

TOLSTOI



SEALASKA TIMBER CORPORATION

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In accordance with the EPA's General NPDES Permit AK-G70-1000,
Section VI.C.8. Bark Monitoring and Reporting "Signatory Requirements",
I certify that Sealaska Timber Corporation received this Bark Monitoring Survey
from Craig's Dive Center on:

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MAY 17 2000

SEALASKA TIMBER CORP.

Principal Corporate or Executive Officer / General Proprietor:

Signature: Robert L. Girt

Printed Name: ROBERT L. GIRT

Date: 5-18-00

Title: Vice President of Operations
Company: Sealaska Timber Corporation

Underwater Bark Debris Survey
Tolstoi Log Transfer Facility
Prince of Wales Island, Alaska

Submitted to: Sealaska Timber Corporation
2030 Sea Level Dr., Suite 202
Ketchikan, AK 99901

Prepared by: Craig's Dive Center
P.O. Box 796
107 Main Street
Craig, AK 99921

May 15, 2000

Introduction:

An underwater survey requested to determine the extent of bark debris accumulation at the Tolstoi Log Transfer Facility, Prince of Wales Island, Alaska, was conducted on May 13, 2000. The purpose of the survey is to satisfy the bark monitoring program required by the NPDES permit. Permit number for the facility is AK-004784-8. The protocol for operating a bark monitoring program is given in the new EPA General Permit, which became effective March 21, 2000.

Methods:

Once on site, the layout of the facility is evaluated to best adapt the standard survey method to the individual site characteristics. A permanent reference point location is selected, ideally in the center of the log bundle input structure. The reference point is positioned as close as possible to the exact center of the structure (regardless of type: bulkhead with A-frame, drive-down ramp, low-angle slide, etc.) and close to the estimated Mean Low Low Water (MLLW) depth to facilitate relocation for future surveys. Initially, five transects are established, radiating from the reference point origin at 30-degree intervals. The center transect is located perpendicular to the face of a bulkhead structure, or in line with the centerline of a drive-down ramp/low-angle slide. An additional transect is added if 100 % bark coverage extends more than five meters perpendicular to an edge transect. Magnetic compass bearings are selected for the transects by referencing the transects to the center of the log transfer device. The magnetic compass bearing is also the identifying label for that transect.

Each transect is sampled at 16.4-foot (5-meter) intervals starting from the origin at the permanent reference point. Debris depth measurements are made with a hand-held ruler at the sample point. The measurement is taken by vertically inserting the ruler into the debris until the natural substrate is felt or its location estimated as closely as possible. Periodically, when the confidence level in the measurement decreases due to the substrate type and/or bark amount, the bark depth is confirmed by digging by hand through the bark layer to the natural substrate. Percentage of areal coverage by bark debris is determined by using the ruler, which is randomly dropped at the sample point, as the base of a visually estimated 3.3-foot (1-meter) square. The percent cover is estimated by the amount of bark cover within that square.

Sample points are established along a transect until a water depth of 60 feet MLLW is reached or the measured bark debris depth becomes insignificant (usually interpreted to mean that less than one inch of bark depth, less than 10 % cover, and a clear decreasing trend is apparent towards the end of the transect). At each sample location several data points are recorded by the diver: water depth; debris depth; percent coverage of debris; debris composition and character; substrate type; species abundance, condition and diversity; direction and strength of current; visibility; and the presence of any significant operational debris. A qualitative assessment of species abundance is made for the overall survey area.

Photographs are taken of representative sample points along the transects (including at least half the sample points) to document substrate, bark debris, algal and animal life, and any other debris/objects that may be of concern. Water depth measurements are taken from a Suunto dive computer with an accuracy of +/- 1%. A Suunto compass is used to navigate the transect compass headings and is attached to a 4-foot measuring ruler.

The total survey surface area is determined by calculating the triangle formed by two adjacent transects. Of those two transects, the one with more sample points is used as the base of a right triangle area calculation. The total square footage of the debris field area is a summation of all triangle areas. This figure is converted to acres as required by the guidelines. To determine the areal extent of 100 % bark cover, the percentage of sample points with 100 % coverage is calculated and multiplied by the total sample area to derive the areal extent in acres of 100 % bark cover.

Results:

Weather conditions at survey time were overcast skies with northerly winds, and air temperature was in the upper forties. The diving started at 1546 and took place during a low slack tide cycle. Low tide occurred at 1621 with a height of 1.1 feet (corrected to subordinate station # 1497, Hadley, Lyman Anchorage, from the Ketchikan reference station) and a tidal range of 14.3 feet. No noticeable current was present during the start of the survey dive and increased to a moderate west to east surface current after slack tide. Water temperature was measured at 46 degrees below the thermocline, 50 degrees above that in the surface waters. Underwater visibility was estimated to be 6 feet above the thermocline, 10-12 feet below the thermocline.

A total of 60 sample points were taken on the six transects, and all sample points had some bark debris. A new transect, transect 260, was added to better define the bark deposit shoreward from transect 290. Of these, 41 (68 %) had 100 % bark cover. Thirty-five sample points (58 %) had 100 % cover and a bark depth of ten centimeters or greater. The total area covered by the dive survey was 1.07 acres. The area covered by 100 % bark cover was 0.73 acres. The area covered by 100 % bark cover and a bark depth of at least 10 centimeters was 0.62 acres.

Bark Deposition Summary		
Total Survey Area	Area with Continuous Bark Cover	Area with Discontinuous Bark Cover
1.07 Acres	0.73 Acres	0.34 Acres

Observations:

The site was not operational when the survey was conducted. The LTF is located on the southern shoreline of a small bay within the larger Tolstoi Bay. The intertidal substrate is

a mix of rocks, gravel and sand, with outcroppings of bedrock on either side of the drive-down ramp. The subtidal substrate is mostly sand, except for the areas of bedrock reefs. The grade of the slope is steeper on the westerly transects and more moderate on the easterly transects. A prominent bedrock reef, located a short distance to the east of the drive-down ramp, projects nearly perpendicularly out from shore and extends down to the maximum depths of the survey. Transects 350, 020 and 050 cross over this reef. After several years of surveying this site, it is apparent that this bedrock reef affects the deeper tidal current flowing parallel to shore, and blocks much of the bark dispersal to the east.

The reference point was moved a little deeper, to the end edge of the ramp surface, in order to clear most of the dense algal cover on top of the ramp. The zone of deposit covers the entire dive survey area, though it is broken up by the reef system. The bark depth measurement data show a decreasing trend towards the ends of the transects, with the majority of bark accumulation on and surrounding the fill rock structure of the ramp. Character and size of the observed bark debris varied, depending on where it was located within the survey area. In the valley between the drive-down ramp and the bedrock reef, debris along transects 020 and 050 tended to be very small in size, characterized as bark dust, with few to no bark chips. Beyond the reef on these transects the bark debris was the more typical chips and chunks. The area of transects 260 to 350 was dominated by larger debris sizes, predominantly as bark chips and bark chunks to small wood pieces. A few, scattered sunken logs were noted during the dive. Where the bark depth was greater than approximately 25 centimeters, the bark mass exhibited a "jiggling" when the measuring ruler was inserted into the debris.

My impression of the survey area is that the marine life observed appears to be generally healthy and is not being adversely affected by the bark debris, other than the smothering effect on benthic infauna when bark accumulation reaches a depth of approximately ten centimeters or more. Habitat types were probably that typical of a rocky, solid substrate (on the rocky reef area) and one associated with a sand substrate before the facility was operated. The marine life community present now is one typical of a community commonly found on a bark-dominated substrate, except for the exposed bedrock and intertidal rocky zones, upon which the bark has not accumulated to 100 % cover levels.

Algal abundance and diversity was high, which is typical of the late spring survey time. Green algae species were present in the intertidal zone, observed mainly on top of the drive-down ramp. Both intertidally and subtidally, the large-bladed Laminarians were present in moderate to high coverage on rocky surfaces. The top of the drive-down ramp structure was completely covered with a variety of species of algae. On the bedrock reef, two unidentified species of foliose red algae were noted, along with crustose red algae.

Few anemones were observed, probably due to the lack of solid substrate for attachment. The white anemone *Metridium sp.* was present occasionally throughout the area, attached to larger man-made or bark debris pieces or rock. On the bedrock reef were unidentified species of an encrusting sponge, as well as unidentified hydroid species. Another anemone species, *Pachycerianthus fimbriatus*, was not observed this during this survey.

