2003 Supplement
to the
Large Whale Gear Research Summary

Glenn Salvador[1], John Kenney[2] & John Higgins[3]
April, 2003

NOAA/Fisheries, Northeast Region
Protected Resources Division
Gear Research Team

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This collection of information represents research conducted by the NOAA! Fisheries, Northeast Regional Office, Protected Resources Division, Gear Research Group, unless otherwise noted. This is a supplement to the 2nd edition, November, 2002. As new research becomes available, it will be added to this volume. For updates, additional copies, questions, comments, etc, contact:

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Additional information can be found at the *"Atlantic Large Whale Take Reduction Plan"* web site: http://www.nero.noaa.qov/whaletrp/

Neutrally Buoyant Line Research

NMFS Gear Research Team

February 2003

Through discussion shared at gear workshops, fishermen from the Down East area of Maine brought forward the idea of developing a neutrally buoyant line as a technological approach to the reduction of floating line used in the fixed gear fisheries. In the spring of 2000 a small amount of neutrally buoyant (NB) line was produced for the NMFS to test it's performance as an alternative to the use of poly (floating) line in the ground lines of lobster gear and anchor lines of gillnet gear. Two underwater videos were shot to document the performance of the NB line before quantities of the line were purchased for industry testing. After viewing the video footage the NB line was thought to have the qualities that would make it a possible alternative to poly line. An order of NB line was made and the line was distributed to industry for at sea testing. To date the NMFS has distributed the following amounts of NB line to the gillnet, Lobster and Hagfish fisheries.

- 225 coils of 3/8 inch (approx 55 miles)
- 80 coils of 5/8 inch (approx 49 miles)
- 2 coils of 11/16 in. (approx 1 mile)

This NB line has been distributed to the following areas and fisheries:

1. Maine Lobster Fisheries
2. Maine Gillnet Fisheries
3. New Hampshire Lobster Fisheries (inshore and offshore)
4. New Hampshire Gillnet Fisheries
5. Massachusetts Lobster Fisheries (inshore and offshore)
6. Massachusetts Hagfish Fisheries
7. Massachusetts Gillnet Fisheries
8. Rhode Island Lobster Fisheries (inshore and offshore)
9. Rhode Island Gillnet Fisheries
10. Connecticut Lobster Fisheries
11. Nova Scotia Lobster Fisheries

A survey form was developed to help document and assess the results of the NB line test. With a total of 55 participating fishermen the NMFS received 25 returned survey forms. A review of the returned surveys indicated the following result.

- Seven returned surveys emphasized line chaffing on hard bottom.
- Three returned surveys reported problems with the lay of the line- stiff lay, poor performance in hauler, line kinking.
- Seven returned surveys indicated good line performance with no more hang up problems then line regularly used in their fishing operations.
- Two returned surveys focused on the great strength of NB line.
- Four participants expressed interest in purchasing the NB line.
- Five returned surveys stated the NB line worked well in their hauler and on deck.
- One of the participating vessels was an offshore lobster "trip" vessel which NMFS outfitted with enough NB line to convert all of the vessels ground lines. The returned survey report emphasized line chaffing. A verbal follow up on the report revealed line

chaffing to be common with all types of line used in this vessels operations. The NB line had an elevated occurrence of chaffing when compared to floating line.

- There was an increase in reported line chaffing in the Down East Maine region (east of Rockland)

Interviews were conducted with participating fishermen. Several fishermen expressed their preference of sink line over NB line. These fishermen stated a good sink line would lay hard on the bottom with a minimum of line movement across the bottom while gear is soaking. These same fishermen had concerns with NB line being lively, moving in the wave and current action very close to the bottom giving the NB line an opportunity to hang up. Our interviews produced much of the same result as the returned survey reports. Down East Maine had the greatest amount of negative feed back with a scattered amount of positive feed back. This pattern of less support for NB line in the Down East areas and greater support for NB line as you travel to Southern New England appears to correlate directly with greater amounts of sink line traditionally used in the fisheries of Southern New England and lesser amounts of sinking line traditionally used in the Down East fisheries.

At the start of the NMFS NB line test there was not a single manufacturer of neutrally buoyant line. In the spring of 2000 there were three manufacturers that produced NB line for the initial sea trials. To date there are at least nine cordage manufactures producing NB line. These cordage manufactures are now speaking directly with industry and the further development of this NB line is being driven by industry. As is the case in the traditional cordage used in our fisheries today each generation of this NB line seems to improve with time through industry driven comments to achieve a workable product.

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Time Tension Line Cutter

NMFS Gear Research Team

Weak links located at the bottom section of the water column make it difficult to haul gear with out weak link failure resulting in gear loss. A Time Tension Line Cutter (TTLC) is designed to release the buoy line after a load is applied to that line for a pre set period of time. Releasing the buoy line being hauled on from an entangled whale would decrease the threat of serious injury or death from an entanglement.

Release Link

1. NMFS has outfitted four offshore trawls with TTLCs designed and manufactured by Blue Water Concepts Inc. They are being hauled on the vessel's regular schedule. These cutters are calibrated to cut the buoy line after 15-min continuous pull time. No failures to date.
2. The design stands up to the regular line loads of inshore and offshore gear.
3. Calibrated to cut the buoy line after a reaching a set line pull load and load pull time.
4. Releases buoy line from anchored gear removing line pull to minimize flesh wound and allowing animal to reach the water surface preventing drowning.
5. Designed to decreases the threat of serious injury or death as required by the ALWTRP.
6. Removes vertical line from the water column.

The vessels participating in the project stated it took 5 to 6 minutes to haul their buoy lines. The TTLCs were calibrated to release the buoy line after being hauled on by these vessel's regular operations for 15 minutes, allowing the fishermen ample time to haul the buoy line prior to being the line being cut and released from the anchored gear. Once the load is taken off the buoy line the TTLC begins to reset itself taking approximately 45 minutes to completely reset. Following a four week trial period where these four TTLC units were hauled on the vessels regular fishing schedule, the units were load tested to determine if the link would cut and release the line at the calibrated 15 minute release moment set prior to sea trials. All units cut and released the buoy line after 15 minutes of pull time when tested shore side following these sea trials.

These units were made of various metal materials for the most part measuring 20 inches in length and weighing approximately 25lbs. The size and weight of these units were handled by these offshore vessels and their crew with no difficulty. A unit of this size and strength is not required of the inshore vessels and the loads put on inshore gear. Currently Blue Water Concepts Inc. is developing an inshore model TTLC which is approximately 10 inches in length and weighs approximately 5lbs. Blue Water Concepts Inc. is investigating a design that could take advantage of injection molding to reduce the per-unit cost.

Time Tension Line Cutter --

10 operational prototypes of a bottom located end line cutter have been tested and delivered to NMFS . Several units have been subjected to in situ testing within the offshore lobster fleet. Balance of units are undergoing testing at NMFS and are capable for continued offshore deployment within other fisheries. (5 additional test units were manufactured and were subjected to destructive testing or design modifications)

Unit design

Design specification and manufacturing drawings were developed from information gathered -- 1 by operational results from pre existing prototypes 2-- informal specifications from both offshore end users and NMFS .

General specification -- highlights

Full ocean pressure and extreme environment operation line cutter with a knotless line sever point

10,000 LB tension capable - tested to 5000 lbs

10 - 15 minutes to cut within load range of 1200- 5000lb tension
Reset 4X duration of activation period.

Simple attachment points to existing gear, minimum operational impact on crew

Non toxic to environment

Long term life -- 5 years or more pending continued materials testing

20lbs or less in air--15lbs or less in water

Observations

Consistent operation over a wide range of both simulated and actual conditions have tested the key technologies of the device. Experimentation results have been compared with initial scientific calculations and have been found to be remarkably consistent with deviations attributed to non exponential factors. High probability equations may be derived which will enhance future designs and expectations.

