SUMMARY REPORT

LOW POWER TELEVISION STUDY

Consultant's Report prepared for the Council on Quality Education

JANUARY 15, 1983

EDUCATIONAL MANAGEMENT SERVICES, INC.

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SUMMARY REPORT

LOW POWER TELEVISION STUDY

Submitted to

Gene Kairies, Coordinator

The Council on Quality Education

By

Educational Management Services, Inc.

January 15, 1983

SUMMARY REPORT

In response to a directive from the Minnesota Legislature, the Council on Quality Education (CQE) instituted the Low Power Television Study. The goals of the study are to: 1) survey the need for LPTV in small rural school districts; 2) develop data on needs for equipment, personnel, and training; and, 3) secure licenses for other communities in the state to maximize the use of LPTV to improve schooling.

Educational Management Services, Inc. (EMS) was contracted to provide two major services to the Minnesota Council on Quality Education as a part of their effort to respond to the legislative directives pertaining to the feasibility of low power television on Minnesota school districts. First, EMS was responsible for managing and monitoring the activities concerning the needs assessment; the development of data/information pertaining to equipment, personnel, and training; and, the determination of requirements for securing licenses. Second, an objective assessment was conducted showing the need for LPTV and the commitment of school districts to develop and establish a station. The sections which follow describe the major tasks completed by EMS to date.

S.1 INITIAL CONTACTS WITH DISTRICTS

Project activities were initiated in early February of

1982. A letter was mailed from CQE to all districts in Minnesota informing them of the focus of the study and the services which would be available through EMS and the Council. Each Superintendent was asked to contact EMS for further information and to express their interest in the development of LPTV in their area. Fifteen school districts who contacted EMS in response to the letter indicated that other districts in their area also were interested in the potential of LPTV for meeting instructional needs. In most instances the Superintendents had met with other districts and had discussed the feasibility of working together to establish a station; thus, the total number of districts identified by the survey was in excess of forty-five. EMS followed each contact with a mailing of materials giving an overview of requirements for developing and implementing a LPTV station as well as instructions for making application for a license and legal services, engineering services and equipment companies who could be contacted for further information and assistance. Districts were urged to contact EMS for further assistance. A listing of the school districts contacted and a description of their comments and actions taken by EMS are shown in Exhibit A.

S.2 LPTV NEEDS ASSESSMENT

The following sections provide an overview of the needs assessment conducted in the spring of 1982. For a more detailed presentation, we refer you to Exhibit B which provides full report on the needs assessment.

S.2-1 Conceptual Approach

The conceptual approach used by Educational Management Services in determining the needs for and potential locations of low power television was multi-faceted. The approach considers students' needs and locations. Program offerings and staffing levels as well as distances between districts were identified as primary indicators of need and optimal location.

A simulator was developed to allow the study of the effects of certain parameters on the optimal location of transmitters. The information entered into the simulator deals with school information and technical considerations. Through the process described in the main report the simulator allocates a number of transmitters to various districts. The mathematical formulas applied in the selection of districts were based on cost effectiveness and average need. Two separate computer runs were made for each formula, the first limiting the radius to 15 miles and the second to 20 miles. The locations of 20 transmitters were generated along with the names of districts associated with the transmitter.

S.2-2 Input Data and Process for Needs Rankings

Data relating to educational program and staff were taken from each of the districts' 1981 reports submitted to the State Department of Education. After correcting for missing data, a computer file was established which was the data base for the simulation runs. Data elements

included for each school district were as follows:

a. Location, given as latitude and longitude.

b. Needs measures.

1) Number of Unique Secondary Codes

2) Number of Secondary Taxonomy Areas

3) District FTE for Secondary Foreign Language

4) District FTE/1,000 Students for Secondary Foreign Language.

5) District Secondary Foreign Language FTE ÷ State Full Time Equivalent Mean Staff for Secondary Foreign Language.

6) District Secondary Foreign Language FTE/1,000 Students ÷ Mean FTE/1,000 Students for Secondary Foreign Language.

7) District Total FTE Regular Secondary Staff

8) District FTE/1,000 Students for Regular Secondary Staff.

9) District Regular Secondary Staff FTE - State Full Time Equivalent Mean Staff for Regular Secondary Staff.

10) District Regular Secondary Staff FTE/1,000 Students ÷ State Mean FTE/1,000 Students for Regular Secondary Staff.

11) District Total FTE for Secondary Art

12) District FTE/1,000 Students for Secondary Art

13) District Secondary Art Staff FTE - State Full Time Equivalent Mean Staff for Secondary Art.

14) District Secondary Art Staff FTE/1,000 Students - State Mean FTE/1,000 Students for Secondary Art.

The second part of the input information to the simulator consists of the following parameters:

a. Number of transmitters to be allocated across the state.

b. Effective range of the transmitters in miles.

c. A set of weights which delineate the relative importance of the needs measures.

d. A decision criterion for establishing the value of a particular site as a transmitter host. This criterion is to be one of the following:

1. The value of a site is computed as the sum of the weighted needs of all schools close enough to the site to fall within the effective range of a transmitter located at the site; or the value of a site is computed as the sum described above divided by the number of schools within the effective range.

2. An assumption of interference or non-interference among closely located transmitters. An assumption of non-interference implies delivery by cable, or the assignments of distinct frequency slots to adjacent transmitters.

3. A list of districts to be excluded fro the allocation process.

4. A list of clusters which must receive a transmitter, regardless of the values of the sites within the cluster as computed by the simulator.

Having stored all of the input data described, the simulator proceeds to allocate transmitters to districts within specific clusters located within a specified radius.

S.3 REFINEMENT OF DISTRICT RANKING PROCESS

In the first phase of the needs assessment two formulas were tested for ranking the districts. The first selected districts on a cost effective basis in that it emphasized the location of the transmitter in an area serving the largest number of districts. The second formula selected districts based on the highest average need. Both formulas selected the same districts but placed them in different rank order. The final ranking was based on the second formula but also

included an option for selecting and/or weighting variables. Exhibit C shows 45 clusters of districts selected by the revised process.

S.4 PROPOSED REQUIREMENTS OF DISTRICTS PRIOR TO APPLICATION AND LICENSING

The progress report presented to CQE in July contained a recommendation relating to preparation of school districts who plan to complete an application for license. Through further discussions with the CQE coordinator and staff members consideration was given to a specific process which a district or group of districts would be asked to complete prior to submitting an application for license. An overview of the process is contained in Exhibit D; at this juncture no specific procedures or process have been adapted by CQE.

S.5 LPTV WORKSHOP FOR DISTRICTS

In the latter part of August EMS and CQE began discussions relating to the need to offer a LPTV workshop for districts. As shown in Exhibit E a tentative agenda was developed in advance of the scheduling of the conference and plans were developed in regard to specific topics to be discussed and questions which would stimulate discussion.

In December a letter was mailed to 220 districts, selected on the basis of need and interest, asking them to indicate their interest in an LPTV informational conference. Based upon the interest shown by approximately 40 districts a

conference was planned for January 19, 1983 and a letter explaining the intent of the conference and the proposed agenda was sent to each district. The letter and proposed agenda are shown in Exhibit E. In preparation of the conference, EMS staff generated a list of questions to be addressed by the conference presentors. Many of the questions were stimulated in the conduct of contacting school districts and consulting on telecommunication needs. Refer to Exhibit F for a review of these questions.

S.6 IMPLICATIONS FOR POLICY

There are a number of variables which point to a need for the development of policy pertaining to low power television and its application in the elementary-secondary educational system in Minnesota.

The interest and commitment of school districts varies from those that have little or no interest or information to those who are totally committed, have the equipment in place, the application submitted and are waiting for an award of license. If the Legislature were to provide assistance to districts in developing a station, the level of interest and preparation is an important consideration. What may be necessary is a required series of steps to be completed by a district before monetary assistance is made available.

The instructional need of the districts for LPTV increases as the size of the district decreases. Smaller

districts are not able to offer as large a variety of courses; for example, many cannot offer foreign languages and advanced mathematics such as calculus. Thus, these districts can obtain direct benefits immediately by sharing staff members who are qualified to teach advanced courses. However, these districts may not have the high interest and commitment to developing and implementing a station; consequently, some incentive either monetary or informational may be helpful.

Although the smaller districts have the greater instructional need, they do not have resources comparable to larger districts. Pairing smaller districts with a larger district host would be appropriate in some instances. Some of the larger districts have facilities and equipment in place and may already be teamed with a community college or an Area Vocational School in two-way instructional broadcasting.

The qualified subject matter staff needed are often not experienced in broadcasting. This, of course, suggests the need for training which further adds to the cost of developing and operating a station. Before an application should be submitted, the sources of funding should be identified with commitment in writing. Without a carefully developed plan and funding commitment, it is unlikely that an application will result in a license award.

The question of integrating low power technology is a complicated one because of its potential to affect

and be affected by other telecommunication devices. Telecommunication devices under development could potentially and substantially enhance LPTV or negate its value.

What is needed, is a broader range study on the potential application for telecommunications in educational programs. The field is complex and changing rapidly. At a minimum, two needs are apparent:

(1) There is a need to study telecommunications in depth and analyze its implications for Minnesota school districts and educational programming.

(2) There is a need to provide awareness and training seminars pursuant to the findings of the telecommunications study prior to the provision of developmental funds.

Specific to the current study, clear guidelines must be generated which will direct state staff in allocating technical assistance monies for the development of LPTV. These questions warrant aditional study:

In terms of state technical assistance, should districts be given broad latitude in defining their LPTV applications or should the state specify that educational applications will be preferred over community oriented applications?

What kinds of educational applications will best address priority unmet need areas?

To what degree, must the stations be monitored by state staff and be considered experimental for evaluation purposes?

To what degree should districts enter into LPTV applications without approval or review by state staff?

To what degree should state staff provide technical assistance funds for LPTV projects of varying definitions so that the range of application can be tested?

To what degree should other telecommunications and computer based programming be compared with LPTV to determine relative educational and cost significance?

To what degree is there a need for establishing an expert information source on telecommunications and how they best interface in order to advise educators at all levels in planning future technological adaptations?

EXHIBIT A

SCHOOL DISTRICTS CONTACTING EMS IN RESPONSE TO INITIAL INTEREST SURVEY

LOW POWER TV

DISTRICT RESPONSES

DATE	CONTACT PERSON/DISTRICT REMARKS	FOLLOW-UP
February 1, 1982	Discuss contract with Gayle Anderson SDE Preliminary activity definition.	
February 4, 1982	Consulted with Mollie Pauka FCC on rules/regulations consulted Keith Larson - FCC.	
February 5, 1982	Consulted with Earl James, Superintendent of Eagle Bend.	
Feburary 9, 1982	• Consulted with Jim Anderson • Consulted with Will Kitchen on regional progress toward Cable/LPTV Adoption. • Consulted with Lawyers for Joint Commission.	
February 12, 1982	MTG with Gene Kairies. Study definition.	
February 10-16, 1982	Library/Literature review of LPTV - state of art.	
February 16, 1982	Consulted with Mankato ECSU - Lee Martisko on LPTV Cable. Interest in So. Region.	

LOW POWER TV

DISTRICT RESPONSES

DATE	CONTACT PERSON/DISTRCT REMARKS	FOLLOW-UP
February 21, 1982	Consulted with Will Kitchen and law representative on legal needs.	
February 25, 1982	MTG with Cambridge Coordinator for Cable Television - Will Kitchen. Lawyers for the Joint Commission were present. Investigated issues of Cable and LPTV.	
March 2, 1982	Consulted LPTV with LPTV Hotline in Washington - Pat Watkins. Discussed rules and regulations and needed references.	
March 4, 1982	Visited Eagle Bend - meet with H.S. principal (Lundgren?) - Viewed program boardcast - talked with teacher from B.H. district.	
March 8, 1982	Superintendent Gordon Dobberstein - Gary called. Gary/Twin Valley interested in LPTV.	These districts should be kept in mind as we do needs assessment. 218-356-8222
March 8, 1982 Metro Number 338-3080	Superintendent Marty Duncan - Howard Lake Waverly District - interested in becoming host district for LPTV - said they have Vo. Coop. - now doing things - not sure if any interest in any other district.	Consider for host site in needs assessment. Fred Parsons at Delano interested?
March 9, 1982 612-269-8833	Superintendents Ralph Norland - Montevideo School District requested information relating to LPTV. Interested in host district status.	Sent materials/information. Consider for host site with others in area.

