		
E	1	T	5.0	1.1	18.0	10.0	8.3	.052	36.0		72.0	7.5	11.0
		M	8.0	1.1	27.0	14.0	17.0	.074	65.0		48.0		
		B	7.0	1.6	25.0	11.0	20.0	.101	20.0		41.0		
	2	T	7.0	1.6	35.0	24.0	33.0	.137	90.0		110.0	6.5	9.0
		M	5.0	1.1	24.0	12.0	11.0	.083	24.0		45.0		
		B	5.0	1.2	27.0	6.9	8.6	.086	17.0		34.0		
F	1	T	15.0	4.2	73.0	61.0	83.0	.373	55.0		151.0	9.7	16.0
		M	16.0	4.1	69.0	179.0	60.0	.351	55.0		185.0		
		B	13.0	3.3	52.0	39.0	24.0	.120	52.0		117.0		
	2	T	17.0	4.3	68.0	78.0	70.0	.369	168.0		209.0	7.0	17.0
		M	15.0	5.0	67.0	62.0	63.0	.441	63.0		145.0		
		B	18.0	4.4	78.0	63.0	56.0	.265	56.0		210.0		

[1] All value ug/g (ppm) dry weight basis

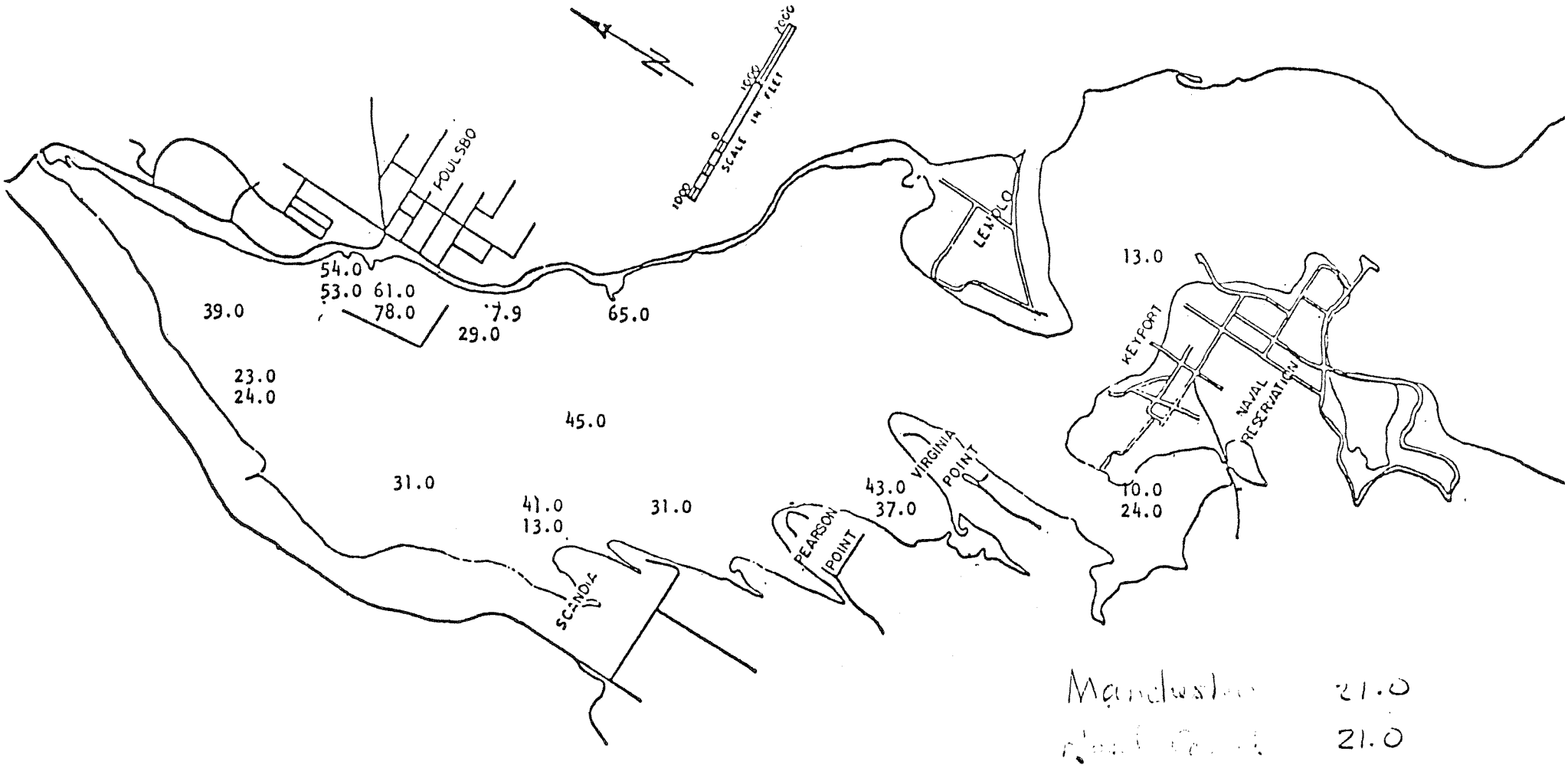
[2] T = Top of core
M = Middle of core
B = Bottom of core



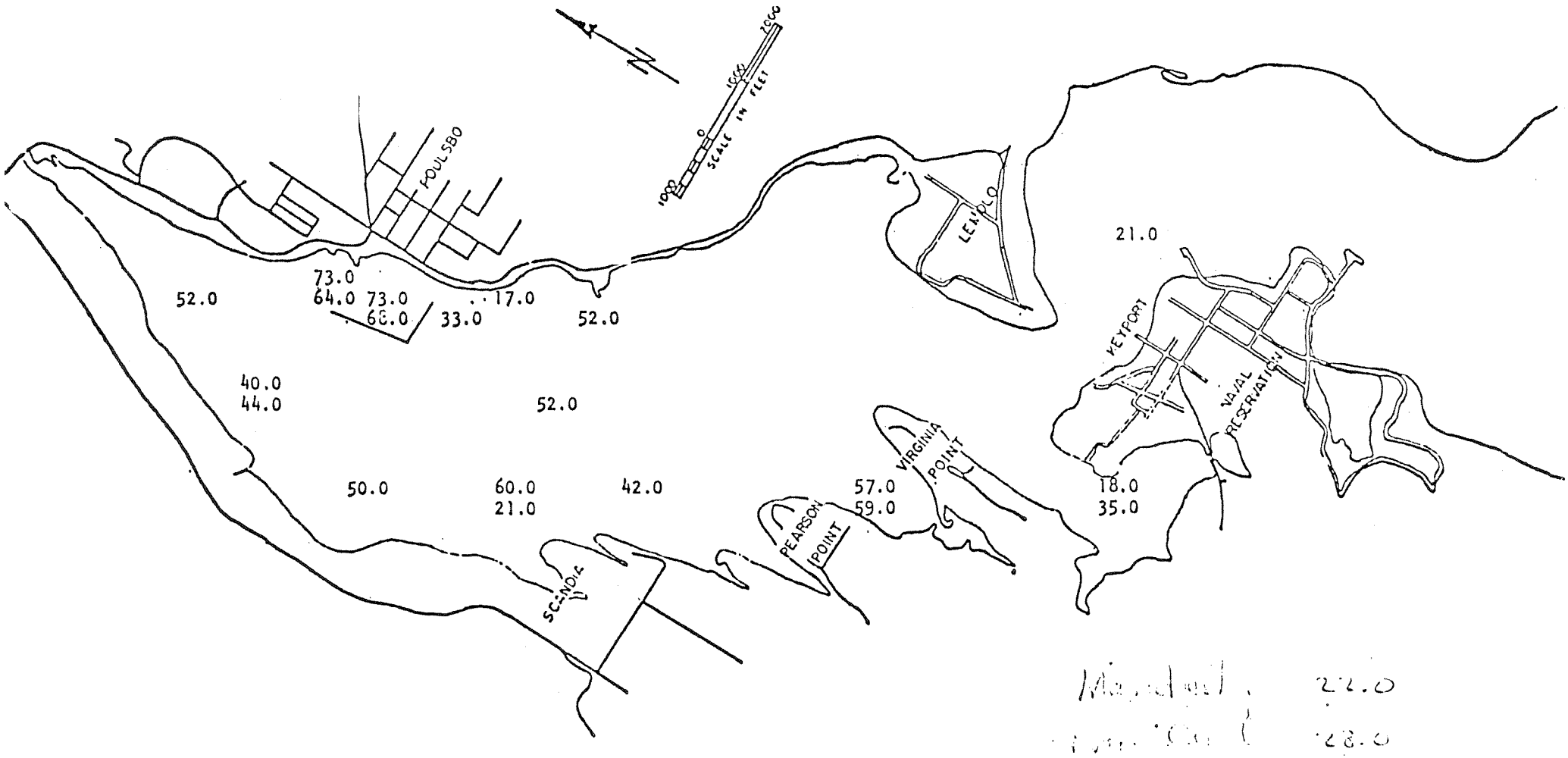
Liberty Bay Arsenic surface sediment concentration (ppm) dry weight. Sept. 15, 1975



