

National Cooperative Transit Research & Development Program

*FOR THE PERIOD
JANUARY 1 THROUGH JUNE 30, 1982
CONTRACT DTUM60-81-C-72012*

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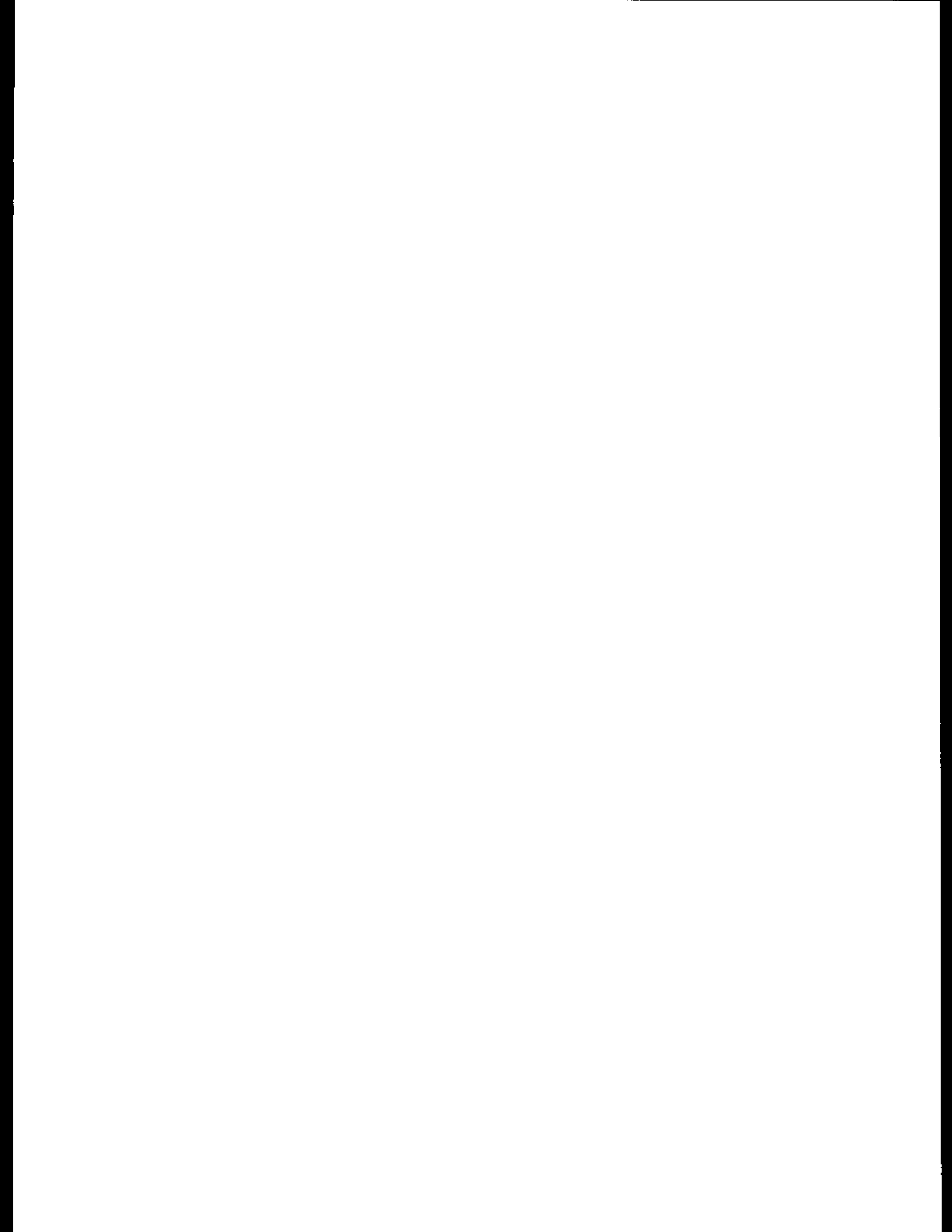
TO THE U.S. DEPARTMENT OF TRANSPORTATION/URBAN MASS TRANSPORTATION ADMINISTRATION
(DOT CONTRACT DTUM60-81-C-72012)

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CONTENTS

	Foreword	
1	Introduction	
2	Management Practices in the NCTRP	
6	Summary of Administrative Progress	
38	TABLE I—STATUS OF FY '80 & FY '81 PROJECTS THROUGH JUNE 30, 1982	
38	TABLE II—PUBLISHED REPORTS OF THE NATIONAL COOPERATIVE TRANSIT RESEARCH & DEVELOPMENT PROGRAM	
39	TABLE III—NCTRP RESEARCH RESULTS DIGESTS *	
37	PROGRESS BY PROJECT	
40	Area Thirty:	Economics
42	Area Thirty-One:	Finance
	Area Thirty-Two:	Policy Development
44	Area Thirty-Three:	Personnel Management
	Area Thirty-Four:	Labor Relations
	Area Thirty-Five:	Procurement
47	Area Thirty-Six:	Alternative Analysis
	Area Thirty-Seven:	Forecasting
49	Area Thirty-Eight:	System Planning
51	Area Thirty-Nine:	Route Planning
53	Area Forty:	Impact Analysis
	Area Forty-One:	Vehicles
	Area Forty-Two:	Vehicle Auxiliary Systems
55	Area Forty-Three:	Track and Ancillary Systems
	Area Forty-Four:	Stations
	Area Forty-Five:	Bridges and Tunnels
	Area Forty-Six:	General Design
56	Area Forty-Seven:	General Materials
	Area Forty-Eight:	Specifications, Procedures, and Practices
	Area Forty-Nine:	Vehicles
	Area Fifty:	Vehicle Auxiliary Systems
	Area Fifty-One:	Maintenance of Way and Structures
	Area Fifty-Two:	Scheduling
	Area Fifty-Three:	Control Systems
58	Area Fifty-Four:	Energy Efficiency
	Area Fifty-Five:	Performance Effectiveness and Efficiency
	Area Fifty-Six:	Fare Collection
	Area Fifty-Seven:	Supplemental Services
59	Area Sixty:	Special Projects



FOREWORD

This document responds to Article II, Deliverable Items and Delivery Schedule, of DOT Contract DTUM60-81-C-72012 between the U.S. Department of Transportation/Urban Mass Transportation Administration and the National Academy of Sciences, designated the Primary Technical Contractor(PTC), for technical and administrative services relative to the Urban Mass Transportation Administration's National Cooperative Transit Research & Development Program(NCTRP). Distribution of this document is made only to the sponsors and others participating officially in the conduct of the NCTRP.

Annual NCTRP activity consists of five(5) distinct phases: (1) Problem Identification, (2) Program Formulation, (3) Project Formulation, (4) Project Execution, and (5) Project Reporting. The Academy's obligation as the PTC is relative to Phases 2 through 5, and responsibilities for administration of technical matters under these phases has been assigned to the Transportation Research Board, a unit of the National Research Council, the operating arm of the National Academy of Sciences and the National Academy of Engineering. The TRB consists of four(4) divisions with Division D, Cooperative Research Programs, being the one to which NCTRP administration is assigned.