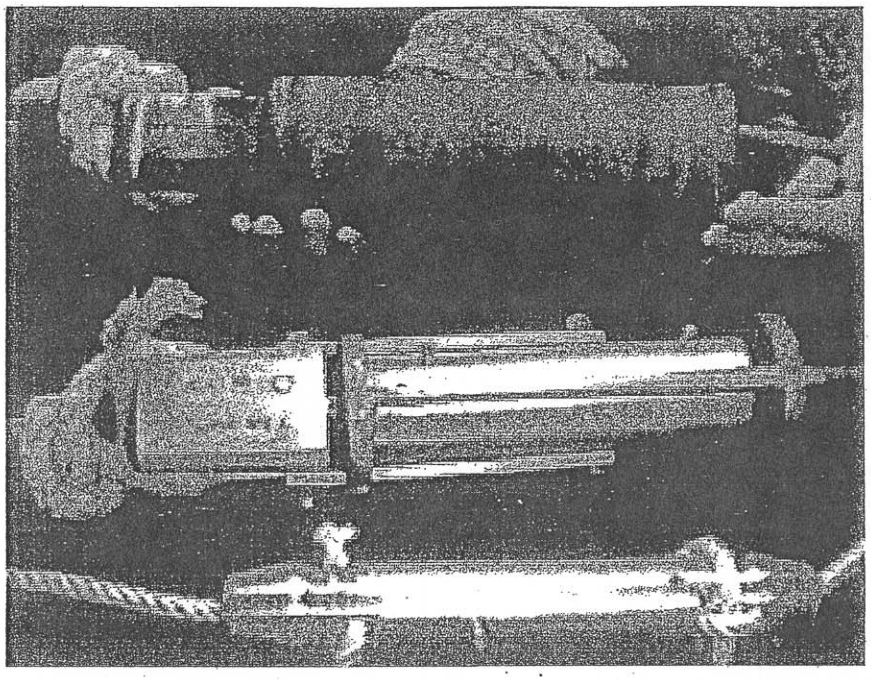
Conclusions

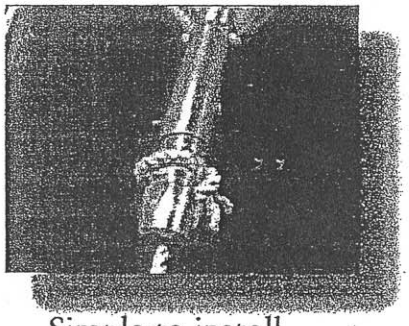
The device functions as intended. Basic design is capable of handling a wide range of operation and environmental conditions. Advancements in the capabilities of the unit have resulted in a true knotless termination point and ability to manufacture economically in large volume productions.

Input from the scientific community is required to determine specifics of operation prior to future design enhancement.

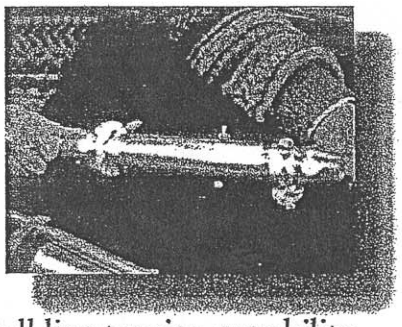
Bottom Break Away For Fishing Gear

Time/Tension line cutters

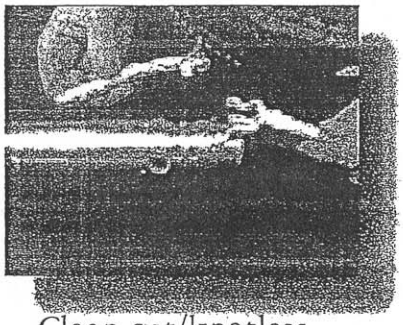




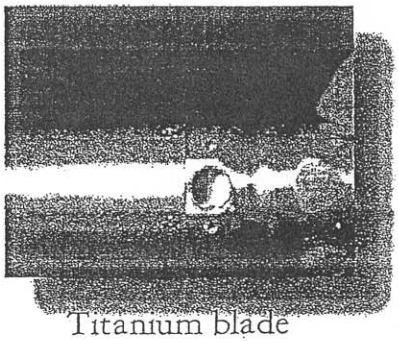
Simple to install



Full line tension capability



Clean cut/knotless



Titanium blade

Whale Safety Products, Inc.

LC – 39 Gillnet Trip Day 1

September 13, 2002

9:25am 15 net string set north and south in 50 fath. with 50lb. mushroom anchor on each end. Red and blue Load cell tied in 75 fath.buoyline 5 fath. from surface. Bottom composition is mud and gravel on edge of hard bottom. Towing south at .5 knots

10:15 speed increased to 1 knot

10:25 increased speed to 1.4 knots

10:27 stopped towing and changed tow point

10:29 resumed towing at 1 knot

10:44 increased speed to 1.2 knots

11:05 stopped towing

11:10 load cell back on vessel

11:25 hauling anchor on north end to check anchor

11:30 anchor full of mud , end of net moved 2 micro seconds

11:45 red and blue load cells tied in tow line connected to floatline on 7th net in 15 net string (900lb weaklink in net that towline is attached to.

11:48 starting to get strain on gear

11:50 towing at 1 knot

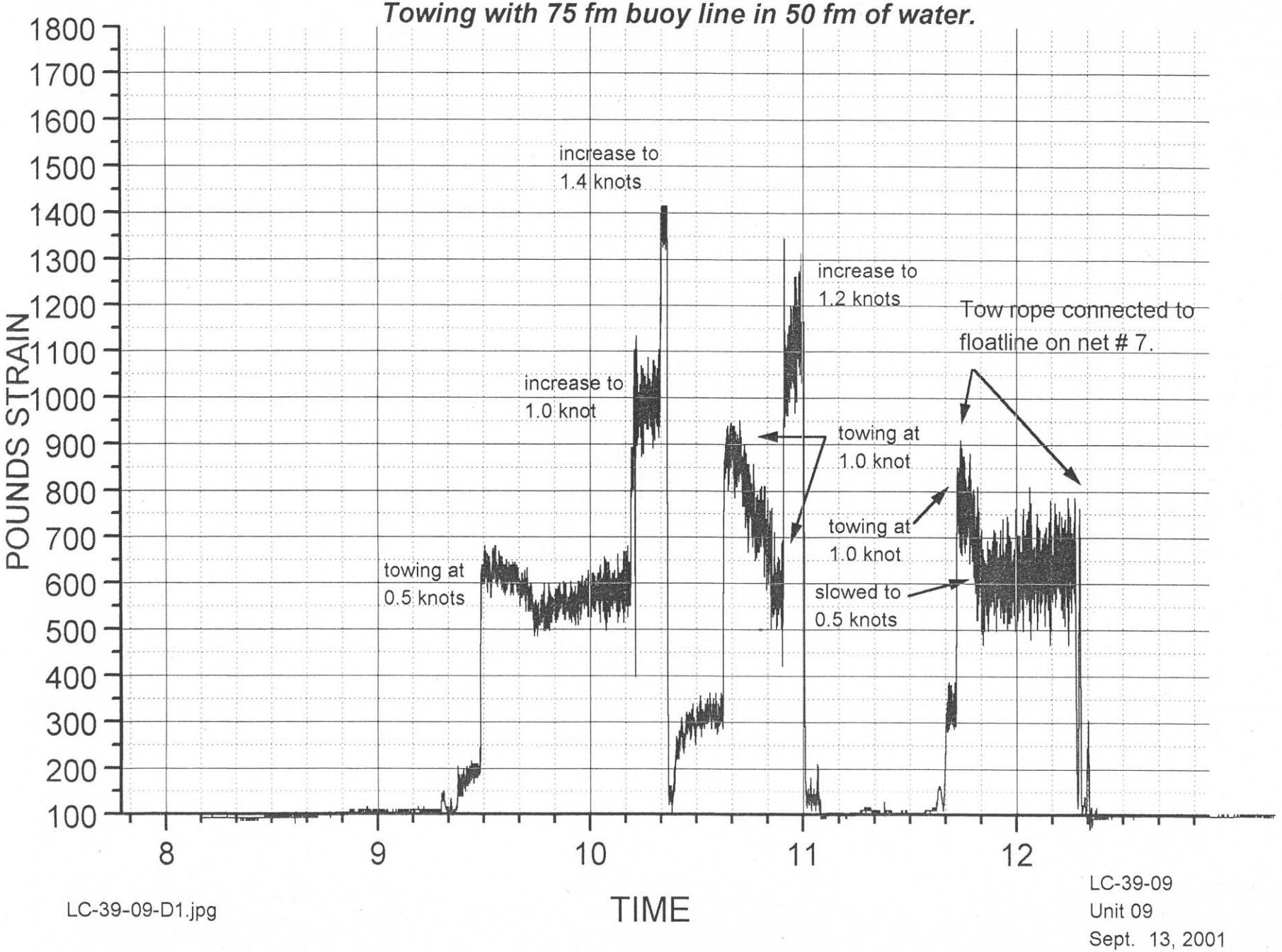
11:55 slowed vessel to .5 knots

12:20 stopped towing

12:25 load cell back aboard

12:35 begin haul back of string , no broken weak links leadline parted on south end , looks like it got fouled in mushroom anchor.

