PHOTOGRAPHIC RECORDING OF THE APPLICATION OF EPOSHIELD INTO THE INTERSTITIAL AREA OF POST-TENSIONED STRAND

Project Evaluation: Larry Sessions and Jonathan Van Hook
Testing: FDOT Structures Research Laboratory
Product: DYWIDAG-Systems International USA
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Introduction:

Epoxy polymers are currently used for the corrosion protection of cable stays but have not been fully utilized for typical post-tensioning applications. In order to fully protect the post-tensioning strands from corrosion, the epoxy polymers must both fully coat the surface of the strand as well as fill the interstitial area of the strand. The protection of the surface of the strand has been well documented; however, the current distributors of the epoxy polymers have insufficient data as to the ability of this material to completely fill this interstitial area. Because the interstitial area acts as a wick for moisture, it is imperative that this area be completely filled with the epoxy polymer for the corrosion protection of the strand.

A simple test was conducted at the FDOT Structures Lab on May 8, 2002 to determine the ability of the epoxy polymer EPOSHIELD to adequately fill the interstitial area of post-tensioning strand.

Purpose:

Determine if the interstitial area of a strand stressed to service level loads can be filled with the epoxy polymer EPOSHIELD.

Test Set-Up:

A short length of ½" diameter strand was placed in a 1" diameter PVC pipe and stressed to 70% GUTS with zero anchor set in a vertical test frame. The PVC pipe was fitted with an PVC elbow and funnel at the top for the application of the EPOSHIELD. The bottom of the PVC pipe was sealed around the strand to prevent leakage of the material as shown in the attached sketch.

The EPOSHIELD material was mixed in a separate container by a hand stirrer for approximately 4 to 5 minutes in the ratio of 75% hardener to 25% resin. The polymerization of the material is 240 hr. at 0°C, 120 hr. at 20°C, 72 hr. at 40°C, and 16 hr. at 60°C.

Findings:

After mixing the material the EPOSHIELD was poured into the annulus between the pipe and strand to the initial level as indicated on the attached sketch. A few minutes after the initial installation of the EPOSHIELD (11:15 AM), the material began to drip from the bottom of the strand. It was observed that the EPOSHIELD was leaking down through the interstitial area of the strand and not through the seal between the pipe and strand. Additional EPOSH18LD was poured into the pipe approximately 30 minutes

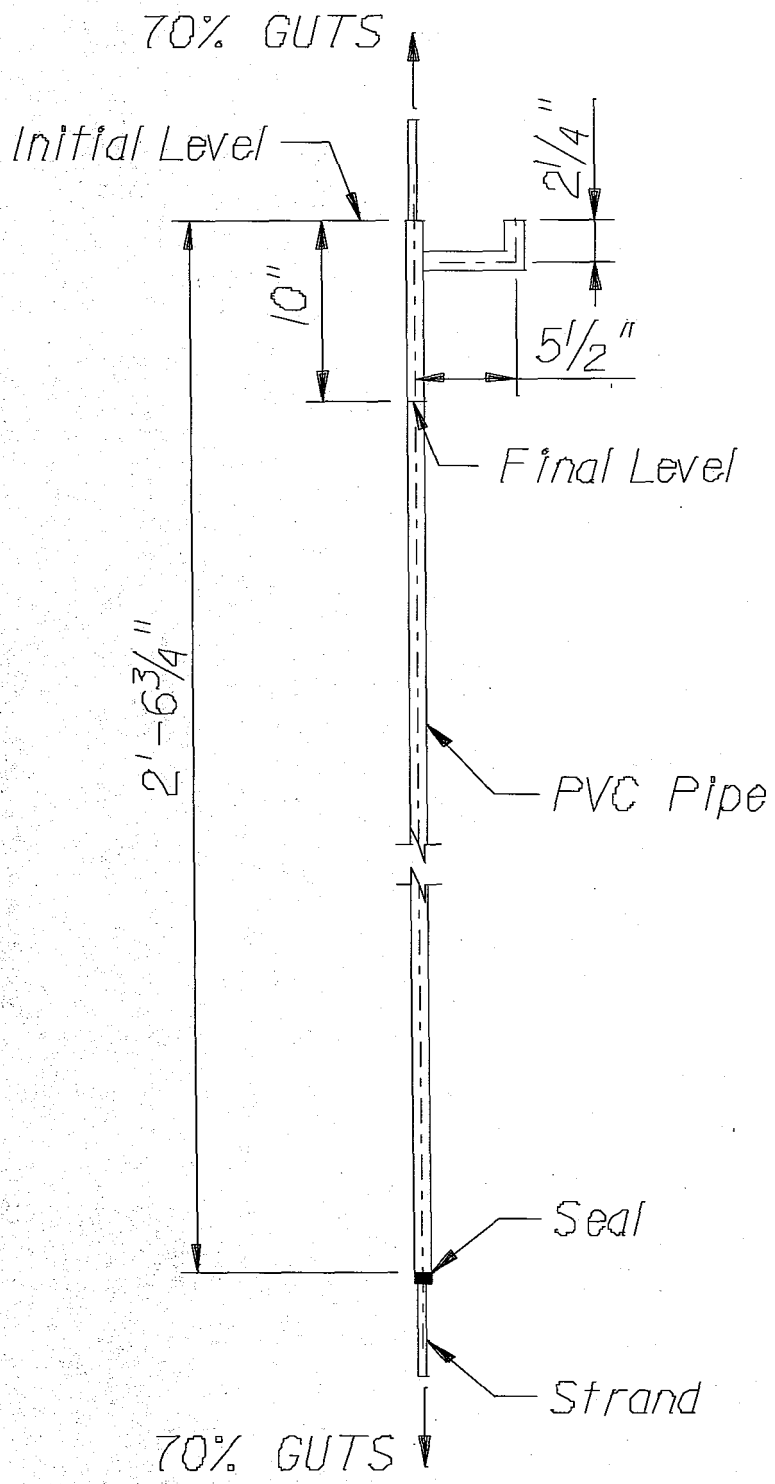
after the initial installation in order to bring the level of the material back up to the initial :level. At 5:00 PM, the material was still dripping at a rate of 3 drops per minute. The final level of the EPOSHIELD in the PVC pipe was determined to be 10" below the initial level. A calculated equivalent volume of 45% of the EPOSHIELD in the pipe flowed through the interstitial area of the strand.