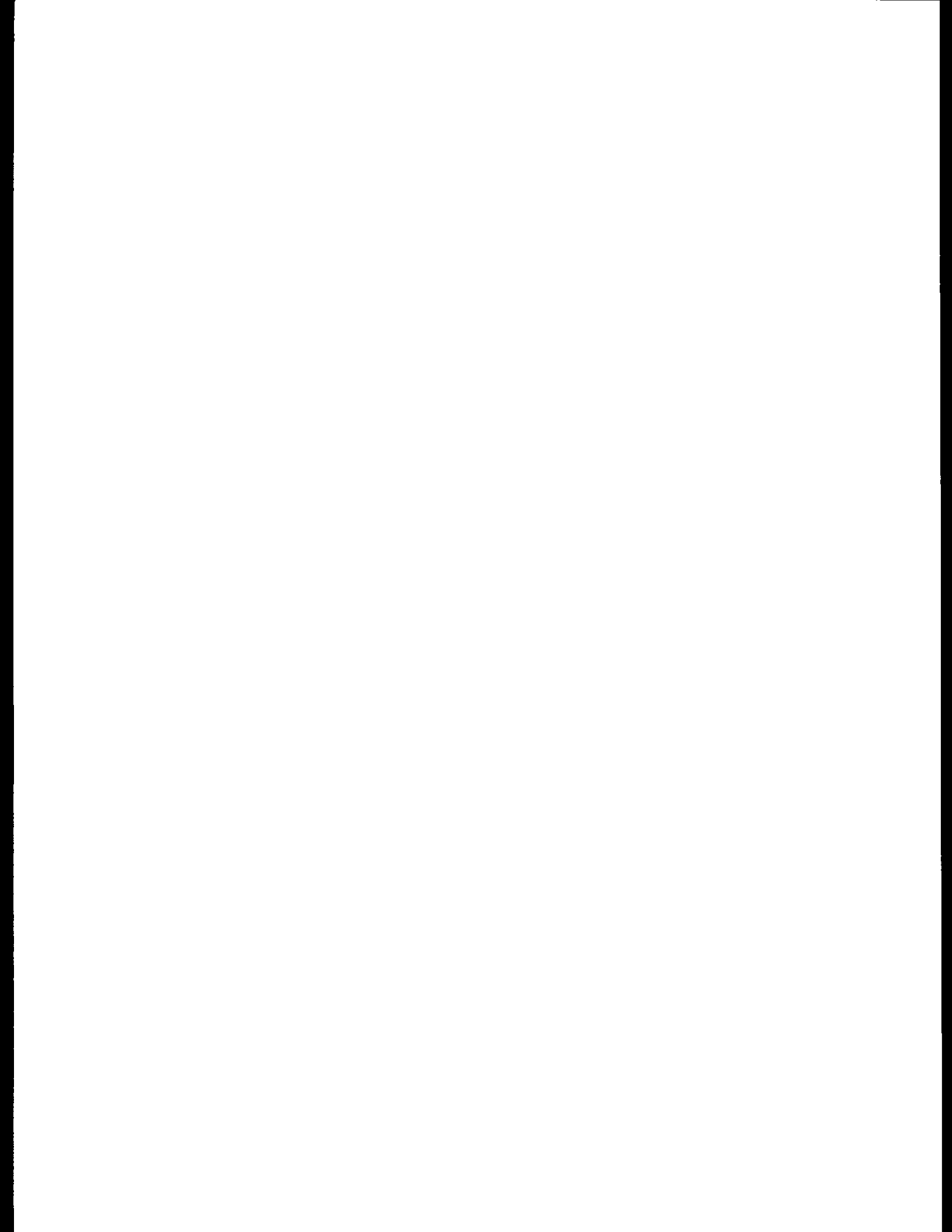
Research programs are referred annually by UMTA to the Academy for administration, and semi-annual progress reporting includes: (1) general coverage of the historical development of the NCTRP and the means by which the Program is carried forward, (2) elaboration on the management practices exercised by the TRB in behalf of the Academy and UMTA, (3) summarization of management activities and deliverables in the six months reported, and (4) provision of detailed reports on each project under contract during the report period as to the: (a) general research need, (b) specific research objectives, (c) progress in achieving project objectives, (d) availability of any reports emanating from the study, and (e) prognosis for ultimate success. Each project report includes identification of the TRB staff engineer having surveillance responsibility and with whom contact may be made for additional insight concerning any details of the contractor's work. Opinions and/or conclusions conveyed by the project reports are those of the research agencies and do not necessarily reflect the position of the National Research Council or the Government, and no official endorsement should be inferred.

A detailed overview of all aspects of NCTRP operation may be obtained from the following:

- NCTRP Summary of Progress Through 1981
- NCTRP Information and Instructions for Preparing Proposals

These are available from the Transportation Research Board on request through:

Cooperative Research Programs
Transportation Research Board
2101 Constitution Avenue, N.W.
Washington, D.C. 20418
(202) 334-3224



NATIONAL COOPERATIVE TRANSIT RESEARCH & DEVELOPMENT PROGRAM

INTRODUCTION

Administrators, engineers, and many others in the transit industry are faced with a multitude of complex problems that range between local, regional, and national in their prevalence. How they might be solved is open to a variety of approaches; however, it is an established fact that a highly effective approach to problems of widespread commonality is one in which operating agencies join cooperatively to support, both in financial and other participatory respects, systematic research that is well designed practically oriented, and carried out by highly competent researchers. As problems grow rapidly in number and escalate in complexity, the value of an orderly, high-quality cooperative endeavor likewise escalates.

Recognizing this in light of the many needs of the transit industry at large, the Urban Mass Transportation Administration, U.S. Department of Transportation, got under way in 1980 the National Cooperative Transit Research and Development Program (NCTRP). This is an objective national program that provides a mechanism by which UMTA's principal client groups across the nation can join cooperatively in an attempt to solve near-term public transportation problems through applied research, development, test, and evaluation. Particularly noteworthy is the fact that the client groups now have a channel through which they can directly influence a portion of UMTA's annual activities in transit technology development and deployment. Although present funding of the NCTRP is entirely from UMTA's Section 6 funds, the planning leading to inception of the Program envisioned that UMTA's client groups would join ultimately in providing additional support, thereby enabling the Program to address a larger number of problems each year.

The NCTRP operates by means of agreements between UMTA as the sponsor and (1) the National Academy of Sciences, a private, nonprofit institution, as the Primary Technical Contractor (PTC) responsible for administrative and technical services, (2) the American Public Transit Association responsible for operation of a Technical Steering Group (TSG) comprised of representatives of transit operators, local government officials, State DOT officials, and officials from UMTA's Office of Technology Development and Deployment, and (3) the Urban Consortium for Technology Initiatives/Public Technology, Inc., responsible for providing the local government officials for the Technical Steering Group.

Annual NCTRP activity consists of five (5) distinct phases: (1) Problem Identification, (2) Program Formulation, (3) Project Formulation, (4) Project Execution, and (5) Project Reporting. The Academy's role as the PTC is relatively to Phases 2 through 5.

Research programs are developed annually by the Technical Steering Group, which identifies key problems, ranks them in order of priority, and establishes programs of projects for UMTA approval. Once approved, they are referred to the National Academy of Sciences for acceptance and administration through the Transportation Research Board.

The Board, established in 1920, operates within the National Research Council, which serves both the National Academy of Sciences and the National Academy of Engineering, and is uniquely suited for the administrative role because: it has a record of successful management of the National Cooperative Highway Research Program (NCHRP) since 1962, the program after which the NCTRP has been modeled; it maintains an extensive committee structure from which authorities on any transportation subject may be drawn; it possesses the avenues of communications and cooperation with federal, state, and local governmental agencies, universities, and industry; it is recognized for its objectivity and understanding of modern research practices; its relationship to its parent organization is an insurance of objectivity; and it maintains a full-time staff of research specialists in transportation matters to take the findings of research directly to those who are in a position to use them.

Research projects addressing the problems annually referred from UMTA are defined by panels of experts established by the Board to provide technical guidance and counsel in the problem areas. The projects are advertised widely for proposals, and qualified agencies are selected on the basis of research plans offering the greatest probabilities of success. The research is carried out by these agencies under contract to the Academy, and administration and surveillance of the contract work are the responsibilities of the Academy and Board.

The needs for transit research are many, and the National Cooperative Transit Research and Development Program is a mechanism for deriving timely solutions for transportation problems of mutual concern to many responsible groups. In doing so, the Program operates complementary to, rather than as a substitute for or duplicate of, other transit research programs.

MANAGEMENT PRACTICES IN THE NCTRP

The commentary that follows is to provide insight into the Academy's functions directed to management, through TRB, of UMTA's resource allocation for NCTRP research under Contract DTUM60-81-C-72012. Highlighted are those activities in which all possible opportunity is taken to weight the odds in favor of obtaining implementable solutions to near-term public transportation problems. A more detailed overview of all aspects of Program operation may be obtained from the following:

- NCTRP Summary of Progress Through 1981
- NCTRP Information and Instructions for Preparing Proposals

Organizationally, the TRB consists of four divisions, each headed by an assistant director reporting to an executive director, who in turn reports to an executive committee. Division D, renamed in 1979 as *Cooperative Research Programs*, was established in 1962 as a special-purpose activity to administer contracts for research under the NCHRP, and it now encompasses the NCTRP. Division D's activities are thus distinctly different from the Board's traditional role of information gathering and dissemination on behalf of a variety of sponsors. Among the differences in operation is the fact that the funds supporting Division D are obtained through channels outside those pertaining to the Board's other divisions; they are budgeted separately; they are accounted for separately; and they are audited independently of those for the Board's other activities. Furthermore, the funds can be spent only on the research designated by the sponsors of the programs administered under Division D.

It should also be recognized that the overall policies and procedures, including the formulation of annual research programs, are entirely the responsibilities and prerogatives of the sponsors. Neither the regular committees nor the Board's staff have a role in the submission or selection of research problems.

UMTA's goal for the NCTRP is a program within which its resources will be managed well and appropriately directed in the search for solutions to near-term public transportation problems. Applied, or mission-oriented, research is a means to the end as regards the technological approach.

The findings from basic research completed elsewhere are brought into play to bring about new technologies. The expectation from the sponsor is that the resource allocation will result in the development of technology that, when implemented, will make life a little easier—not merely the development of scientific knowledge that has no direct practical application. Meeting this expectation is somewhat comparable to new-product research in industry, and, in addition to being extremely costly, the probability of failure is high. Furthermore, although projects may begin as applied research, the synergistic nature of research often catapults them back into the realm of basic studies, because true solutions are not achieved without understanding the underlying causes for the problem so that they may be accounted for in the future.

