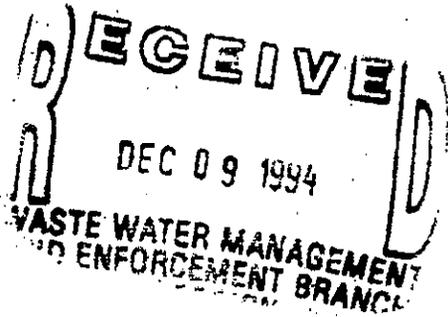


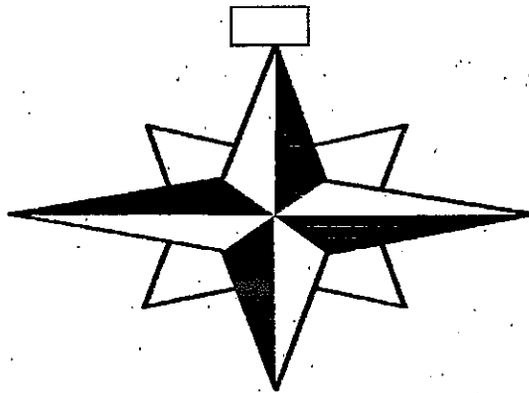
ENVIRONMENTAL SURVEYS

WB Full
10 (6)



WESTWARD SEAFOODS

NPDES DIVE SURVEY



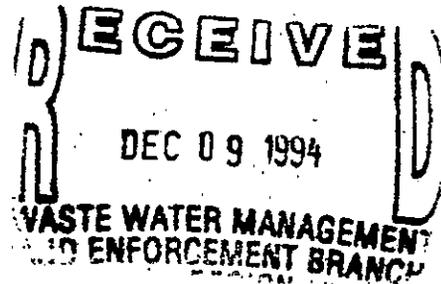
1111 3RD AVE., SUITE 2250
SEATTLE, WASHINGTON 98101
(206) 682-5949 FAX (206) 682-1825



P.O. BOX 618
DUTCH HARBOR, ALASKA 99692
(907) 581-1660 FAX (907) 581-1293

29 November 1994

Ms. Florence Carroll
Compliance Officer
USEPA, Region 10
Seattle, Washington



Dear Ms. Carroll,

Please find enclosed a copy of the Westward Seafoods 1994 summer NPDES DIVE SURVEY, conducted by Mr. Tim Jewell of Enviro-Tech Diving.

The actual survey was started in late July, approximately one week after our side-scan survey effort. However, because of various scheduling conflicts for the diving company, the survey was not completed until early September. We received the final report in October.

As you may recall, in an effort to reconcile the side-scan and "CHIRP" sonar data collected by Watson Company with actual diver observations, we used Watson Company's precision navigation capability to place 13 additional Baseline Markers. The Markers now describe a 400 X 400 foot grid over the outfall area. The Diver observations were made at 20 X 20 ft. interval points within the grid.

You may note in the Report that waste coverage is described as 2.4 acres. This value was determined using an integration program which extrapolates coverage between the last measurable waste observation and all surrounding "zero" observations.

However, in review of the data, a total of 441 observations were made at the uniformly spaced grid points. Of these, 235 observations indicated measurable waste, suggesting that coverage may be closer to 2.0 acres.

Enviro-Tech is presently reviewing the data for computation of coverage to the 0.1 ft (3 cm.), 0.2 ft (6 cm.) and 0.3 ft (10 cm.) accumulation levels. These will be forwarded to your office when completed.

Please let me know if you require any additional information.

Sincerely,

David W. Boisseau

David W. Boisseau
Dutch Harbor Facility

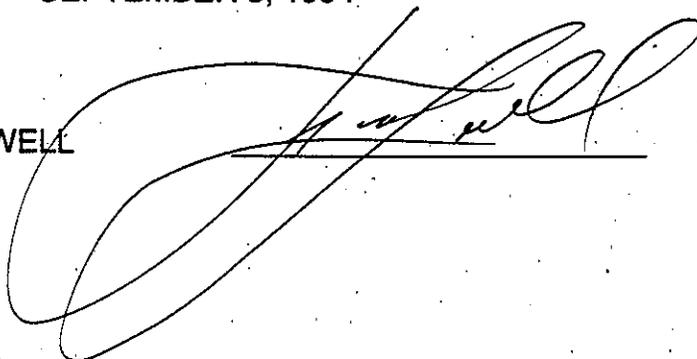
ENVIRO -TECH DIVING INC.

NPDES SURVEY
WESTWARD SEAFOODS INC.

SEPTEMBER 5, 1994

Tim Jewell

DIVER TIM JEWELL

A large, stylized handwritten signature in black ink, appearing to read 'Tim Jewell', is written over a horizontal line. The signature is highly cursive and loops around the line.

METHODOLOGY

GRID CONSTRUCTION AND DIVE SPECIFICS

A series of four grids, two hundred feet by two hundred feet were established around the Westward Seafoods outfall line. A total of 13 monuments were placed by Watson Co. on 7/21/94 using a Mini-Ranger system and referenced to a state plane coordinates (Diagram 1). These grids will be referenced as grids sections, one through four in this report. All of the grids as seen in Diagram 1 are interconnected. The north and south grid lines are set on an azimuth of 0° <-----> 180° True, with the east and west grid lines set on an azimuth of 90° <---> 270° True. Each grid had a temporary grid reference line extended between the permanent monuments. This grid reference line had a reference mark every twenty feet. During the survey times divers extended a line reel with data marks every twenty feet between the corresponding reference marks on the grid reference line (Diagram 2).

At each data point the diver recorded depth of waste measurements and any other pertinent observations of marine life or other topographic anomalies. Water depths were taken with a US Divers M-2 dive computer. Waste depths were taken with a hollow slotted PVC probe so the diver could effectively examine the substrate and determine waste content. In areas of great topographic anomalies additional data points were taken at even closer points depending on the waste or topographic irregularity. Upon completion of each dive divers immediately and extensively debriefed on observations during the dive.

All data gathered by the divers was then used to construct a data point matrix (Diagram 3) of both the bottom topography and waste depths. This information was

then entered into a Pacsoft engineering survey software package producing a T-Net which was used to generate graphs, maps and waste volume measurements.

A total of forty-two dives were made over a period of thirty days with a total water time of sixty four hours. Divers reached depths of over 170 feet in the examination of the northwestern section. These conditions combined with limited light, shortened dive times and at times high content of particulate in the water column made for an exceedingly difficult survey.

It should be noted that during the survey time two anchors were inadvertently drug through the two western most survey grids. Divers reestablished markers 1,6 & 11 but their accuracy may have a degree of error.

Water depths are adjusted using predicted tidal tables and adjusted to the nearest hour with depths rounded to the nearest foot. This will cause some difference in depths from bathymetric data.

DIVERS OBSERVATIONS

SECTION 1

This southeastern most section is dominated by the reef which extends throughout majority of the south and eastern portions of this section. The subsequent topography is very shallow and rocky with the depths in the southeastern most corner being at some points only ten feet. In the shallowest portions, the bottom consist of large rock, sand and shell that for this reef area. The larger rock is encrusted with Kelp and sea grass as well as mussels and giant acorn barnacles. This area is also covered with numerous species of sea anemones such as Leather Anemone (*Tealia coriacea*), Giant green Anemone (*Anthopleura xanthogrammica*) and Frilled anemone (*Metridium senile*). The green sea urchins (*Strongylocentrotus droebachiensis*) are seen in this section to depths to fifty feet. The bottom in many areas of this section that is not rock is covered with numerous species of shells including Bent Nosed Macoma (*Macoma nasuta*) and Pacific Littleneck Clam (*Protothaca staminea*) as well as Rock Jingle (*Pododesmus macroschisma*) and the blue Mussel (*Mytilus edulis*) & Horse Mussel (*Modiolus modiolus*). Other marine life seen in the reef area included the Kelp Greenling (*Hexagrammous decagrammus*) or Rock Greenling (*Hexagrammous lagocephalus*) as well as numerous sculpin. Sole and flounder were most evident in the southwest portion of the grid section.