A few bivalve siphons were observed protruding above the bark surface. The identified siphons were that of *Mya truncata* (one was dug up to confirm the identification). A gastropod mollusk, *Polinices lewisii*, observed in low numbers crawling on the surface of the debris on transects 020 and 050. Feces of the wood-boring clam *Bankia setacea* bordered any large piece of wood or log. The nudibranch *Melibe leonina* and their egg cases were numerous on the large kelp blades from the lower intertidal zone down to about thirty feet. Another nudibranch, *Flabellina sp.*, was observed occasionally on the eastern transects. Low to moderate numbers of *Pododesmus cepio* were attached to the rock reef surfaces, as were unidentified limpets. Small numbers of the scallop *Chlamys sp.* were observed over the entire survey area. A single *Octopus sp.* was on the low bedrock hump at the end of transect 290.

Echinoderm abundance and diversity in the area was moderate. Sea star species observed were *Pycnopodia helianthoides*, *Crossaster papposus*, *Henricia leviuscula*, *Mediaster aequalis*, *Dermasterias imbricata*, and *Evasterias troschelii*. Unidentified brittle star species were on the surface of the bark debris in low numbers. Moderate numbers of large *Parastichopus californicus* were observed over the entire survey area and at all depths.

Crustacean abundance and diversity was also moderate. Shrimp of undetermined species were observed using small rocks or bark chips for crevice habitat over the entire area. Small crabs of the Majidae family (decorator crab), commonly observed at LTFs on the bark and natural substrate, were present in moderate abundance. Most of these crabs were using bark pieces to “decorate” their shell, instead of the more commonly used algae or pieces of other invertebrates. Hermit crab abundance and diversity was also moderate.

Other miscellaneous invertebrate species present were the tunicates *Corella willmeriana* and *Halocynthia aurantia* and terebellid worms in rock crevices on the reef.

A few species of fish were observed and all were low in abundance. Small flatfish of undetermined species were present at all depths in low numbers. The family Cottidae, the sculpins, was represented by two or three species in moderate numbers. Rockfish were in the crevices of the reef areas on transects 050. Unidentified gunnels were observed in the shallow 100 % kelp-covered areas.

No significant manmade debris was observed in the survey area, other than the typical amounts of banding wire, scattered tires, and other minor operational debris.

Conclusion:

A sixth transect was added shoreward of transect 290 to better define the bark zone of deposit. A seventh transect shoreward of transect 050 was not added because of the close proximity of rock reef extending out from shore, which leaves very little area for bark to accumulate. The overall area of 100 % cover by bark increased only very slightly from the previous survey, while the area with bark depth greater than ten centimeters increased

by 0.16 acres. Given the topography of the site, I would expect this trend to continue. That is, the bark zone of deposit will not expand much more beyond the reef obstructions, and any further bark accumulation will be essentially confined by the reef system to the existing deposit area.

If there are any questions regarding this report, please contact me at 907-826-3481. Thank you for allowing Craig's Dive Center to be of service.

Respectfully submitted,

A handwritten signature in black ink that reads "Craig Sempert". The signature is written in a cursive style with a long, sweeping horizontal line extending to the right.

Craig Sempert
Diver

TABLE 1
Transect Data

Transect/Sample Pt.	Depth from MLLW	Debris Depth (cm)	Percent Coverage	Substrate Type
Ref. Pt.	8	<3	50	Rk
260/1	14	5	100	Rk
260/2	23	48	100	Gr, Rk
260/3	30	66	100	Sa
260/4	30	48	100	Sa
260/5	30	43	100	Sa
260/6	26	46	100	Sa
260/7	21	38	100	Sa
260/8	14	5	50	Sa, Gr
260/9	9	<3	25	Sa, Gr, Rk
290/1	18	10	90	Rk
290/2	29	69	100	Rk
290/3	39	43	100	Sa
290/4	44	33	100	Sa
290/5	49	15	100	Sa
290/6	54	10	100	Sa
290/7	58	8	100	Sa, Rk
320/1	25	43	100	Rk
320/2	33	48	100	Rk
320/3	41	33	100	Rk
320/4	47	18	100	Sa
320/5	52	10	100	Sa
320/6	59	8	100	Sa
350/1	21	38	100	Rk
350/2	34	66	100	Rk
350/3	40	23	100	Sa
350/4	46	15	100	Sa
350/5	51	13	100	Sa
350/6	46	5	25	Rk, Sa
350/7	46	10	90	Sa, Brk
350/8	50	8	50	Rk, Brk
350/9	62	8	100	Brk, Sa

TABLE 1 (cont.)
Transect Data

Transect/Sample Pt.	Depth from MLLW	Debris Depth (cm)	Percent Coverage	Substrate Type
020/1	16	10	100	Gr, Rk
020/2	24	84	100	Rk
020/3	27	64	100	Sa
020/4	27	18	100	Sa
020/5	27	36	100	Sa
020/6	28	18	100	Sa
020/7	32	18	100	Rk, Sa
020/8	32	10	75	Brk
020/9	37	10	100	Sa
020/10	42	10	100	Sa, Rk
020/11	42	5	50	Brk
020/12	45	3	25	Sa, Brk
020/13	48	<3	25	Sa, Brk
020/14	62	<3	75	Sa, Brk
050/1	10	3	25	Gr, Rk
050/2	15	28	100	Gr, Rk
050/3	17	56	100	Sa, Gr, Sh
050/4	16	86	100	Sa, Sh
050/5	17	69	100	Sa, Sh
050/6	15	15	50	Brk
050/7	8	3	25	Brk
050/8	14	13	50	Sa, Rk
050/9	19	10	100	Sa, Sh
050/10	19	8	100	Sa, Sh
050/11	19	8	100	Sa, Sh
050/12	18	<3	25	Sa, Brk
050/13	19	<3	25	Sa, Brk
050/14	20	<3	10	Sa, Brk

