IB Docket No. 95-91

CEMA

Consumer Electronics Manufacturers Association
A sector of the Electronic Industries Association
2500 Wilson Boulevard ■ Arlington, Virginia 22201-3834 USA
Tel 703/907-7600 ■ Fax 703/907-7601

February 4, 1997

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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF SECRETARY

David R. Siddall
Senior Legal Advisor
Office of Commissioner Susan Ness
Federal Communications Commission
1919 M Street NW
Washington, DC 20554

Re: Allocation of the S-Band Spectrum for DAR Service; IB Docket No. 95-91; GEN Docket 90-357

Dear Mr. ~~Siddall:~~ David

Thank you for meeting with us on Wednesday to discuss the Commission's proposed allocation of the S-Band spectrum for DAR service, and allowing us to provide you with data from our recent testing of DAR transmission technologies.

We believe that our tests have documented significant technical problems with the use of the S-Band for DAR, and we encourage the Commission to investigate the allocation of alternative spectrum that may be more suitable. At the same time, we recognize that prospective DAR license auction participants hold a different technical opinion as to the suitability of S-Band for digital radio service.

CEMA's overriding interest in this matter is to ensure that DAR, when introduced, is capable of providing a seamless national service that can be received in urban and rural areas in both mobile and stationary environments. If not, the great promise of DAR will be squandered on a limited-use service receivable only on stationary receivers by the small fraction of the public located in unobstructed regions of the country.

Therefore, should the proposed auction of S-Band DAR licenses proceed, we request that the Commission define a set of specific requirements for DAR service implementation.

Specifically, we suggest that in addition to the satellite construction and launch milestones recommended by the Commission, each license be subject to additional buildout and service conditions. CEMA recommends that these license conditions should include: (I) a requirement that a DAR licensee be offering quality, seamless digital radio coverage to a significant percentage of the stationary and mobile radio receivers within the top 100 metropolitan markets within five years of the license grant; and (ii) a requirement that DAR licensees demonstrate to the Commission that they are successfully providing seamless quality DAR to mobile users. Only

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such requirements ensure that the American public is not denied full benefit of DAR, and that DAR assumes its rightful place in this nation's communications structure.

In addition, CEMA is poised to undertake for a comprehensive analysis of the comparative technical merits of the candidate frequency bands (2310-2360 MHz, 1710-1755 MHz and 1452-1492 MHz) by an unaffiliated, third-party research organization. We are prepared to go forward should the Commission believe such data would be of assistance prior to making a determination concerning DAR allocation. The results of this analysis could be ready in as little as eight weeks.

Please do not hesitate to contact us if we can provide you with any further information.

Sincerely,

Gary Shapiro
President

CATHERINE WANG
ATTORNEY-AT-LAW

SWIDLER & BERLIN
CHARTERED

DIRECT DIAL
(202)424-7837

IB Docket No. 95-91

January 30, 1997

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OFFICE OF COMMISSIONER

VIA HAND DELIVERY

Commissioner Susan Ness
Federal Communications Commission
1919 M Street, N.W.
Room 832
Washington, DC 20554

Re: Consumer Electronics Manufacturers Association
Digital Audio Radio Information

Dear Commissioner Ness:

Enclosed is CEMA's field test data regarding digital audio radio. This data is part of a draft report being completed by CEMA.

Please do not hesitate to call if you have any questions regarding the data.

Very truly yours,

Catherine Wang

Catherine Wang

Enclosures

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THE CONSUMER ELECTRONICS MANUFACTURERS ASSOCIATION VISION FOR DIGITAL AUDIO RADIO SERVICES

BACKGROUND: After almost 10 years of review, the Federal Communications Commission has endorsed the introduction of digital audio radio ("DAR") service so that American consumers can enjoy seamless, nationwide, CD quality sound over the radio.

The FCC is currently considering the best technology for making DAR available in the United States. **CEMA has been tasked with the responsibility of providing technical expertise for evaluating DAR technologies.**

DAR will provide listeners, not only the fidelity that they have come to expect from CDs, but also with real-time ancillary data services including: weather, news, traffic, emergency and other advanced services that are not available through the use of current analog broadcasting technology. In the face of declining listenership, DAR will provide a powerful opportunity to compete with other advanced digital transmission technologies available to cable providers, Internet providers, and now, television broadcasters.

THE FCC SHOULD NOT AUCTION DAR LICENSES AT S-BAND

CEMA'S VIEW: **DAR cannot be successfully provided at S-Band or on existing frequencies using IBOC/IBAC methods. The Commission must immediately reconsider its proposal to use S-Band spectrum for purposes of providing DAR within the US.**

CEMA'S TESTS: CEMA, in conjunction with NASA, has performed extensive technical testing of multiple transmission technologies, including S-Band, L-Band, IBOC and IBAC over the course of the past few years. ***CEMA's goal was to conduct an open and impartial evaluation of these technologies*** and choose the system that will satisfy realistic performance requirements in order to ensure broad consumer acceptance and the rapid growth of DAR within the US. ***CEMA and others have continually urged the Commission to not preclude any options, including spectrum options, until the technical facts on DAR system performance were established by this testing initiative.***

S-BAND DEFICIENCIES: The FCC has allocated S-Band DAR frequencies. CEMA and FCC panel testing show, however, that the innate propagation characteristics of S-Band prove unacceptable for the provision of commercially viable DAR service. CEMA's extensive battery of testing reveals that:

- ***S-Band operations suffer from a significant and startling level of signal blockage*** by buildings and foliage. In major urban areas, S-Band system failure rate exceeded 90%. Overall system performance is unsuitable for commercial applications;

- ***Signal reacquisition times in excess of 1 second likely exceed a maximum threshold of consumer acceptance.*** The S-Band VOA/JPL system universally failed to satisfy this criteria;

- The propagation characteristic of ***S-Band frequencies will require*** hundreds, ***perhaps thousands, of "gap filling" transmitters*** for a single metropolitan market, as well as other costly remedial solutions in order to achieve seamless coverage;

- As a practical matter, S-Band DAR systems provide ***unacceptable service quality***, and as such have no likelihood for nationwide commercial acceptance. Similar conclusions were reached by the independent panel investigating the satellite DAR applicants' pioneer preference applications.

CONCURRENCE WITH PIONEER'S PREFERENCE REPORT: CEMA's findings concerning use of the S-Band are consistent with the FCC's own DAR Pioneer Preference Panel findings that the proposed DAR S-Band services would require substantial terrestrial buildout in order to be viable as a seamless service.

ADDITIONAL CEMA TEST FINDINGS

IBOC / IBAC DEFICIENCIES

- ***IBOC systems failed to meet fundamental performance criteria***, including: audio quality, non-interference, and digital coverage. Accordingly, CEMA found IBOC to be categorically unacceptable.

- ***Implementing the IBAC system tested by CEMA relies on spectrum vacancies that are not available.*** Further, coverage is limited by interference from existing stations and therefore has limited potential to be successfully implemented and cannot be recommended.

* * * *

CONCLUSION: **CEMA recommends immediate FCC consideration of other spectrum options such as L-Band *(1452-1492 MHz)*, UHF or VHF.**

THE FCC MUST LOCATE OTHER, MORE APPROPRIATE DAR SPECTRUM

Because CEMA's testing conclusively finds that S-Band is unsuitable for purposes of DAR. CEMA urges the FCC to consider use of alternative spectrum, including L-Band, UHF and VHF.

FACTORS FOR CONSIDERATION: In evaluating alternative spectrum allocations, the FCC should consider reallocation of spectrum that will provide DAR with:

- ***Superior audio quality***.;
- ***Immunity to interference;***
- ***Robust transmission and recovery characteristics***;
- Significant potential for ***ancillary data capacity*** and services;
- Substantial likelihood of meeting and ***exceeding customer expectations for DAR***.
- ***Compatibility*** with other worldwide DAR systems.

180493.1

ADDENDA AND ERRATA PAGES;
REPORT OF THE FIELD TEST TASK GROUP
underline indicates changed item

INDEX PAGE, Contents page numbers; revised page attached

TEST ROUTE DATA, NOTE AND COMMENTS; new page attached

TEST ROUTE DATA, PATH OBSERVATION SUMMARIES; corrected below

Route "D";

EU-147	64,070	63,759(99.5)	97(0.2)	214(0.3)
SEU-147	70,054	69,751(99.6)	164(0.2)	139(0.2)
AT&T	68,777	63,704(92.6)	779(1.1)	4294(6.2)

Route "P";
no changes

Route "N:;

EU-147	87,997	67,250(76.4)	3,972(4.5)	16,775(19.1)
AT&T	85,669	55,859(65.2)	383(0.4)	29,427(34.4)

Route "E";

EU-147	97,932	66,711(68.1)	2,717(2.8)	28,504(29.1)
SEU-147	76,822	36,433(47.4)	1,140(1.5)	39,249(51.1)
AT&T	88,991	49,333(55.4)	605(0.7)	39,053(43.9)

Route "S";

AT&T	71,795	19,726(27.5)	4,894(6.8)	47,175(65.7)

Route "W";

AT&T	76,968	28,701(37.3)	779(1.0)	47,458(61.7)
VOA-JPL	71,416	59,492(83.3)	1262(1.8)	10,662(14.9)

APPENDIX F-4, TRANSMISSION SITE LOGS; new page attached

REPORT OF THE FIELD TEST TASK GROUP; FIELD TEST DATA COLLECTION AND PRESENTATION

CONTENTS

INTRODUCTION	PAGE 1
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TEST ROUTE DATA

PATH "D" - SAN FRANCISCO DOWNTOWN
PATH "P" - SAN FRANCISCO PERIMETER
PATH "N" - NORTH BAY
PATH "E" - EAST BAY
PATH "S" - SOUTH BAY
PATH "W" - PENINSULA

APPENDICES

APPENDIX A	- EIA-DAR Field Test Plan - Audio Test Segments
APPENDIX B	- NRSC DAB Subcommittee - Long Path Test Routes
APPENDIX C	- Field Test R.F. Testbed data
APPENDIX D	- Audio Event Descriptions
APPENDIX E	- Field Test Step-by-step Procedure
APPENDIX F	- Test Transmission Facilities
APPENDIX G	- R.F. Graphical Events - expanded views
APPENDIX H	- VHF Interference Study

NOTE AND COMMENTS
EIA-DAR FIELD TEST ROUTE SEGMENT GRAPHS

NOTE #1 **Distance Anomaly** - Landmark(s) incremented at the wrong location on a route, too early or too late by a significant distance, more than a few percent of the segment length. The graph will be marked, reconstructed or both.

NOTE #2 **Landmark Anomaly** - Extraneous or missing Landmark(s). Where possible and significant the graph will be reconstructed to the proper landmark position(s).

NOTE #3 **Data Corrupted** - The data file, or portion of the file, is missing and/or the data is corrupted. Valid data from adjoining files will be substituted where possible.

NOTE #4 **Velocity Anomaly** - A velocity spike is created in its calculation, probably due to intermittent time code errors.

NOTE #5 **Graph Detail** - See Zoom graphs(s) in Appendix G (to be added with future reports). A detail is presented which helps in the understanding of the data or collection method.

NOTE #6 **Graph Reconstruction** - A graph or series of graphs have been reconstructed from proceeding and/or following Landmarks and/or files. Such graphs will be Labelled "Reconstructed Graph Landmark N-N"

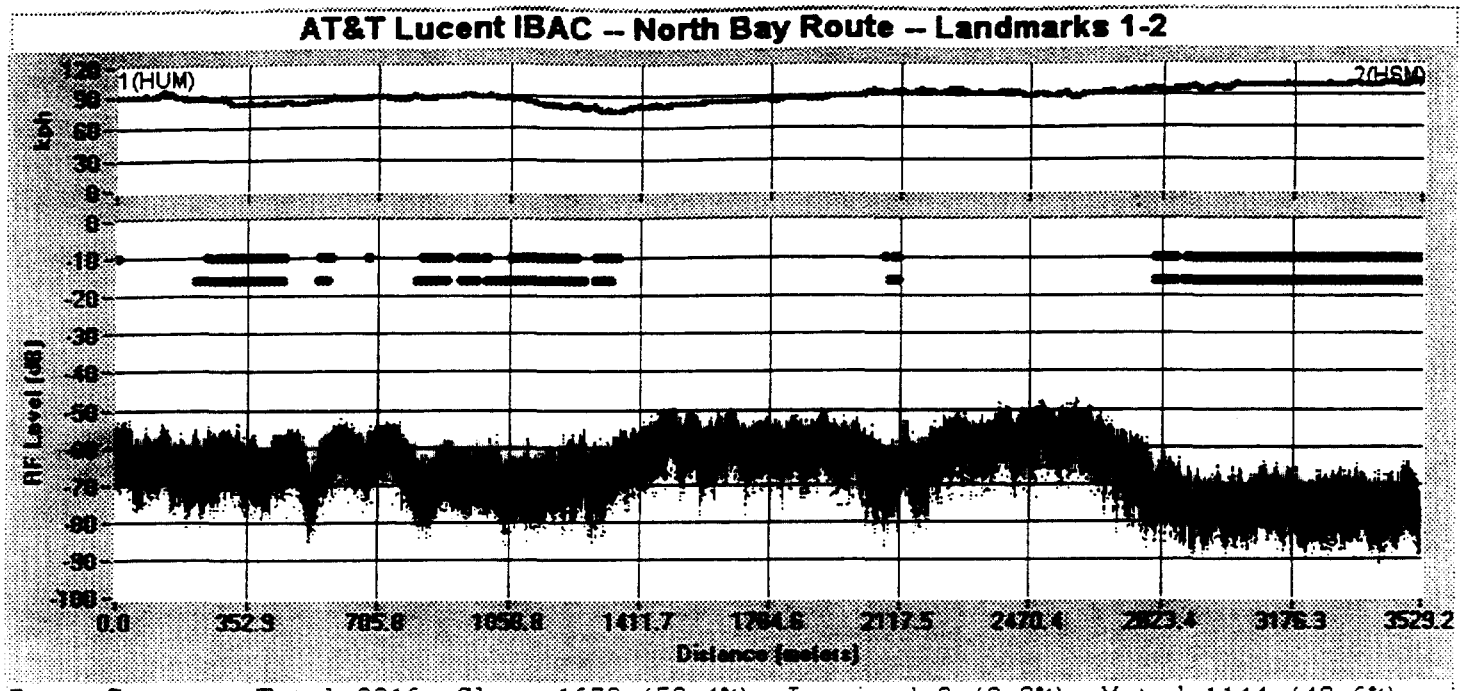
APPENDIX F-4
Transmission Site Logging and Access Control

