NEWFOUNDLAND AND LABRADOR

BOARD OF COMMISSIONERS OF PUBLIC UTILITIES

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1995 01 13

Mr. Peter Alteen,
Legal Counsel,
Newfoundland Light & Power Co. Limited,
P.O. Box 8910,
St. John's, NF.
A1B 3P6

Dear Mr. Alteen:

Service Interruptions in the Community of Branch

May we please have a report on the recent service interruption history in the community of Branch. The Board also requests that the Company document its experiences of service interruptions to Branch.

We look forward to your reply.

Yours truly,

Carol Horwood,
Clerk.

NEWFOUNDLAND POWER

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1995 03 27

Board of Commissioners of
Public Utilities of Newfoundland
P. O. Box 21040
120 Torbay Road
St. John's, NF
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Ladies & Gentlemen:

As per your request of January 13, 1995, please find attached a "Report on the Service Interruption History for the Community of Branch". This is a final version of the draft report that we filed on February 16, 1995 on this issue.

We will be available to answer any questions arising from this report, if necessary, at the next regularly scheduled meeting with the Board on April 13, 1995.

Yours very truly,

Aidan F. Ryan
President & Chief Executive Officer

Report on the Service Interruption History Community of Branch

Newfoundland Light
& Power Co. Limited
March 27, 1995

1. INTRODUCTION

This is in response to the Board of Commissioners of Public Utilities' (the "Board") request for a report on the recent service interruption history for the community of Branch. The period covered is from September 1994 to January 1995.

2. DESCRIPTION OF SYSTEM

The community of Branch is provided electrical service via a distribution feeder from our Dunville Substation (DUN-01). The DUN-01 feeder is a 25 kV feeder, three phase to St. Bride's with two phases from St. Bride's to Branch. There are approximately 640 customers on DUN-01 feeder with 170 customers in Branch itself. The Dunville Substation is tied into the power grid via our radial transmission line 55L (42.33 km) from Blaketown Substation. These facilities are indicated on Table 1.

The distribution feeder from Dunville to Branch is approximately 90 km in length and is exposed to the sea and the prevailing southwest winds across Placentia Bay. Therefore, as a result of the length of the line and its location, the customers are more susceptible to interruptions than would be experienced in less exposed areas.

3. HISTORICAL BACKGROUND

The original line to Branch was built approximately 35 years ago under the Rural Electrification Program. Typical line construction at the time consisted of #2 ACSR conductor and long span (100 m) construction.

This line is typical of lines in rural areas where there are a small number of customers, resulting in a long feeder fed via a radial transmission line.

When this feeder was originally built, it was along the then main road. In the 1970's the road was upgraded and re-routed to eliminate some of the turns and hills, thereby making the line inaccessible from the travelled road in a number of locations.

Even with the road relocation and upgrading, road conditions are hazardous in the winter because of ice build up and the numerous hills. Heavy drifting is experienced in the Branch Country and Custlett Ridge areas. Other times of the year fog conditions also make driving hazardous.

Interruptions on the Cape Shore and in particular in Branch can be attributed to salt contamination, icing, and high winds. Salt contamination has been a contributing factor in many of the outages on the Cape Shore over the years.

Because most Newfoundland communities are on the coast, the majority of our lines are located near the shoreline where onshore winds play havoc on the system, depositing salt on the insulators causing the feeder to trip. This is a particularly bothersome problem in coastal areas with a southwesterly exposure. This problem manifested itself very early on with DUN-01 feeder. After a couple of years in operation, as a 25 kV feeder, the voltage was reduced to 12.5 kV to combat the salt contamination. We operated the feeder at 12.5 kV until 1980 at which time voltage problems caused by the load and length of the feeder, and improvements in 25 kV construction resulted in a conversion back to 25 kV. Today the line is still operating at 25 kV. Through maintenance and rebuilding, the line is being insulated for 34.5 kV with the new pin type insulators and suspension insulators in an attempt to reduce the outages due to salt contamination.

In the 1970's a test site was established in Little Barasway, on the Cape Shore. This test site was built in conjunction with the Canadian Electrical Association (CEA) to examine the effects of salt contamination on various electrical equipment items used in line construction. Several types of insulators, bushings, paints and other materials are being tested at this site. This site was chosen as it has some of the worst salt contamination in Canada.

The onshore southwesterly winds across Placentia Bay not only contaminate the line with salt but cause other problems as well. High winds cause the lines to slap together and, over time, deteriorate the conductor and equipment.

To address this situation, we installed midspan poles in areas where this problem was prevalent. As a result, midspan poles were placed on approximately 60% of the line. In addition, we installed storm guys on sections of the line to prevent the strong crosswinds from breaking the poles.

While present and potential future loads do not warrant additional transmission lines or substations in the area, we have been reconductoring the line to 4/0 AASC to improve voltage lowered by loading and the length of the line. As well, we have been relocating wherever possible to the road right-of-way.