Key to Substrate Type	
Brk	Bedrock
Gr	Gravel
Rk	Rock
Sa	Sand
Sh	Shell
Si	Silt

Table 2

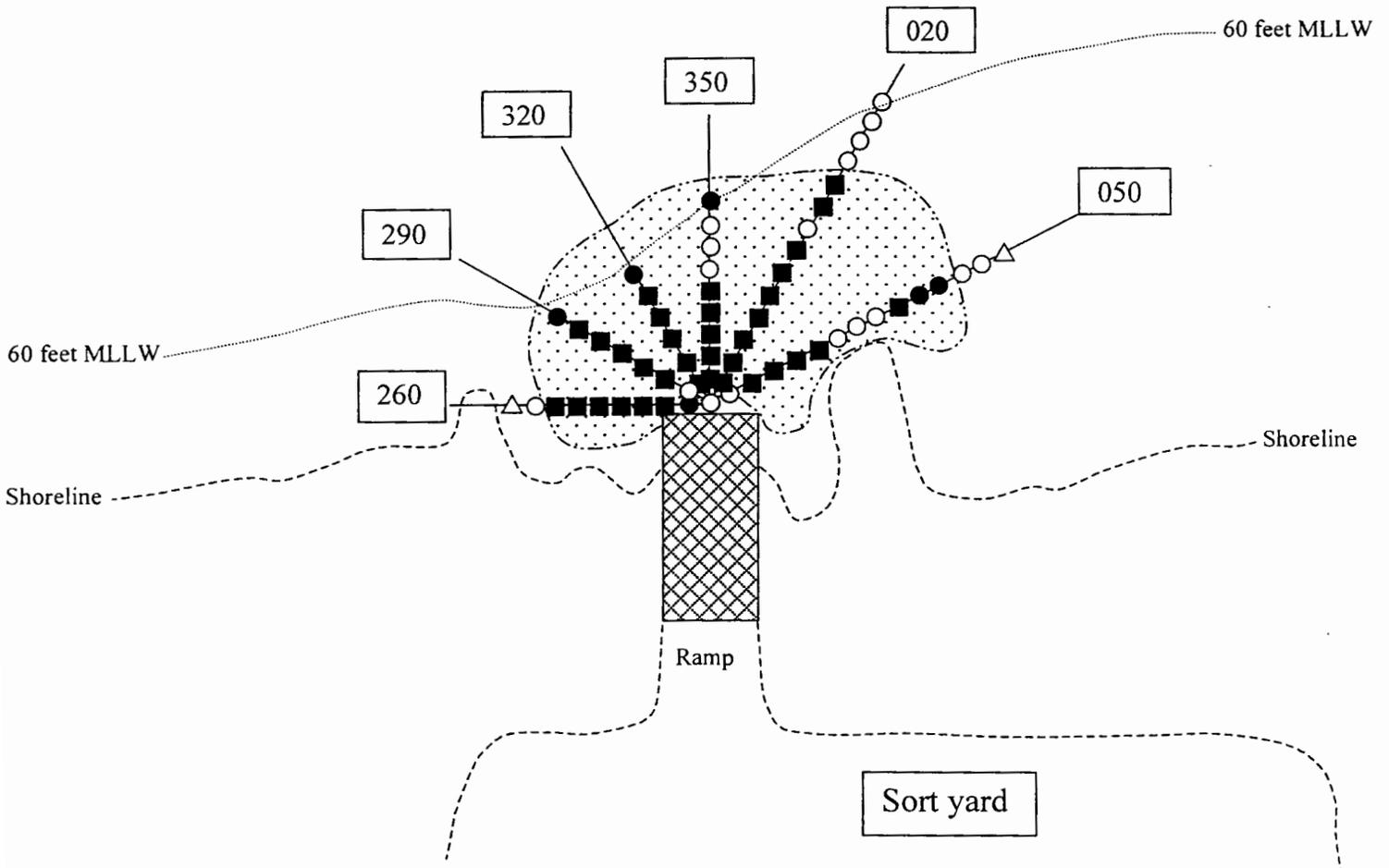
<u>Species Abundance</u>		
L = Low C = Common A = Abundant		
Scientific Name	Common Name	Abundance
<u>Plants</u>		
<i>Ulva/Monostroma spp.</i>	Green algae	L
<i>Lithothamnion spp.</i>	Crustose red algae	L
Rhodophyta spp.	Foliose red algae	L
<i>Cymathere triplicata</i>	Three-ribbed kelp	C
<i>Alaria marginata</i>	Ribbon kelp	C
<i>Nereocystis luetkeana</i>	Bull kelp	L
<i>Laminaria saccharina</i>	Sugar kelp	C
<u>Invertebrates</u>		
<i>Metridium sp.</i>	Anemone	C
Unidentified Hydroid spp.	Plumose hydroid	L
Unidentified Porifera spp.	Sponge	L
<i>Thelepus crispus</i>	Terebellid worm	L
<i>Octopus sp.</i>	Octopus	L
Lottidae spp.	Limpet	L
<i>Chlamys spp.</i>	Scallop	L
<i>Polinices lewisii</i>	Moon snail	L
<i>Bankia setacea</i>	Shipworm	C
<i>Pododesmus macrochisma</i>	Jingle	L
<i>Flabellina spp.</i>	Nudibranch	L
<i>Melibe leonina</i>	Lions mane nudibranch	C
<i>Parastichopus californicus</i>	Sea cucumber	C
<i>Henricia leviuscula</i>	Blood star	L
<i>Mediaster aequalis</i>	Red star	L
<i>Dermasterias imbricata</i>	Leather star	L
<i>Pycnopodia helianthoides</i>	Sunflower star	C
<i>Crossaster papposus</i>	Rose star	L
<i>Evasterias troschelii</i>	False ochre star	L
Unidentified Ophiuroidea spp.	Brittle star	L
<i>Balanus sp.</i>	Barnacle	L
<i>Pandalus spp.</i>	Shrimp	C
<i>Pagurus spp.</i>	Hermit crab	C
<i>Oregonia gracilis</i>	Graceful decorator crab	C
Unidentified Bryozoan spp.	Moss animal	L
<i>Halocynthia aurantia</i>	Sea Peach	L
<i>Corella willmeriana</i>	Solitary tunicate	L

<u>Vertebrates</u>		
<i>Hexagrammos decagrammus</i>	Kelp greenling	L
Pleuronectidae spp.	Righteye flounder	L
<i>Pholis spp.</i>	Gunnel	L
Cottidae spp.	Sculpins	L

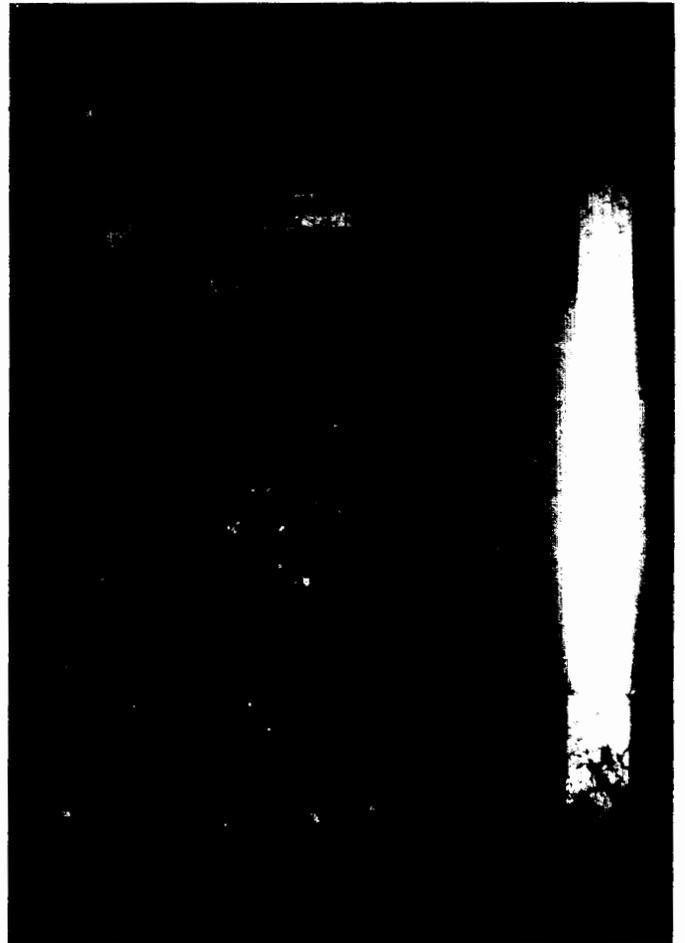
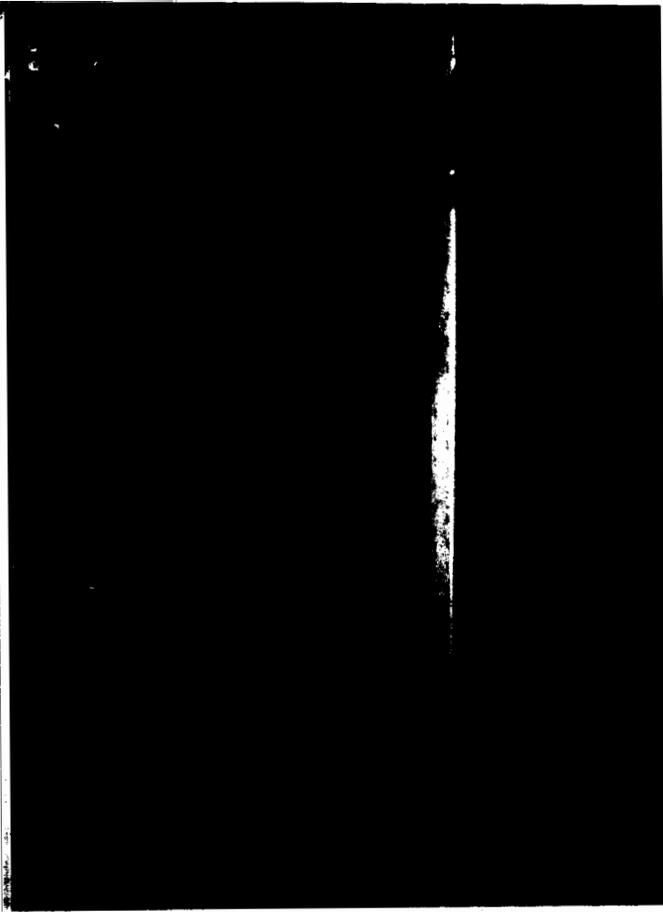
Photograph Key		
Photo Number	Transect/ Sample Pt.	Description
1	Reference Point	Thick algal cover at ramp edge
2	260/1	Nudibranchs and their eggs on algae
3	260/2	Complete bark cover and large wood chunk
4	260/3	Complete bark cover
5	260/4	Complete bark cover by mostly fine debris
6	260/5	Large branch on complete bark cover
7	260/6	Sea cucumber on complete bark cover
8	260/8	Ascending into shoreline rock and sand
9	290/1	Log and debris on rock fill
10	290/2	Debris cover of large bark chips
11	290/3	Complete bark cover
12	290/4	Complete bark cover
13	290/5	Continued complete bark cover
14	290/6	Continued complete bark cover
15	290/7	Next to bedrock hump
16	350/8	Mostly fine bark debris with some chunks
17	350/9	Complete bark cover
18	350/1	Complete bark cover
19	350/2	Complete bark cover
20	350/3	Large wood chunk in bark layer
21	350/4	Edge of rock reef
22	350/5	Nearly complete bark layer on reef
23	350/6	Sea star, tunicate on reef rock
24	350/7	Nearly complete bark layer on reef
25	050/2	Start of bark zone at edge of fill
26	050/3	Uniform, fine bark debris
27	050/4	Wood chunk on uniform, fine bark debris
28	050/6	Old wire, edge of reef
29	050/7	Nudibranchs and their eggs on algae
30	050/8	Pocket of debris in rock reef
31	050/9	Complete bark cover past reef