During periods when proponent personnel were present at the Mt. Beacon test site, secured equipment was continuously attended by the test site manager or his designee. Secured equipment consisted of the encoders/modulators at the Mt. Beacon site and the system receivers, which were installed in the test van. Proponents were required to receive prior permission from the test site manager before supervised adjustments or repairs could be made to any of the secured equipment. During times when the secured equipment was not in use, it was locked in the Mt. Beacon test room or in the test van, which was parked in a garage near the test site.

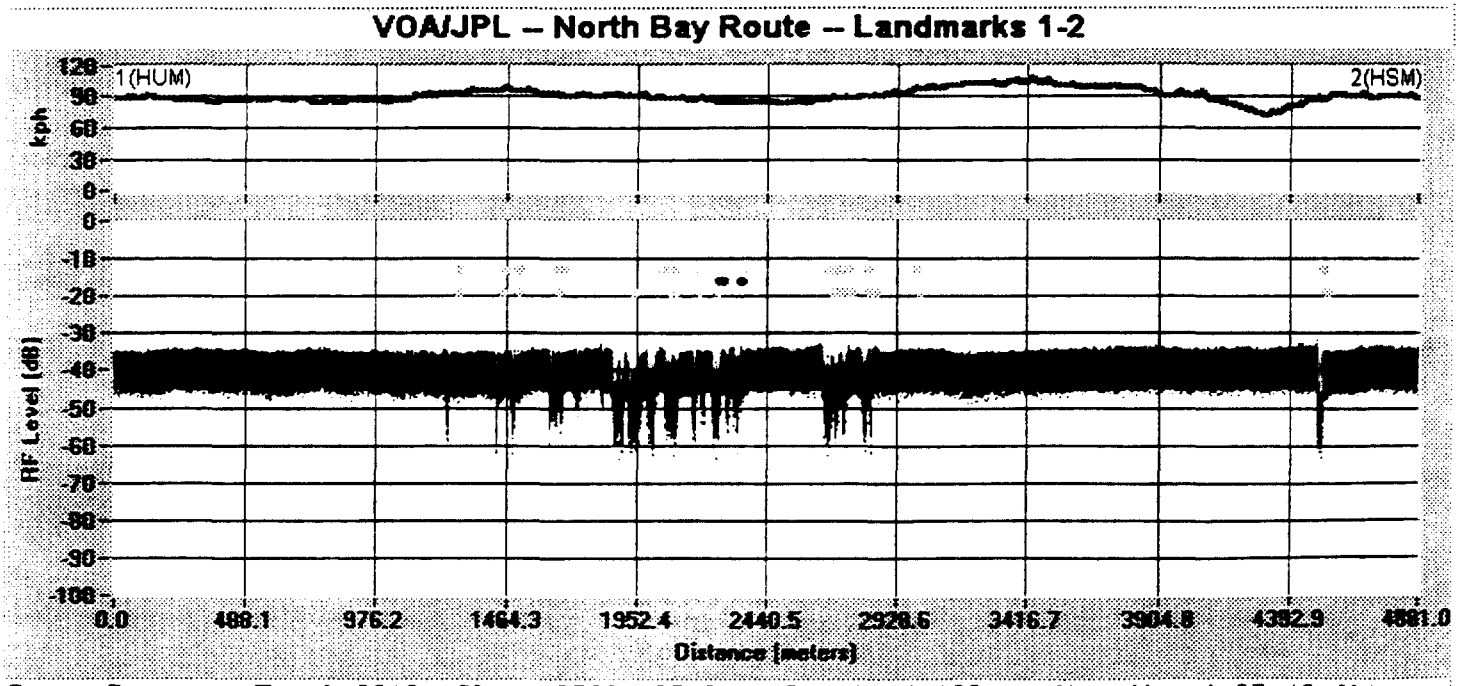
Logs were kept during times when the Eureka 147 and AT&T/Lucent IBAC transmission systems were operated. Operation of the Eureka 147 system required prior and real-time coordination with the National Telecommunications and Information Administration (NTIA), the Aerospace & Flight Test Radio Coordinating Council (AFTRCC), and the National Aeronautics and Space Administration (NASA). A monitoring station at NASA/Ames Research Center in Sunnyvale, California, was set up for continuous monitoring of the Eureka 147 L-band transmissions during periods when the system was active. Operation of the Eureka 147 system was limited to weekdays between 8:00 am and 4:00 pm local time. Operating power of the Eureka 147 system was monitored at the test site by persons designated by the test site manager, as well as remotely using a dial-up modem for the single frequency network sites, when they were operated, to ensure that the FCC-authorized power for each site was not exceeded.

Operation of the AT&T/Lucent DAR system was conducted entirely from the Mt. Beacon test site. During each day of initial testing and during days when test data was being gathered, the proponent activated the equipment approximately one hour before it was used, to allow the system to stabilize. After the initial stabilization period, power readings of the intermediate power amplifier (IPA) and the power amplifier (PA) were recorded. Additional readings were taken and recorded generally twice more during each day to ensure that the system was operating within established power tolerances; minor power adjustments were made as needed.

Operation of the VOA/JPL transmission uplink equipment was handled entirely by the staff at the White Sands Test Center, near Las Cruces, New Mexico. A prior schedule was arranged with the proponent and the equipment was activated during the coordinated time periods. Other than the actual times of operation, no other information about operation of the VOA/JPL system was recorded at the test site.

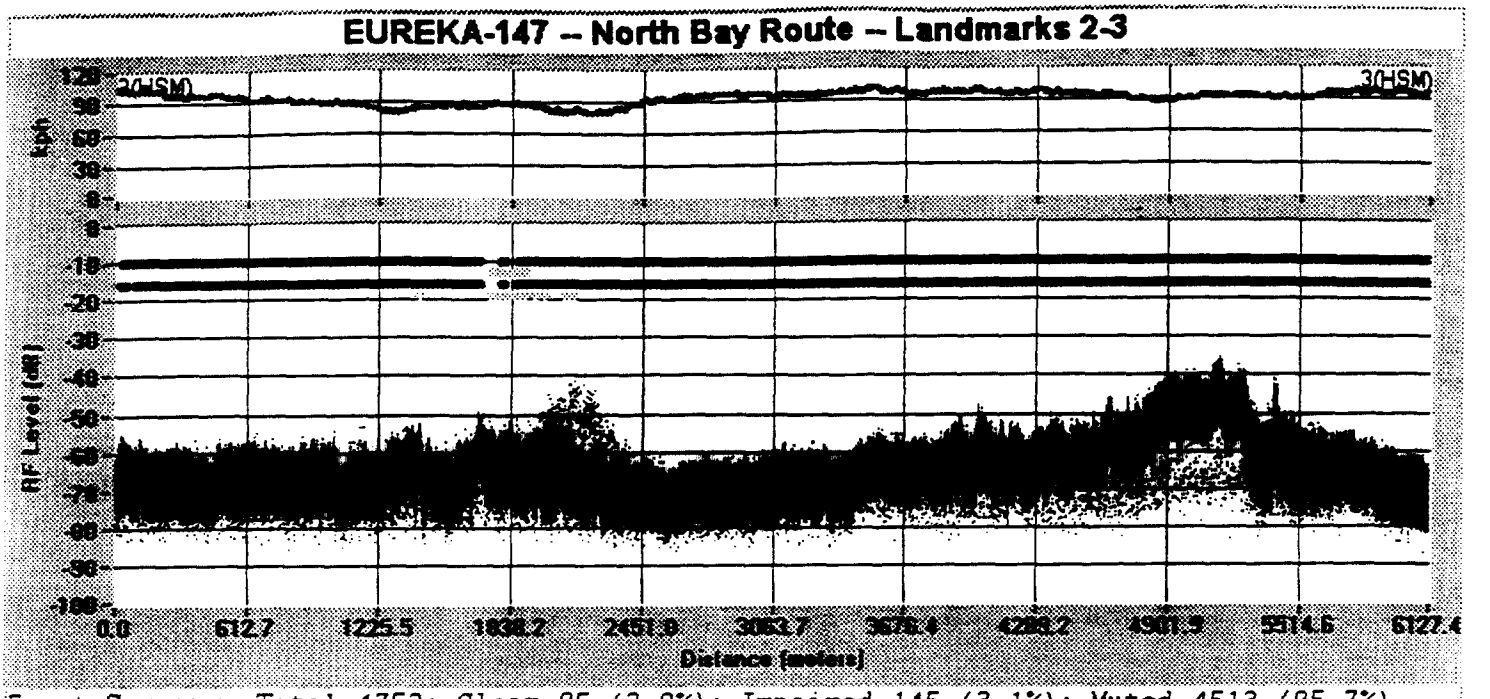


Event Summary: Total 2816; Clear 1672 (59.4%); Impaired 0 (0.0%); Muted 1144 (40.6%).

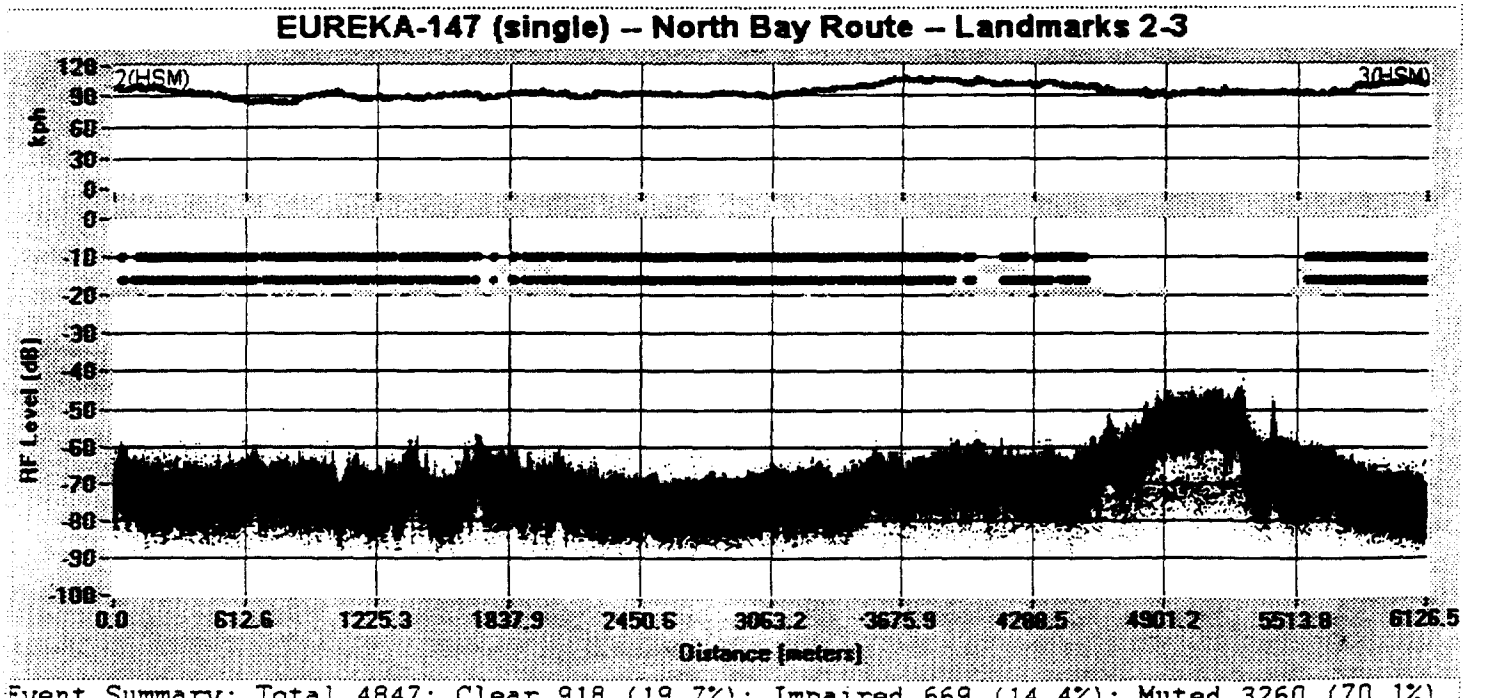


Event Summary: Total 3913; Clear 3708 (95.0%); Impaired 180 (4.6%); Muted 25 (0.6%).