Approximately $1,220,000 has been spent over the past ten years (see Table 2). Funds have been allocated over the next five years to continue work on this feeder.

As well, communication systems at our Control Centre and our Whitbourne Office have been upgraded over recent years to provide a better communication between our offices and crews working in the Cape Shore area. The latest upgrade provided the capability of linking repeater sites together to increase communication coverage. Additional funds have been allocated to make further enhancements to the radio system on the Avalon peninsula.

4.0 INTERRUPTION HISTORY

Including the December 8th storm there were 11 outages affecting Branch from September 1, 1994 to January 15, 1995.

The December 8th, 1994 failure is the subject of a report already filed with the Board. The December 8th failure was a part of the exceptional storm-related failure of the electrical system which affected virtually every customer on the Avalon peninsula. This one outage did however result in an interruption time of approximately 5700 minutes.

Of the remaining 10 outages, 5 were scheduled and 5 were unscheduled. Two of the scheduled outages were to accommodate upgrading of the DUN-01 feeder. The 5 unscheduled outages were a result of weather in the area and salt contamination on the line. Table 3 provides an individual explanation of each of the interruptions affecting Branch during the September 1994 to January 1995 period. Note that these are outages that affect whole communities, and do not include individual customer outages.

To permit a review of these outages in an historical context, the Company has provided a ten year graphic history of interruptions in this area. (Figures 1, 2 & 3). While the total number of interruptions appear to be high at first blush, it is noteworthy that the number of unscheduled outages for 1994 (excluding the December 8th, 1994 experience) was the lowest of the past ten years for this feeder (Figure 1). The average duration of these unscheduled outages was the third lowest for the past ten year period and the total unscheduled interruption time for 1994 was the second lowest for the time period (Figure 2 & 3).

Also provided are graphic depictions of the frequency, average duration and total interruption time for 1994 interruptions by month (Figure 4, 5 & 6). From these it can be seen that January and December had the highest number of unscheduled interruptions. This is due to the weather conditions at that time of year. High winds combined with icing place extra loading on the line.

5.0 SUMMARY AND CONCLUSIONS

Substantial upgrading has been taking place over the past five years on DUN-01, and will continue for the next five years as the Company continues to replace the existing conductor on the feeder. In the past ten years approximately $1,220,000 has been expended in this effort. During the upgrading the line is being relocated, where possible, to the road right of way. This will improve the serviceability of the line. While there will be planned interruptions required to accomplish the upgrading, for obvious reasons we will try to keep planned interruption time to a minimum.

Upgrading should improve reliability and reduce the number of unscheduled interruptions. However, this alone will not eliminate all of the service difficulties experienced by the residents of Branch. Branch is at the end of a long feeder serviced by a radial transmission line in a hostile environment where salt spray, icing, and high winds impact operations. As such any problem on the transmission line, and almost all problems on the feeder will affect electrical service to the community of Branch. Consequently, interruptions in electrical service can only be kept to a minimum, not eliminated.