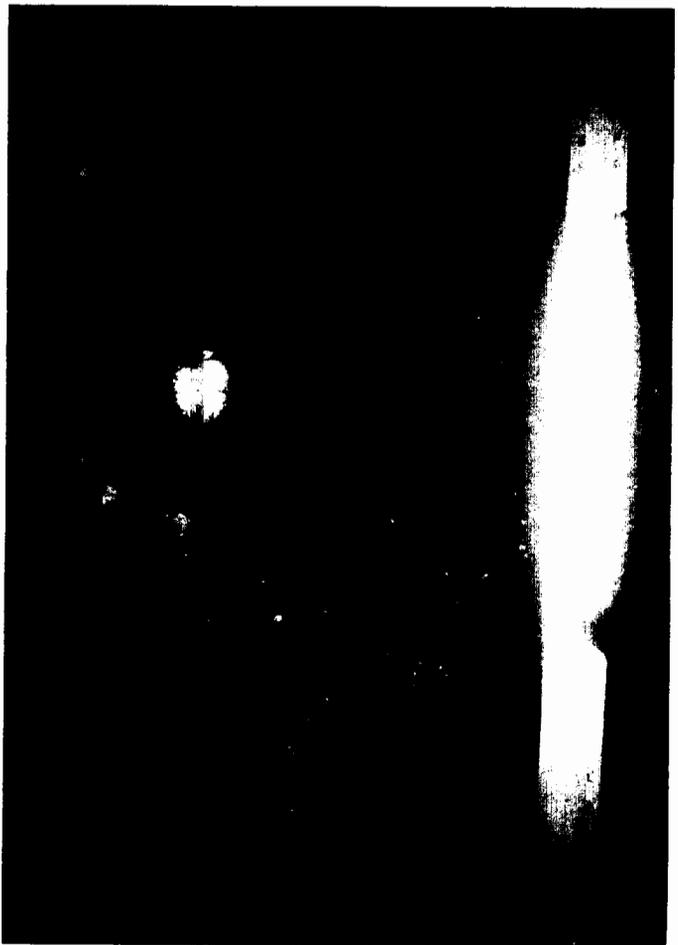
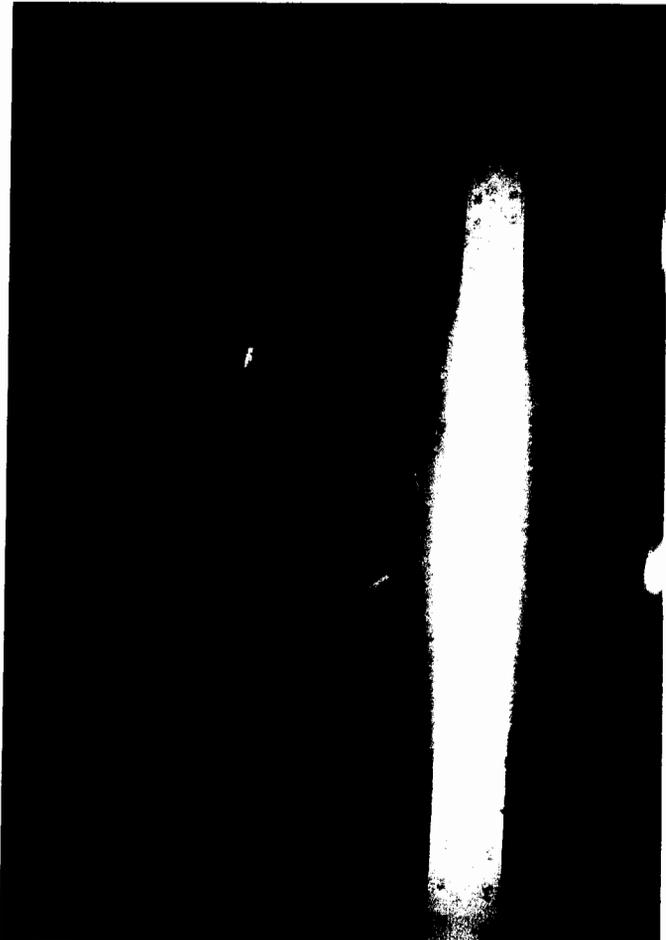
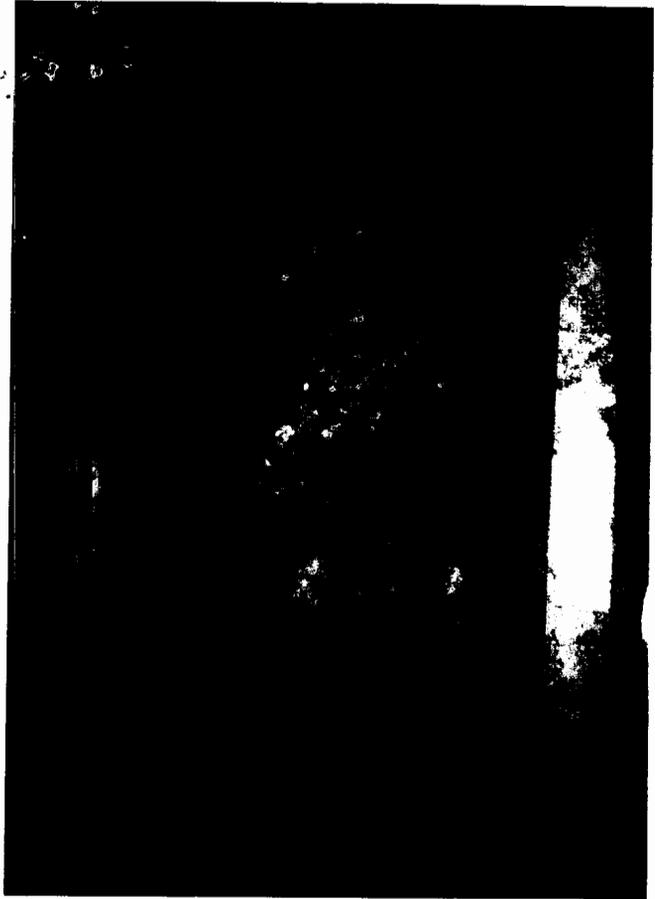
- △ Sample Point with Insignificant Bark Debris
- Sample Point with No Debris
- Sample Point with Debris Present
- Sample Point with 100% Bark Debris Cover
- Sample Point with 100% Cover & Debris Depth > 10 cm
- ⊙ Area of 100% Bark Cover