Currently, each year's research program is funded at about \$1 million, which represents about one-fourth the

amount contemplated in the planning processes leading to establishment of the NCTRP. As earlier stated, it is hoped that the present level can be increased through financial support ultimately obtained from UMTA's client groups joined in a cooperative venture. In any event, proper management of resources is the sole basis for establishment of the Board's entire philosophy, organization, and functions regarding work under Division D—*only the sponsor's expectations matter*. Toward this end, network control is employed in the classic sense of network utilization for project management. Primary focus is on those milestones where the best opportunities lie for positively weighting the odds of success. These opportunities are afforded through the use of common-sense strategies to control various circumstances surrounding each milestone. Subtle processes result that will, through the natural evolution of interdependent events, increase the probability of research results being implemented and improving transportation practices. Such an approach is based on game theory, is admittedly idealistic, is complex, and must be monitored constantly. Nonetheless, its practical validity cannot be denied if, in the context of total administrative responsibility, one wants to take advantage of all possible opportunities to insure the best return on the sponsor's investment.

As a first element of strategy, the NCTRP establishes the research agency and personnel qualifications that are mandatory if the projects are to have any chance of success. These are spelled out to potential proposers and are adhered to in selecting research agencies. By means of the project statements and various other widely distributed publications, the NCTRP clearly states the agency attributes deemed essential and thereby hopefully precludes proposals from any but qualified researchers having practical experience in the problem area. Emphasis is placed on the importance of a record of successful past performance in endeavors similar to those to be undertaken. The specifications for proposals are demanding in the sense of requiring the agencies to lay their knowledge, experience and accomplishments on the line, and proposals simply are not accepted if, among other factors, they do not contain specific statements as to how the contemplated results can be used to improve practice.

The next element of strategy comes into play when a research problem and its objectives are first defined in the form of an NCTRP Project Statement by which research proposals will be solicited. A continuing responsibility of the Board is to see that the projects are sensibly structured around the practical facts of operational life and that they represent current circumstances. Therefore, this task is carried out by persons not only very knowledgeable in the problem area but who also have a complete understanding of the needs of the practitioners with whom the problem originated and the best format by which the practitioner can utilize the results. Improved odds therefore become immediately inherent.

Toward the goal of sensible projects, the Board has established seven broad research fields under which project panels are organized to deal with research in specific problem areas falling within the broad fields (refer to Figure 1). For example, in the broad subject field of Operations each

NCTRP RESEARCH FIELDS AND AREAS

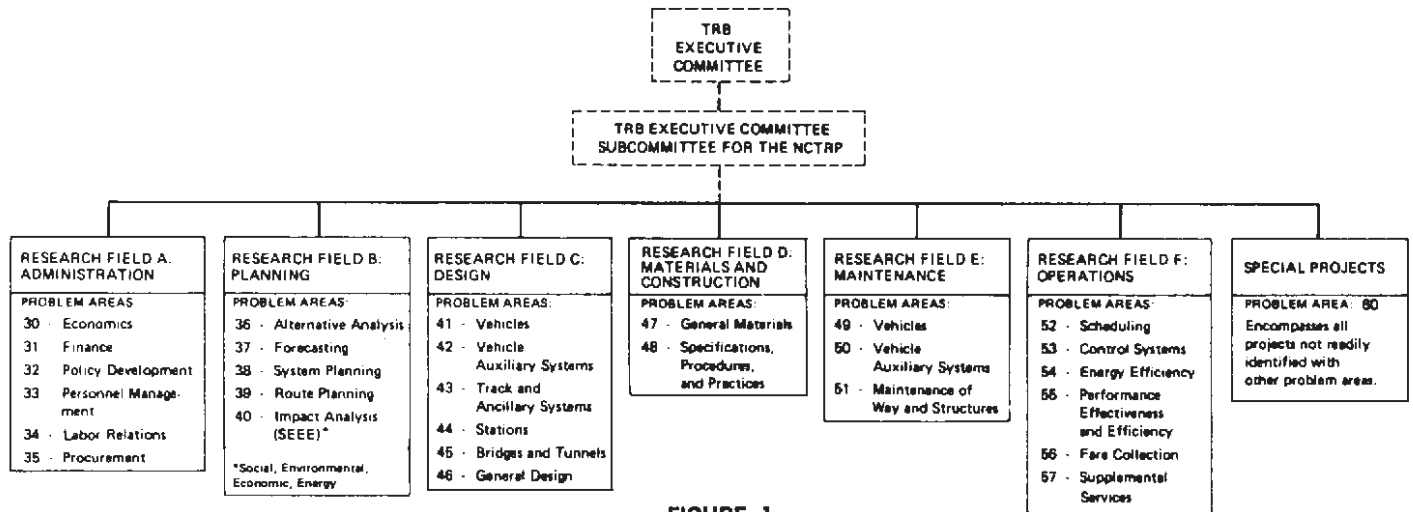


FIGURE 1

project falling within the more specific subject areas of Energy Efficiency—Area 54—is assigned a project panel comprised of outstanding individuals who are very knowledgeable in the specifics of the particular project and who are looked to for guidance and counsel throughout the research and reporting phases. Those projects that do not conveniently fit under one of the first six general fields are assigned to the seventh one, Special Projects.

When the project panels meet for the first time to prepare project statements, it is stressed to them that a first-class statement is the first of the two most important factors bearing on the ultimate success of any project. Accordingly, extreme care is exercised in the development of clear, concise project statements that are distributed to the research community at large. These statements contain objectives designed to result in the most extensive work possible for the available funding. They spell out what is expected of a contractor in terms of findings from innovative research that can be applied practically; they do not spell out how to go about the research. Statements of explicit objectives, matched to funding, places proposers in the position of knowing exactly what is expected of them, because the available funding is made known along with the objectives. Not only does this result in more realistic proposals, but it most assuredly eases each project panel's task of comparative evaluation. Of the members of the project panels for the NCTRP's first program (FY 1980), about 36 percent come from transit operating agencies. Because of their intimate involvement in the development of the various research projects, their knowledge of what is to be expected, and the "spreading of the word" among their associates, there is yet another step toward improving the odds that results will be put to use.

The second of the two most important factors, and the next element of strategy, concerns the process of evaluating proposals to select research agencies. The odds can be advanced materially if extreme care is exercised throughout this activity. Indeed, this activity constitutes the milestone on which the success of the project can become totally dependent, irrespective of the strengths built in at the pre-

ceding milestones. Prior to contracting, there *must* be satisfaction not only that the proposed research plan is the best possible in addressing the specifics of the objectives, but also that it culminates with the best promise for providing transit agencies with a product that is both usable and readily implementable; otherwise, the proposal process—and possibly that of project definition—should be repeated. The importance of this activity is made abundantly clear to the project panels when they meet to select agencies and suggest minor modifications of the research plans as a means for keeping them squarely on target. A comprehensively detailed research plan not only aids the selection process but also serves as the yardstick by which the staff exercises day-to-day surveillance of research progress.

Two top proposals are chosen for each project. The deliberations of the project panel include a review of all known aspects of agency performance on other research projects under NCTRP or elsewhere and a determination that the first-choice research plan offers the best promise for providing a product that is both usable and readily implementable. A key factor is the merit of the research approach and the experiment design. There is nothing anywhere in the Program's specifications that says the project statements must be adhered to strictly in every detail and that any deviation in research thrust or from the proposed project period warrants outright rejection. The key element is that the agencies must present a strong, convincing case for whatever approaches they take. These always receive just consideration because the sole interest of the project panels is to determine the plan with the best probability of success.

Prior to contracting, any suggested modifications are taken by the Program staff to the agencies, and a clear meeting of the minds is established regarding what is specifically expected from the research and the personnel carrying it out. By means of the "Procedural Manual for Agencies Conducting Research in the National Cooperative Transit Research and Development Program," further emphasis is placed on the requirement for practically oriented research and the proper means for reporting it.

Experience has demonstrated that, once the research is under way, the practical fact of life is that the destiny of the research is pretty well committed, no matter how extensive the staff surveillance or how many administrative processes are available to accommodate changes. Rarely are changes accompanied by gains when having to stay within the original funding; rather, the effects are usually negative.

A first requirement of the research agency immediately after contracting is the development of a working plan that is intended to be a comprehensively detailed amplification of the approved research plan, inclusive of a specific schedule of events for the major tasks. This document is used by the staff in the day-to-day surveillance of the project's progress. Should review of this document by the staff and project panel bring to light necessary changes that were not previously apparent, these can be accommodated without hindering prosecution of the work. Through this activity, an additional opportunity is afforded for improvement of the odds of success.