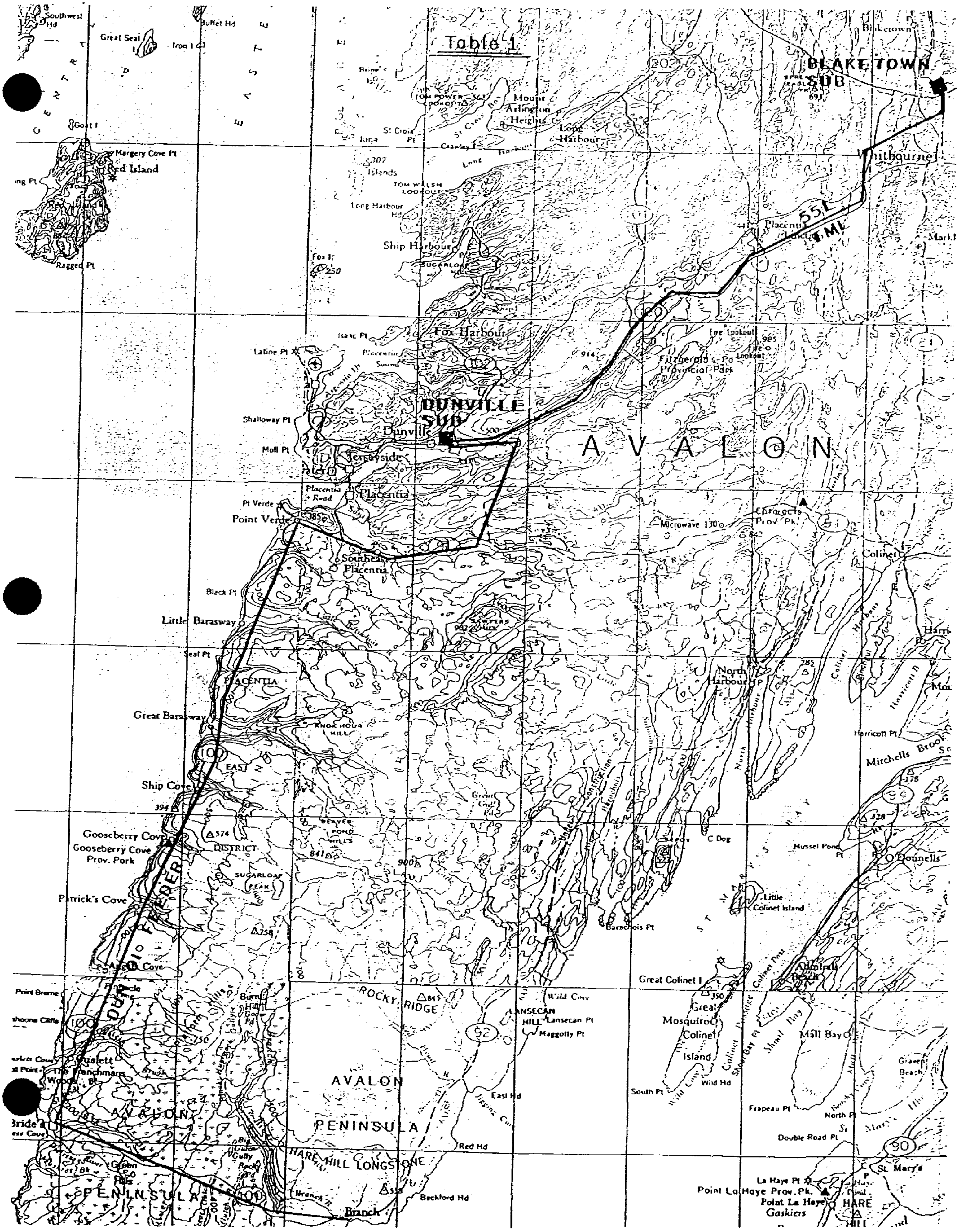
Table 1
BLAKETOWN SUB
Blaketown
Whitbourne
55L
TML
DUNVILLE SUB
Dunville
Jerseyside
Placentia
Point Verde
Southeast Placentia
AVALON
Little Barasway
Great Barasway
Ship Cove
Gooseberry Cove
Gooseberry Cove Prov. Park
Patrick's Cove
Angels Cove
Point Lance
Branch
DUNVILLE FEEDER
AVALON PENINSULA
HARE HILL LONGSTONE
ROCKY RIDGE
Fox Harbour
Ship Harbour
Long Harbour
Mount Arlington Heights
Red Island
Margery Cove Pt
Ragged Pt
Great Seal I
Iron I
Goat I
Buffet Hd
Southwest Hd
Tom Walsh Lookout
Long Harbour Hd
Isaac Pt
Latine Pt
Shalloway Pt
Moll Pt
Black Pt
Seal Pt
Fitzgerald's Pd Provincial Park
Chrorocis Prov. Pk.
Microwave
Colinet
North Harbour
Harricott Pt
Mitchells Brook
C Dog
Mussel Pond Pt
Dunnells
Little Colinet Island
Barachois Pt
Great Colinet I
Great Mosquito
Colinet Island
Admirals Beach
Mall Bay
Wild Cove
Lansecan Hill
Lansecan Pt
Maggotty Pt
East Hd
Red Hd
Beckford Hd
South Pt
Wild Hd
Frapeau Pt
North Pt
Double Road Pt
St. Mary's
La Haye Pt
Point La Haye Prov. Pk.
Point La Haye
Gaskiers
HARE HILL
Gravel Beach
Point Breme
Gualett
The Frenchmans
Woody Bk
Bride
Green Hills
DISTRICT
PLACENTIA
EAST
SUGARLOAF PEAK
BEAVER POND HILLS
KNOB HOUR HILL
SAWYERS HILLS

Table #2

Capital Expenditures

The Company has been upgrading the feeder and the transmission line over the past ten years. A breakdown of this expenditure is as follows.

1985	$ 38,000
1986	$ 35,000
1987	$ 74,000
1988	$ 28,000
1990	$ 77,000
1991	$153,000
1992	$162,000
1993	$116,000
1994:	$537,000

Table #3

List of Service Interruptions
Branch
Fall of 1994

September 01	0957 to 1349	Scheduled interruption to replace existing conductor.
September 17	1700 to 2014	Unscheduled interruption to entire distribution line. Equipment at St. Brides had burnt as a result of salt contamination.
September 18	0633 to 1234	Scheduled interruption to replace a pole in the transmission line supplying the Dunville substation.
September 22	1300 to 1407	Scheduled outage associated with the upgrading work on the distribution line supplying Branch and Pt. Lance.
December 8		Unscheduled outage due to the severe snow storm. Power was restored late Monday night.
December 21	1230 to 1438	Scheduled outage to make permanent repairs to a broken pole and damaged conductor as a result of the December 8th storm.
December 23	1050 to 1138	Unscheduled outage to replace a pin type insulator at Big Barachoix.
December 30	0211 to 0735	Unscheduled outage due to snow storm. Conductor had come off the insulator. Restoration of the service was hampered due to severe road conditions. Crews were delayed until road was plowed.
January 3	1030 to 1345	Unscheduled interruption due to equipment failure near Branch. Cause of failure is uncertain but believed to have been caused by the high winds experienced at that time.
January 4	1300 to 1405	Scheduled interruption to make repairs as a result of high winds experienced in the area.
January 4	2316 to 0146	Unscheduled interruption due to equipment failure as a result of high wind conditions at Custlett.