No measurable amounts of processing waste were seen in the shallow reef portion however there was trace amount of light drifting processing waste that was observed drifting throughout this portion of the section during processing times. During the survey period there was a significant plankton bloom in the area. This band of plankton extended from the surface to at times twenty-five to thirty-feet below the surface. This plankton at the beginning of the survey resembled a red tide. This plankton bloom was observed throughout the Unalaska area and was not limited to

Captains Bay. There is a band of older waste along the southern boundary approximately eighty feet from monument # 3. It appears this is the remains of where the outfall was previously located this band is approximately 20 feet wide and 40 feet long and has collected in a narrow ravine formed by the reef.

The southwest corner has the greatest accumulations of processing waste due to the out fall terminating forty feet inside the southern boundary just five feet from the eastern boundary. This diffuser is has multiple slots as well as an open end which has a high volume discharge at the end of a sixteen inch pipe. Waste in this area has reached depths of 4.7 feet. The volume of flow has formed a caldera along the eastern boundary of section 2 and will be described in that sections detailed findings. The balance of the waste in this section is restricted by the reef that runs to the northeast. This keeps the majority of the waste confined within eighty to one hundred feet of the western boundary with the greatest depths just along the boundary itself. The waste is a very fine fish waste that was distributed well into the water column during discharge times. In areas where depths exceeded .5 of a foot gaseous emissions were observed when a probe was inserted. The greatest amount of emissions were in the immediate area of the diffuser head.

The northeastern portion of this section is essentially free of waste with only trace amounts of waste in some of the reef areas. This area is covered with numerous types of clams, scallops and mussel shells attached to the rocks and littering the bottom

The northwest portion of this section has significant amounts of waste along the western boundary. These waste depths decrease rapidly as the diver traveled to the east.

DIVERS OBSERVATIONS

SECTION 2

This section is dominated by the termination of the outfall just five feet east of the eastern boundary and forty feet from the southern boundary. The diffuser has formed a volcano like caldera along the eastern boundary. This caldera forty feet long and fifteen feet wide that lays in a northwest direction. Waste at the deepest point is 9.2 feet, at a depth of sixty five feet below the surface. The sides of the caldera waste is two to three feet deep with a deepest area at the far northwest end. The sides of the caldera on the northwest end have steeply sloping sides that sit on a steep natural slope. The center of the caldera has only small amounts of waste and in some areas completely clear due to the high volume flow from the diffuser. Again the waste is very fine processing waste no particles larger than .5 inches. The waste flow travels in a northwest direction and has diminished to a little more than two feet by the time the northern boundary of this section is reached. Waste depths diminish rapidly as divers traveled to the west.

There were gaseous emissions when the probes were inserted into the waste during measurement periods as well as during other times on the main pile. The only adverse effect seen in this section were four dead codfish and one herring on the main

pile. The reason for the codfish mortality was not apparent to the diver, however, the herring was due to some type of bite. Numerous codfish were observed swimming in the immediate area of the main pile. Sculpin were present also in this area.

The southwest portion of this section is relatively free of waste with only trace amounts seen in most areas. This portion is dominated by steep reef topography with depths dropping rapidly as divers traveled to the north. This reef is covered by numerous types of anemones such as Leather Anemone (*Tealia coriacea*), Giant green Anemone (*Anthopleura xanthogrammica*) and Frilled anemone (*Metridium senile*). The green sea urchins (*Strongylocentrotus droebachiensis*). Encrusted along the sides of this reef are numerous types of shellfish such as Bent Nosed Macoma (*Macoma nasuta*) and Pacific Littleneck Clam (*Protothaca staminea*) as well as Rock Jingle (*Pododesmus macrochisma*) and the blue Mussel (*Mytilus edulis*) & Horse Mussel (*Modiolus modiolus*) seen in this area. Numerous types of fin fish were seen in this area including Rock Greenling (*Hexagrammos lagocephalus*) as well Sole and flounder. A small school of black rockfish (*Sebastes ?*) were seen inhabiting this area. On the top of the reef a small arm of green sea urchins (*Strongylocentrotus droebachiensis*) are traveling along the edge along with numerous types of star fish. Hermit crabs were also seen along the reef. Divers found one Pacific Octopus (*octopus dofleini*) weighting over 35 lbs. was found on this reef.

The reef gives way to a shell and silt covered bottom as you approach the northern boundary. Small amounts of waste are encountered in the northwestern portion of this section but processing waste increases steadily as you travel to the east toward the main pile.

The northeast section has fairly even coverage of waste with limited marine life observed. These waste depths decrease as diver traveled to the west.

DIVERS OBSERVATIONS

SECTION 3

This section is dominated by a reef in the south east portion of this grid. The bottom drops steeply in the some areas as much as eighty feet as you travel to the north. The reef is rock covered by numerous types of anemones such as Leather Anemone (*Tealia coriacea*), Giant green Anemone (*Anthopleura xanthogrammica*) and Frilled anemone (*Metridium senile*). Encrusted along the sides of this reef are numerous types of shellfish such as Bent Nosed Macoma (*Macoma nasuta*) and Pacific Littleneck Clam (*Protothaca staminea*) as well as Rock Jingle (*Pododesmus macroschisma*) and the blue Mussel (*Mytilus edulis*) & Horse Mussel (*Modiolus modiolus*) seen in this area. Numerous types of fin fish were seen in this area including Rock Greenling (*Hexagrammous lagocephalus*) as well Sole and Flounder. The reef area gives way to a shell and soft mud substrate. Waste accumulations in the southeast portion of this section are only in trace amounts.

The southwest portion of this section has a fairly even covering of processing waste which slowly decreased as the divers traveled to the east. Marine life is limited in this area except in the areas close to the reef. Waste depths in this area are one foot or less.

The northeast portion of this section is completely free of waste. The shell and mud bottom is littered with large Frilled Anemone (*Metridium senile*) attached to any solid object

The northwest portion of this survey section as limited amounts of waste with the greatest amounts along the western boundary. The waste decreased as divers traveled to the east. The soft bottom substrate makes waste identification in this area exceeding difficult. Marine life seen in this area was limited to the occasional sculpin.

DIVERS OBSERVATIONS

SECTION 4

This section has extensive coverage throughout most of the survey area. The waste depths are the greatest in the southeast corner and decrease as you travel to the north and west. Water depths reach almost 170' at the northwest corner with water depths at the northeast corner being 162'. Many of the waste depths on the edge of the waste are very difficult to determine due to the soft substrate and waste composition. The depths along this edge range from .2 to .4 of a foot.