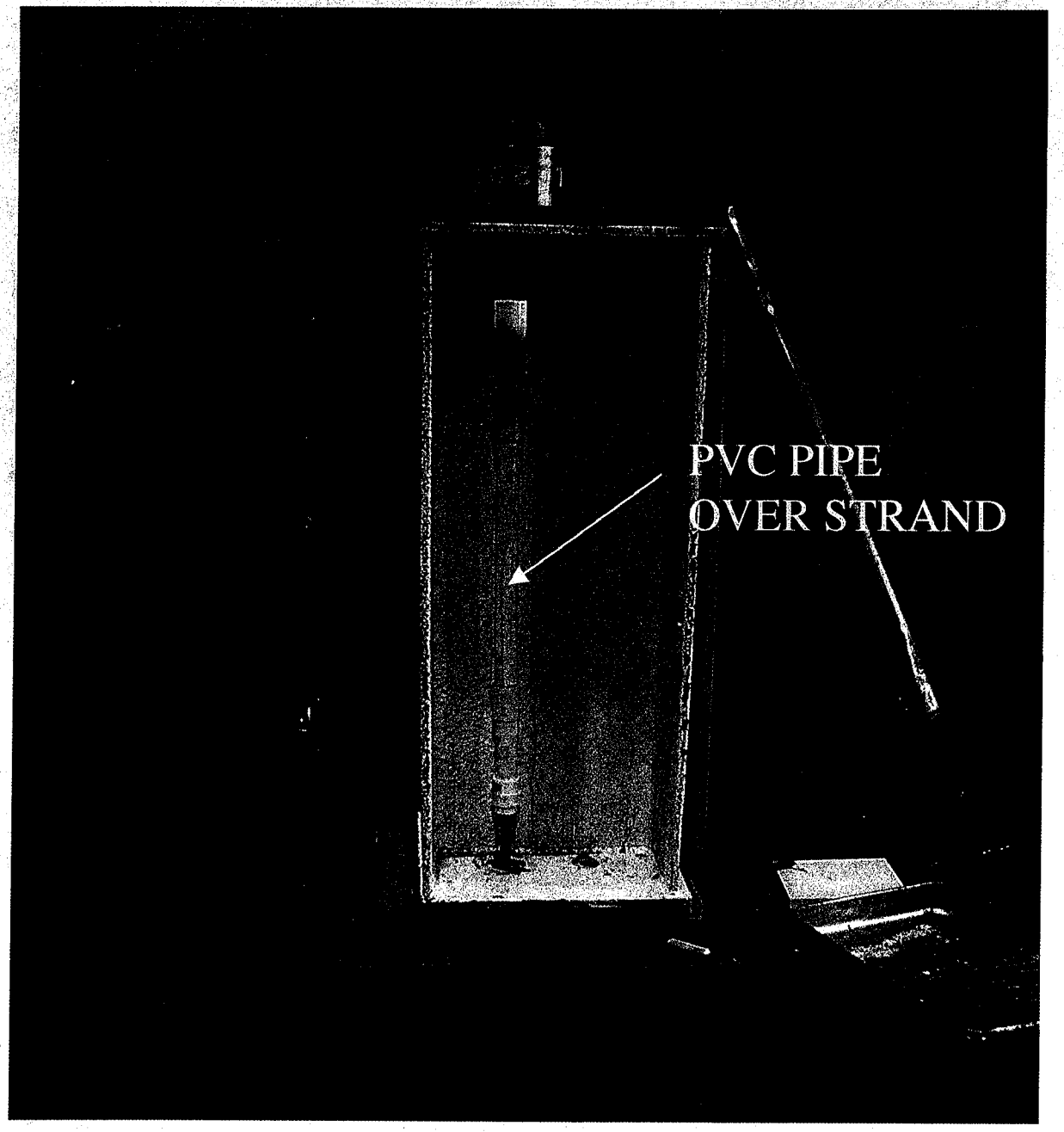
After 72 hours of curing, the strand was de-stressed, separated from the PVC pipe, cut into 5 pieces approximately 6" long, and labeled ("1" at the top of the test, "5" at the bottom near the seal). The wires were then separated to confirm the presence of EPOSHIELD in the interstitial area. Photos of the test set-up, the testing, and the confirmation of the presence of EPOSHIELD are attached.

Conclusion:

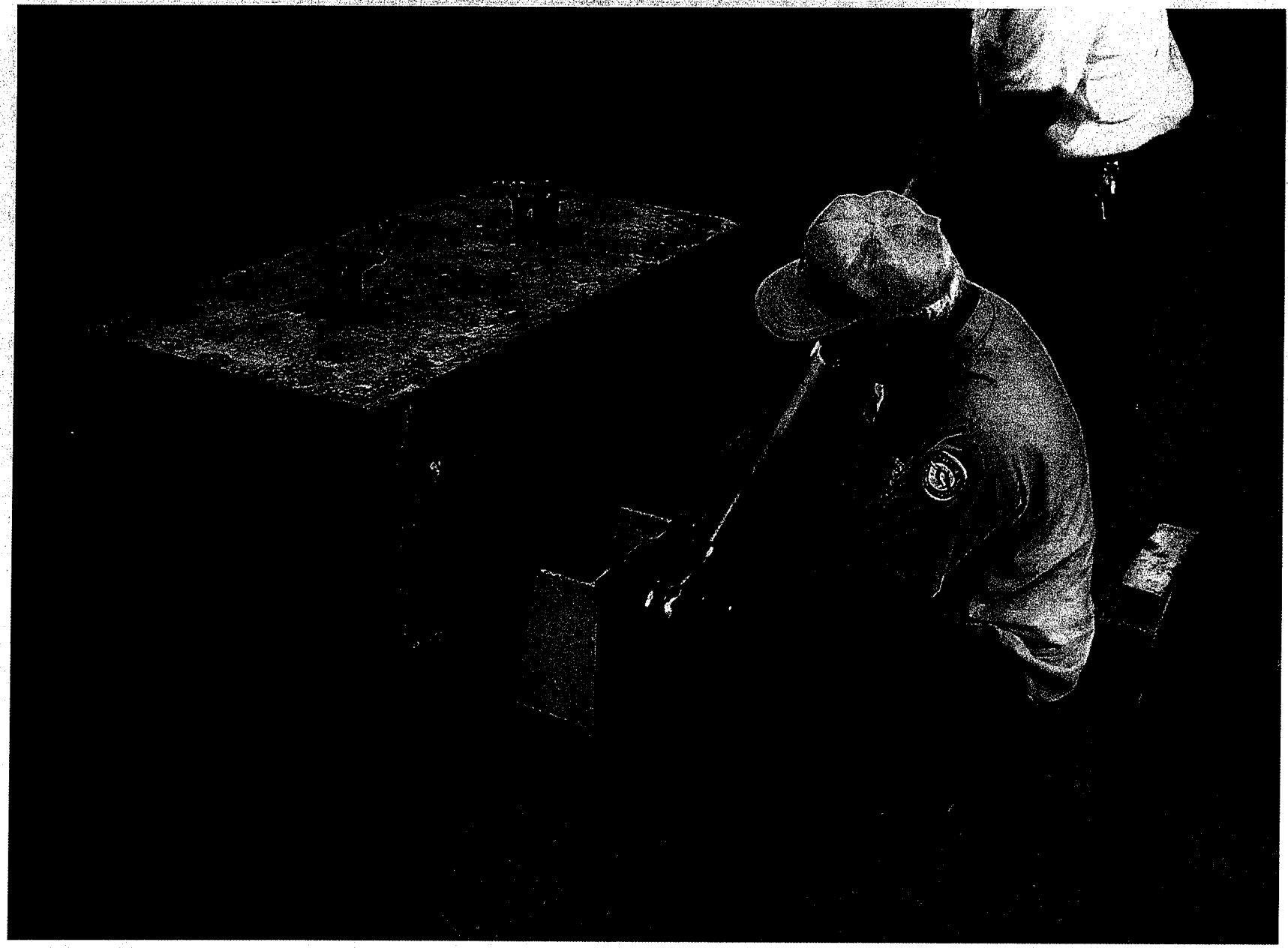
This test confirmed that EPOSHIELD completely filled and coated the interstitial area and wires of a ½" diameter strand stressed to service level loads, respectively. If the decision is made to utilize unbonded or partially unbonded post-tensioning tendons, an economic analysis will be required to evaluate the feasibility of the use of this product as an alternative to cementitious grout.