As a means of mutual assistance while work is under way, two types of progress reports are required from the agencies. On a monthly basis, one-page progress schedules are submitted that graphically depict several aspects of progress. On a calendar quarter basis, narratives are required that fully describe accomplishments to date and outline future activities based on the accomplishments. Based on these reports and information gained through surveillance visits, Program staff prepares its own progress reports that are sent to UMTA and the Technical Steering Group as a measure of providing a current awareness of on-going work. By these controls the Program is, to some degree, able to appraise the agency's level of performance, while at the same time the agency is provided with tools to assist its own management responsibility in both administrative and technical respects. All too often in the administration of research programs problems arise because there is insufficient communication between the agency's management staff and the technical staff performing the research.

Project surveillance constitutes a major element of strategy in achieving the administrative goal. The gains here reflect the effort that the NCTRP staff exerts (a) to keep the research in line with the approved research plan; (b) to keep the researchers continually aware of the needs of the practicing engineer; and (c) to see that all project developments, through final reporting, center around these practical needs. Projects engineers with wide ranging experience are assigned to the NCTRP by the Board and are responsible for administrative and technical surveillance of the contracts. Their activities include visiting each research agency at least once every six months to discuss the status of the work with the principal investigator(s) and to determine if the research is being pursued in line with the approved research plan. Any need for change in the plan is referred to the project's panel for review and approval. Finally, the staff engineer and the project panel evaluate the final report on the completed research to determine the degree of technical compliance with the contract and to ensure adherence to the Program's specifications for report writing.

Research agencies are required to report their results in

language that is understandable and succinctly summarizes the results so that the transit administrator and others may easily determine their usefulness to their operations. The objectives are accomplished through a "Summary of Findings" and a chapter on "Interpretation, Appraisal, and Application of Results." The detailed research techniques and analyses in which a researcher would be interested are presented as report appendices. Available to the researchers in report preparation are guidelines that have been developed with the objective of providing a report of maximum utility to the transit industry. Each report, as finally published in the regular NCTRP series (Reports or Syntheses of Transit Practice) also contains a staff-prepared foreword that directs the attention of the busy reader to the persons who would be most interested in the results and, also, to how the results fit into present knowledge and practice.

Prior to publication, extraordinary measures are taken to ensure that useful research results are made immediately available to the appropriate personnel. One means consists of forwarding copies of the research agency drafts of final reports. According to the urgency of the particular circumstances, these drafts may be either uncorrected or corrected on the basis of an acceptance review. Several copies of unedited drafts of the agency reports are retained until formal publication and are available, on a loan basis, to others having an interest in the research. Once published in their entirety, the drafts are destroyed.

After publication, each report is distributed widely through the TRB's selective distribution system. Copies go automatically to about 100 libraries, TRB transit representatives, educational institution liaison representatives, appropriate project panels and committees of the Board, and individual members who have selected publications in the particular subject area of the report. As a further means of disseminating the research reports, announcements of their availability are made to the trade press. Also, the Technical Activities Staff comprising the Board's Division A follow the progress of the work throughout its conduct and consequently are able to discuss application of the research results with potential users during visits to operating agencies.

A tragic result of much research is a compilation of findings that, because of language and form, simply cannot be used until the sponsor devotes considerable supplementary effort to translating the findings into the language and working tools of the users. This kind of time cannot be afforded in the sponsor's scheme of day-to-day operation. In an applied research program such as the NCTRP, the sponsor rightfully expects a product that has immediate applicability to practice. This is not asking too much, because improvements are going to occur mostly in the form of moderate refinements of existing practices, rather than as dramatic innovations or breakthroughs that one might expect from extensive basic research. Therefore, where necessary as an integral part of administration, staff assumes the role of interpreter and interjects itself as a third party between the sponsor and the researcher by means of a very brief publication titled *NCTRP Research Results Digest*. The Digests are issued as a series of flyers to provide in understandable language an early awareness

of project results so as to encourage early implementation. They are brief in summarizing specific findings—they do not deal with methodology—and require the reader to expend very little time in determining the usefulness of the findings. Reference is made in each to the fact that uncorrected draft copies of the agency's report are available on a loan basis for those desiring more extensive information. Where circumstances warrant, staff does not wait for requests for reports but distributes copies of the agencies' draft final reports to appropriate personnel.

With the culmination of the formal reporting activity, plus any of the special measures just described, the NCTRP reaches the final milestone of its administrative network. What happens beyond that point—how successful the projects really turn out to be—is entirely up to UMTA and the operating agencies. Projects that have accomplished their objectives in providing useful products might just as well have been failures if, at least, consideration is not given to how the results might be used to improve operations. It simply does not make good sense to invest millions in research on critical problems and then not give adequate attention to a determination of the implementation value of the products. Such determination can range from mere thought to total, immediate incorporation as standard practice. Certainly, any action must be temperate to avoid the pitfalls that are present in pushing too hard too fast. To aid decisions as to the course to be pursued, future NCTRP publications will report on all known uses of results, be they limited or extensive. Given the fact that the NCTRP addresses critical, national problems, documented payoff to any one agency should attract study by others. So should documented failures, for their also contain lessons by which all can profit. Research is a venture into risk and uncertainty, the risk being particularly high in applied or mission-oriented research such as the NCTRP undertakes. The wisdom of accepting risk is impossible to determine without studious inquiry into the benefits derived.

In summary, the NCTRP is an applied, contract research program that has been structured along specific lines to enable it to respond to specific needs of the nation's transit industry. The needs are expressed through problem statements referred from UMTA, and each problem is accompanied by the funds to see it through. From the preparation of project statements through final reporting on the projects results, the goal of the NCTRP is administration that, in the final analysis, will prove to be fully effective in obtaining the best return on the investment supporting the Program.

SUMMARY OF ADMINISTRATIVE PROGRESS

The following summary addresses the research programs for fiscal years 1980, 1981, and 1982, and it pertains to activities in the 6 months subsequent to December 31, 1981. The narrative for each year is cross-referenced to the networks cited and included at the end of the summary. Accompanying the networks are descriptions of the activities (subtasks), and those underlined represent the deliverables to which the PTC is committed.

There are five (5) networks representing the PTC's overall perception of the nature and sequence of activities re-

quired by all NCTRP participants for an efficient, fully coordinated operation. All five are included in this report (for FY 1980 only) to provide perspective of the total operation. For the other fiscal years only those pertinent through the end of the report period are included. Relative progress on tasks and subtasks is indicated by shading of the activity nodes (i.e., a fully shaded node represents completion of a subtask; a partially shaded node represents, to the extent of shading, the relative degree of accomplishment of the subtask). Accordingly, progress for the respective fiscal-year programs is as follows.

FY 1980 Program

I. *Reference: Network #1, Tasks 1.1 and 2.1 (subtasks 2.1.1 through 2.1.13)*

All work under Task 1.1 of this network is covered by the APTA contract for conduct of the TSG operation relative to formulation of annual programs and other responsibilities. Task 2.1 work is carried out by the PTC in support of the TSG, and it was completed and reported on earlier.

II. *Reference: Network #2, Tasks 2.1 (beginning with subtask 2.1.15), 3.0, 3.1, 3.2, and 3.3 (ending with subtask 3.3.7)*

All work under the referenced tasks was completed and reported on earlier (see NCTRP Progress Report 1).

III. *Reference: Network #3, Tasks 3.3 (beginning with subtask 3.3.9), 3.4, and 4.1 (ending with subtask 4.1.5)*

All work under the referenced tasks was completed and reported on earlier (see NCTRP Progress Report 1).

IV. *Reference: Network #4, Tasks 4.2, 5.2, and 5.4 (ending with subtask 5.4.1)*

Surveillance of research on six projects and two syntheses was maintained through staff on-site visits with contractors, telephone contacts, and various written communications. The latter consisted primarily of monthly progress schedules and quarterly progress reports submitted by the contractors and feedback comments from project panels and staff.

V. *Reference: Network #5, Task 5.4 (beginning with subtask 5.4.3)*

Work was completed on preparation and distribution of two classifications of progress reports:

- NCTRP Summary of Progress Through 1981 (annual report)
- NCTRP Progress Report 1 (semi-annual report)

Respectively, these constituted the first annual and the first semi-annual progress reports to be issued for the NCTRP. Several thousand copies of the annual report were distributed, mostly at the January annual meeting of the TRB, whereas distribution of the semi-annual progress report was made principally to UMTA and others participating directly in the work of the NCTRP. A few additional recipients (such as the AASHTO Standing Committee on Public Transportation and the TRB transit representatives) were included as part of the on-going effort to make the objectives and work of the NCTRP known widely in the transit industry.

Work was completed relative to production and distribu-

tion of the first three technical documents to emanate from project research; that is:

- Synthesis 1, "Cleaning Transit Buses: Equipment and Procedures"
- Synthesis 2, "Enforcement of Priority Treatment for Buses on Urban Streets"
- Research Results Digest 1, "Review of Literature Related to Bus Operator Stress"

The occasion of the availability of these documents was marked by a June 7 gathering in the TRB offices attended by UMTA personnel, contractors, press, and others.