VOLUME AND AREA MEASUREMENTS

OVERALL SURVEY SITE

VOLUME MEASUREMENTS

TOTAL WASTE COVERAGE 105,025 SQ. FEET

2.41 ACRES

AVERAGE DEPTHS
IN AREAS OF WASTE COVERAGE .90 FEET

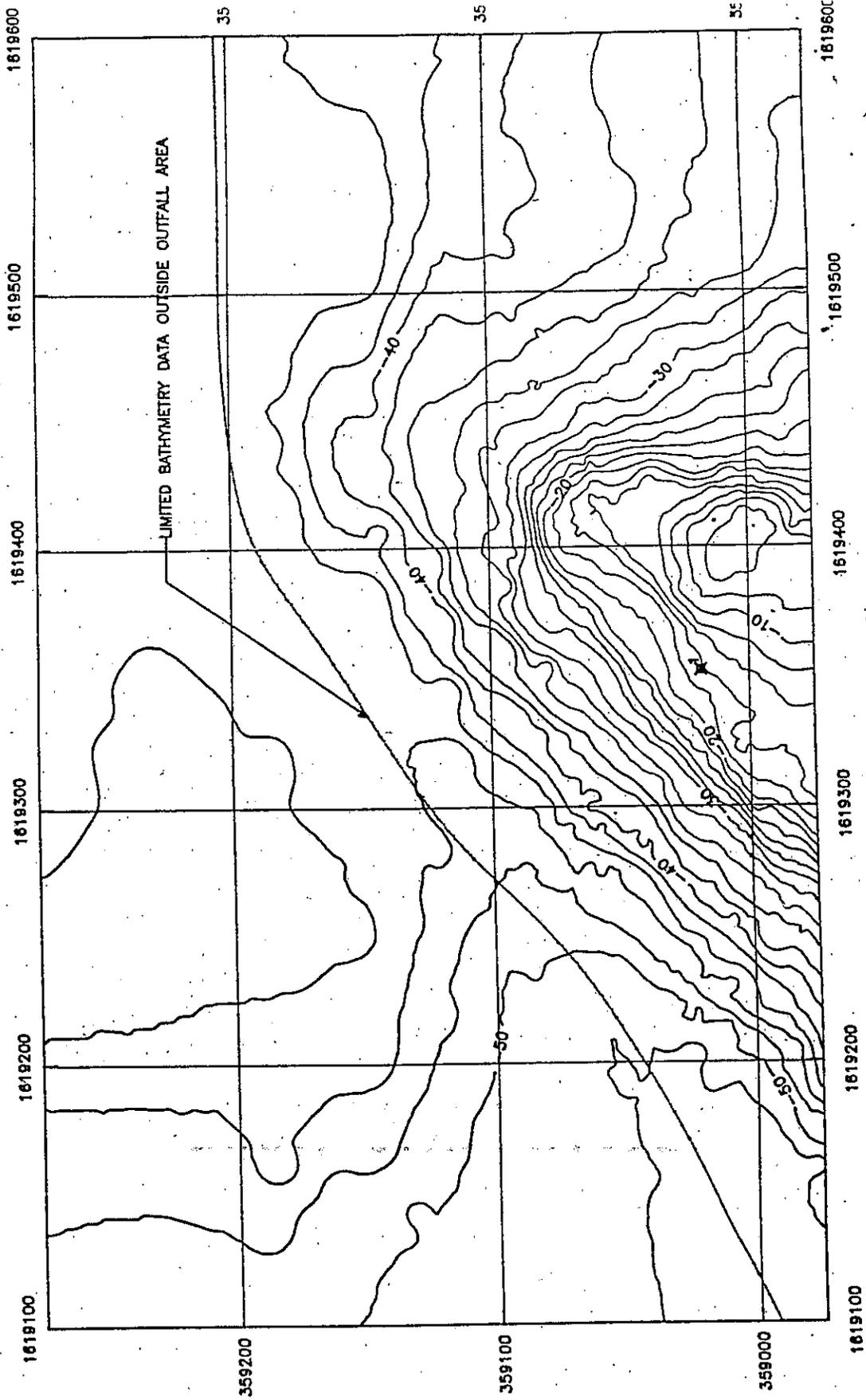
WASTE GREATEST DEPTH 9.2 FEET

DIAGRAMS

DIAGRAMS FOR TEXT

- | | |
|------------------|--|
| DIAGRAM 1 | <i>OVERVIEW OF SURVEY SITE</i> |
| DIAGRAM 2 | <i>LINE REELS</i> |
| DIAGRAM 3 | <i>DATA POINT MATRIX OF SURVEY SITE</i> |
| DIAGRAM 4 | <i>OUTFALL DIFFUSER HEAD</i> |
| DIAGRAM 5 | <i>MONUMENT MARKER</i> |

WESTWARD SEAFOODS -- BAILEYS LEDGE OUTFALL SURVEY -- OCTOBER 1993
State Plane Zone 10 (Meters)



bathymetry in meters
contours at 2 meter intervals
 $1 m = 3.28 ft$

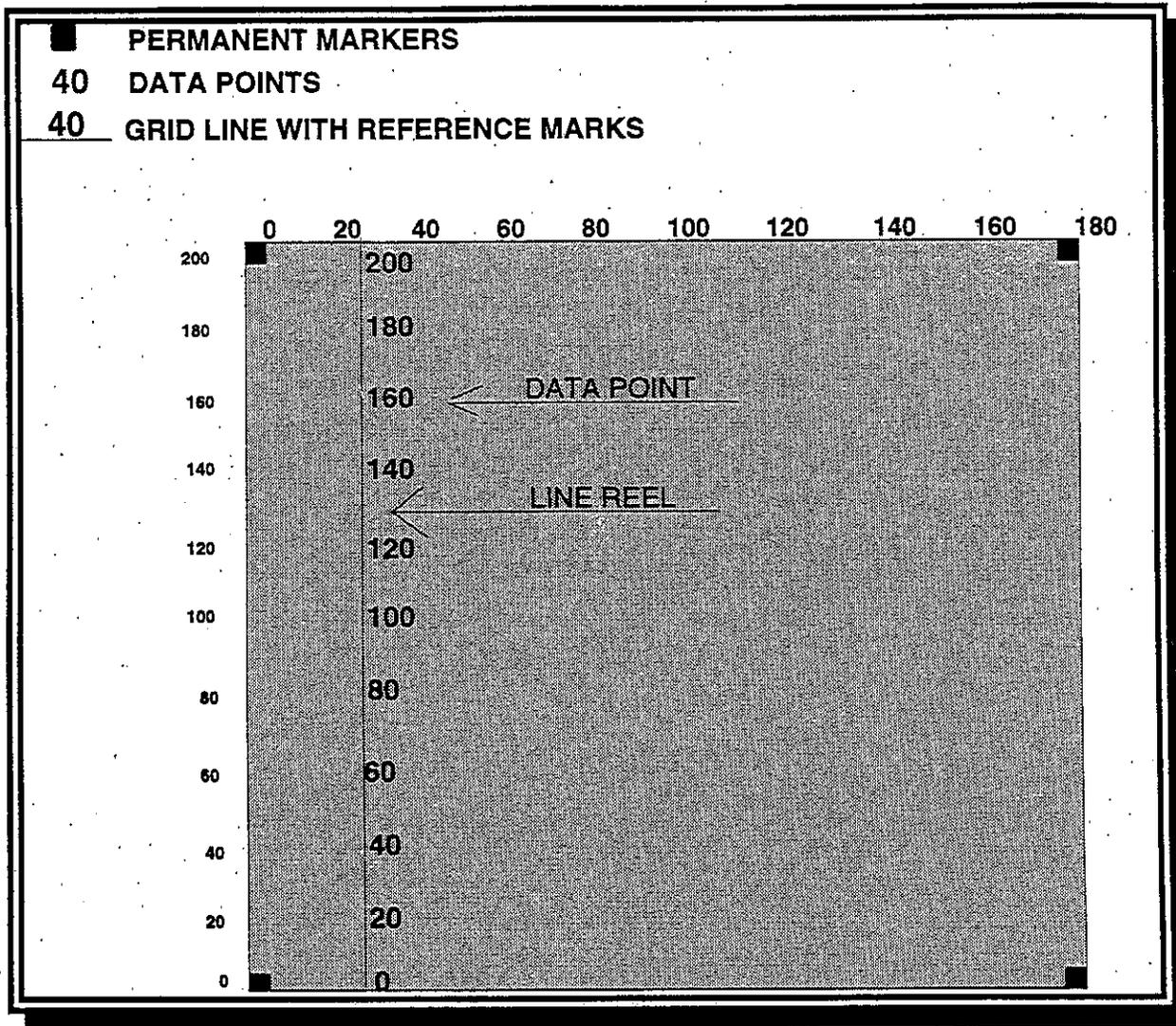
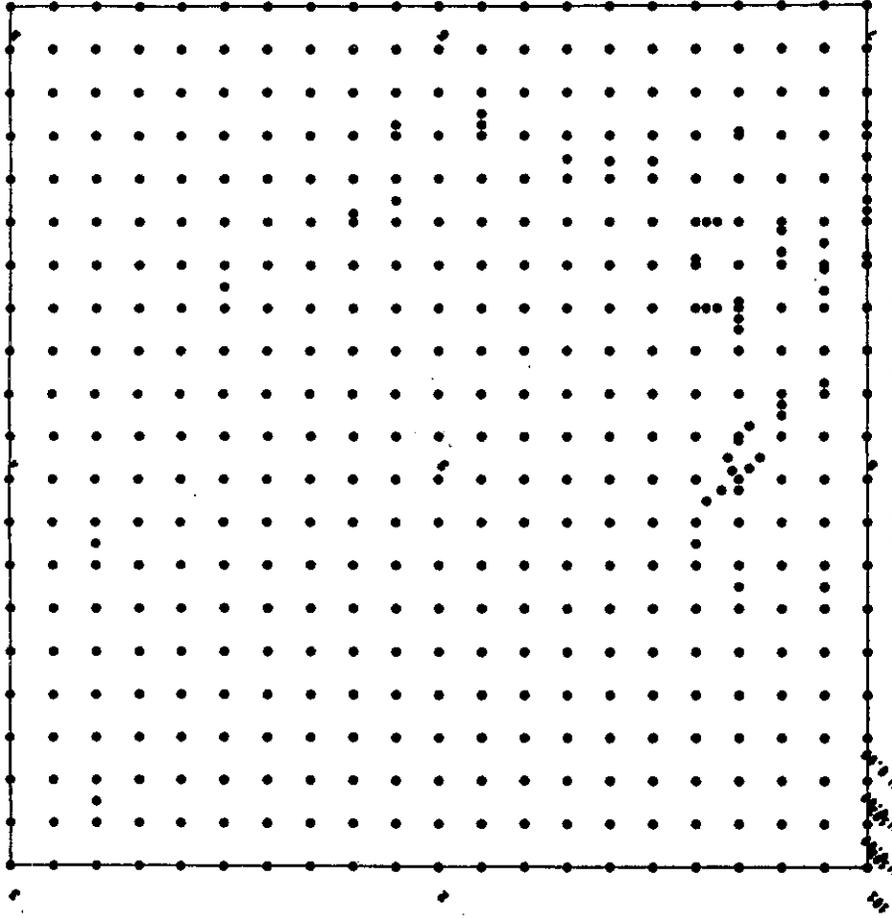


