

**Tolstoi Bay
Log Transfer Facility
Log Storage Area
Pre-Discharge Survey**

**Longitude 132° 27' 20"
Latitude 55° 37' 30"**

Submitted to:

Forest & Land Management Inc.
P.O. Box 110149
Anchorage, Alaska 99511-0149

Prepared by:

Stephen Haggitt
Craig, Alaska 99921

Dive Jan. 1.01

Introduction

An underwater reconnaissance was requested to determine the representative condition of the area proposed for use as a Log Transfer Facility (LTF). The site surveyed is located approximately five miles southeast of Thorne Bay, in Tolstoi Bay¹. The applicant is the Alaska Mental Health Trust Land Office, located in Anchorage, Alaska. This report was conducted at the request of Forest and Land Management Inc., also located in Anchorage.

This inspection documented findings according to Alaska Department of Environmental Conservation (ADEC), Environmental Protection Agency (EPA) and NPDES requirements. The survey included three linear transects from MHW to a depth of 90' (using an alternate method due to topography) and three additional, radial transects to 300 linear feet. The survey quantified and identified species of organisms present at sample locations along the transects. Bottom composition and topography are described as well as the depth and extent of any existing bark deposits along the transects. The percent coverage of bark was determined by using the protocol for operating a bark-monitoring program given in the EPA General Permit. The area calculation used in this report is outlined in the ADEC publication "**Required Method for Bark Monitoring Surveys under the LTF General Permits**".

Methods

Radial Transects:

The fixed hub reference point for the transects radiating from the proposed log transfer ramp was located by assessing maps and diagrams provided by Forest and Land Management Inc. for this purpose. The area indicated on the drawings was also clearly marked with orange flagging on trees adjacent to the beach.

The reference hub was located as close as possible to the center of the discharge site to facilitate future reconnaissance. Three transects were established, radiating from the reference hub at 30-degree intervals. Two separate magnetic compasses were compared to determine the bearings. The heading was also verified by establishing a "fix" on the opposite shore and by personnel on the beach monitoring the diver's progress toward that reference point.

Samples were taken at intervals of 15 linear feet along each transect. This interval distance was established with the use of a metal ruler 48 inches in length, laid end over

¹ Please see Appendix A for area and site map.

end. The sample points began at 15 linear feet from the fixed reference hub and continued along the transect, terminating at the requisite distance of 300 linear feet or 60 FSW (feet of seawater).

Linear Transects:

Three linear transects were established perpendicular to shore as part of this survey. Two transects intersected the existing log raft area and one intersected the proposed log raft site. The reference point for each of the linear transects was located using maps supplied by Forest and Land Management Inc. These maps also were used to establish the primary location and distance separating the three transects. The shoreward end was then located, as accurately as possible, at the MHW line (alternate method). A compass bearing perpendicular to shore that intersected the log storage raft area was then determined. Samples were taken at intervals of 15 linear feet along each transect. This interval distance was established using a metal ruler 48 inches in length, laid end over end. The sample points began at 15 linear feet from the fixed reference point and continued along the transect, terminating at a depth of 92 FSW MHW.

Sample Points:

At each sample point observations were noted on the abundance and type of marine organisms present, the native vegetation, and composition of the substrate. Data including the water depth, current direction, and estimated current velocity also were incorporated into the field notes. Each of the sample points also included relevant observations on operational debris and existing bark debris. Photographic documentation² was used at representative sample locations to record algal life, animal life, substrate, and debris present. Sample location depth notations are based on readings from a Cochran Consulting Nemesis IIA dive computer calibrated for saltwater and altitude.

Findings

Survey Area:

The total area covered by this survey was 14.66 acres. The radial transects encompassed 1.03 acres. The linear transects comprised 13.63 acres.

Log Transfer Ramp:

The reference point hub position was recorded using a hand held DGPS. The coordinates for this hub are N 55° 37. 481 by W 132° 27.450.

Weather conditions during the survey consisted of clear skies with winds less than five knots. Diving commenced at 10:21 during MHHW. The Hadley Lyman Anchorage tidal station (subordinate station #1461) was used, reporting a MHHW of 16.8 ft at 10:17 a.m. The current conditions were negligible. Seawater temperature was recorded at 46 degrees F. The horizontal visibility was estimated to be 35 feet.

² Please see Appendix E for photographic documentation.

Three transects radiated out from the reference point on bearings labeled 20°, 350°, and 320°. Each of these transects terminated at 300 linear feet. Number of samples for the Tolstoi Bay log transfer ramp totaled 60.

Log Storage Area:

Three linear transects were established using the following DGPS reference point coordinates with a compass bearing of 110°:

Transect 3: Reference point coordinate N55° 37.670 W132° 27.35

Transect 4: Reference point coordinate N55° 37.791 W132° 27.17

Transect 5: Reference point coordinate N55° 37.891 W132° 27.09

Site conditions remained steady with winds less than five knots and clear skies. Diving commenced at 12:35 during MHW. The Hadley Lyman Anchorage tidal station (subordinate station #1461) was used, reporting a MHW of 15.3 ft at 12:30 p.m.³ Current velocity was negligible. Seawater temperature was recorded at 46 degrees F. The horizontal visibility was estimated to be 40 feet.

Each transect terminated at 92 FSW, corrected to MHW at subordinate station #1461. A total of 25 sample locations were assessed. The angle of repose for these transects varied from gradients as high as 1:27 to a final declination of 1:1 or 45 degrees.

Observations

Log Transfer Ramp:

The topography of the log transfer ramp area is a gradual grade. This location did contain a trace amount of larger bark debris that had been imported from the existing log storage area. The smaller particles apparently remained in suspension in the water column as a result of tidal action. The diversity of species found in the area is typical for this type of sandy substrate with abundance varying from low to common.

A narrow band of eelgrass (*Zostera marina*) was observed west of the 20° transect at sample location number six. The balance of the survey area contained a low abundance of plants. The species identified are noted in the transect logs⁴.

Molluscs were not observed in abundance on the slope. No bivalve siphons were apparent along the transects.

Echinoderms observed along the predominantly sandy slope included sea star species

³ Please see Appendix B for tidal information.

⁴ Please see Appendix D for transect logs.

Evasterias troschelii, *Dermasterias imbricata*, and *Pycnopodia helianthoides*⁵.

Crustacean diversity and abundance were markedly low. Barnacles were established in commonly observed densities along the bedrock.

Log Storage Area:

The topography in the area proposed as a log storage area has a substantial angle of repose (i.e., consists of a steep slope), with several breaks in the slope. A consistent tidal/current influence is evident. As a result, the debris present remained mobile. The substrate adjacent to the storage area consisted primarily of bedrock. The shoreline was populated by species of seaweeds, lichens, and animals commonly associated with a rocky substratum. At the base of the rock walls, the substrate changed to cobble and sand/aggregate mix that supported sea stars and sea cucumbers in lower abundances than were noted on the rock wall.