15 net string with 50# mushroom each end set in mud & gravel on the edge of hard bottom. Towing with 75 fm buoy line in 50 fm of water.



LC-39-09-D1.jpg

LC-39-09
Unit 09
Sept. 13, 2001

LC – 39 Gillnet Trip Day 2

September 14, 2002

8:20 am 15 net string set out in 50 fathom with 22lb danforth anchor red and blue load cell tied in buoyline,,string set north and south

8:47 started towing from north end into 5' sea

9:02 stopped towing and rigged bridle to tow on

9/14/01 9:04 back towing hard to get nets to tow , vessel does not appear to be making headway

9:20 stopped towing

9:28 loadcell back onboard

9:36 steamed to south end string still on same loran #'s set out on, does not appear to have moved

9:47 start towing east from floatline of 7th net in string red and blue load cell inline

9:55 stopped towing to change tow point

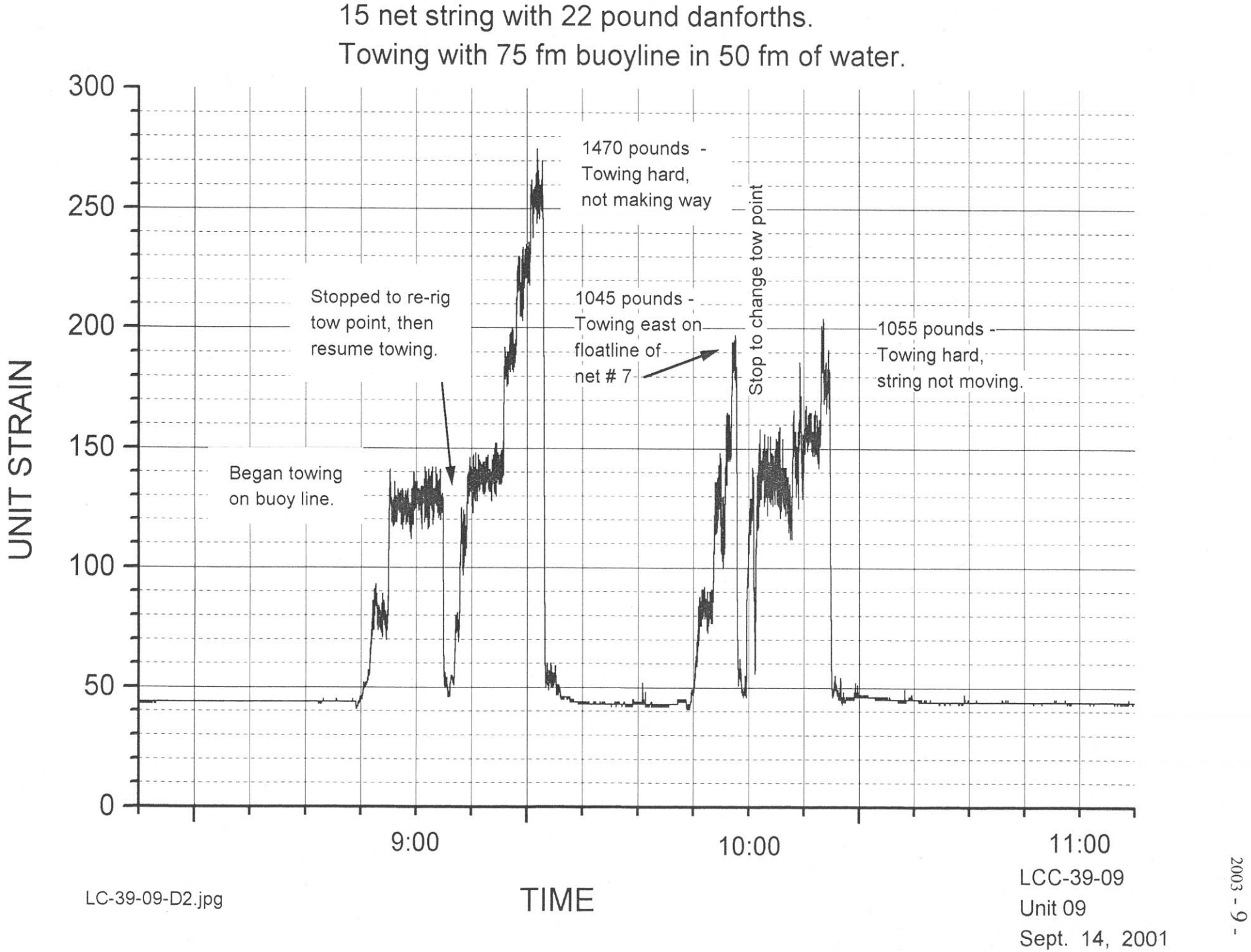
9:57 back towing

10:09 increased power

10:11 stopped towing, string just won't move!!

10:45 tried hauling string both anchors are stuck down

12:45 string back onboard no broken links


15 net string with 22 pound danforths.
Towing with 75 fm buoyline in 50 fm of water.
UNIT STRAIN
300
250
200
150
100
50
0
9:00
10:00
11:00
TIME
1470 pounds - Towing hard, not making way
Stopped to re-rig tow point, then resume towing.
1045 pounds - Towing east on floatline of net # 7
Stop to change tow point
1055 pounds - Towing hard, string not moving.
Began towing on buoy line.
LC-39-09-D2.jpg
LCC-39-09
Unit 09
Sept. 14, 2001

LC – 39 Gillnet Trip Day 3

September 18, 2002

8:10 am set 20 net string with no anchors in 50 fathom, red loadcell in floatline between 5th and 6th net, 6th net has 600lb. weaklinks, blue loadcell mounted in towline. string set north and south

8:19 red loadcell set off stern

8:31 20 net string setout

8:48 towing south on south end of string

9:40 stopped towing string moved about 5 micro seconds

9:45 blue load cell back onboard

10:06 started towing east from line tied to floatline in middle of string, blue loadcell in towline

10:15 stopped to change tow point

10:17 resumed towing

10:50 stopped towing
10:54 blue load cell onboard

11:05 hauling back string from north end

11:55 red loadcell back onboard

12:15 towing alum. hyflyer and 40" scan float and 50 fathom of line at 5 knots with red load cell