Frequency of Interruptions

Branch

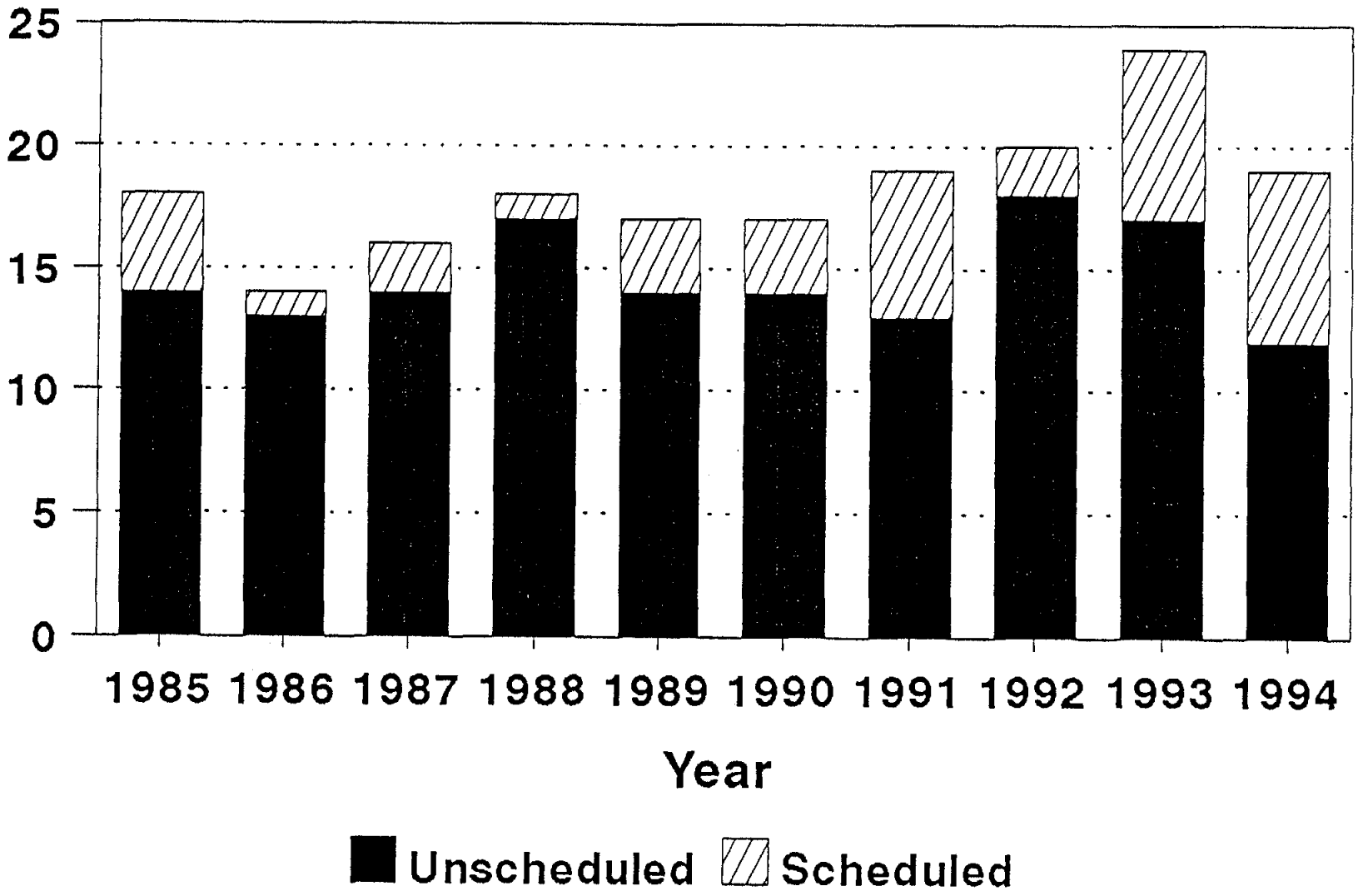

Fig. # 1 (Excludes the Dec. 08 outage)