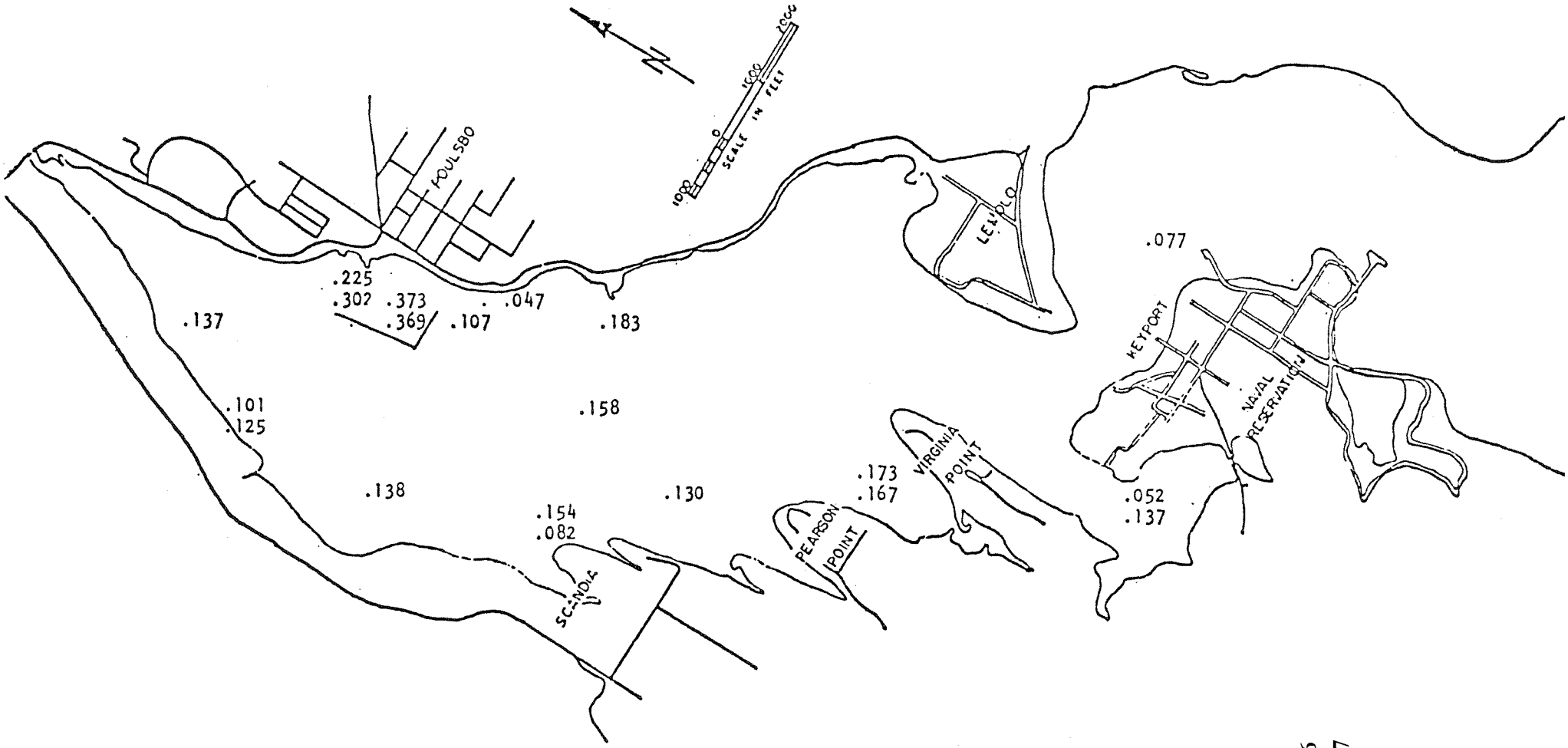
Liberty Bay Cadmium surface sediment concentration (ppm) dry weight. Sept. 15, 1975



Liberty Bay Copper sediment concentration (ppm) dry weight. Sept. 15, 1975

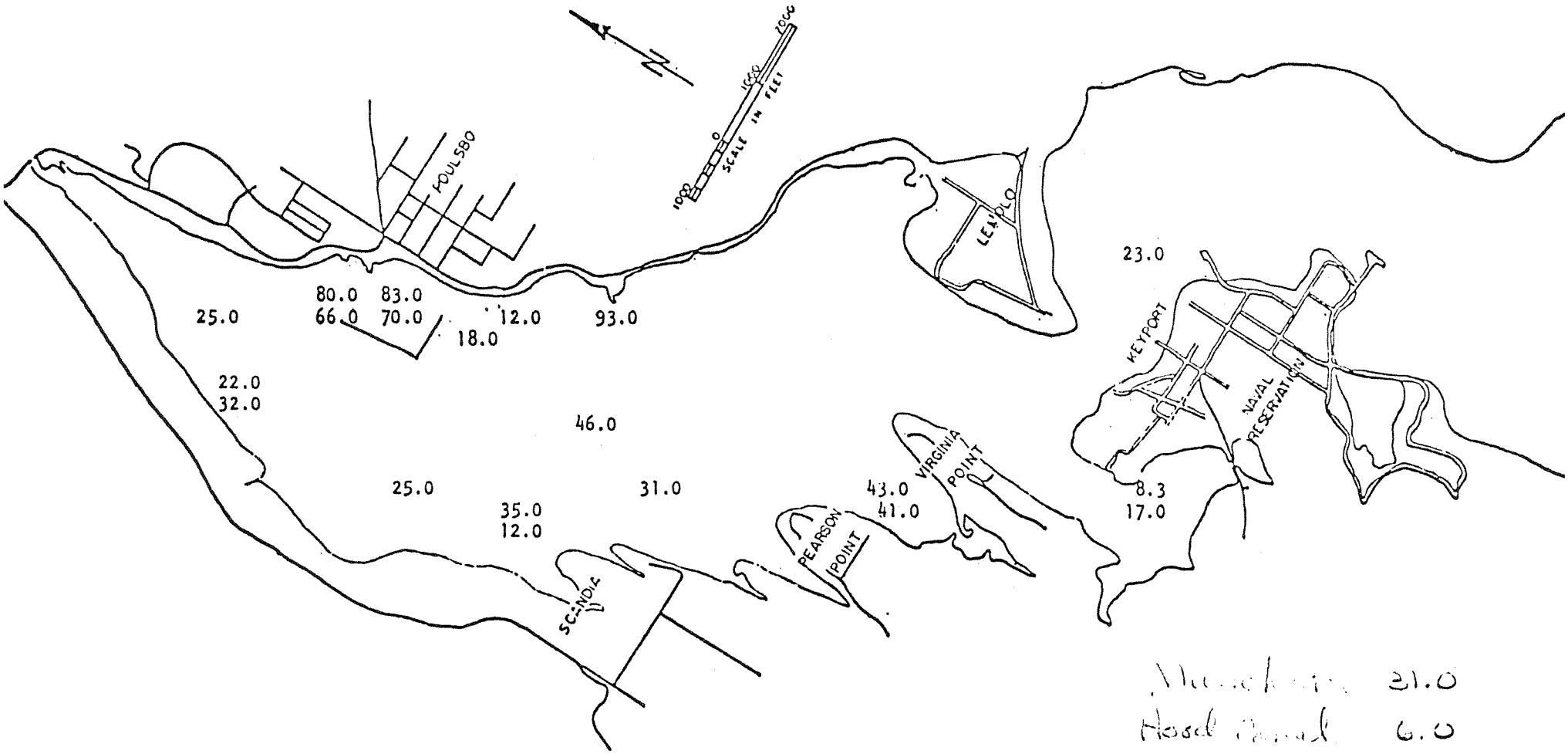


Liberty Bay Chromium surface sediment concentration (ppm) dry weight. Sept. 15, 1975