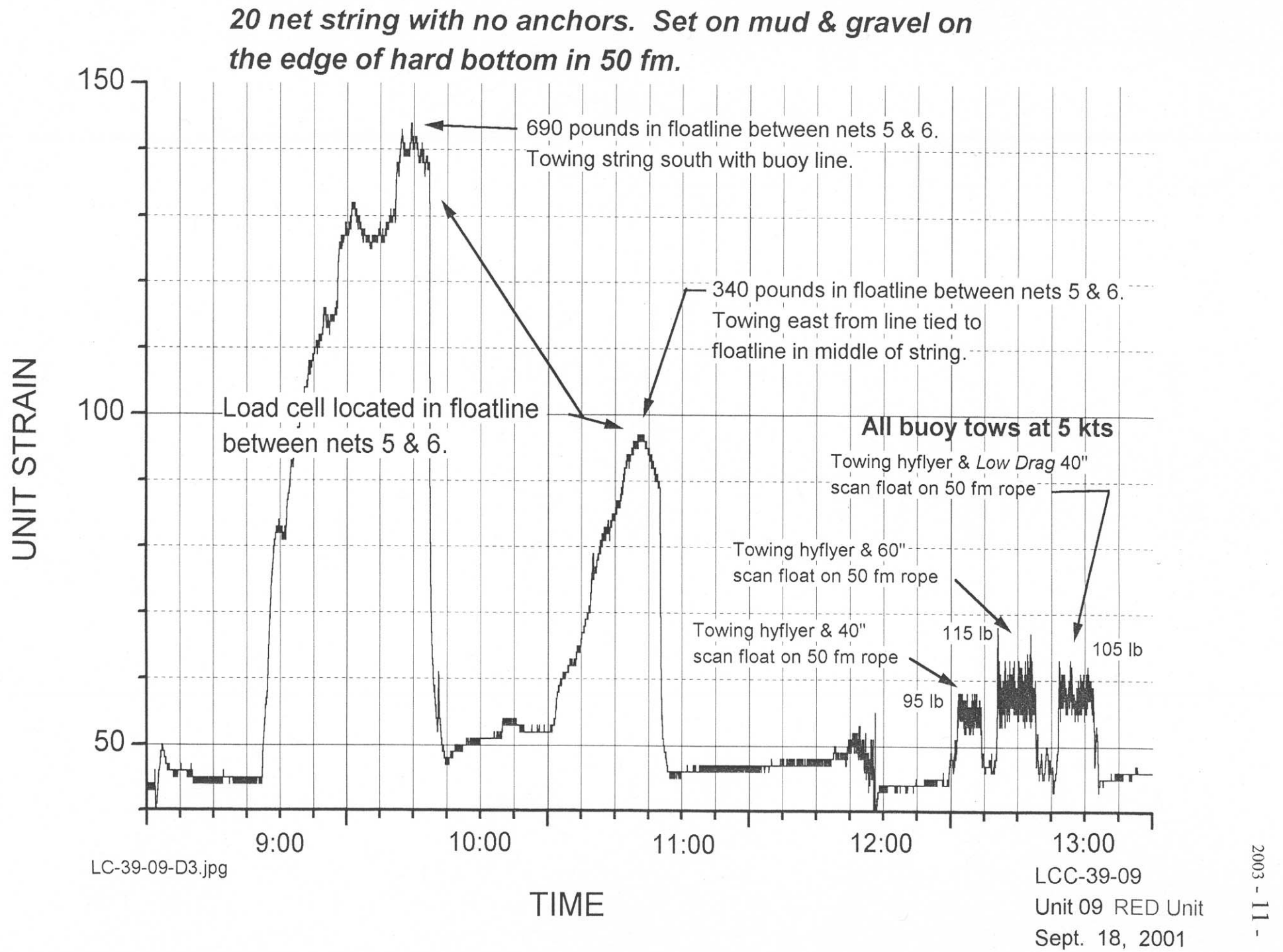
12:25 stopped towing

12:30 started towing hyflyer with 60" scanfloat with 50 fath. line at 5 knots with red load cell

12:43 stopped towing

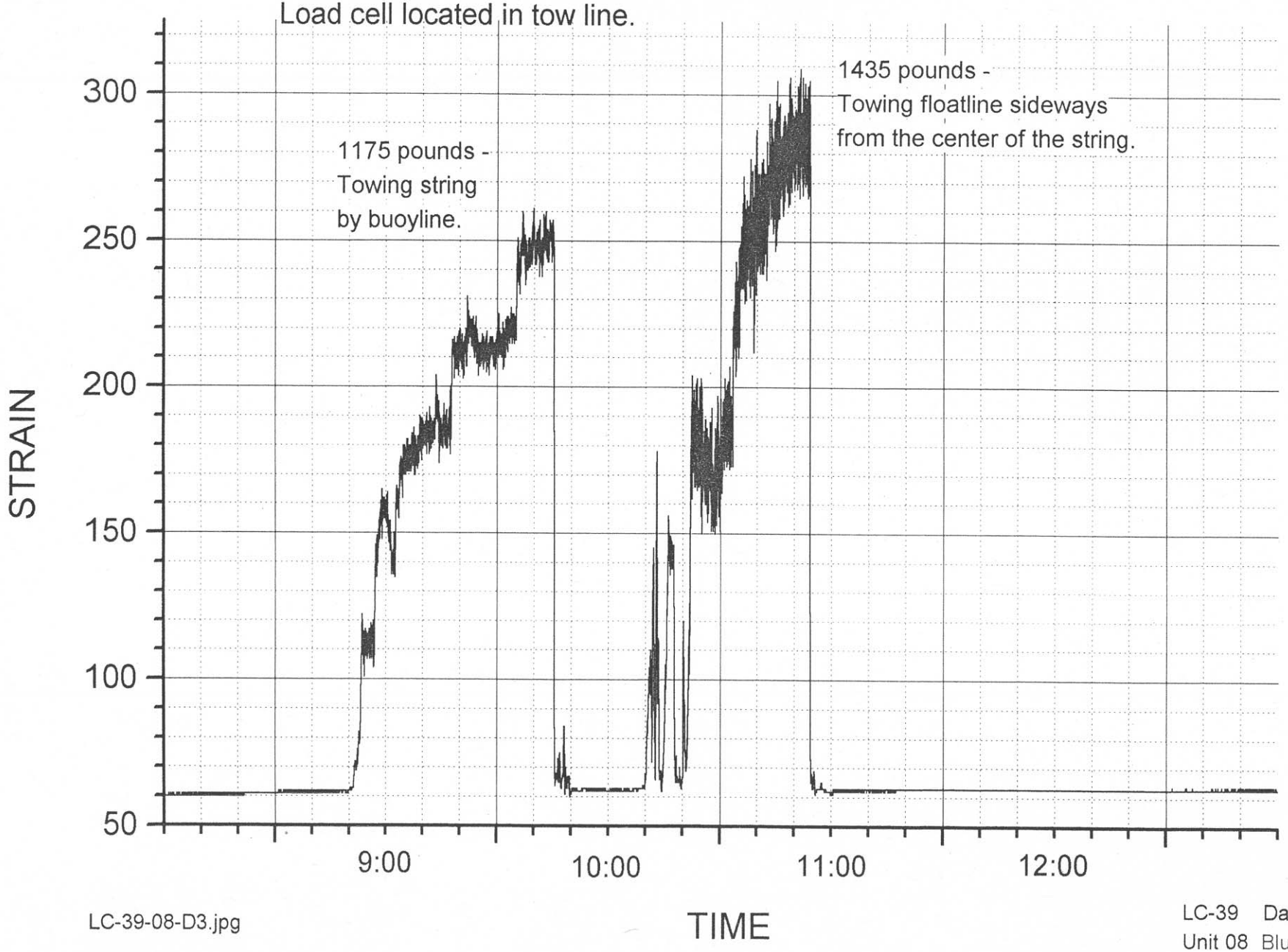
12:47 started towing at 5 knots hyflyer with 40" low drag scanfloat , red load cell

13:00 stopped towing


20 net string with no anchors. Set on mud & gravel on the edge of hard bottom in 50 fm.
150
100
50
UNIT STRAIN
690 pounds in floatline between nets 5 & 6.
Towing string south with buoy line.
340 pounds in floatline between nets 5 & 6.
Towing east from line tied to
floatline in middle of string.
Load cell located in floatline
between nets 5 & 6.
All buoy tows at 5 kts
Towing hyflyer & Low Drag 40"
scan float on 50 fm rope
Towing hyflyer & 60"
scan float on 50 fm rope
Towing hyflyer & 40"
scan float on 50 fm rope
115 lb
105 lb
95 lb
9:00
10:00
11:00
12:00
13:00
TIME
LC-39-09-D3.jpg
LCC-39-09
Unit 09 RED Unit
Sept. 18, 2001

20 net string with no anchors. Set on mud & gravel on the edge of hard bottom in 50 fm water.

Load cell located in tow line.



LC-39-08-D3.jpg

LC-39 Day 3
Unit 08 Blue Unit
Sept 18, 2001

LC - 41 Gillnet Trip

October 2, 2001

8:20 Begin set 15 net string with 22lb danforth anchors in 50 fathom of water, string set north and south. Load cell tied between net 7 and 8 on floatline. Tow line tied on floatline of 7th net in between 2 weak links (this net had three 1100lb weak links of 5/16" poly, the links were at the 12th, 24th and 36th floats). Sea conditions 6 - 8 foot swell with 10 knots of west wind.