Average Duration of Interruptions

Branch

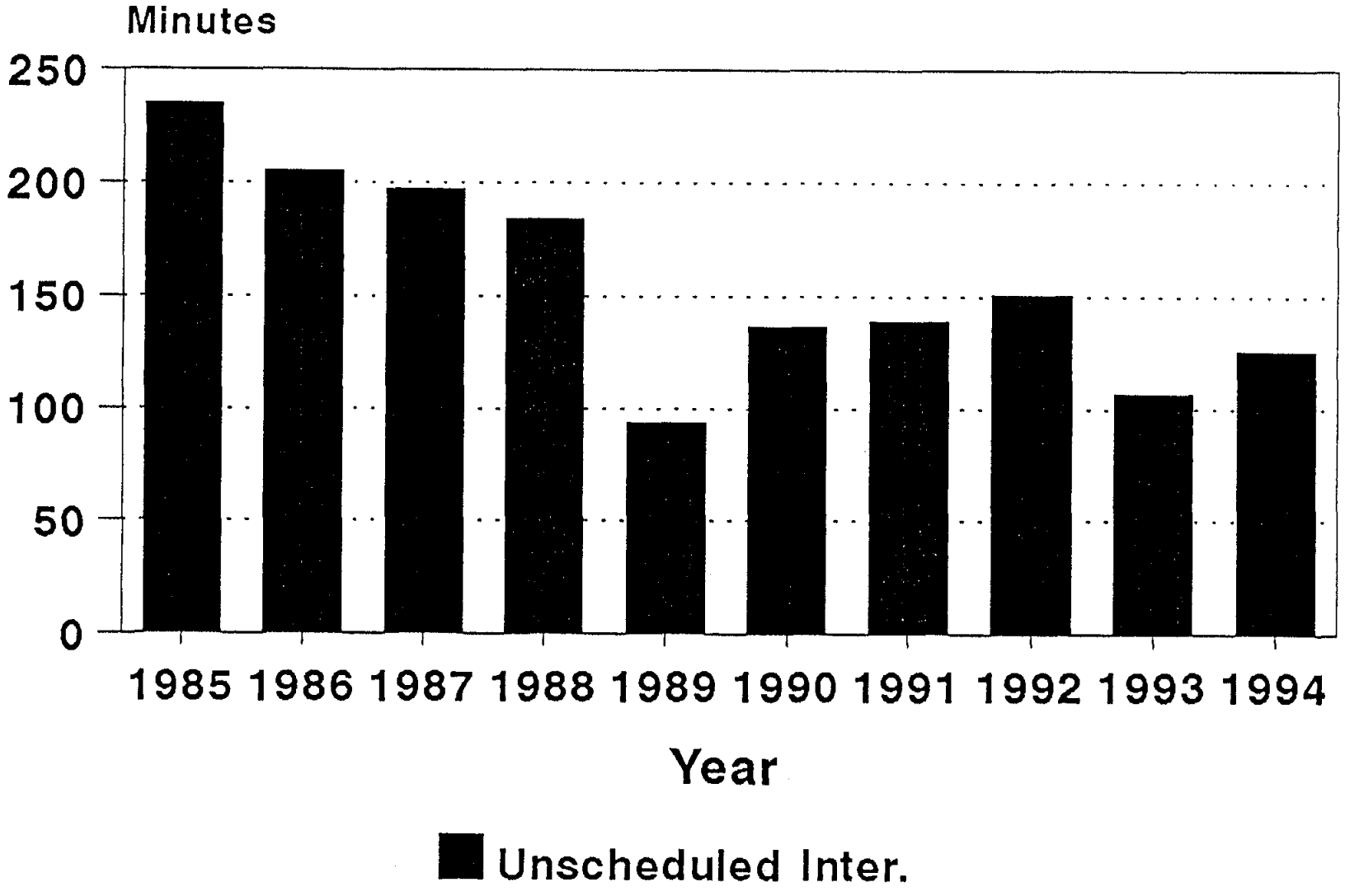

Fig # 2 (Excludes the Dec. 08 outage)