LOW POWER TV

DISTRICT RESPONSES

DATE	CONTACT PERSON/DISTRICT REMARKS	FOLLOW-UP
March 10, 1982 507-537-1481	Penny Dickhudt - ECSU Marshall. They are aware and knowledgeable of LPTV, have SFU at Southwest State College which is subcontracted to ECSU.	Doing a needs assessment now which could be helpful to us. May be potential host.
March 10, 1982 218-229-3321	Dr. Nolan Aurora/Hoyt Lakes. Would be interested in host district sites. Apparently has money to do so.	Consider as a potential host.
March 10, 1982 218-697-2394	Darrell Nelson, Superintendent of Schools, Hill City (Remer). Interested in more information. Mailed a copy of Hotline to him.	Is investigating possibility further.
March 10, 1982 507-225-3413	Superintendent Marls Hinckley - Nicollet Public Schools. Has lease agreement with Cable TV Co. Interested in host district status.	Sent copy of Guidebook and Hotline. Recommend for host.
March 11, 1982 218-681-4510	Richard Cotschevar - Thief River Falls Director of Northwest Vocational Corporation. Have 1200 students participating now from six districts. Specialists in several vocational areas as well as radio. Goodridge, Middle River, New Foxden, Strandquist, Plummer, Red Lake Falls in Special Education.	Recommend for host. AVTI has radio/television facility.
March 11, 1982 ?-528-2111	John Ross?	

LOW POWER TV

DISTRICT RESPONSES

DATE	CONTACT PERSON/DISTRICT REMARKS	FOLLOW-UP
March 18, 1982 507-467-2229	Marilyn Bunge - Coordinator Title 4C, Lanesboro School District #229 (Southeastern Minn.). Are now cooperating with Harmony, Preston, Wykoff to provide teleconference (audio only) capability for Spanish in H.S. and accelerated reading in grades 5 and 6. Emanating from Lanesboro. Have a history of cooperation considered using local Cable TV but too expensive.	Consider Lanesboro for host district. Mailed materials relating to LPTV.
March 18, 1982 612-464-3313 Local Call	Bob Juhl - Forest Lake District #831. Expressed an interest in LPTV. Although he has not discussed this with other districts, he feels Chisago Lakes, North Branch, Centennial and others may be interested.	Consider as a possible host. Sent a letter acknowledging this call and Hotline and sources.
March 18, 1982 218-378-4133	Dr. Don Langren - Superintendent at Goodridge. Is interested in host district for three districts Goodridge, Oklee, Grygla. Also would cooperate if Thief River Falls were the center.	Consider for host of three districts. Sent letters of acknowledgement and Hotline information.
March 19, 1982 612-528-2529	Ken Swanson, principal, Barrett Public Schools District #262. Interested in LPTV in cooperation with Elbow Lake, Hoffman, Evansville, Herman, Kensington, and Ashby. They presently cooperate on some programs. They would like to be considered as the host district.	Mailed acknowledgement and information. Consider as possible host district.
March 19, 1982 218-827-3101	Dan Mobilia, Superintendent, Babbitt Public Schools District #262. They are interested in being the host district in cooperation with Ely and Tower. They presently cooperate in many programs and have discussed the possibility of LPTV.	Consider for the host district. Letter of acknowledgement and information materials were sent.

LOW POWER TV

DISTRICT RESPONSES

DATE	CONTACT PERSON/DISTRICT REMARKS	FOLLOW-UP
March 22, 1982 (Kairies-March 10) 218-253-2165	Claude Sheldon, Superintendent of Red Lake Falls District #630, is interested in being LPTV site. Presently has a weather transmitting channel (Cable) to the community.	Possible host district sent letter of acknowledgement.
March 22, 1982 (Kairies-March 10) 507-534-3651	Harlan W. Tlustos, Superintendent of Plainview District #810. Would be interested in being included in the LPTV project School Board is considering TV in increase cost effectiveness for certain courses.	Possible host district Sent letter of acknowledgement.
March 25, 1982	Bob Shagen, St. Paul Public School Director of Instructional Media - questions regarding LPTV vs. cable.	None
April 3, 1982	Burton Nypen, Superintendent of Ortonville expressed an interest in LPTV host. Superintendents in Clinton and Graceville, Beardsley, Cholsio-Alberta, Wheaton, Morris, Cyrus, and Browns Valley have met to discuss communicasting.	Sent letter of ackowledgement.
July 16, 1982	Dr. Ron Madson, Emmons School District #243, expressed an interest in LPTV. He met with superintendents at Lyle, Glenville, Kiester (located on the Iowa-Minnesota border.) Talked of using LPTV for science, math and language. Emmons presently paired with Glenville. Requested a copy of Needs Assessment.	Sent letter of acknowledgement, LPTV Guidelines, Hotline information and other contents. Name and address of Engineering firm.

EXHIBIT B

PROGRESS REPORT

LOW POWER TELEVISION STUDY

Submitted to:

Gene Kairies
Coordinator of Council on Quality Education

July 6, 1982

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APPENDICES

I. OVERVIEW OF THE STUDY

The Minnesota Legislature directed CQE to complete three major tasks by January 15, 1983: 1) survey the need for LPTV in small rural school districts; 2) develop data on needs for equipment, personnel, and training; and 3) secure licenses for other communities in the State to maximize the use of LPTV to improve schooling.

The legislature based its request for CQE assistance on findings that small rural secondary schools, because of fiscal constraints, are experiencing a decrease in course offerings, uneconomical class sizes, restricted student access to courses, and the necessity for teachers to teach in subject areas for which they are not licensed.

To satisfy the directives of the legislature, the CQE issued a set of proposals for work to be done in four basic areas: (1) managing and monitoring the overall effort; (2) surveying need among small rural districts and identifying those locations where LPTV might be used to the maximum educational benefit; (3) performing engineering and technical analysis to assist in screening high need areas as to licensable locations for LPTV stations, and providing appropriate engineering data on resulting applications to the FCC; and (4) actual preparation by legal counsel of the applications to the FCC.

Educational Management Services, Inc. submitted proposals to CQE to manage and coordinate the overall effort and to complete a

survey of needs among small rural districts and identify those locations where LPTV might be used to the maximum educational benefit of students. The management and coordination activities proposed by EMS were to occur within four project phases: 1) Development and Implementation of Management and Coordination Plan; 2) Monitor contractor and other group tasks and activities; 3) Develop an information service for local school districts and contractors; and 4) Assist in preparing a legislative report. The needs survey was conceptualized as being conducted in three phases; 1) an assessment of student needs; 2) identification and solution of technical feasibility issues; and 3) determine capability and receptivity of districts to deliver services.

Progress to date in carrying out the proposed activities are discussed herein. Section 2.1 of Chapter II reviews the tasks related to management and coordination of activities, while Section 2.2 discusses progress toward the completion of the needs assessment tasks.

II. PROJECT ACTIVITIES

In this chapter, progress relating to project management and the needs assessment is discussed. Tasks to be completed in the future as well as questions and concerns pertaining to further activities also are noted.

2.1 PROJECT MANAGEMENT AND COORDINATION

A management plan has been developed to coordinate the project activities as they pertain to school districts as well as the engineering and legal firms to be contracted by the State Department of Education. EMS has conducted an initial planning meeting with the Coordinator of the Council on Quality Education to review the objectives of the study and establish protocol for contacts with the school districts. Initially, a letter was written by the Coordinator of the Council to all of the district superintendents in the state informing them of the legislative directive to study the feasibility of Low Power TV as an alternative instructional delivery system. The superintendents were asked to contact either EMS or CQE if they had an interest in utilizing low power television. Responses from fifteen districts indicating an interest were received as shown in Figure 2.1. Nearly all of the responding districts expressed an interest in becoming a host district and many identified districts with which they might be affiliated. The responding districts ranged from those who were just beginning to consider LPTV to those who have

Figure 2.1

DISTRICTS EXPRESSING AN INTEREST IN LPTV

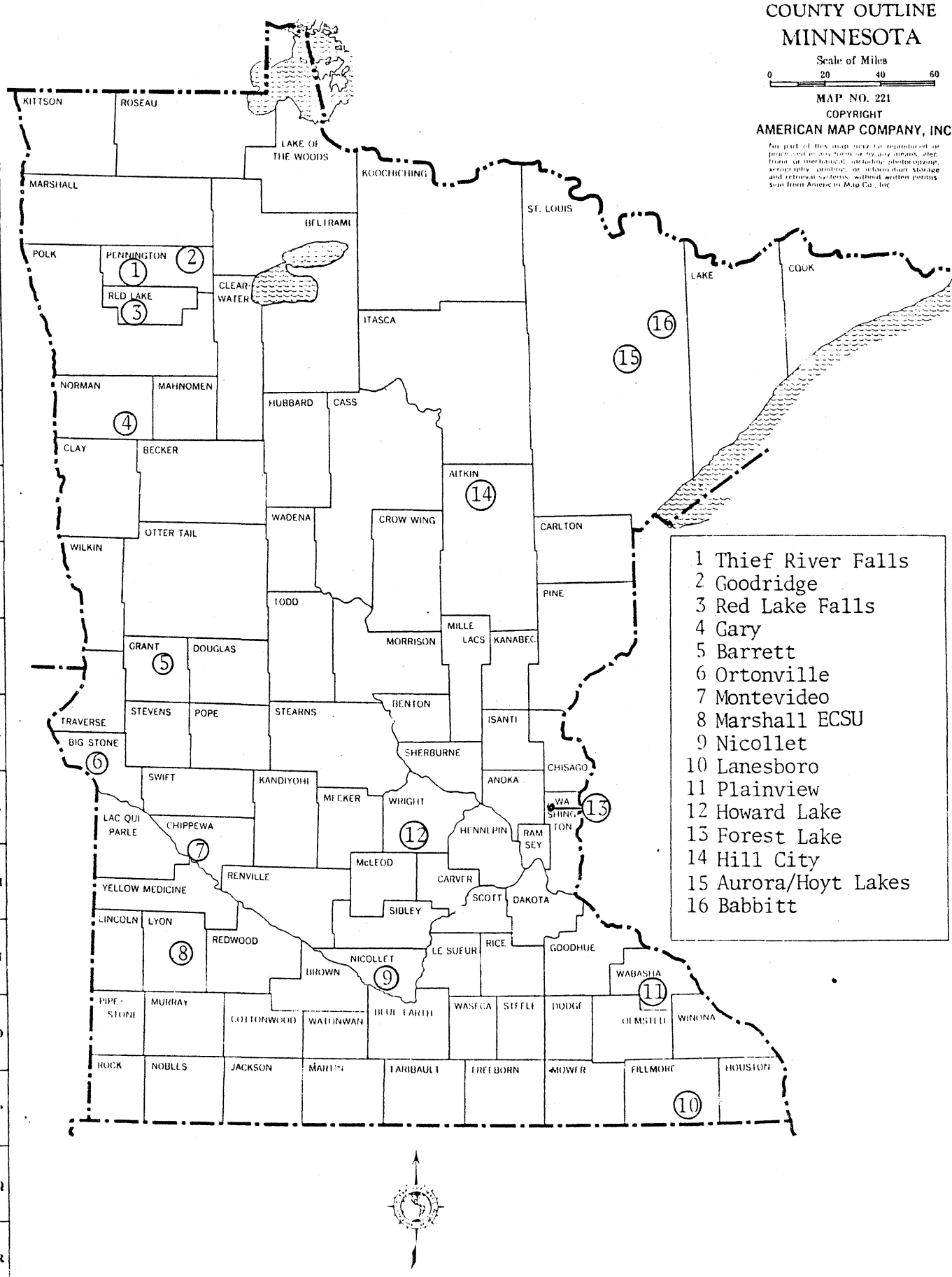


Figure 2.1

SUGGESTED COOPERATING SCHOOLS (Cont'd)

1. Thief River Falls #564
   - Goodridge #561
   - Middle River #440
   - Newfolden #441
   - Strandquist #444
   - Plummer #628
   - Red Lake Falls #630

2. Goodridge #561
   - Oklee #627
   - Grygla #447

3. Red Lake Falls #630

4. Gary #523
   - Twin Valley #526

5. Barrett #262
   - Elbow Lake #263
   - Hoffman #265
   - Evansville #208
   - Herman #264
   - Kensington #209
   - Ashby #261

6. Ortonville #62
   - Clinton #58/Graceville #60
   - Beardsley #59
   - Chokio-Alberta #771
   - Browns Valley #801
   - Wheaton #863
   - Morris #769
   - Cyrus #611

7. Montevideo #129

8. Marshall ECSU

9. Nicollet #507

10. Lanesboro #229
    - Harmony #228
    - Preston #233
    - Wykoff #236

11. Plainview #810

12. Howard Lake/Waverly #880

13. Forest Lake #831
    - Chisago Lakes #141
    - North Branch #138
    - Centennial #12

14. Hill City #002

15. Aurora/Hoyt Lakes #691

16. Babbitt #692
    - Ely #696
    - Tower #708

expended a considerable amount of time, energy, and resouces to developing a low power station.