High densities of *Fucus gardneri* were observed at the shallow sample points, but abundance declined with depth. Subtidally, several species of *Laminaria* populated the wall in common abundance along with unidentified species of foliose red algae.

Abundance of *Parastichopus californicus* ranged from low to high, depending on substrate and food availability. Echinoderms observed along the slope in the 40 to 90 FSW range included the sea star species *Evasterias troschelii*, *Crossaster papposus*, *Dermasterias imbricata*, *Mediaster aequalis*, and *Pycnopodia helianthoides*. Mussels observed were identified as *Mytilus edulis* and were found in high abundance on the rock wall at the shallower sample points. Fish abundance was low at all sample points.

Conclusions

Although General Permit AK-G70-1000 requires the pre-discharge survey to evaluate whether the discharge site meets the requirements of Part III of the post-1985 GP (V.D.7.f.), the Department of Environmental Conservation believes this evaluation must be the responsibility of the permittee; as outlined in paragraph five of the ADEC publication "**Required Method for Bark Monitoring Surveys under the LTF General Permits**".

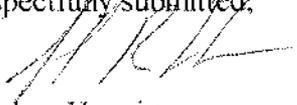
In accordance with the requirements listed above and with regard to the applicable siting guidelines that are within the scope of this marine survey, it is my opinion that the site is in compliance with the requirements of Part III of the post 1985 GP.

No continuous bark
Traces only
See tables

⁵ Please see Appendix C for list of common names.

If you have need of further service regarding this report, please contact me directly at (253) 209 9380. E-mail correspondence can be forwarded to Haggitt1@juno.com. I appreciate the opportunity to provide you with this report.

Respectfully submitted,

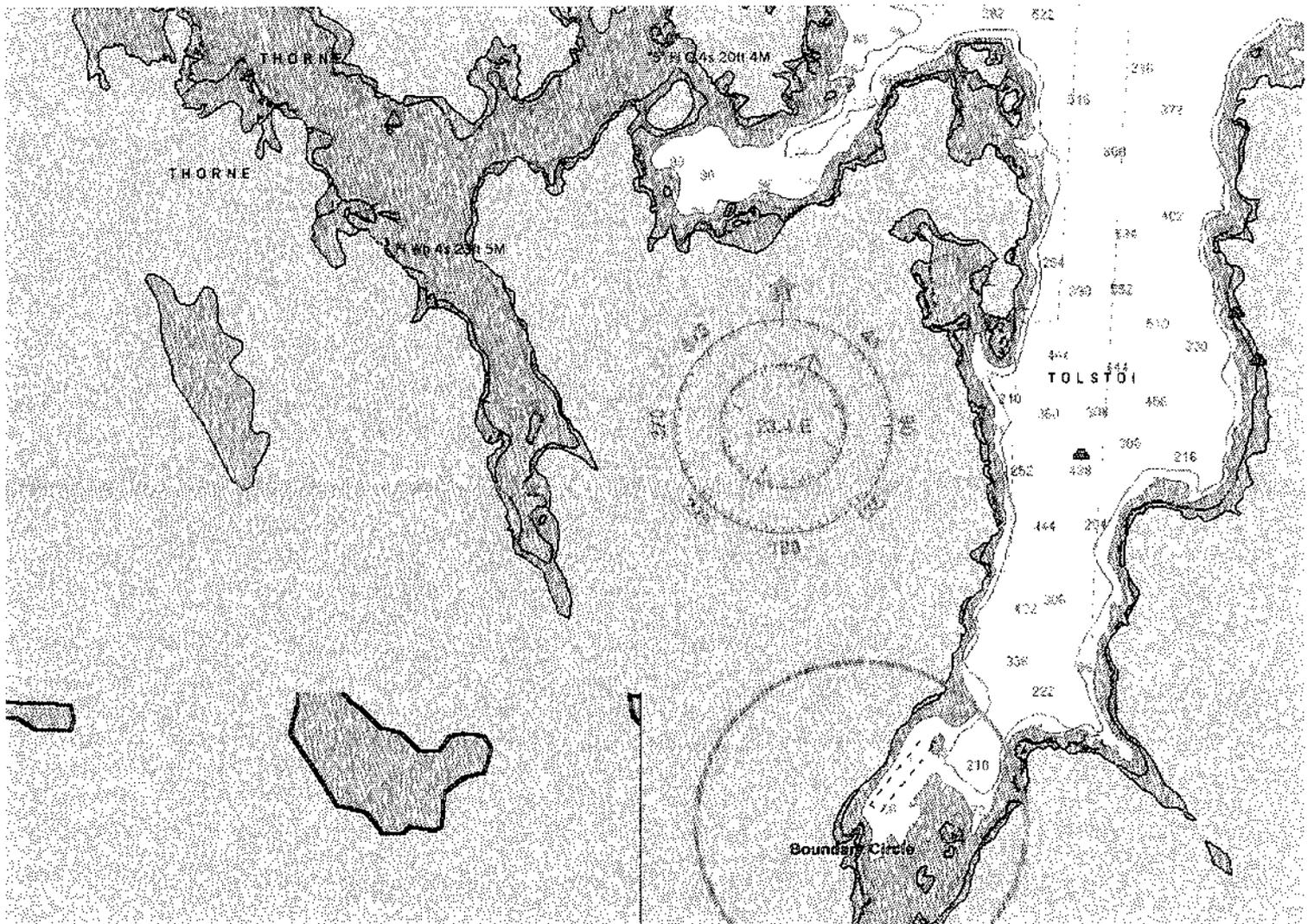
A handwritten signature in black ink, appearing to read 'S. Haggitt', written over the typed name.