Total Interruption Time
Branch

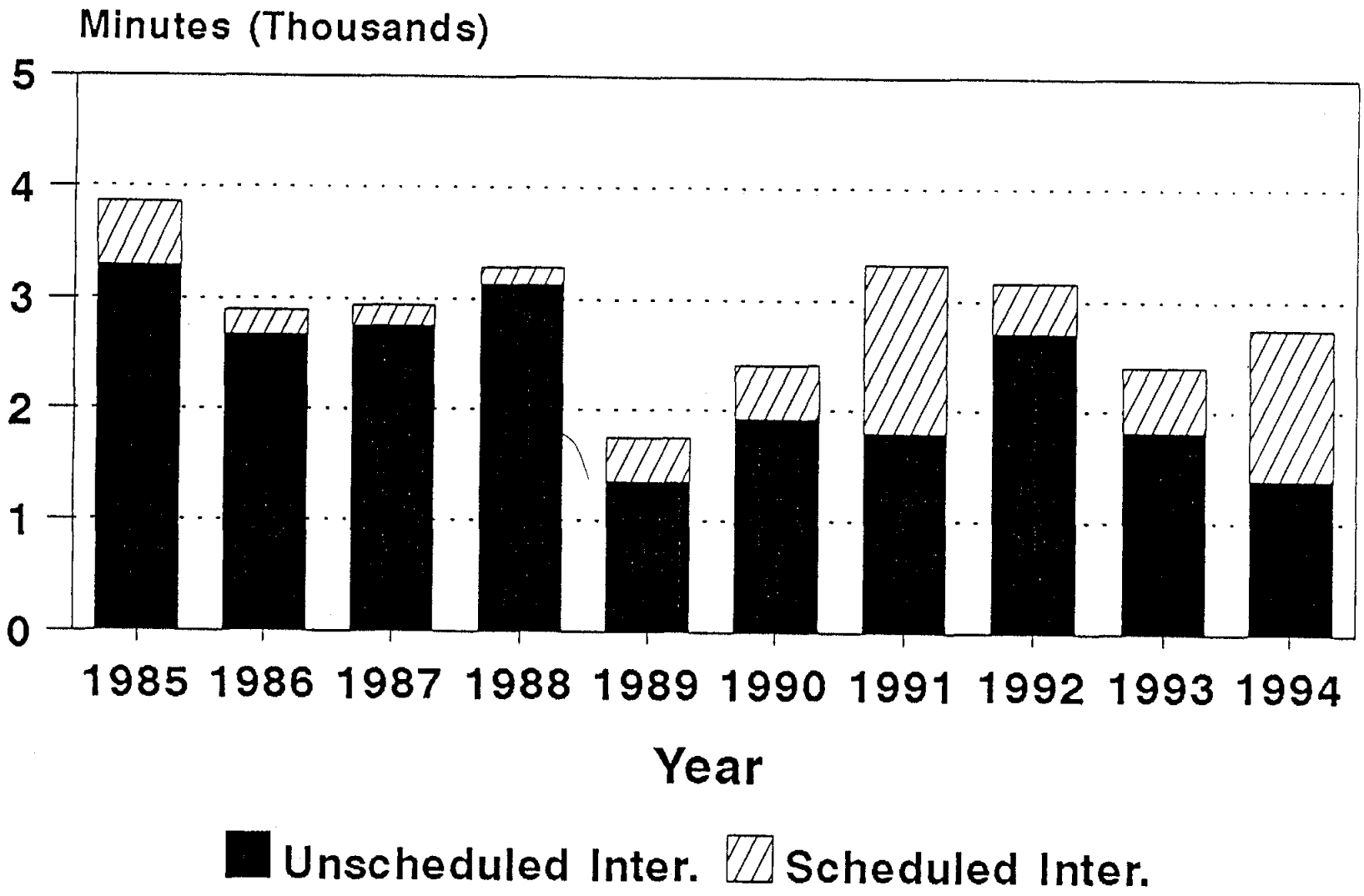

Fig # 3 (Excludes the Dec. 08 outage)

