FINAL REPORT

MEMORIAL UNIVERSITY OF NEWFOUNDLAND

ANIK B PILOT PROJECT

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Date : September 1981

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I. SUMMARY

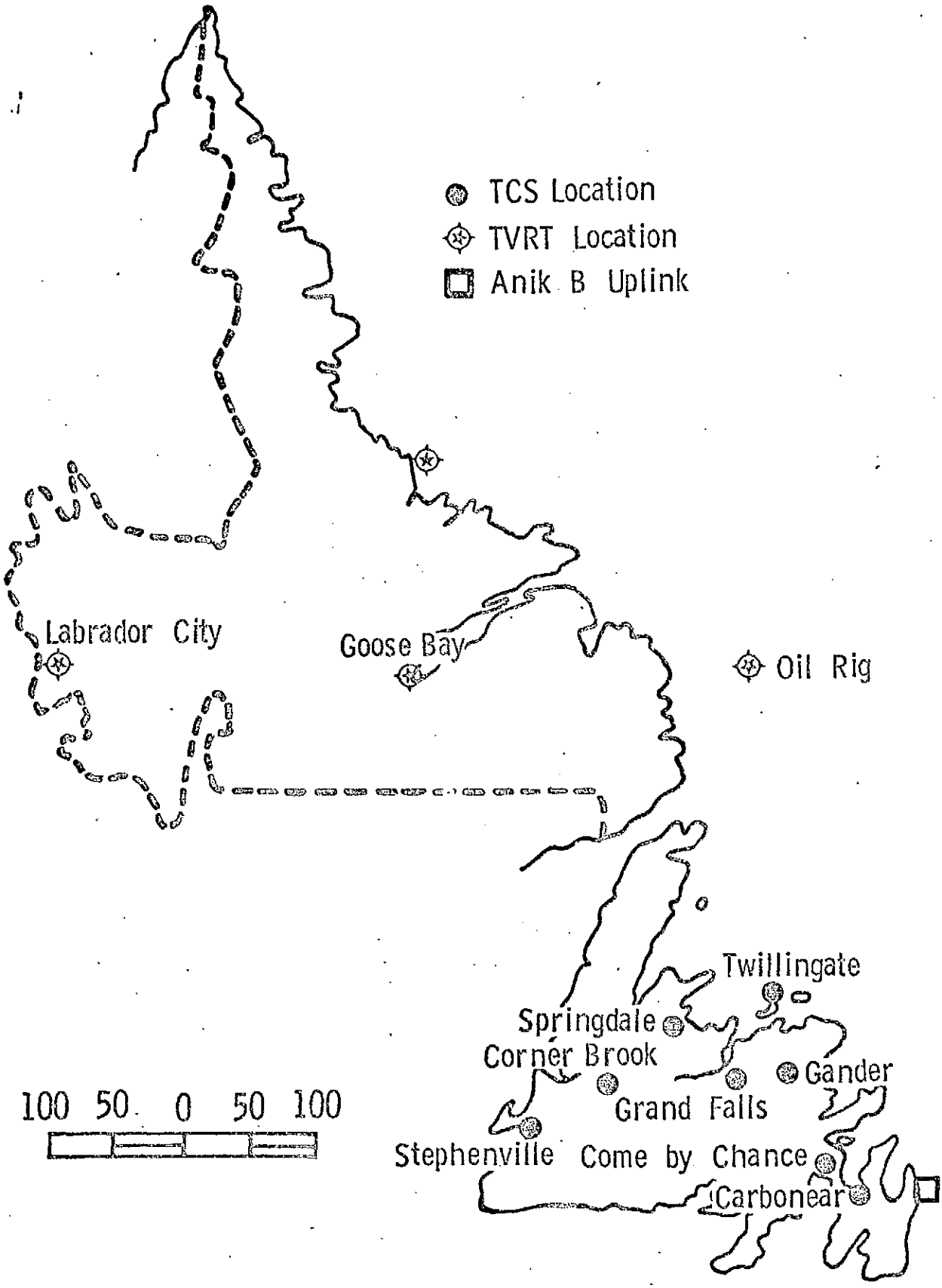
In the 1980-81 fiscal year, Memorial University's Faculty of Medicine conducted a pilot project using the Department of Communications' Anik B satellite. In this Phase I of the Department's programme, the University employed four 3 metre terminals and one 32 inch terminal to provide an interactive audio system. In the summer of 1980, the System consisted of a 3 metre terminal in St. John's and the 32 inch terminal on the petroleum exploration vessel, PetroCanada's Neddrill 2. Full use of the System did not occur in the period July 1 to September 30 because of a variety of technical and logistical problems. However, successful test transmissions confirmed that satellites and their associated terminals have a potential role to play in providing communication services to offshore development. In the fall of 1980, the three other 3 metre terminals were installed in Labrador City, Goose Bay and Makkovik. They were installed to provide personnel in the health facilities in those places with access to programming in areas such as continuing education for health professionals, and committee meetings. Ground lines were provided in Labrador City and Goose Bay to academic facilities used by the University and people in those communities were able to participate in University credit courses. The programming made available to these communities by the Anik B satellite was developed for a terrestrial teleconference system that linked several other communities in the Island portion of Newfoundland. The project thus involved successful integration of satellite and terrestrial interactive audio facilities.

Since the support from the Department of Supply and Services ended, the satellite terminals have continued to be used and the terrestrial teleconference system has been expanded. Negotiations are under way with the Department of Communications to decommission the satellite terminals over the late summer and fall now that their potential has been demonstrated. Planning is proceeding for a project to expand the use of Anik B in the offshore environment in late 1982.

II INTRODUCTION

In December 1979, Memorial University's Faculty of Medicine submitted an unsolicited proposal to the Science Procurement Branch of the federal Department of Supply and Services (DSS) (Appendix A). It requested support in the amount of $229,413.47 to develop an interactive audio system using the federal Department of Communications (DOC) Anik B satellite. Terminals were to be placed in Labrador City, Goose Bay and St. John's in the early summer of 1980 (Figure I). They were to be located on hospitals and used for a variety of educational and administrative applications in the health care system. The Faculty of Medicine was to coordinate the scheduling and programming of the terminals, and had a subcontract with the University's Educational Television Centre (ETV) to provide the technical interface appropriate to the terminals. This interface was designed to permit the satellite system to be linked with an existing terrestrial Teleconference System (TCS) developed by Memorial University and Newfoundland

Figure I Memorial University Anik B Project Locations



Telephone Company Limited (NTC) (see Figure I and Appendix A). This aspect of the project was to start in the early summer at 1980 and end as late as possible in 1981, depending upon negotiations with DOC.

The project was also to involve (1) placement of an interactive terminal on a petroleum exploration ship (i.e., the Neddrill 2 leased by PetroCanada Explorations Limited) off the Labrador coast in the 1980 summer drilling season, and (2) the transmission of medical data using slow scan television equipment (SSTV), first from the Neddrill 2 and then from the hospital in Labrador City. These aspects of the project permitted it to qualify for research support from oil companies operating under Provincial exploration regulations. $95,000 was received, primarily from PetroCanada, to cover the project's capital costs, which DSS was unable to consider according to the terms of reference of the UP Programme in 1979-80.

The proposal was approved in the amount of $114,625, and included support from the federal Department of Health and Welfare (HWC). The period of the contract was from April 1, 1980 to March 31, 1981.

After reviewing the project's objectives and milestones, this report summarizes the work completed during the twelve month period of the contract under the following headings: (1) Neddrill 2, (2) Labrador Terminals, (3) Slow Scan Television and (4) Other Medical Data.

III PROJECT OBJECTIVES

(1) To assess the capability and the operational effectiveness and efficiency of satellite communications to provide an interactive audio system used for health care, and health and general education.

(2) To assess the feasibility of utilizing the satellite system with Memorial University's currently existing terrestrial Teleconference System.

(3) To test and assess the capabilility and operational viability of satellite communications to improve the provision of health care, education, general communication services and public radio service to offshore petroleum exploration.

(4) To test and assess the capability of slow scan television (SSTV) on a satellite communication system in both the offshore petroleum and Labrador hospital settings.

IV PROJECT MILESTONES

December 1979	- Proposal Submitted to DSS
April 1980	- Proposal Approved
May 1980	- Visit by DOC Technical Personnel to finalize details of Neddrill 2 component
June 1980	- St. John's 3 Metre Terminal Installed

June 30-July 3, 1980	- 32 inch Terminal Installed on Neddrill 2
July 5-9, 1980	- St. John's - Neddrill Link Used
August 1980	- Labrador City and Goose Bay Terminals Installed
November 1980	- Makkovik Terminal Installed
January 1981	- SSTV equipment in Labrador City
March 1981	- DSS Contract Terminated

V REPORTS ON PROJECT COMPONENTS

1. Neddrill 2

(a) Introduction

In June 1979, Memorial University prepared a funding proposal which it submitted to several oil companies operating off the Newfoundland coast (Appendix B). The proposal sought research funding, under guidelines prepared by the Newfoundland Provincial Government, to support the developmental costs of a combined terrestrial/satellite interactive audio system that would include a terminal on an oil rig. Funding was received primarily from PetroCanada Explorations Limited, with a smaller contribution from Hudson Bay Oil and Gas Exploration Ltd., that totalled $95,000. This support, received in November 1979, permitted necessary technical and clerical staff to be engaged and orders for capital equipment to be placed. Bridge funding for operational costs was therefore requested of DSS.

By April 1980 when DSS funding was confirmed, an agreement had been reached with PetroCanada to permit the installation of a 32 inch telephony terminal on Neddrill 2 in the summer of 1980. A visit by DOC officials in mid-May settled the final details.

(b) Project Description

A 32 inch terminal was mounted on Neddrill 2, using a manually adjustable pedastal, to provide two four-wire voice grade telephony circuits between St. John's and the ship. On the ship, ETV installed internal wiring to the Infirmary and to a lounge. In St. John's, a 3 metre terminal on the roof of the Education Building at Memorial was connected by cable to the Emergency Department of the General Hospital in the Health Sciences Centre (HSC) and to the offices of the Teleconference System (TCS) in the HSC. These facilities were to be used for medical care and consultations between the ship's male nurse and personnel in the HSC, for continuing nursing education programmes and for general educational programmes for ship personnel (e.g., safety education). These applications were to be supplemented by SSTV transmission equipment on the ship and receiving equipment in the HSC Emergency Department. A teleconference installation in the PetroCanada offices would also have permitted personnel there to participate in programmes as needed.