EMS has responded with a letter to each district acknowledging their interest in LPTV and directed them to informational sources for further study as well as specific steps to be taken prior to formal application.

2.2 LPTV NEEDS ASSESSMENT

In an earlier study for the State Department of Education, the 842 Finance Study, EMS used a technique to uniformly compare all districts on two dimensions: (1) secondary program offerings; and, (2) availability of staff to deliver programs; this was referred to as the Service Capability of Districts. The same data base, the teacher certification and assignment file, updated to 1981 has utility for this project.

The Request for Proposal from CQE specified that a ranking of small rural districts be determined as a first of the study steps. Criteria to be used in defining "small rural" districts were not specified. While it is possible that a strict definition could be established, such as, under 300 students and more than 25 miles from another district of over 1,000 students, such a definition may not necessarily address the student needs which could be met by LPTV. Our conceptual approach envisions looking more at student needs, as measured by secondary program offerings and staffing levels as well as location. Measures relating to secondary program offerings and staffing levels have been identified as primary indicators of need. Distances between districts

is the major criterion for determining optimal locations of low power television stations within clusters of districts.

A simulator has been developed which allows one to study the effects of certain parameters on the optimal location of transmitters. The input data to the simulator consists of two parts. The first part is raw information on the schools, consisting of:

a. Location, given as latitude and longitude.

b. Needs measures.

1) Number of Unique Secondary Codes

2) Number of Secondary Taxonomy Areas

3) District FTE for Secondary Foreign Language

4) District FTE/1,000 Students for Secondary Foreign Language.

5) District Secondary Foreign Language FTE ÷ State Full Time Equivalent Mean Staff for Secondary Foreign Language.

6) District Secondary Foreign Language FTE/1,000 Students ÷ State Mean FTE/1,000 Students for Secondary Foreign Language.

7) District Total FTE Regular Secondary Staff

8) District FTE/1,000 Students for Regular Secondary Staff.

9) District Regular Secondary Staff FTE ÷ State Full Time Equivalent Mean Staff for Regular Secondary Staff.

10) District Regular Secondary Staff FTE/1,000 Students ÷ State Mean FTE/1,000 Students for Regular Secondary Staff.

11) District Total FTE for Secondary Art

12) District FTE/1,000 Students for Secondary Art

13) District Secondary Art Staff FTE - State Full Time Equivalent Mean Staff for Secondary Art.

14) District Secondary Art Staff FTE/1,000 Students - State Mean FTE/1,000 Students for for Secondary Art.

The second part of the input information to the simulator consists of the following parameters:

a. Number of transmitters to be allocated across the state.

b. Effective range of the transmitters in miles.

c. A set of weights which delineate the relative importance of the needs measures.

d. A decision criterion for establishing the value of a particular site as a transmitter host. This criterion is to be one of the following:

1. The value of a site is computed as the sum of the weighted needs of all schools close enough to the site to fall within the effective range of a transmitter located at the site; or the value of a site is computed as the sum described above divided by the number of schools within the effective range.

2. An assumption of interference or non-interference among closely located transmitters. An assumption of non-interference implies delivery by cable, or the assignments of distinct frequency slots to adjacent transmitters.

3. A list of districts to be excluded from the allocation process.

4. A list of clusters which must receive a transmitter, regardless of the values of the sites within the cluster as computed by the simulator.

Having stored all of the input data described, the simulator proceeds to allocate transmitters in the following fashion: A single need measure is assigned to each school by applying a normalization and weighting process. The need of each school is

then a number between 0, representing no need, and 1, representing maximal need. A list of potential transmitter hosts is compiled. The initial list contains all schools in the state excepting those which were specified as "excluded" in the simulator input. Any clusters which must be assigned a transmitter are placed at the front of the list. A value is associated with each site on the list. If a site lies within the range of a previously allocated transmitter, and if the input parameters indicate interference in such a case, then the site is assigned value zero. Otherwise, all schools on the list which fall within the range of the site under consideration are identified. The value of the site is then computed according to the evaluation criterion specified. This criterion is either total need served or total need served divided by number of schools served. Once all sites on the list have been assigned a value, the simulator allocates a transmitter to one of them as follows: If the initial segment of the list comprises a user-defined cluster, the simulator chooses the most valuable member of the cluster, allocates a transmitter to that site, and removes the entire cluster from the list. If the initial segment of the list does not comprise a user-defined segment, then the simulator chooses the most valuable member from the entire list, allocates a transmitter to that site, and removes from the list all schools within the effective range of the newly allocated transmitter. In either case, a shortened list of unserved schools remains on the list. The previously computed values for these remaining sites are removed. The process is repeated

to allocate a second transmitter. The process continues until the specified number of transmitters has been allocated, or until the list has been exhausted.

A mathematical description of the simulation algorithm is given in Appendix E.

Two mathematical formulas were applied in the selection of the districts. The first was designed to select districts on a cost effective basis; this emphasized locating a transmitter in an area which would serve the greatest number of districts. The second formula selected districts based on the highest average need served which resulted in the identification of a smaller number of districts within a given radius.

Two separate computer runs were made using each formula - the first limiting the radius to 15 miles and the second to 20 miles. The locations of the 20 transmitters of greatest need districts are shown in Figures 2.2, 2.3, 2.4 and 2.5, while the total list of districts associated with each transmitter location are appended; Appendix A contains a list of districts selected within a 15 mile radium of the transmitters, and Appendix B are those districts selected within a 20 mile radius as determined by the "cost effective formula." Appendices C and D contain lists of districts selected within 15 and 20 mile radii respectively, using the "highest average need formula." Within each cluster, districts are listed in order of greatest need to least need as indicated by the weight associated with each.

Other data/information have been analyzed and must be considered before the recommendations for the selection of a given

Figure 2.2

TRANSMITTER LOCATIONS FOR DISTRICTS WITHIN 15 MILE RADIUS

"Cost Effective Formula"

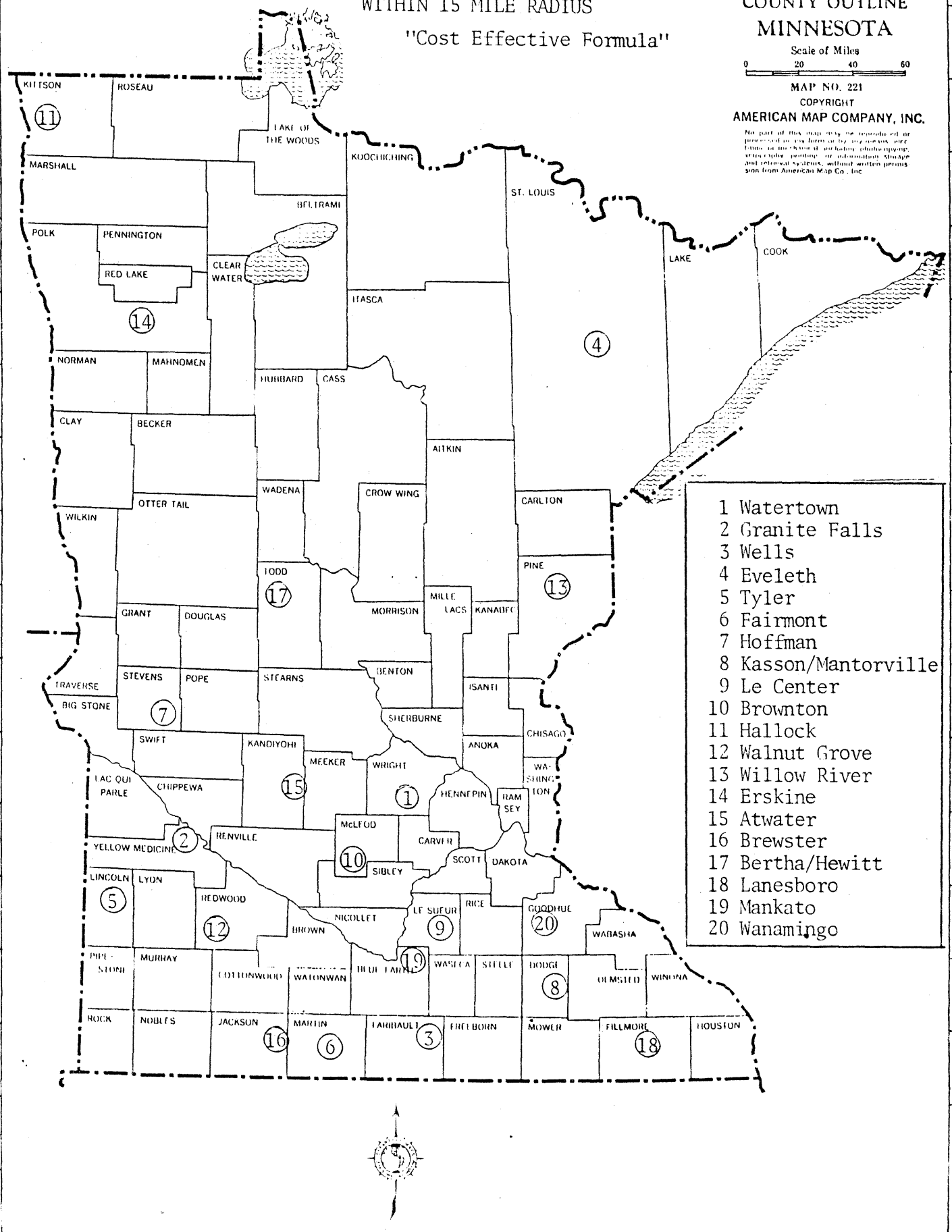


Figure 2.3

TRANSMITTER LOCATIONS FOR DISTRICTS WITHIN 20 MILE RADIUS

"Cost Effective Formula"