8:23 load cell over board

8:29 string all set out

8:40 begin tow

8:42 tow line broke floatline at attachment of tow rope

8:50 hauling back string to re-attach

9:30 load cell back aboard, lots of dog fish after 1 hour soak

9:55 set string back out

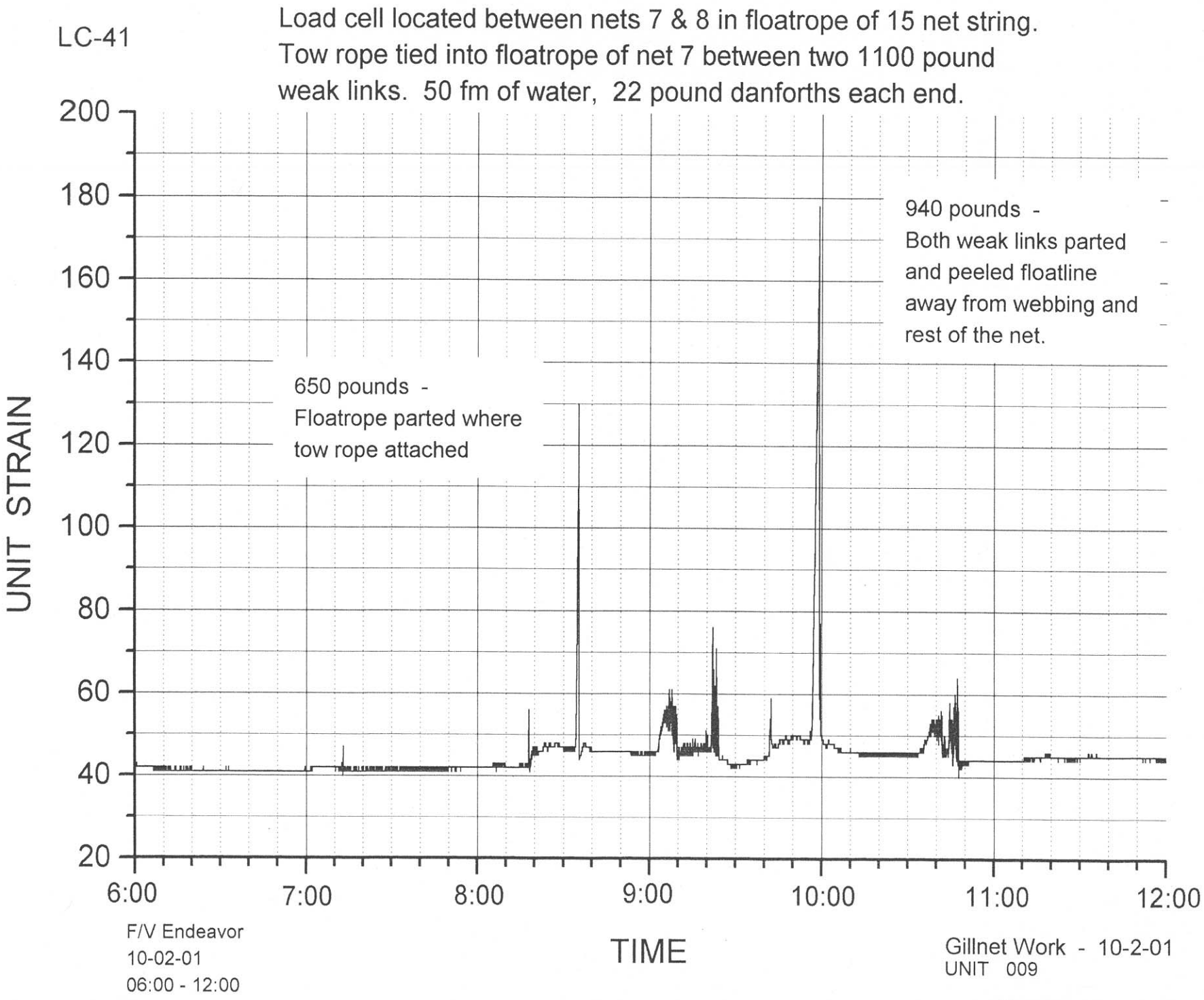
10:03 start towing same as above

10:05 both 1100lb weak links broke and peeled floatline away from webbing and rest of net

10:25 start haulback

10:53 load cell back aboard

11:55 string back on board, lots of dog fish through out string!!!!


LC-41
Load cell located between nets 7 & 8 in floatrope of 15 net string.
Tow rope tied into floatrope of net 7 between two 1100 pound
weak links. 50 fm of water, 22 pound danforths each end.
200
180
160
140
120
100
80
60
40
20
UNIT STRAIN
940 pounds -
Both weak links parted
and peeled floatline
away from webbing and
rest of the net.
650 pounds -
Floatrope parted where
tow rope attached
6:00
7:00
8:00
9:00
10:00
11:00
12:00
TIME
F/V Endeavor
10-02-01
06:00 - 12:00
Gillnet Work - 10-2-01
UNIT 009
1-17-02

North Carolina/Cape Hatteras Load Cell Time Line

Research was performed aboard the F/V Net Results a 34' 220hp Gillnetter based in Hatteras, NC. Testing was conducted in shoal water (2 to 8 fathom) within 1 mile of the beach in an area traditionally fished by this particular fisherman. Bottom type consisted of sand of various hardness levels.

April 16, 2002 Light winds and seas less than 2'

9:38am A 4 lb. Danforth style anchor with 4' chain and 20 fathom of 3/8 line was set in 3 fathom of water. Anchor is being pulled on by vessel and reset a number of times until 9:45 when anchor was brought back aboard vessel. Red load cell tied in tow line about 5 fathom from attachment point on vessel

9:48 Setting 5lb high tensile strength Danforth anchor set up with chain and line same as above experiment. Putting strain on anchor.

9:50 Anchor popped loose. Pulling again.

9:52 Pulling again on anchor, anchor popped loose.

9:53 Load cell back onboard

9:59 Set up 22lb. Danforth anchor set up with same set up as anchors above(4' of chain and 20 fathom of line). Starting to pull on anchor.

10:01 Anchor broke loose.

10:02 Towing again.

10:03 Broke anchor line. Saved piece of parted line.

10:52 Eel Head anchor (25 lb. trawl anchor) with 4' of chain and 20 fathom of line set out with red load cell tied into line.

10:54 towing

10:55 slowed towing

10:56 tow
10:57 stop

10:57 tow

10:58 stop anchor is constantly pulling loose with little strain exerted from vessel.

11:05 5lb. high tensile strength Danforth with 3 fathom of 3/8 chain and 20 fathom of line set out. Starting to tow.

11:06 Anchor broke loose

11:06 Towing again

11:08 Stop towing and hauled anchor back aboard, fluke on anchor bent. Adding the additional chain made a difference in it's holding ability , anchor seemed to hold much better than earlier experiment.

11:35 LD3 Poly Foam buoy + 2 (5" by 11") bullet buoys set out on the end of 20 fathom of line and 4 lb Danforth anchor. Red load cell tied in line and left over night to record strain on buoy system.

4/17/02

9:03 Blue load cell tied in-between 4lb Danforth with 4' of ¼"chain and string of nets set in 3 fathom of water just outside break off beach.

9:07 Red load cell hauled back after overnight set.

9:36 Red load cell set out in line with 22lb Danforth with 3 fathom of 3/8 chain and 25 fathom of ½"line in 7 fathom of water.

9:50 Anchor won't seem to set in bottom repeated pulls encounter little strain before anchor pulls loose

10:14 Anchor set up above (22lb Danforth) set out in 3 fathom of water outside breakers. Starting to tow.
10:22 slacking off tow.

10:23 increase power of tow to 1600 RPM's, anchor holding well.

10:35 tied 600lb. Seaside flat link in line with load cell and anchor system from above.Link broke as soon as tow began

10:40 600lb Plante flat link tied into line .Link broke as soon as tow began

10:45 1100lb Plante swivel tied in line, splice pulled out as soon as tow began

10:47 towing 1100lb swivel, swivel broke.

Anchor created quite a problem to retrieve, tried to pull loose with ring bolt on rail, broke ring bolt, towed on cleat and broke cleat and timber it was bolted to. Anchor line had to be snubbed up on bow of vessel in order to break loose .