(c) Project Implementation

By June 29, 1980, when the Neddrill 2 arrived in St. John's, all technical and administrative preparations had been completed. From June 30 to July 3, DOC and ETV staff installed their respective equipment on the ship and briefed the radio operator on its operation and maintenance. The male nurse met personnel in the HSC and draft protocols for documenting use of the satellite were discussed.

From July 4 to 8, regular contact was established with Neddrill 2 several times a day as the ship travelled from St. John's to its drilling location. Both voice and SSTV equipment were tested and shown to be working well. Regular contact was maintained even when the ship was moving and very few re-alignments of the terminal pedastal were needed. A separate technical report to be submitted by ETV describes the reason why these results are significant.

From July 9 to September 22, a variety of technical problems were experienced that were compounded by the logistical difficulties in gaining access to the ship because of the operational pressures of the drilling programme. Programming was limited to public affairs sessions transmitted to the ship every evening from August 12 to September 22. These hour - long transmissions would not have been available to the ship's personnel without the Anik B project as other communications services were not appropriate for a variety of technical reasons.

The ETV and DOC equipment was decommissioned on the Neddrill 2 October 12-16 and shipped to St. John's since the vessel was not returning to the City. The antenna was returned to DOC and the associated electronic packages were sent to a nursing station in the coastal Labrador community of Makkovik (see page 10).

(d) Conclusions and Recommendations

i. The systems installed on the Neddrill 2 initially worked very well in spite of the fact that (a) the terminal was much smaller, 32 inches, than the 3 metre size used in other sites, (b) the 12-14 GHz range required a high degree of pointing accuracy, and (c) the antenna was not mounted on a stabilized platform.

ii. Because the terminal was not designed for application on a moving object, the rigid waveform guide monitor constituted a design defect and was the primary technical problem. Such a situation could be remedied in an operational system specifically planned for offshore petroleum exploration.

iii. The project used a substantial amount of spacecraft power to compensate for the small size of the antenna. In an operational system, sufficient power may not be available and/or may be too expensive.

iv. The project experienced problems such as scarce spare terminal parts and restricted access to the ship which would have to be corrected if an operational system were to be implemented.

v. DOC operated the satellite from 0900 to 2200 hours (Newfoundland time) five days a week. This limited schedule would not be suitable in a more active experiment, when seven day use, that was as close as possible to 24 hours daily, would be required.

This project occurred in Phase I of DOC's Anik B Programme. The experience gained has resulted in participants agreeing to plan a project in Phase II that would correct the technical problems encountered. Once a viable system were available, the programming applications described above could be implemented.

2. Labrador Terminals

(a) Introduction

Although the hospitals in Labrador City and Goose Bay had participated in a previous Hermes experiment in the spring of 1977 (House, McNamara, Roberts, 1977), they were not part of the dedicated, four-wire terrestrial teleconference system (TCS) started in the summer of 1979 with DSS support. The cost of accessing them on such telephone lines provided by the common carrier was considered to be prohibitive, and illustrated the advantage of satellites in servicing remote communities. This situation was a major reason for Memorial's interest in the Anik B programme.

Once TCS start up problems were resolved and the System was operational late in 1979, two wire facilities in Labrador City and Goose Bay were installed to permit groups at both the hospitals and university facilities to dial into programmes on TCS for

the cost of a long distance call. These installations were also intended to serve as a back up to Anik B should it experience technical difficulties. The dial up service was operational by January 1980. The costs and poor quality of long distance circuits to Labrador made users there enthusiastic to use Anik B once it could be made available.

(b) Project Description

The final project was approved by DOC in the spring of 1980 after a lengthy process of revision to a much larger project, that had started being planned as early as the fall of 1977 when Memorial's Hermes project had ended. Three 3-metre terminals were installed on the hospital roofs in Labrador City and Goose Bay, and at the nursing station in Makkovik. The DOC terminals provided two four-wire telephony channels, one for interactive audio programming and one for technical and data transmission purposes. ETV wired two or three rooms within the hospitals to the terminals and provided Darome audio equipment similar to that used on TCS. Local NTC telephone service linked a high school in Labrador City and the MUN Building in Goose Bay to the hospitals.

The primary use of the Anik B installation was participation in regular TCS sessions in programme areas such as continuing education for health professionals, administrative applications such as committee meetings, and general university educational activities. The SSTV equipment from Neddrill 2 was installed in

Labrador City for medical data transmission and consultations (see page 18). The Labrador City and Goose Bay terminals were to be operational July 1, with the dates for installing SSTV and the Makkovik terminal dependent on the date of decommissioning the equipment on Neddrill 2.

(c) Project Implementation

Problems with the availability of DOC equipment resulted in the Labrador City and Goose Bay terminals not being operational until early September 1980. (As a result, DOC extended Memorial's participation in Anik B Phase I from February 27 to May 31, 1981). The Makkovik terminal became operational in November. No major problems were experienced in the installation process. The dial up facilities were retained as a back up to the satellite.

Specific usage of the terminals for interactive programming with TCS sites is summarized in Table 1. Virtually all usage of the Labrador terminals was in combination with the terrestrial TCS, except for one series of CME programmes which was started January 1981 especially for physicians in Labrador City and Goose Bay, to overcome their problem of the inconvenient times at which other CME programmes were held. Thus, although technically the two systems could be operated independently, functionally there was litte need for it at this time in the development of TCS.

TABLE 1 USE OF LABRADOR TERMINALS FOR INTERACTIVE AUDIO PROGRAMMING

September 1, 1980 to March 31, 1981

SITE NAME	# Sessions Eligible	# Sessions Participated	# Hours Eligible	# Hours Participated	Participation Percentage
Labrador					
Hospital	237	100	294	129	44%
School	41	36	57.5	54	93%
Goose Bay					
Hospital	295	168	380	215	57%
School	53	45	73	65	89%
Makkovik	33	10	38	9	24%

It should be noted that the participation rates were higher for the non-hospital sites because the programmes offered to them were credit courses, whose registrants knew that they could attend at that time. Hospital educational sessions were non-credit and potential participants were subject to service demands. Makkovik had only three nursing staff and it was not expected that they would be able to participate in many sessions. The participation rates should be interpreted in terms of the overall pattern of TCS use where the range in the hospital participation percentages was from 65% to 48%. Labrador City Hospital had thus the lowest participation percentage overall. The range in the non-hospital participation rates was from 99% to 28% (see Appendix C).

Technical problems occurring in the period October 27, 1980 to March 31, 1981 are summarized in Table 2. It can be seen that, while technical problems were not frequent, they tended to last a long time. These technical problems caused considerable expense in dial up calls during the contract period and have continued after March 31. The heading of "Human delay in start up" refers to the fact that DOC and TCS staff thought that they had a problem early in the day, but learned that site personnel in Labrador had not powered up the antenna that day.

(d) Conclusions and Recommendations

i. Despite the asymmetry in interaction time caused by the satellite's geosynchronous orbit and its "double hop" design, no problems were experienced in using the satellite and

TABLE 2 SUMMARY OF ANIK B TECHNICAL PROBLEMS

October 27, 1980 - March 31, 1981

SITE WITH TECHNICAL PROBLEM	FREQUENCY	TOTAL DURATION (HOURS)
OTTAWA		
DOC equipment	4	4.5
Human intervention	1	.666
Outside Factors	2	1.75
SUBTOTAL	7	6.91
ST. JOHN'S		
DOC equipment	3	5.75
LABRADOR CITY		
DOC equipment	6	5 days 1.5 hours
Human delay in start up	2	unknown
Outside factors	1	1 day
SUBTOTAL		6 days
GOOSE BAY		
DOC equipment	4	12 days 1.5 hours
Experimenter equipment	1	6 days
Human delay in start up	7	4.5 hours (3 times unspecified)
SUBTOTAL	12	18 days
MAKKOVIK		
DOC equipment	4	2 days 2 hours
TOTAL	35	26 days 22.15 hours

terrestrial audio systems in the combined mode.

ii No substantial problems were caused by the limited availability of the satellite compared to the dedicated terrestrial system, but as TCS expands, there is pressure to use the weekend time in particular.

iii. The fact that users did not perceive any difference in the two systems was an advantage for programming, but a disadvantage when technical problems developed. For several reasons, the repair of DOC equipment took longer than servicing TCS, but users could not appreciate the difference because they thought it was one system. The dial ups were expensive and of inferior quality to the Anik B circuits. Yet the almost total programming linkage of the two systems made it impossible to drop Labrador out of the system when there were technical problems.

iv The long service response time and unavoidable problems with the DOC equipment compared to that in the terrestrial TCS, the costs of Anik B in Phase II and the limited availability of programme time are factors leading Memorial to reconsider its involvement in Phase II of the Anik B programme. All these considerations make Anik B increasingly expensive.

v The DSS support was crucial in the expensive start up phase of Memorial's Anik B project. The lack of comparable outside support in Phase II is one of the factors limiting the extend of Memorial's future participation.

vi Cost comparisons would need to be done to determine the cost effectiveness of satellites and terrestrial systems in the Labrador setting. The cost study would have to compare the conditions of the Anik B Programme with the common carrier rates, and would be complicated by the fact that, in Newfoundland and Labrador, satellites are not part of the carriers' network.

3. Slow Scan Television Equipment (SSTV)

(a) Introduction

Trial use of SSTV in the Hermes project (House, Robbins, Roberts 1977) and an in-house research project in the winter of 1979/80 (Roberts, House, Canning, 1981) were sufficiently encouraging that equipment was purchased with a grant from the Weston Foundation in 1979.

(b) Project Description

It was planned to use the two Colorado Video 280 Transceivers first during the Neddrill 2 project to supplement audio consultations between the male nurse on the ship and personnel in the Emergency Department of the General Hospital. A Telemation camera was on the ship for transmission purposes; an Electrohome monitor was installed in the Emergency Department, as well as Darome teleconferencing equipment at both sites.