NOTE #1



Event Summary: Total 4753; Clear 95 (2.0%); Impaired 145 (3.1%); Muted 4513 (95.7%).

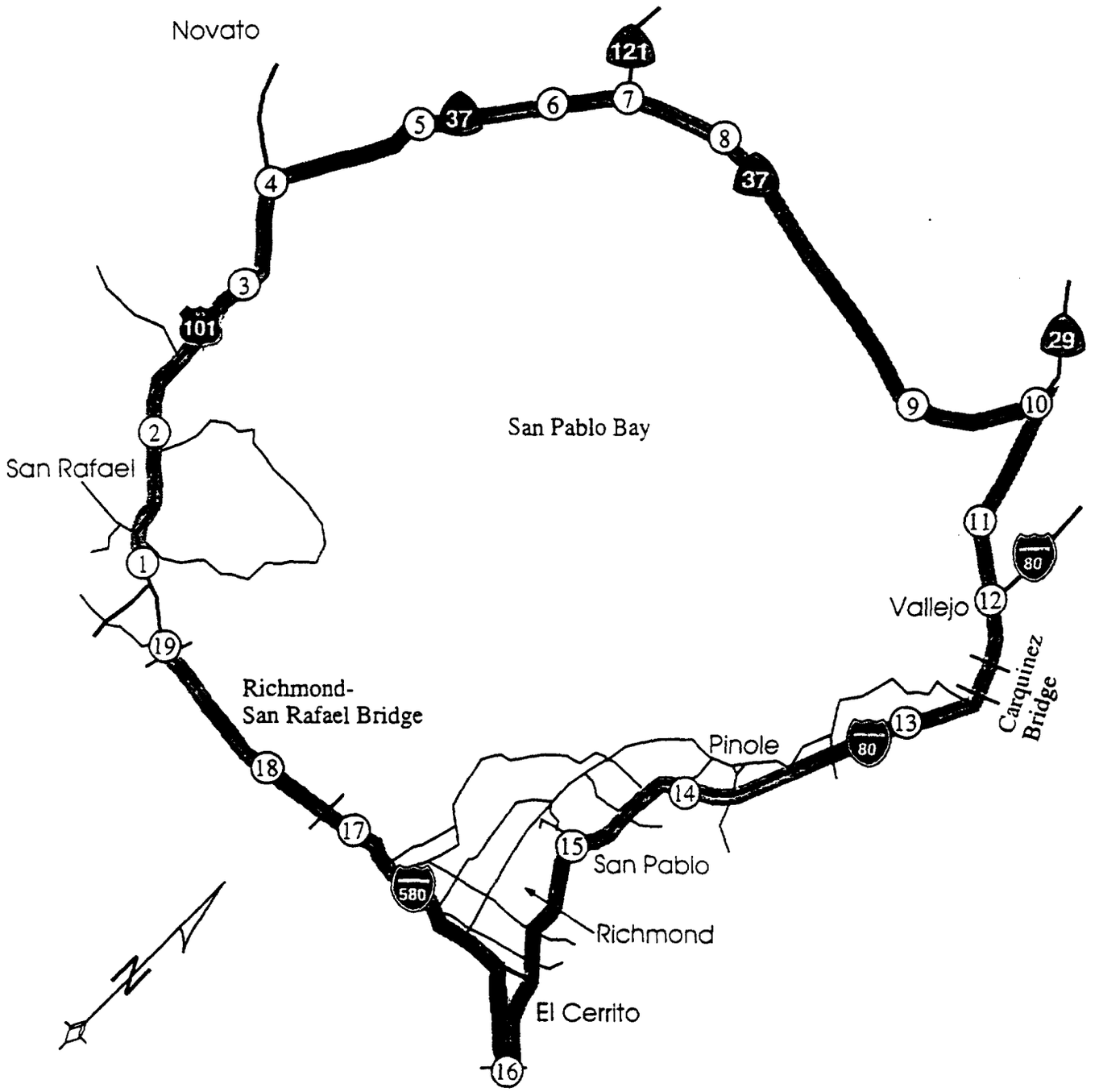


Event Summary: Total 4847; Clear 918 (19.7%); Impaired 669 (14.4%); Muted 3260 (70.1%).

Electronic Industries Association • Consumer Electronics Manufacturers Association

"Long Path" Test Routes

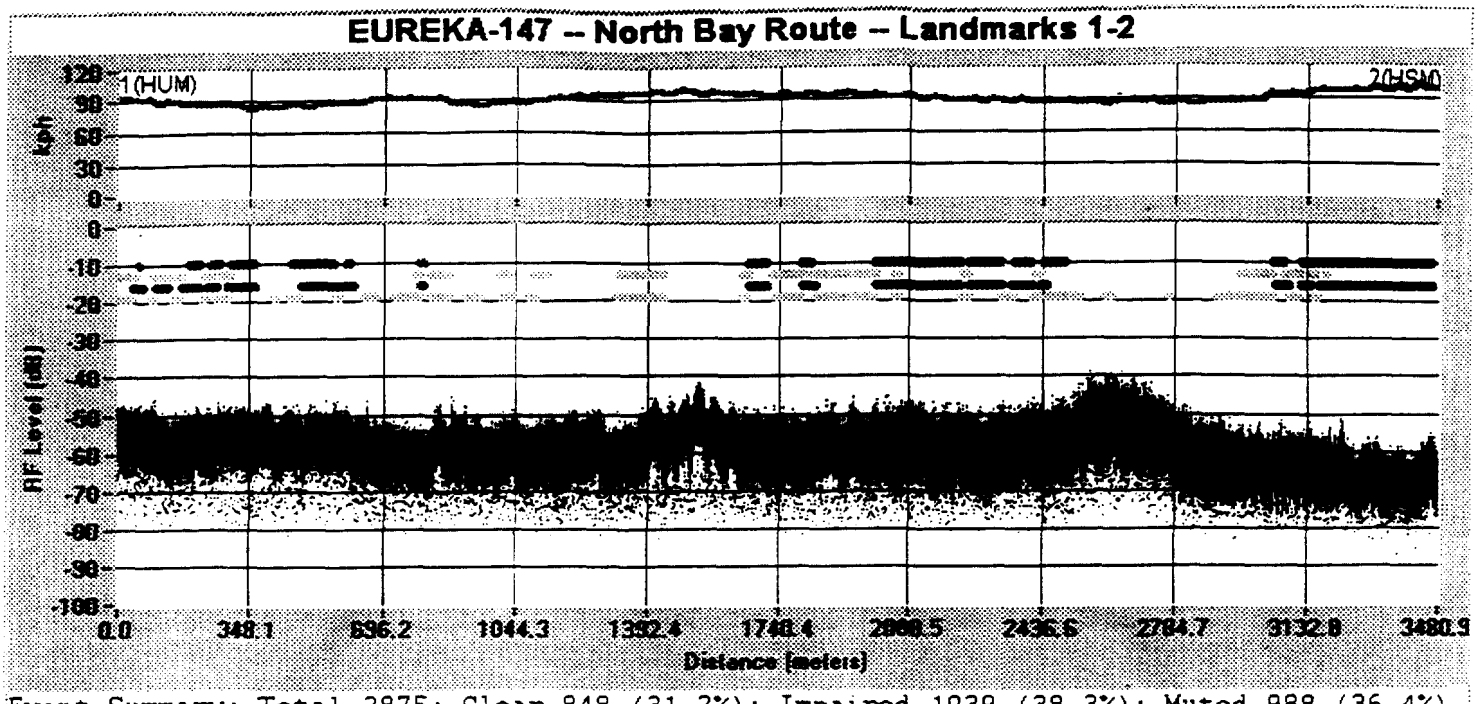
Route N • North Bay



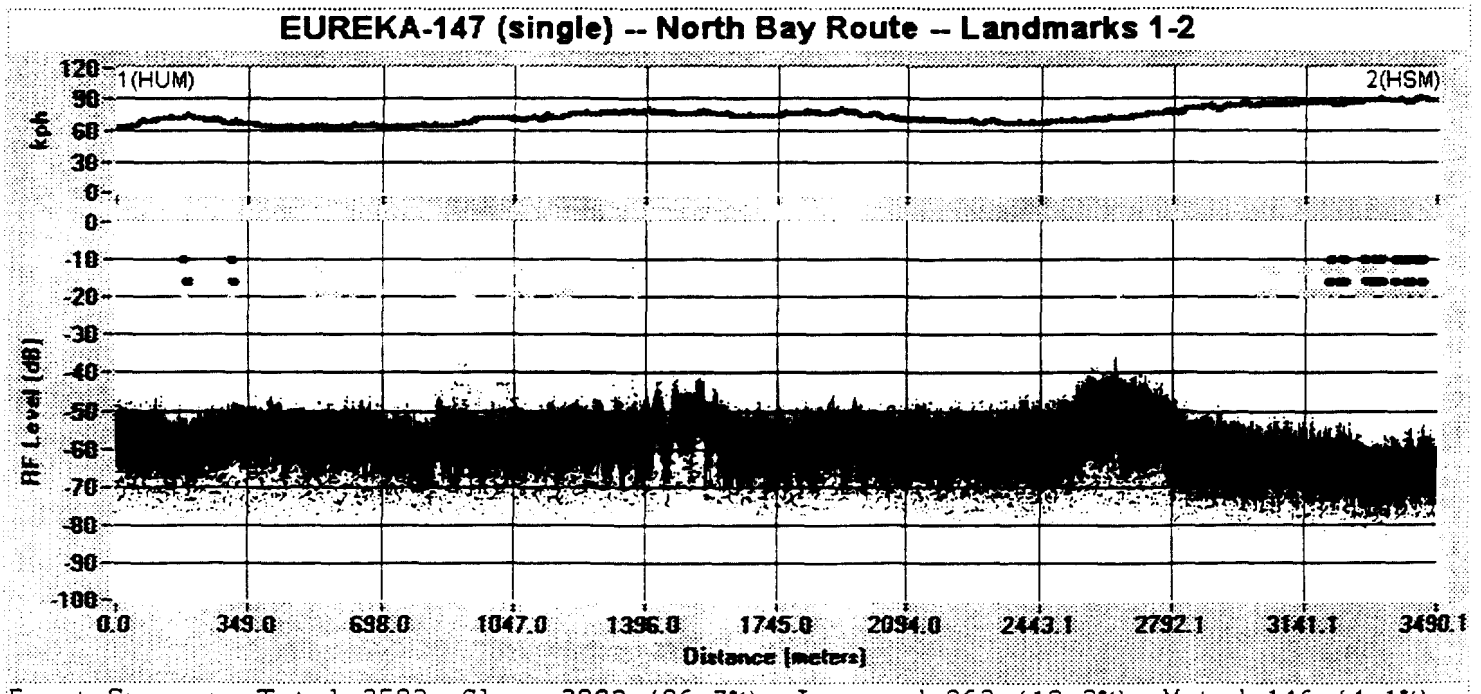
Numbers denote route landmarks in Figure 3

HAMMETT & EDISON, INC.
CONSULTING ENGINEERS
SAN FRANCISCO

961210
Figure 2E



Event Summary: Total 2875; Clear 848 (31.2%); Impaired 1039 (38.3%); Muted 988 (36.4%).



Event Summary: Total 3592; Clear 3083 (86.7%); Impaired 363 (10.2%); Muted 146 (4.1%).