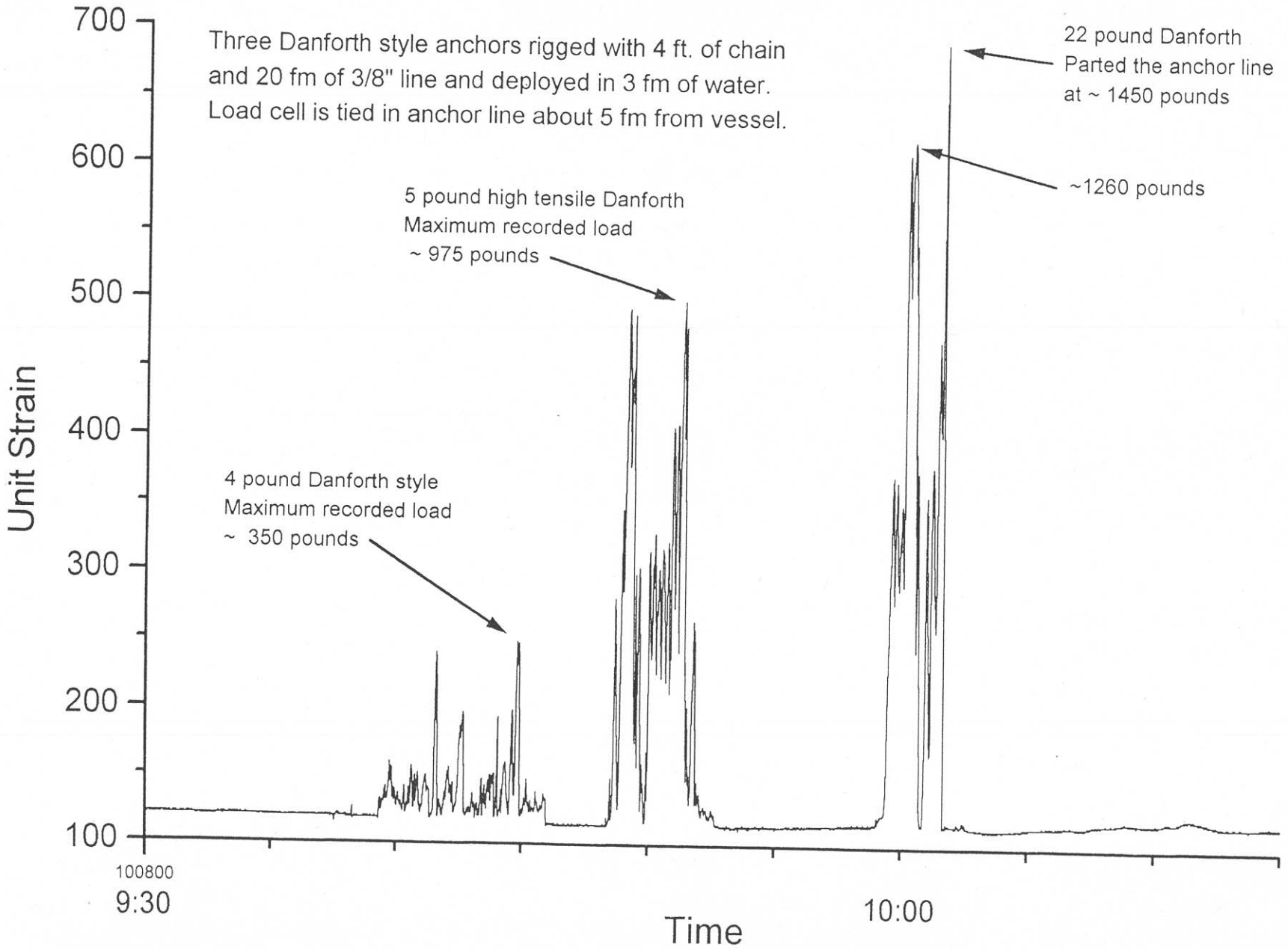
11:15 Started to haul back nets from offshore end, Blue load cell mounted on opposite end between anchor and net.

11:32 Blue load cell back onboard

LC-42-09 RED
April 15 - 19, 2002

North Carolina / Cape Hatteras Gillnet Load Cell Work

NOAA/Fisheries Gear Research Team



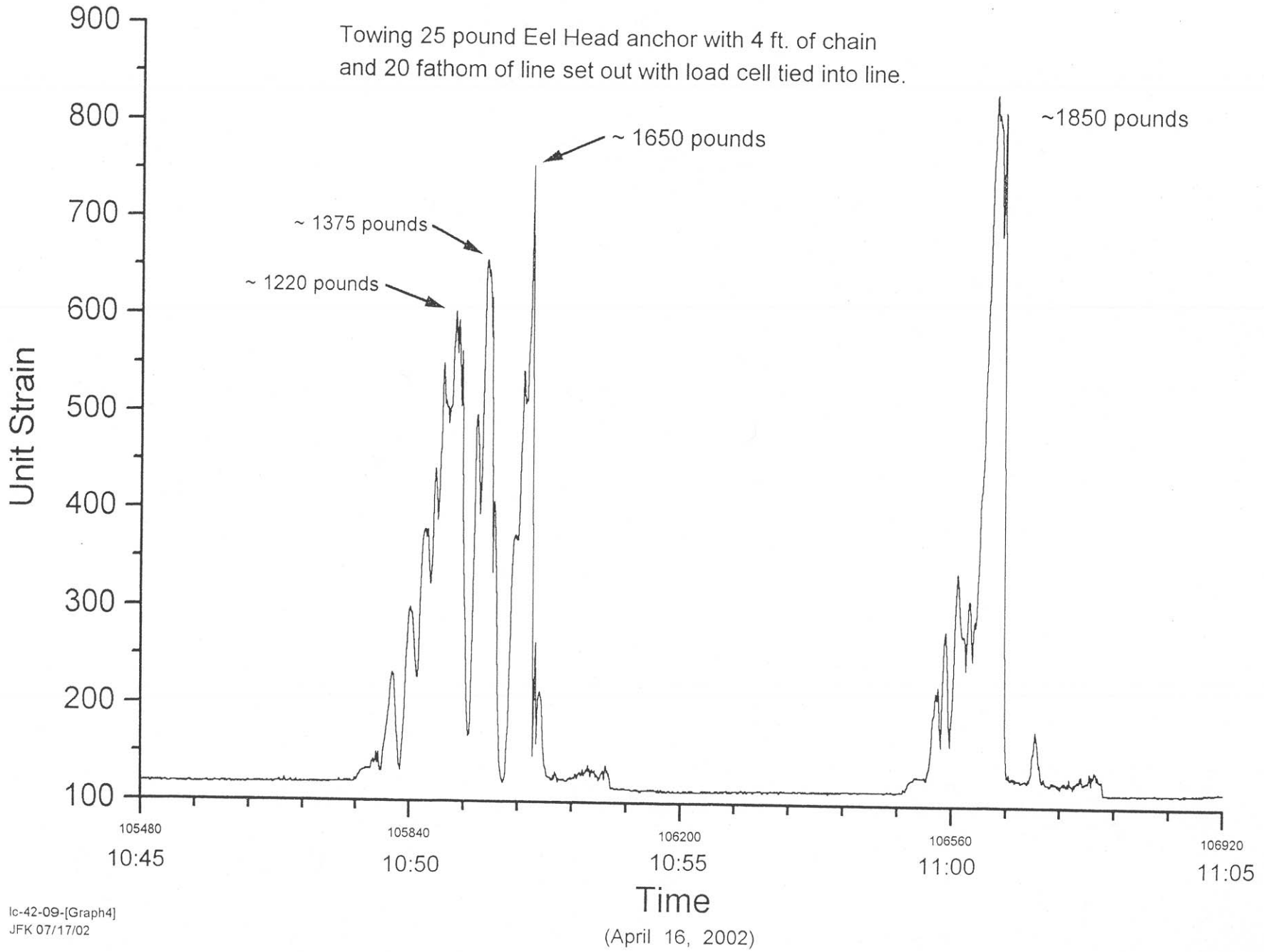
lc-42-09-[Graph5]
JFK 07/17/02

LC-42-09 RED
April 15 - 19, 2002

North Carolina / Cape Hatteras Gillnet Load Cell Work

NOAA/Fisheries Gear Research Team

Towing 25 pound Eel Head anchor with 4 ft. of chain
and 20 fathom of line set out with load cell tied into line.