DIAGRAM 2
WESTWARD SEAFOODS



WESTWARD SEAFOODS INC.

ENVIRO-TECH DIVING INC.

THE ENVIRONMENTAL SURVEY PEOPLE

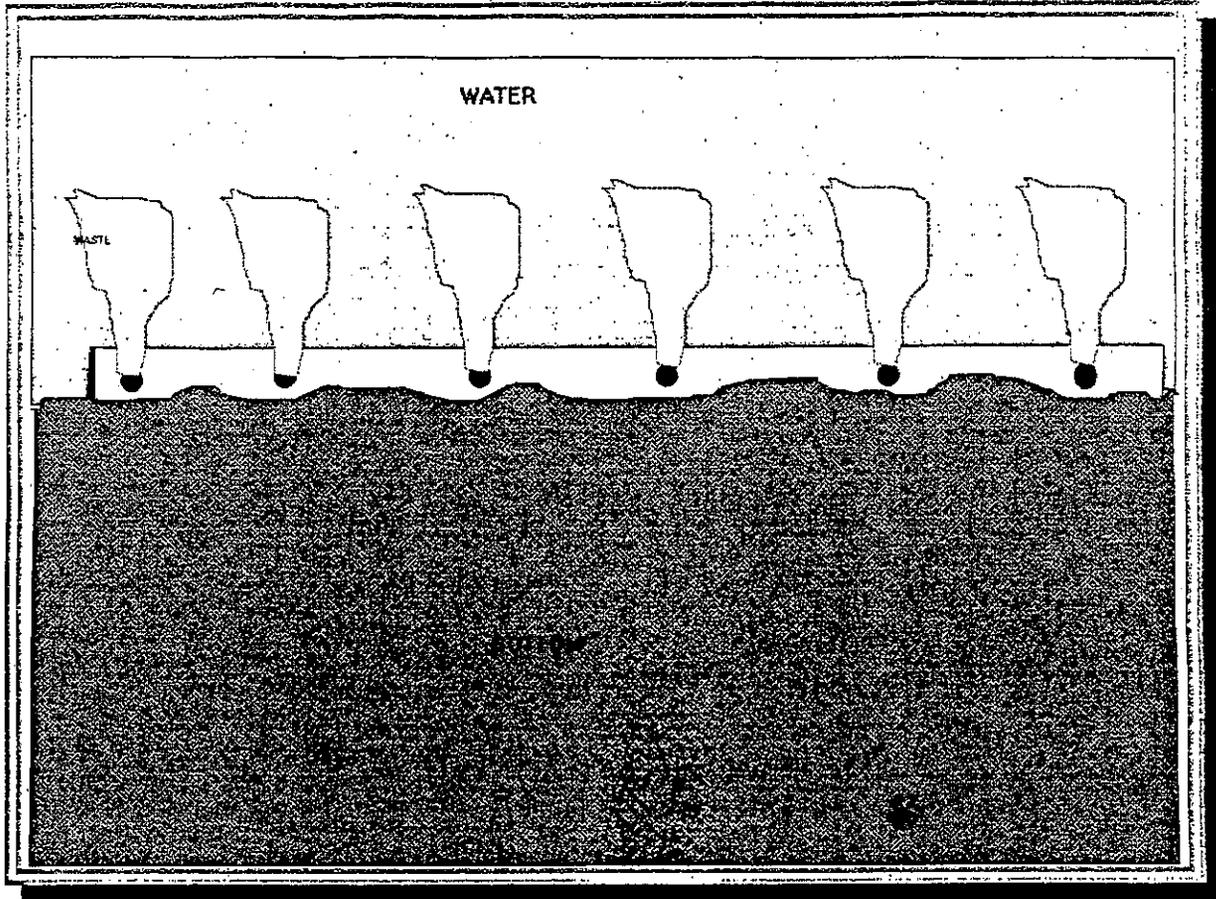
DUTCH HARBOR, ALASKA

AUGUST 1984

DATA POINT MATRIX

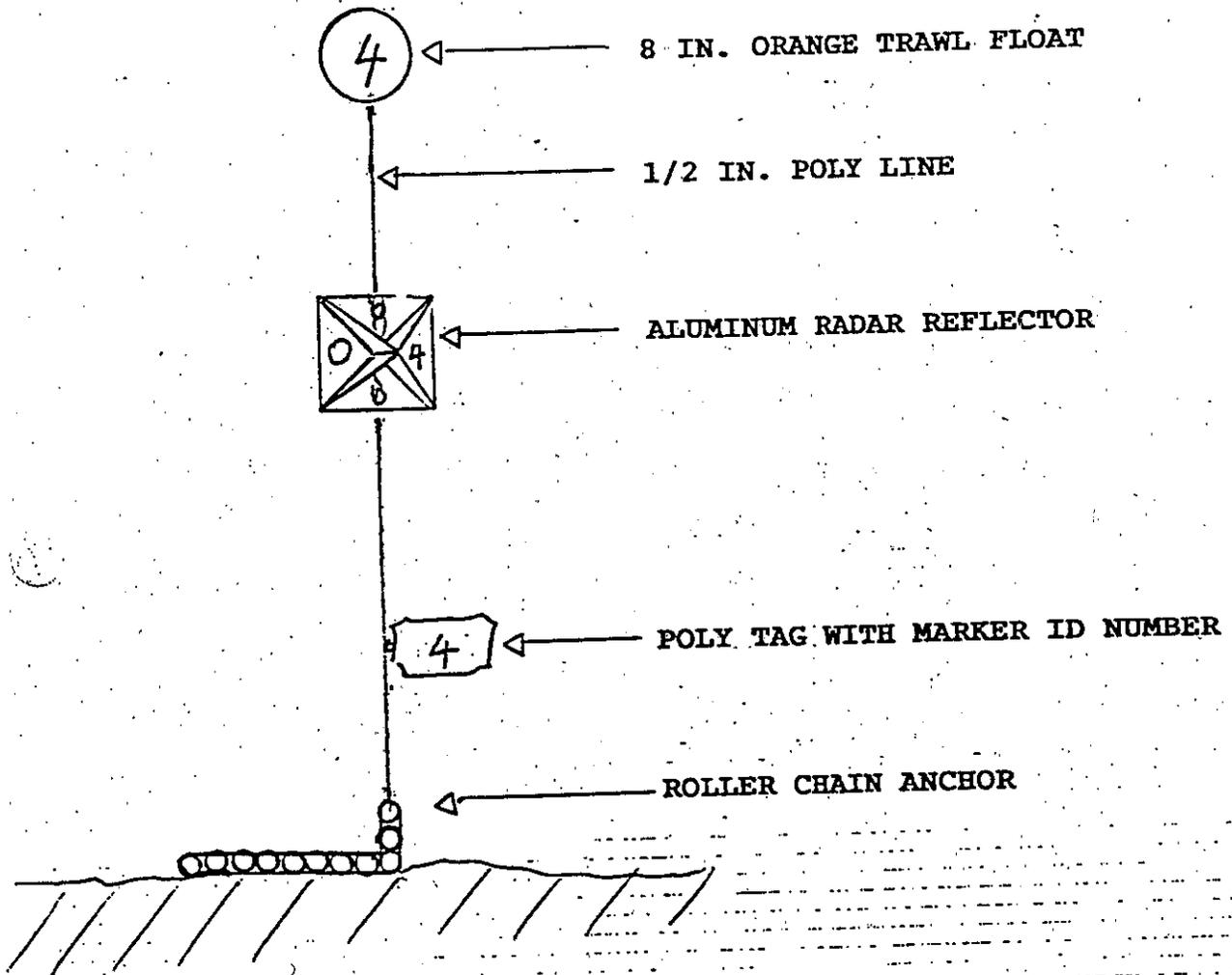
DIAGRAM 3

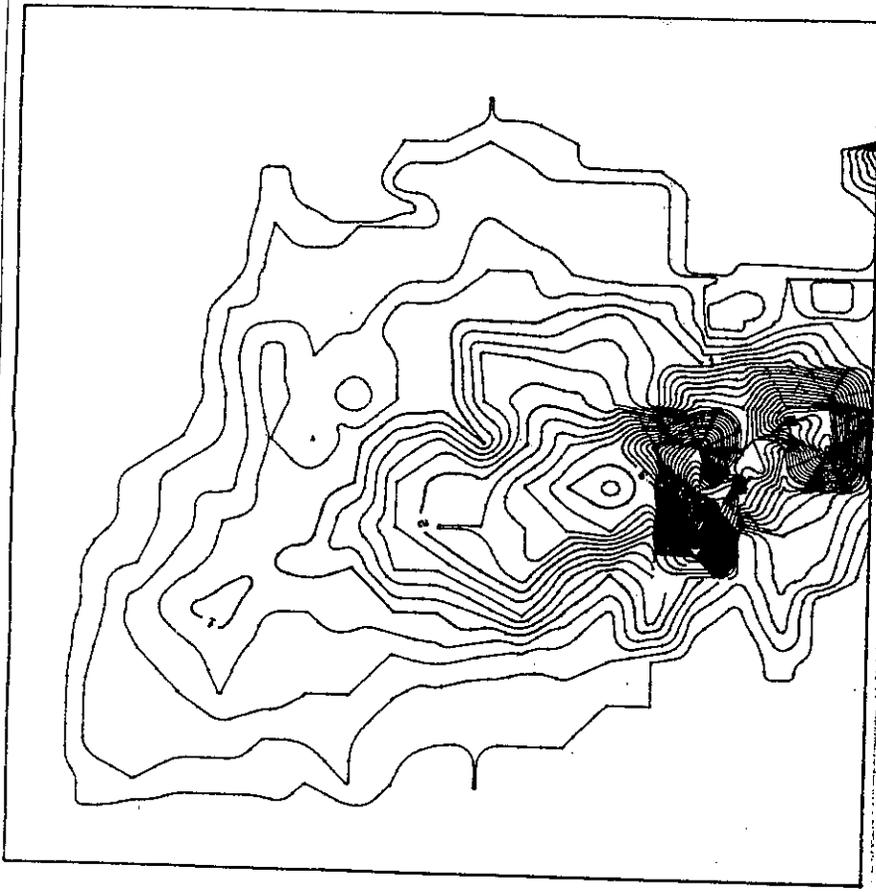
WESTWARD SEAFOODS INC
DIAGRAM 4
DIFFUSER HEAD



1994 WSI OUTFALL SURVEY

TYPICAL BASELINE MARKER, 1994 PLACEMENT





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ENVIRO-TECH DIVING INC.

THE ENVIRONMENTAL SURVEY PEOPLE

DUTCH HARBOR, ALASKA

AUGUST 1994

WASTE EXTENT MAP

MAJOR CONTOUR 1'

MINOR CONTOUR .2'

MAPS AND DATA POINT INFORMATION.