EIA-DAR FIELD TEST ROUTE DATA
PATH "N" - NORTH

NO.	ENV.	DESCRIPTION
1	HUM	Central San Rafael Exit Sign (North end of exit lane)
2	HSM	Frank Loyd Wright Building at Marin Center Sign
3	HSM	Alameda del Prado OverPass
4	FRM	Highway 101 and Highway 37 Take Highway 37 East Double Arrows
5	FRL	Marin Sonoma County Line on Bridge
6	FRL	Lakeville Highway Stop Light
7	FRL	Highway 121 Stop Light
8	FRL	Solano County Line Sign
9	FSL	Welcome to Vallejo Sign
10	HUM	Highway 37 and Highway 29 Take Highway 29 South (T-Sign)
11	HSM	Veer Left AT Curtola Pkwy
12	HSM	Highway 29 and I-80 take I-80 in Vallejo South (Freeway Entrance Sign)
13	HEM	Hercules Next Two Exits
14	HSM	Appian Way Overpass 1st 1
15	HSM	San Pablo City Limit Sign
16	HSM	Freeway Entrance sign at on ramp to 580 North from Central Avenue
17	FBL	Toll Crossing Entrance Sign 1/4 Mile
18	HSM	Marin County Line Sign On Bridge
19	END	I-580 and Highway 101 / Exit sign for Sir Francis Drake

ENVIRONMENT THREE LETTER CODES

TERRAIN: Flat, Hilly, Mountainous, Valley

AREA: Downtown, Urban, Suburban, Rural, Bridge, Expressway, Tunnel

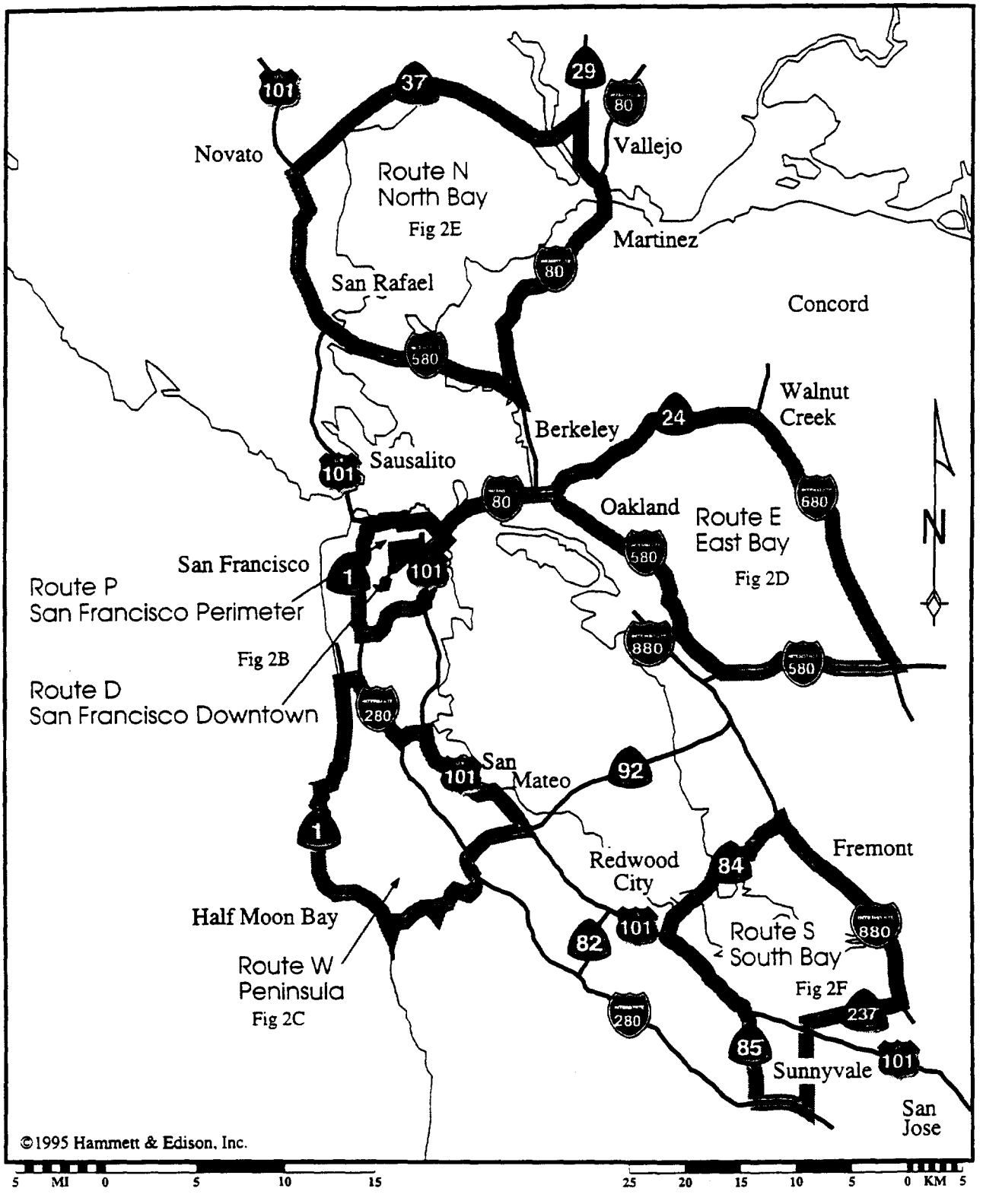
FOLIAGE: None, Light, Moderate, Heavy

PATH OBSERVATION SUMMARIES - Number (%)

SYSTEM	TOTAL	CLEAR	IMPAIRED	MUTED
EU-147	87,997	67,250(76.4)	3,972(0.2)	16,775(19.1)
SEU-147	90,014	76,135(84.6)	3,267(3.6)	10,612(11.8)
AT&T	85,669	55,859(65.2)	383(0.5)	29,427(34.4)
VOA-JPL	88,623	83,065(93.7)	2,528(2.9)	3,030(3.4)

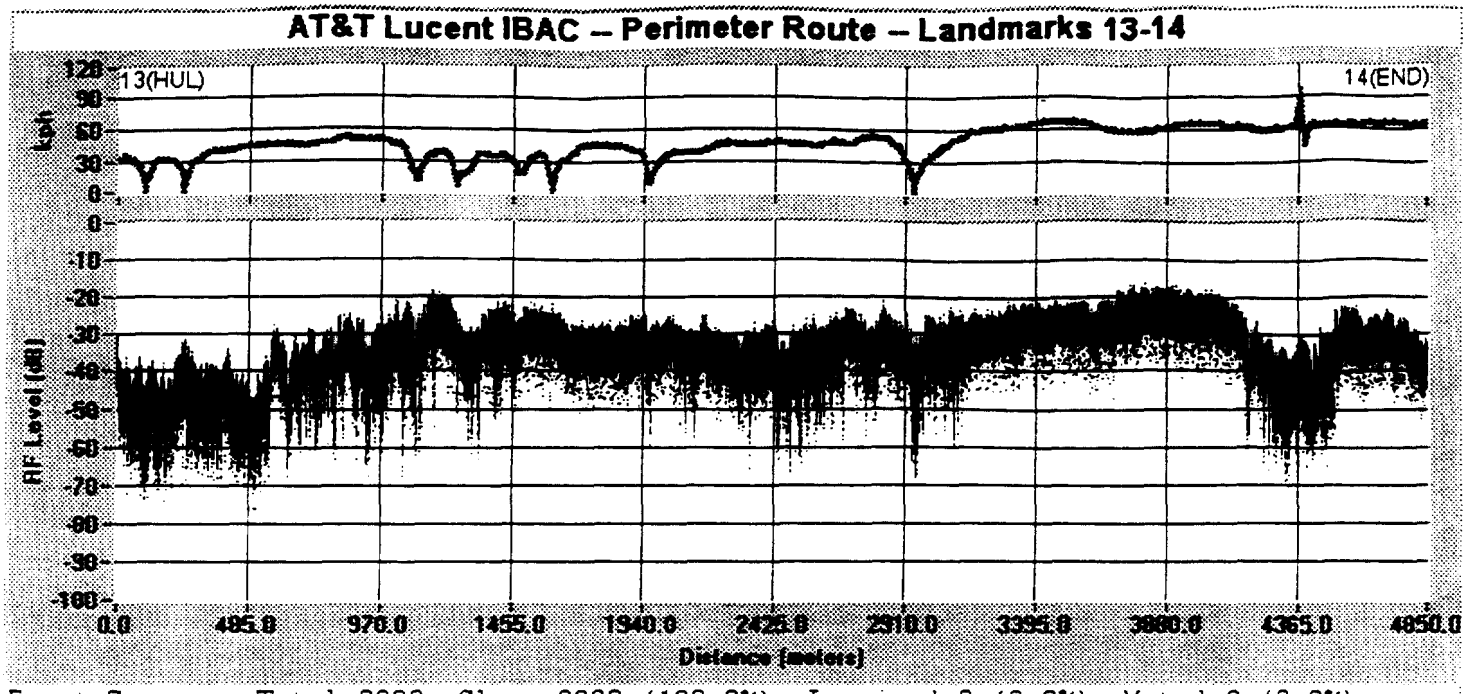
Electronic Industries Association

NRSC DAB Subcommittee • Field Test Task Group
"Long Path" Test Routes



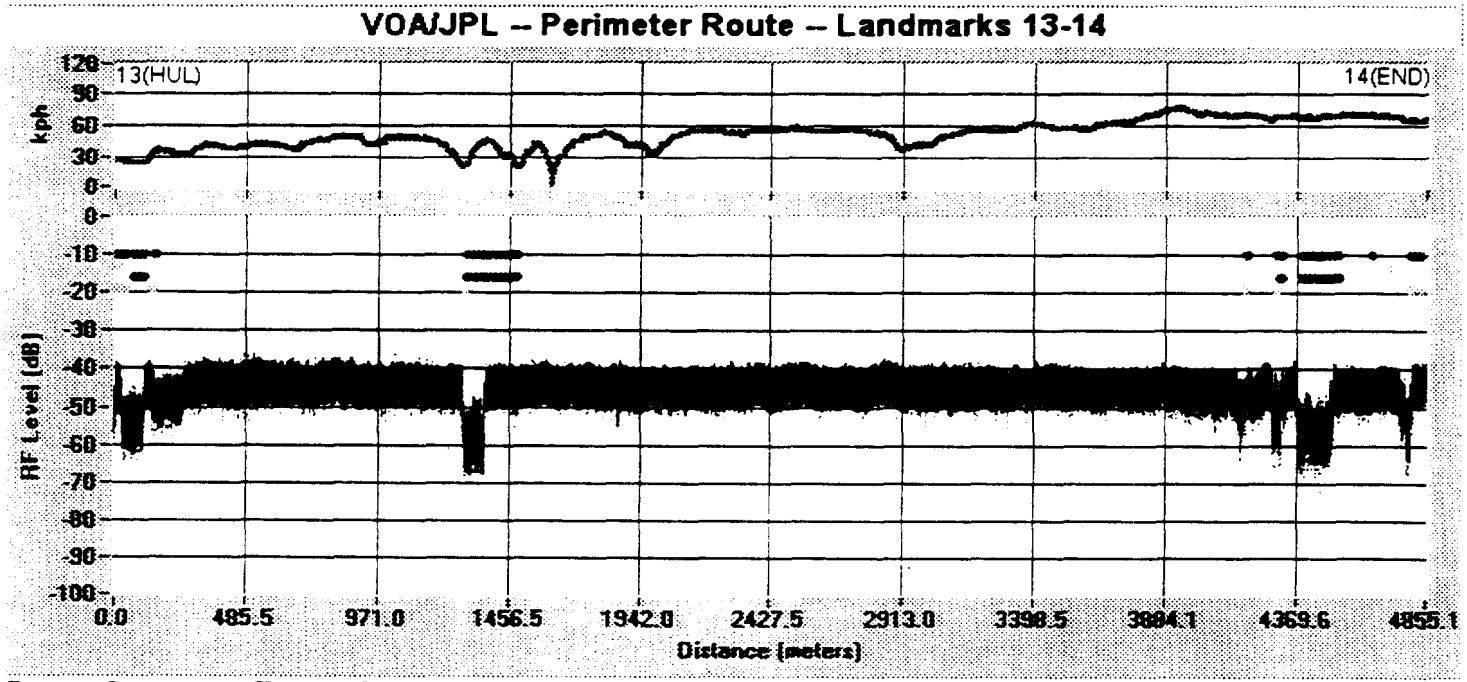
HAMMETT & EDISON, INC.
CONSULTING ENGINEERS
SAN FRANCISCO

Figure 2A
Revised June 26, 1996



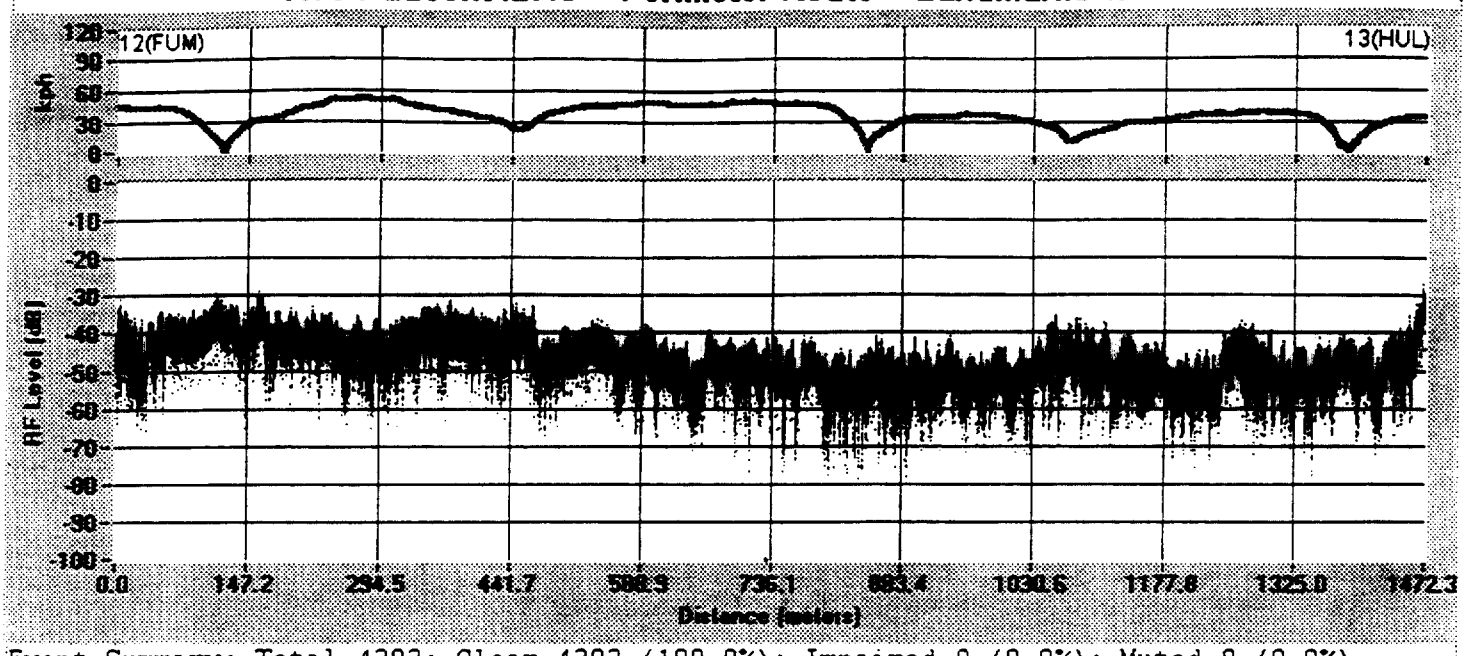
Event Summary: Total 9980; Clear 9980 (100.0%); Impaired 0 (0.0%); Muted 0 (0.0%).