Stephen Haggitt
January 12, 2002

Appendix A

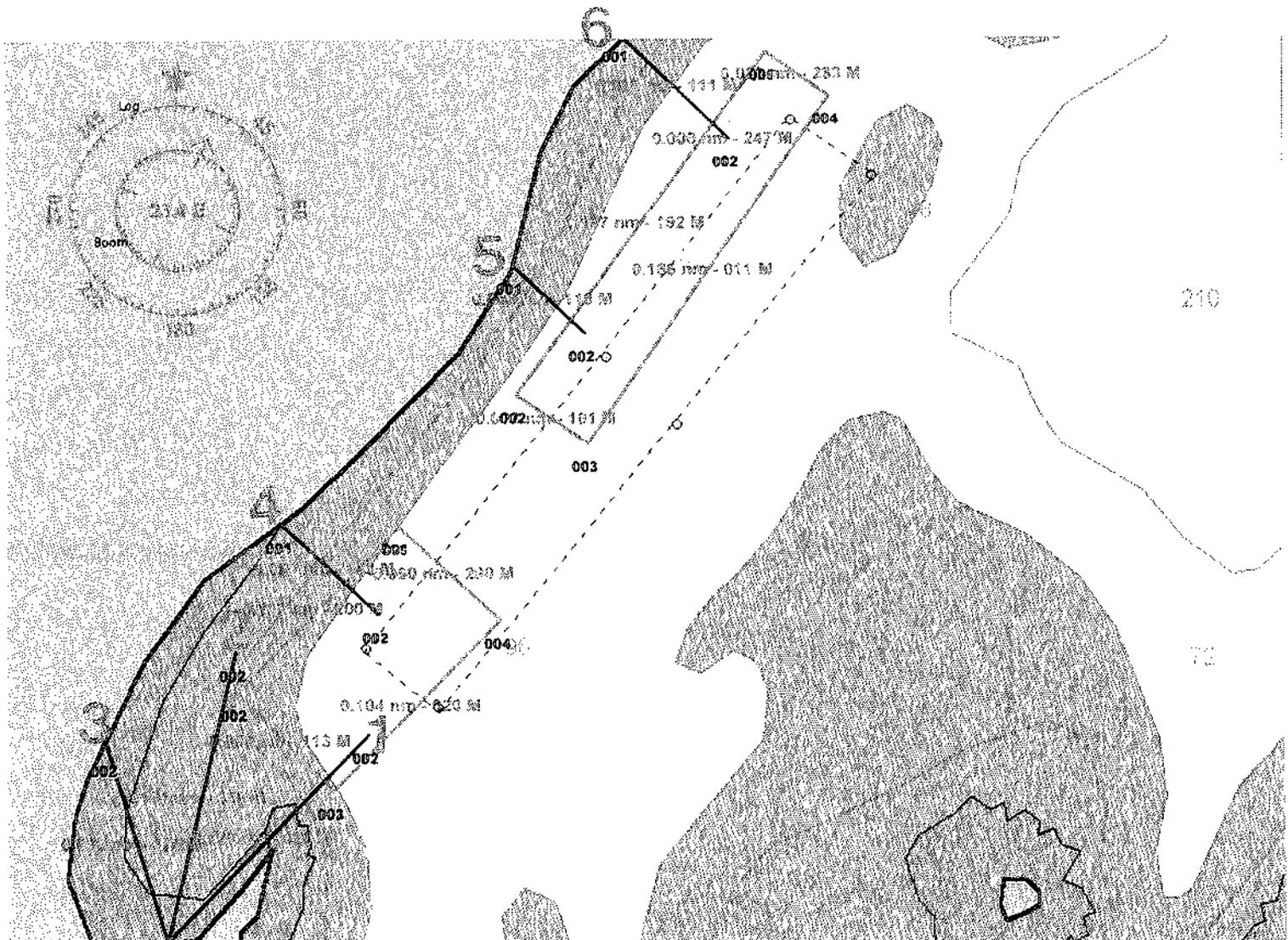
Vicinity Map

U.S.-CANADA. HECATE STRAIT TO ETOLIN ISLAND. BEHM & PORTLAND CANALS. - 1 : 170,464
(Passport World Charts - vector format) Chart #U17420 - Depth Units:



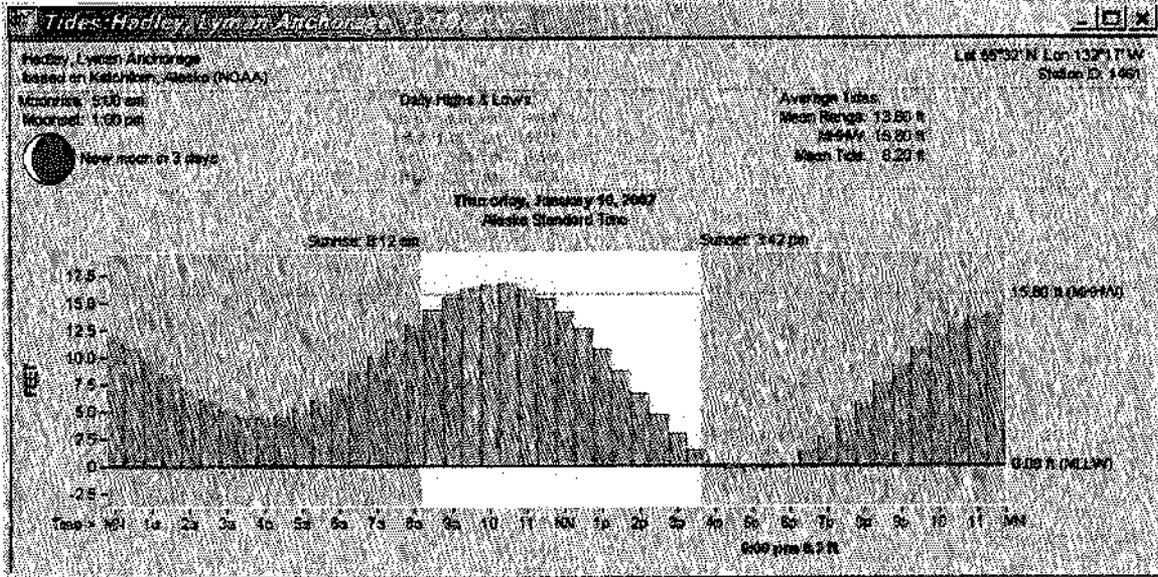
Diagram

5. ALASKA - SE COAST. PRINCE OF WALES I. TOLSTOI AND THORNE BAYS. - 1 : 21,308
(Transport World Charts - vector format) Chart #U17423C - Depth Units:



Appendix B

Tidal Chart



Appendix C

Common Names

Plants

Scientific Name	Common Name	Abundance
<i>Zostera marina</i>	eel grass	L
<i>Alaria marginata</i>	ribbon kelp	L
<i>Ulva sp.</i>	sea lettuce	C
<i>Cymathere triplicata</i>	three-ribbed kelp	L
<i>Fucus gardneri</i>	rockweed	A

Invertebrates

Scientific Name	Common Name	Abundance
<i>Flabellina trilineata</i>	three-lined nudibranch	L
<i>Octopus rubescens</i>	red octopus	L
<i>Mediaster aequalis</i>	vermilion star	C
<i>Lottidae</i>	limpet (Family)	L
<i>Saxidomus giganteus</i>	butter clam	L
<i>Crossaster papposus</i>	rose star	C
<i>Dermasterias imbricata</i>	leather star	L
<i>Parastichopus californicus</i>	sea cucumber	C
<i>Evasterias troschelii</i>	mottled star	L
<i>Strongylocentrotus franciscanus</i>	red sea urchin	L
<i>Pycnopodia helianthoides</i>	sunflower star	L