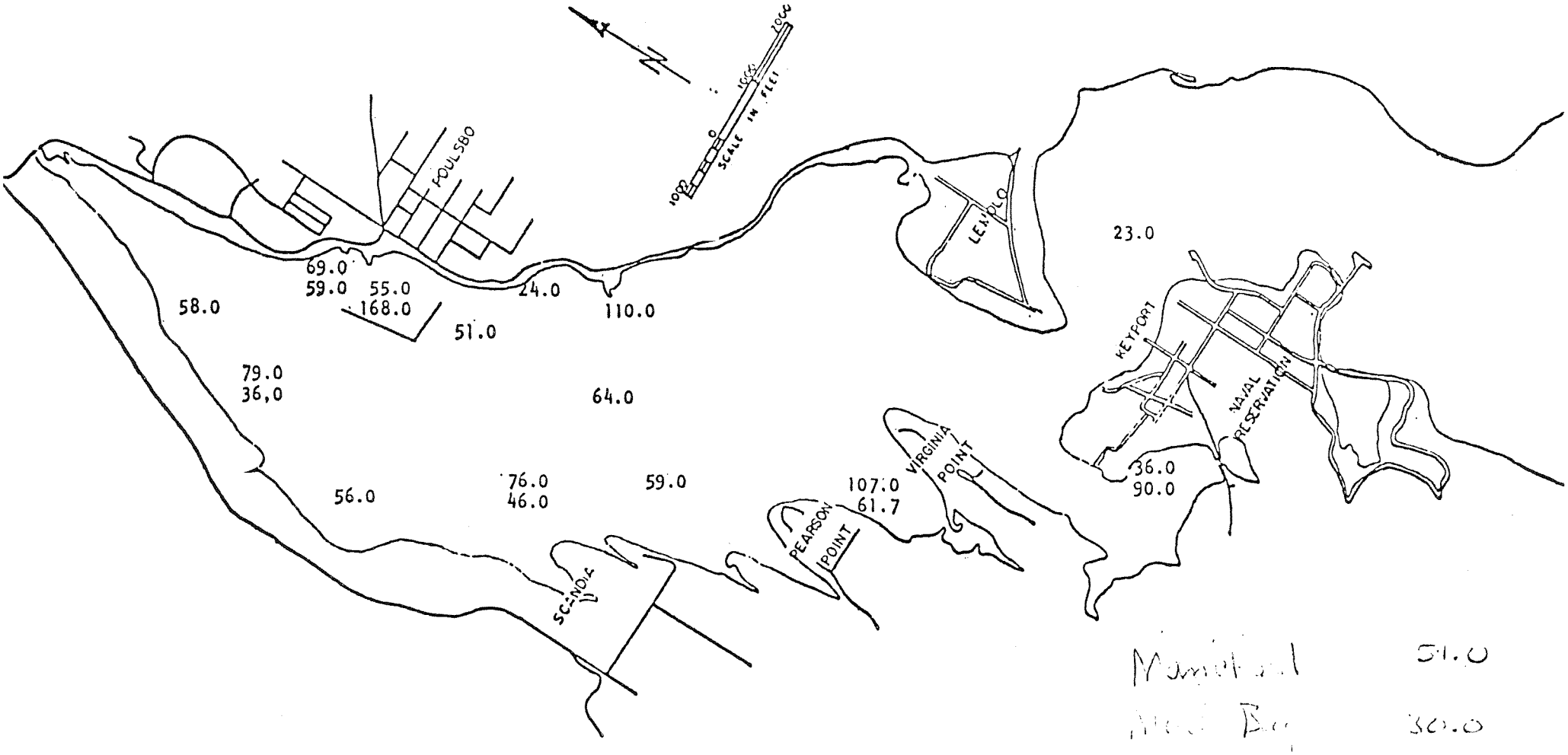


Liberty Bay Mercury sediment concentration (ppm) dry weight. Sept. 15, 1975

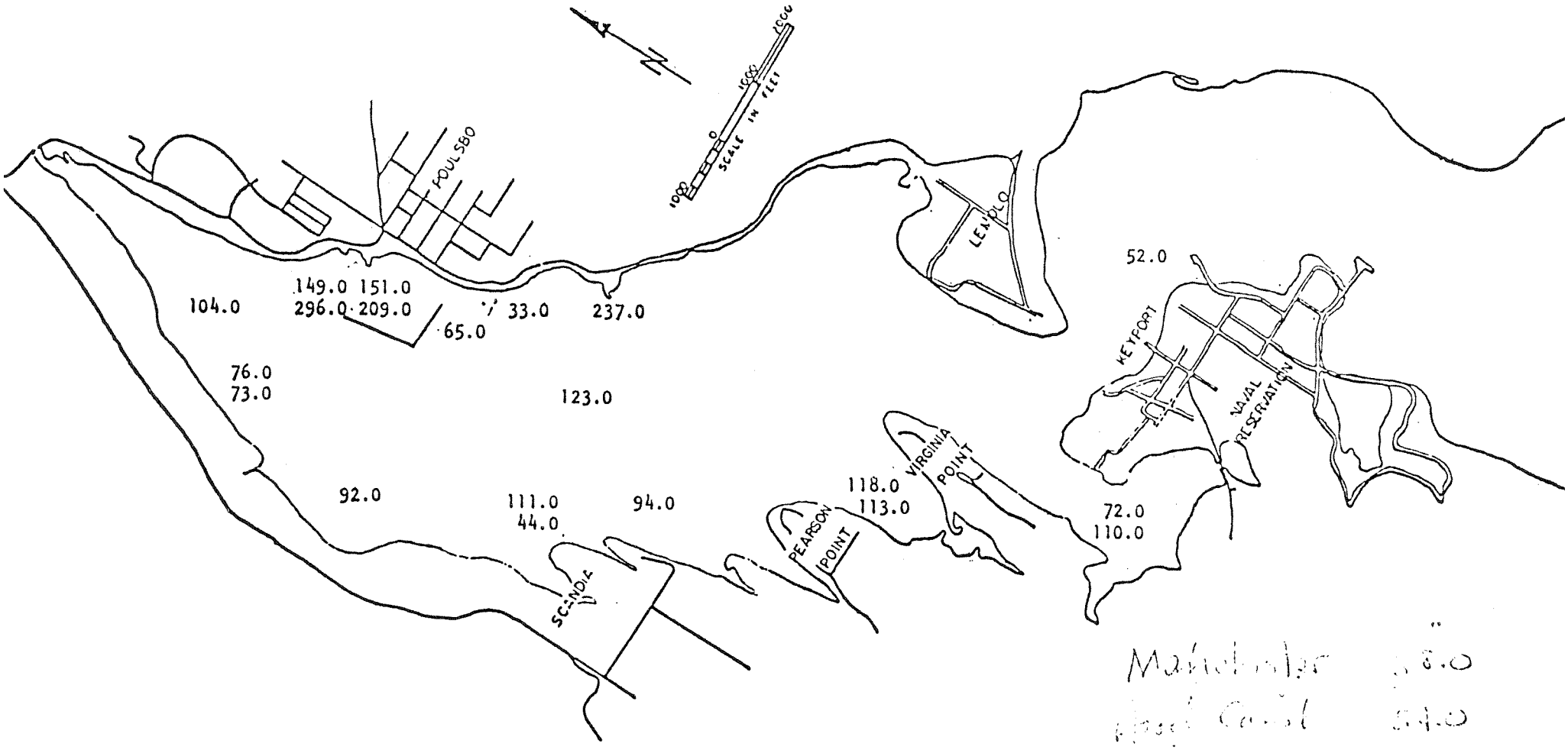
Hood Canal .066
Manchester .097



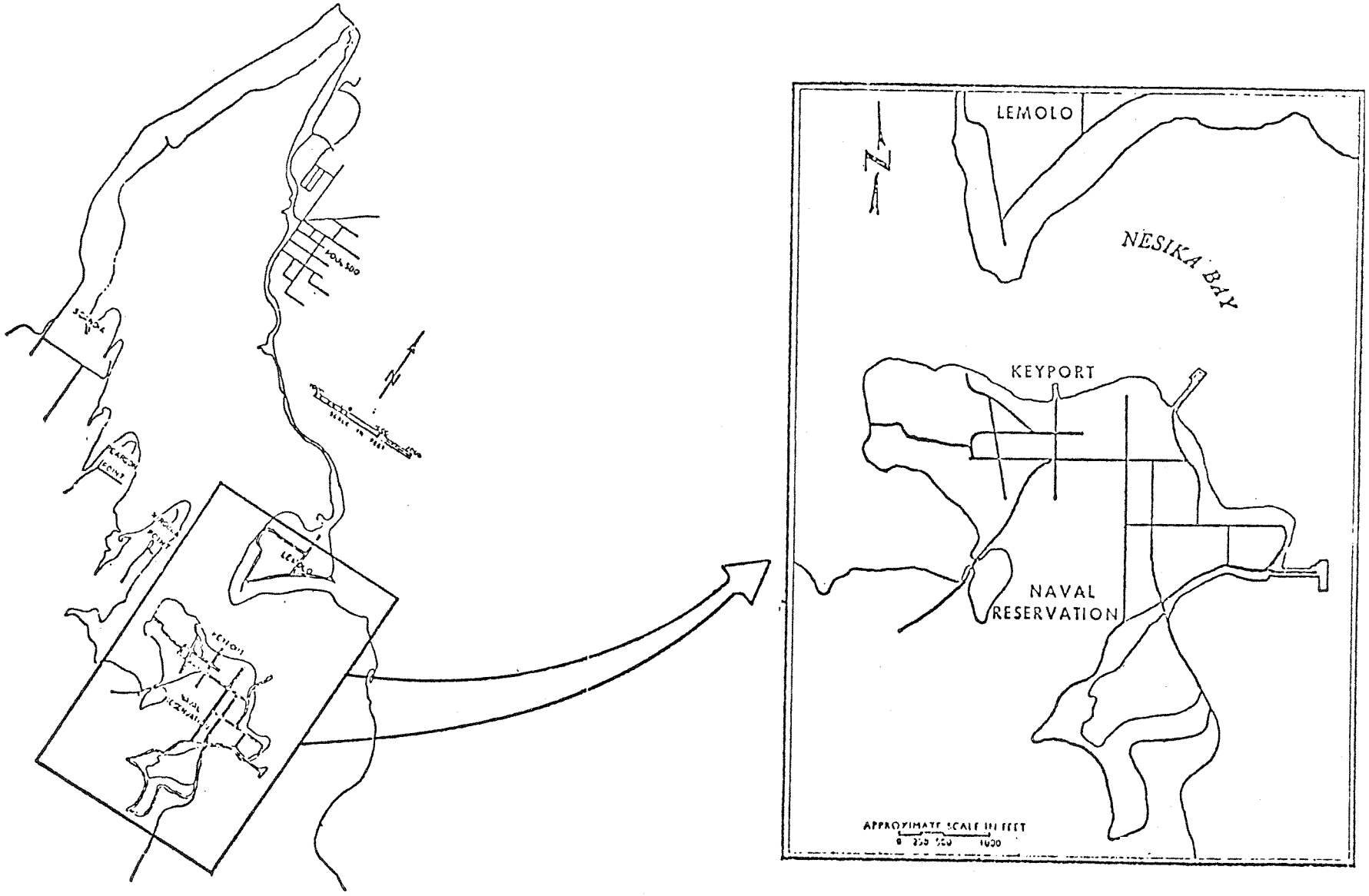
Liberty Bay Lead surface sediment concentration (ppm) dry weight. Sept. 15, 1975