NOTE #4



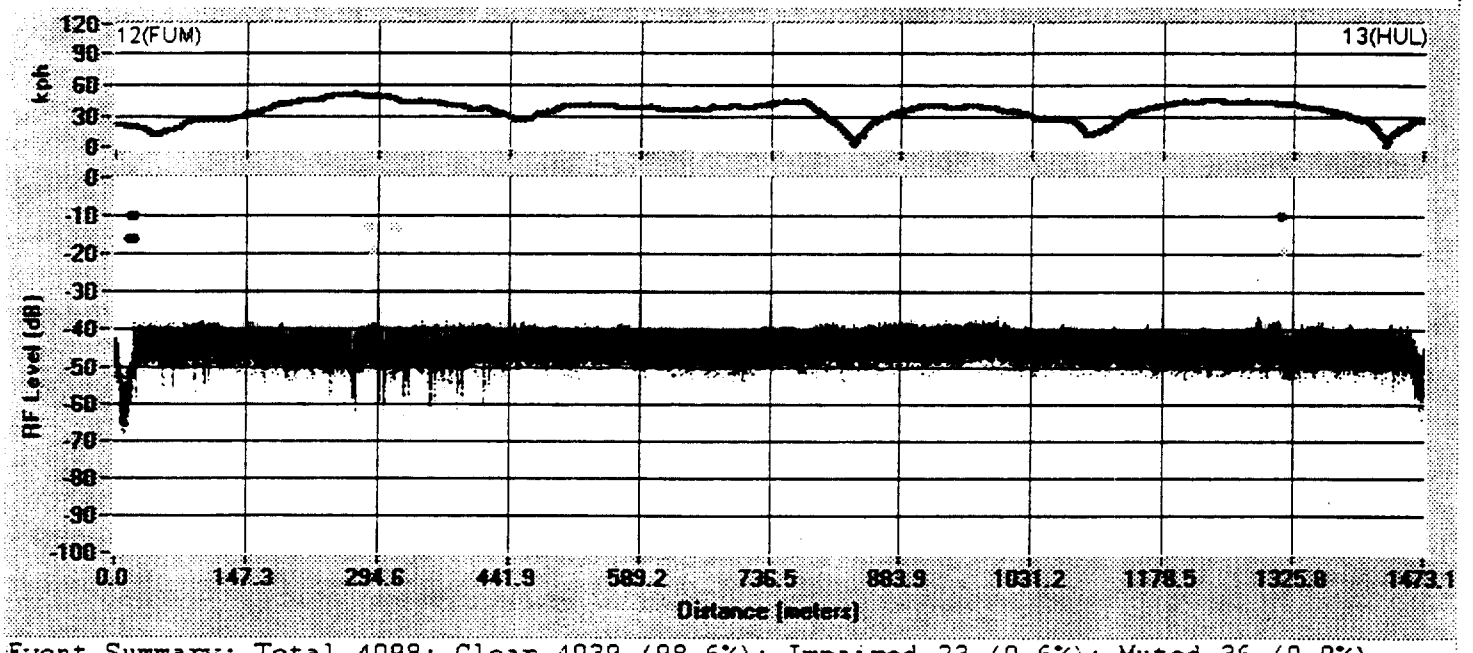
Event Summary: Total 8217; Clear 7284 (89.2%); Impaired 75 (0.9%); Muted 858 (10.5%).

AT&T Lucent IBAC -- Perimeter Route -- Landmarks 12-13

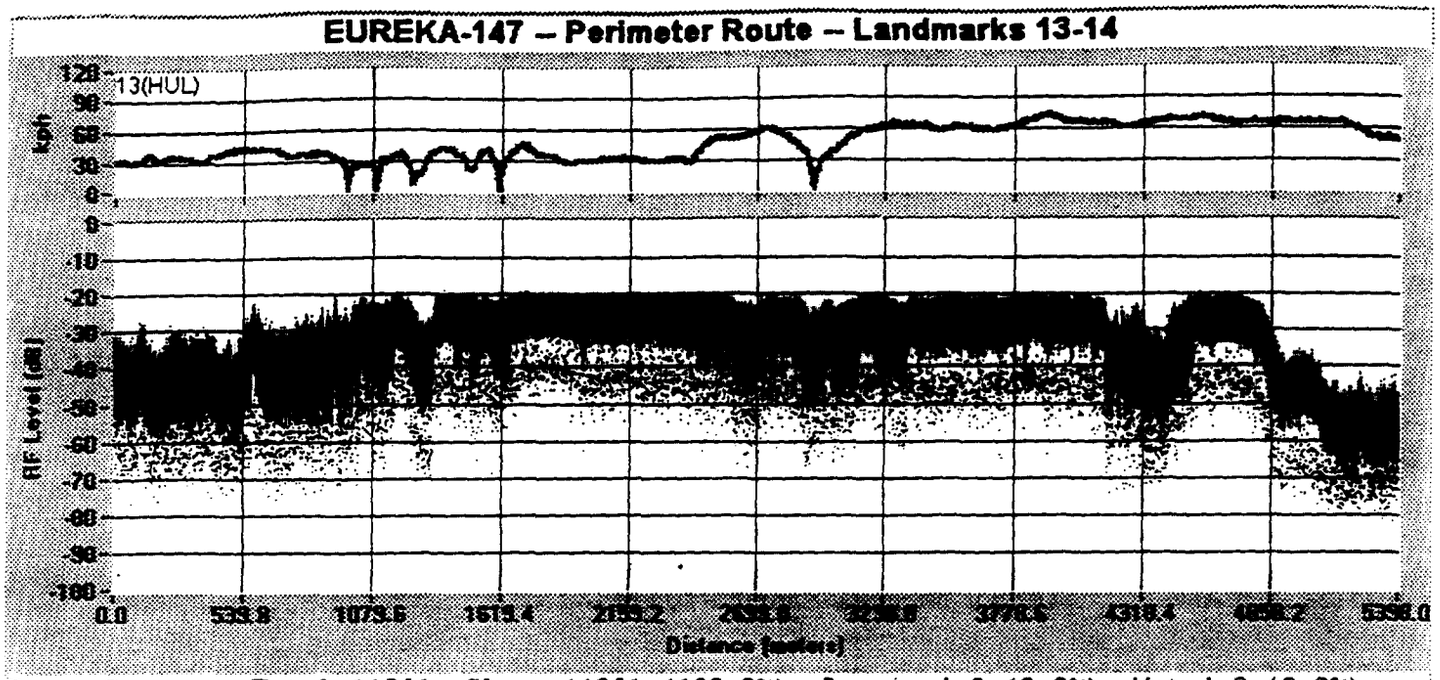


Event Summary: Total 4202; Clear 4202 (100.0%); Impaired 0 (0.0%); Muted 0 (0.0%).

VOA/JPL -- Perimeter Route -- Landmarks 12-13

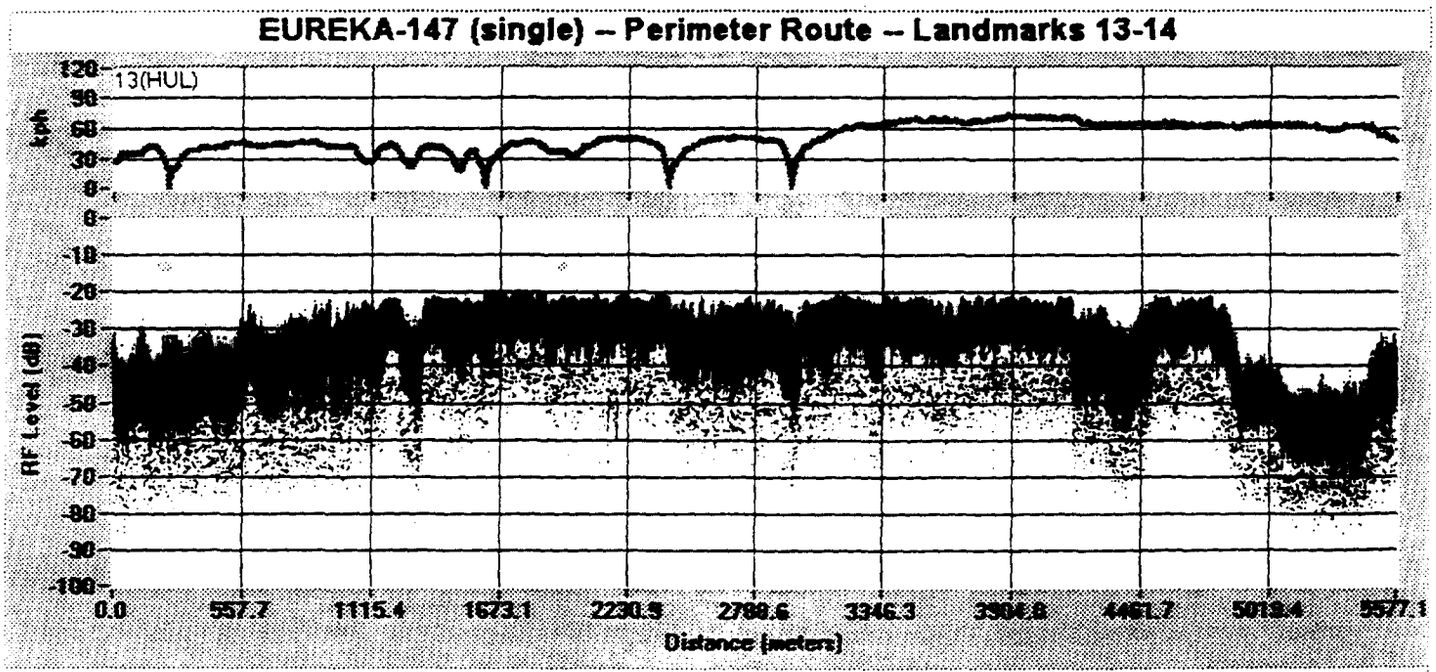


Event Summary: Total 4098; Clear 4039 (98.6%); Impaired 23 (0.6%); Muted 36 (0.9%).