Appendix D

Sample points

Log Transfer Ramp Transect 1: 20° Bearing

Sample Number	Depth	Substrate	Algal Abundance; (L) Low, (C) Common, (A) Abundant	Animal Abundance; (L) Low, (C) Common, (A) Abundant	Debris / Coverage
1	4 FSW	cobble and sand			bark <10%
2	6 FSW	cobble and sand			bark <10%
3	7 FSW	cobble and sand			bark, trace
4	9 FSW	sand			
5	12 FSW	sand and bedrock			bark, 1-foot chunk, trace
6	15 FSW	sand	<i>Zostera marina</i> (L)		
7	18 FSW	sand and bedrock			
8	20 FSW	sand and bedrock		<i>Flabellina trilineata</i> . (L),	
9	22 FSW	sand and bedrock, shell			
10	26 FSW	sand and bedrock, shell	<i>Alaria marginata</i> (holdfast and stipe only) (L)	<i>Flabellina trilineata</i> . (L), <i>Octopus rubescens</i> (L)	Several 6-7" pieces of bark, trace
11	27 FSW	sand	<i>Ulva sp.</i> (C)		
12	31 FSW	cobble, bedrock,		<i>Flabellina trilineata</i> . (C)	
13	29 FSW	cobble, bedrock, sand and shell	<i>Ulva sp.</i> (C), <i>Alaria marginata</i> (holdfast and stipe only) (L)		
14	33 FSW	cobble and sand	<i>Ulva sp.</i> (C), <i>Cymathere triplicata</i> (L)		
15	35 FSW	sand	<i>Ulva sp.</i> (C)	<i>Mediaster aequalis</i> (C)	
16	42 FSW	sand		<i>Mediaster aequalis</i> (C)	
17	45 FSW	sand	<i>Ulva sp.</i> (C)	<i>Mediaster aequalis</i> (C)	
18	49 FSW	sand and shell			
19	55 FSW	sand			
20	62 FSW	sand			

Log Transfer Ramp Transect 2: 350° Bearing

Sample Number	Depth	Substrate	Algal Abundance; (L) Low, (C) Common, (A) Abundant	Animal Abundance; (L) Low, (C) Common, (A) Abundant	Debris / Coverage
1	4 FSW	cobble and sand			bark <10%
2	6 FSW	cobble and sand			bark <10%
3	8 FSW	sand			bark <10%
4	9 FSW	sand			bark, trace
5	10 FSW	sand and cobble		<i>Lottidae</i> (C)	
6	12 FSW	sand			
7	15 FSW	sand and shell			
8	18 FSW	sand and shell			
9	22 FSW	sand and shell			
10	25 FSW	sand and bedrock, cobble, shell	<i>Alaria marginata</i> (holdfast and stipe only) (L), <i>Cymathere</i> <i>triplicata</i> (C)	<i>Saxidomus giganteus</i> (L), <i>Flabellina trilineata</i> (L)	
11	25 FSW	sand	<i>Ulva sp.</i> (C)	<i>Saxidomus giganteus</i> (L)	
12	28 FSW	sand and shell		<i>Mediaster aequalis</i> (C)	
13	29 FSW	sand and shell		<i>Mediaster aequalis</i> (C)	
14	34 FSW	sand	<i>Ulva sp.</i> (C)		
15	36 FSW	sand	<i>Ulva sp.</i> (C)	<i>Saxidomus giganteus</i> (C), <i>Mediaster aequalis</i> (L)	
16	39 FSW	sand	<i>Ulva sp.</i> (C)		
17	43 FSW	sand and shell		<i>Dermasterias</i> (L)	
18	45 FSW	sand	<i>Ulva sp.</i> (C)		
19	52 FSW	sand	<i>Ulva sp.</i> (C)		
20	54 FSW	sand			

Log Transfer Ramp Transect 3: 320° Bearing

Sample Number	Depth	Substrate	Algal Abundance; (L) Low, (C) Common, (A) Abundant	Animal Abundance; (L) Low, (C) Common, (A) Abundant	Debris / Coverage
1	5 FSW	cobble and sand			bark <10%
2	7 FSW	cobble and sand			bark <10%
3	8 FSW	sand			bark <10%
4	9 FSW	sand			bark <10%
5	10 FSW	sand			
6	12 FSW	sand			
7	12 FSW	sand			
8	14 FSW	sand and shell			
9	16 FSW	sand and shell			
10	17 FSW	sand and shell			
11	18 FSW	sand and shell			
12	20 FSW	sand			
13	21 FSW	sand and shell			
14	24 FSW	sand and shell	<i>Ulva sp.</i> (C)	<i>Parastichopus californicus</i> (L), <i>Evasterias troschelii</i> (L)	bark, (3) 18" pieces
15	25 FSW	sand	<i>Ulva sp.</i> (C)		
16	27 FSW	sand	<i>Ulva sp.</i> (C)	<i>Saxidomus giganteus</i> (L), <i>Flabellina trilineata</i> (L)	
17	27 FSW	sand			
18	28 FSW	sand	<i>Ulva sp.</i> (C)	<i>Parastichopus californicus</i> (L)	
19	32 FSW	sand			
20	34 FSW	sand, cobble and shell	<i>Ulva sp.</i> (C)	<i>Parastichopus californicus</i> (C)	

Log Storage Area Transect 4 110 Degree Bearing

Sample Number	Depth	Substrate	Algal Abundance; (L) Low, (C) Common, (A) Abundant	Animal Abundance; (L) Low, (C) Common, (A) Abundant	Debris / Coverage
1	10 FSW	Rock and Shale			
2	12 FSW	Rock	<i>Fucus gardneri</i> (A)		
3	18 FSW	sand and shell		<i>Parastichopus californicus</i> (C), <i>Mediaster aequalis</i> (C)	
4	22 FSW	Rock	<i>Fucus gardneri</i> (A) <i>Alaria marginata</i> (holdfast and stipe only) (L)	<i>Parastichopus californicus</i> (A), <i>Lottidae</i> (C), <i>Strongylocentrotus franciscanus</i> (L)	
5	33 FSW	sand and shell	<i>Ulva sp.</i> (C)	<i>Parastichopus californicus</i> (A), <i>Mediaster aequalis</i> (C), <i>Lottidae</i> (C)	
6	40 FSW	sand and gravel	<i>Ulva sp.</i> (C)	<i>Parastichopus californicus</i> (A)	bark, shreds < 10%
7	53 FSW	sand and fine silt		<i>Parastichopus californicus</i> (A)	bark, chunks < 10%
8	65 FSW	sand, silt and shell		<i>Pycnopodia helianthoides</i> (C)	bark, chunks < 10%
9	75 FSW	sand, silt and shell		<i>Parastichopus californicus</i> (L)	bark, chunks < 10%
10	91 FSW	sand, cobble and silt			bark, chunks < 10%