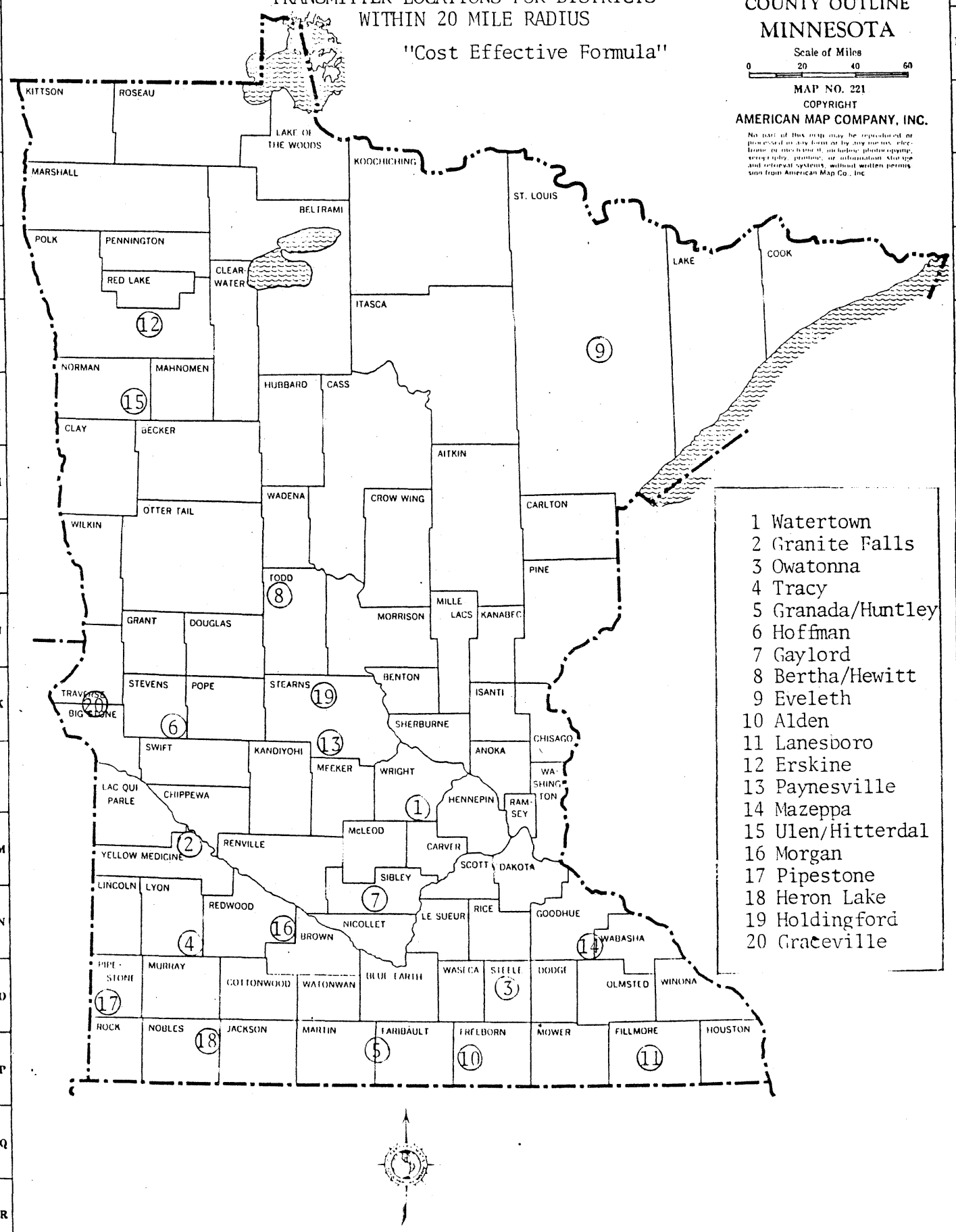


Figure 2.4

TRANSMITTER LOCATIONS FOR DISTRICTS WITHIN A 15 MILE RADIUS

"Average Need Formula"

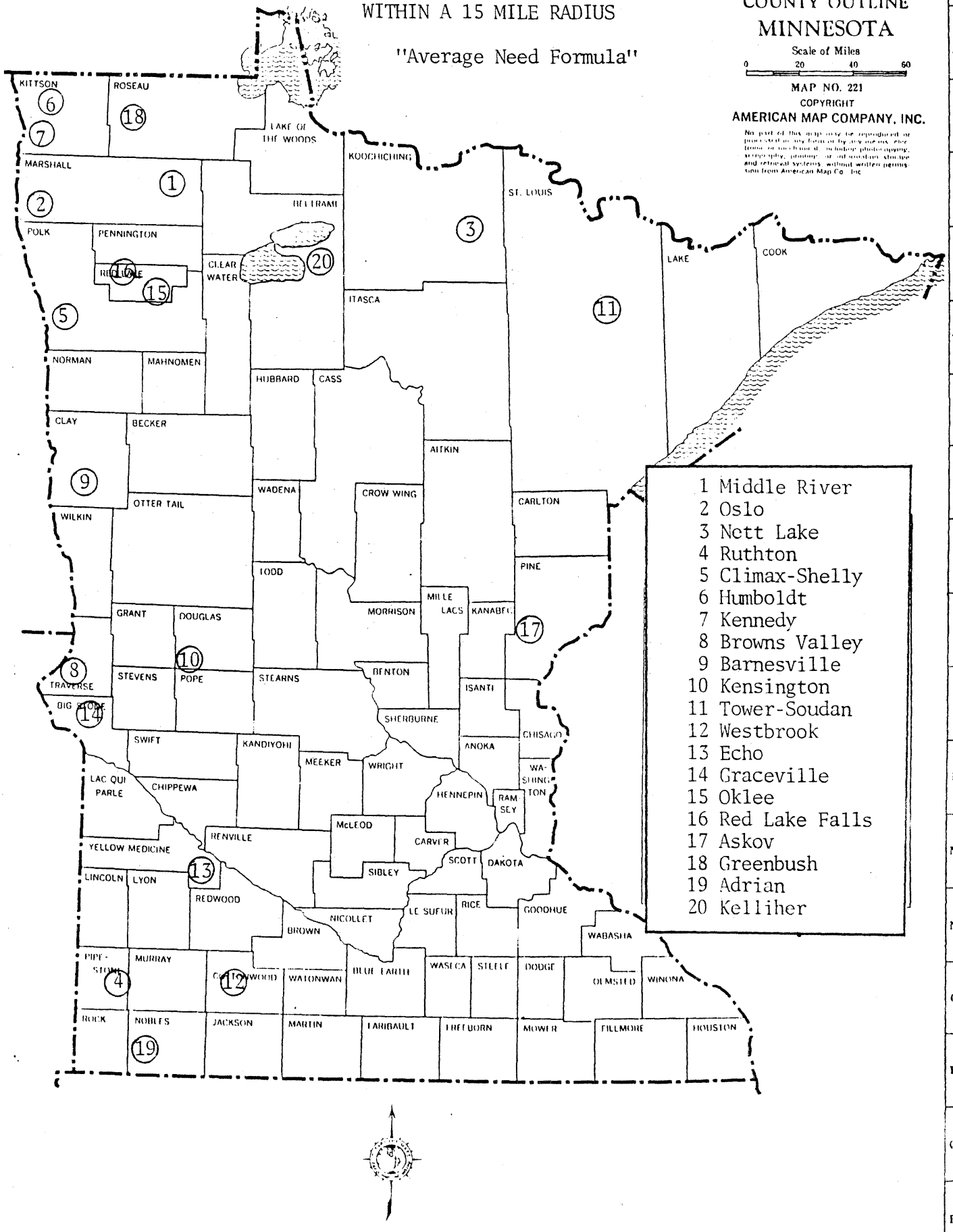
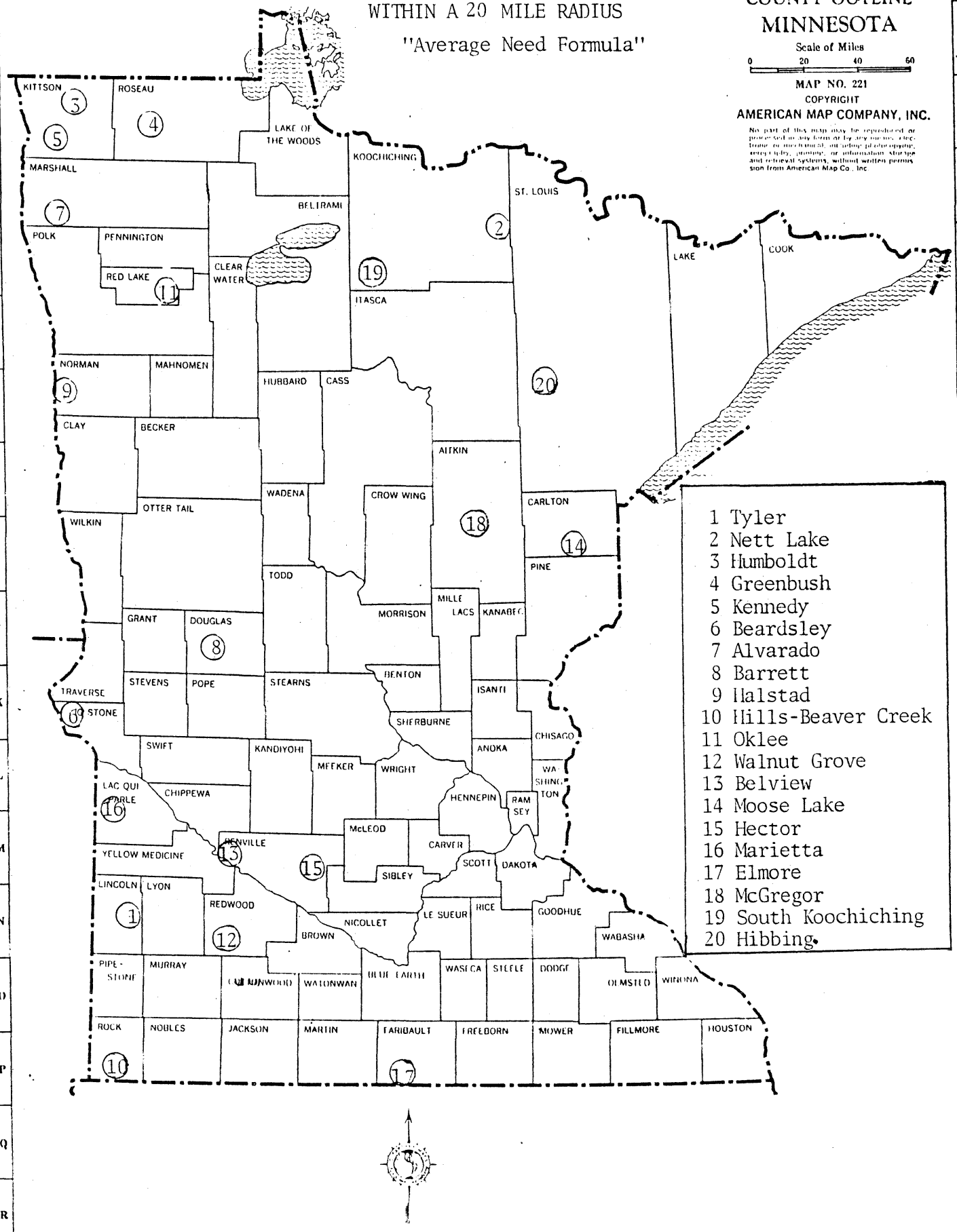


Figure 2.5

TRANSMITTER LOCATIONS FOR DISTRICTS WITHIN A 20 MILE RADIUS

"Average Need Formula"



number of districts would be completed. Of course, the interest of the districts and their commitment to developing and implementing a station are important elements in the final determination. Suggested steps preceding final approval are as follows:

1. Written agreement by districts to work together.
2. Assessment of course offerings to identify needs.
3. Review of qualifications of staff available for instruction in courses selected in the assessment.
4. Identification of staff and staff training needs, i.e., which district or districts will be responsible for training of staff?
5. Written guidelines on course operations, i.e., ways to exchange paper work site to site, ways of monitoring class behavior, etc.
6. Written agreement relating to scheduling of classes.
7. Specific guidelines developed concerning how each district will prorate costs of each course offered. For example, if District A. hosts an art class and two students enrolled in that district but seven enroll from the receiving District B, how will District A charge District B for that particular course?
8. Written agreement concerning funding and contribution by each district.

Assistance in completing these steps would be available to site districts determined to be high priority districts for licensing. A log of the contacts is on file in the EMS office.

2.3 TASKS TO BE COMPLETED

As the project continues and the engineering and legal firms become involved in the project the activities will become more specific and detailed. Within the management component (Phases I-III) EMS will work with the school districts to apprise them of the services that are available from these firms as well as provide

them with information relating to the steps needed to complete the application process. In Phase IV, EMS will assist the Executive Committee of the CQE in the preparation of the legislative report.

The assessment of needs will focus on the service capability and need of the districts relating to the implementation of a low power television station.

Districts ranking high in need and service capability will be screened by the engineering firm to evaluate the technical feasibility of the sites. Finally, districts will be judged on capability and receptivity to deliver services.