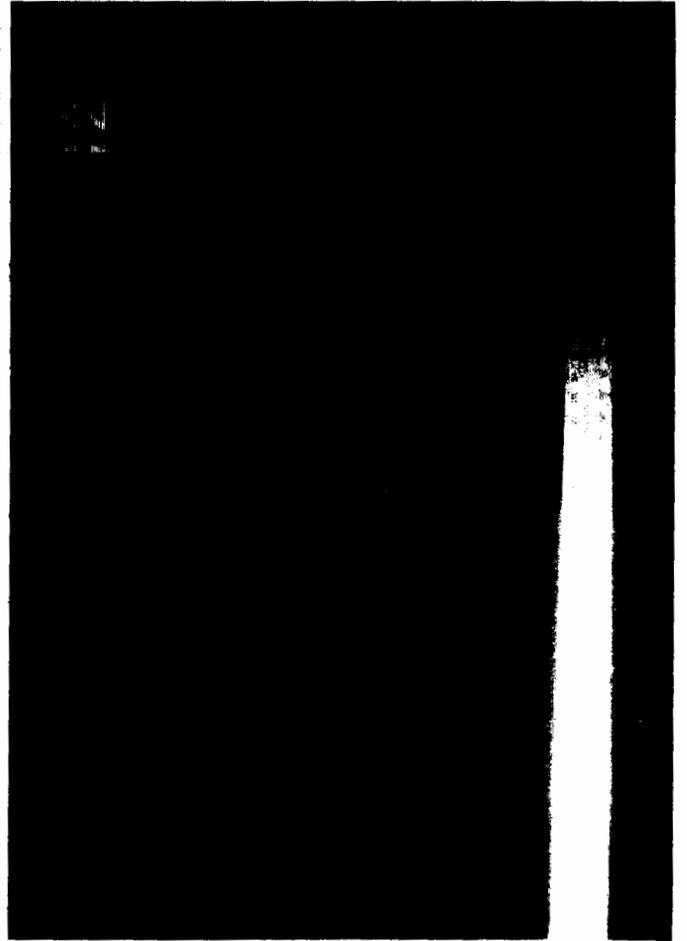
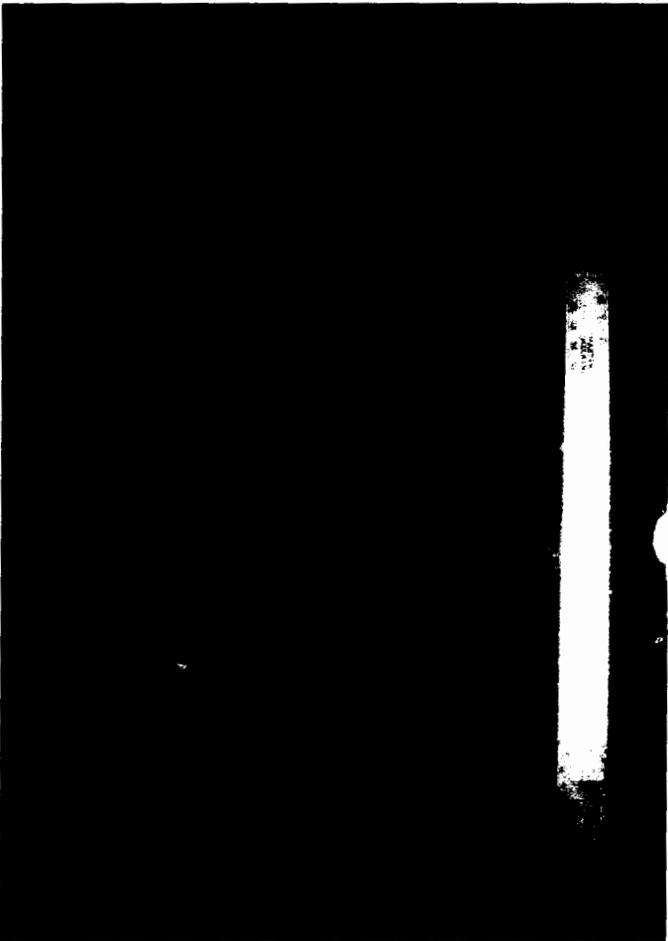
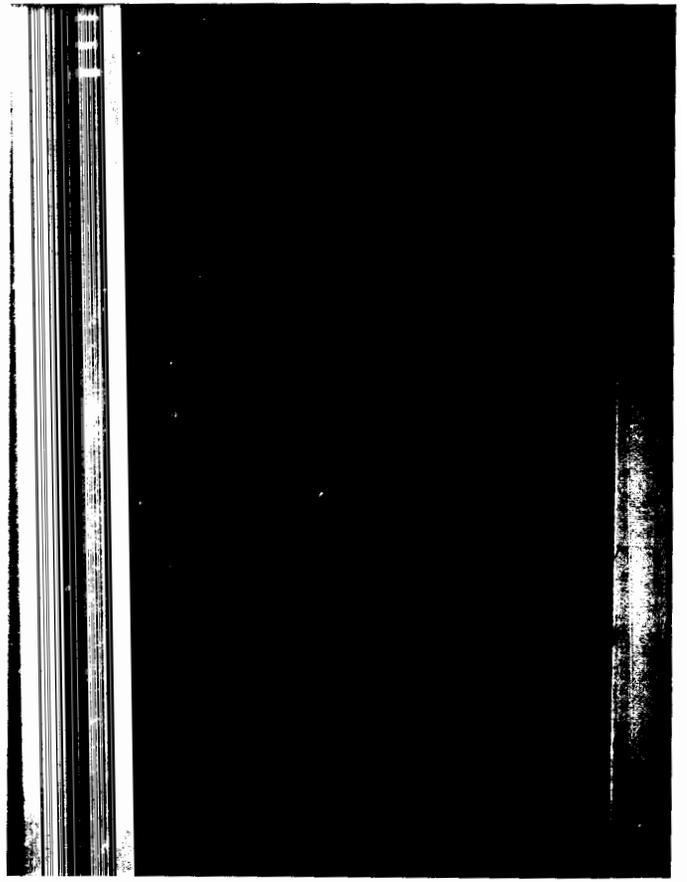
Diagram Not To Scale

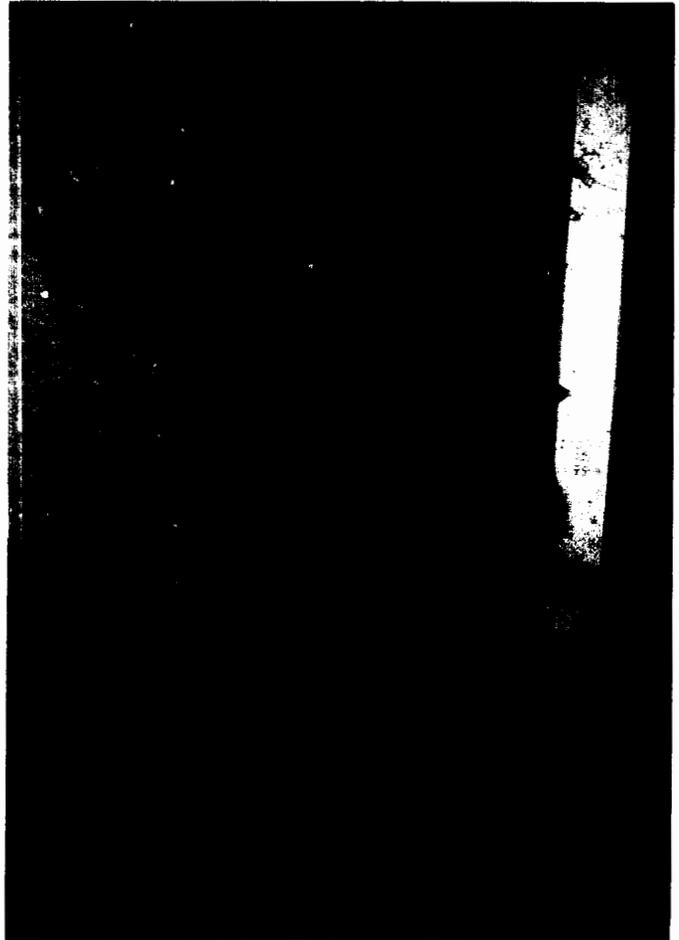
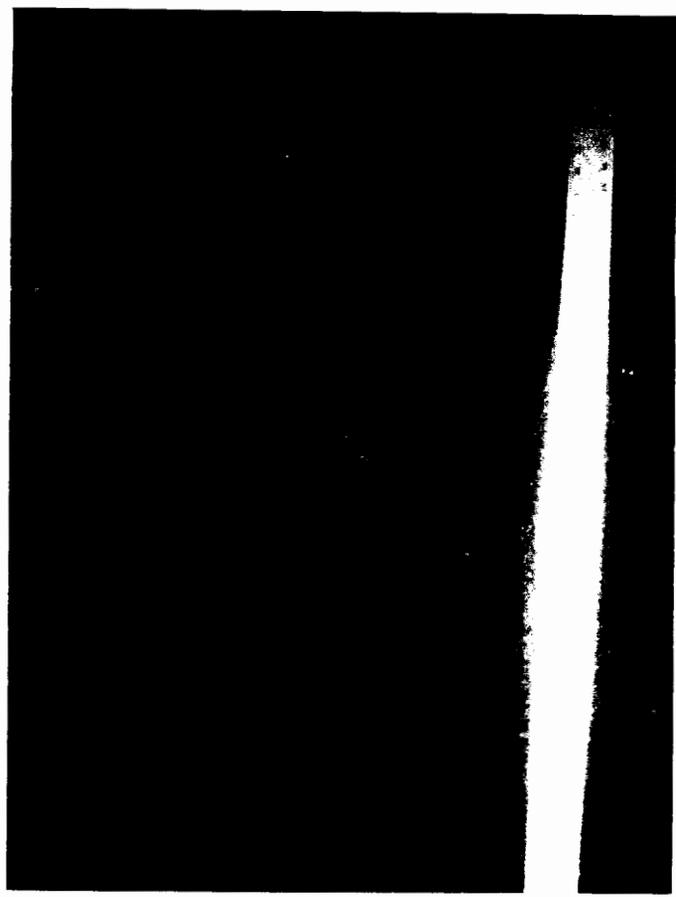
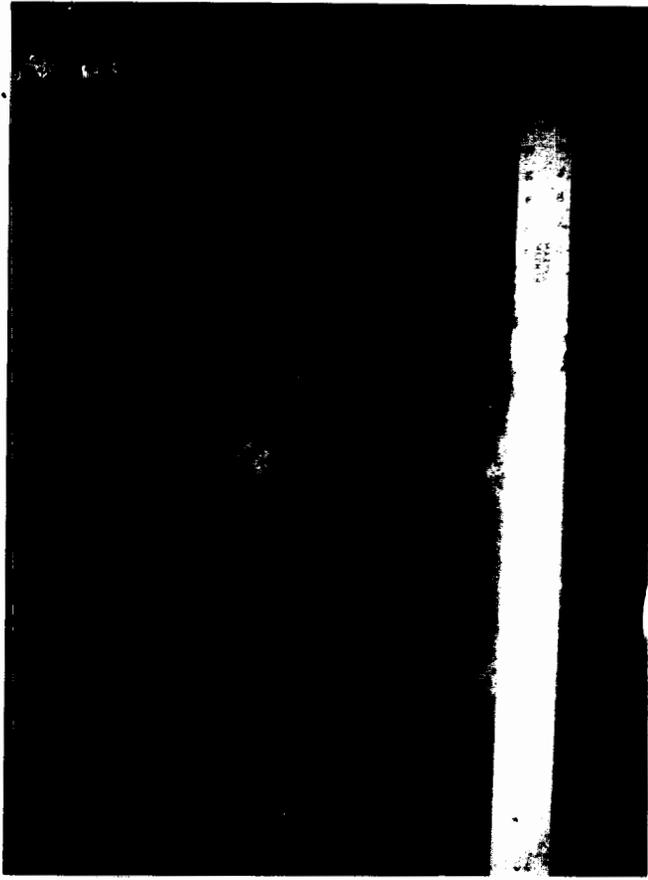