EPOSHIELD TEST SET-UP

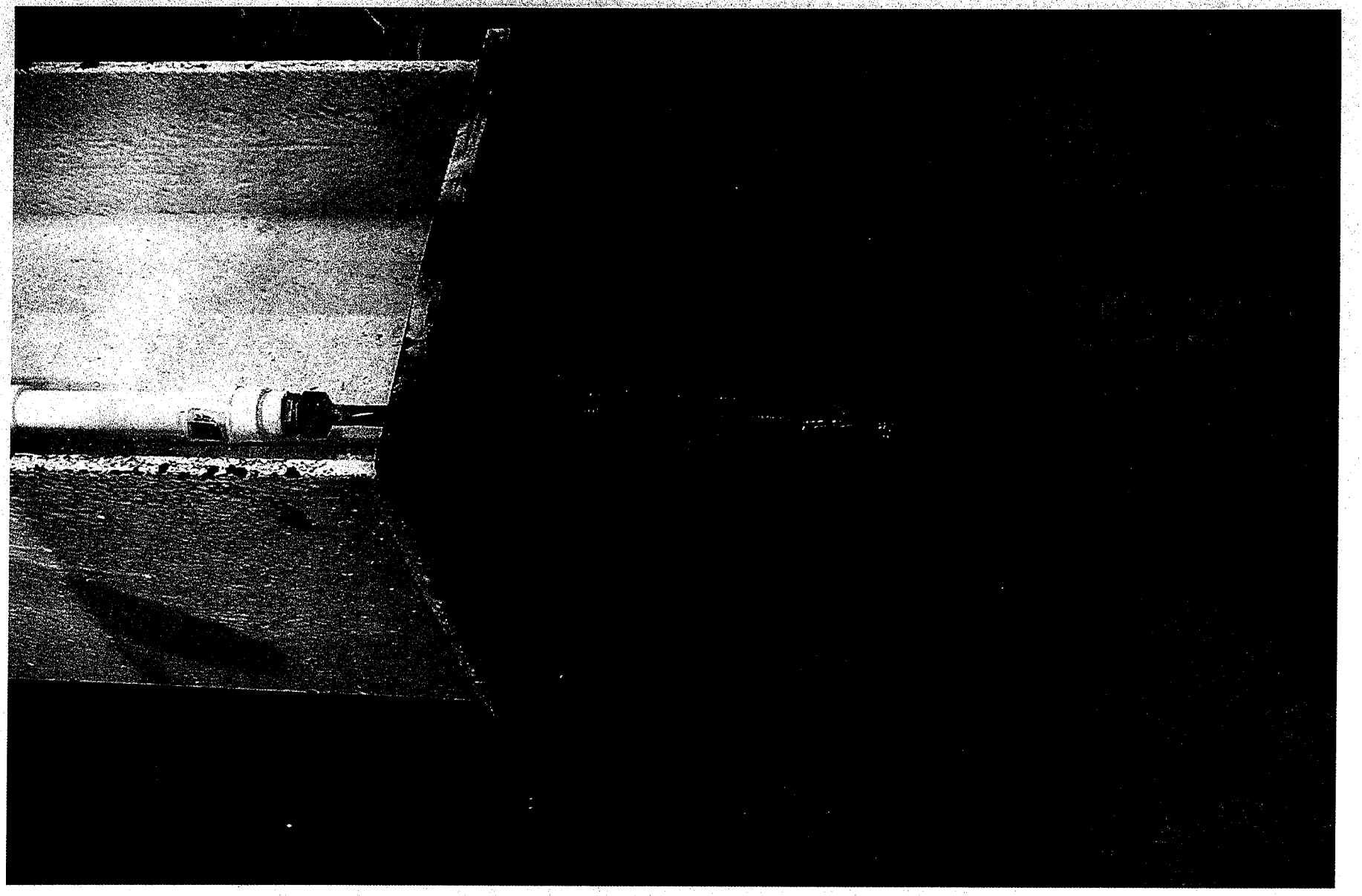




TEXT SET-UP

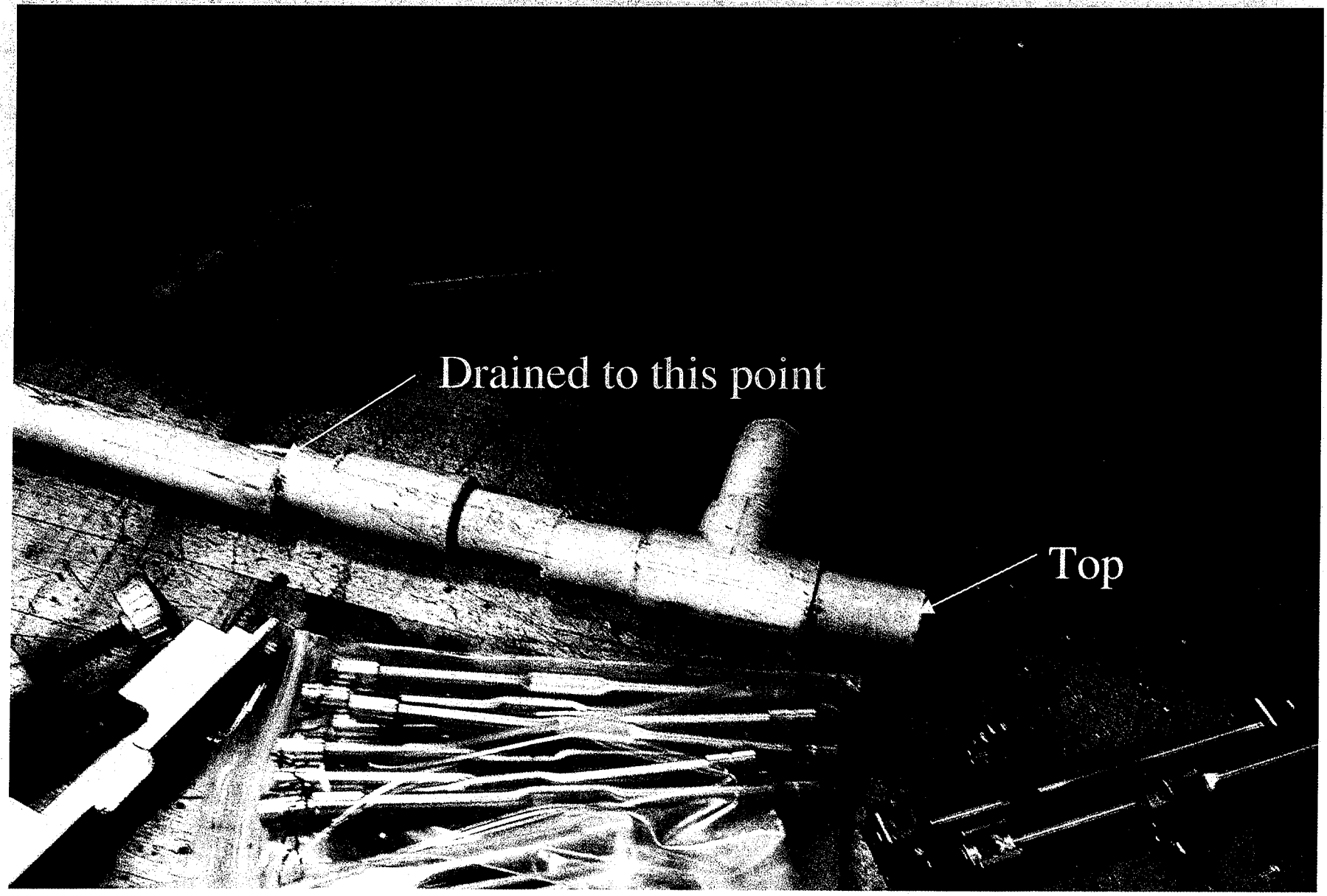


DESTRESSING

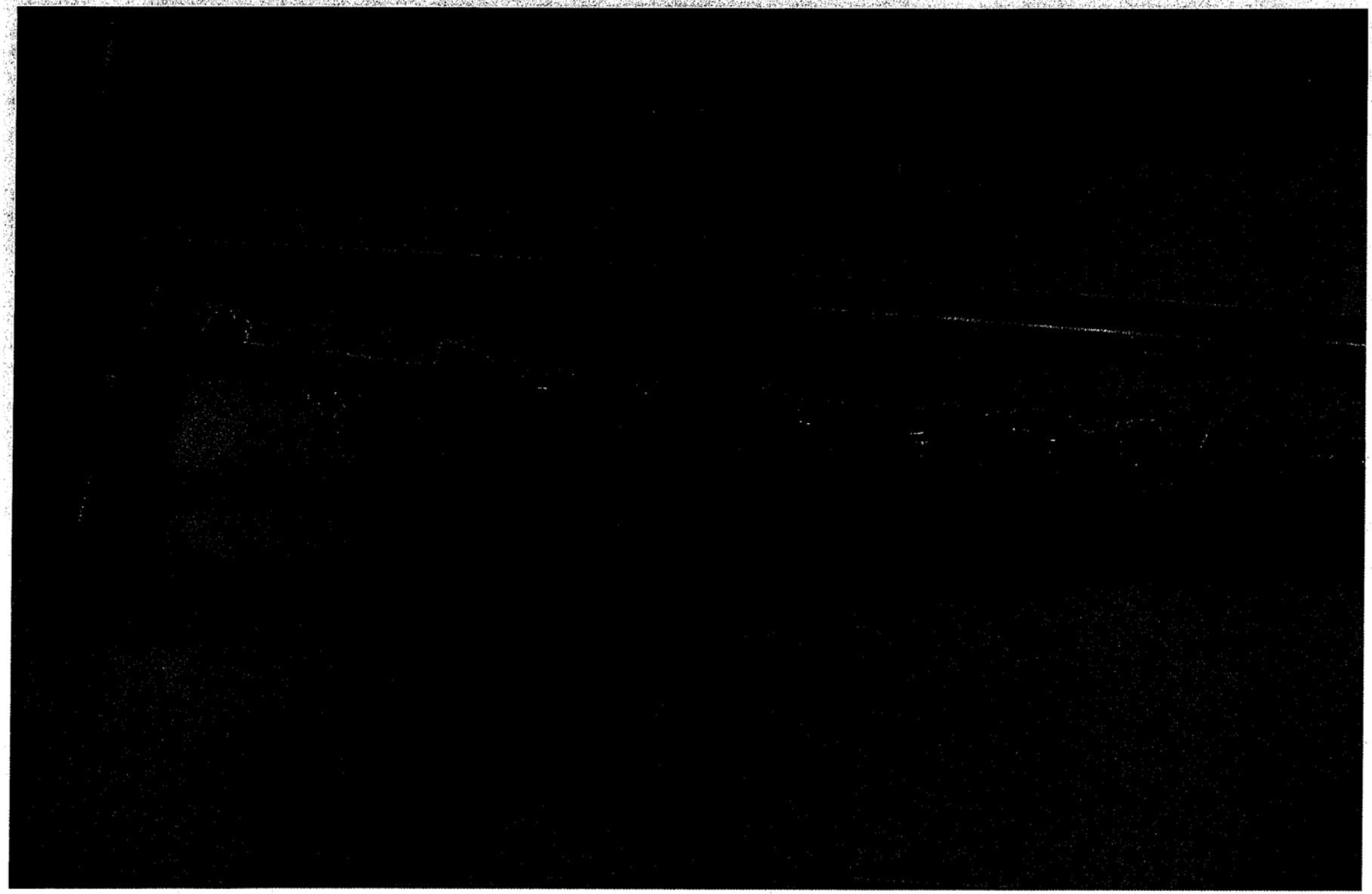