Once the Neddrill 2 project was finished, it was planned to install the SSTV transmitting equipment in the Hospital in Labrador City to facilitate consultations.

(c) Project Implementation

As mentioned on page 8 , the SSTV equipment worked in a few test sessions in early July between Neddrill 2 and ETV, but transmission problems related to the antenna and associated electronics packages prevented its regular use.

Once the equipment was received from the Neddrill 2 in late October, it was checked out and sent to Labrador City where it was installed the first week in January 1981.

The late installation and the fact that subsequently it was not used extensively can be attributed to a series of problems that have plagued this aspect of the Anik B pilot project:

i an unanticipated personnel shortage in ETV in the fall and early winter of 1980-81;

ii difficulties in finding and training appropriate personnel at the hospital in Labrador City to operate the equipment on a regular basis and misunderstandings about the source of payment to such a person;

iii medical staff shortages in Labrador City which prevented them from having the extra time to begin using the equipment to solve patient problems;

iv greater interest in Labrador City in equipment to transmit ECG's rather than radiographs;

v intermittent problems with the DOC equipment in Labrador City, St. John's or Ottawa that seemed to happen

at crucial times in efforts to try to start up use of the SSTV.

vi underestimation of the problem in St. John's caused by the fact that the radiologists who normally provided a visiting service to Labrador City were not located at the HSC where the SSTV was installed.

(d) Conclusions and Recommendations

i Personnel in both Labrador City and St. John's remain interested in the concept of SSTV.

ii It is planned to use SSTV in an offshore petroleum project being planned for 1982.

iii Discussions with Kelcee Communications personnel have revealed that the type of camera and size of television monitor used are not the optimum for interface with the CVI units.

4. Other Medical Data

It should be noted that meetings were held with personnel from the Université de Montréal/Sacré Coeur Anik B project to discuss the equipment appropriate to transmit ECG's over telephone lines. It is hoped that a project can be developed incorporating the results of these discussions; however, outside grant support would have to be sought for such a project.

In late April 1981, equipment for transmitting EEG's* over the satellite data channel was installed in Labrador City and a nurse from the hospital spent a week in St. John's being trained in its use. Patients are now regularly having EEG's sent to St. John's using this equipment and the Anik B satellite.

VI FUTURE DIRECTIONS

A number of very positive conclusions can be drawn from the project described in this report. Satellite facilities can be used to provide an interactive audio system to remote parts of a province. These facilities are not only suitable for use as a separate system, but can also be intergrated with terrestrial facilities. The voice quality on the two systems can be equivalent and the brief delay in the satellite signal is easily tolerated by users. This project demonstrated that satellite and terrestrial systems could be successfully operated in either the combined or split modes. The issue of cost effectiveness was not a primary objective of this project and was therefore not addressed.

It should be noted that the start up costs and initial capital and operation budgets involved in this project may seem excessive if they are analysed over the period of this 12 month DSS contract. The facilities and personnel that were engaged could in theory last much longer than that period and a major cost study would have to consider a more appropriate amortization

* electroencephalograms

period. Informally, users indicated that they were effecting cost savings as a result of using the satellite system for meetings but there is no documented material available on this point. This is an issue which could be addressed in future projects. Since common carrier rates are not now available for satellites facilities, satellite costs for operational systems are difficult to predict.

As in other communication projects, this one confirmed that contingency plans and back up technical systems are necessary if systems are to be used in an operational mode rather than the experimental one. This project experienced technical problems with some of the satellite equipment which could not be resolved despite the best efforts of all agencies concerned. However, this fact is not surprising since some of the equipment is reaching the end of its designed life span and is therefore not likely to function at its optimal level. In spite of the problems that were encountered, the University successfully interested the common carrier in Newfoundland to take over the technical operation of the satellite terminals at the end of May 1981 when the University's ETV had to withdraw from the project because of funding constraints. The Newfoundland Telephone Company is in active discussion with DOC about continuing the offshore application of the satellite technology and the Faculty of Medicine plans to use whatever systems these two agencies develop. Since March 31, EEG's have been successfully

transmitted on the satellite facility from Labrador City to St. John's and it is planned to continue these transmissions both on the satellite and later on terrestrial facilities. The Faculty is about to begin a field trial of facsimile equipment, which will be used to transmit ECG's from Labrador City. It is expected that part of the field trial will involve the use of the Anik B terminal in that community. Thus, the University continues to feel positive about the potential of satellite technology and will continue its close contacts with the Department of Communications with a view to possible participation in Phases II and III of the Anik B programme.

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2. House AM, Robbins C, Roberts JM. Trial Use of Slow Scan Equioment to Transmit X-rays via the Satellite Hermes. Memorial University of Newfoundland 1977.

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Appendix A

Memorial University of Newfoundland
Anik B Pilot Project

MEMORIAL UNIVERSITY OF NEWFOUNDLAND

ANIK B PILOT PROJECT

Submitted by : Dr. A.M. House

Date : December 1979

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I SUMMARY

Memorial University's Faculty of Medicine proposes to explore the potential of a hybrid interactive audio network using the Anik B satellite and the University's terrestrial teleconference system. Since the latter system exists and is supported by user fees contributed by Newfoundland hospitals and other health agencies, funding is requested only for the support of the Anik B portion of the project. The system will be used for a wide variety of health activities such as medical consultations and the transmission of medical data, continuing education for health professionals and community health education. Non health applications will also be explored, particularly as they relate to offshore resource development since one of the Anik B terminals will be located on an oil rig. Parts of the system will also have the capacity to transmit data by slow scan television equipment.

Memorial has already received seed money from various agencies and has been approved as a participant in the Department of Communications Anik B programme with access to 4 interactive audio terminals. Operational funds totalling $229,413.47 are needed for the 1980/81 fiscal year to permit essential preparations and system operation from July 1980 to March 1981, the period of access to the satellite. Additional funds are being sought elsewhere for specific health research expenses.

II INTRODUCTION

Since its inception in 1949, Memorial University of Newfoundland has had a commitment to making its resources available to the entire Province. As part of the University, the Faculty of Medicine has involved itself in

the needs of the Province. Aside from the undergraduate, graduate and post-graduate programmes offered on campus, the Faculty provides continuing medical education (CME) to physicians throughout the Province. Indeed the CME programme was started in 1967, two years before the Faculty accepted its first undergraduate class. The Faculty is affiliated with a number of hospitals across the Province and rotates its medical students through these hospitals as an integral part of their undergraduate education. Specialists in the Faculty travel to hospitals throughout the Province to assist in patient care through the provision of consultation services.

Newfoundland's geography, climate and transportation challenges make it difficult for the University and the Faculty of Medicine to fulfill their commitments to the degree that they would like. Communications technology seems to offer great potential in overcoming these difficulties and the Faculty of Medicine therefore proposes the attached project. Both the provincial Department of Health and the Department of Transportation and Communication are aware of this proposal and fully support the Faculty in its efforts. (See Appendix 1)

The federal Department of Communications has approved Memorial University as an official participant in the Department's Anik B programme. (See Appendix 1)

III BODY OF PROPOSAL

(a) What

Memorial University proposes to develop the first province-wide dedicated interactive teleconference system, the technical basis of which is

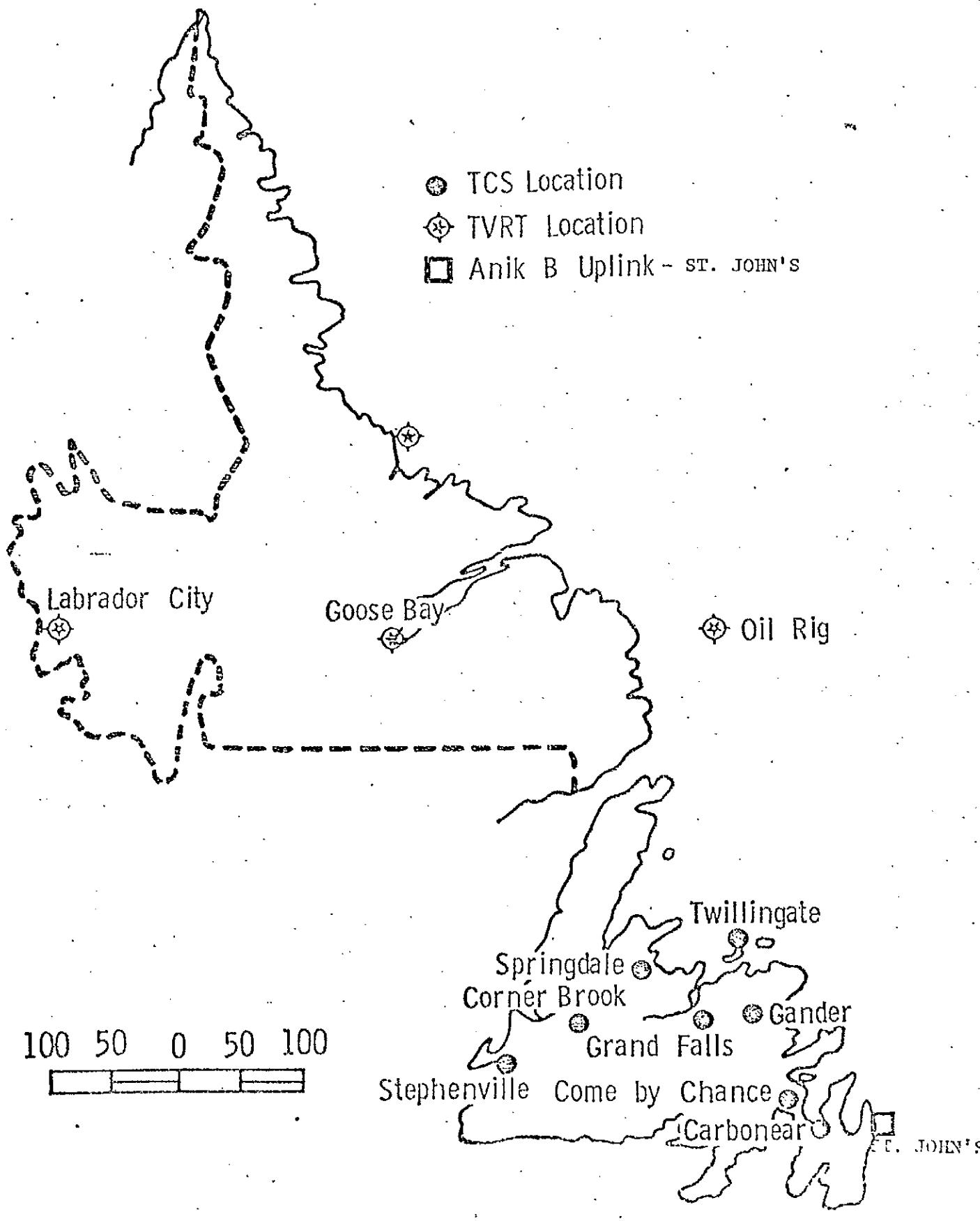
a hybrid network employing both terrestrial and satellite telecommunications facilities.