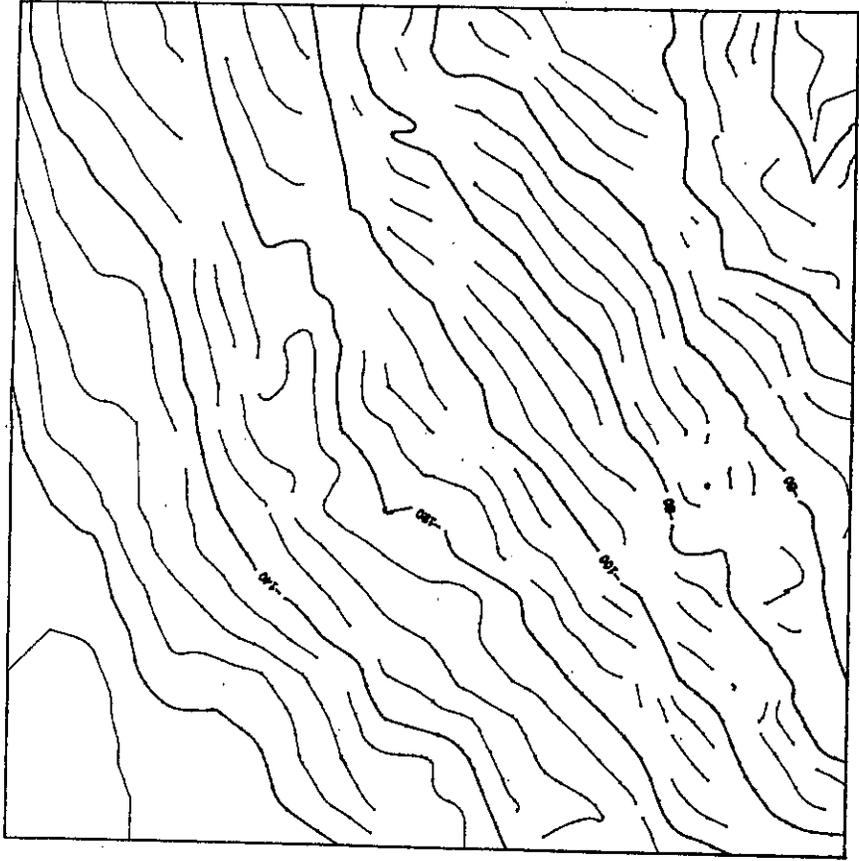
BOTTOM ONLY - MAPS AND DATA

BOTTOM TOPOGRAPHIC MAP

BOTTOM THREE DIMENSIONAL MAP

BOTTOM 3-D WITH TOPOGRAPHIC OVERLAY

DATA POINT INFORMATION



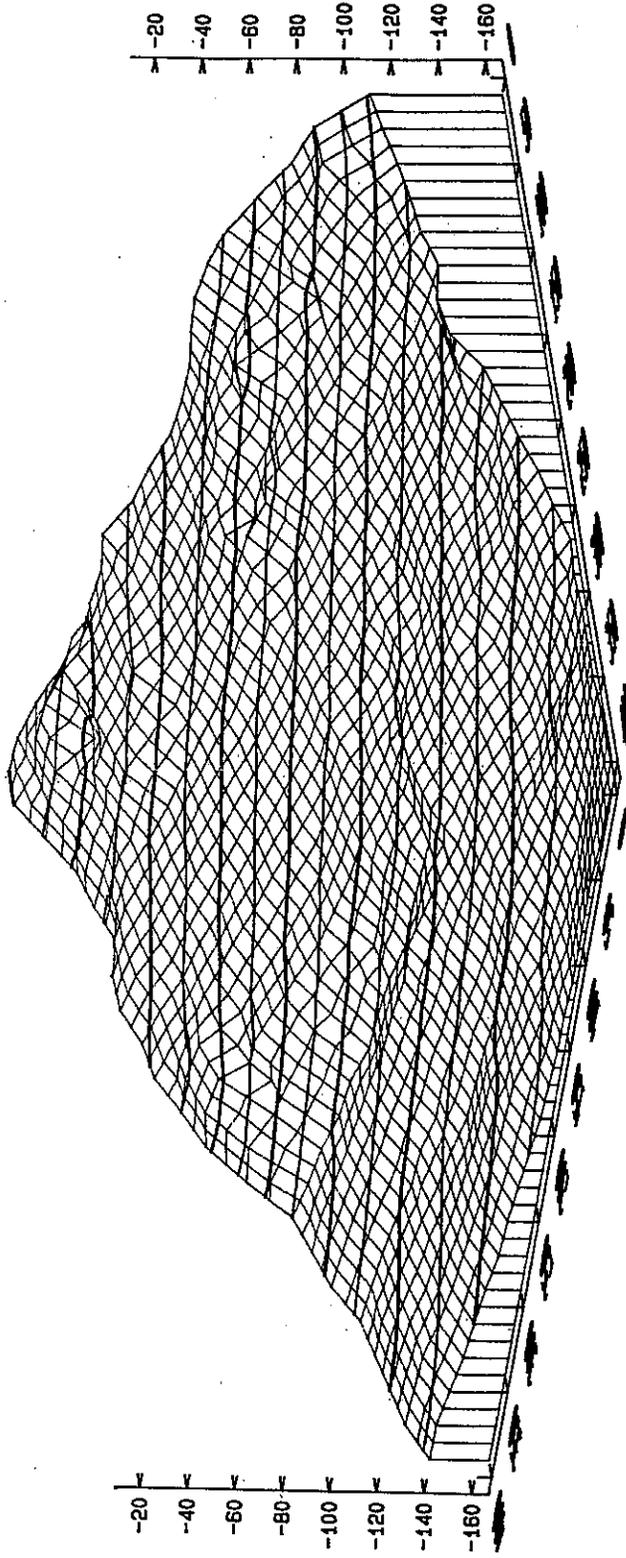
WESTWARD SEAFOODS INC.

ENVIRO-TECH DIVING INC.

THE ENVIRONMENTAL SURVEY PEOPLE
DUTCH HARBOR, ALASKA

AUGUST 1994
VERTICAL EXAGGERATION # 1
MAJOR CONTOUR 20'
MINOR CONTOUR 5'

BOTTOM
TOPOGRAPHIC MAP



WESTWARD SEAFOODS INC.

ENVIRO-TECH DIVING INC.

THE ENVIRONMENTAL SURVEY PEOPLE

DUTCH HARBOR, ALASKA

BOTTOM

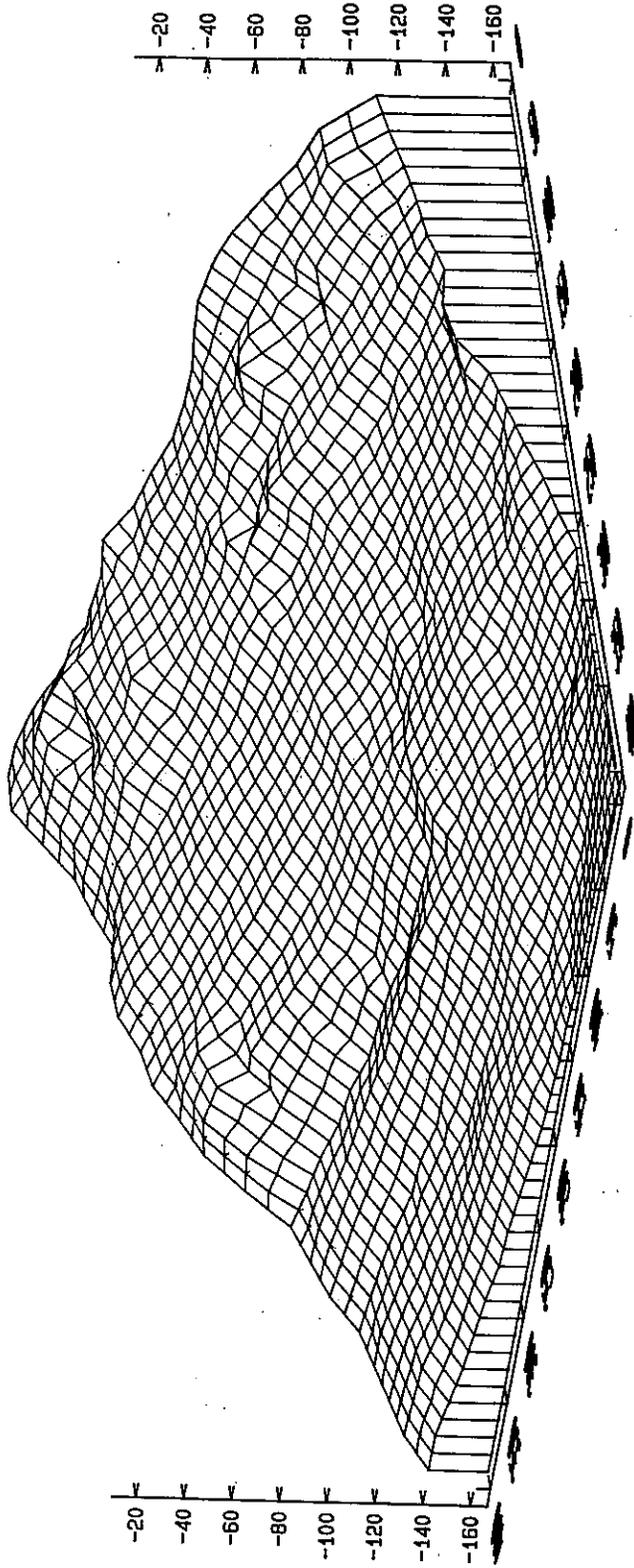