DISASSEMBLY @ 72 HOURS

REMOVING STRAND

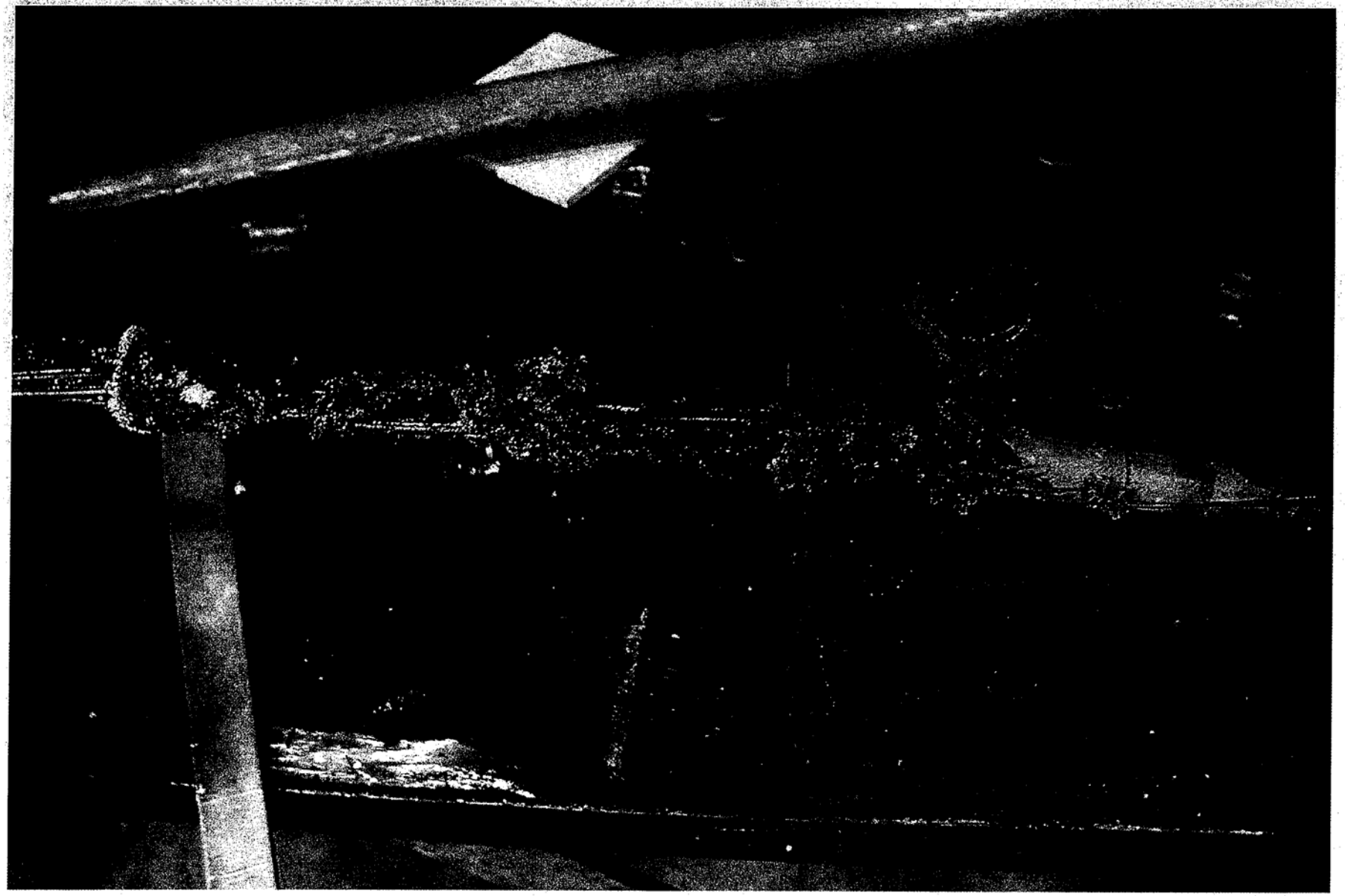


TOTAL TUBE LENGTH 38" AND
17" DRAINED THROUGH STRAND