This Anik B pilot project will use the unique teleconference system developed by the University and the Newfoundland Telephone Company Limited. Started in July of 1979 after a 2 year preparation period, this system links over 20 buildings, primarily but not exclusively University and hospital facilities, in the sites shown in Figure 1. By July 1980, it will be self supporting on a user pay basis from the institutions and organizations using it.

Costs of extending this system to Labrador on Newfoundland Telephone terrestrial facilities were considered expensive at this time. It was also thought that satellite technology was more appropriate for the distances and small population of the area. It is therefore proposed to use Anik B to make this expansion and to assess the technical feasibility of so doing. Since no similar teleconference system exists in Canada, this project is unique. Moreover, none of the United States teleconference systems has, to our knowledge, been interfaced to a satellite system.

The project will also explore the challenges of adding a variety of narrowband data transmission equipment to the hybrid system. Experience at Memorial University and elsewhere shows that slow scan equipment can be used on terrestrial telephone facilities (Dunn et al) and on satellites (Roberge et al) but no one has used the equipment on a hybrid system. If it is practical to use slow scan, then funding will be sought from other sources to add equipment such as telex, computers and hard copy capacity such as

FIGURE 1: MEMORIAL UNIVERSITY ANIK B PROJECT LOCATIONS



facsimile, EKG printouts, etc.

PetroCanada and the Hudson's Bay Oil and Gas Company Limited have supported the project with seed money totalling $95,000 in order that a study be done of the feasibility of putting a satellite terminal on an oil rig. Associated data transmission by slow scan equipment will also be assessed. Preparation of this phase of the project has been underway since July 1979 and has also received partial support from the Weston Foundation. A conference on health care in offshore resource development is being planned for June 1980, financed by the University. It will be the first such conference in Canada, to which international experts are being invited.

Both the oil companies and medical users are concerned about confidentiality. A system based on touch tone telephony technology is in the final preparation stage and will be field tested on the terrestrial teleconference system starting in January 1980. It is the first such system developed in Canada and needs to be tested on a satellite carrier also. The Department of Communications engineers in Ottawa are developing scrambling devices which can be tested in applications such as health and resource development.

The proposed work is of interest to both federal and provincial departments of communications as part of their mandates in such areas as maintaining Canada's position at the forefront of the development and application of ultra high frequency communications technology, and improving communications in the more isolated and rural parts of Canada. It is also relevant to the federal and provincial departments of health as they seek methods of improving health care delivery in the North and rural Canada.

Memorial University's Faculty of Medicine has been involved in telemedicine experiments using a variety of communications technology for the past seven years. It possesses a qualified and experienced team capable of mounting the project and has data from other related projects which can be used to plan and evaluate this project. (See Appendix 2 and Bibliography)

(b) How

Memorial University has been approved as a participant in the federal Department of Communications Anik B programme. As such, it will have full use of 4 two-way audio terminals beginning in July 1980 and ending in March 1981. (There is the possibility that such use may be extended to December 1981 but as that option is contingent on several factors, it is not incorporated into the present project plan.) During that 9 month period, the terminals can be used for up to 16 hours a day, 7 days a week.

The Anik B terminals will be mounted on the roof of Memorial's Education Building (linked by cable to the Health Sciences Centre) in St. John's, the hospitals in Labrador City and Goose Bay and an oil rig. (If the latter is not in operation for the full 9 months, the fourth terminal will be moved to a Labrador coastal community for the balance of the project.) The Faculty of Medicine has already received seed money of $95,000 from PetroCanada and Hudson's Bay Oil and Gas Company Limited. It is permitting necessary technical staff to be hired to begin their training and the purchase of most of the equipment necessary to make the basic system operational.

The two way audio system provided by satellite is being designed to permit its interface with a terrestrial multi-point, multi-disciplinary teleconference system which was started in mid-July 1979. Its experimental

phase will end April 30, 1980.

In addition to the two-way audio system, the project will utilize slow scan television transceivers at the 4 satellite terminals to permit transmission and reception of (1) medical data such as X rays to facilitate consultations and of (2) visual information for education and administrative purposes. Since the terrestrial system will not have such units, their usefulness can be assessed on a comparative basis. Funding will be sought from other sources for the associated health research costs and for other equipment to permit the transmission of data such as EKG's and ultra sound.

(c) How Much

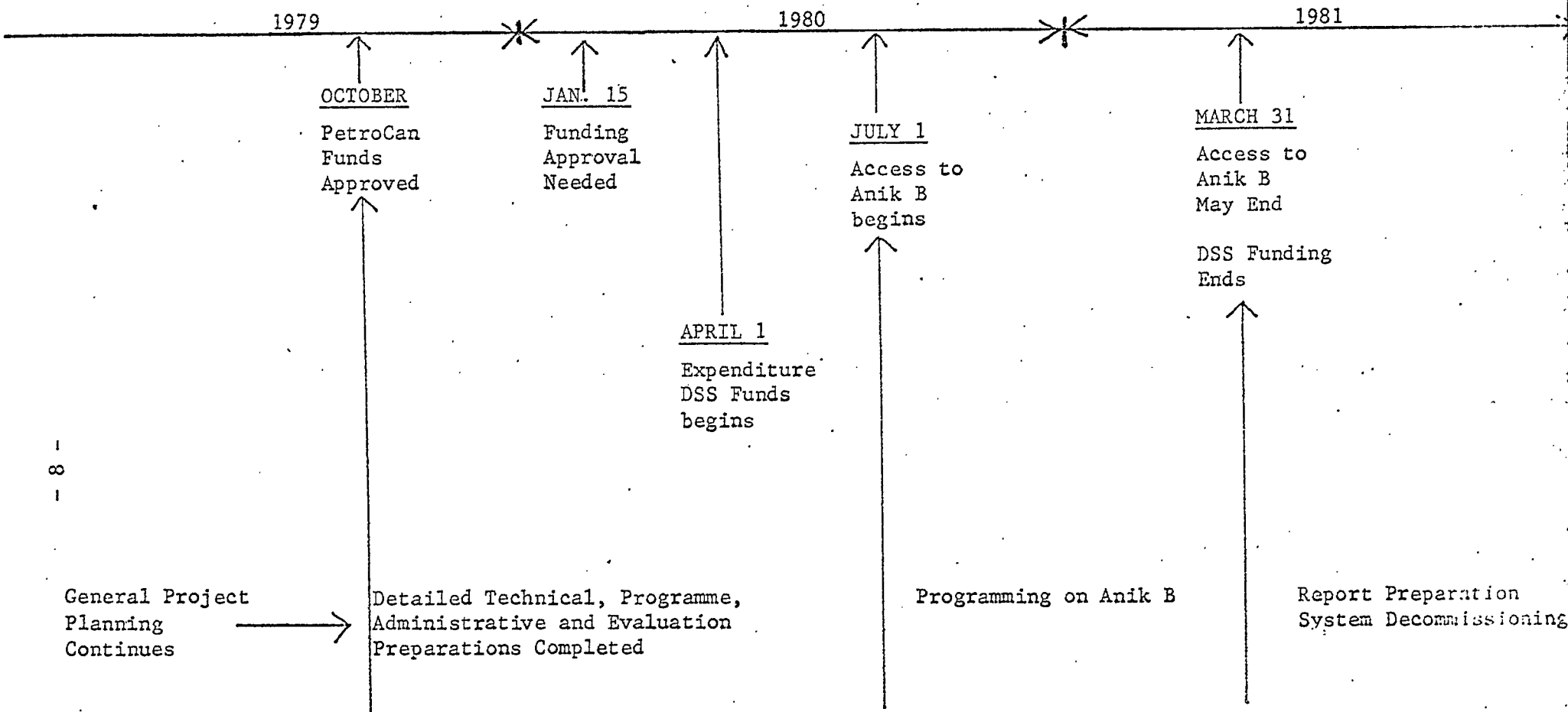
As indicated in Price Proposal, $229,413.47 is being requested from the Department of Supply & Services to permit this project to continue after PetroCanada seed money ends.

In addition, it should be recognized that the University and participating hospitals are making their facilities and substantial staff resources available at no charge to the project.

(d) When

As shown in Figure 2, work has already begun on the project. During the winter of 1978-79, senior project personnel developed the project plan and explored various options until the activities described herein were finalized. Confirmation of PetroCanada funding was received in October, and the required technician and clerk-stenographer were hired by mid-November. Orders have been placed for required equipment for the first phase of system preparations. If a preliminary decision on this contract is known by mid-

FIGURE 2: ANIK B PROJECT SCHEDULE



January, these preparations can continue. To mount a project of such scope, 5½ months lead time is the absolute minimum required.

Should the Department of Supply & Services make a positive decision on the proposal, a second technician and a research assistant will be engaged April 1. Access to the Anik B satellite begins July 1980 and ends March 1981. Firm dates for the arrival and departure of the terminals are still under negotiation with the Department of Communications and depend upon the schedule of projects elsewhere in Canada.

In March 1981, one of two alternatives will occur. First, the access to Anik B will end. System decommissioning and report preparation would be supported by University funds and alternate terrestrial communications facilities would be reassessed regarding their ability to continue the needed portions of the Anik B programming. Second, if the Department of Communications has exercised its option for another 3 years of Anik B, programming would continue for another 9 months to December 1981. Costs would be met through user fees and other grant monies which would be sought.