Log Storage Area Transect 5: 110° Bearing

Sample Number	Depth	Substrate	Algal Abundance; (L) Low, (C) Common, (A) Abundant	Animal Abundance; (L) Low, (C) Common, (A) Abundant	Debris / Coverage
1	9 FSW	rock	<i>Fucus gardneri</i> (A)		
2	20 FSW	rock	<i>Fucus gardneri</i> (A) <i>Alaria marginata</i> (holdfast and stipe only) (L), <i>Cymathere</i> <i>triplicata</i> (L)	<i>Parastichopus</i> <i>californicus</i> (C)	
3	31 FSW	rock	<i>Fucus gardneri</i> (A), <i>Alaria marginata</i> (holdfast and stipe only) (L)	<i>Cucumaria miniata</i> (C), <i>Lottidae</i> (C), <i>Strongylocentrotus</i> <i>franciscanus</i> (L)	
4	42 FSW	rock		<i>Parastichopus</i> <i>californicus</i> (A), <i>Lottidae</i> (L) <i>Strongylocentrotus</i> <i>franciscanus</i> (L)	
5	50 FSW	sand and cobble	<i>Ulva sp.</i> (C)	<i>Parastichopus</i> <i>californicus</i> (C)	
6	60 FSW	sand and cobble	<i>Ulva sp.</i> (C)	<i>Pisaster ochraceus</i> (L)	
7	70 FSW	sand and gravel	<i>Ulva sp.</i> (C)		
8	81 FSW	sand, shell and gravel		<i>Parastichopus</i> <i>californicus</i> (L), <i>Pisaster</i> <i>ochraceus</i> (L)	bark, chunk/shreds <10%
9	93 FSW	sand			bark, shreds <20%

Log Storage Area Transect 6: 110° Bearing

Sample Number	Depth	Substrate	Algal Abundance; (L) Low, (C) Common, (A) Abundant	Animal Abundance; (L) Low, (C) Common, (A) Abundant	Debris / Coverage
1	8 FSW	rock	<i>Fucus gardneri</i> (A)		
2	20 FSW	rock and sand	<i>Fucus gardneri</i> (A), <i>Alaria marginata</i> (holdfast and stipe only) (L), <i>Cymathere</i> <i>triplicata</i> (L)	<i>Parastichopus</i> <i>californicus</i> (A), <i>Lottidae</i> (C), <i>Strongylocentrotus</i> <i>franciscanus</i> (L) <i>Pycnopodia</i> <i>helianthoides</i> (L)	
3	40 FSW	rock	<i>Alaria marginata</i> (holdfast and stipe only) (L)	<i>Lottidae</i> (L), <i>Crossaster</i> <i>papposus</i> (L) <i>Pisaster</i> <i>ochraceus</i> (L)	
4	73 FSW	sand	<i>Ulva sp.</i> (C)		
5	81 FSW	sand, shale and rock	<i>Ulva sp.</i> (C)	<i>Parastichopus</i> <i>californicus</i> (A),	
6	90 FSW	sand shell and rock	<i>Ulva sp.</i> (C)		mooring cable

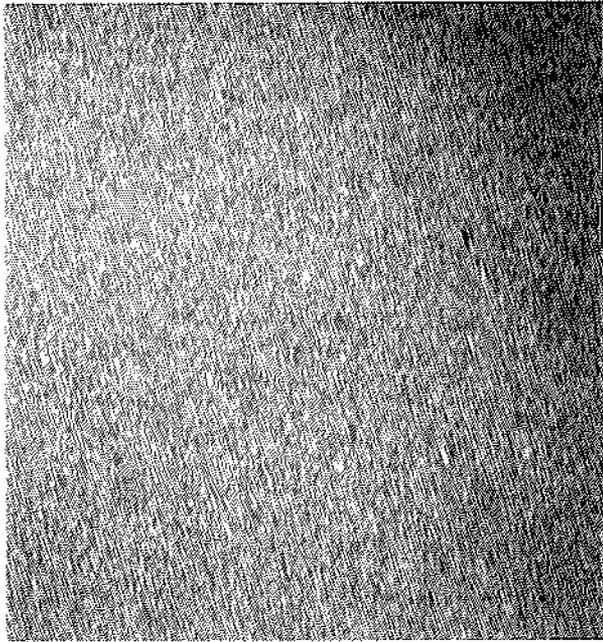
Appendix E

Photographs

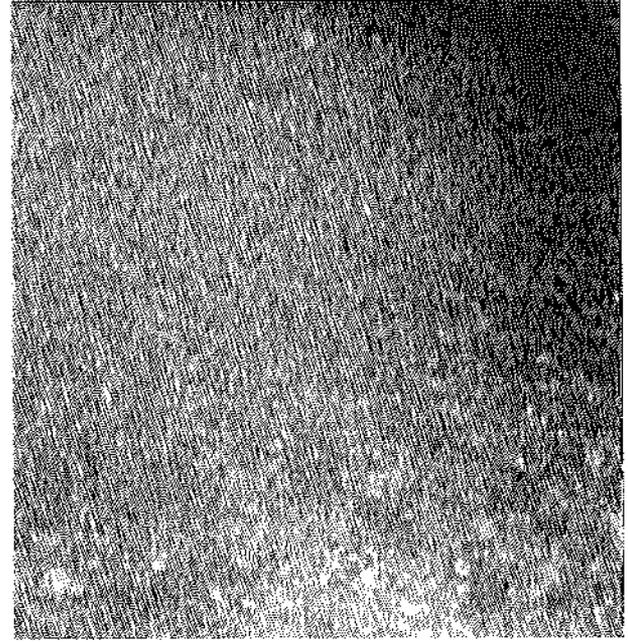


Log Transfer Ramp

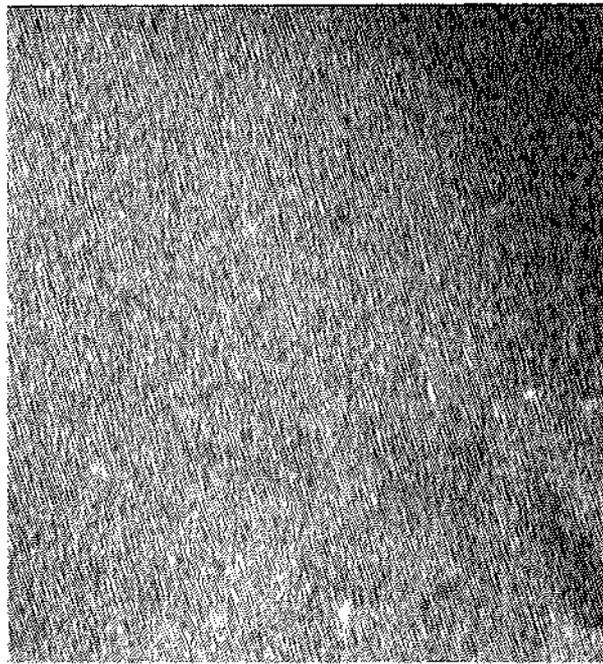
Log Transfer Ramp Transect 1: 20° Bearing