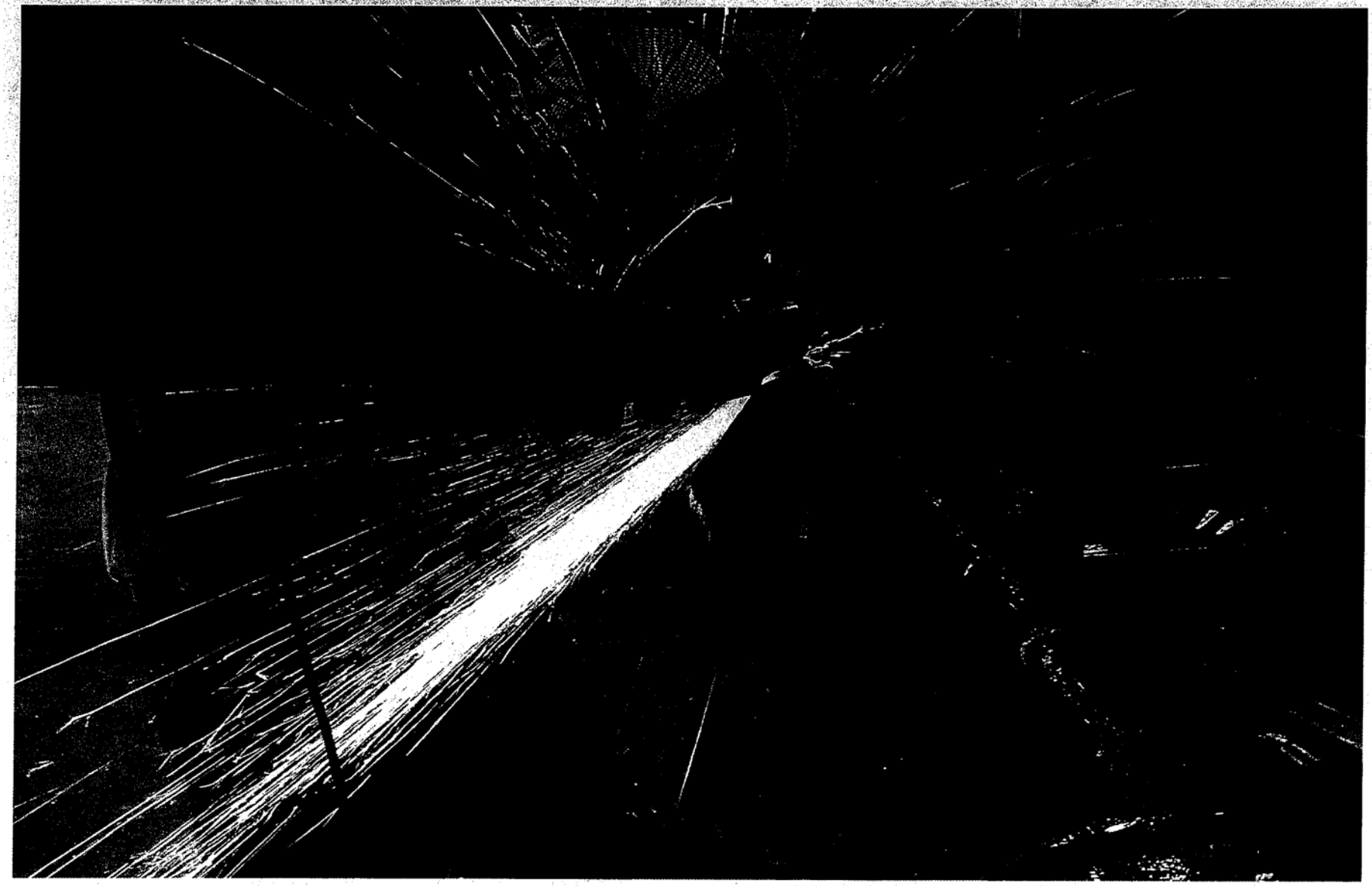


STRAND AFTER REMOVAL
OF PVC PIPE

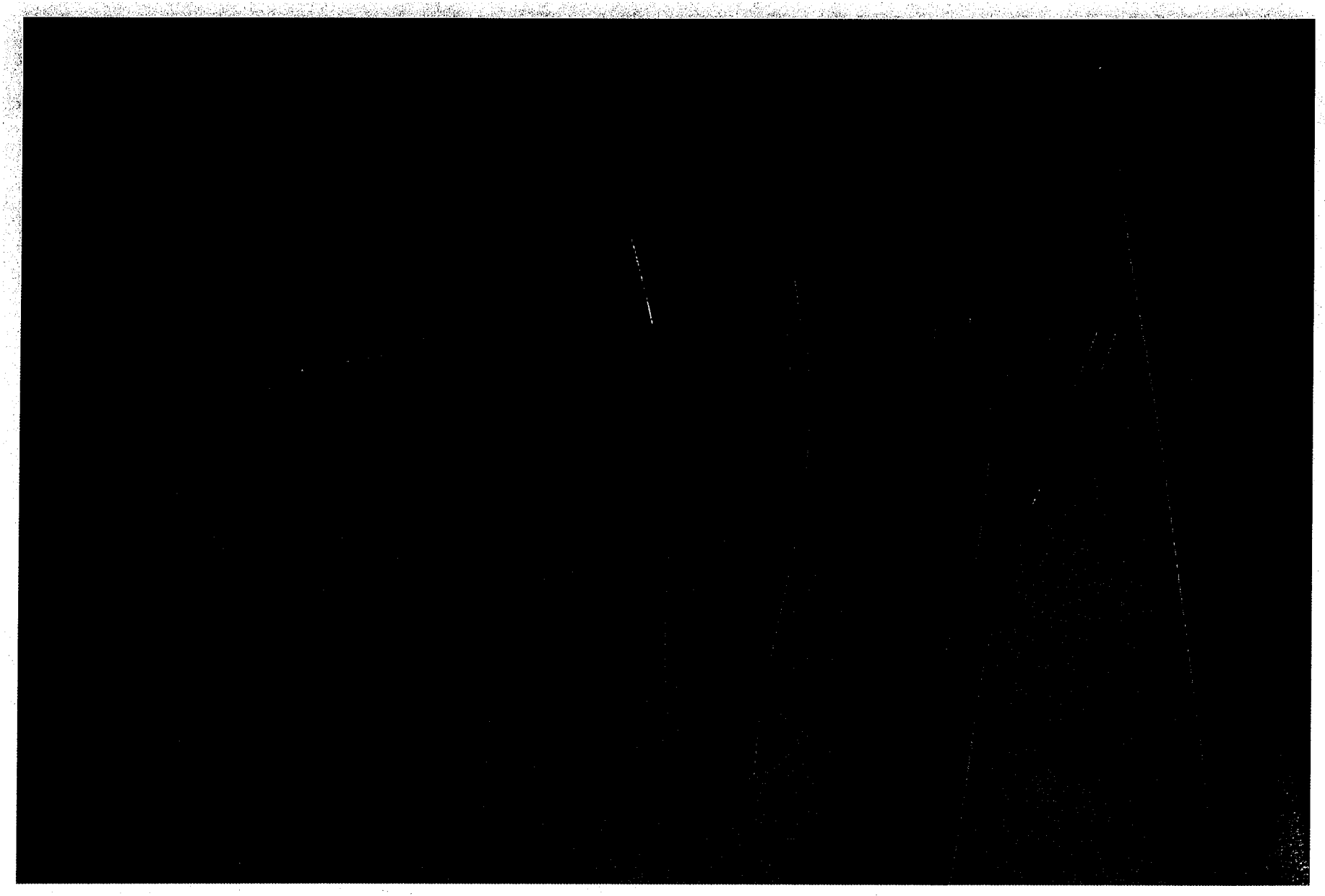
STRAND AFTER
PVC REMOVAL



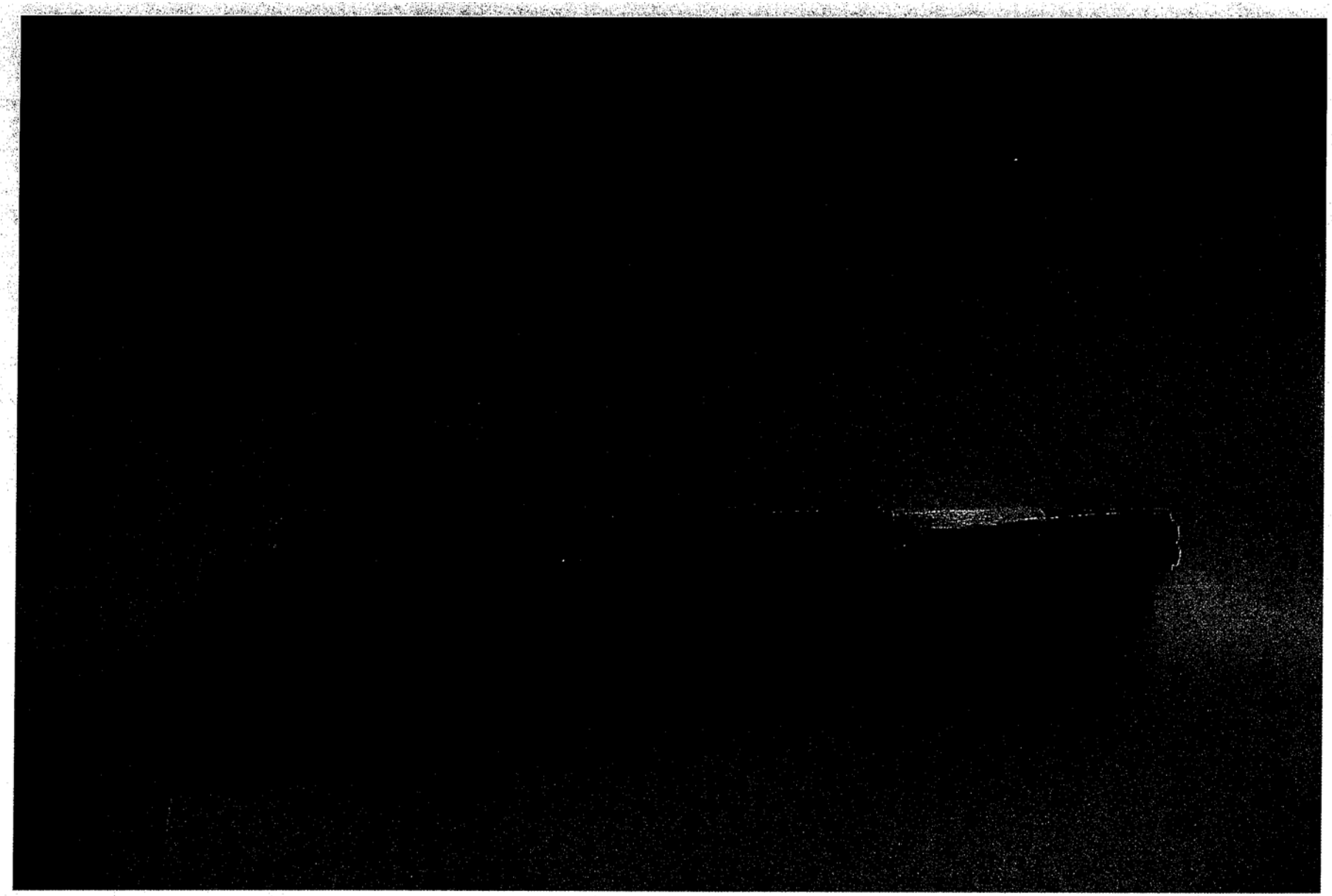