Department of Supply & Services funding is therefore requested for the period April 1, 1980 to March 31, 1981. This will permit completion of basic system preparations and the operation of the project.

(e) Where

As shown previously in Figure 1, the sites involved are Labrador City, Goose Bay, an oil rig (to be chosen over the winter in consultation with PetroCanada) and possibly a coastal Labrador community, and St. John's. In Labrador City, the terminal will be located on the Captain William

Jackman Hospital and in Goose Bay on the Melville Hospital.

In St. John's, it will be located on the Education Building of the University as the Health Sciences Centre does not have a look angle to the satellite. The Educational Television Centre (ETV) is located in the Education Building and has the proper interconnection to the Centre to permit the project to proceed. Existing teleconference facilities in the Health Sciences Centre and other hospitals shown in Figure 1 will also be used.

(f) Benefits

Installation of this system will permit the Faculty of Medicine to extend its research into the role of communications technology in the provision of health care to remote and rural areas. The Faculty already has data on one way video-two way audio systems (i.e., Hermes) and on terrestrial teleconferencing in health care. Different systems are proposed in this Anik B project so that comparisons can be made. Within the Anik configuration, there will be different components to facilitate comparisons. Additional research funds will be sought from sources interested in specific aspects of this project. Memorial has unique expertise and an experienced team which can continue to explore new aspects of telemedicine if it has access to new and changing communication systems.

Since the project is being developed as a multi-institutional, multi-disciplinary effort, it will enhance services and research across a wide variety of areas: e.g., continuing education for all health professionals, administrative applications such as committee meetings, patient consultations and the transmission of medical data and community health education.

The system will also be available to non health users. The University makes use of the terrestrial system and will continue to expand its use once there is access to the more northerly sections of the Province. The proposed project could be of use to Memorial's cold ocean engineers, its Institute of Northern Medicine and Health, and the Labrador Institute of Northern Studies, and other disciplines related to offshore petroleum. The Province's College of Trades and Technology, being part of the terrestrial system, will also provide input to the Anik system.

Some of the programmes related to offshore petroleum exploration and the development of energy sources (e.g., Goose Bay will be the base for the Lower Churchill Hydro Development) will be relevant to industrial and energy developments elsewhere in Canada.

Local, provincial and national resources have been and will be used insofar as possible. The confidentiality feature to be tested on this system was developed by the Newfoundland Oceans Research and Development Corporation (NORDCO). The Department of Communication's prototype scramblers will be used in preference to others. ETV is developing expertise and trained technical staff for such projects. The slow scan equipment will be obtained through a Canadian distributor which is just beginning to get a large enough Canadian market to lessen its dependence on the Colorado manufacturer for services such as repair and maintenance.

Newfoundland is the only province east of Quebec with an ongoing and increasing interest in telecommunications. Its work is relevant to all northern and remote parts of Canada and helps to maintain Canada's position at the forefront of the development and application of communications technology.

Memorial's broad approach to the development of this system also maximizes the likelihood that the system, or some adapted version of its most worthwhile aspects, will continue after the termination of the Department of Supply & Services funding.

(g) By Whom

The project will be under the direction of Dr. A.M. House, Associate Dean of Clinical Affairs, Faculty of Medicine. Dr. House has been co-director of a series of telemedicine projects dating to 1972. (See Appendix 3)

The project coordinator, Miss J. Roberts, has been involved as coordinator of such projects since 1974. She is currently in the final stages of a Ph.D. programme in telemedicine. (See Appendix 3)

The subcontract with ETV is directed by Mr. Ken Hauschildt, Technical Manager of ETV. He had a similar role in the Hermes experiment and is technical consultant to the teleconference system.

IV MANAGEMENT PROPOSAL

(a) Memorial University of Newfoundland

This project will be an official University research project. As such, it will be subject to all the normal University guidelines and regulations for the conduct of research, as administered by the University's Office of Research. All accounting of grants and contracts received is carried out by the University's Comptroller's Office.

(i) Faculty of Medicine: Since its inception, the Faculty has been involved in programmes to make its resources available to physicians throughout the Province. Problems encountered in trying to send tutors regularly

and frequently to outlying hospitals to offer continuing medical education programmes were part of the impetus behind the Faculty's original involvement in Telemedicine in 1972. It is assuming an increasing role in the North through agencies and programmes such as its Institute of Northern Medicine & Health, its participation in the major Labrador Dust Study recently funded by the Provincial Government and its long standing relationship with the International Grenfell Association.

The Anik B project will be the most recent in a series of telemedicine projects, which have received over $800,000 in outside funding to date. Previous success in raising funds from a variety of government and private sources (see Appendix 4) enhances the likelihood that, once core funding from the Department of Supply & Services is assured, funding for the necessary research and supplementary equipment will also be located.

(ii) Educational Television Centre: ETV has co-sponsored most of the telemedicine projects to date. The division between the two agencies has been that the Faculty has been responsible for programmes and content and ETV for production and technical matters.

ETV will continue as technical consultant and subcontractor for the Anik B system. Mr. Hauschildt, ETV's technical manager, is responsible for one broadcast quality television studio, a 30-point off-campus credit VTR network and, as technical consultant to the Hermes and teleconference projects, has recognized expertise in interactive satellite and terrestrial audio systems. (In May 1978, he was invited to be a

key note speaker at the University of Wisconsin conference on the Technical Design of Interactive Audio Systems.)

ETV programmes the University cable channel of the St. John's Avalon Cablevision Company. It has a tape exchange relationship with all the other cable companies scattered throughout the Province and is actively pursuing options to permit live simultaneous programming on all the networks. Should it become feasible to do this via the Anik B satellite, it will be possible to have a video component to the proposed project. It will also be possible to extend the range of programming to include non health material. The Department of Communications has previously approved Memorial University's having video capacity terminals and it is expected that the Department will consider a future video option for the project favourably.

(b) The Participating Institutions

The hospitals in Labrador City and Goose Bay participated in the Hermes project and thus understand the requirements of such a project. Senior hospital personnel in both institutions are enthusiastic and will make necessary personnel and facilities available: e.g., at least one room per institution will be used and hospital employees will be seconded to act as local technical and administrative coordinators.

PetroCanada is very interested in the project. (See Appendix 1) Several meetings have been held with a variety of senior personnel from their Calgary office. Now that funding has been received from the Company, and that a new local manager has been appointed, regular meetings will be held to make detailed plans for the use of the Anik system in the petroleum

exploration aspect of the project.

The overall project administrative structure is summarized in Figure 3.

(c) Management Techniques

The management structure provided in Figure 3 shows that attention has been paid to providing levels of responsibility and accountability. This same basic structure has been used in previous telemedicine projects and has worked well. Major project deadlines have always been met and there have been no overexpenditures on any funding received to date.

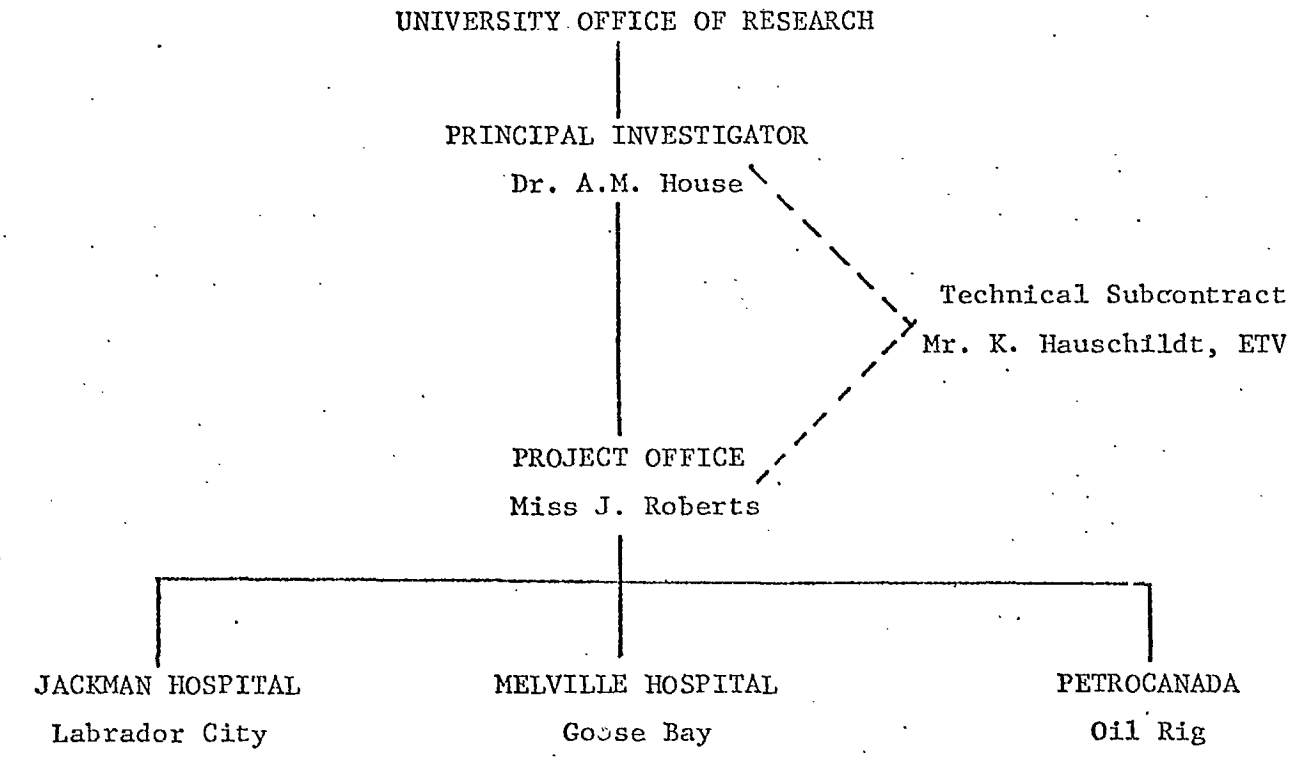
Other management strategies successfully used in other projects that will be applied to this one include continuity of senior personnel, contingency planning, constant availability of senior personnel with decision making authority, regular meetings properly minuted, close attention to scheduling, etc. Budget expenditures are recorded by the project secretary and monthly statements are provided to senior personnel for comparison with monthly statements from the Comptroller's Office.