Frequency of Interruptions
Branch, 1994

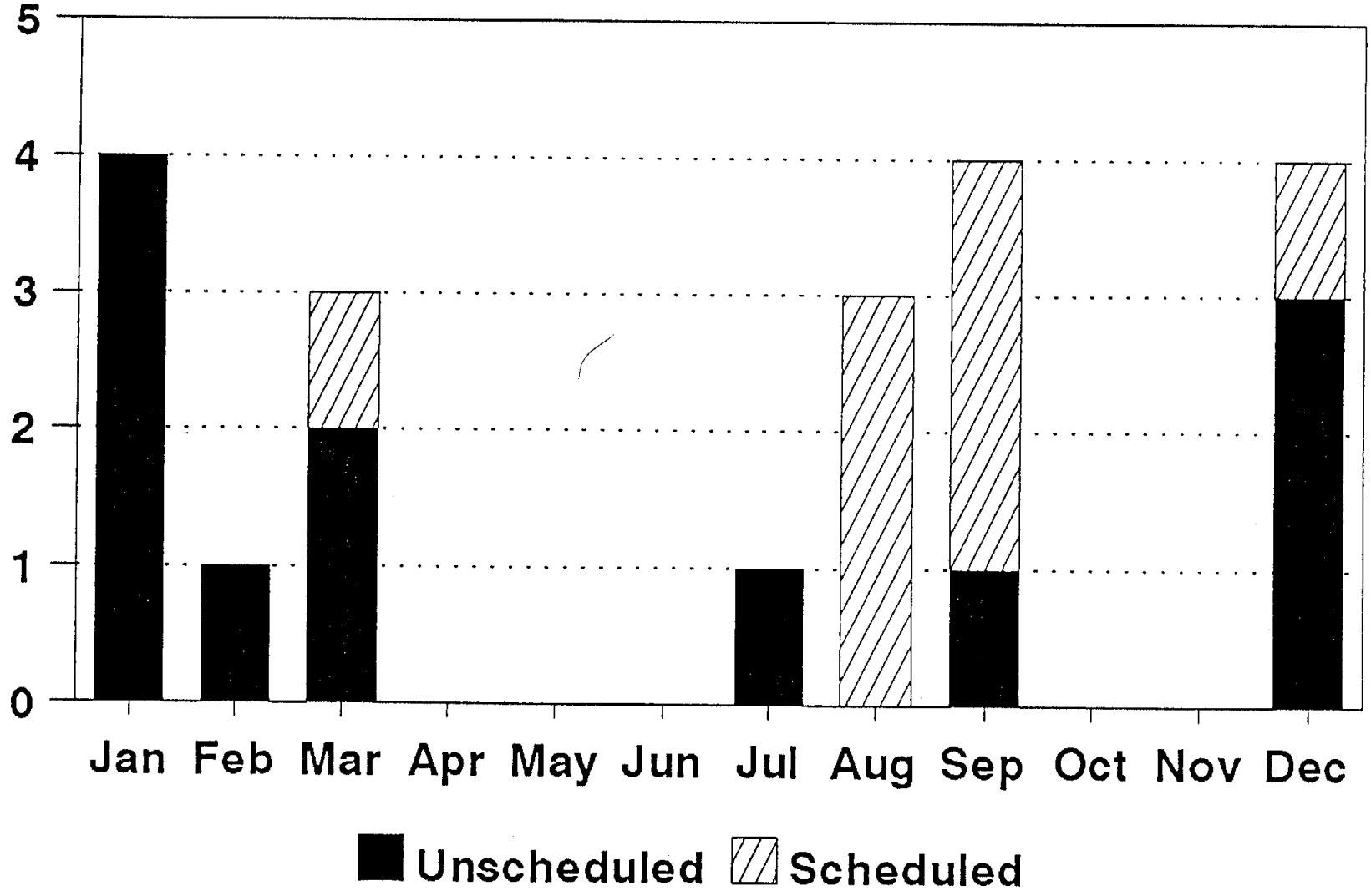

Fig. # 4 (Includes the Dec. 08 outage)