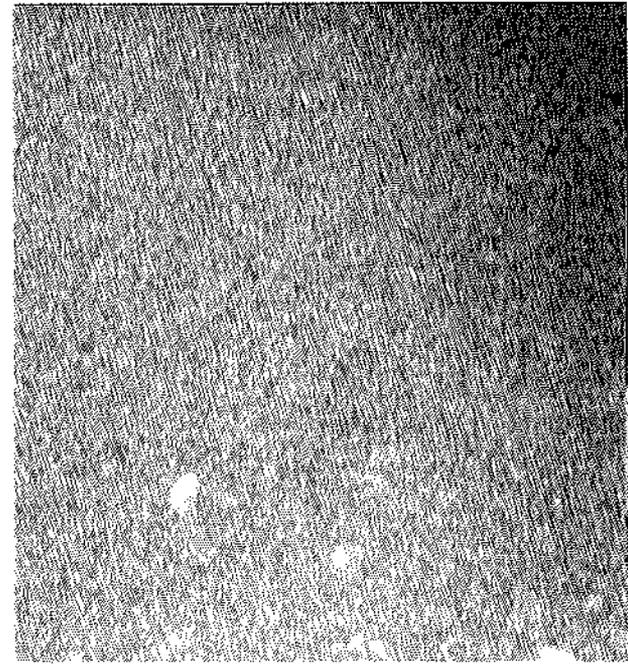
Sample point 4; 9 FSW



Sample point 6; 15 FSW

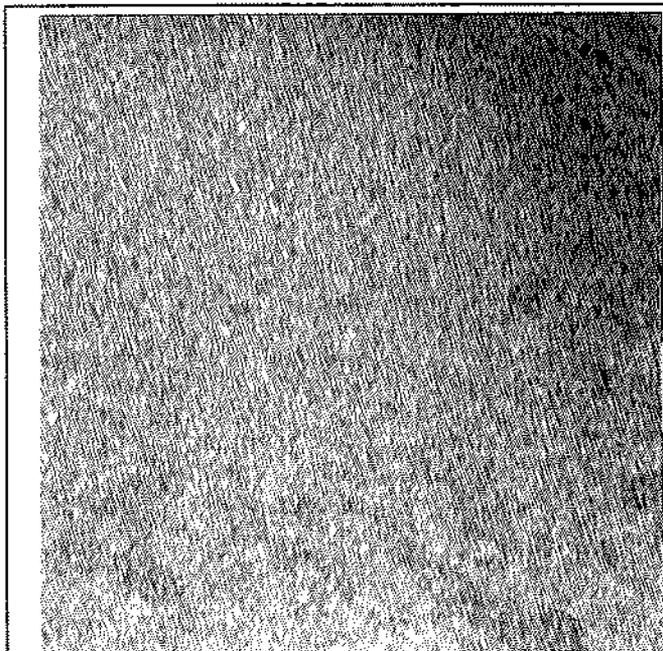


Sample point 13; 29 FSW

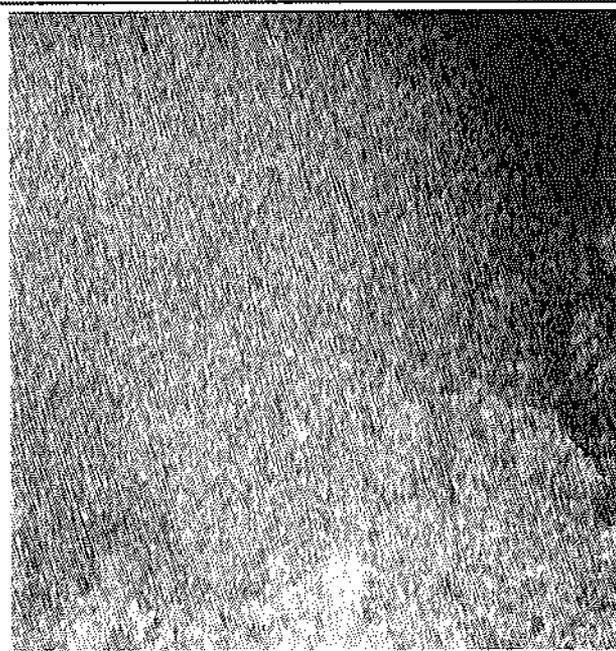


Sample point 18; 49 FSW

Log Transfer Ramp Transect 2: 350° Bearing



Sample point 5; 10 FSW



Sample point 10; 25 FSW

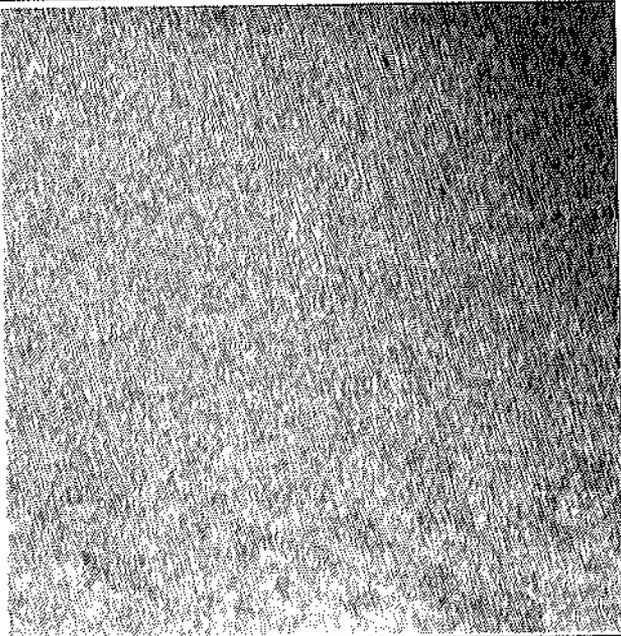
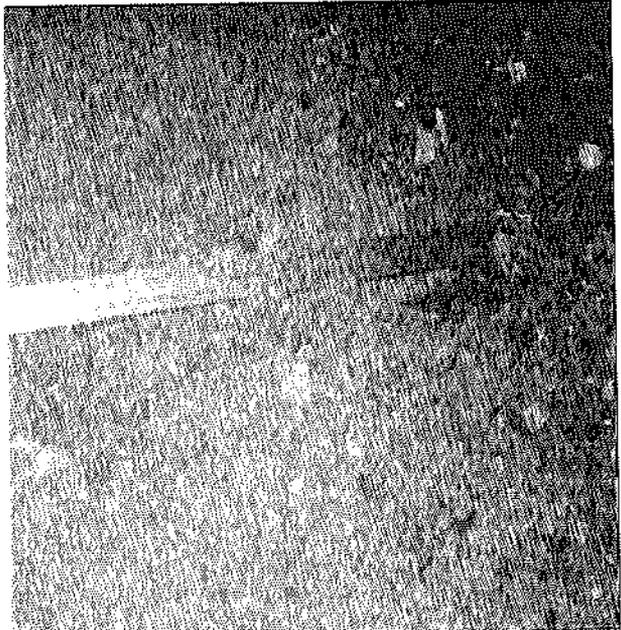
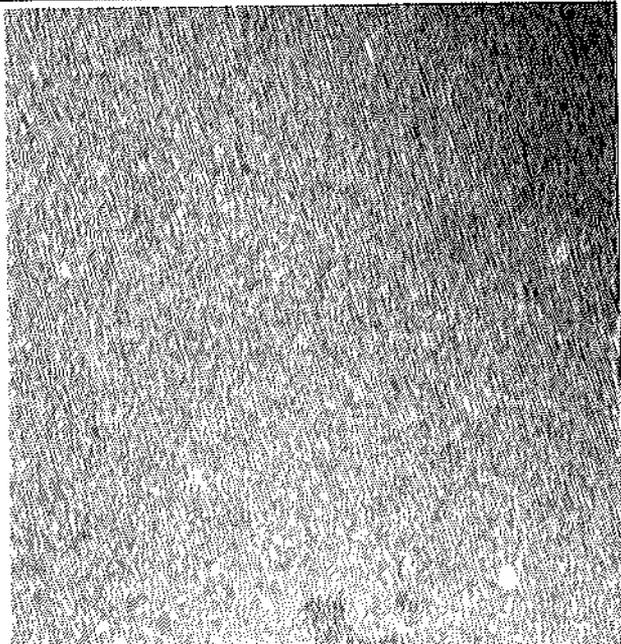