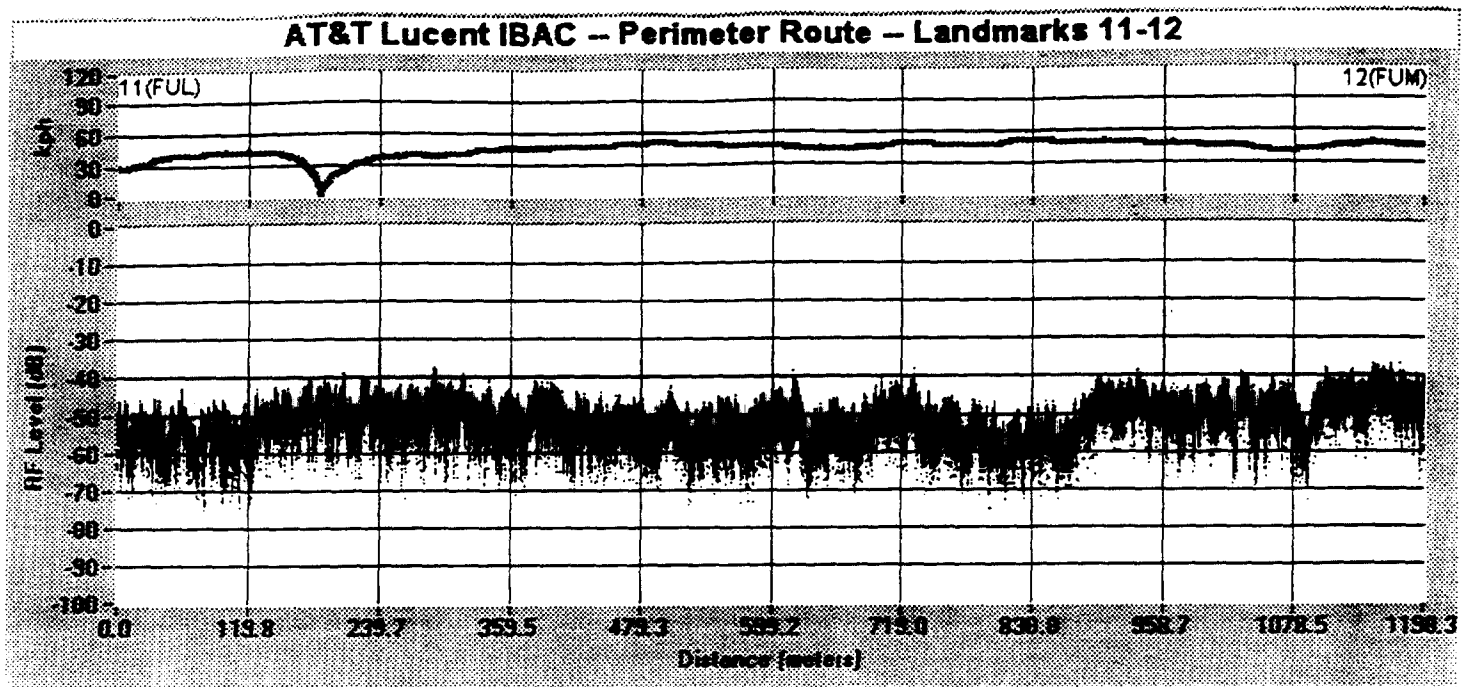
Event Summary: Total 11061; Clear 11061 (100.0%); Impaired 0 (0.0%); Muted 0 (0.0%).

NOTE #2

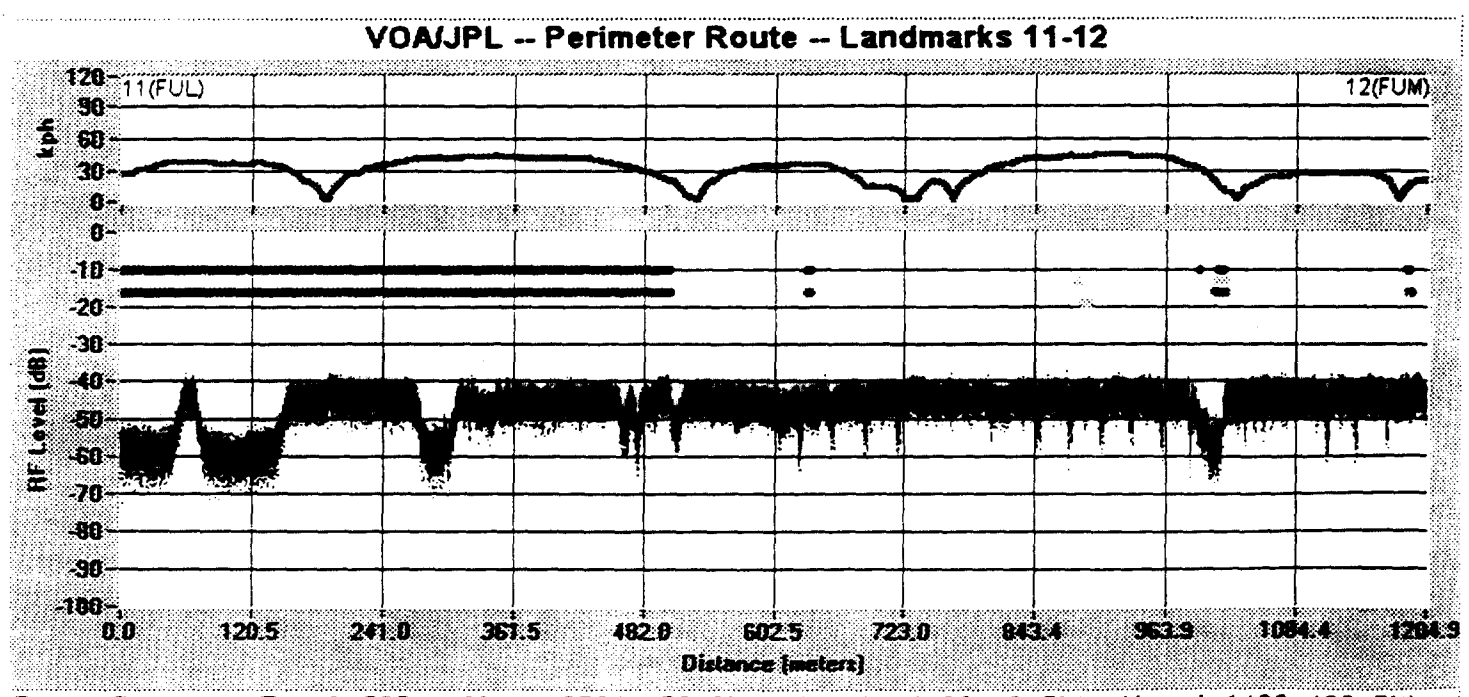


Event Summary: Total 10382; Clear 10363 (99.8%); Impaired 19 (0.2%); Muted 0 (0.0%).

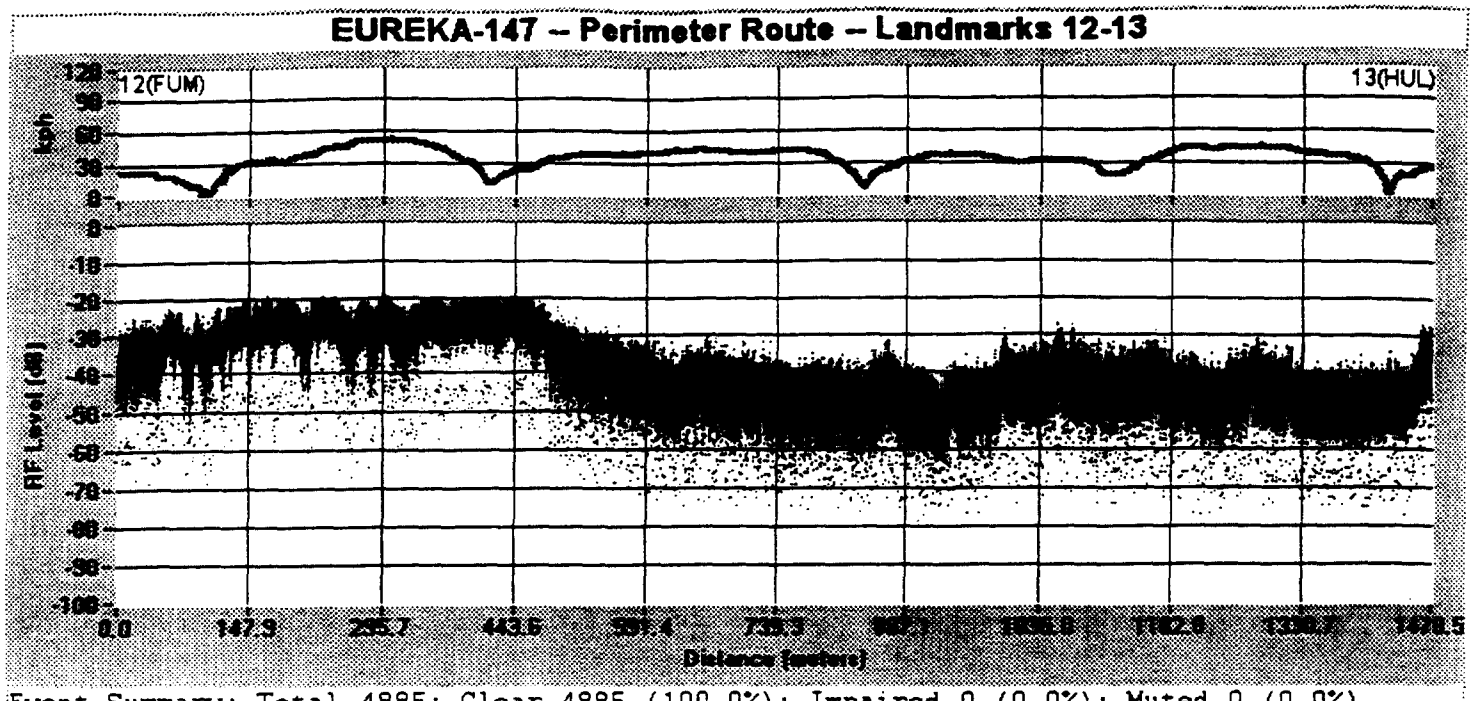
NOTE #2



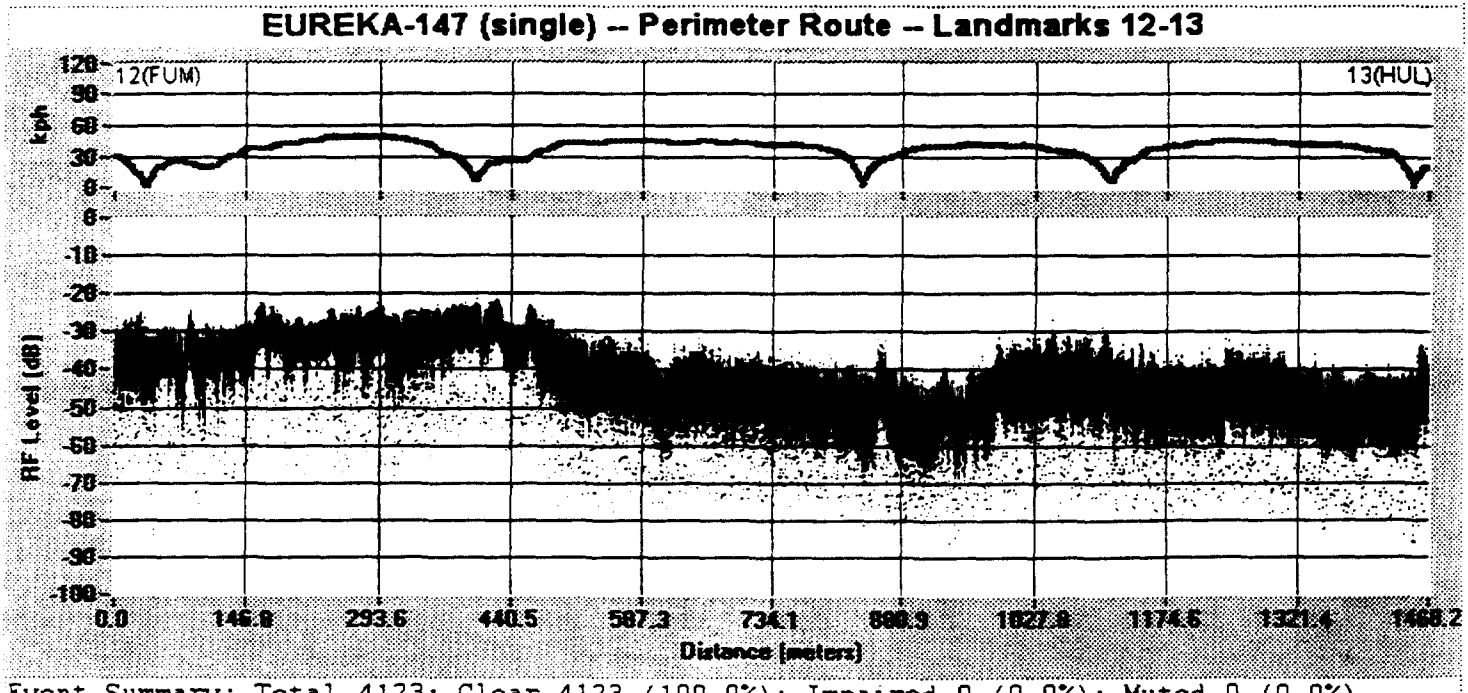
Event Summary: Total 2382; Clear 2382 (100.0%); Impaired 0 (0.0%); Muted 0 (0.0%).