The preliminary draft final report for Project 54-1, "Improve Transit Bus Energy Efficiency and Productivity," was received in April, reviewed by the project panel, revised by the contractor, and readied by the NCTRP editor for transmittal to the printer in the first week of July. This will be the first report in the regular NCTRP series, and its publication is anticipated to occur in August.

VI. Reference: Synthesis Task (Unnumbered)

Activities of the report period are covered in the preceding comments on Network #5 activities.

VII. Reference: Contract DTUM60-81-C-72012

In line with the requirements of Article XIX, Subcontracting Reporting Requirements, it is reported that no subcontracts for research under the FY 1980 program were entered into during the 6 months ending June 30, 1982.

FY 1981 Program

I. Reference: Network #1, Tasks 1.1 and 2.1 (subtasks 2.1.1 through 2.1.13)

All work under Task 1.1 of this network is covered by the APTA contract for conduct of the TSG operation relative to formulation of annual programs and other responsibilities. Task 2.1 work is carried out by the PTC in support of the TSG, and it was completed and reported on earlier (see NCTRP Progress Report 1).

II. Reference: Network #2, Tasks 2.1 (beginning with subtask 2.1.15), 3.0, 3.1, 3.2, and 3.3 (ending with subtask 3.3.7)

The final makeup of the TSG's FY '81 program (six projects, two syntheses) was not made known to the PTC until January 5, 1982; however, based on PTC knowledge of the outcome of the TSG meeting in Chicago in October, work was started soon thereafter on structuring project panels and preparing for March and August meetings. The first series of meetings took place March 22-30, and the project statements developed there were mailed within 2 weeks of each meeting to more than 3,000 recipients.

Based on the January 5 awareness of the program to be referred officially, steps were taken to obtain ballot approval by the TRB Executive Committee Subcommittee for the NCTRP, so that formal acceptance by the Academy could follow soon after program referral. Ballot approval was under date of January 27.

UMTA officially referred the program on March 30, and the Academy's acceptance of it for administration was on May 3.

III. Reference: Network #3, Task 3.3 (beginning with subtask 3.3.9 and ending with 3.3.19)

Seventy-one proposals were received in early June from 55 agencies; two were rejected for reasons of noncompliance with specifications; and the remaining 69 were mailed within one week of receipt to the project panels for evaluation and rating. Meetings to translate the ratings to final rankings and to select 1st- and 2nd-choice agencies are scheduled for August 16-20, 1982.

IV. Reference: Synthesis Task (Unnumbered)

Steps were taken toward identification and selection of members for the topic panels pertaining to the two syntheses identified in Table I for the FY '81 program. Funds carried forward from the allocations to the FY '80 syntheses are being used to the point of depletion while awaiting contract amendment by which the FY '81 funds will be provided. A first topic panel meeting is set for July 1 relative to the subject of fuel additives and alternative fuel grades. July 20 is the date established for the topic panel meeting concerning the subject of allocation of time for maintenance workers. The main objectives of the meetings are to settle on scope statements and identify potential topic panel consultants, and these objectives will be carried forward to the extent that presently available funds permit.

V. Reference: Contract DTUM60-81-C-72012

In line with the requirements of Article XIX, Subcontracting Reporting Requirements, it is reported that no subcontracts for research under the FY 1981 program were entered into during the 6 months ending June 30, 1982.

FY 1982 Program

I. Reference: Network #1, Tasks 1.1 and 2.1 (subtasks 2.1.1 through 2.1.13)

All work under Task 1.1 is covered by the APTA contract for conduct of the TSG operation relative to formulation of annual programs and other responsibilities.

Under Task 2.1, the PTC processed 48 1st-stage problems relative to TRIS searches and staff evaluations for benefit of the submitters. The next activity will consist of staff participation in the TSG meeting to formulate the research program.

II. Reference: Contract DTUM60-81-C-72012

In line with the requirements of Article XIX, Subcontracting Reporting Requirements, of the prime contract, it is reported that no subcontracts for research under the FY 1982 program were entered into during the 6 months ending June 30, 1982.

Difficulties Encountered During Report Period

None of serious consequence. Some difficulty was encountered in obtaining TRIS retrievals on a timely basis because of staff problems that were transient and unavoidable and should not reoccur.

Difficulties Projected for Next Report Period

Research agencies for the FY '81 projects will be selected in August. The overall schedule of events calls for con-

tracting in the September-October period. Amendment of Contract DTUM60-81-C-72012 to provide the funds to support the FY '81 research is, therefore, critical from a timing standpoint if this objective is to be met.

The TSG will meet soon to formulate the FY 1982 program. Consideration needs to be given then to the matter of continuation projects. These are defined as projects started earlier and for which, for a variety of reasons, the project panels have recommended additional funding to ensure that the projects are carried to a point of reasonable conclusion and in reasonable time. The background supporting the need for continuations is contained in the Problem Evaluation Forms (PEFs) developed initially under subtask 3.2.9, Network #2, and updated under subtask 3.3.27, Network #3. Following the latter activity, the PEFs are incorporated in the annual PTC report to UMTA and the TSG on the reasons behind contractor selections, the first such report being issued under date of August 31, 1981. The next report will be ready around the end of August 1982.

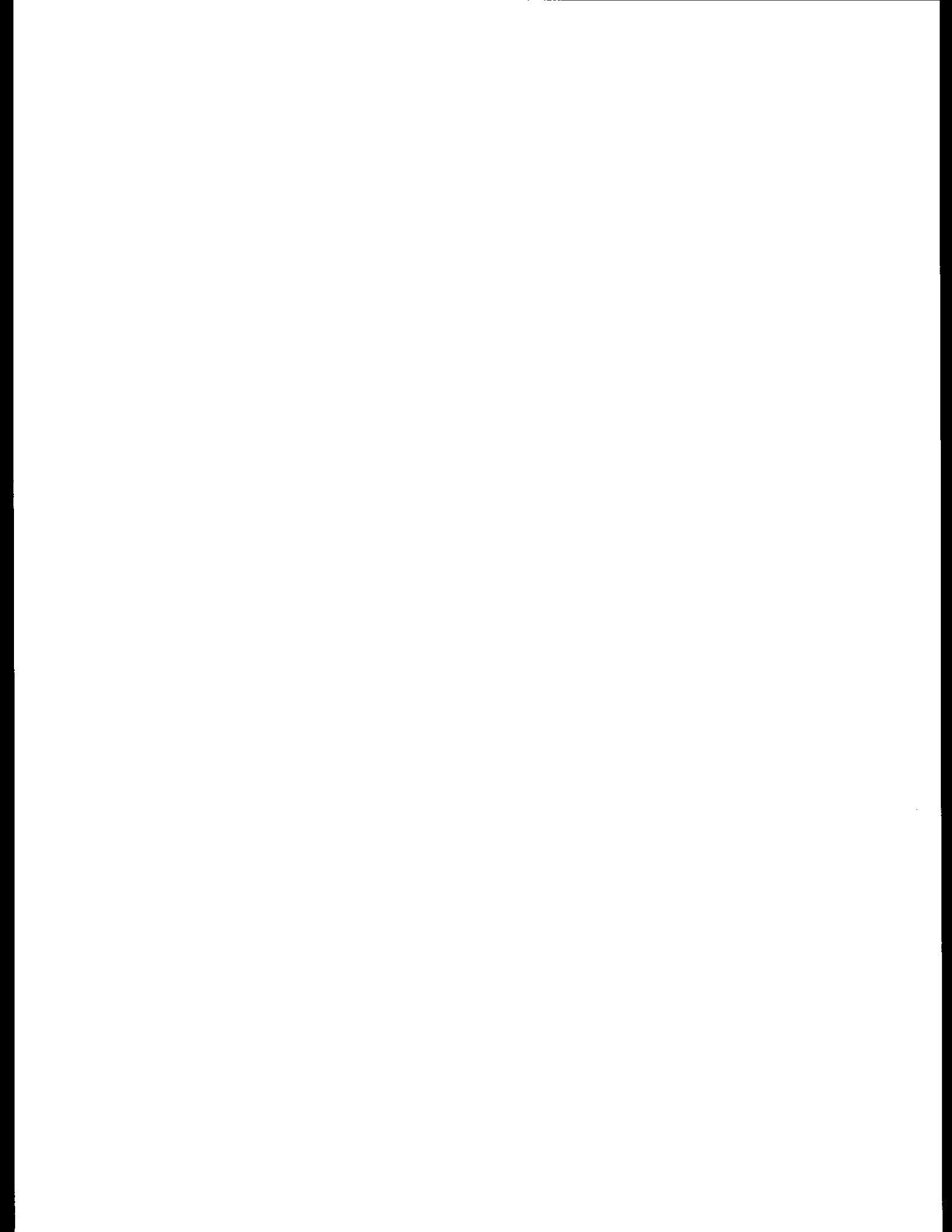
As matters now stand, three projects are candidates for continuation funding, the first of which is under the FY '80 program and for which the PEF is contained in the August report. The remaining two are under the FY '81 program, and their PEFs will be updated in the forthcoming August meeting of the project panels and will be included in the contractor selection report to be submitted to UMTA and the TSG soon thereafter. The three projects, their recommended funding levels, and the requested year of funding are:

1. Project 31-1, FY '80, at \$300,000 from FY '82
2. Project 38-1, FY '81 at \$ 50,000 from FY '82
3. Project 43-1, FY '81, at \$200,000 from FY '83

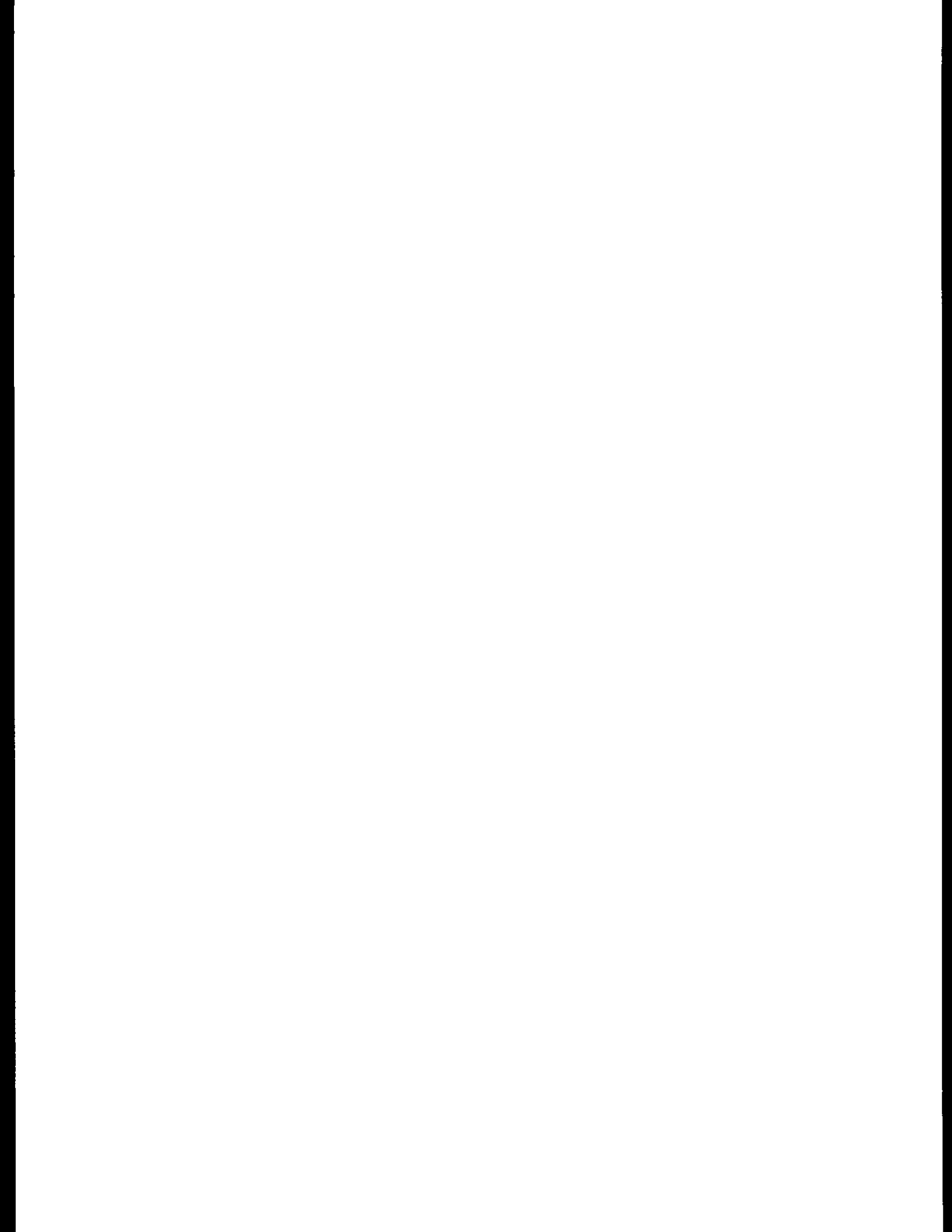
The foregoing serves to remind UMTA and the TSG of a facet of overall NCTRP operation that must be addressed if projects are to be fully executed and carried out in the shortest possible time frame. More information will be provided soon to the TSG for consideration in its forthcoming meeting.

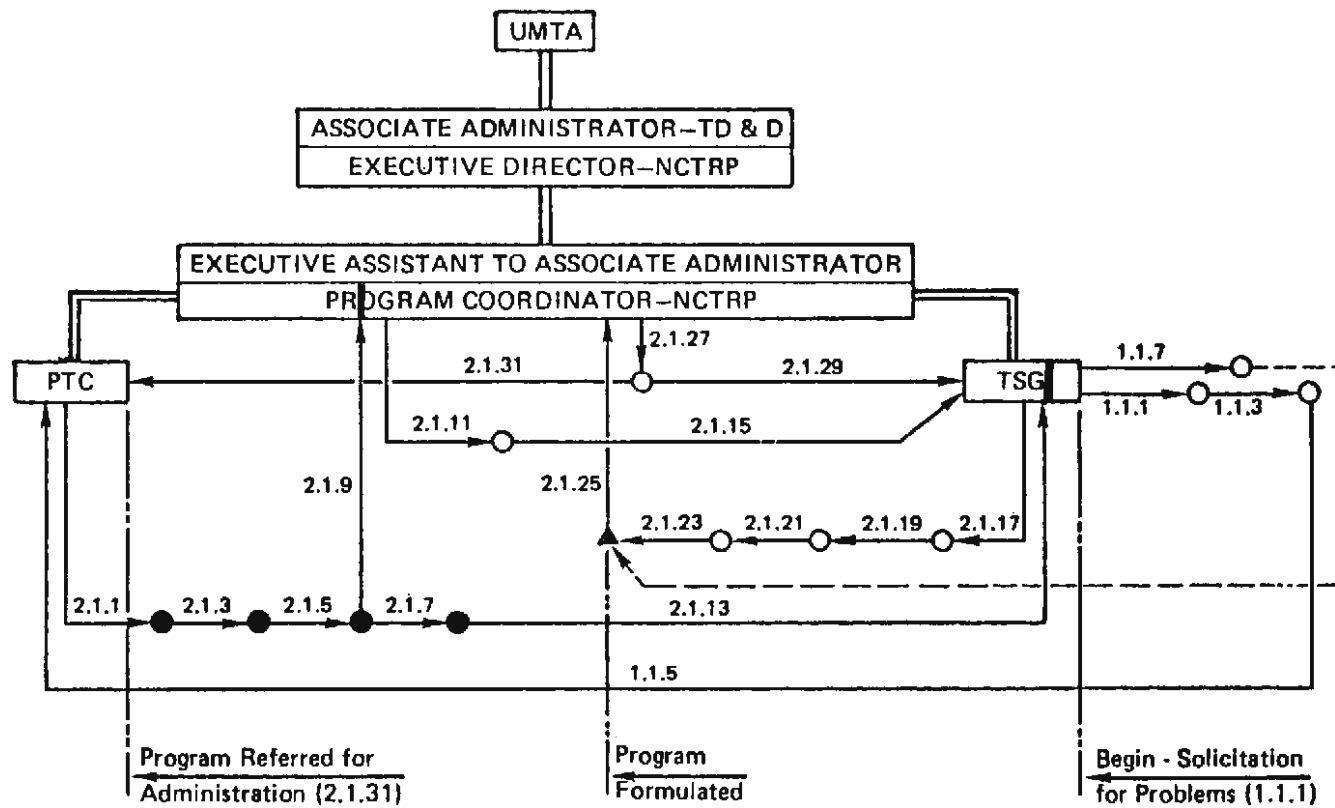
PTC Activities in the Next Report Period

1. Routine surveillance of contracts for FY '80 research and follow-up as appropriate on projects that reach their expiration dates in the report period.
2. Panel meetings to select agencies for FY '81 research and follow-up as appropriate to arrive at executed contracts.
3. Routine surveillance of contracts for FY '81 research with beginning dates in the report period.
4. Participation in the TSG meeting to formulate the FY '82 program.
5. Establish dates for project panel meetings and structure panels relative to the FY '82 program.
6. Support, as may be required, the TSG processes for evaluation of problems submitted for consideration under the FY 1983 program.
7. Provide background information necessary to the TSG's deliberations on project panel recommendations of continuation funding for certain FY '80 and '81 projects.