3-DIMENSIONAL W/TOPOGRAPHIC

AUGUST 1984

VERTICAL EXAGGERATION * 1

MAJOR CONTOUR 10'

MINOR CONTOUR 20'



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THE ENVIRONMENTAL SURVEY PEOPLE

DUTCH HARBOR, ALASKA

AUGUST 1994

VERTICAL EXAGGERATION * 1

BOTTOM

3-DIMENSIONAL MAP

MAPS AND DATA POINT INFORMATION

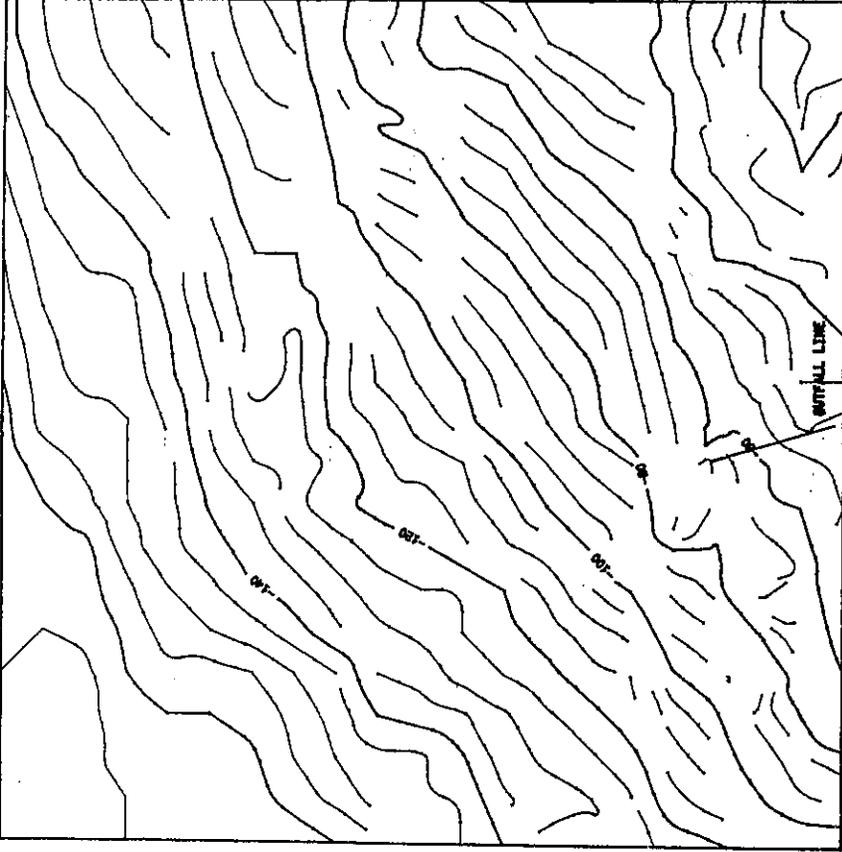
BOTTOM WITH WASTE - MAPS AND DATA

BOTTOM TOPOGRAPHIC WITH WASTE

BOTTOM 3-D WITH WASTE

BOTTOM 3-D WITH WASTE AND TOPOGRAPHIC OVERLAY

DATA POINT INFORMATION



WESTWARD SEAFOODS INC.