APPENDIX A

TRANSMITTER LOCATIONS

COST EFFECTIVE FORMULA

15-MILE RADIUS

APPENDIX A

Transmitter #1		Watertown/Mayer
427	.747	Winsted
424	.322	Lester Prairie
883	.575	Rockford
111	.363	Watertown/Mayer
108	.563	Norwood/Young America
879	.543	Delano
880	.534	Howard Lake
277	.524	Westonka
278	.503	Orono
877	.497	Buffalo
110	.693	Waconia

Transmitter #2		Granite Falls
655	.877	Sacred Heart
893	.747	Echo
896	.709	Wood Lake
892	.682	Clarkfield
196	.651	Clara City

Transmitter #3		Wells
218	.778	Delavan
244	.731	Freeborn
217	.700	Bricelyn
242	.338	Alden
222	.635	Kiester
223	.331	Minnesota Lake
72	.609	Mapleton
913	.688	Waldorf/Pemberton
226	.569	Wells

Transmitter #4		Eveleth
699	.740	Gilbert
650	.737	Franklin
703	.682	Mountain Iron
693	.675	Biwabik
694	.665	Buhl
677	.662	Eveleth
695	.644	Chisholm
783	.603	Virginia
710	.637	St. Louis County

Transmitter #5		Tyler
418	.866	Russell
408	.853	Verdi
584	.784	Ruthton
404	.744	Lake Benton
411	.723	Balaton
409	.660	Tyler
403	.645	Ivanhoe

Transmitter #6		Fairmont
460	.702	Granada/Huntley
453	.696	East Chain
457	.692	Tri-Mont
451	.685	Ceylon
458	.679	Truman
459	.672	Welcome
456	.555	Sherburn
454	.694	Fairmont

Transmitter #7		Hoffman
262	.846	Barrett
209	.782	Kensington
265	.770	Hoffman
611	.709	Cyrus
208	.679	Evansville
207	.668	Brandon
263	.532	Elbow Lake

Transmitter #8		Kasson/Mantorville
201	.693	Claremont
202	.663	Dodge Center
205	.660	West Concord
203	.591	Hayfield
204	.531	Kasson/Mantorville
531	.500	Byron
534	.690	Stewartville
255	.433	Pine Island
535	.312	Rochester

Transmitter #9		Le Center
736	.751	Henderson
791	.723	Cleveland
392	.611	Le Center
395	.369	Waterville/Elysian
394	.569	Montgomery
508	.523	St. Peter
393	.501	LeSueur
721	.439	New Prague

Transmitter #10		Brownton
426	.825	Stewart
421	.716	Brownton
425	.678	Silver Lake
735	.641	Winthrop
732	.579	Gaylord
422	.565	Glencoe
423	.531	Hutchinson

Transmitter #11		Hallock
442	.835	Oslo
443	.763	Stephen
436	.747	Alvarado
437	.740	Argyle
351	.644	Hallock
446	.523	Warren

Transmitter #12		Walnut Grove
178	.802	Storden/Jeffers
635	.721	Milroy
641	.709	Walnut Grove
175	.699	Westbrook
633	.686	Lamberton
417	.648	Tracy

Transmitter #13		Willow River
570	.822	Finlayson
577	.795	Willow River
566	.682	Askov
91	.642	Barnum
97	.607	Moose Lake
576	.506	Sandstone

Transmitter #14		Erskine
604	.825	Mentor
627	.758	Oklee
603	.747	McIntosh
397	.679	Erskine
601	.567	Fosston
31	.375	Bemidji

Transmitter #15		Atwater
464	.791	Grove City
461	.731	Cosmos
341	.555	Atwater
345	.324	New London/Spicer
465	.473	Litchfield
792	.434	Long Prairie
347	.393	Willmar

Transmitter #16		Brewster
328	.758	Sioux Valley
330	.662	Heron Lake/Okabena
513	.659	Brewster
516	.652	Round Lake
505	.607	Fulda
518	.503	Worthington

Transmitter #17		Bertha/Hewitt
543	.775	Deer Creek
789	.686	Clarissa
790	.655	Eagle Bend
786	.613	Bertha/Hewitt
818	.510	Verdale

Transmitter #18		Lanesboro
236	.728	Wykoff
234	.621	Rushford
228	.621	Harmony
229	.619	Lanesboro
233	.549	Preston
227	.535	Chatfield

Transmitter #19		Mankato
75	.726	St. Clair
830	.706	Janesville
507	.665	Nicollet
70	.603	Lake Crystal
78	.597	Garden City
77	.266	Mankato

Transmitter #20		Wanamingo
809	.730	Mazeppa
658	.662	Wanamingo
253	.593	Goodhue
260	.579	Zumbrota
254	.579	Kenyon
252	.510	Cannon Falls

APPENDIX B

TRANSMITTER LOCATIONS

COST EFFECTIVE FORMULA

20-MILE RADIUS

APPENDIX B

Transmitter #1		Watertown/Mayer
427	.747	Winsted
425	.678	Silver Lake
424	.622	Lester Prairie
885	.592	St. Michael/Albertville
883	.575	Rockford
111	.563	Watertown/Mayer
108	.563	Norwood/Young America
879	.543	Delano
880	.534	Howard Lake
277	.524	Westonka
272	.509	Eden Prairie
278	.503	Orono
877	.497	Buffalo
110	.493	Waconia
720	.438	Shakopee
112	.403	Chaska

Transmitter #2		Granite Falls
655	.877	Sacred Heart
631	.777	Belview
893	.747	Echo
896	.709	Wood Lake
412	.689	Cottonwood
892	.682	Clarkfield
126	.651	Clara City
127	.642	Maynard
654	.638	Renville
647	.614	Buffalo Lake
717	.613	Jordan
894	.604	Granite Falls
129	.481	Montevideo

Transmitter #3		Owatonna
657	.865	Morristown
201	.693	Claremont
827	.688	New Richland
763	.678	Medford
202	.663	Dodge Center
205	.648	West Concord
762	.630	Ellendale/Geneva
203	.591	Hayfield
254	.579	Kenyon
395	.569	Waterville/Elysian
756	.513	Blooming Prairie
731	.417	Owatonna
829	.414	Waseca
653	.387	Faribault

Transmitter #4		Tracy
415	.954	Lynd
418	.866	Russell
178	.802	Storden/Jeffers
411	.723	Balaton
635	.721	Milroy
641	.709	Walnut Grove
175	.699	Westbrook
504	.689	Slayton
633	.686	Lamberton
417	.648	Tracy
413	.423	Marshall

Transmitter #5		Granada/Huntley
218	.778	Delavan
219	.774	Elmore
460	.702	Granada/Huntley
453	.696	East Chain
457	.692	Tri-Mont
451	.685	Ceylon
458	.679	Truman
459	.672	Welcome
225	.614	Winnebago
79	.579	Amboy/Good Thunder
240	.532	Blue Earth
454	.394	Fairmont

Transmitter #6		Hoffman
262	.846	Barrett
209	.782	Kensington
265	.770	Hoffman
264	.747	Herman
611	.709	Cyrus
261	.709	Ashby
614	.689	Starbuck
208	.679	Evansville
207	.668	Brandon
263	.532	Elbow Lake
769	.500	Morris

Transmitter #7		Gaylord
426	.825	Stewart
734	.751	Henderson
421	.716	Brownton
507	.665	Nicollet
733	.662	Gibbon
735	.641	Winthrop
731	.634	Arlington
732	.579	Gaylord
422	.565	Glencoe
508	.528	St. Peter
393	.501	LeSueur

Transmitter #8		Bertha/Hewitt
543	.775	Deer Creek
545	.700	Henning
789	.686	Clarissa
790	.655	Eagle Bend
547	.651	Parkers Prairie
786	.613	Bertha/Hewitt
553	.604	New York Mills
786	.604	Browerville
818	.510	Verndale
819	.466	Wadena
793	.462	Staples

Transmitter #9		Eveleth
699	.740	Gilbert
650	.737	Franklin
703	.682	Mountain Iron
693	.675	Biwakib
694	.665	Buhl
697	.662	Eveleth
695	.644	Chisholm
706	.603	Virginia
691	.589	Aurora/Hoyt Lakes
710	.437	St. Louis County

Transmitter #10		Alden
244	.751	Freeborn
217	.700	Bricelyn
243	.675	Emmons
242	.668	Alden
222	.635	Kiester
223	.631	Minnesota Lake
245	.625	Glenville
913	.600	Waldorf/Pemberton
224	.569	Wells
241	.302	Albert Lea

Transmitter #11		Lanesboro
236	.728	Wykoff
857	.658	Lewiston
234	.621	Rushford
228	.621	Harmony
229	.619	Lanesboro
533	.603	Dover/Eyota
858	.552	St. Charles
233	.549	Preston
227	.545	Chatfield
238	.534	Mabel/Canton

Transmitter #12		Erskine
604	.825	Mentor
627	.758	Oklee
603	.747	McIntosh
628	.693	Plummer
597	.679	Erskine
599	.616	Fertile/Beltrami
630	.614	Red Lake Falls
601	.567	Fosston
31	.375	Bemidji

Transmitter #13		Paynesville
464	.791	Grove City
741	.576	Paynesville
745	.576	Albany
766	.572	Belgrade
341	.555	Atwater
750	.538	Cold Spring
345	.524	New London/Spicer
463	.483	Eden Valley/Watkins
465	.473	Litchfield
792	.434	Long Prairie

Transmitter #14		Mazeppa
809	.730	Mazeppa
806	.723	Elgin/Millville
658	.662	Wanamingo
253	.593	Goodhue
260	.579	Zumbrota
813	.515	Lake City
531	.500	Byron
255	.466	Pine Island
256	.353	Red Wing
535	.312	Rochester

Transmitter #15		Ulen/Hitterdal
522	.788	Borup
914	.737	Ulen/Hitterdal
24	.733	Lake Park
521	.648	Ada
21	.638	Audubon
150	.591	Hawley
435	.590	Waubun
526	.549	Twin Valley

Transmitter #16		Morgan
638	.873	Sanborn
652	.719	Morton
85	.628	Springfield
649	.623	Fairfax
636	.565	Morgan
637	.559	Redwood Falls
84	.548	Sleepy Eye
640	.537	Wabasso

Transmitter #17		Pipestone
408	.853	Verdi
384	.784	Ruthton
404	.744	Lake Benton
918	.675	Chandler/Lake Wilson
581	.672	Edgerton
382	.668	Jasper
583	.525	Pipestone
Transmitter #18		Heron Lake/Okabena
328	.758	Sioux Valley
330	.662	Heron Lake/Okabena
513	.659	Brewster
516	.652	Round Lake
505	.607	Fulda
324	.534	Jackson
325	.521	Lakefield
518	.503	Worthington
Transmitter #19		Holdingford
486	.695	Swanville
791	.671	Grey Eagle
487	.577	Upsala
748	.571	Sartell
738	.543	Holdingford
485	.466	Royalton
740	.429	Melrose
47	.384	Sauk Rapids
482	.339	Little Falls
742	.214	St. Cloud
Transmitter #20		Graceville
801	.758	Browns Valley
57	.751	Beardsley
58	.737	Clinton
60	.719	Graceville
771	.521	Chokio/Alberta
62	.502	Ortonville
803	.501	Wheaton

APPENDIX C

TRANSMITTER LOCATIONS

AVERAGE NEED FORMULA

15-MILE RADIUS

APPENDIX C

Transmitter #1		Middle River
444	.360	Strandquist
440	.322	Middle River
441	.307	New Folden
Transmitter #2		Oslo
442	.340	Oslo
436	.318	Alvarado
Transmitter #3		Nett Lake
707	.327	Nett Lake
Transmitter #4		Ruthton
418	.348	Russell
408	.344	Verdi
584	.327	Ruthton
404	.318	Lake Benton
411	.312	Balaton
409	.296	Tyler
Transmitter #5		Climax/Shelly
600	.329	Fisher
592	.318	Climax/Shelly
Transmitter #6		Humboldt
356	.339	Lancaster
352	.338	Humboldt
351	.292	Hallock
Transmitter #7		Kennedy
443	.322	Stephan
354	.319	Kennedy
Transmitter #8		Browns Valley
801	.321	Browns Valley
57	.319	Beardsley
Transmitter #9		Barnesville
850	.353	Rothsay
146	.287	Barnesville
Transmitter #10		Kensington
262	.342	Barret
209	.328	Kensington
265	.324	Hoffman
611	.308	Cyrus
614	.304	Starbuck
207	.298	Brandon
Transmitter #11		Tower/Soudan
708	.316	Tower/Soudan
Transmitter #12		Westbrook
178	.331	Storden/Jeffers
641	.308	Walnut Grove
175	.306	Westbrook
Transmitter #13		Echo
655	.350	Sacred Heart
631	.325	Belview
893	.318	Echo
896	.308	Wood Lake
417	.304	Cottonwood
894	.283	Granite Falls
Transmitter #14		Graceville
58	.316	Clinton
60	.311	Graceville
Transmitter #15		Oklee
627	.321	Oklee
603	.318	McIntosh
628	.305	Plummer
597	.301	Erskine
Transmitter #16		Red Lake Falls
604	.337	Mentor
630	.285	Red Lake Falls
Transmitter #17		Askov
570	.337	Finlayson
577	.330	Willow River
566	.302	Askov
576	.256	Sandstone
Transmitter #18		Greenbush
676	.329	Badger
678	.282	Greenbush
Transmitter #19		Adiran
669	.344	Magnolia
514	.324	Ellsworth
511	.283	Adiran
670	.270	Luverne
Transmitter #20		Kelliher
36	.305	Kelliher
Transmitter #21		Hector
426	.337	Stewart
651	.307	Hector
646	.306	Bird Island
462	.305	Cosmos
649	.287	Fairfax
653	.277	Olivia