Networks
FY 1980 Program



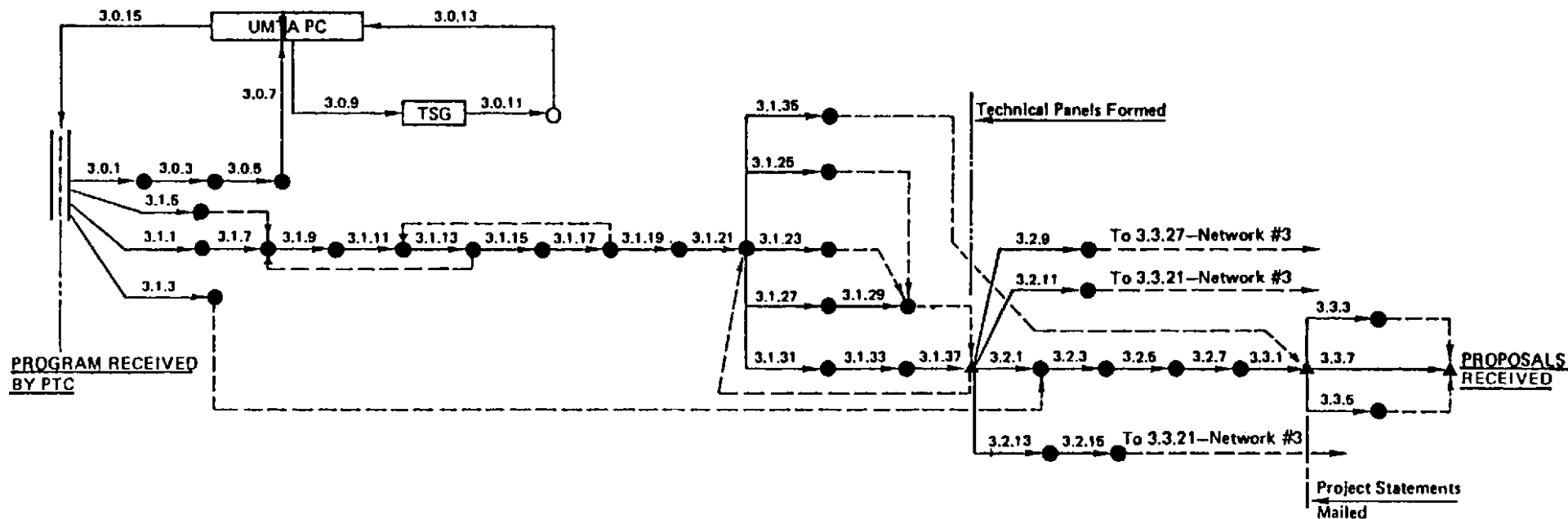


NCTRP NETWORK #1
 TSG Initiation of Program
 through Referral to PTC
KWH - May '79

RE: FY 1980 PROGRAM
 30 June 1982

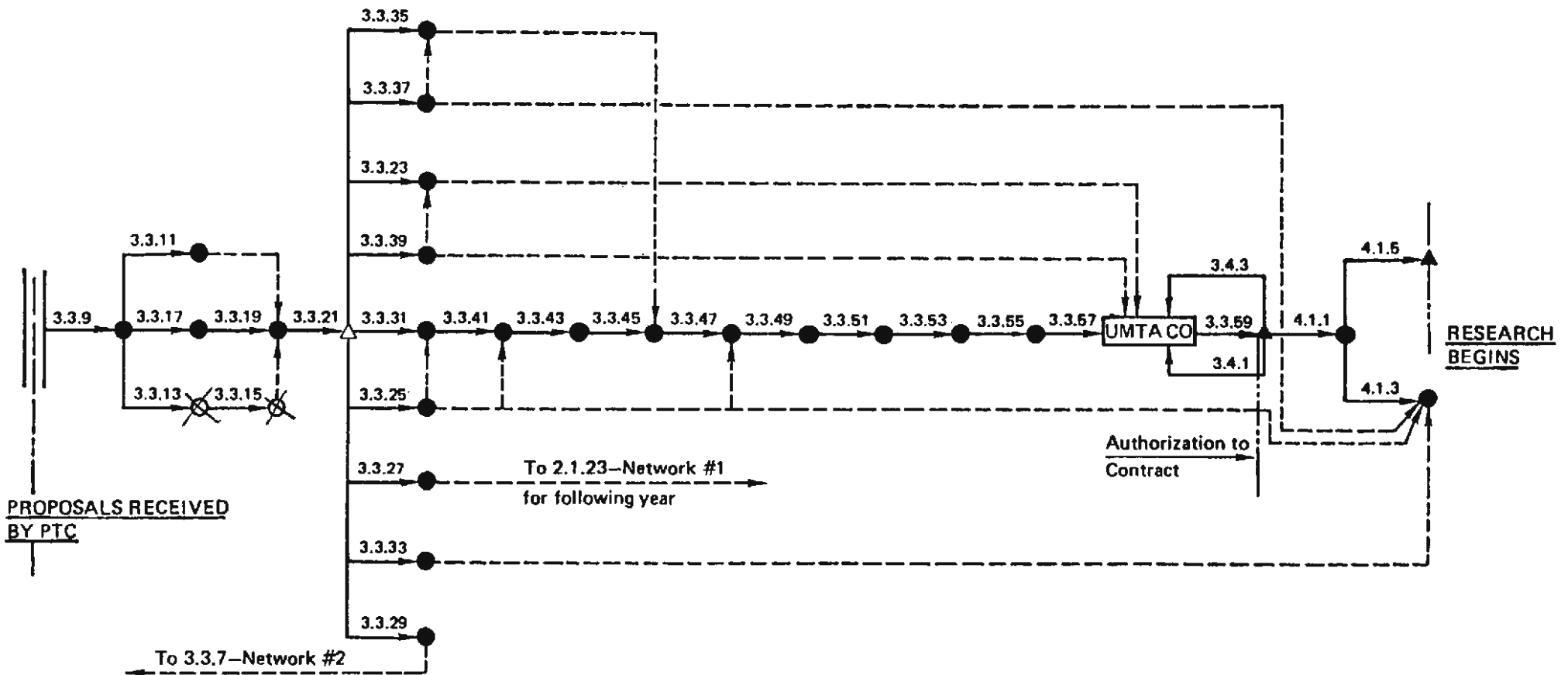
NOTE:

Fully shaded nodes represent completed subtasks;
 partially shaded nodes indicate relative degree of
 subtask completion.



NCTRP NETWORK #2
 PTC Receipt of Program
 through Receipt of Proposals
KWH - May '79