(d) Point of Contact

Miss J. Roberts
Research Associate/Co-ordinator
Telemedicine Office
Faculty of Medicine
Health Sciences Centre
Memorial University of Newfoundland

(709) 737-6654

FIGURE 3: ANIK B PROJECT STRUCTURE



PRICE PROPOSAL

	April 1, 1980-March 31, 1981	Totals
I PERSONNEL		
A. Programme Planning and Coordination		
1. Research Associate/Coordinator Miss J. Roberts Two-thirds of working week @ $19,257.94 p.a. (est.)	$ 9,628.97	
2. Research Assistant III Mrs. E. Canning One third of working week @ $16,263.00 p.a.	No Charge	
3. Research Assistant II Full time @ $13,892.00 p.a. (est.)	$ 13,892.00	
4. Senior Secretary Mrs. Y. King One third of working week @ $11,557.00 p.a.	No Charge	
5. One Clerk Stenographer Miss E. Browne Full time @ $9,102.00 p.a. (est.)	$ 9,102.00	
6. Clinical Consultant Dr. C. Robbins, Labrador City @ $150 per diem for 50 days	$ 7,500.00	
7. Coordinators on existing TCS	No Charge	
8. Honoraria to coordinators at Labrador City, Goose Bay and coastal community @ $600 p.a. each	$ 1,800.00	
B. Technical		
9. Mr. Ken Hauschildt ETV Technical Manager	No Charge	
10. Teleconference Technician Mr. M. Mooney One third of working week @ $14,431.00 p.a.	No Charge	

11. Anik B technicians (2) Mr. J. Kuzmanovic Full time @ $14,431.00 p.a. (est.)	$ 28,862.00	
12. Honoraria to technical coordinators at Labrador City, Goose Bay, and coastal community @ $600 p.a. each	$ 1,800.00	
C. Fringe Benefits @ 10% on 3, 5 and 11	$ 6,148.50	
SUBTOTAL		$ 78,733.47

II MATERIALS AND SUPPLIES

1. Long distance charges for project administration and programme planning	$ 2,000.00	
2. Printing, Xeroxing, etc.	$ 3,000.00	
3. Videotapes, slides, etc.	$ 3,000.00	
SUBTOTAL		$ 8,000.00

III TRAVEL

1. Senior project personnel	$ 5,000.00	
2. Training seminars	$ 3,000.00	
SUBTOTAL		$ 8,000.00

IV SUBCONTRACTS

1. ETV for technical operation of system - July 1, 1980 - March 31, 1981	$ 10,000.00	
2. MUN for lease of 4 SSTV transceivers and interface	$ 88,500.00	
3. MUN for access to TCS facilities - personnel	$ 10,000.00	
SUBTOTAL		$108,500.00

V OVERHEAD AND ADMINISTRATION

1. Travel 2% of III	$ 160.00	
2. On campus 30% of I and II	$ 26,020.00	
SUBTOTAL		$ 26,180.00
GRAND TOTAL		$229,413.47

NOTES TO PRICE PROPOSAL

I PERSONNEL

NOTE: All budget figures are based on Memorial's current salary contracts which will change as of April 1, 1980.

A. Programme Planning and Coordination

1. Miss Roberts will oversee the Anik B project as part of her duties as Coordinator of the Telemedicine Office. Approximately two thirds of her time will be allocated to the project. Half of her salary will be charged to this contract and the other half will be paid by the Faculty of Medicine.

2. Mrs. E. Canning supervises the other major telemedicine project, i.e., the teleconference system, on a daily basis. She will be involved for at least a third of her time in the Anik B project since the satellite system will often be interfaced with the terrestrial one. Her salary will be supported by the teleconference system budget.

3. Extra research duties in connection with the development of programmes for Anik B require a research assistant II to be recruited on a full time basis.

4. The teleconference system's senior secretary, Mrs. Y. King, will relate to all Anik B personnel because of the overlap between the two telemedicine projects. She will supervise the clerk stenographer engaged for Anik B and will perform related duties at no charge to this project.

5. A clerk stenographer, Miss Elizabeth Browne, has been engaged with the TerreCanada seed money to perform clerical duties already

required by the Anik B project. She will be required for the duration of the project as such a complex undertaking requires clerical support to function efficiently.

6. Consulting fees are to be paid to a senior non-salaried physician in Labrador City in partial compensation of the time he will spend planning and administering project activities in this area. The transmission of medical data by slow scan equipment makes it particularly necessary that the project engage the assistance of a local physician. The fee is based upon the per diem paid to general practitioners by the Provincial Medical Care Plan.

7. The 16 coordinators identified by institutions already on the tele-conference system will continue and slightly expand their interface responsibilities with the Telemedicine Office to accommodate the extra usage due to Anik. There will be no charge to the Anik B budget for their efforts.

8. Administrative coordinators will be necessary at each of the Anik B sites and will consist of personnel seconded by the local hospitals as part of their contribution to the project. The experience with other telemedicine projects at Memorial and elsewhere is that substantial extra work is performed by such personnel and it is therefore proposed to give each of them a modest honorarium.

B. Technical

9. ETV's Technical Manager, Mr. Ken Hauschildt, will supervise the development of the required technical system at no charge to the project.

10. The technician, Mr. Michael Mooney, who currently operates the teleconference system, will also be responsible for the Anik B head end on a day to day basis. Such duties are not covered in the ETV subcontract since the control console for both systems is located in the Faculty of Medicine. His salary is part of the teleconference budget and his work on Anik B will not be charged to this budget.

11. One additional technician, Mr. J. Kuzmanovic, has been engaged with the PetroCanada seed money and his employment will have to be continued throughout the 1980-81 fiscal year. A second technician will also be hired to cope with the extra work of final preparations and of the broadcast period. Mr. Kuzmanovic has been seconded to ETV so it can meet the commitments of its technical subcontract and the other technician will be assigned to either the Faculty of Medicine or ETV as the workload requires.

12. Technical coordinators will be necessary at each of the Anik B sites and will consist of personnel seconded by the local hospitals as part of their contribution to the project. The experience with other telemedicine projects at Memorial and elsewhere is that substantial extra work is performed by such personnel and it is therefore proposed to give each of them a modest honorarium.

C. Standard University charges for fringe benefits are 10% on all full time staff.

II MATERIALS AND SUPPLIES

1. Experience with previous communication experiments has shown the need for close coordination between Memorial and the Department of Communications and all participants within Newfoundland. It is estimated that $2,000 will be needed for long distance calls, telex, etc. Such charges will cover project administration, programme planning and evaluation.

2. The number of agencies and locations involved will require an allotment for xeroxing and printing. Reports, brochures and handout material are essential both for project reporting and for programme development. The use of printed material to supplement the audio has been shown to be crucial to effective programming. $3,000.00 is requested.

3. Use of slides, videotapes and audiotapes will also be important to effective sessions. $3,000.00 is requested for this purpose.

III TRAVEL

1. Senior project personnel have to travel both within and outside the Province to facilitate project planning, promote local programming, and set up evaluation procedures. They also attend conferences or seminars on occasion to present reports of their work and/or to learn about developments elsewhere. Dr. House's travel is paid from regular University budget funds but the travel costs of other project personnel must be covered.

2. Training seminars will be held for the various clinical, administrative and technical coordinators and consultants required for the project.

Travel costs to and from Labrador are substantial, requiring an allocation of $3,000.00 for these purposes.

IV SUBCONTRACTS

1. ETV will provide the technical system for the Faculty of Medicine on a subcontract basis. Seed money from PetroCanada is providing the funds required until April 1, 1980. After that date, in addition to the salaries of the two technicians, ETV will require a budget of $10,000 to cover operating expenses during the broadcast period of July 1980 to March 1981. Expenses will consist of items such as travel for technical maintenance and repair at the remote sites, shipping of equipment, contingency funds for spare parts and emergency expenses, decommissioning, report preparation, etc. Specific details can be provided upon request.

2. It is planned to put slow scan transceivers at each remote site and in St. John's to permit the transmission of medical data - primarily X rays - and educational material. The total cost of the transceivers and interface equipment is $ 88,500. This equipment is being purchased by the University and will be leased to the Faculty for the sum of $7,375 per month for the 12 month period of this contract. (See Appendix 5)

3. Memorial University will also charge the fixed sum of $10,000 over the term of the contract for unlimited access to the TCS and its staff. This charge permits recovery of a minimal proportion of the costs associated with the teleconference system interface to the Anik B project. The balance of the $100,000. annual operating costs of the system come from the contributions of Newfoundland agencies using it.

V Standard University rates for overhead are charged.

Appendix B

Development of Telemedicine System for Support of Petroleum Exploration in Remote Locations

DEVELOPMENT OF TELEMEDICINE

SYSTEM FOR SUPPORT OF PETROLEUM

EXPLORATION IN REMOTE LOCATIONS

Submitted by: Dr. A.M. House
Associate Dean of Clinical Affairs
Faculty of Medicine
Memorial University of Newfoundland

Date : June 1979

IDENTIFICATION PAGE

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Date: May 24, 19 79

A.M. House, M.D., F.R.C.P.(C),
Associate Dean, Clinical Affairs,
Faculty of Medicine.

Date: May 24, 1979

N.J. Gogan, Ph.D.,
Director,
Office of Research.

I INTRODUCTION

As resource exploration frequently takes place at locations remote from major population centres with sophisticated health care facilities, the provision of medical care to workers, particularly in the case of injury, is of great concern. When such activity takes place in a hostile physical environment such as the Labrador and/or the ocean, the challenge of providing care is heightened by factors such as harsh weather. Moreover, in spite of the increasing numbers of people involved and the amounts of money being spent in offshore petroleum exploration, inadequate information is available about health care in this setting. Memorial University therefore proposes to provide both service and research related to health care in an offshore setting.