Sample point 15; 36 FSW



Sample point 17; 43 FSW

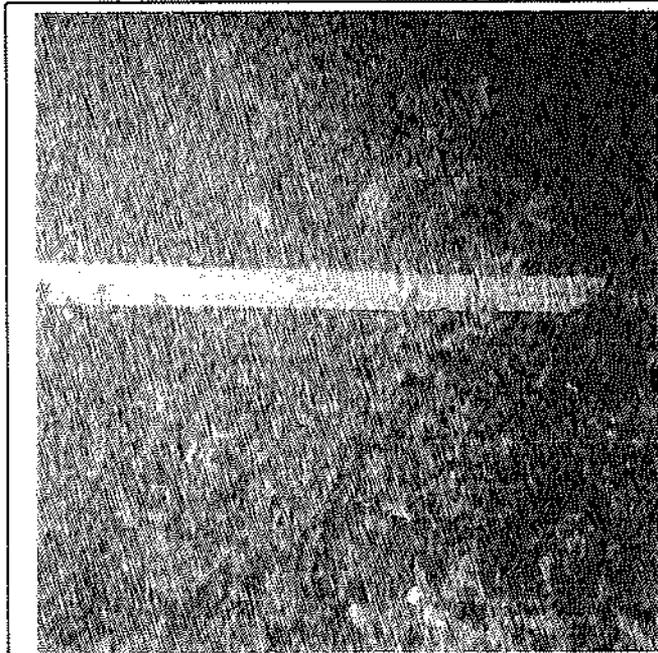
Log Transfer Ramp Transect 3: 320° Bearing