ENVIRO-TECH DIVING INC.

THE ENVIRONMENTAL SURVEY PEOPLE

DUTCH HARBOR, ALASKA

BOTTOM WITH WASTE

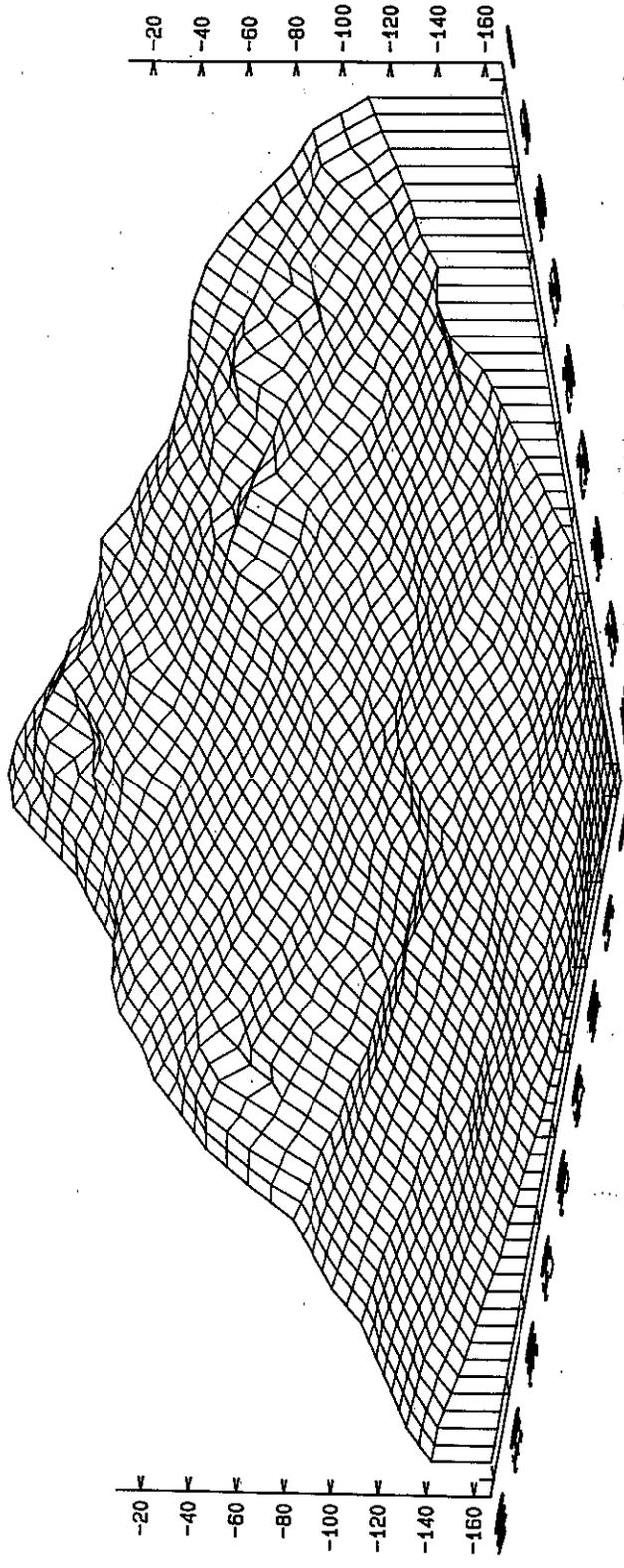
TOPOGRAPHIC MAP

AUGUST 1994

VERTICAL EXAGGERATION # 1

MAJOR CONTOUR 20'

MINOR CONTOUR 5'



WESTWARD SEAFOODS INC.

ENVIRO-TECH DIVING INC.

THE ENVIRONMENTAL SURVEY PEOPLE

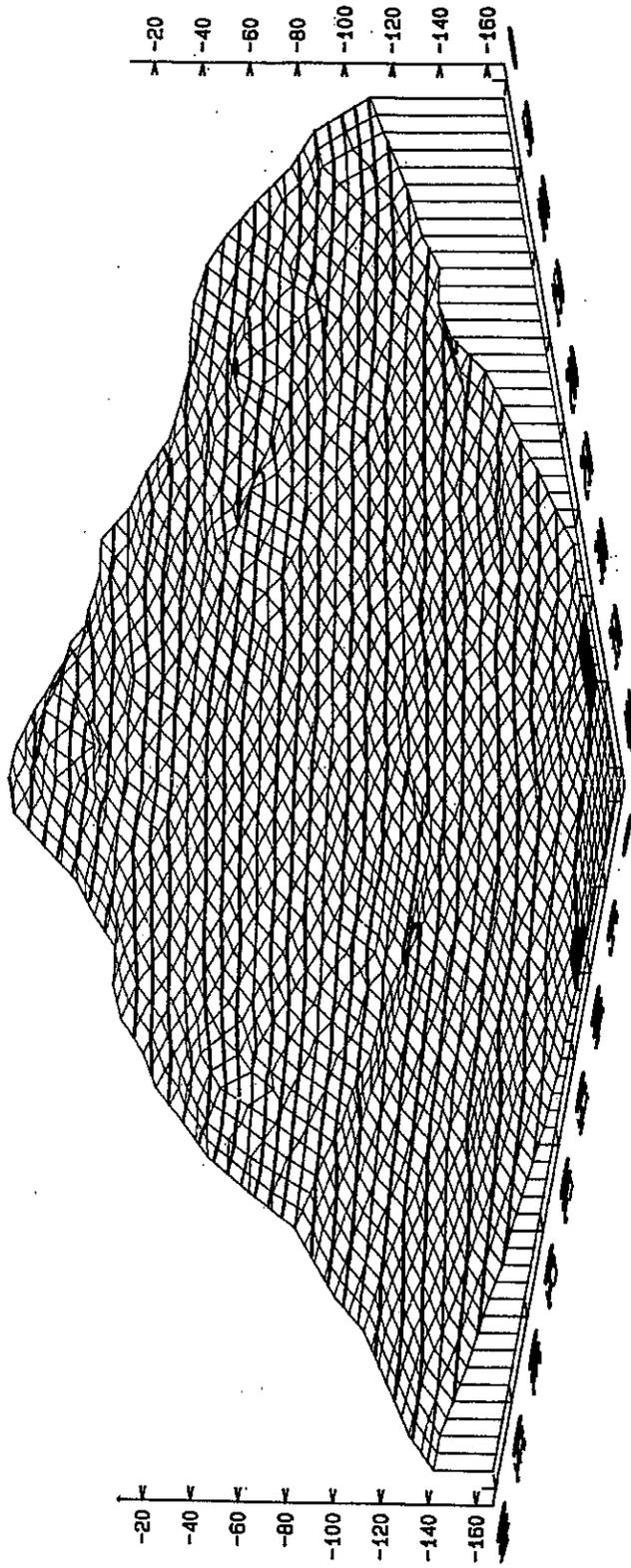
DUTCH HARBOR, ALASKA

BOTTOM WITH WASTE

3-DIMENSIONAL MAP

AUGUST 1994

VERTICAL EXAGGERATION * 1



WESTWARD SEAFOODS INC.

ENVIRO-TECH DIVING INC.