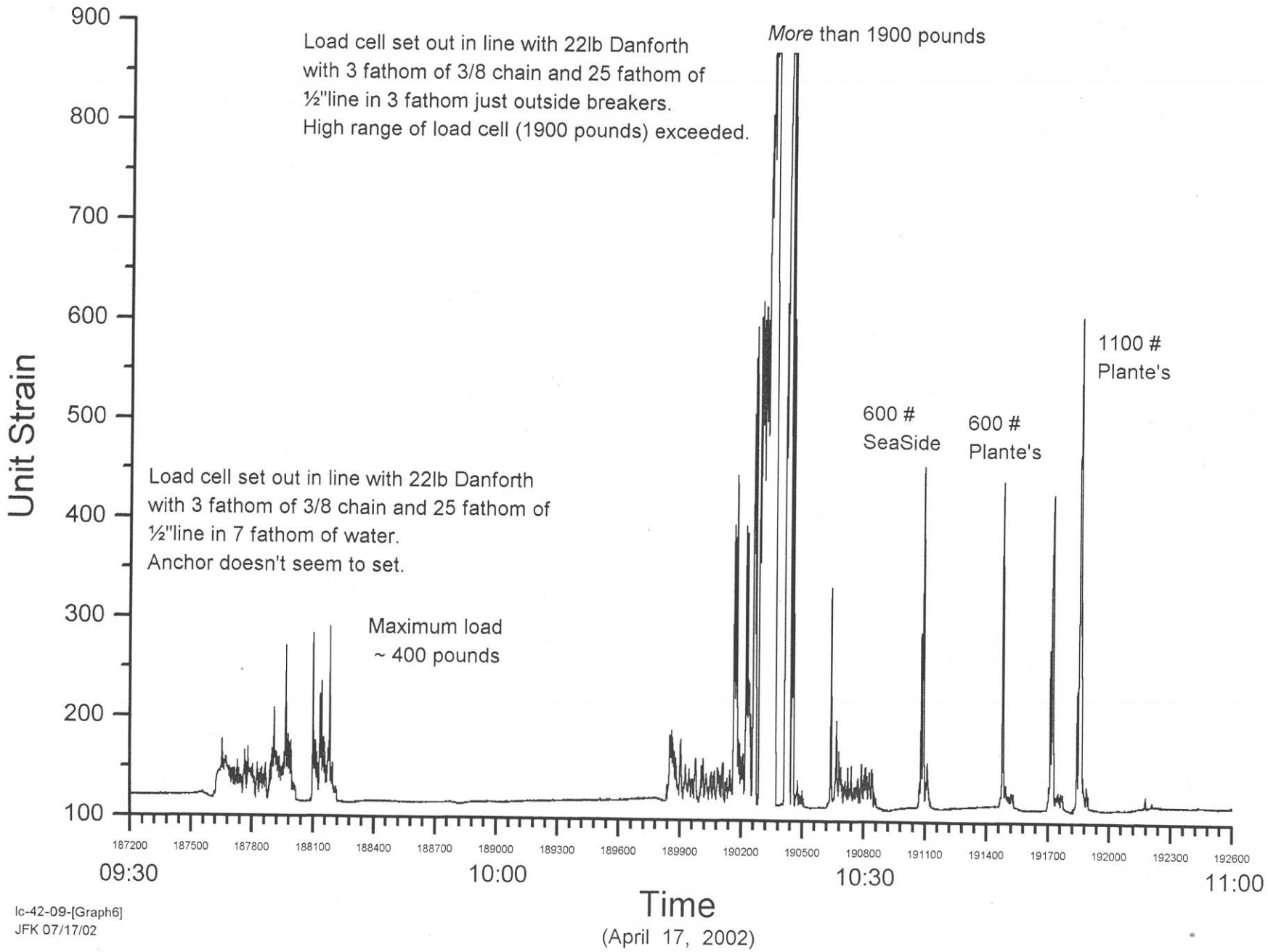


lc-42-09-[Graph4]
JFK 07/17/02

North Carolina / Cape Hatteras Gillnet Load Cell Work

NOAA/Fisheries Gear Research Team

LC-42-09 RED
April 15 - 19, 2002



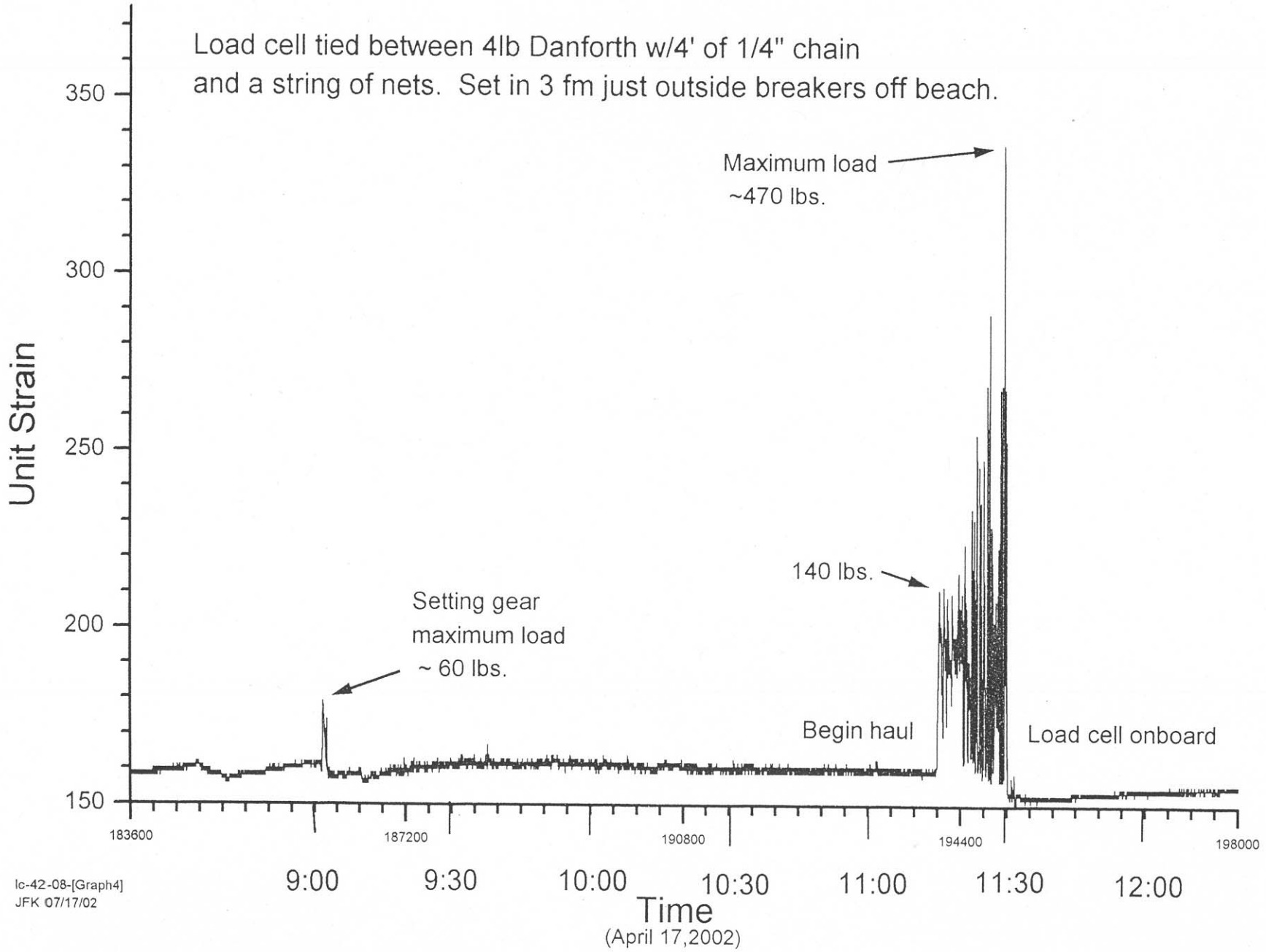
lc-42-09-[Graph6]
JFK 07/17/02

North Carolina / Cape Hatteras Gillnet Load Cell Work

NOAA/Fisheries Gear Research Team

LC-42-08 BLUE
April 15 - 19, 2002

Load cell tied between 4lb Danforth w/4' of 1/4" chain
and a string of nets. Set in 3 fm just outside breakers off beach.



lc-42-08-[Graph4]
JFK 07/17/02

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US Department Commerce, NOAA, NMFS
MGMT & Budget Division
One Blackburn Drive
Gloucester, MA 01930

November 25, 2002

Re: Conclusions drawn from testing for usage and marketability of recovered floating polypropylene trap line

On October 17, 2002, The Valley Company performed a test grinding of recovered floating polypropylene trap line to assist in determining the economic and logistic feasibility of recycling this material. Three conclusions resulted from this test, the cost of transporting unprocessed rope is prohibitive, the material must be processed on site and the processed material is marketable.

Material was loaded, by bucket loader, into a thirty cubic yard open top container at the collection site in Portsmouth, New Hampshire. Because the material was not yet processed or packaged in any way it had to be loaded into an open top container. The rope that was loaded weighed a total of 9,740 pounds, which we will round to 10,000 for simplicity. Average industry price for transporting material in a roll-off is sixty-five dollars per hour. The rope was transported from New Hampshire to Whitefield, Maine and then back to Scarborough, Maine. Waiting time, while the box was loaded and unloaded was billed at the same price. The box was slightly over eighty percent full. The projected weight for a full box is twelve thousand pounds. Based on actual weight moved, the cost per pound is slightly less than nine cents per pound. If calculating this at the "full" weight of twelve thousand pounds, the cost of transportation is slightly less than seven and a half cents per pound.