Transmitter #22		Sanborn
638	.350	Sanborn
81	.319	Comfrey
633	.303	Lamberton
654	.292	Renville
85	.289	Springfield
640	.264	Wabasso

Transmitter #23		Marietta
376	.322	Marietta
371	.305	Bellinghaam
377	.282	Madison

Transmitter #24		Nashwauk/Keewatin
319	.346	Nashwauk/Keewatin
701	.259	Hibbing

Transmitter #25		Henning
543	.326	Deer Creek
545	.307	Henning
658	.294	Parkers Prairie
542	.282	Battle Lake

Transmitter #26		Gonvick
161	.307	Clearbrook
158	.297	Gonvick

Transmitter #27		Borup
522	.328	Borup
914	.316	Ulen/Hitterdal
521	.293	Ada
526	.269	Twin Valley

Transmitter #28		Tracy
635	.312	Milroy
417	.291	Tracy

Transmitter #29		Hill City
2	.301	Hill City

Transmitter #30		Chandler Lake/Wilson
504	.303	Slayton
918	.301	Chandler Lake/Wilson
581	.299	Edgerton

Transmitter #31		Blue Earth
218	.327	Delavan
219	.325	Elmore
460	.307	Granada/Huntley
225	.283	Winnebago
240	.262	Blue Earth

Transmitter #32		Backus
114	.324	Backus
117	.274	Pine River

Transmitter #33		Isle
473	.308	Isle
480	.289	Onamia

Transmitter #34		Argyle
437	.317	Argyle
446	.280	Warren

Transmitter #35		Aurora/Hoyt Lakes
699	.317	Gilbert
693	.300	Biwabik
691	.277	Aurora/Hoyt Lakes

Transmitter #36		Cromwell
95	.298	Cromwell

Transmitter #37		Clara City
346	.307	Raymond
126	.294	Clara City
127	.292	Maynard

Transmitter #38		Akeley
306	.323	Laporte
308	.311	Nevis
301	.280	Akeley
119	.275	Walker

Transmitter #39		Southland
497	.314	Lyle
495	.299	Grand Meadow
499	.292	LeRoy/Ostrander
500	.282	Southland

Transmitter #40		Halstad
524	.308	Halstad
525	.286	Hendrum

Transmitter #41		Lake Park
24	.315	Lake Park
21	.291	Audubon
150	.280	Hawley

Transmitter #42		McGregor
4	.295	McGregor

Transmitter #43		Gibbon
733	.296	Gibbon
735	.291	Winthrop

Transmitter #44		Kiester
217	.306	Bricelyn
243	.301	Emmons
242	.299	Alden
222	.291	Keister
224	.273	Wells
Transmitter #45		Ashby
261	.308	Ashby
550	.303	Underwood
208	.301	Evansville
263	.262	Elbow Lake
Transmitter #46		Hills/Beaver Creek
671	.294	Hills/Beaver Creek
Transmitter #47		Cook County
166	.294	Cook County
Transmitter #48		Sioux Valley
328	.320	Sioux Valley
513	.297	Brewster
516	.294	Round Lake
325	.262	Lakefield
Transmitter #49		Buffalo Lake
892	.302	Clarkfield
378	.293	Dawson
647	.285	Buffalo Lake
Transmitter #50		Minnesota Lake
244	.319	Freeborn
223	.290	Minnesota Lake
72	.283	Mapleton
913	.281	Waldorf/Emberton
Transmitter #51		Browerville
789	.303	Clarissa
790	.295	Eagle Bend
786	.283	Browerville
Transmitter #52		Floodwood
698	.293	Floodwood
Transmitter #53		Hendricks
403	.294	Ivanhoe
402	.293	Hendricks
Transmitter #54		Lynd
415	.369	Lynd
414	.276	Minneota
413	.234	Marshall
Transmitter #55		Red Lake
38	.304	Red Lake
363	.280	So Koochiching
Transmitter #56		Gaylord
421	.310	Brownton
731	.288	Arlington
732	.276	Gaylord
Transmitter #57		Glenwood
615	.314	Villard
612	.268	Glenwood
Transmitter #58		Fertile/Beltrami
523	.297	Gary
599	.285	Fertile/Beltrami
Transmitter #59		Henderson
734	.319	Henderson
391	.312	Cleveland
392	.284	Le Center
717	.283	Jordan
393	.255	Le Sueur
Transmitter #60		Fulda
330	.297	Heron Lake/Okabena
54	.283	Fulda

APPENDIX D

TRANSMITTER LOCATIONS

AVERAGE NEED FORMULA

20-MILE RADIUS

Transmitter #1		Tyler
415	.205	Lynd
418	.194	Russell
408	.192	Verdi
584	.184	Ruthton
404	.178	Lake-Benton
411	.176	Balaton
409	.169	Tyler
403	.165	Ivanhoe
Transmitter #2		Nett Lake
707	.182	Nett Lake
Transmitter #3		Humboldt
356	.190	Lancaster
352	.188	Humboldt
351	.166	Hallock
Transmitter #4		Greenbush
444	.200	Strandquist
676	.184	Badger
440	.180	Middle River
353	.163	Karlstad
678	.162	Greenbush
Transmitter #5		Kennedy
443	.181	Stephan
354	.179	Kennedy
Transmitter #6		Beardsley
801	.180	Browns Valley
57	.179	Beardsley
58	.177	Clinton
60	.176	Graceville
Transmitter #7		Alvarado
442	.190	Oslo
436	.179	Alvarado
437	.178	Argyle
446	.159	Warren
Transmitter #8		Barret
262	.191	Barret
209	.182	Kensington
265	.182	Hoffman
264	.179	Herman
261	.174	Ashby
208	.170	Evansville
207	.168	Brandon
263	.150	Elbow Lake
Transmitter #9		Halstad
522	.184	Borup
592	.179	Climax/Shelly
524	.174	Halstad
521	.167	Ada
525	.165	Hendrum

Transmitter #10		Hills/Beaver Creek
669	.192	Magnolia
514	.182	Ellsworth
671	.165	Hills/Beaver Creek
670	.153	Luverne
Transmitter #11		Oklee
604	.189	Mentor
627	.180	Oklee
603	.179	McIntosh
628	.172	Plummer
597	.170	Erskine
158	.167	Gonvick
601	.156	Fosston
Transmitter #12		Walnut Grove
638	.194	Sanborn
178	.185	Storden/Jeffers
635	.175	Milroy
641	.174	Walnut Grove
175	.173	Westbrook
633	.171	Lamberton
654	.165	Renville
417	.165	Tracy
640	.153	Wabasso
Transmitter #13		Belview
655	.194	Sacred Heart
631	.183	Belview
893	.179	Echo
652	.176	Morton
896	.174	Wood Lake
894	.161	Granite Falls
637	.153	Redwood Falls
Transmitter #14		Moose Lake
570	.188	Finlayson
577	.185	Willow River
566	.170	Askov
95	.169	Cromwell
91	.165	Barnum
97	.161	Moose Lake
Transmitter #15		Hector
426	.189	Stewart
421	.175	Brownton
651	.174	Hector
646	.173	Bird Island
462	.171	Cosmos
733	.168	Gibbon
649	.164	Fairfax
653	.158	Olivia

Transmitter #16		Marietta
376	.181	Marietta
371	.173	Bellingham
378	.167	Dawson
377	.161	Madison
Transmitter #17		Elmore
219	.183	Elmore
218	.182	Delavan
460	.174	Granada/Huntley
453	.172	East Chain
217	.172	Bricelyn
222	.164	Kiester
225	.160	Winnebago
240	.150	Blue Earth
Transmitter #18		McGregor
4	.169	McGregor
Transmitter #19		So. Koochiching
38	.173	Red Lake
161	.172	Clearbrook
363	.162	So. Koochiching
Transmitter #20		Hibbing
319	.190	Nashwauk/Keewatin
703	.170	Mountain Iron
694	.168	Buhl
695	.166	Chisholm
701	.148	Hibbing

APPENDIX E

Appendix E

Algorithm for Optional Location of LPTV Transmitters

LET N = Number of schools
M = Number of needs measures

$NEED_{ij}$ = need of school i as indicated by measure .

$1 \leq i \leq N, \quad 1 \leq j \leq M$

(X_i, Y_i) = location of school i, converted to miles from an arbituarily chosen origin.

$1 \leq i \leq N$

R = transmitter range
P = number of transmitters to be allocated

W_j = weight assigned to needs measure j.

$1 \leq j \leq M$

EXC = $\{ i / 1 \; i \; N$ and (X_i, Y_i) is the location of an excluded site$\}$

Q = number of user-defined cluster, each of which must receive a transmitter

$CLUST_j$ = $\{ i / 1 \; i \; N$ and (X_i, Y_i) is the location of a site in the jth cluster$\}$

$1 \leq j \leq Q$

Compute for $1 \leq j \leq M$:

$$MAX_j = \max \{ NEED_{ij} / 1 \leq i \leq N$$
$$MIN_j = \min \{ NEED_{ij} / 1 \leq i \leq N$$

Compute normalized weighted need for each school, i.e. for $1 \leq i \leq N$:

$$\overline{NEED_i} = \frac{1}{\sum_{j=1}^{m} W_j} \left(\sum_{j=1}^{m} \frac{W_j \; (MAX_j - NEED_{ij})}{MAX_j - MIN_j} \right)$$

LIST = $\{ i / 1 \leq i \leq N$ and a transmitter has been allocated to site $(x_i, Y_i)\}$

LIST is initially empty, i.e. LIST = $\emptyset$

Allocate user-defined clusters first; i.e. for $1 \leq j \leq \min(P,Q)$ compute:

$$\text{for } i \in \text{LUST}j, \quad Ti = \{k/k \in \text{CLUST}j \text{ and } \sqrt{(Xi-Xk)^2 + (Yi-Yk)^2} \leq R\}$$

$$\text{VAL}i = \begin{cases} \sum_{k \in Ti} \overline{\text{NEED}}k, & \text{if value based on total need} \\ \frac{2}{|Ti|} \sum_{k \in Ti} \overline{\text{NEED}}k, & \text{if value based on total need/number of schools served} \end{cases}$$

$\text{LIST} \leftarrow \text{LIST} \cup \{i\}$
where $i \in \text{CLUST}j$ and $\text{VAL}i = \max\{\text{VAL}k/k \in \text{CLUST}j\}$

If more transmitters remain, after allocation to user-defined clusters, i.e. if $P>Q$, then allocate remaining transmitters as follows:

Compile candidate list:

$$\text{CAND} = \{i/1 \leq i \leq N\} - \text{EXC} - \bigcup_{j=1}^{Q} \text{CLUST}j$$

while $|\text{LIST}| \leq P$ and $|\text{CAND}| > \emptyset$ repeat the following allocation scheme:

$$\text{for } i \in \text{CAND}, \quad Ti = \{k/k \in \text{CAND and } \sqrt{(Xi-X)^2 + (Yi-Y)^2} \leq R\}$$

0, if interference is specified and $\exists j$ such that j LIST and $\sqrt{(Xi-Xj)^2 + (Yi-Yj)^2} \leq R$

$\sum_{k \in Ti} \overline{\text{NEED}}k$, if value based on total need, and (no interference is specified or $\forall j(j \in \text{LIST} \rightarrow \sqrt{(Xi-Xj)^2 + (Yi-Yj)^2} > R)$

$\frac{1}{|Ti|} \sum_{k \in Tj} \overline{\text{NEED}}k$, if value based on total need/number of schools served and (no interference is specified or

$$\forall j[j \in \text{LIST} \rightarrow \sqrt{(Xi-Xj)^2 + (Yi-Yj)^2} > R$$

$\text{LIST} \leftarrow \text{LIST} \cup \{i\}$
where i CAND and $\text{VAL}i = \max \text{VAL}k/k \in \text{CAND}\}\}$

$\text{CAND} \leftarrow \text{CAND} \; Ti$,
where $i \in \text{CAND}$ and $\text{VAL}i = \max\{\text{VAL}k/k \in \text{CAND}\}$

EXHIBIT C

Revised Computer Analysis for LPTV Need Study

Phone: (612) 831-1819

EDUCATIONAL MANAGEMENT SERVICES, INC.