In the past five years, Memorial University, through its Faculty of Medicine and Educational Television Centre, has become involved in a series of research projects involving the use of various communications technologies in health care. Specifically, Memorial conducted a 3-month project using the Department of Communications/NASA Hermes satellite to link St. John's with Stephenville, St. Anthony, Goose Bay and Labrador City on a one-way video/two-way audio system. The project also involved experimentation with the use of slow scan equipment in the transmission of X-rays and other medical data from Labrador City to St. John's. The University is now starting a dedicated four wire telephone conference system linking 13 hospitals across the Island portion of the Province, and anticipates the expansion of the system to Labrador within the next 18 months. The system is being provided under a subcontract by the Newfoundland Telephone Company Limited. (Separate reports on all these projects are available from the Telemedicine Office. See Bibliography.)

Local expertise has thus already been created in the use of advanced telecommunication facilities. All the work conducted to date has been performed by local institutions. All senior and middle level project personnel are still in the Province and available to work on the Anik B project.

II THE ANIK-B PROJECT

Because there was substantial enthusiasm about the potential of telemedicine as a result of the Hermes project, the University has been approved as an official experimenter in the Department of Communications Anik-B programme, with access to the satellite scheduled to begin July 1980.

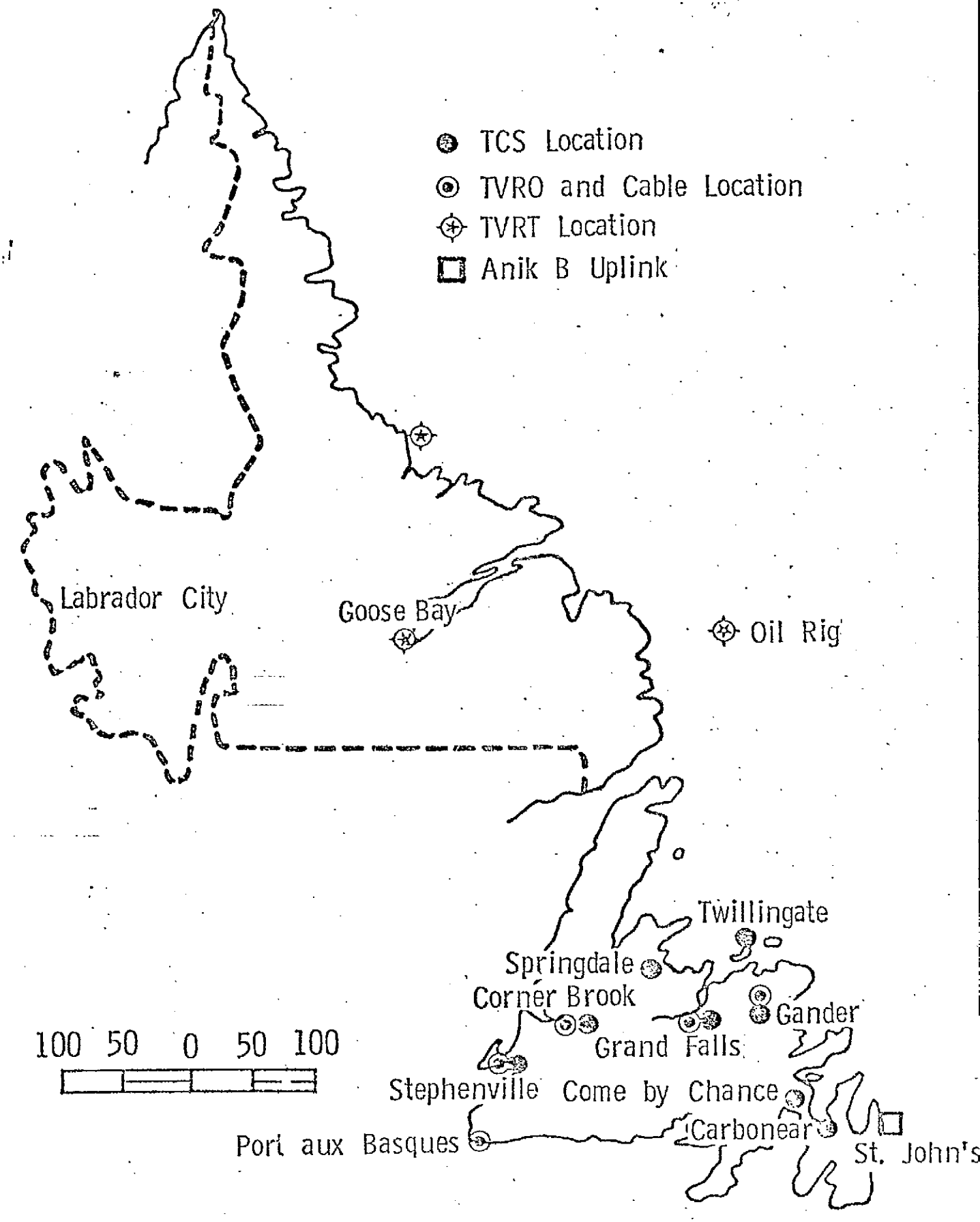
As shown in Figure I, a sophisticated project is planned that will consist of three components: telemedicine and health, cable TV, and the technical system to support both.

(1) Telemedicine and Health

The Health Sciences Centre proposes to originate live two way audio programmes between St. John's and Goose Bay, a coastal Labrador location and an oil rig. (When the rig is not in operation, that terminal could be moved to Labrador City or whatever location is deemed appropriate.) The three remote terminals will be capable of receiving video programming, either in a pretaped format through the ETV cable project (see below) or live on occasion. It may be possible to receive some programming from the other Atlantic Provinces and Central Canada.

Programming will concentrate on continuing education for health professionals, administrative functions, patient care, including the transmission of medical data, and community health education. All these programme

FIGURE I: ANIK-B SYSTEM CONFIGURATION



areas appear to be relevant to health care needs in petroleum exploration.

The Health Sciences Centre houses Memorial University's School of Medicine and the General Hospital. The latter is a 300 bed hospital opened in 1978 which has most major inpatient, outpatient and specialty services. There is a major Emergency Department with a helicopter pad located close by. Within the Hospital there are neurosurgery, othopaedic and burn services, and sophisticated intensive care units. A number of medical personnel have expertise in the management of diving and hyperbaric problems. There is thus within the Hospital and the Medical School the capacity for clinical and basic research in these specialized areas of medicine.

In addition, the Medical School has its own computer facilities and ready access to those of the University. In the Division of Community Medicine, there is expertise in environmental and industrial medicine.

(2) Cable TV

Memorial operates one channel on the cable network based in St. John's. Cable networks also exist in Gander, Grand Falls, Corner Brook, Stephenville and Port aux Basques but they are not linked for live shared programming. ETV proposes to use the 'receive only' terminals provided by the Department of Communications to permit simultaneous broadcasting to all cable networks across the Island. Access to such educational/training programming could benefit workers who are stationed on oil rigs.

(3) The System

In addition to existing facilities at Memorial University, the system will consist of 9 terminals provided by the Department of Communications:

one broadcast terminal in St. John's, 3 interactive terminals in the locations shown in Figure I, and 5 receive only terminals shown in Figure I. In addition, the system is being designed to interconnect with the teleconference system, whose present locations are also shown on Figure I. A sophisticated, multi-mode system will thus be created.

III THE CURRENT PROPOSAL

Memorial University has an institutional commitment to making its facilities available to the whole Province and to lending its expertise, when appropriate, to developments that affect the Province's future.

Memorial University therefore proposes to place an interactive Anik-B terminal on an oil rig in 1980. Such a terminal would provide personnel on the rig with a reliable and sophisticated communications link. The system can be used to provide medical consultations between the rig-based medic and specialty services at the Health Sciences Centre, consultations that will be facilitated by the transmission of medical data such as ECG's and x-rays by slow scan equipment. Discussions are underway with other medical researchers regarding the use of the system in dealing with hyperbaric problems. A wide variety of educational programmes can be accessed through the system, ranging from health education programmes, safety on the job and technical/vocational training. Agencies such as the College of Trades and Technology and Workmen's Compensation Board could be given access to the system. There is expertise in the Province related to remote sensing and weather tracking which could make use of such a system. The Health Sciences Centre is located near the Engineering Building and the planned National Research Council laboratories.

Since the Anik system will be linked to the teleconference system,

it will be possible to bridge in resource persons from any location such as company or government offices or other rigs for either educational or administrative purposes. The teleconference system has a planned confidentiality feature which will be provided by the Newfoundland Oceans Research and Development Corporation (NORDCO) and it could be expanded to Anik so that, when desired, sessions would be confidential.

Baseline data will be collected this summer related to the types and frequency of health related problems that occur on oil rigs. During and after this data collection process, the specific relevance of telemedicine will be examined in terms of factors such as direct and indirect costs, the effect on evacuation travel and/or staff rotation, etc.

To develop an efficient system, preparations need to begin as soon as possible. Technicians have to be engaged to work on the system development, essential equipment must be ordered, and research and administrative expenses must be met. While outside funding is required, substantial expertise and equipment already exist at the University. No charge will be made for the work of regular University faculty and staff. Extra personnel required for the project will be recruited locally.

Memorial University plans to submit to federal government and other agencies a major research proposal related to the project in the fall of 1979. The time frame of such programmes does not permit an earlier application, yet seed funding must be received soon for project planning to continue. The University has already agreed to fund two other technical positions that are required in order to begin system preparation. The lead time for system preparation is considerable and must begin as soon as possible if the system is to start up on schedule in July 1980.

IV CONCLUSION

Drawing upon its expertise in telemedicine and distance education, Memorial University proposes to develop a sophisticated telecommunications system using the Anik-B satellite starting July 1980. To develop the system, preparations must begin soon and seed funding is therefore needed in the amount of $95,000.00.

Such a project will contribute to ensuring that resource exploration in the Province can be backed up by the most modern and appropriate telecommunications available.

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CURRICULUM VITAE

DR. A.M. HOUSE

CURRICULUM VITAE

Name: Arthur Maxwell House

Birth: Glovertown, Newfoundland. August 10, 1926

Position: Associate Dean, Clinical Affairs, Memorial University of Newfoundland
Assistant Dean, Continuing Medical Education, M.U.N.
Professor of Medicine (Neurology), M.U.N.