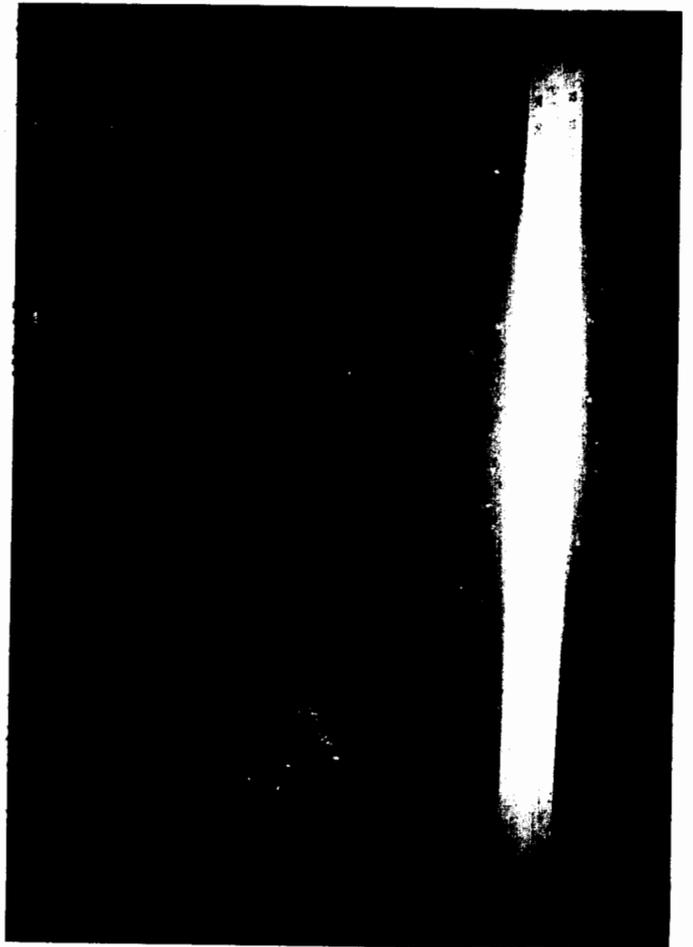
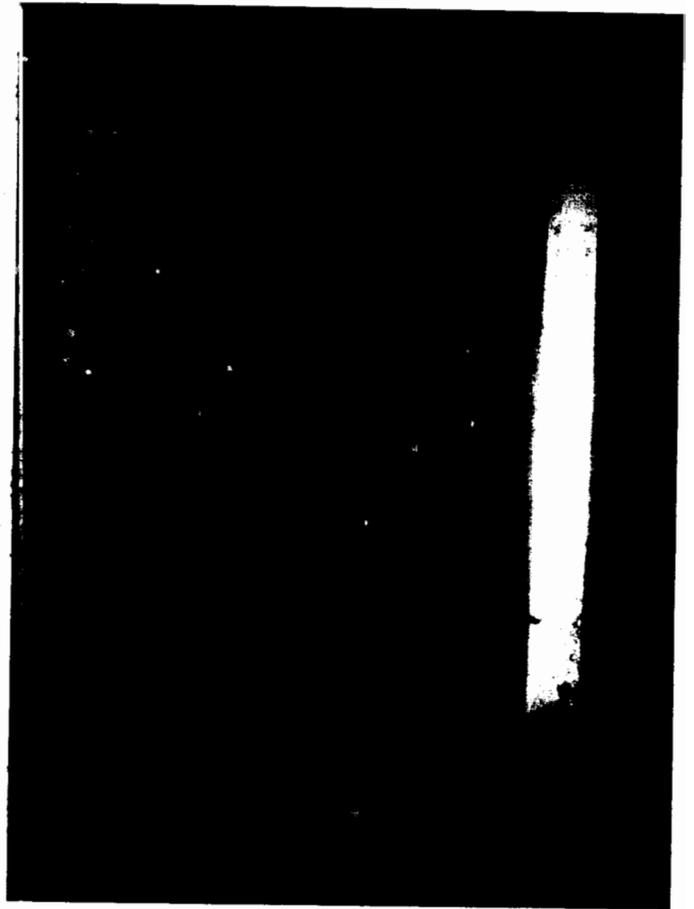
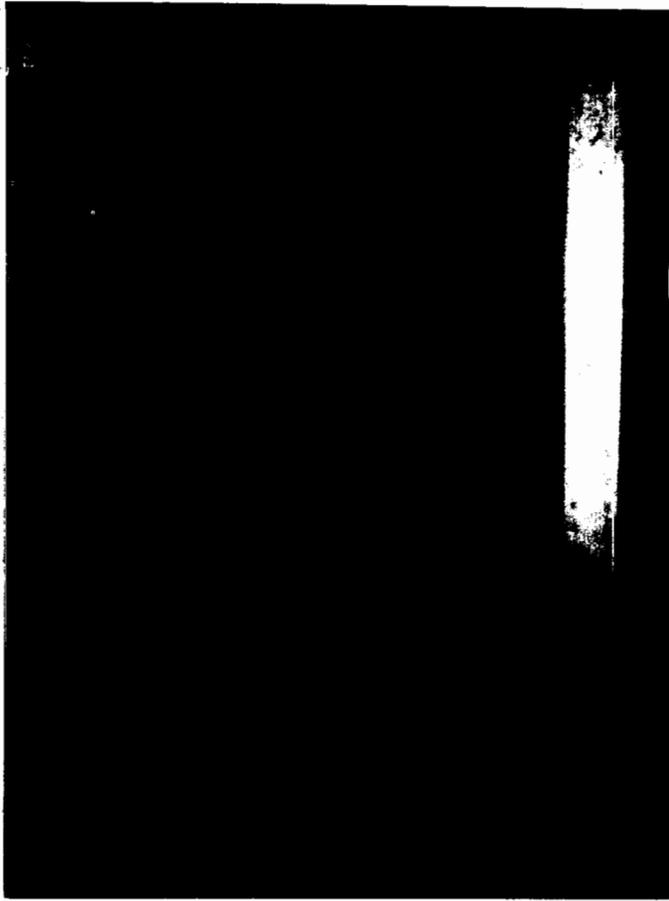
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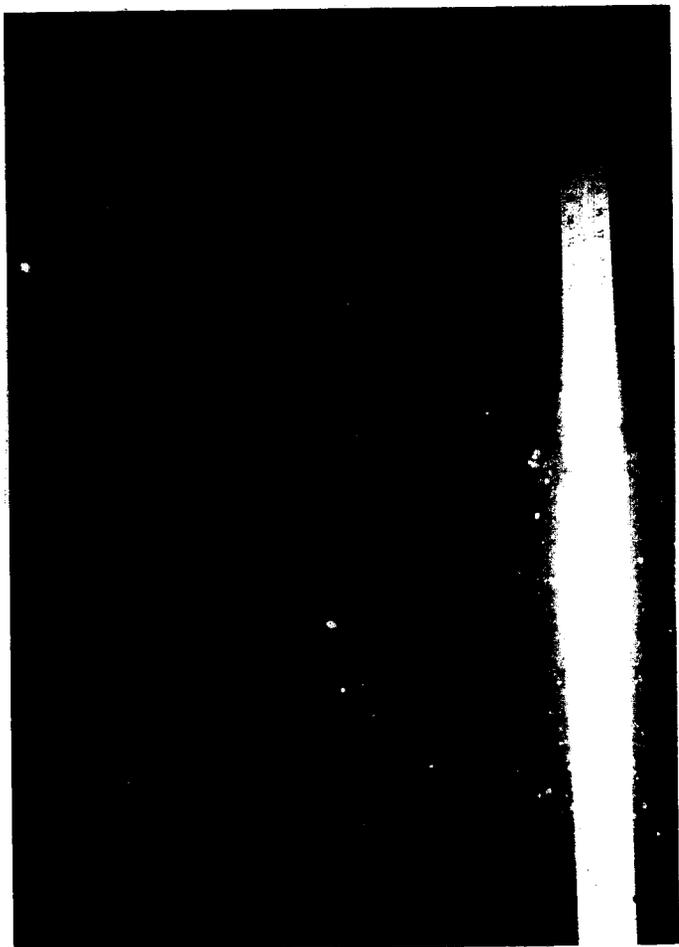
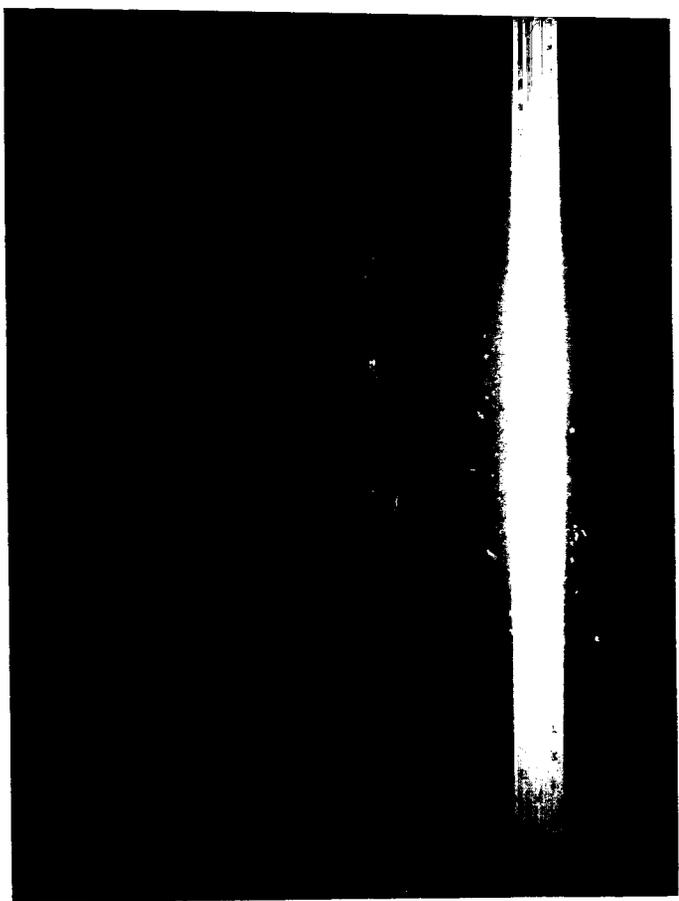
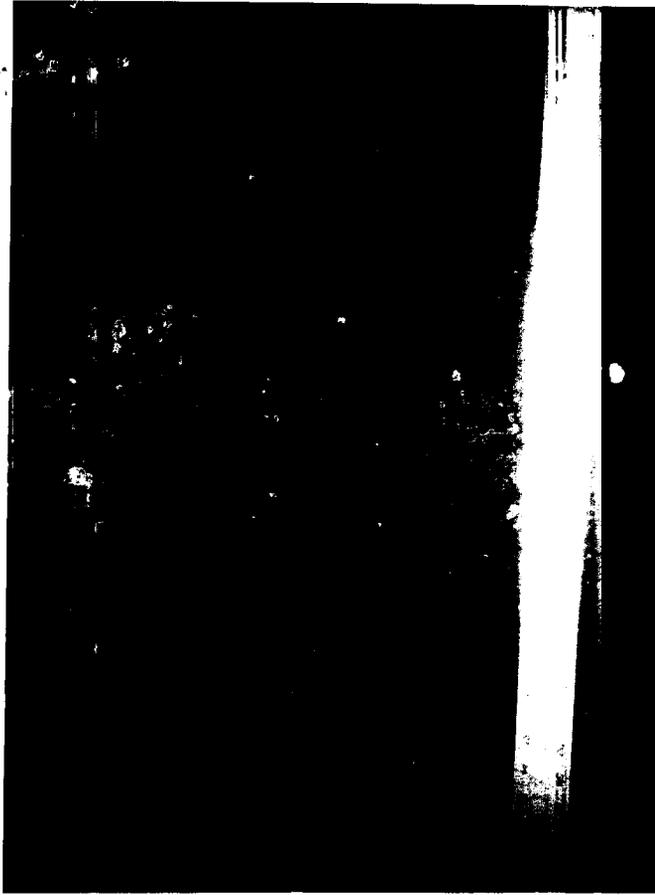