4510 West 77th Street, Suite 100 • Minneapolis, Minnesota 55435

MEMORANDUM

TO: Gene Kairies
Diane Morehouse
Sue Sattel

FROM: Jack Zimmer
Jan Johnson

DATE: July 29, 1982

RE: Merged Computer Analysis for LPTV Need Study

Enclosed is a revised listing of the "high need" LPTV district clusters. This new generation of clusters is based on a merging of the analyses from the average need index and the cost effective formula.

As we discussed in our last meeting, the analysis for each index shared significant overlap in the clusters identified. Merging the formulas resulted in the listing of 45 transmitter locations on the enclosure as identified.

Please review this new list and let us know when it is timely to review the LPTV management study with you. Do not hesitate to call if you have questions or concerns.

DISTRICTS SELECTED FOR LPTV NEED

Transmitter	District	Need Measure	Location
Transmitter #1	218	32720	Delavan
	244	31989	Freeborn
	217	30667	Bricelyn
	243	30107	Emmons
	242	29924	Alden
	222	29104	Kiester
	223	29047	Minnesota Lake
	72	28370	Mapleton
	913	28157	Waldorf-Pemberton
	224	27368	Wells
Transmitter #2	699	31715	Gilbert
	650	31623	Franklin
	703	30289	Mountain Iron
	693	30067	Biwabik
	694	29783	Buhl
	697	29741	Eveleth
	695	29184	Chisholm
	706	27932	Virginia
	710	23930	St. Louis County
Transmitter #3	655	35035	Sacred Heart
	893	31897	Echo
	896	30892	Wood Lake
	892	30289	Clarkfield
	126	29467	Clara City
	127	29256	Maynard
	894	28316	Granite Falls
	129	24918	Montevideo
Transmitter #4	460	30710	Granada-Huntley
	453	30655	East Chain
	457	30435	Tri-Mont
	451	30253	Ceylon
	458	30198	Truman
	459	30015	Welcome
	456	26958	Sherburn
	454	22604	Fairmont
Transmitter #5	418	34840	Russell
	408	34474	Verdi
	584	32775	Ruthton
	404	31806	Lake Benton
	411	31258	Balaton
	409	29613	Tyler
	403	29412	Ivanhoe

DISTRICTS SELECTED FOR LPTV NEED - (cont'd)

Transmitter	District	Need Measure	Location
Transmitter #6	809	31441	Mazeppa
	258	29662	Wanamingo
	205	29065	West Concord
	253	27845	Goodhue
	260	27676	Zumbrota
	254	27642	Kenyon
	252	25730	Cannon Falls
	255	23976	Pine Island
Transmitter #7	734	31989	Henderson
	391	31258	Cleveland
	392	28459	Le Center
	395	27402	Waterville-Elysian
	394	27219	Montgomery
	508	25657	St. Peter
	393	25503	LeSueur
	721	24135	New Prague
Transmitter #8	262	34291	Barrett
	209	32811	Kensington
	265	32409	Hoffman
	611	30892	Cyrus
	208	30198	Evansville
	207	29845	Brandon
	263	26231	Elbow Lake
Transmitter #9	178	33192	Storden-Jeffers
	635	31294	Milroy
	641	30892	Walnut Grove
	175	30618	Westbrook
	633	30381	Lamberton
	654	29229	Renville
	417	29100	Tracy
Transmitter #10	426	33743	Stewart
	421	31075	Brownton
	425	30070	Silver Lake
	735	29193	Winthrop
	732	27611	Gaylord
	422	27114	Glencoe
	423	26003	Hutchinson
Transmitter #11	464	32957	Grove City
	462	30560	Cosmos
	341	26967	Atwater
	345	25978	New London-Spicer
	465	24656	Litchfield
	792	24032	Long Prairie
	347	21956	Willmar

DISTRICTS SELECTED FOR LPTV NEED - (cont'd)

Transmitter	District	Need Measure	Location
Transmitter #12	100	31349	Wrenshall
	700	29401	Hermantown
	93	28462	Carlton
	99	27877	Esko
	704	25286	Proctor
	94	23440	Cloquet
	709	14684	Duluth
Transmitter #13	570	33780	Finlayson
	577	33049	Willow River
	566	30289	Askov
	91	29281	Barnum
	97	28344	Moose Lake
	576	25678	Sandstone
Transmitter #14	604	33743	Mentor
	627	32172	Oklee
	603	31897	McIntosh
	597	30198	Erskine
	601	27438	Fosston
	31	21569	Bemidji
Transmitter #15	328	32093	Sioux Valley
	513	29778	Brewster
	330	29741	Heron Lake-Okabena
	516	29496	Round Lake
	54	28368	Fulda
	518	25081	Worthington
Transmitter #16	543	32628	Deer Creek
	789	30341	Clarissa
	790	29509	Eagle Bend
	786	28462	Bertha-Hewitt
	818	25799	Verndale
	819	24755	Wadena
Transmitter #17	236	31477	Wykoff
	234	28772	Rushford
	229	28730	Lanesboro
	228	28694	Harmony
	233	26982	Preston
	227	26762	Chatfield
Transmitter #18	75	31349	St. Clair
	830	30762	Janesville
	507	29832	Nicollet
	70	28188	Lake Crystal
	78	28054	Garden City
	77	21636	Mankato

DISTRICTS SELECTED FOR LPTV NEED - (cont'd)

Transmitter	District	Need Measure	Location
Transmitter #19	652	31166	Morton
	85	28916	Springfield
	649	28736	Fairfax
	636	27271	Morgan
	84	26814	Sleepy Eye
	637	26750	Redwood Falls
Transmitter #20	486	30527	Swanville
	791	29887	Grey Eagle
	487	27516	Upsala
	745	27506	Albany
	738	26634	Holdingford
	485	24722	Royalton
Transmitter #21	657	34712	Morristown
	201	30481	Claremont
	763	30070	Medford
	829	29985	Waseca
	761	22877	Owatonna
	656	22007	Faribault
Transmitter #22	881	30234	Maple Lake
	727	28018	Big Lake
	885	27784	St. Michael-Albertville
	882	26461	Monticello
	716	25895	Belle Plaine
	728	22108	Elk River
Transmitter #23	139	27457	Rush City
	333	26886	Ogilvie
	314	26592	Braham
	332	26348	Mora
	578	26331	Pine City
	911	24214	Cambridge
Transmitter #24	669	34474	Magnolia
	514	32409	Ellsworth
	671	29405	Hills-Beaver Creek
	511	28395	Adrian
	670	27013	Luverne
Transmitter #25	522	32866	Borup
	914	31623	Ulen-Hitterdal
	24	31532	Lake Park
	150	28039	Hawley
	526	26942	Twin Valley

DISTRICTS SELECTED FOR LPTV NEED - (cont'd)

Transmitter	District	Need Measure	Location
Transmitter #26	376	32226	Marietta
	371	30527	Bellingham
	377	28224	Madison
	784	28145	Appleton
	62	25732	Ortonville
Transmitter #27	806	31140	Elgin-Millville
	857	29650	Lewiston
	533	28188	Dover-Eyota
	810	27057	Plainview
	858	27878	St. Charles
Transmitter #28	497	31441	Lyle
	495	29924	Grand Meadow
	499	29229	Le Roy-Ostrander
	500	28279	Southland
	237	27332	Spring Valley
Transmitter #29	736	27493	Belgrade
	741	27313	Paynesville
	750	26190	Cold Spring
	463	25178	Eden Valley-Watkins
	740	23606	Melrose
Transmitter #30	356	33926	Lancaster
	352	33871	Humboldt
	354	31989	Kennedy
	351	29284	Hallock
Transmitter #31	444	36082	Strandquist
	440	32263	Middle River
	441	30710	Newfolden
	353	28864	Karlstad
Transmitter #32	202	29577	Dodge Center
	203	27881	Hayfield
	204	26318	Kasson-Mantorville
	531	25417	Byron
	535	16596	Rochester
Transmitter #33	442	34017	Oslo
	436	31897	Alvarado
	437	31715	Argyle
	446	28002	Warren

DISTRICTS SELECTED FOR LPTV NEED - (cont'd)

Transmitter	District	Need Measure	Location
Transmitter #34	261	30892	Ashby
	545	30746	Henning
	550	30344	Underwood
	542	28279	Battle Lake
Transmitter #35	638	35022	Sanborn
	81	31989	Comfrey
	836	29284	Butterfield
	173	23875	Mountain Lake
Transmitter #36	306	32354	Laporte
	308	31112	Nevis
	301	28039	Akeley
Transmitter #37	25	31623	Pine Point
	820	29650	Sebeka
	821	28919	Menahga
	553	28316	New York Mills
Transmitter #38	415	36960	Lynd
	417	30472	Cottonwood
	414	27609	Minneota
	413	23463	Marshall
Transmitter #39	918	30107	Chandler-Lake Wilson
	581	29948	Edgerton
	582	29924	Jasper
	583	26263	Pipestone
Transmitter #40	297	29793	Spring Grove
	294	27859	Houston
	299	27689	Caledonia
	238	26433	Mabel-Canton
Transmitter #41	768	31532	Hancock
	726	26948	Becker
	771	26184	Chokio-Alberta
	769	25464	Morris
Transmitter #42	615	31441	Villard
	612	26876	Glenwood
	213	26463	Osakis
	206	22235	Alexandria

DISTRICTS SELECTED FOR LPTV NEED - (cont'd)

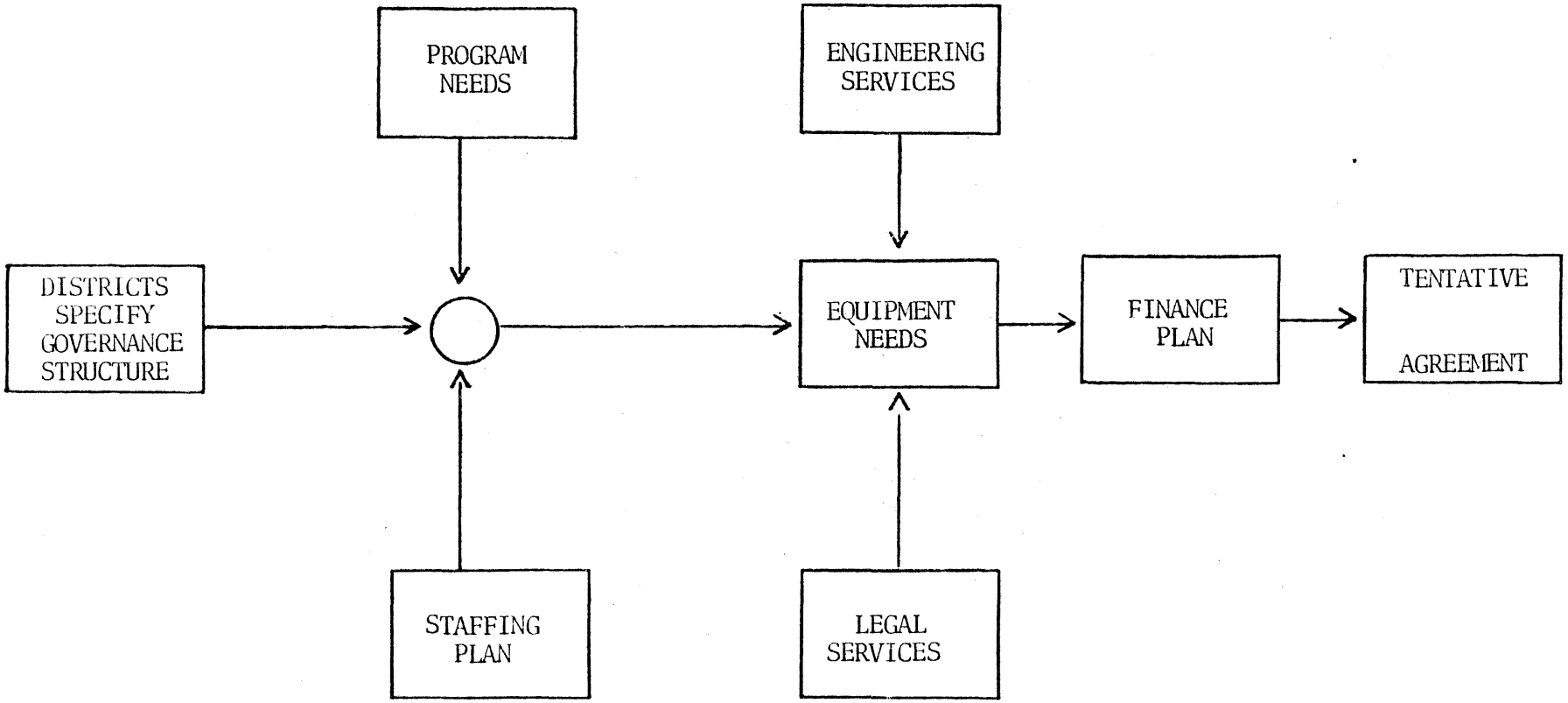
Transmitter	District	Need Measure	Location
Transmitter #43	140	28882	Taylors Falls
	141	23727	Chisago Lakes
	138	22358	North Branch
	831	20605	Forest Lake
Transmitter #44	801	32172	Browns Valley
	57	31989	Beardsley
	60	31166	Graceville
Transmitter #45	600	32957	Fisher
	592	31897	Climax-Shelly
	593	24957	Crookston

EXHIBIT D

Proposed Steps Prior To Application And Licensing

The attached papers served to focus the discussion during a meeting with the Coordinator of the Minnesota Council on Quality Education.