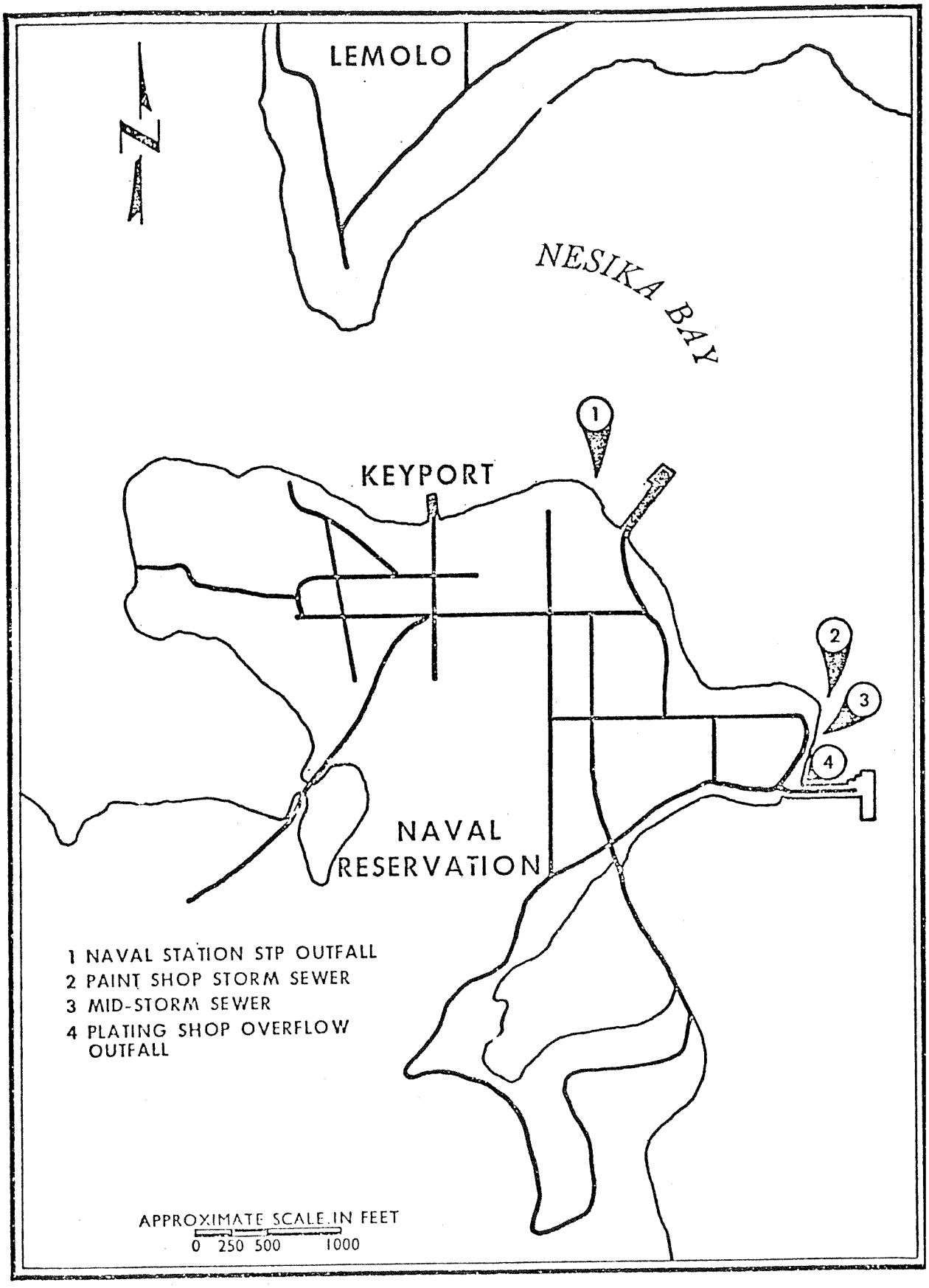


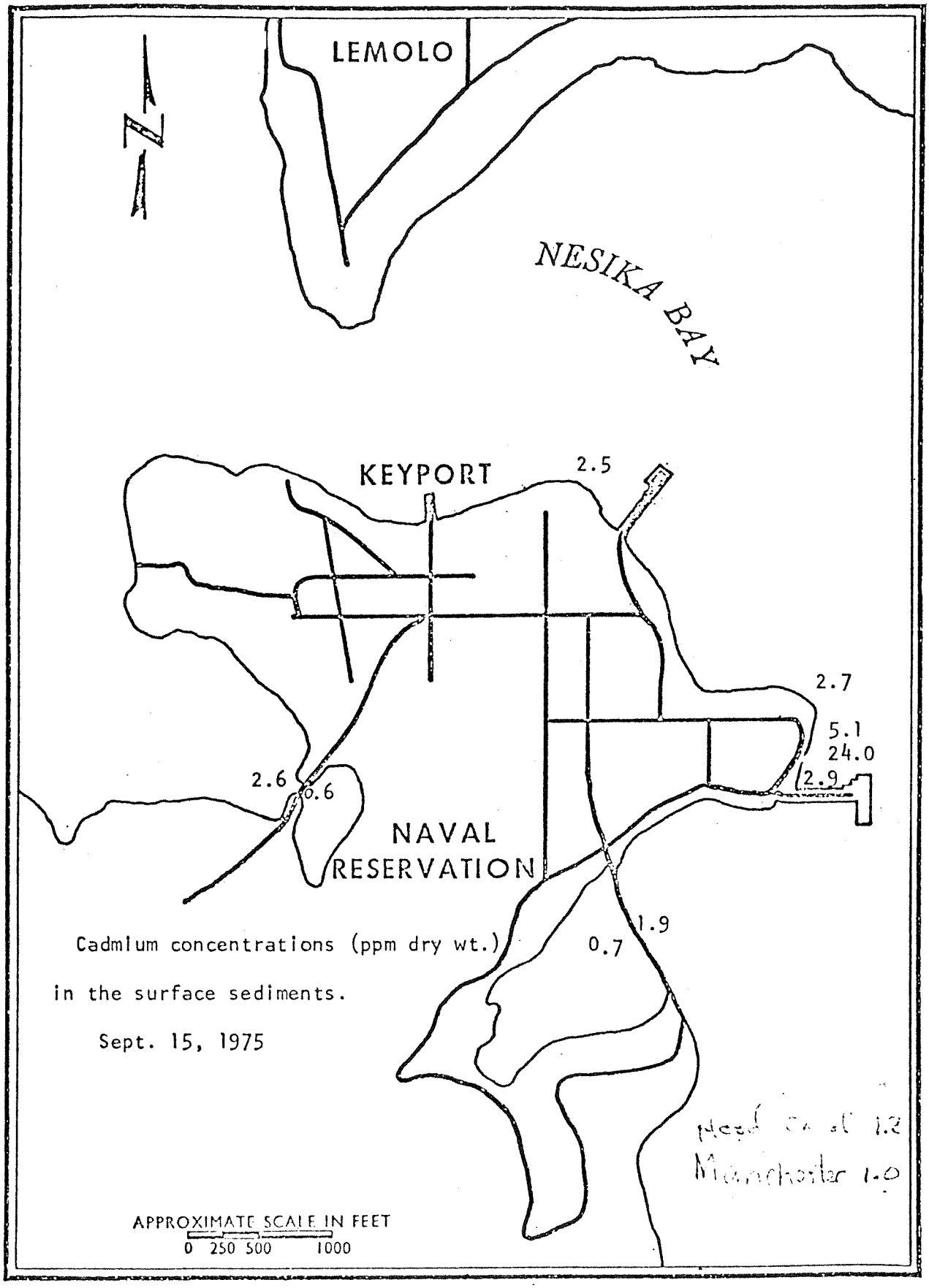
Liberty Bay Nickel surface sediment concentration (ppm) dry weight. Sept. 15, 1975