STRAND AFTER PVC
PIPE REMOVAL



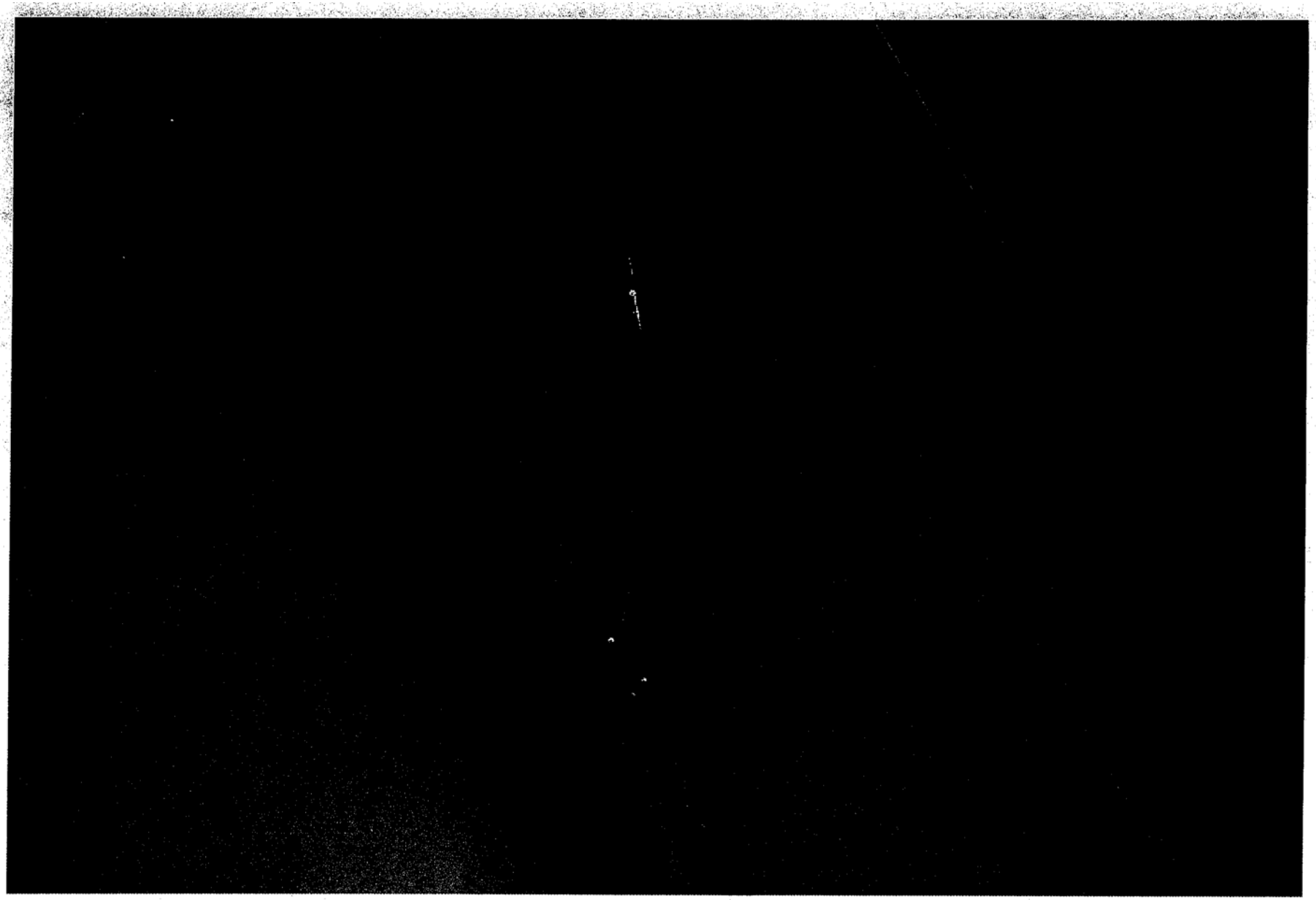
CUTTING STRAND INTO
6" SAMPLES



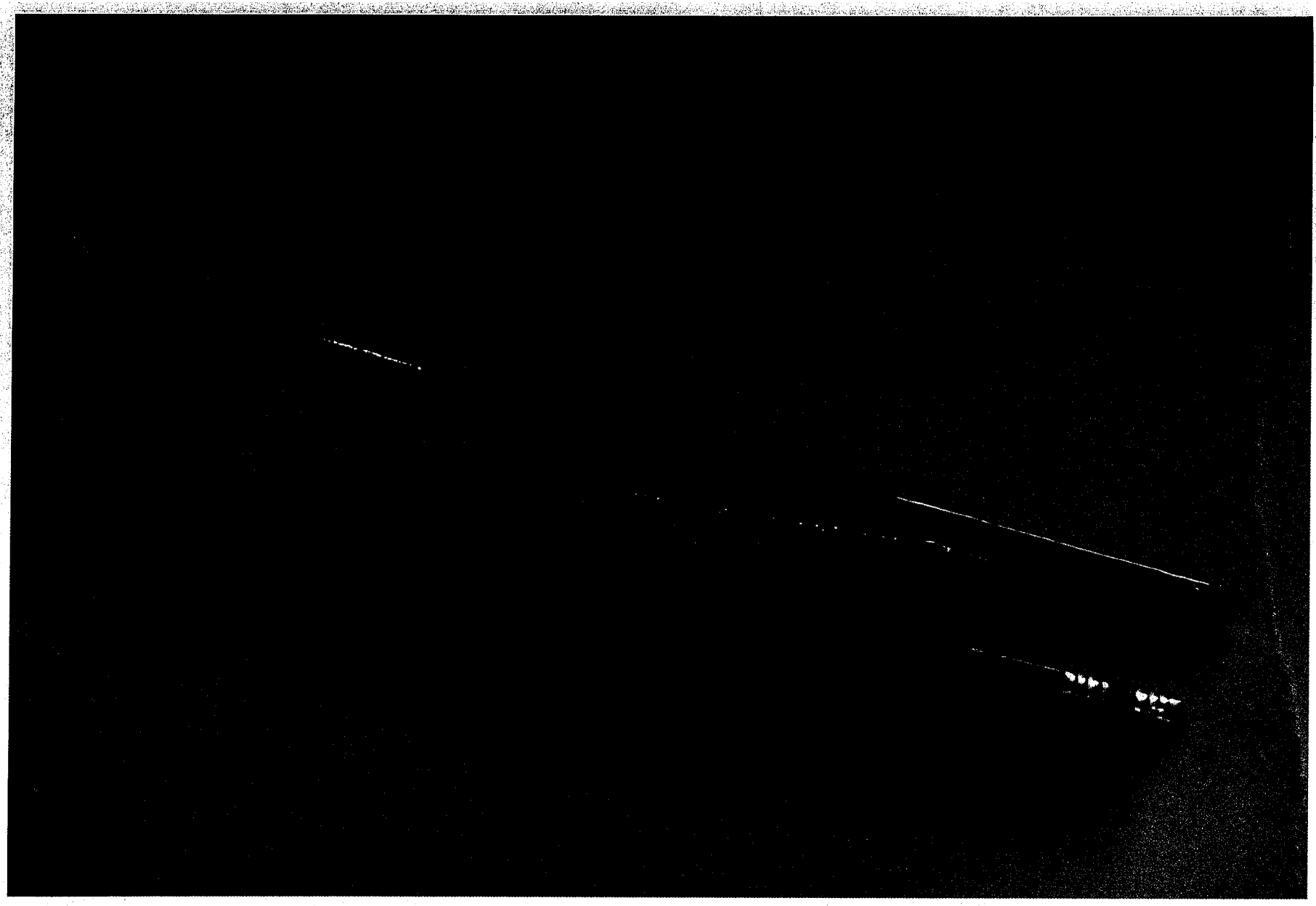