PROPOSED PROCESS PRIOR TO APPLICATION AND LICENSING



TENTATIVE AGREEMENT PRELIMINARY ACTIVITIES

I. It is necessary that districts take specific preliminary steps prior to developing a low power television station.

- Determine instructional need.
- Determine appropriate applications for clusterwide applications.
- Determine potential relationship between LPTV and other delivery modes such as Cable and ITFS.

II. Districts must sign an agreement to cooperate which includes, but is not limited to, the following:

A. Governance

1) Board of Directors (Number of members nominated)
2) Charter/Bylaws
3) Community Involvement
4) Host District Identification

B. Program Needs

1) Identify courses to be proposed.
2) Number of students expressing desire to take courses.
3) Number of students past and presently in identified courses in each district.
4) Analysis of schedules and proposed schedules.
5) Textbooks and materials needed.

C. Staff Availability

1) Staff available to provide instruction in each subject matter area
2) Evidence of certification in subject matter area
3) Experience
4) Training needs to work in LPTV

D. Engineering Service

1) Identify barriers to signal
2) Determine that area is not restricted by FCC regulations
3) Application assistance

E. Faculties/Equipment/Materials

1) Options for consideration
2) Projected costs
   a) Transmission equipment
   b) Studio equipment
   c) Satellite Earth Station
   d) Tower Costs
   e) Other Costs

F. Legal Service

1) Lawyer assigned
2) Legal requirements

G. Financial Commitment

1) Approximate cost estimates
2) Proposed funding process
3) districts contributions
4) Fiscal Agent

Dear Superintendent:

The Minnesota Legislature directed the Council on Quality Education (CQE) to survey the need for Low Power television (LPTV) in small rural school districts in Minnesota, and assist in securing licenses to maximize the use of LPTV to improve instruction. Your school district was identified, in an assessment conducted earlier this year, as one of the schools which ranked high in regard to factors indicative of a need for an LPTV station. The Council is prepared to offer assistance to selected districts in planning and developing a station provided specific criteria are met.

With the limited resources available to assist in this endeavor, it is important that preliminary steps be completed by the school districts who have an interest in developing and implementing an LPTV station. Therefore, the Council is requiring that a tentative agreement be reached by districts that attest to their commitment to identify their needs relating to program offering, staffing, equipment, financing and legal services in addition to a governance structure for planning, developing and managing their station when and if it becomes operational.

Before assistance can be provided by CQE, it will be necessary for clusters of districts to submit a plan showing that each district has been involved in the preliminary planning and is committed to providing resources for further development.

Please complete the attached forms and return them to EMS by _____. Your district and those included in your tentative agreement will be assigned a priority for receiving assistance in developing the plan in greater detail including engineering service, legal service and overall assistance in completing the application process.

If you have any questions, please call me or Janice Johnson and we will be happy to assist you.

Sincerely,

John F. Zimmer

JFZ/laf

LOWPOWER TELEVISION AGREEMENT

The school districts identified below do hereby declare their intent to cooperate to develop a plan to seriously explore the implementation of the LPTV station designed to provide instruction to students enrolled in the respective school districts. _____ will serve as the fiscal agent.

DISTRICT NAME	DISTRICT NUMBER	SUPERINTENDENT	SUPERINTENDENT'S SIGNATURE

I. PROGRAM NEEDS - The following courses are identified as potential offerings for completion of the developmental process.

TITLE OF PROPOSED COURSES TO BE OFFERED	ENROLLMENT						
	ACTUAL				PROJECTED		
	78-79	79-80	80-81	81-82	83-84	84-85	85-86
1.							
2.							
3.							
4.							
5.							
6.							
7.							
8.							
9.							
10.							

SCHEDULING OF CLASSES - Indicate how the class scheduling will be coordinated among districts.

II. FINANCIAL PLAN

A. Initial Costs - Please estimate startup costs for the items shown below.

Transmission Equipment	- (Past LPTV stations have ranged from $15,000 to $90,000)	$_____
Studio Equipment	- (Past LPTV stations have ranged from $100,000 to $200,000)	$_____
Satellite Earth Station	- (Estimated at $30,000)	$_____

B. Operating Costs For First Three Years. $_____

$_____

$_____

C. General description of how the project will be financed. (Show your capital outlay for 1981-82.)

III. STAFFING PLAN

A. Teachers - Indicate how many staff will be needed and their area of certification.

B. What staff will be needed to operate the station? (Usually a full time project director and at least a part time assistant are needed - depending on the amount of time the station operates each day) Students are trained to operate cameras, etc.

C. Training Needs - Describe the training you will provide to prepare staff members for LPTV Instruction.

IV. GOVERANCE PLAN - Draft a statement indicating how the station will be governed and managed. i.e. board comprised of members of each board, meetings each month.

V. TIME TABLE FOR DEVELOPMENT AND IMPLEMENTATION - Identify target dates for the completion of specific tests and a final date indicating where the station would be in operation.

VI. LPTV EQUIPMENT PLAN

A. Coverage - Indicate the radius of the coverage from the host site, transmitter power output, and rationale for selection of equipment.

B. Equipment — Cost

Transmission Equipment

1 1000 watt UHF transmitter with exciter	_____
1 omnidirectional transmitting antenna	_____
1 5/8" foam cozx transmission line @ $8.36/foot (400')	_____
2 transmission line connectors	_____
_____	_____
_____	_____
_____	_____
_____	_____

TOTAL TRANSMISSION EQUIPMENT _____

Studio Equipment

2 braodcast quality color studio cameras with lenses, pedestals and cabling	_____
2 1" type "C" video tape recorders with no editing features	_____
1 studio lighting package	_____
1 limited effects production switcher	_____
1 studio color monitor	_____
3 black & white studio monitors	_____
1 routing switcher	_____
1 studio audio package including microphones, stand and console cables, connectors and other miscellaneous test equipment including waveform monitor, vectorscope, VTVM, etc.	_____
_____	_____
_____	_____
_____	_____
_____	_____

TOTAL STUDIO EQUIPMENT _____

Satellite Earth Station

1 Receiver-only satellite earth station complete with noise amplifier, receiver, site clearance and installation	_____

GRAND TOTAL _____

EXHIBIT E

LPTV Workshop

Phone: (612) 831-1819

EDUCATIONAL MANAGEMENT SERVICES, INC.

4510 West 77th Street, Suite 100 • Minneapolis, Minnesota 55435

August 24, 1982

Eugene Kairies, Coordinator
Minnesota Council on Quality Education
722 Capitol Square Building
550 Cedar Street
St. Paul, Minnesota 55101

Dear Gene:

Attached is a proposed agenda for LPTV workshops to be conducted at selected sites around the state. The topics could be presented by members representing your department, EMS and possibly the engineering firm presently under contract with you.

When you have had an opportunity to review the agenda, we probably should meet to more specifically identify topics, presenters, time allocations and other needed revisions. Of course, the demographics of the meeting will require a great deal of thought and preparation; e.g., site, room arrangements, and lunch.

I look forward to discussing this with you. Let me know when we should meet.

Sincerely,

John F. Zimmer, Ph.D.
Vice President for Consulting

JFZ:baj
Enc.

Phone: (612) 831-1819

EDUCATIONAL MANAGEMENT SERVICES, INC.

4510 West 77th Street, Suite 100 • Minneapolis, Minnesota 55435

LPTV WORKSHOP
PROPOSED AGENDA
9:00 a.m. - 3:00 p.m.

- LPTV Background (45-60 minutes)

  1) Development of LPTV in Minnesota
  2) Pros & Cons of LPTV
  3) Legislative Intent
  4) Project Objectives and Activities
  5) Other Introductory Information (LPTV with Cable, LPTV with Microwave, etc.)

- Needs Assessment (30-45 minutes)

  1) Responses Received from Districts
  2) Conferences, Workshops, Hotline, and Other LPTV Related Informational Sources
  3) Needs Assessment Design
  4) Needs Assessment Activities and Findings

- Engineering and Legal Service Overview (30-45 minutes)

- Guidelines for School Districts in Acquiring a License for LPTV (45-60 minutes)

  1) Federal Guidelines - Application Screening Process, etc.
  2) Minnesota Legislative Expectations
  3) Prerequisites to Obtaining a License

     a. Cooperative Agreement
     b. Resources Needed
     c. Financial Commitment and Agreement
     d. Program Analysis
     e. Staff Identification
     f. Application Process
     g. Legal Service
     h. Engineering Service

- Legislative Report and Action (30 minutes)

  1) Future Activities Anticipated
  2) Legislative Report

EXHIBIT F

LOW POWER TELEVISION POINTS OF INQUIRY

LOW POWER TELEVISION POINTS OF INQUIRY

APPLICATION FOR LICENSE

1) What is the probability that districts will be awarded a license if they apply?
2) What is the implication for application award if you are located in tier 3? tier2? tier 1?
3) To whom are applications submitted?
4) How many applications have been submitted to this point in time?
5) Are applications now being processed?
6) Will the rate of processing increase in the future? Is it true that the FCC will develop an automated approach to application processing?
7) What is the probability of success?
8) What are the criteria for approving applications?
9) How do I obtain an application?

COSTS

1) What would the total cost be for developing and implementing a system similar to the one at Eagle Bend, Clarissa, and Bertha Hewitt?
2) Would additional staff members be required? If so, what costs would this involve?
3) Given different equipment configurations what would the costs be for the first year? Satellite only? Microwave only?

4) What do you project the costs to be for legal services through one year of operation?

5) How much should be budgeted for materials/supplies/tapes etc.?

6) What sources of income are available other than district funds?

7) Is there a potential for the station to generate an income?

8) What is the cost for an application if it is awarded?

9) Are maintenance costs prohibitive?

EQUIPMENT

1) Given different systems/models what equipment is needed?

2) Is it necessary to erect an antenna?

3) What companies are major suppliers?

4) Are contracts for equipment usually awarded in response to bids?

5) What is the minimum equipment configuration to have sending and receiving capabilities?

6) Is it important to purchase high quality equipment?

7) What is the life span of the major equipment needed to operate a station?

8) Are maintenance contracts necessary to assure that the station stays on the air?

LEGAL REQUIREMENTS

1) Is it necessary to have legal counsel? How often are they needed?

2) Must the law firm or lawyer have specific expertise pertaining to LPTV?

3) In what ways can a legal service assist the district?

4) Are there firms in Minnesota who feature the kind of service?

5) Does a district have a need for a lawyer after the first year of broadcasting?

PROGRAM

1) What are the first steps to be taken by districts interested in LPTV?

2) Have program requirements been established?

3) How does one determine what courses should be taught?

4) Is it necessary to establish a Board to give advice as well as approve decisions and allocation of funds?

5) Is it necessary to show a student demand for courses before they are offered?

6) Is it appropriate to offer programs for community consumption?

7) Is it required that one district be the fiscal agent?

8) What are the requirements relating to staff assignments?

9) Is there a need for staff training?

10) How can students be used in operating the system?

11) Must there be an agreement for the contribution of funds by each district?