Recycling is generally a regional industry because, as with any commodity, it is based on pennies per pound. Due to the comparatively low value of recycled material, transportation, processing and delivery of product are accomplished as close to the source of generation as possible. A rule of thumb in the industry is that transportation should cost no more than a penny a pound. It would be possible to load more pounds of this material into 100 yard live bottom trailers to lower the per pound transportation cost. This is a cumbersome solution at best due to the special permits required for tri axel vehicles on many roads and the logistics of fishing docks. We assume that with practice the material could be loaded and unloaded more efficiently than this first time so fewer hours would be billed. However, even if the freight cost was reduced by a third because all loading operations ran perfectly, the price per pound is still too high for unprocessed material.

In marketing plastic, it is always preferable to sell to the end user, thereby maintaining the largest possible margin. Polypropylene is not a high value resin. Generally, recycled product is not consistent in quality or properties. This can be costly in

manufacturing time spent making adjustments. To attract an end user the price of the recycled resin must be significantly below that of virgin resin.

Recycling plastic rope presents handling problems unique to rope. Rope is very awkward to handle for people as well as machinery. As part of our initial test we processed the material three ways. We attempted grinding in a large, open tub grinder. This method was unsuccessful. We ran the material through a standard grinder. This method worked but resulted in a product that required further processing for marketing and did nothing to immediately condense the material for transport. We then baled the material in a large dual ram horizontal baler. This method worked and resulted in a low end product marketable outside of the United States. The two on site processing options that we found feasible would be baling or processing to pellets. Which option makes more sense is difficult to determine without knowing how many overall pounds are involved to calculate payback.

It seems unlikely that it would be economically feasible to install large baling systems in each collection site due to the cost of such a system. A series of used vertical balers at collection sites, however, would be considerably less expensive to purchase and to maintain as well as to dispose of at the termination of the project. Used vertical balers can be purchased and installed for less than ten thousand dollars each. It may be desirable to modify the openings of the balers to accommodate a feed system for use with a bucket loader to limit any risks inherent in handling such large rope. A few thousand pounds of material can be tested at our facility to see if a vertical baler will be powerful enough to compress the rope sufficiently. This has worked successfully with smaller dimension rope. If vertical balers are used on site, transportation becomes realistic. Full truckload quantities can be amassed for sale. More mainstream transportation (standard closed tractor trailers) can be utilized at far less expense. Additionally, a system of empty trailers for storage and exchanging can be arranged. We currently have an overseas market that will pay for baled rope. The Valley Company is eminently qualified to sell, use and maintain vertical balers. We currently service several hundred of these machines in New England.

The other on site processing option that we considered is palletizing the rope. This would occur with a trailer-mounted system that grinds, extrudes and then palletizes the material. The system would travel to all pick up points and process the material. All the components for this exist and can be purchased used. While the technology is common practice, it is not a practice often made mobile. A power supply in the form of a diesel generator and a recirculating water supply would have to be incorporated. This is, on the surface, a much more expensive proposition than vertical balers. However, this process will result in a product that is widely marketable and worth three to five times as much as baled material. It is also a solution that expands the abilities of recycling into more practical means. Obviously, such a system would have usage far beyond this project. The Valley Company would be very excited to pursue this option with the American Plastics Council as well as other associations for possible grant monies to reduce initial project costs. We have located several end users in New England for these pellets. This method ensures that economic benefits of the end product are accrued to domestic manufacturers and regional economies.

The feasibility of recycling recovered floating polypropylene trapline is absolute. A proper cost estimate cannot be constructed without having more information regarding the longevity of this project as well as estimated weights of material to be recovered. With this

information The Valley Company can provide a detailed proposal for either option listed above. We can also perform a test using a vertical baler to ensure that this is an option. Regardless of the process chosen, the material is marketable. More research is required, utilizing estimated expected pounds against costs, to determine the specific economics of recycling this material.

The Valley Company is uniquely positioned to provide further input to this project based on our diverse experience and staff. In addition to our years of experience in waste and waste equipment handling, we are lucky to employ an expert on the making and unmaking of plastic rope. We are familiar with the process, the equipment and the science of rope making and recycling. Please feel free to contact us if you require further information or input. Thank you for asking The Valley Company to participate in this forward thinking, environmental project.

Sincerely,

Edmond J. Betit
The Valley Company

NMFS Gear Research Team

Subject: Supplement to Valley Co.
floating line recycle report

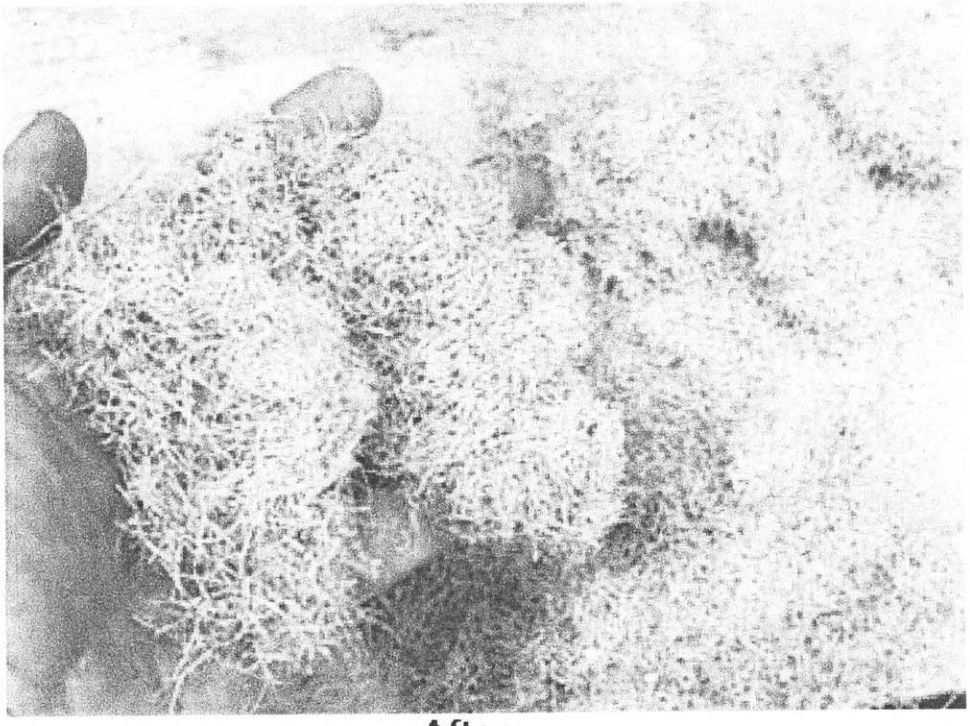
The Valley Co. states the transportation fee of $65/hour was applied during times of loading and unloading the shipping container. If the line to be transported was in a condition ready to be loaded when the transporting vehicle arrived at the scene the open shipping container could have been loaded in one hour and transported in 2-1/2 hours to Whitefield Me. from Portsmouth N.H. In fact the shipping container took 5 hours to load while the rope was culled through using knives to cut away nylon straps which were joined to the poly line. While in route to Whitefield Me. the driver was called to return to its home base in Kittery Me. because others involved in this project felt the line was going to arrive to late in the day to complete the job. The following morning the line was delivered to the Valley Co. for the recycle test. The Valley Company report states a full shipping container holds 12000 lbs. If the line was in the proper condition to be transported for recycling, the line could have easily been loaded and transported from Portsmouth NH to Whitfield Maine in four hours. Adding another four hours for drop off and return trip would make a total billing of 8hrsX $65/hr = $520.00 having a transportation cost of .043cents/lb.

Any future rope recycle efforts should make certain the rope is in proper condition to transport prior to the start of the project. Fishermen who may remove this poly line from their fishing operations must know ahead of time the line must be free of any other joining lines which are not made up of poly line. Having other non poly lines joined to the poly line will contaminate the end product and in some cases fowl the recycling process due to different melting points. Having fishermen know this ahead of time will allow these fishermen to clean these lines of the unwanted non poly lines as the line is being handled/flaked aboard the boat, preventing the need to re-handle the line again and greatly minimizing the man hours of labor involved.

New polypropylene line coast on the average of $1.20/pound. Bringing the poly line through two recycling processes, producing a resin pellet form, brings a price of approximately .20cents/pound. While it is rewarding to do something productive with this recycled product as opposed to land fill or bailing and shipping to China it does not appear to be a profitable venture at this time even if the recycle company received the line free of charge. The concept introduced in this report of having a mobile recycling unit arrive to do its job at various fishing port, "poly line drop off stations", will need to be studied in greater length to determine if this is a viable option.

Recycling

Before



After