Pre-medical training:
- Memorial University College 1944-47
- Kellogg Scholarship 1945-46
- Kellogg Scholarship 1946-47

Medical Training:
- Dalhousie University, M.D., C.M. 1947-52
- Entrance Scholarship

Postgraduate Education Neurology:
- Waterford Hospital, St. John's (Hospital for Mental and Nervous Diseases) 1954-56
- Montreal Neurological Institute 1956-59

Certification in Neurology, Royal College of Physicians & Surgeons of Canada 1959

Fellowship in the Royal College of Physicians & Surgeons of Canada 1972

National Hospital, Queen's Square, London, England
February to June 1965

- General Practice, Baie Verte, Nfld. 1952-54
- Practice in Neurology, St. John's, Nfld. 1960-65
- Director of Continuing Medical Education Memorial University of Newfoundland 1968-74
- Assistant Dean, Continuing Medical Education Memorial University of Newfoundland 1974- to present
- Associate Dean, Clinical Affairs Memorial University of Newfoundland 1977- to present
- Chief, Division of Neurology, The General Hospital 1966- to present
- Director EEG and EMG Laboratories, The General Hospital 1961- to present
- Member of Board of Governors, The General Hospital 1968-74
- Chief of Medical Staff, The General Hospital 1966-74
- Member, Planning and Development Committee, Health Sciences Complex 1971- to present
- Member of Integrating and Co-ordinating Committee Health Sciences Complex 1974- to present
- President, Canadian Neurological Society 1971-72
- President, Canadian Society of Electroencephalographers 1970-72

ARTHUR MAXWELL HOUSE, M.D., F.R.C.P.(C)

Publications:

A. M. House & J. M. Roberts. "Telemedicine at Memorial University of Newfoundland." Newfoundland Medical Association Newsletter: Volume XVIII No. 5, November, 1976 - pp 17-18.

Judy Roberts; Erin Canning; Larry W. Chambers; A. M. House; Margaret Cox; Claire Neville-Smith. "The Role of Physicians in Caring for Preschool Deaf Children in Rural Newfoundland and Labrador." Newfoundland Medical Association Newsletter: Volume XVIII, No. 6 - December, 1976.

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A. M. House; J. M. Roberts. "Telemedicine in Canada". Canadian Medical Association Journal/August 20, 1977/Vol. 117, pp. 386-388.

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E. M. Canning; A. M. House; W. C. McNamara; J. M. Roberts. "Report of the Teleconferencing Pilot Study". Unpublished Report, Memorial University of Newfoundland, January, 1978.

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Appendix C

Statistical Tables Summarizing Use of
Anik B Terminals and Teleconference
System from September 1, 1980
to March 31, 1981

SUMMARY OF TCS USAGE

SEPTEMBER 1, 1980 to

MARCH 31, 1981 INCLUSIVE

LIST OF TABLES

TABLE I SUMMARY OF SYSTEM USE IN HOURS

TOTAL SESSION TIME	797.5	hours
TOTAL SIMULTANEOUS TIME	8	hours
ACTUAL TIME USED	789.5	hours
AVERAGE SESSION TIME	1	hour 20 minutes
SHORTEST SESSION	15	minutes
LONGEST SESSION	5	hours

TABLE IS BASED UPON: 589 sessions
28 weeks
21 sessions/week on average
28 hours/week on average

PERCENTAGE UTILIZATION 37%

TABLE II Site Profile - Hospitals Outside St. John's

Name of Hospital	Number Sessions		Number Hours		Participation Percentage
	Eligible	Participated	Eligible	Participated	
Baie Verte	225	112	281.0	145.3	51.7
Carbonear	296	153	378.8	206.3	54.5
Come by Chance	251	120	316.0	158.5	50.2
Corner Brook	350	209	458.0	281.5	61.5
Gander	322	171	428.0	231.8	54.2
Grand Falls	365	237	477.3	308.3	64.6
Goose Bay	295	168	380.0	215.0	56.6
Labrador City	237	100	293.8	128.8	43.8
Makkovik	33	10	37.8	9.0	23.8
St. Anthony	341	181	444.3	244.5	55.0
Stephenville	280	131	349.0	168.5	48.3
Springdale	271	135	331.8	164.5	49.6
Twillingate	262	134	329.3	168.5	51.2

Table III Site Profile - Hospitals Inside St. John's

Name of Hospital	Number Sessions		Number Hours		Participation Percentage
	Eligible	Participated	Eligible	Participated	
General Hospital					
HSC	157	94	197.5	123.0	62.3
Miller Centre	28	9	34.5	11.0	31.9
Grace	170	104	200.3	119.3	59.6
Janeway	223	145	262.8	161.3	61.4
St. Clare's	164	86	190.8	104.3	54.7
Waterford	127	79	159.3	99.5	62.5

Table IV Site Profile - Schools Outside St. John's

Site	Number Sessions		Number Hours		Participation
	Eligible	Participated	Eligible	Participated	Percentage
Carbonear	42	38	58.3	55.8	95.7
Clarenville	58	46	79.3	62.5	78.9
Corner Brook	71	50	91.0	70.3	77.2
Gander	53	44	69.8	57.8	82.8
Grand Falls	44	39	62.3	54.3	87.2
Goose Bay	53	45	72.8	64.5	88.7
Labrador City	41	36	57.5	53.8	93.5
St. Anthony	12	4	10.8	3.0	27.9
Stephenville	53	52	68.8	67.8	98.6
Springdale	44	35	58.8	47.8	81.3

Table V Site Profile - Non Hospital Sites Inside St. John's

NAME OF SITE	Number Sessions		Number Hours		Participation
	Eligible	Participated	Eligible	Participated	Percentage
A.R.N.N.	1	1	1.0	1.0	100.00
College of Trades					
Prince Philip	56	16	53.0	13.5	25.5
Topsail Road	8	4	10.3	6.3	61.0
Department of Health					
Confederation Bldg.	60	42	58.5	40.0	68.4
Public Health Bldg.	89	66	105.8	78.3	74.0
Memorial University					
Faculty of Medicine	277	228	356.5	297.8	83.5
Other	55	42	77.8	58.5	75.2
Nfld. Hospital Assoc.	19	12	32.0	21.3	66.4
Nfld. Medical Assoc.	8	7	18.5	15.5	83.8

Table VI System Use by Group - Health Professional

Health Professional	Number of Sessions	Number of Session Hours	Number of Simultaneous Hours	Number of Hours of Actual Use
Allied Health	23	36.25	0.00	36.25
Medical	81	94.25	0.00	94.25
Nursing	68	105.75	0.00	105.75
dical & Nursing & Allied Health	71	83.25	0.00	83.3
Physicians & Nurses	4	4.5	0.00	4.5
Nurses & Allied Health	5	6.5	0.00	6.5
Medical & Allied Health	2	4.0	0.00	4.0
Physiotherapists	20	27.0	0.00	27.5
Dieticians	12	17.0	0.00	17.0
Admin. Personnel	12	17.75	0.00	17.75
Social Workers	2	3.0	0.00	3.0
Occupational Therapist	4	5.5	0.00	5.5

Table VII System Use by Group - Other Health Groups

Other Health Groups	Number of Sessions	Number of Session Hours	Number of Simultaneous Hours	Number of Hours of Actual Use
Telemedicine Staff	24	30.75	0.00	30.75
Faculty of Medicine	7	9.25	0.00	9.25
Nfld. Hospital Assoc.	14	25.50	0.00	25.50
[illegible]cer Foundation	1	2.00	0.00	2.00
[illegible]ld. Pharmacists	5	8.00	0.00	8.00
College of Trades	1	1.25	0.00	1.25
Dept. of Health	26	41.75	0.00	41.75
Nfld. Medical Assoc.	8	18.50	0.00	18.50
Assoc. of Reg. Nurses	7	10.50	0.00	10.50

Table VIII System Use by Group - University and Other Non-Health Groups

University and Other Non-Health Groups	Number of Sessions	Number of Session Hours	Number of Simultaneous Hours	Number of Hours of Actual Use
UNIVERSITY				
Off Campus Students	31	45.50	0.00	45.50
Other Students	4	4.00	0.00	4.00
Librarians	1	1.00	0.00	1.00
Faculty Members	3	4.50	0.0 0	4.50
Extension	8	11.00	0.00	11.00
E.T.V.	2	8.00	0.00	8.00
OTHERS				
Non-Specific	5	3.75	0.00	3.75
Telephone Company	28	57.00	0.50	56.50
Newfoundland Teachers Association	4	8.50	0.00	8.50

Table IX System Use by Topic - Education and Project Administration

Education and Project Administration	Number of Sessions	Number of Session Hours	Number of Simultaneous Hours	Number of Hours of Actual Use
Allied Health	10	22.00	0.00	22.00
Medical	68	80.00	0.00	80.00
Nursing	15	22.25	0.00	22.25
Med, Nurs & All Hth	77	83.25	0.00	83.25
dy & Discussion	1	0.75	0.00	0.75
Off Campus Credit	39	59.50	0.00	59.50
Out Patient Education	1	2.00	0.00	2.00
Non-Specific	169	247.00	0.00	247.00
Non-Specific	6	5.75	0.00	5.75
TCS Demonstration	13	11.50	0.00	11.50
TCS Coordinators	67	55.75	0.00	55.75
Technical Checks	33	72.00	0.50	71.50
Advisory Comm. Meeting	1	1.50	0.00	1.50
Nfld. Tel. Maintenance	1	2.00	0.00	2.00

Table X System Use by Topic - Other Uses

Other Uses	Number of Sessions	Number of Session Hours	Number of Simultaneous Hours	Number of Hours of Actual Use
Non-Hlth. Non-Specific	2	2.00	0.00	2.00
Non-Health - University	30	44.25	0.00	44.25
Prog. Planning Non-Spec.	1	1.00	0.00	1.00
Allied Health	2	2.00	0.00	2.00
Medical	9	9.00	0.00	9.00
University	2	2.00	0.00	2.00
Lectures	7	14.50	0.00	14.50
Seminars	10	20.00	0.00	20.00
EEG	19	22.00	0.00	22.00