TOP SAMPLE LIGHTLY COATED WITH EPOSHIELD
MATERIAL DRAINED TO THE BOTTOM



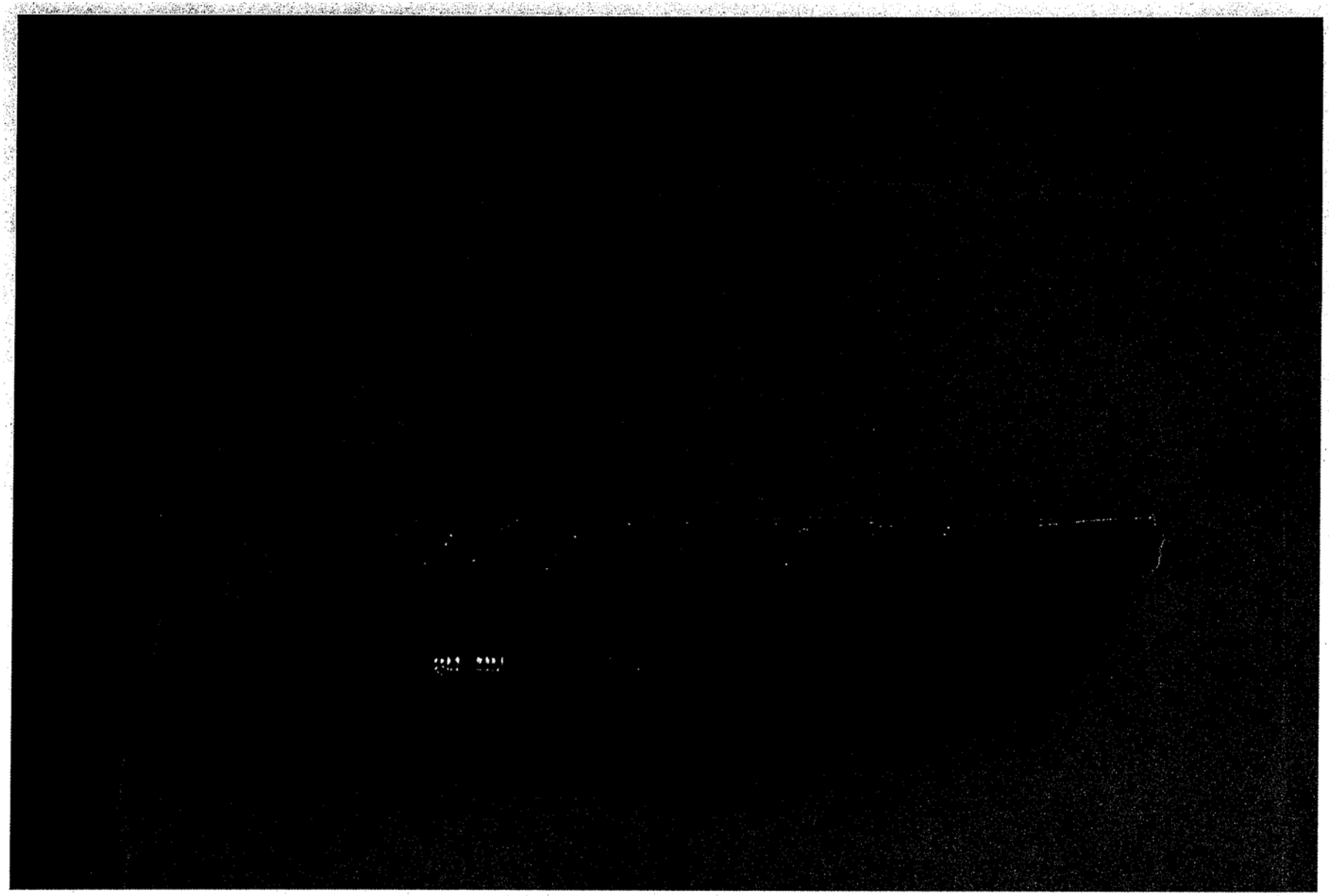
SAMPLE 2 PARTIALLY SUBMERGED IN EPOSHIELD
6" TO 12"