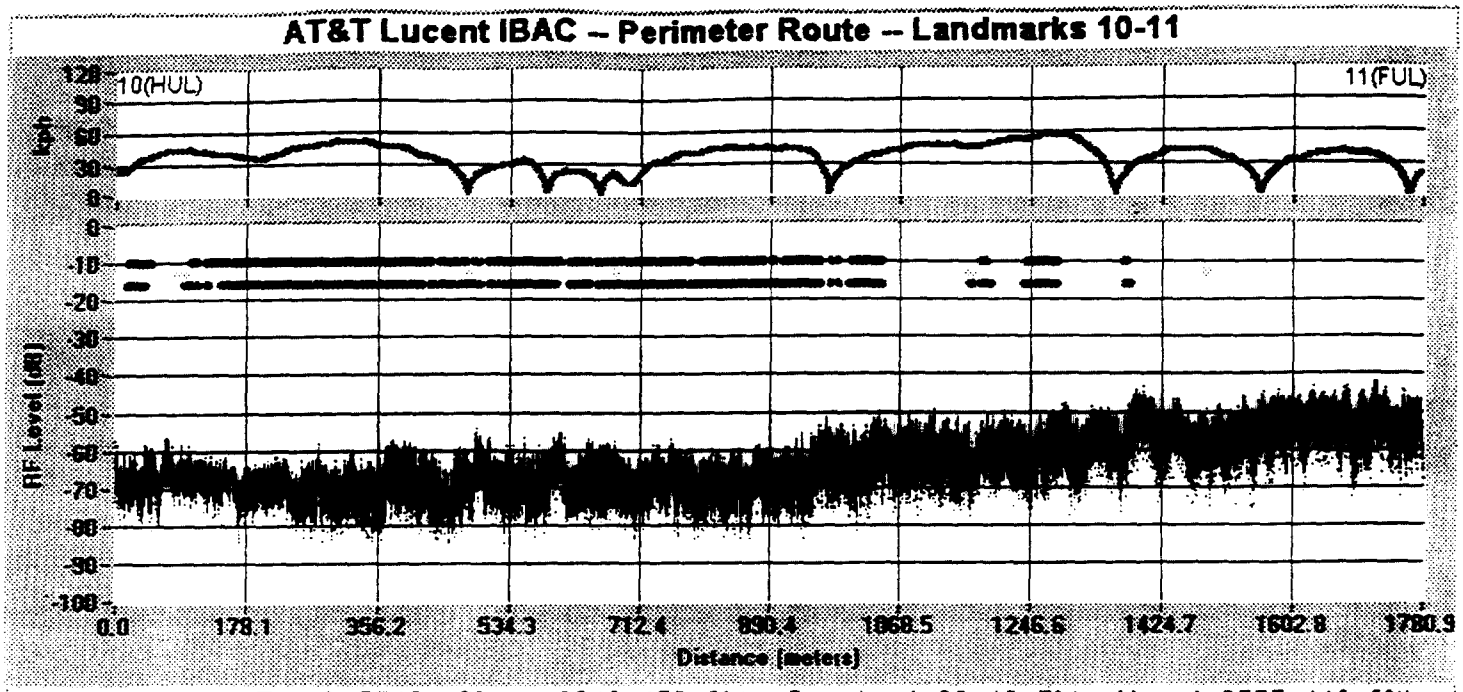
Event Summary: Total 5051; Clear 3526 (70.0%); Impaired 26 (0.5%); Muted 1499 (29.7%).



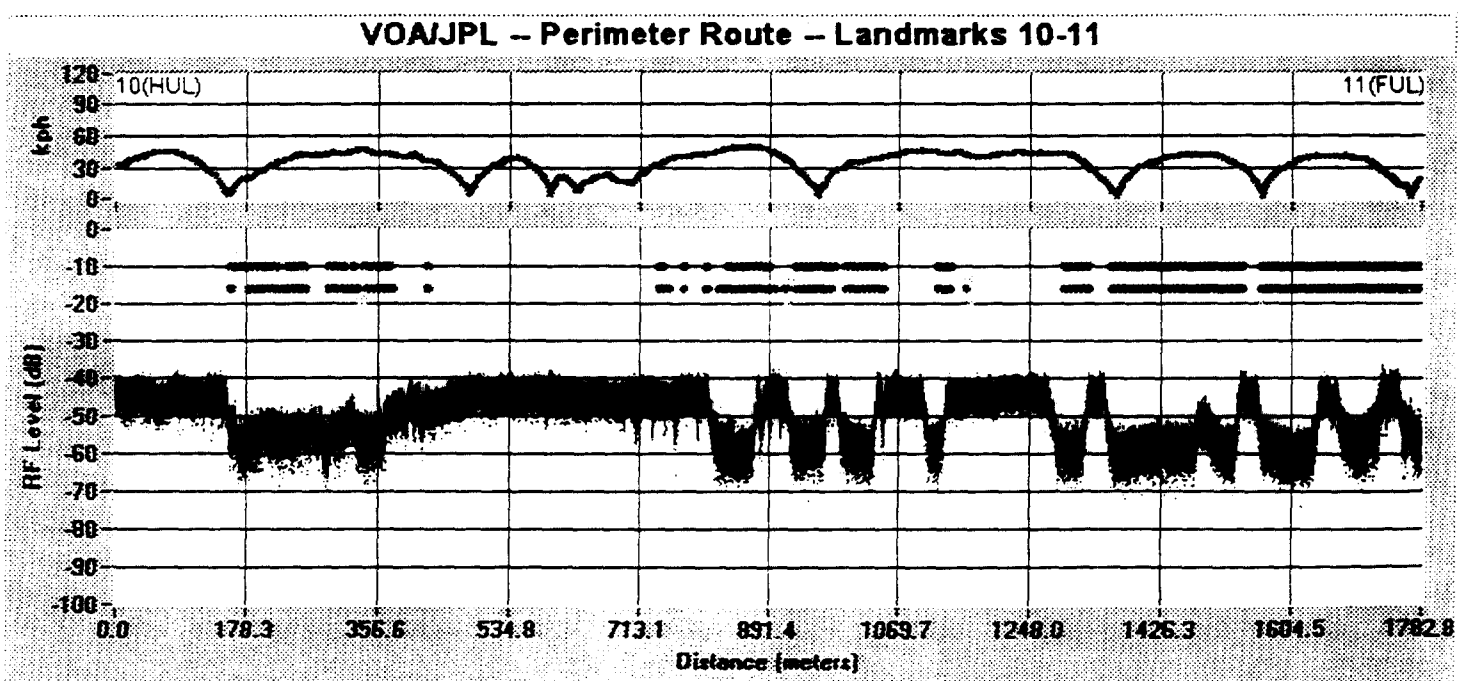
Event Summary: Total 4885; Clear 4885 (100.0%); Impaired 0 (0.0%); Muted 0 (0.0%).



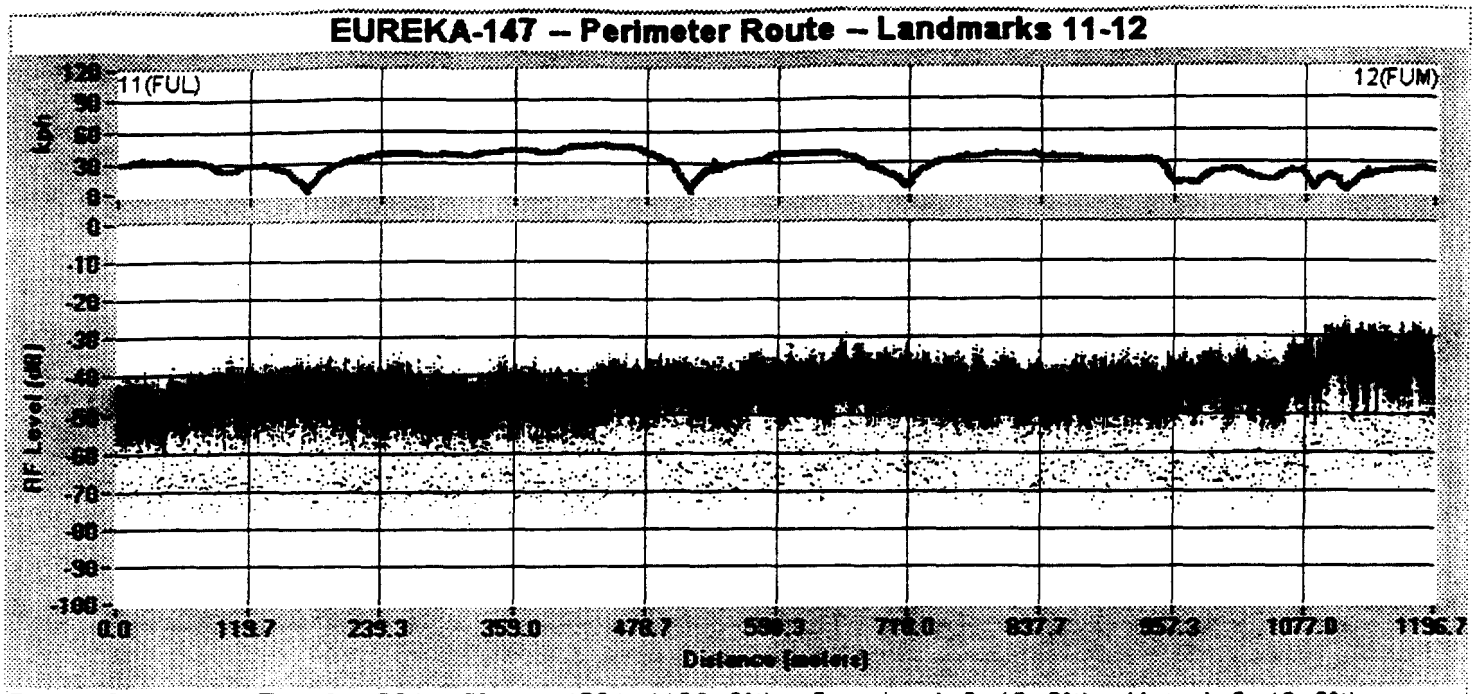
Event Summary: Total 4123; Clear 4123 (100.0%); Impaired 0 (0.0%); Muted 0 (0.0%).



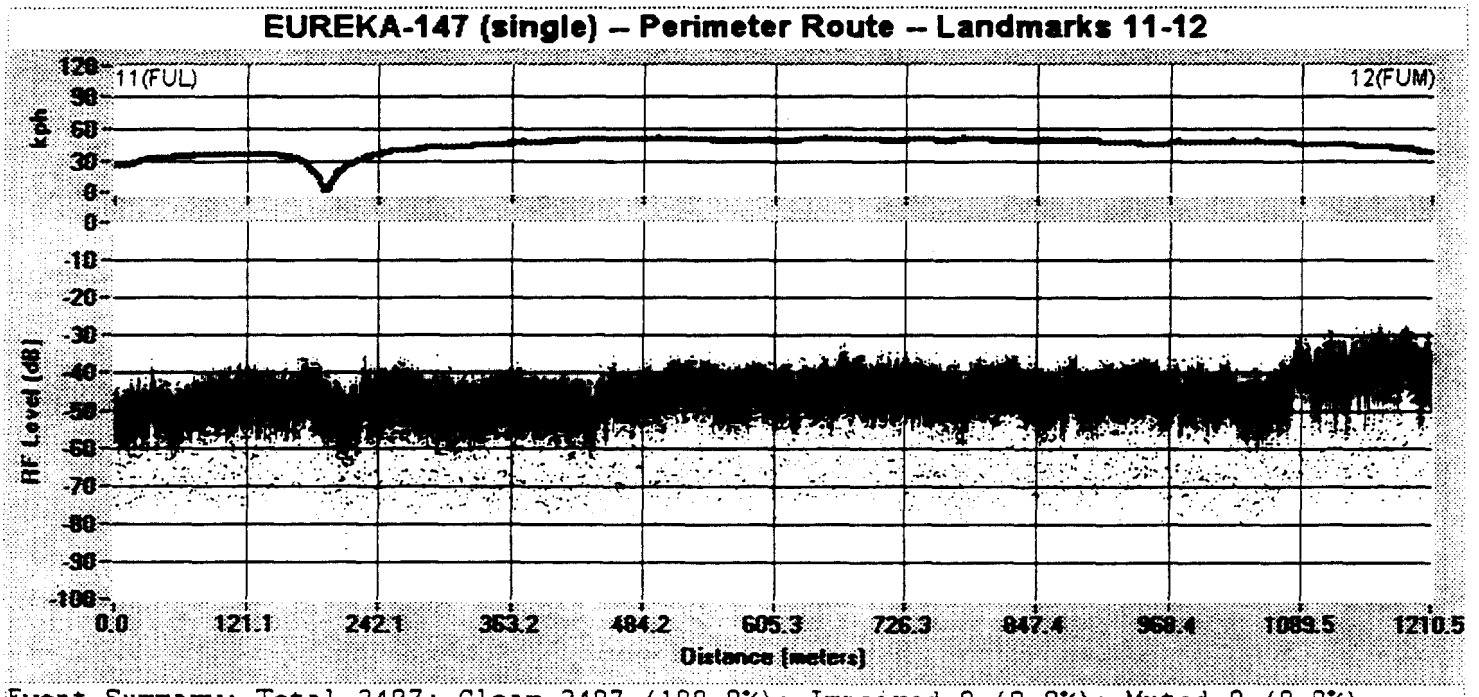
Event Summary: Total 5543; Clear 2940 (53.2%); Impaired 28 (0.5%); Muted 2575 (46.6%).