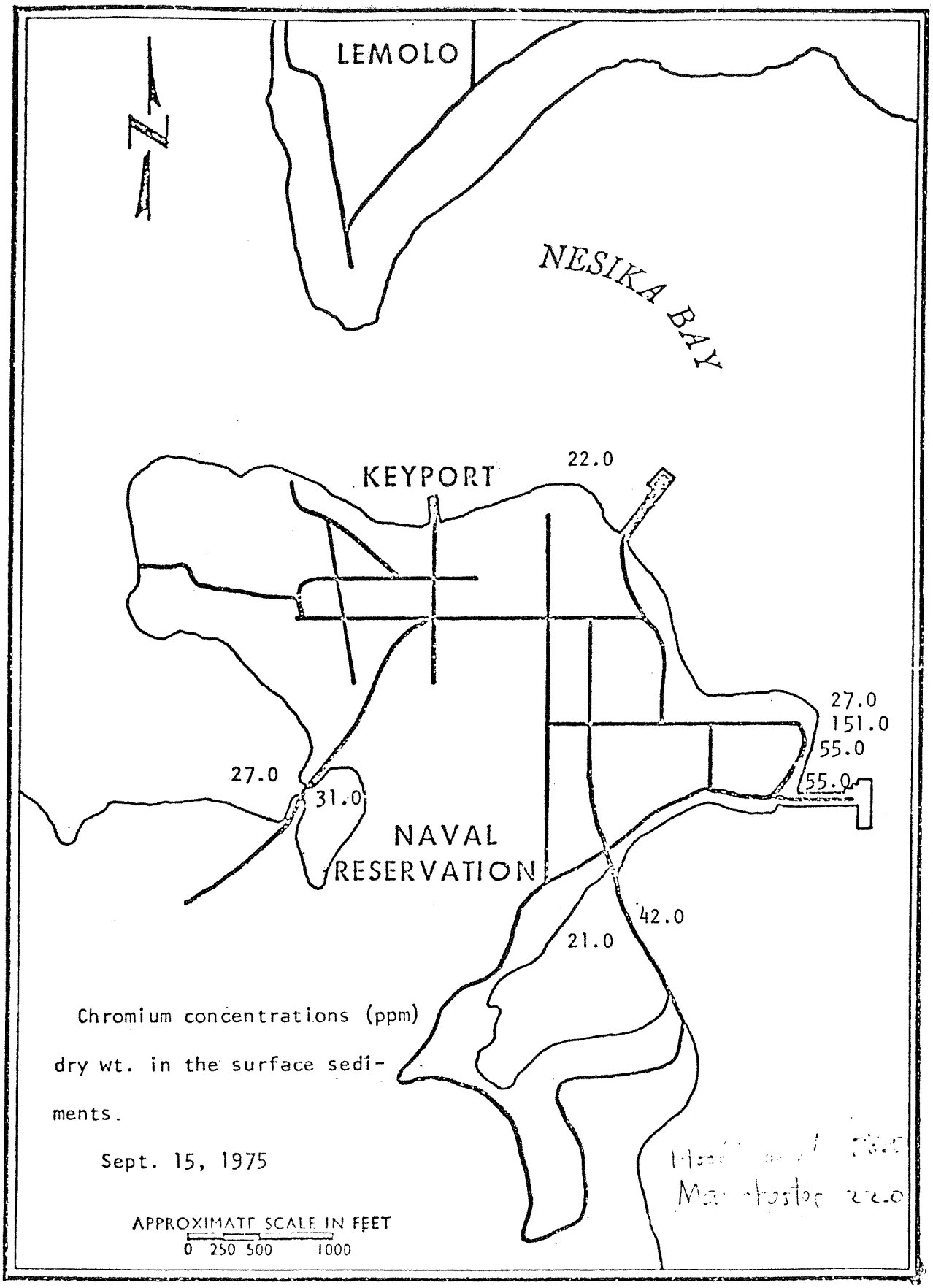


Liberty Bay Zinc sediment concentration (ppm) dry weight. Sept. 15, 1975


LEMOLO
NESIKA BAY
KEYPORT
NAVAL
RESERVATION
APPROXIMATE SCALE IN FEET
0 250 500 1000

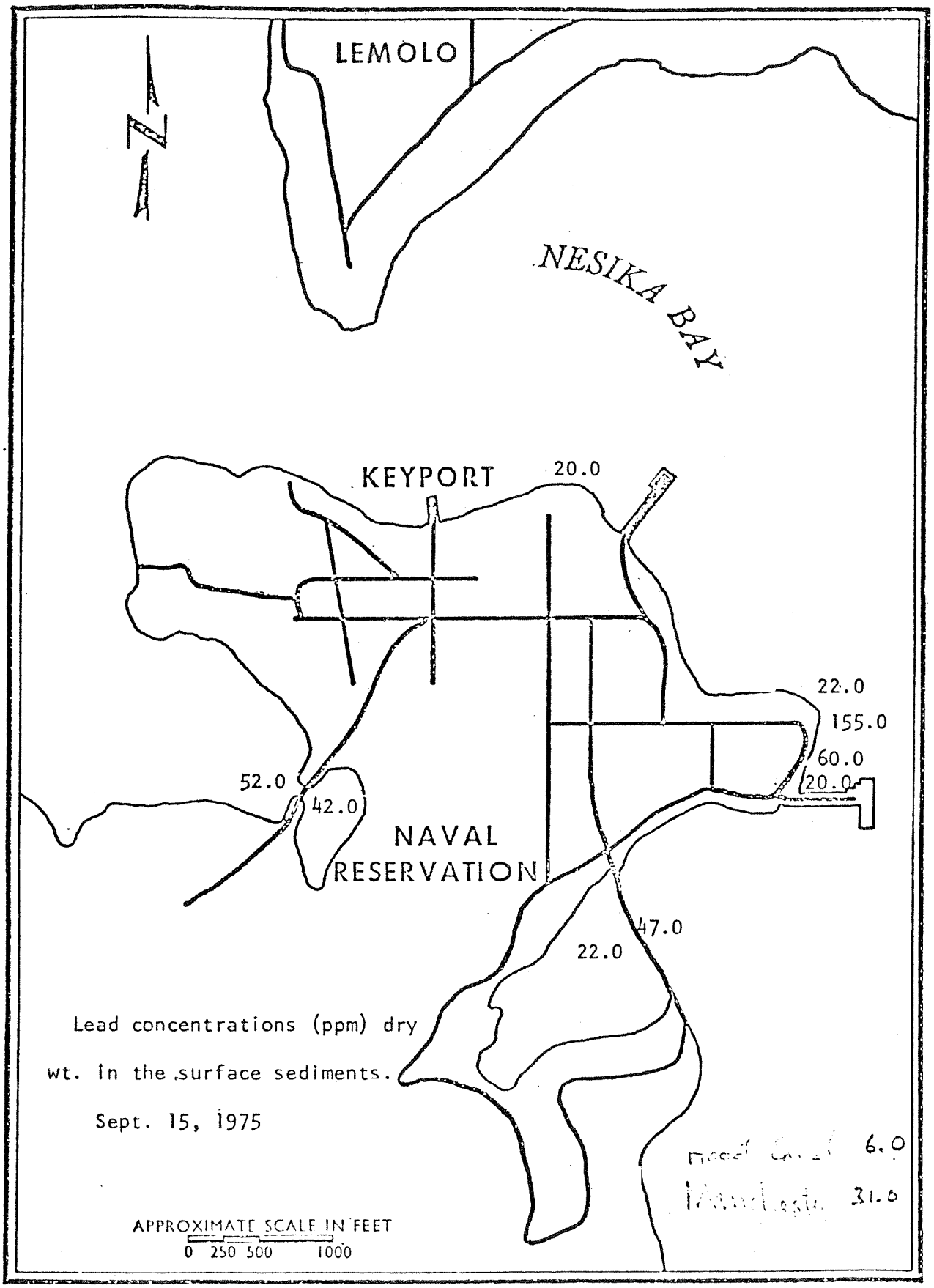

LEMOLO
NESIKA BAY
KEYPORT
NAVAL
RESERVATION
1
2
3
4
1 NAVAL STATION STP OUTFALL
2 PAINT SHOP STORM SEWER
3 MID-STORM SEWER
4 PLATING SHOP OVERFLOW
OUTFALL
APPROXIMATE SCALE IN FEET
0 250 500 1000


LEMOLO
N
NESIKA BAY
KEYPORT
2.5
2.7
5.1
24.0
2.9
2.6
0.6
NAVAL
RESERVATION
1.9
0.7
Cadmium concentrations (ppm dry wt.)
in the surface sediments.
Sept. 15, 1975
APPROXIMATE SCALE IN FEET
0 250 500 1000



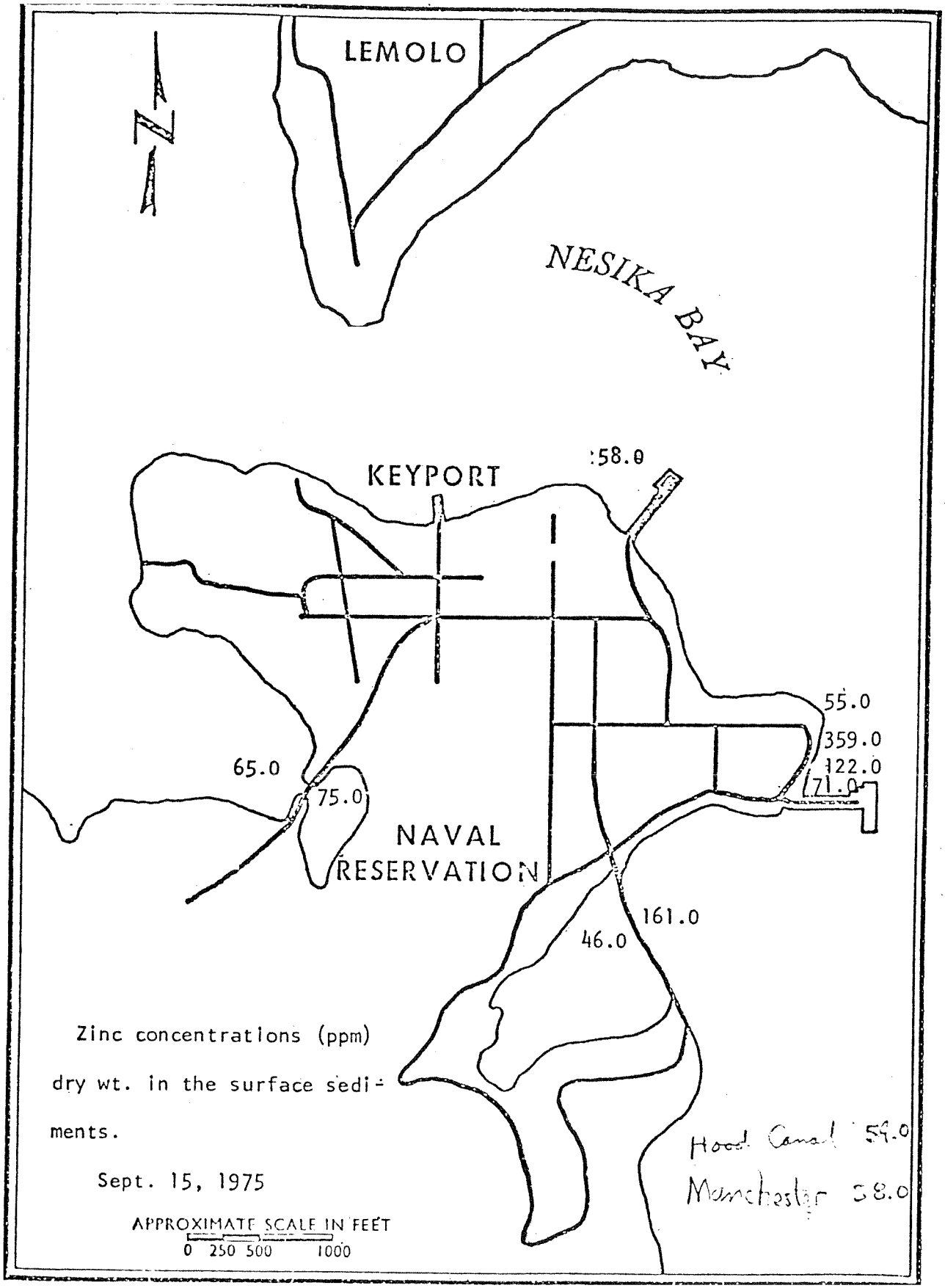
Chromium concentrations (ppm) dry wt. in the surface sediments.