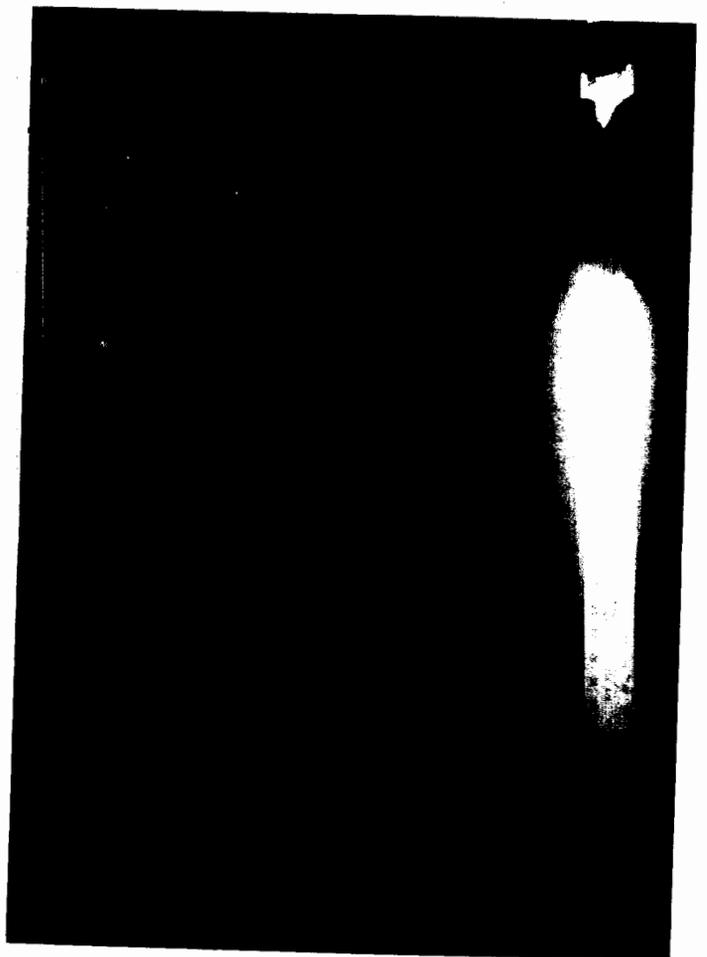
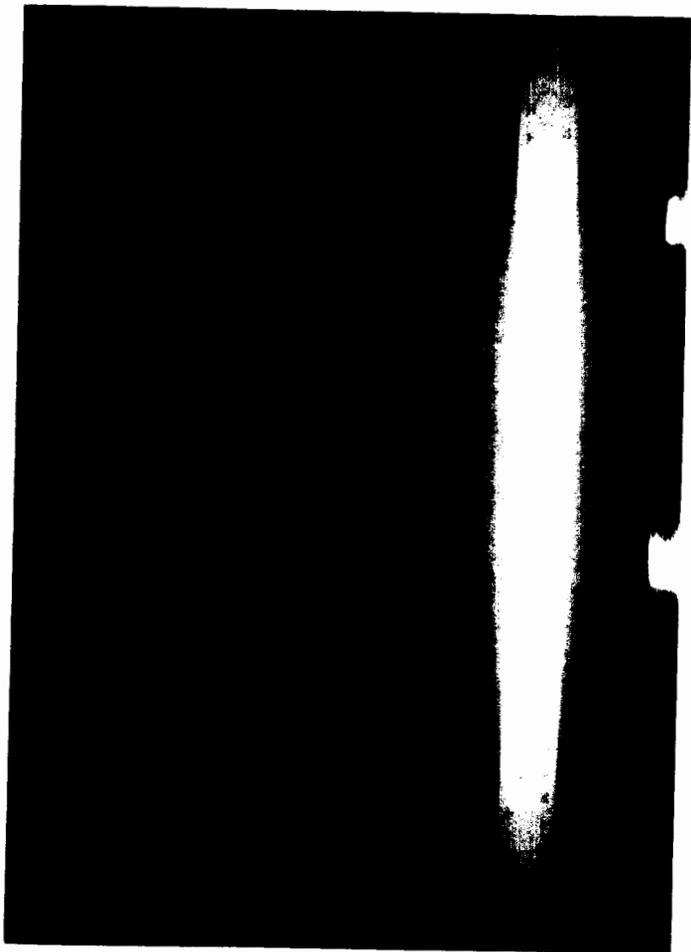
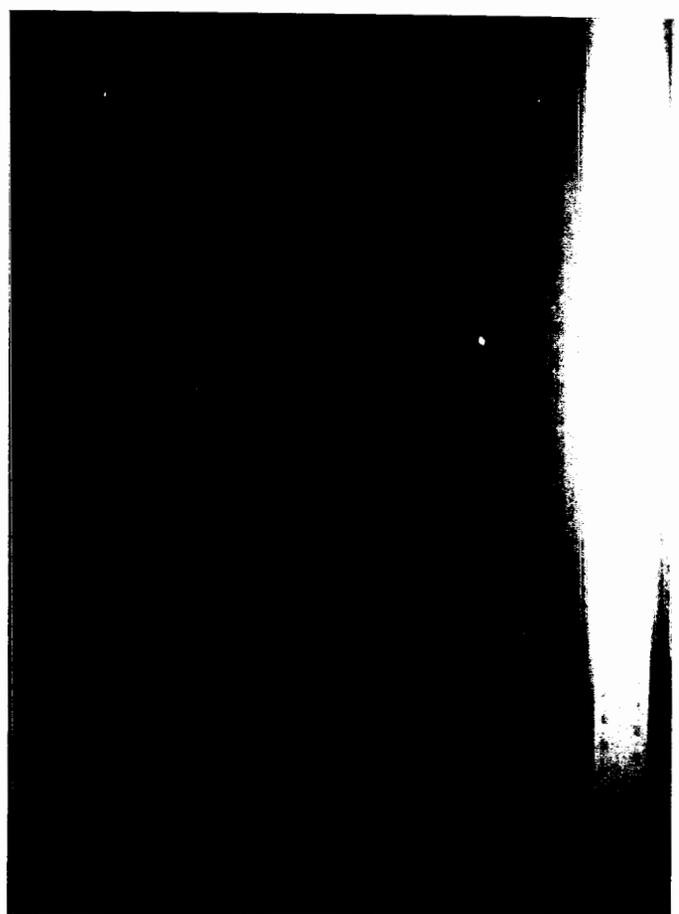