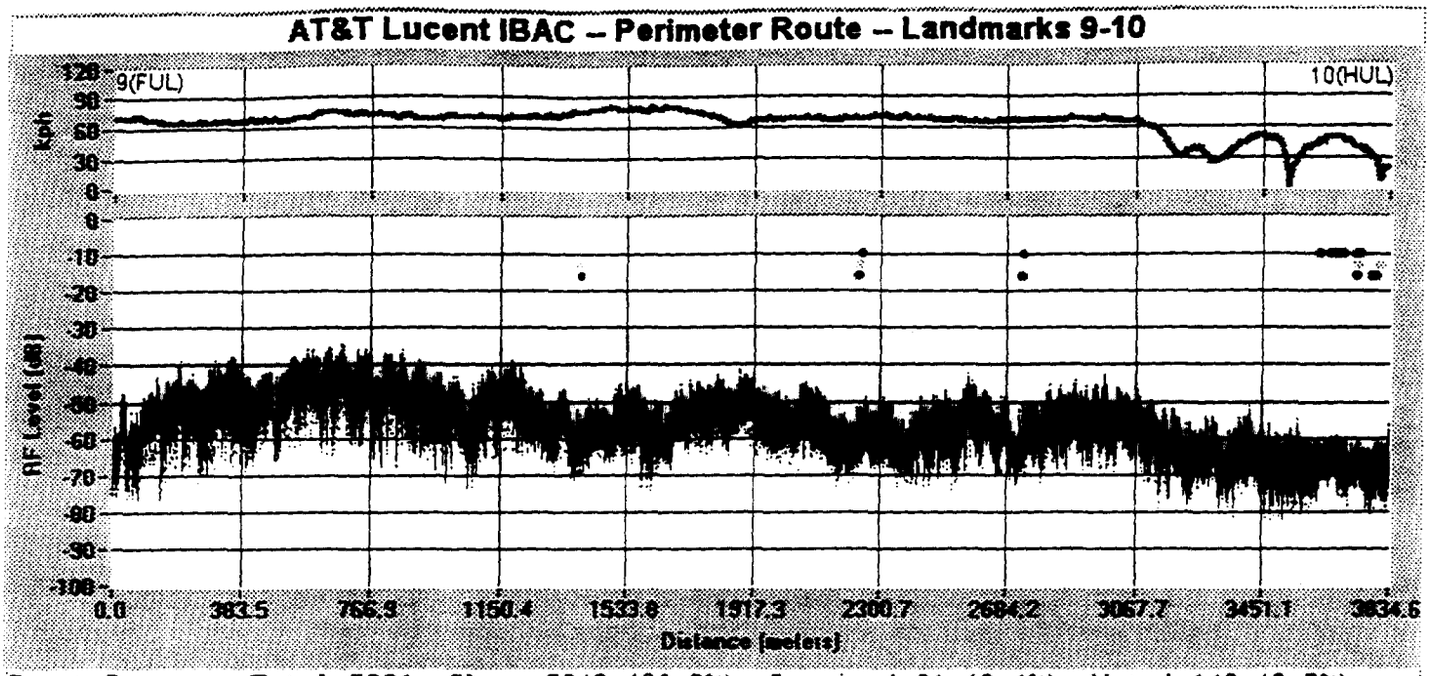
Event Summary: Total 5725; Clear 3025 (53.0%); Impaired 56 (1.0%); Muted 2644 (46.4%).



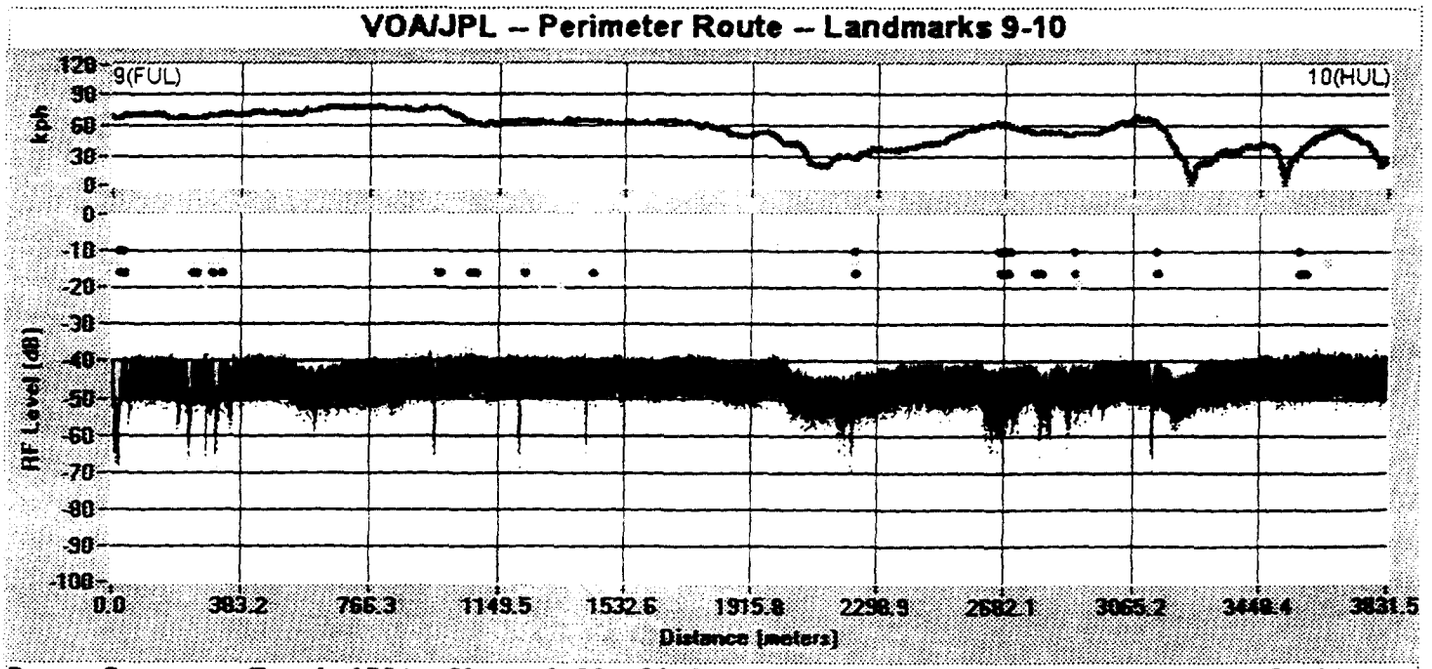
Event Summary: Total 4731; Clear 4731 (100.0%); Impaired 0 (0.0%); Muted 0 (0.0%).



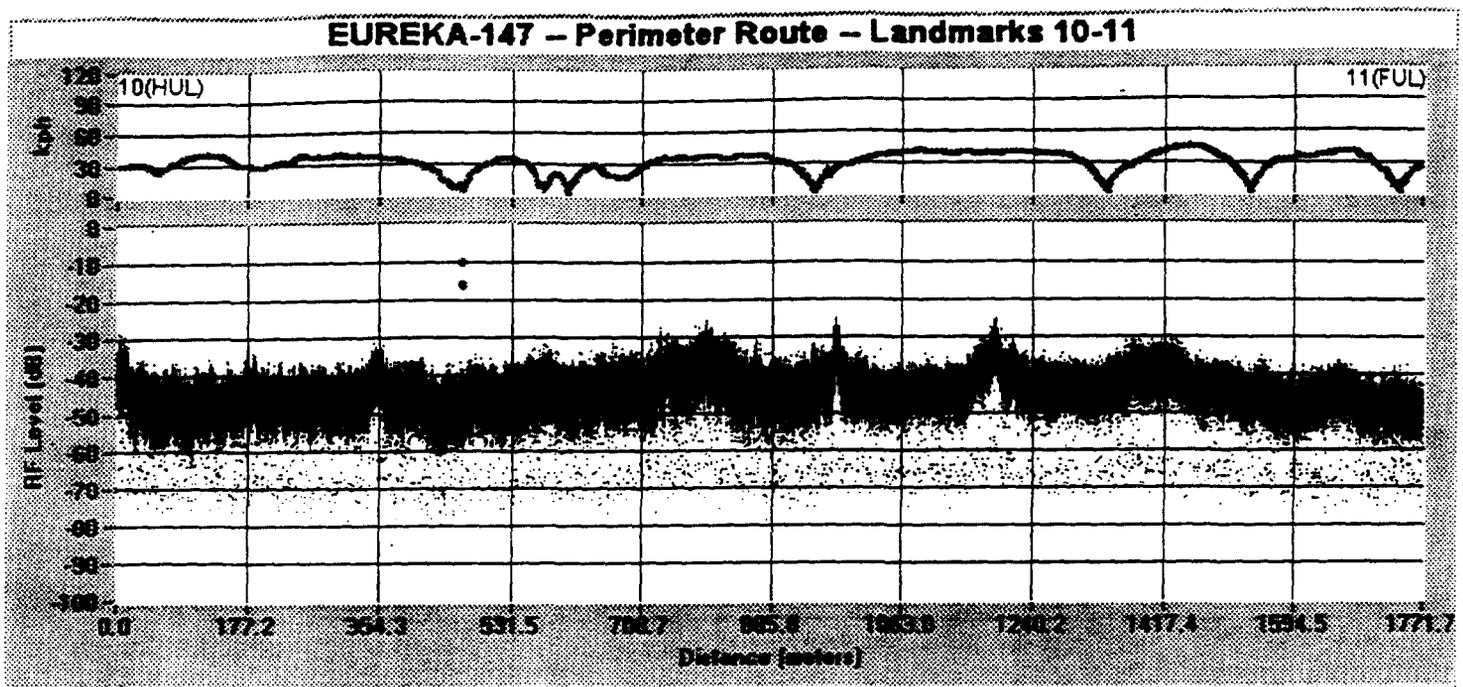
Event Summary: Total 2497; Clear 2497 (100.0%); Impaired 0 (0.0%); Muted 0 (0.0%).



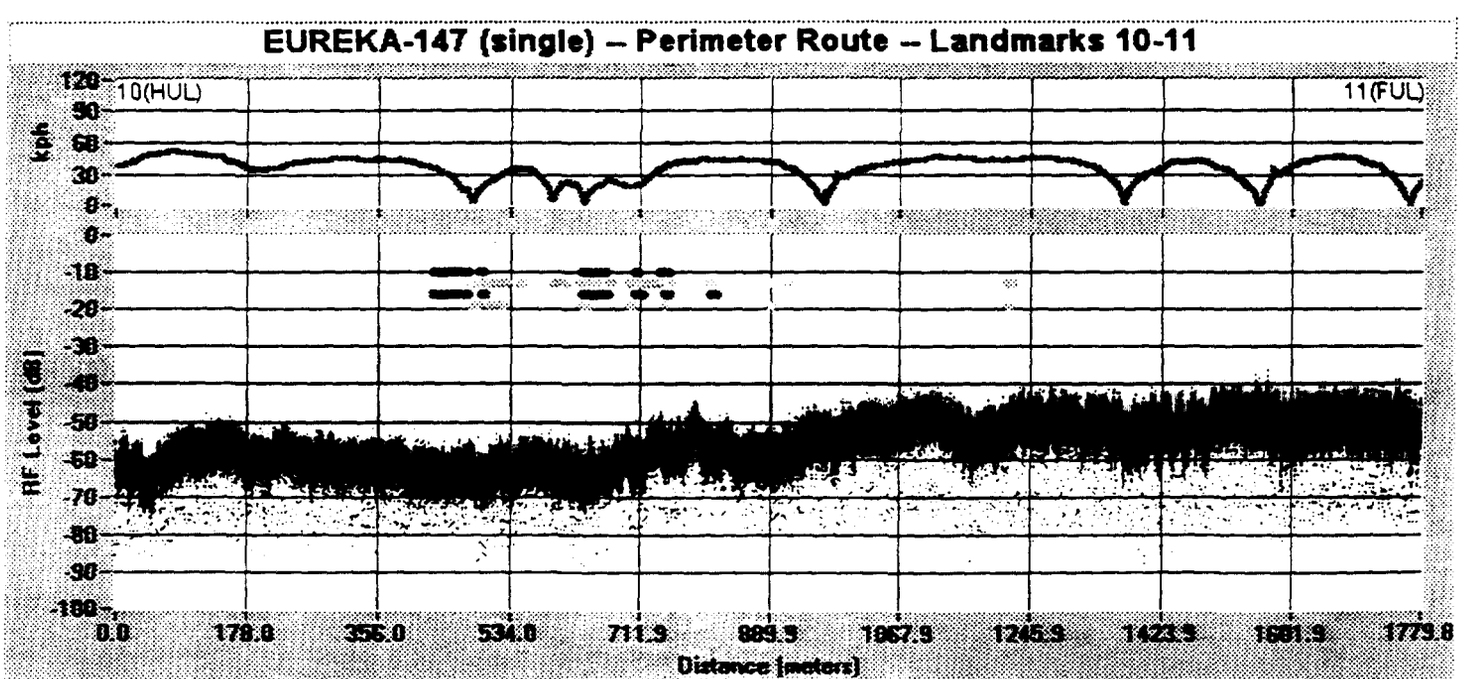
Event Summary: Total 5201; Clear 5040 (96.9%); Impaired 21 (0.4%); Muted 140 (2.7%).



Event Summary: Total 6791; Clear 6499 (96.0%); Impaired 81 (1.2%); Muted 211 (3.1%).



Event Summary: Total 6470; Clear 6448 (99.7%); Impaired 0 (0.0%); Muted 22 (0.3%).



Event Summary: Total 5934; Clear 4996 (84.9%); Impaired 445 (7.6%); Muted 493 (8.4%).