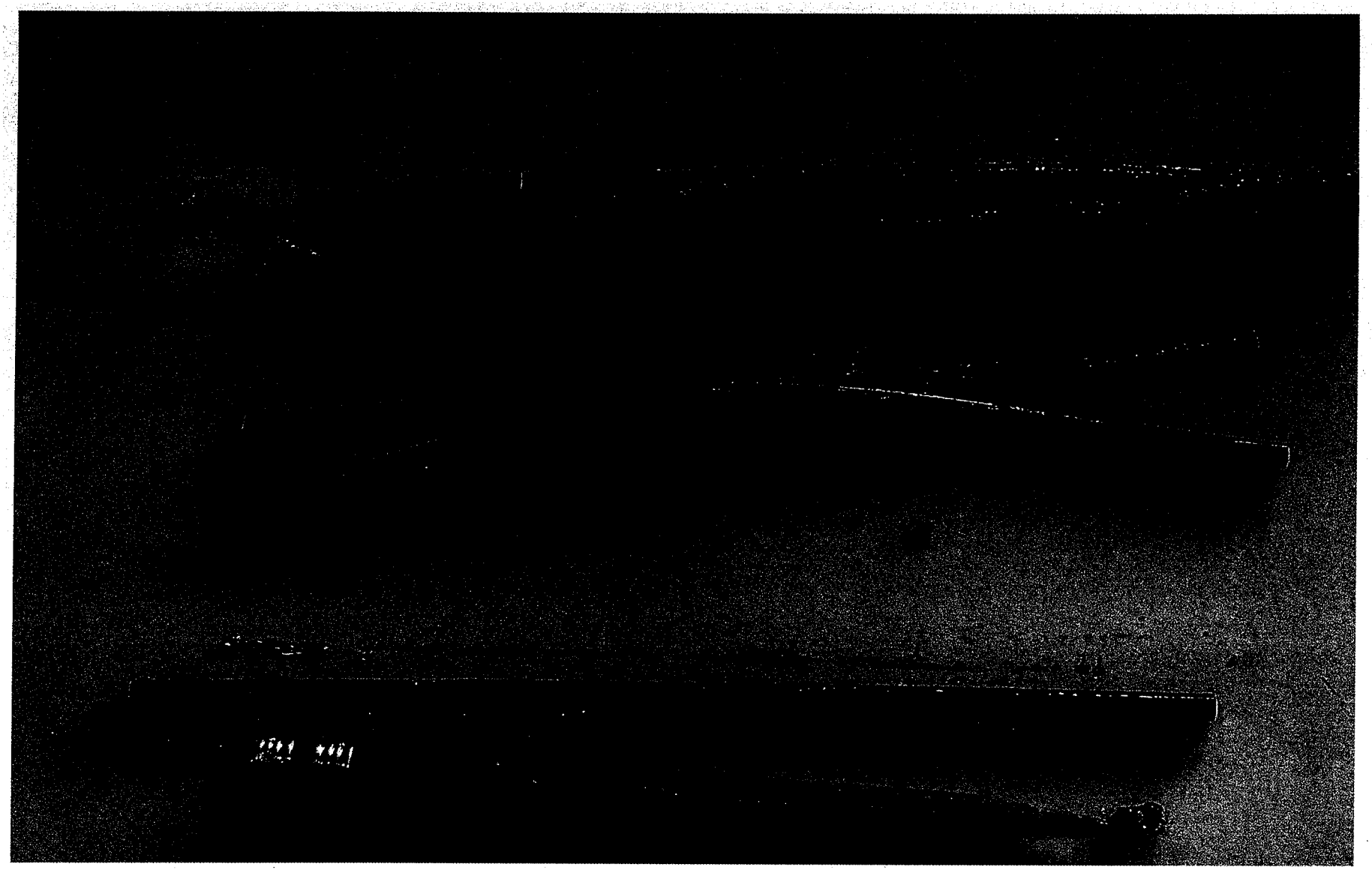
SAMPLE 2 INDIVIDUAL WIRE COMPLETELY COATED



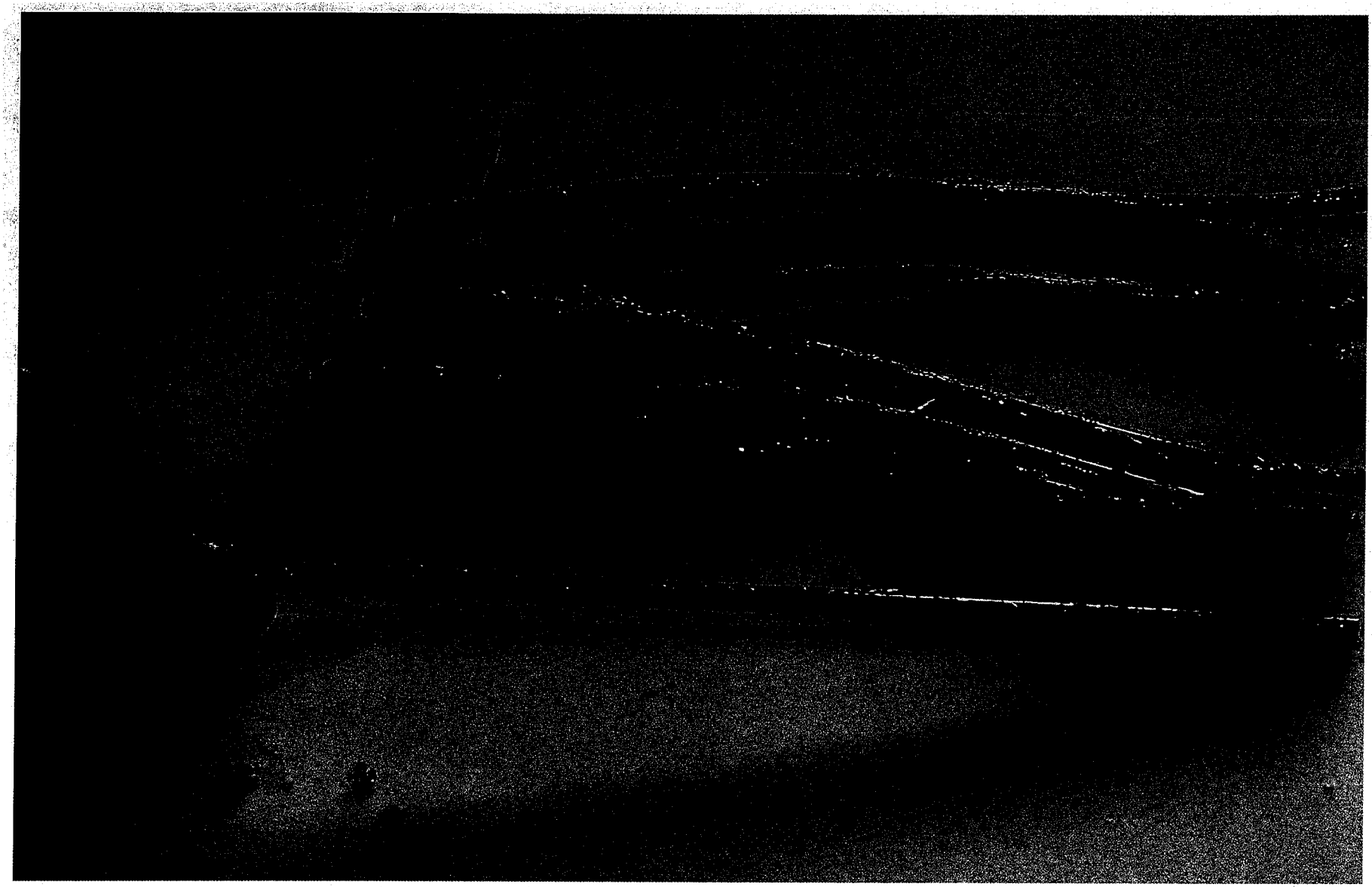
SAMPLE 2 INDIVIDUAL WIRE COMPLETELY COATED



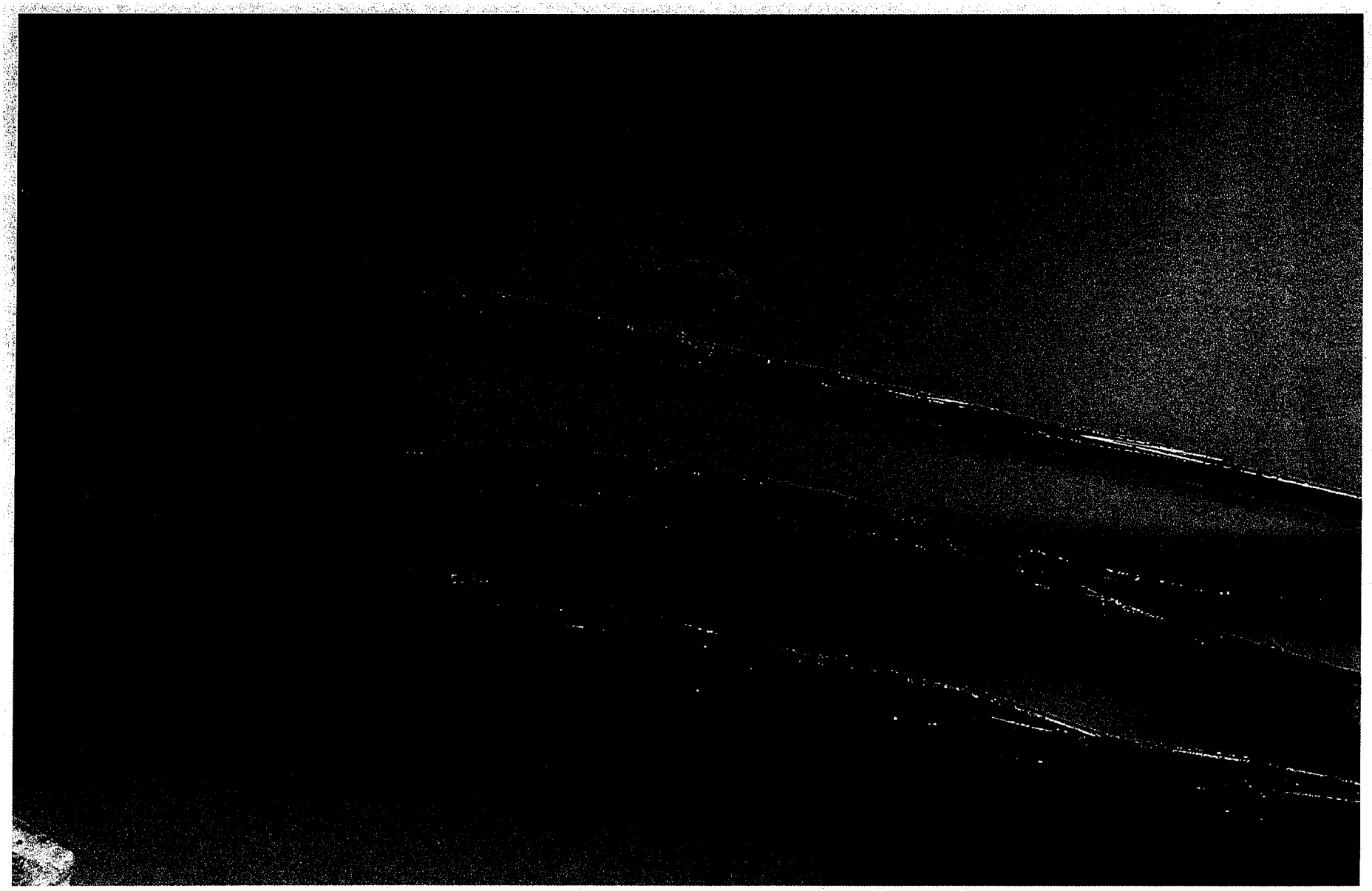
SAMPLE 3 LOCATED
12" TO 18' FROM TOP



SAMPLES 3,4&5 VERY SIMILAR
WITH STRANDS COMPLETELY COATED



SAMPLE 4 LOCATED 24"TO 30" FROM THE TOP
STRANDS FULLY COATED



SAMPLE 5 LOCATED AT THE BOTTOM
STRANDS FULLY COATED