Average Duration of Interruptions
Branch, 1994

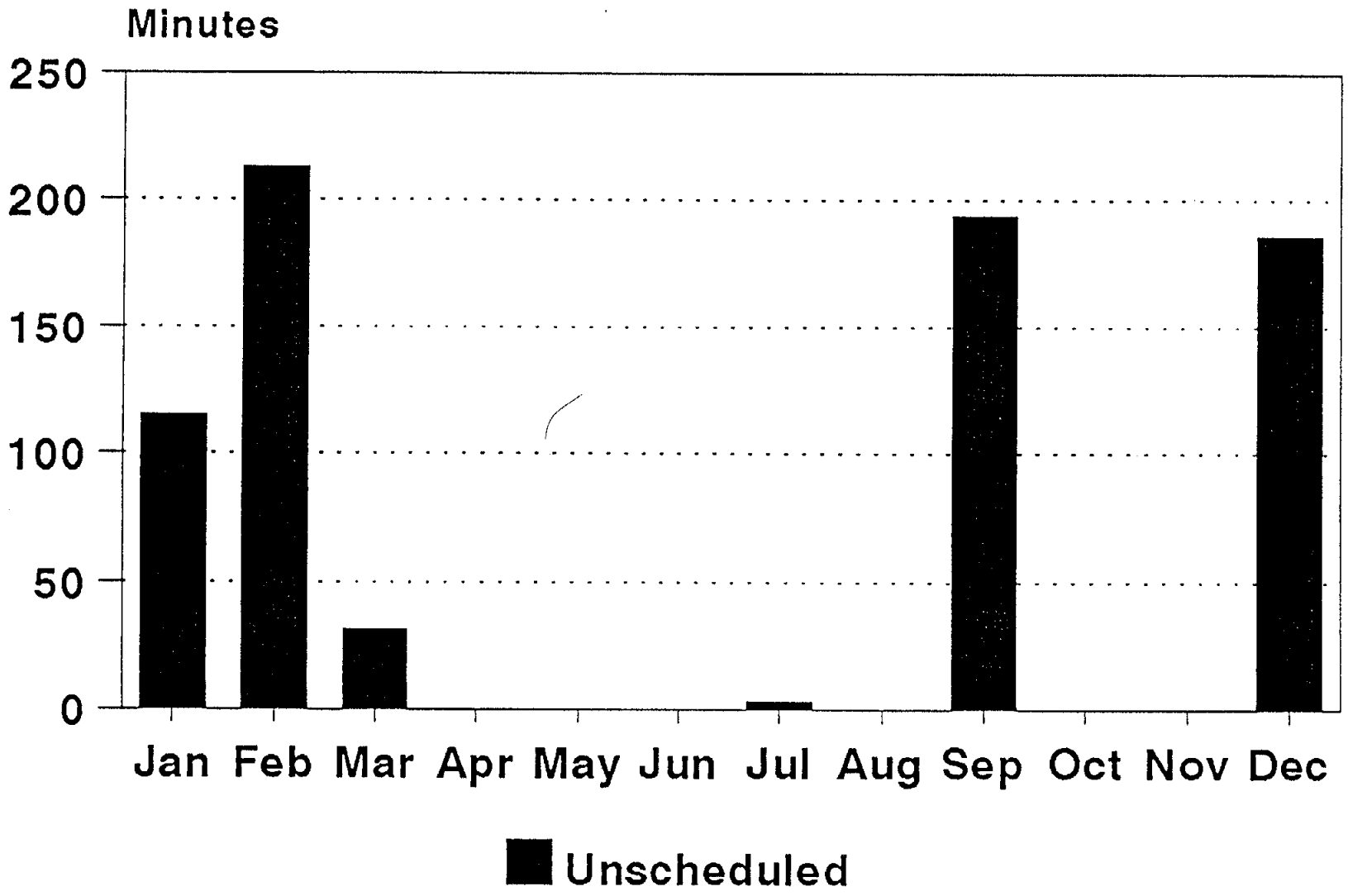

Fig. # 5 (Excludes the Dec. 08 outage)

Total Interruption Time
Branch, 1994

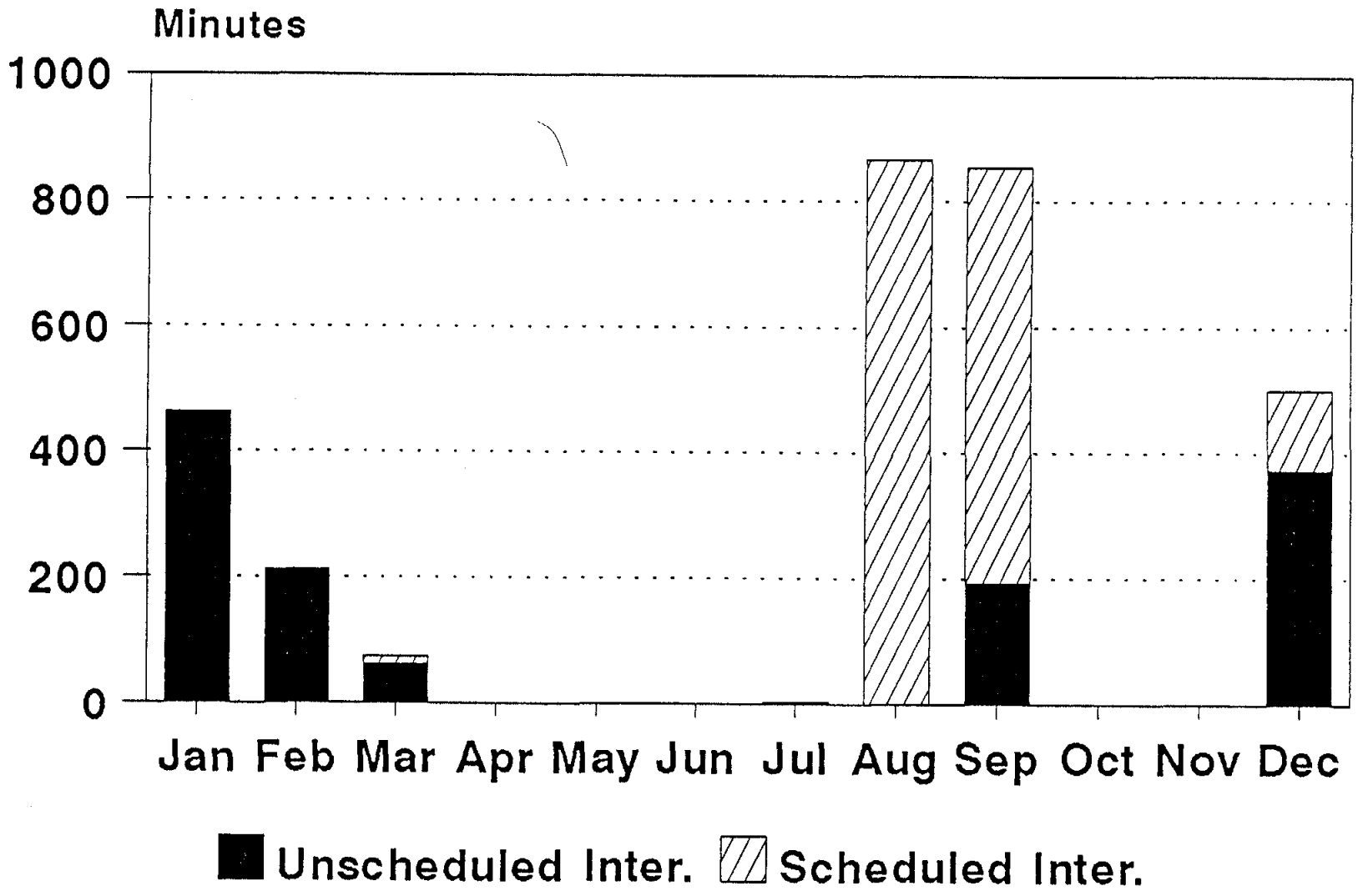

Fig. #6 (Excludes the Dec. 08 outage)