Sept. 15, 1975

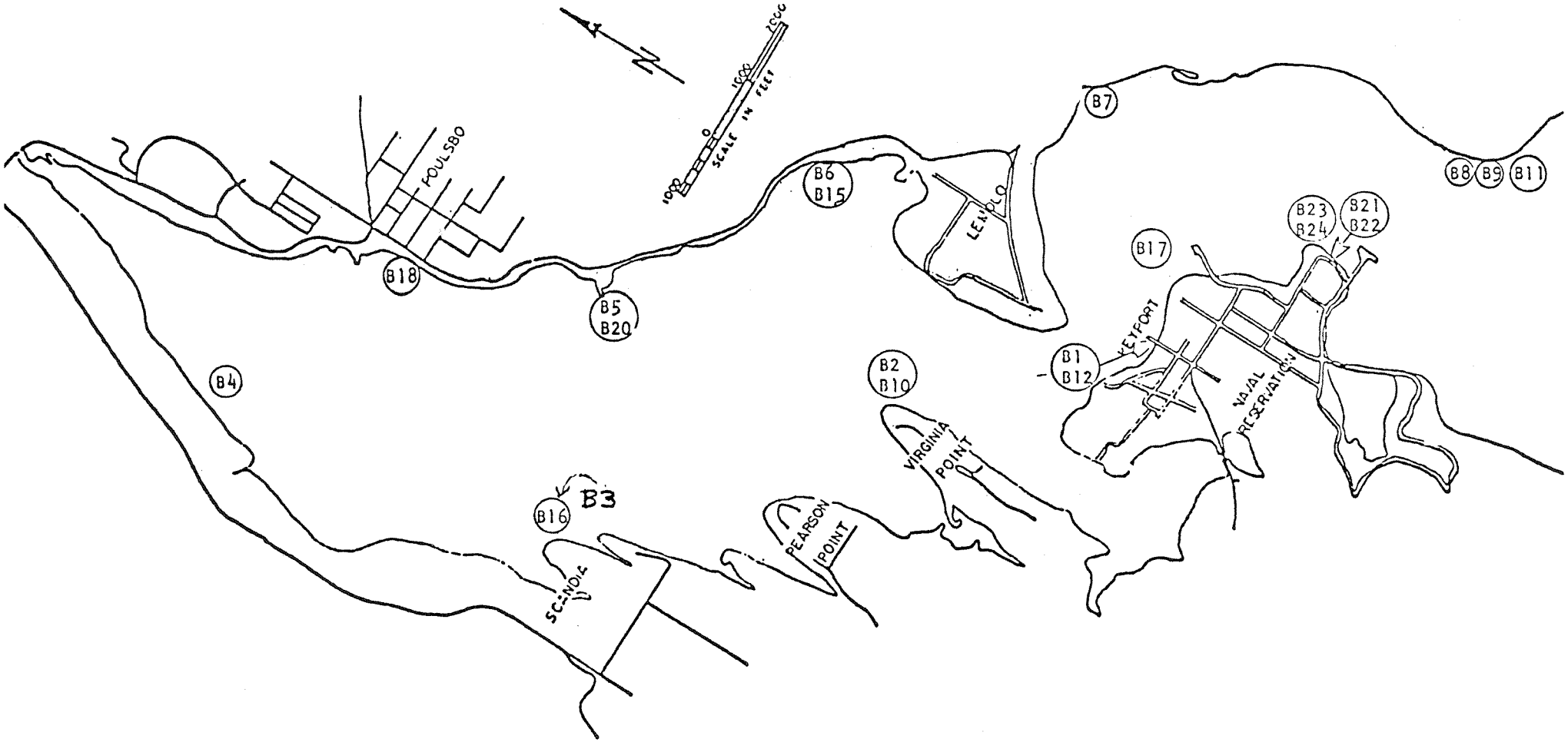


Lead concentrations (ppm) dry wt. in the surface sediments.

Sept. 15, 1975


LEMOLO
NESIKA BAY
KEYPORT
58.0
55.0
359.0
122.0
71.0
65.0
75.0
NAVAL
RESERVATION
161.0
46.0
Hood Canal 59.0
Manchester 58.0
Zinc concentrations (ppm)
dry wt. in the surface sedi-
ments.
Sept. 15, 1975
APPROXIMATE SCALE IN FEET
0 250 500 1000

LIBERTY BAY FISH AND SHELLFISH LOCATIONS



SHELLFISH SAMPLES

LAB NUMBER	LOCATION	TYPE OF SHELLFISH
37050	Keyport Marina	Japanese Littleneck Clams
37051	Virginia Point	Japanese Littleneck Clams
37052	Scandia	Native Littleneck Clams
37053	N.W. Liberty Bay	Pacific Oysters
37054	Sea Farms	Japanese Littleneck Clams
37055	"Comet"	Native Littleneck Clams
37056	Nesika Bay	Native Littleneck Clams
37057	Barage Balloon Site	Native Littleneck Clams
37058	Barage Balloon Site	Butter Clams
37059	Virginia Point	Native Littleneck Clams
37060	Nesika Bay	Japanese Littleneck Clams
37061	Keyport Marina	Native Littleneck Clams
37062	Hood Canal (Misery Pt.)	Japanese Littleneck Clams
37063	Clam Bay	Native Littleneck Clams
37064	"Comet"	Japanese Littleneck Clams
37065	Scandia	Japanese Littleneck Clams

FISH SAMPLES

LAB NUMBER	LOCATION	TYPE OF FISH
39015	Sta. 13, Keyport STP o/f	C-O Sole
39016	Sta. 3, Poulsbo STP o/f	Great Sculpin
39017	Hood Canal	Staghorn Sculpin
39018	Sta. 5, Sea Farms	Buffalo Sculpin
39019	Sta. 18, Plating Shops o/f	Rock Sole
39020	Sta. 18, Plating Shop o/f	Great Sculpin
39021	Sta. 18, Torpedo Sta. STP. o/f	Rock Sole
39022	Sta. 18, Torpedo Sta. STP o/f	Rock Sole
40000	Manchester - Clam Bay	Rock Sole
		Rock Sole

SHELLFISH TISSUE SAMPLES

units μg/g (wet wt.)

LIBERTY BAY

Stations	As	Cd	Cr	Cu	Fe	Pb	Mn	Hg	Ni	Sb	Zn
B1	0.8	0.38	0.6	1.92		0.9		0.016	1.4	0.3	19.7
B2	1.0	0.53	1.6	1.60		1.1		0.024	2.1	0.2k	18.2
B3	1.5	0.50	0.5	1.81		2.0		0.015	1.5	0.2k	18.6
B4	0.2	1.10	0.5	7.61		1.4		0.008	2.3	0.2k	144.9
B5	1.0	0.44	0.9	1.86		2.7		0.024	2.7	0.2k	18.6
B6	1.5	0.58	0.7	0.68		1.9		0.012	1.4	0.3	18.3
B7	1.2	0.47	1.4	1.65		1.2		0.010	14.7	0.2k	17.1
B8	1.2	0.49	1.0	2.05		1.0		0.012	2.0	0.2	13.2
B9	2.2	0.24	1.9	3.84		1.2		0.017	7.8	0.2k	18.0
B10	1.2	0.57	0.7	0.92		1.1		0.019	1.1	0.3k	16.1
B11	0.6	0.43	1.8	1.91		1.1		0.013	2.7	0.2k	20.7
B12	1.1	0.45	0.7	1.01		1.1		0.016	2.3	0.2k	24.8
B15	1.1	0.35	0.7	1.63		1.2		0.020	1.7	0.2	19.2
B16	0.7	0.45	0.8	1.80		1.7		0.023	1.7	0.2k	16.9

Control Stations

B13 (Hood Canal)	0.5	0.35	0.7	2.80		1.2		0.013	1.8		15.2
B14 (Clam Bay)	1.2	0.36	0.9	1.78		1.2		0.013	3.6		15.4

k designates less than

Liberty Bay Oysters Periled

BY STEPHEN GREEN

Severe pollution in Liberty Bay, home of the state's largest oyster hatchery, probably will make it unfit for shellfish production indefinitely, according to preliminary test results released yesterday by the federal Environmental Protection Agency.

"Even if we could eliminate all sources of the pollutants today, the residual affects would be there for years to come," said Dick Bauer, chief of the EPA's regional Surveillance Branch.

Last week it was reported that high levels of mercury in the water was killing off oyster larve at the Sea Farms, Inc., hatchery.

Bauer said that more research has shown potential problems with not only mercury but copper, cadmium, chloramines and other toxic pollutants.

"It is clear that potential exists for any number of stresses on the (oyster) larve," Bauer said. "It's impossible to

Page A-5, Column 1

Pollution Perils Liberty Bay Oysters

From Page A-1

say if it's just mercury or one or a combination of many other things."

The bay, located north of Bremerton, received effluent from sewage plants in Poulsbo, Keyport and the Keyport Naval Torpedo Station. In the past, many different chemicals have been used in the area, Bauer said.

Last week EPA inspectors found seven violation of water pollution laws at the torpedo stations plus chemical and metal pollutants "in fair quantities" passing through the municipal sewage plants.

They also found evidence of natural pollutants and man-made toxicants of unknown origin in both the water and bottom sediments.

The pollution problem became apparent last spring when large numbers of oyster larve began dying at Sea Farms, the largest of four oyster hatcheries in the state.

Water and oyster samples taken in August by Laucks Testing Laboratories of Seattle were found to have high levels of mercury and other toxic metals such as cadmium, copper, chromium and zinc. One sample with an extremely high concentration of mercury was taken from near the Naval Station.

That brought both state and federal agencies into the picture. EPA testing started last week.

Bauer said the EPA has tested water, mud and marine life only for mercury so far, but each sample will be investigated from 17 different standpoints before they are through. All results should be available in two-to-three weeks, he said.

"Mercury levels in bottom sediments were higher than normal," Bauer said, "but not comparable to the high level found by Laucks (near the Naval Station) . . . It shows that the pollutants must be intermittent."

At the Naval Station, where the effluent had not been inspected by EPA officials since a sewage discharge permit was issued two years ago, seven violations were recorded last week.

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Oyster Hatchery Biologist Welcomes Pollution Verdict

TEPHEN GREEN

Taggart, biologist Liberty Bay oyster y put out of busi- by pollution, was a "great sense of yesterday.

than 24 hours be- pokesmen for the mental Protection had called it a hope" for any y to continue op- in the polluted f the bay.

though we've been and upheld," Ms. said in a tele- nterview from the hatchery north of ton. "Our charges pollution here are be verified now. e of it. We're more ic than we've been g time."

ninary tests had a variety of metal mical pollutants in from both man- and some natural

if we could elimi- sources of pollu- day," the residual would be there for come," said Dick chief of the EPA's n a l Surveillance

Taggart and Lee manager of the hatchery have voiced suspicions that the Keyport Naval Torpedo Station was a major source of mercury and other pollutants in the bay. Naval officials have denied the charge.

EPA spokesmen said that although pollution violations were found at the Naval Station, there appeared to be many other potential sources of pollution in the bay. It will take several more weeks of testing to pinpoint the sources, they said.