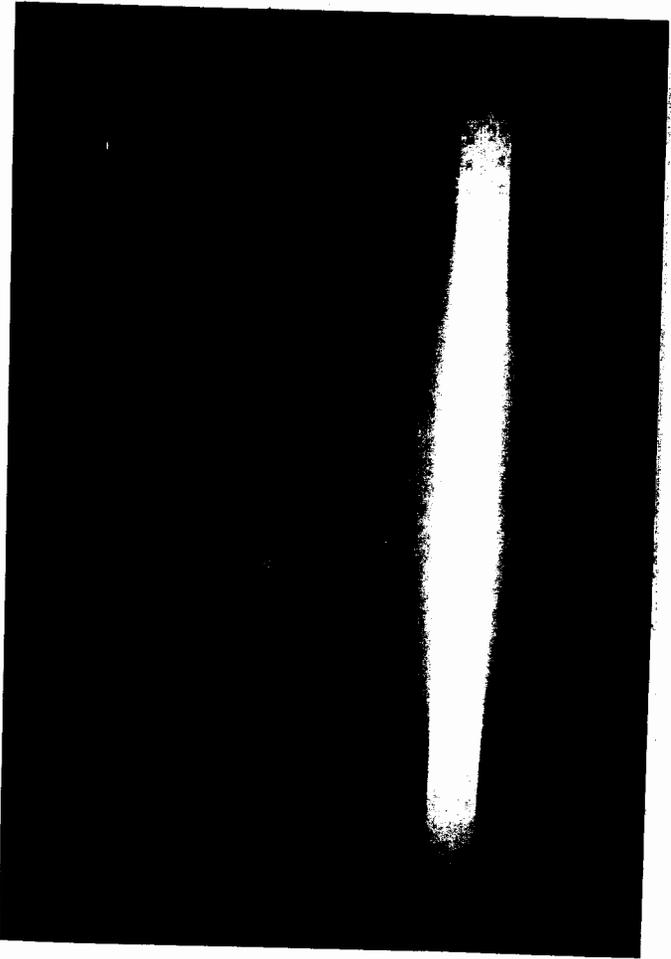
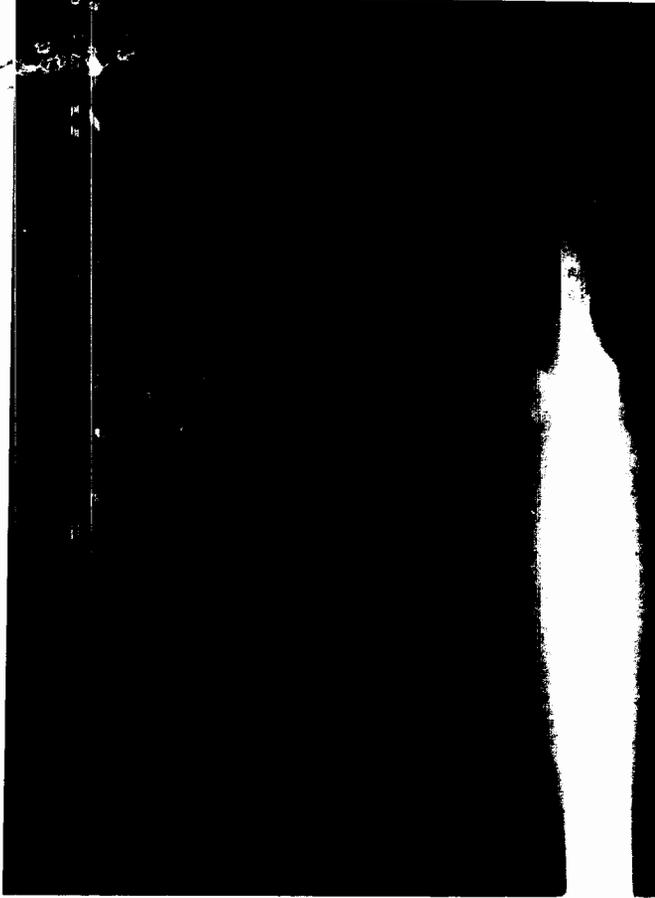












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