THE ENVIRONMENTAL SURVEY PEOPLE

DUTCH HARBOR, ALASKA

BOTTOM WITH WASTE

3-DIMENSIONAL W/ TOPOGRAPHIC

AUGUST 1984

VERTICAL EXAGGERATION * 1

MAJOR CONTOUR 20'

MINOR CONTOUR 5'

MAPS AND DATA POINT INFORMATION

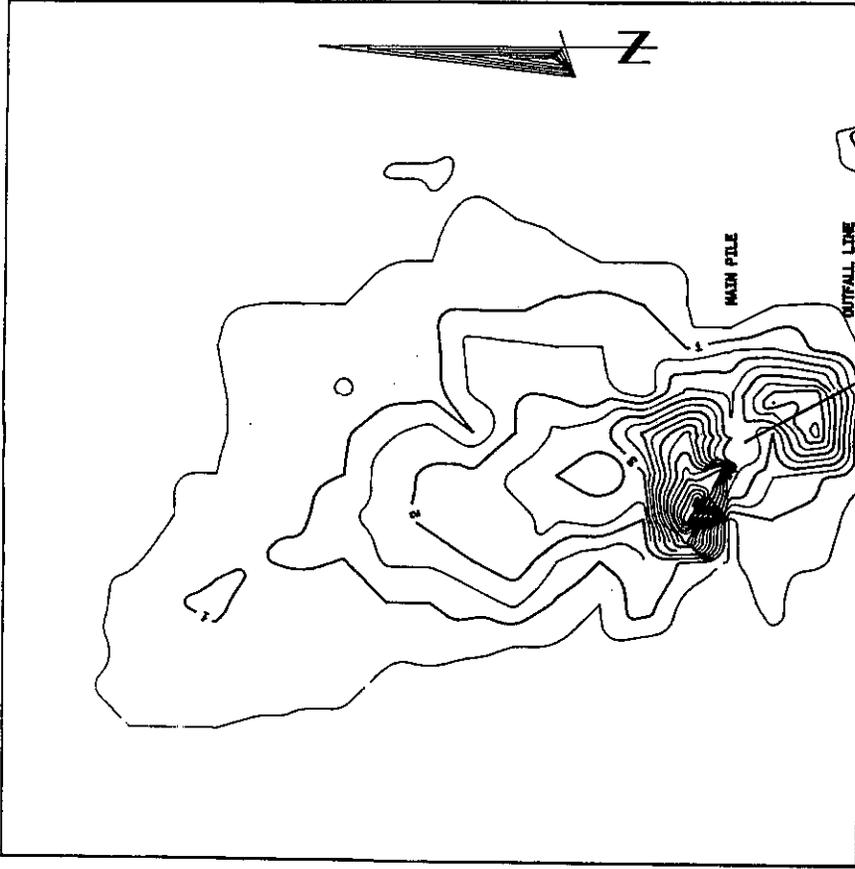
WASTE ONLY - MAPS AND DATA

WASTE TOPOGRAPHIC

WASTE THREE DIMENSIONAL

WASTE 3-D WITH TOPOGRAPHIC OVERLAY

DATA POINT INFORMATION



WESTWARD SEAFOODS INC.

ENVIRO-TECH DIVING INC.

THE ENVIRONMENTAL SURVEY PEOPLE

DUTCH HARBOR, ALASKA

WASTE

TOPOGRAPHIC MAP

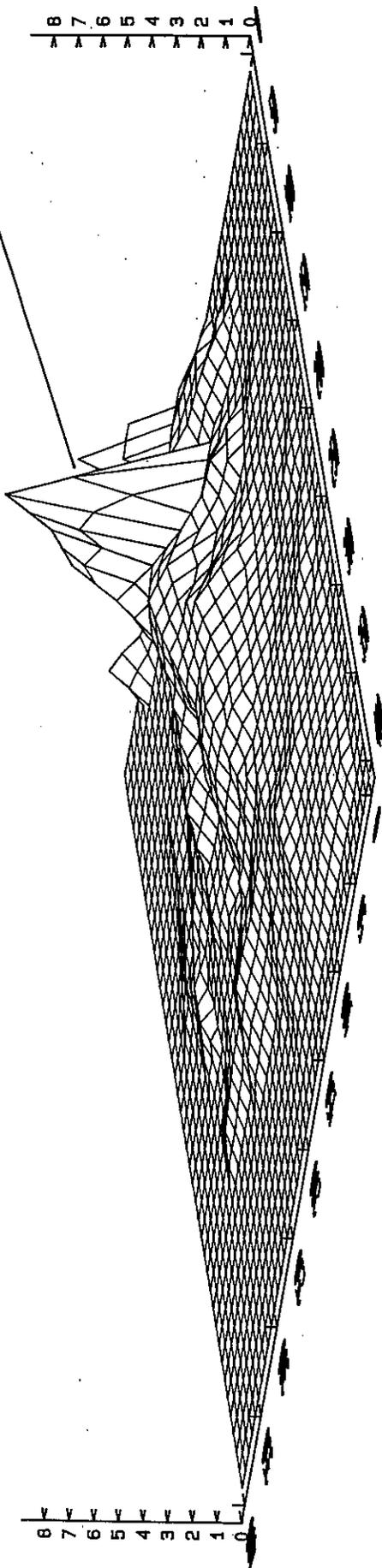
AUGUST 1994

VERTICAL EXAGGERATION * 10

MAJOR CONTOUR 1'

MINOR CONTOUR .5'

CUTFALL LINE



WESTWARD SEAFOODS INC.

ENVIRO-TECH DIVING INC.

THE ENVIRONMENTAL SURVEY PEOPLE

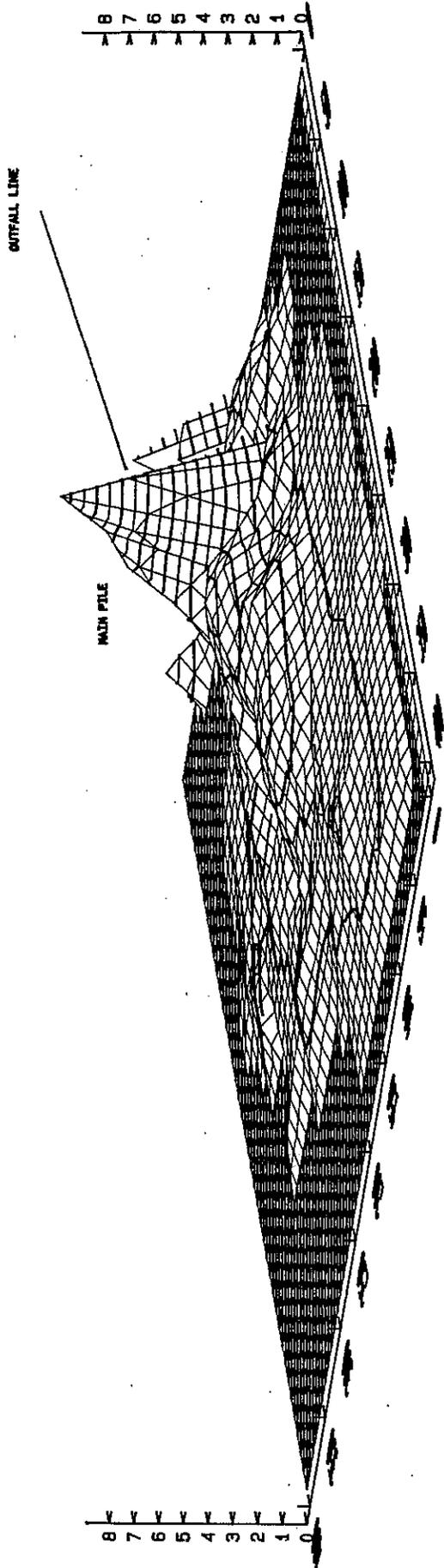
DUTCH HARBOR, ALASKA

WASTE

AUGUST 1994

VERTICAL EXAGGERATION * 10

3-DIMENSIONAL MAP



WESTWARD SEAFOODS INC.

ENVIRO-TECH DIVING INC.

THE ENVIRONMENTAL SURVEY PEOPLE

DUTCH HARBOR, ALASKA

AUGUST 1994

VERTICAL EXAGGERATION # 10

MAJOR CONTOUR 1'

MINOR CONTOUR .5'

WASTE

3-DIMENSIONAL W/TOPOGRAPHIC