Even before the EPA's preliminary findings were released Tuesday, Sea Farms owners had decided to "pull the plug" on the operation Ms. Taggart said. Any legal action against possible polluters will await the outcome of conclusive water sampling.

Sea Farms, one of four hatcheries in Washington, will relocate on the cleaner waters of Hood Canal in the near future, she said.

But they'll be leaving behind the building, concrete setting tanks, and plumbing for a two-year-old hatchery costing several hundred thousand dollars, she said.

In the meantime, the U.S. Food and Drug Administration completed sampling Tuesday of the adult oyster beds scattered throughout the bay.

Bob Stott of the FDA said yesterday that results will be in next week. Until then, he cautioned, there's no evidence that the same pollutants responsible for killing off Sea Farm's oyster larvae have contaminated the bay's adult oyster population.

Ron Westley, head of the state Shellfish Laboratory at Brinnon, said Washington's annual 5 million-pound oyster crop is not endangered by loss of the Sea Farms hatchery. Commercial growers should be able to get seed oysters from other sources, he said.

Sea Farms produced 7,500 cases of oyster seed in its first year of production.

"That was so encouraging that we doubled the size of the hatchery," Ms. Taggart said. "Then the trouble started."

The delicate oyster larvae began to die off.

The hatchery process, involves exact water quality, temperature and timing controls. Mature oysters are put in warm tanks until they spawn. The eggs are placed in another tank until they hatch.

The tiny larvae are then "set" on shells and sold to oyster farmers.

The Sea Farms staff experimented with different hatching procedures and equipment. Nothing worked. Only 3,000 cases of oyster seed could be produced this year despite a doubling of the hatchery size.

After ruling out everything else, they turned t the water in Liberty Bay Preliminary tests found a variety of larvae-killing pollutants in it.

Now it's a question o awaiting complete result of federal efforts to fin the pollution sources.

Seattle Post-Intelligencer Sept. 25, 1975 S A

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JIM SWEENY
JOE CUMMINS
MAX HAYES
LARRY LEWIS
DICK BAUER

AUG 15 LOKS TOOKS SAMPLES, ANALYSIS WAS 13 & 100 µg/l
AUG 18 EPA (CUMMINS) TOOK OYSTERS, CLAMS, ETC. BELOW FDA ALERT LEVELS (Hg low, Pb 18.5 µg/l)
ALSO COPPER, CAD., LEAD. EVEN AT MANCHESTER

EPA PLANS TO TAKE COMPOSITE SAMPLES OF ALL DISCHARGES IN LIBERTY BAY, PLUS BOTTOM SEDIMENT TRANSECTS, PLUS OYSTER & CLAM MEAT ANALYSIS.

SEA FARMS, POUSLBO
(MEMO)

DATE	LOCATION	TIME	SAMPLED BY	PARAMETER	VALUE*
4/28/75	2S		SF	Hg	0.004
4/28/75	2S		SF	Pb	<0.003
4/28/75	2S		SF	Cu	0.002
4/28/75	2S		SF	Zn	0.01
4/28/75	2S		SF	Cd	<0.001
4/28/75	2S		SF	Sulfide	0.2
4/28/75	2S		SF	NH_3-N	<0.1
4/28/75	2S		SF	Cl	16,300
4/28/75	2S	Linear Alkyl Sulfonate			0.1
8/8/75	Water System		SF	Cu	0.021
				Hg	0.013
8/8/75	2S		SF	Cu	0.024
8/10/75	2S	11:55	L	Cu	0.001
8/10/75	2S	11:55	L	Hg	0.005
8/10/75	1S	12:00	L	Cu	ND
8/10/75	1S	12:00	L	Hg	0.001
8/10/75	4S	12:10	L	Cu	ND
8/10/75	4S	12:10	L	Hg	0.001
8/10/75	12S	12:10	L	Cu	ND
8/10/75	12S	12:10	L	Hg	ND
8/10/75 PSNS, Pier #25	S	12:30	L	Cu	0.011
8/10/75 PSNS, Pier #25	S	12:30	L	Hg	0.004
8/10/75 Algae Culture			L	Cu	0.006
8/10/75 Algae Culture			L	Hg	0.001
8/15/75	1S	Flood Tide	L	Cu	0.006
8/15/75	1S	Flood Tide	L	Hg	0.003
8/15/75	2S	Flood Tide	L	Cu	0.002
8/15/75	2S	Flood Tide	L	Hg	0.001
8/15/75	5S	Flood Tide	L	Cu	0.001
8/15/75	5S	Flood Tide	L	Hg	0.110
8/15/75	8S	Flood Tide	L	Cu	0.005
8/15/75	8S	Flood Tide	L	Hg	0.002
8/15/75	Pt. Bolin	Flood Tide	L	Cu	HD
8/15/75	Pt. Bolin	Flood Tide	L	Hg	0.001

DATE	LOCATION	TIME	SAMPLED BY	PARAMETER	VALUE*
8/15/75	Algae		NMF	Hg	0.010
8/15/75	Larvae		NMF	Hg	0.050
8/15/75	Adult From Nearby Beach		NMF	Hg	0.020 0.040
8/19/75	5S	Flood Tide	L	Hg	0.056
8/22/75	3S	Flood Tide	L	Hg	0.001
8/22/75	5S	Flood Tide	L	Hg	0.002
8/22/75	5B	Flood Tide	L	Hg	0.005
8/22/75	10S	Flood Tide	L	Hg	0.001
8/22/75	9-30'	Flood Tide	L	Hg	0.004
8/22/75	7S	Flood Tide	L	Hg	0.001
8/22/75	6S	Flood Tide	L	Hg	0.001
8/22/75	2S	Flood Tide	L	Hg	0.001
[illegible]/75	Dead Larve	Flood Tide	L	Cu	0.290
	"	" "		Hg	0.005
8/24/75	12S		SF	Hg	0.002
	11S	12:15	SF	Hg	0.001

S = Surface
B = Bottom
SF = Sea Farms
L = Laucks Labs, Seattle
NMF = National Marine Fisheries

* NOTE: All values in mg/l (ppm)

MEMORANDUM

CHECK
INFORMATION
FOR ACTION
PERMIT
OTHER

State of Washington Department of Ecology

TO: Bob McCormick, Stew Messman, Ron Pine, Files

FROM: L. L. Lewis

SUBJECT: SEA FARMS, POULSBO

DATE: August 29, 1975

Late in the afternoon on August 11, 1975, Larry Ashley received a complaint from Lee Hanson, Sea Farms, concerning heavy metals in Liberty Bay. This was DOE's (NWRO) first contact on the problem. Since then I have talked with several people at EPA, DOE, and West NAVFAC. On August 26, 1975, I met with Mr. Hanson in Poulsbo. He explained his operation and the mortality problems they have experienced.

Sea Farms has been in operation for 2 years. The first year they experienced few, if any larvae mortality problems. About a year ago this time was when they began experiencing larvae loss problems. At first they looked in-house for possible contamination. This investigation lead to the finding of Cu and Hg in their Sea Water system. From there they went into an extensive program, the first results of which are attached.

The timing of larval die-off would occur during any day of the week but usually happened on the Sunday-Monday period. The water change in those tanks took place on Friday. The water change took place every 3 days. Mr. Hanson feels the water in front of their pier was usually more contaminated on Friday then the other days of the week. They would rotate water changes so that some tanks were changed every day. He feels this repetition is too strong to be a coincidence.

Most of the sampling he or Laucks Labs did was on a flood tide. The results shown are preliminary. He should be receiving more complete ones later.

LLL:js

SEA FARMS, POUSLBO
(MEMO)