	
Sample point 2; 7 FSW	Sample point 8; 14 FSW
	
Sample point 14; 24 FSW	Sample point 20; 34 FSW



Log Storage Area

Log Storage Area Transect 4: 110° Bearing



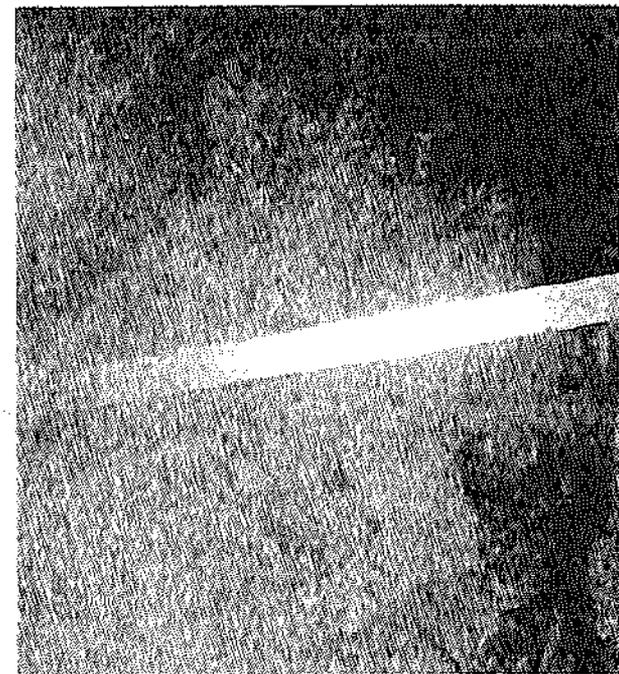
Sample point 2; 12 FSW



Sample point 4; 22 FSW

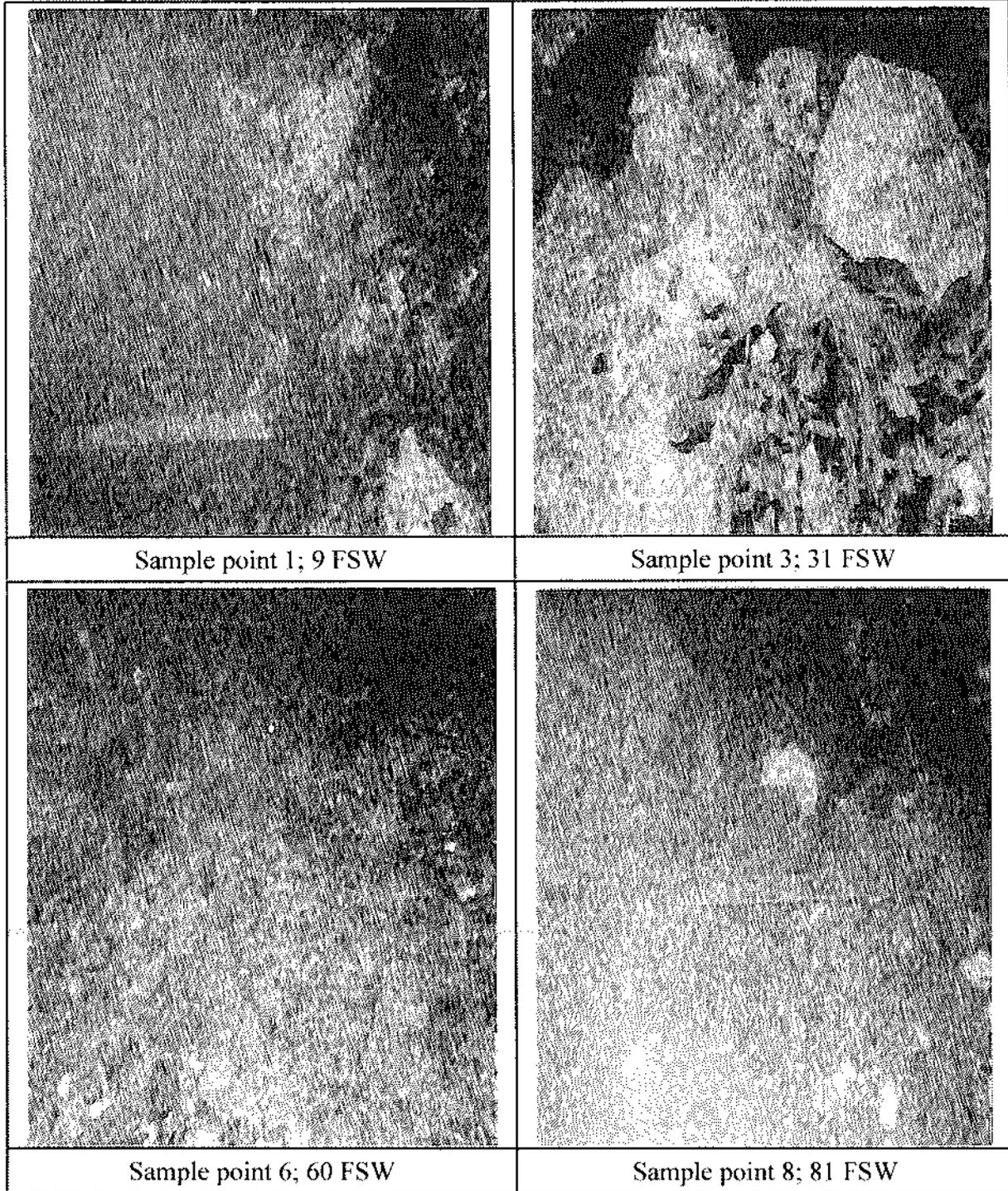


Sample point 8; 65 FSW

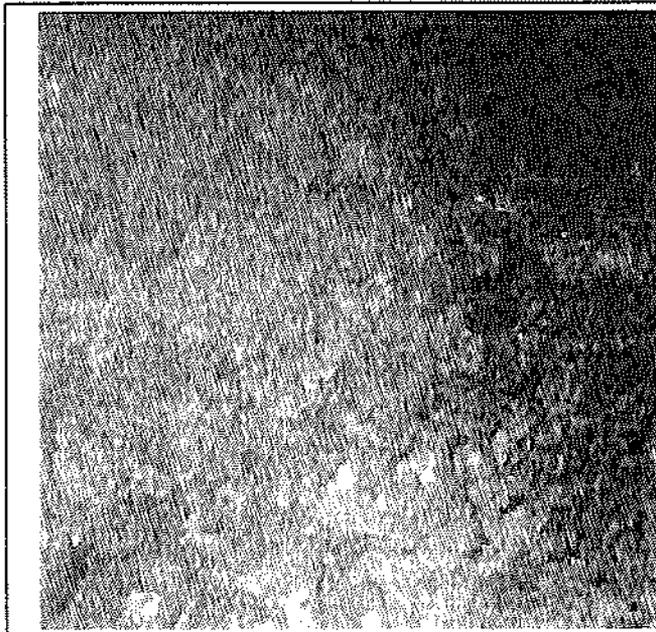


Sample point 10; 91 FSW

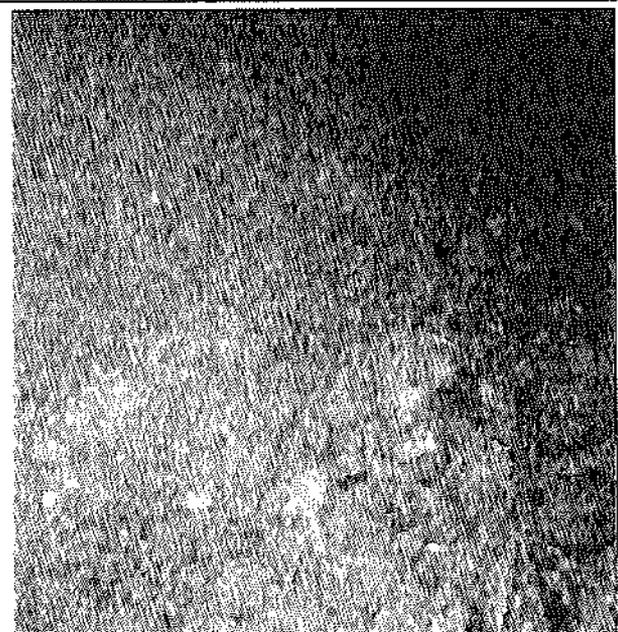
Log Storage Area Transect 5: 110° Bearing



Log Storage Area Transect 6: 110° Bearing



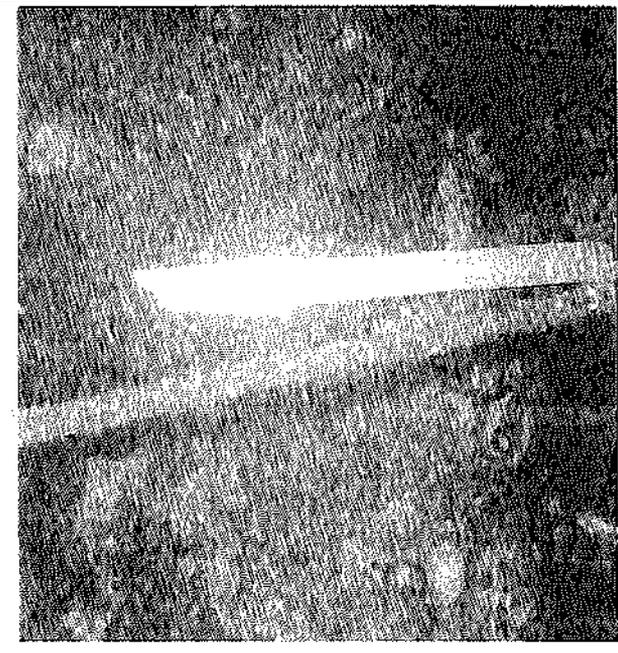
Sample point 2; 20 FSW



Sample point 3; 40 FSW



Sample point 5; 81 FSW



Sample point 6; 90 FSW