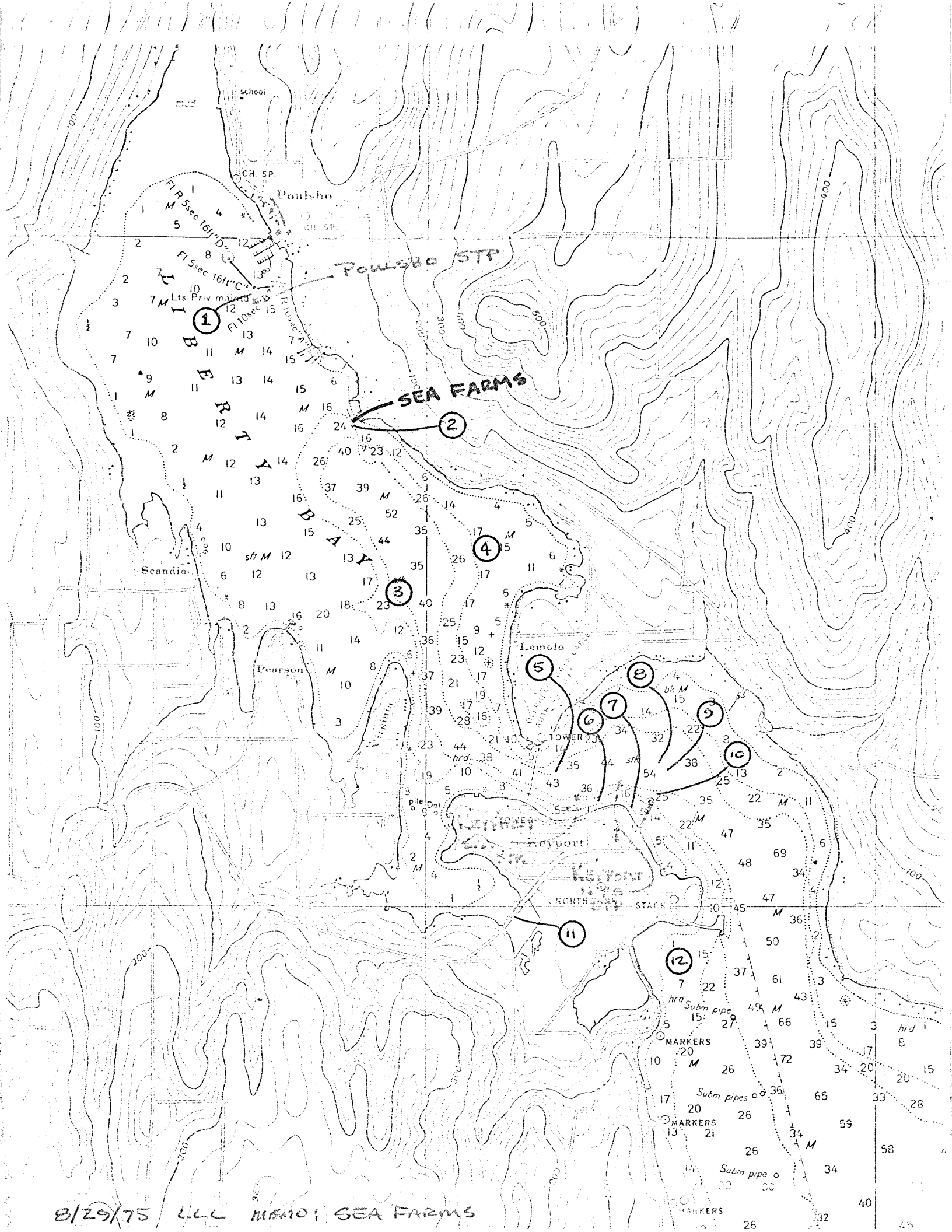
DATE	LOCATION	TIME	SAMPLED BY	PARAMETER	VALUE*
4/28/75	2S		SF	Hg	0.004
4/28/75	2S		SF	Pb	<0.003
4/28/75	2S		SF	Cu	0.002
4/28/75	2S		SF	Zn	0.01
4/28/75	2S		SF	Cd	<0.001
4/28/75	2S		SF	Sulfide	0.2
4/28/75	2S		SF	NH_3-N	<0.1
4/28/75	2S		SF	Cl	16,300
4/28/75	2S	Linear Alkyl Sulfonate			0.1
8/8/75	Water System		SF	Cu	0.021
				Hg	0.013
8/8/75	2S		SF	Cu	0.024
8/10/75	2S	11:55	L	Cu	0.001
8/10/75	2S	11:55	L	Hg	0.005
8/10/75	1S	12:00	L	Cu	ND
8/10/75	1S	12:00	L	Hg	0.001
8/10/75	4S	12:10	L	Cu	ND
8/10/75	4S	12:10	L	Hg	0.001
8/10/75	12S	12:10	L	Cu	ND
8/10/75	12S	12:10	L	Hg	ND
8/10/75 PSNS, Pier #25	S	12:30	L	Cu	0.011
8/10/75 PSNS, Pier #25	S	12:30	L	Hg	0.004
8/10/75 Algae Culture			L	Cu	0.006
8/10/75 Algae Culture			L	Hg	0.001
8/15/75	1S	Flood Tide	L	Cu	0.006
8/15/75	1S	Flood Tide	L	Hg	0.003
8/15/75	2S	Flood Tide	L	Cu	0.002
8/15/75	2S	Flood Tide	L	Hg	0.001
8/15/75	5S	Flood Tide	L	Cu	0.001
8/15/75	5S	Flood Tide	L	Hg	0.110
8/15/75	8S	Flood Tide	L	Cu	0.005
8/15/75	8S	Flood Tide	L	Hg	0.002
8/15/75	Pt. Bolin	Flood Tide	L	Cu	HD
8/15/75	Pt. Bolin	Flood Tide	L	Hg	0.001

EA FARMS, POUSLBO
EMO
AGE 2

DATE	LOCATION	TIME	SAMPLED BY	PARAMETER	VALUE*
3/15/75	Algae		NMF	Hg	0.010
3/15/75	Larvae		NMF	Hg	0.050
3/15/75	Adult From Nearby Beach		NMF	Hg	0.020 - 0.040
8/19/75	5S	Flood Tide	L	Hg	0.056
8/22/75	3S	Flood Tide	L	Hg	0.001
8/22/75	5S	Flood Tide	L	Hg	0.002
8/22/75	5B	Flood Tide	L	Hg	0.005
8/22/75	10S	Flood Tide	L	Hg	0.001
8/22/75	9-30'	Flood Tide	L	Hg	0.004
8/22/75	7S	Flood Tide	L	Hg	0.001
8/22/75	6S	Flood Tide	L	Hg	0.001
8/22/75	2S	Flood Tide	L	Hg	0.001
8/22/75	Dead Larve	Flood Tide	L	Cu	0.290
	"	" "		Hg	0.005
8/24/75	12S		SF	Hg	0.002
	11S	12:15	SF	Hg	0.001

S = Surface
B = Bottom
SF = Sea Farms
L = Laucks Labs, Seattle
NMF = National Marine Fisheries

* NOTE: All values in mg/l (ppm)



8/29/75 LLC MEMO: SEA FARMS

The Bremerton Sun
Friday, August 22, 1975

Poulsbo Oyster Farm Closed By Pollution

By Adele Ferguson
Sun Political Writer

Just two years after it went into business, raising oyster larva for growers, Sea Farms, Inc., of Poulsbo is shutting down for good.

Something is killing its larva.

Manager Lee Hanson blames mercury and copper pollutants in the water of Libery Bay and thinks it's coming from the Naval Torpedo Station at Keyport.

Cmdr. Robert D. Melim, Keyport executive officer, says it isn't them — "We don't dump any mercury and we come doggone close to be environmentally pure."

And while Eric Gauglitz, head research chemist for the National Marine Fisheries Pacific utilization center, admits mercury has shown up in larva, algae and oyster samples taken there, that may not be the cause.

The amounts shown also are not significant enough to be harmful to humans eating shellfish or fish from the bay, he said.

But the Environmental Protection Agency in Seattle is taking the whole matter "pretty seriously," according to Alex Smith of the director's office.

An immediate inventory has been ordered, she said. "We want to see who's in the area, do a survey with some surveillance of what's going on, do some water sampling, and check with the state on a toxicity study."

EPA wants answers by Sept. 2, she said.

Whatever the cause, Sea Farms, Inc., is going to have to rebuild elsewhere, perhaps in Hawaii and will be out over $1 million in relocation costs and loss of business, according to Hanson.

The last of 13 employes will complete the shutdown as of Sept. 1.

Hanson came up from Santa Cruz, Calif., in May of 1973, to establish the new business in partnership with Joe and Gary Engman of Poulsbo and Randy Webb of Hawaii.

They moved into the old codfish processing plant on the Poulsbo waterfront and began raising oyster larva which they then sold as spat on oyster shells to growers.

The larva is grown in cultured algae in large tanks in the main building and the first sign of trouble came a year ago.

Some of the larva died, said Hanson, and while water sampling was done at the time, it was not with any thought of possible contamination of any so-called "heavy waters."

"We thought it was an in-house problem," he said, "something we were doing wrong. Now we believe it's the high levels of copper and mercury in the bay."

Maximum amounts of those pollutants are found near the head of the bay where the torpedo station is located, he said.

The problem has been off and on with the water sometimes showing no problem, and then suddenly producing contamination, he said.

Hanson said he sought permission from Commander Melim at Keyport to do some on-base sampling and was refused.

"They said I could get all the information I need from their district engineer and from the EPA which monitors their own

See POULSBO Page 2

(Continued from Page 1)

water sampling."

Hanson learned that Keyport is allowed to dump as a waste product of its electroplating plant the following heavy metals: cyanide, chromium, copper, nickel, aluminum and zinc.

And Commander Melim said today that's all that's going into the bay from there.

"We have no process in which we use mercury," he said. "Our electroplating plant is being modernized right now, and we have a new sewage plant to take the outfall. It is processed and purified right down to zilch. It's all documented in EPA reports and we are doggone close to being environmentally pure."

The reason he denied permission for Hanson to do his own sampling, Commander Melim said, is that he has no knowledge of the control procedures in analyzing same.

Once before he let someone do that kind of thing and there was a "huge flap," he said, "Chemical analysis is a delicate process and it takes high quality control procedures."

"We are really being straightforward and what puzzles me is that Mr. Hanson's own sampling as he reported to me shows a high mercury level above Keyport and [illegible]," said Commander Melim. "The tide does come and go."

Gauglitz of the National Marine Fisheries office was the one who had the latest sampling done on Aug. 15, and it showed that the algae in the tanks contained 10 parts per billion of mercury, the larva contained 50 ppbs. of mercury and adult oysters picked up on the beach showed 30 ppbs.

But while that level can kill oyster larva, it's nothing to worry about, he said.

"It is not a hazard to other marine life as far as human consumption goes. The Food and Drug Administration action level is 0.5 parts per million so this is well below that action level. There is absolutely no problem there."

His office has done numerous sampling of other marine fishes in the area and there is no problem, said Gauglitz.

There is mercury in the water, however, and it could come from a number of sources, he said. "The entire Pacific area is of volcanic origin and there are significant deposits of mercury there.

"There a lot of old mercury mines around, some of them with rivers cutting right through them. As for man-made mercury problems, there are relatively few instances of that going into the waters."

Pulp mill operations have done it in past years and one plant at Bellingham which produced chlorine by a method using mercury was shut down in 1971, he said.

It might not be mercury anyway which is killing the larva, he said, and another problem could be rainfall.

"Heavy rains put a tremendous amount of fresh water in the Sound and this in itself can cause a salinity change," said Gauglitz. "Just recently over an inch of rain fell in less than a 24-hour period. Just imagine one inch of water over thousands of acres running into Puget Sound — there is a definite change in salinity."

Hanson though is convinced that the mercury is what's driven him out of business.

The worst thing about it, he said, "is that we lose the growers' confidence. And we are losing a brand-new market in France which wanted to buy from us."

Hanson is going to Hawaii on a grant from the state government there to study shellfish propagation, and will look for a possible relocation site.

"We can't stay here. Mercury gets into the bottom mud of the bay and stays there for years. We have to move out. I still think that's something from Keyport because there's nothing else around that could do it. It always shows up at their doorstep. Maybe the officials don't even realize it. But since the problem shows up periodically, like larva put into the tanks on Friday are almost always dead on Sunday, I'm convinced it's a clean-up thing. Something is being dumped periodically there."