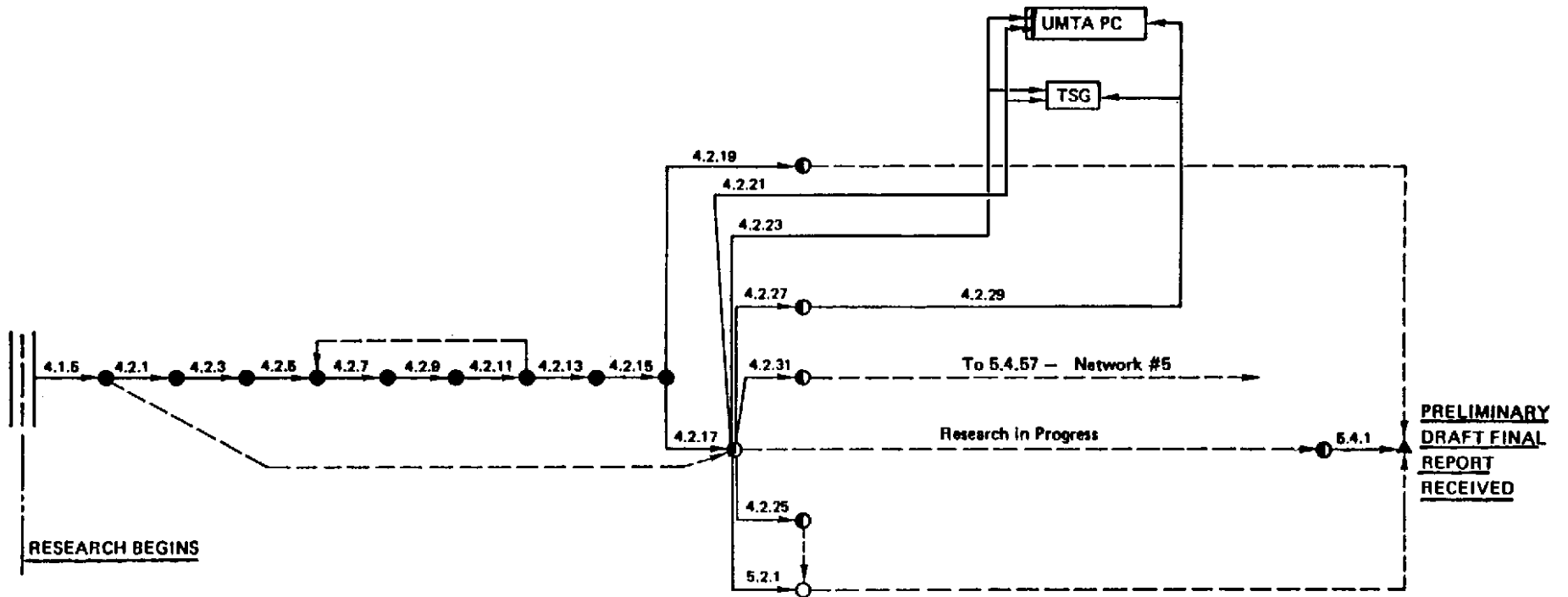
RE: FY 1980 PROGRAM
 30 June 1982



NCTRP NETWORK #3
 Receipt of Proposals through
 Initiation of Research

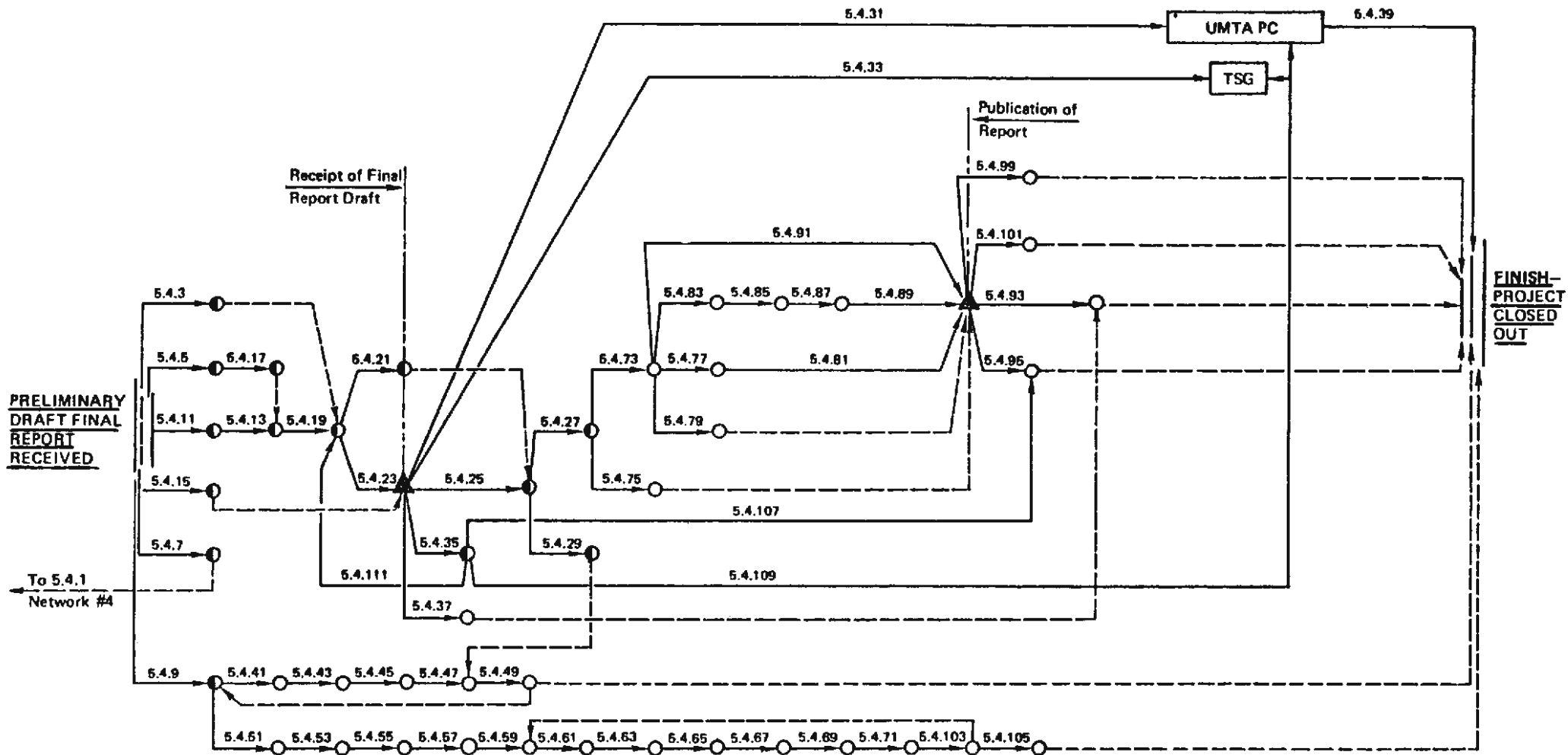
KW4-May 79

RE: FY 1980 PROGRAM
 30 June 1982



NCTRP NETWORK #4
 Initiation of Research through Receipt
 of Preliminary Draft Final Report
KYM - May 79

RE: FY 1980 PROGRAM
 30 June 1982



PRELIMINARY
DRAFT FINAL
REPORT
RECEIVED

To 5.4.1
Network #4

Receipt of Final
Report Draft

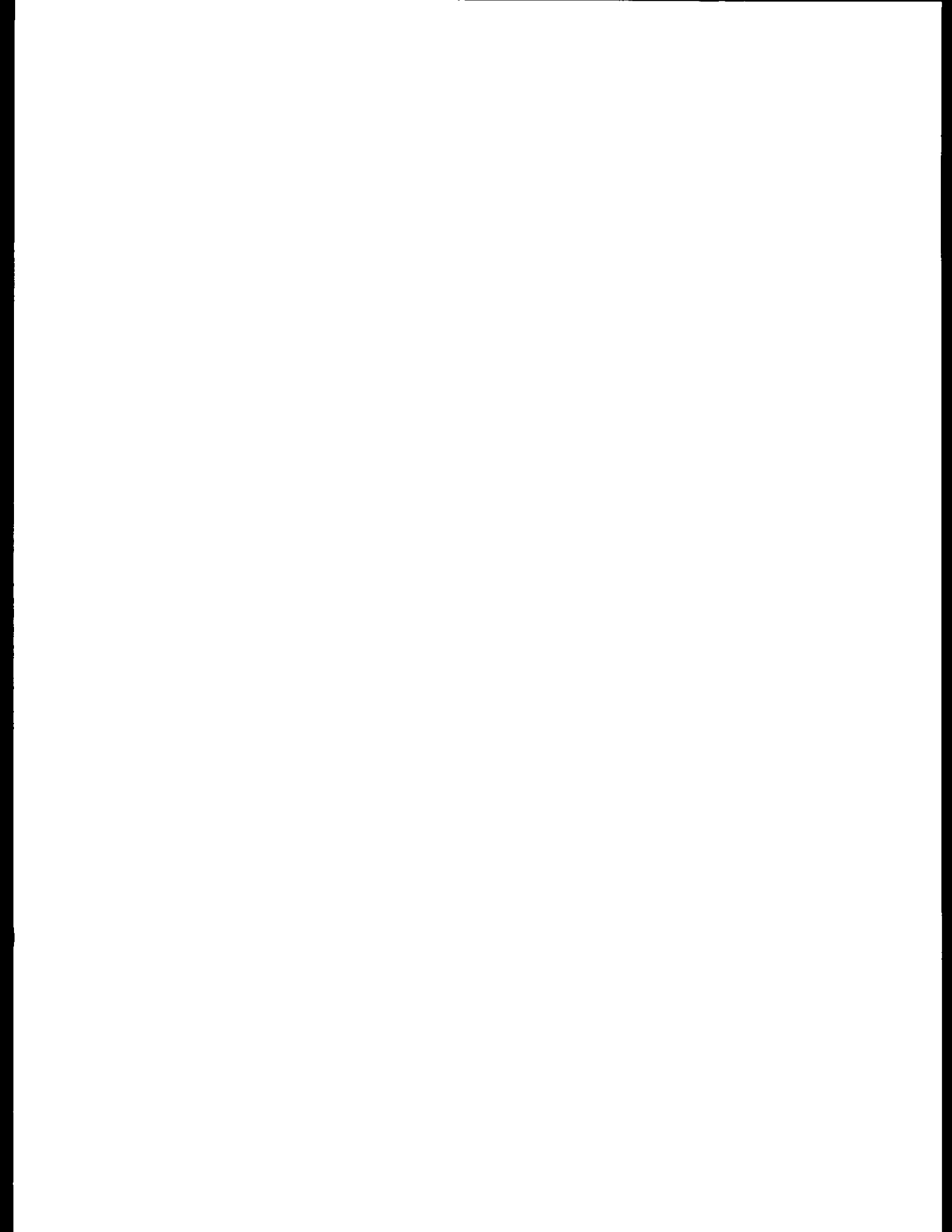
Publication of
Report

FINISH-
PROJECT
CLOSED
OUT

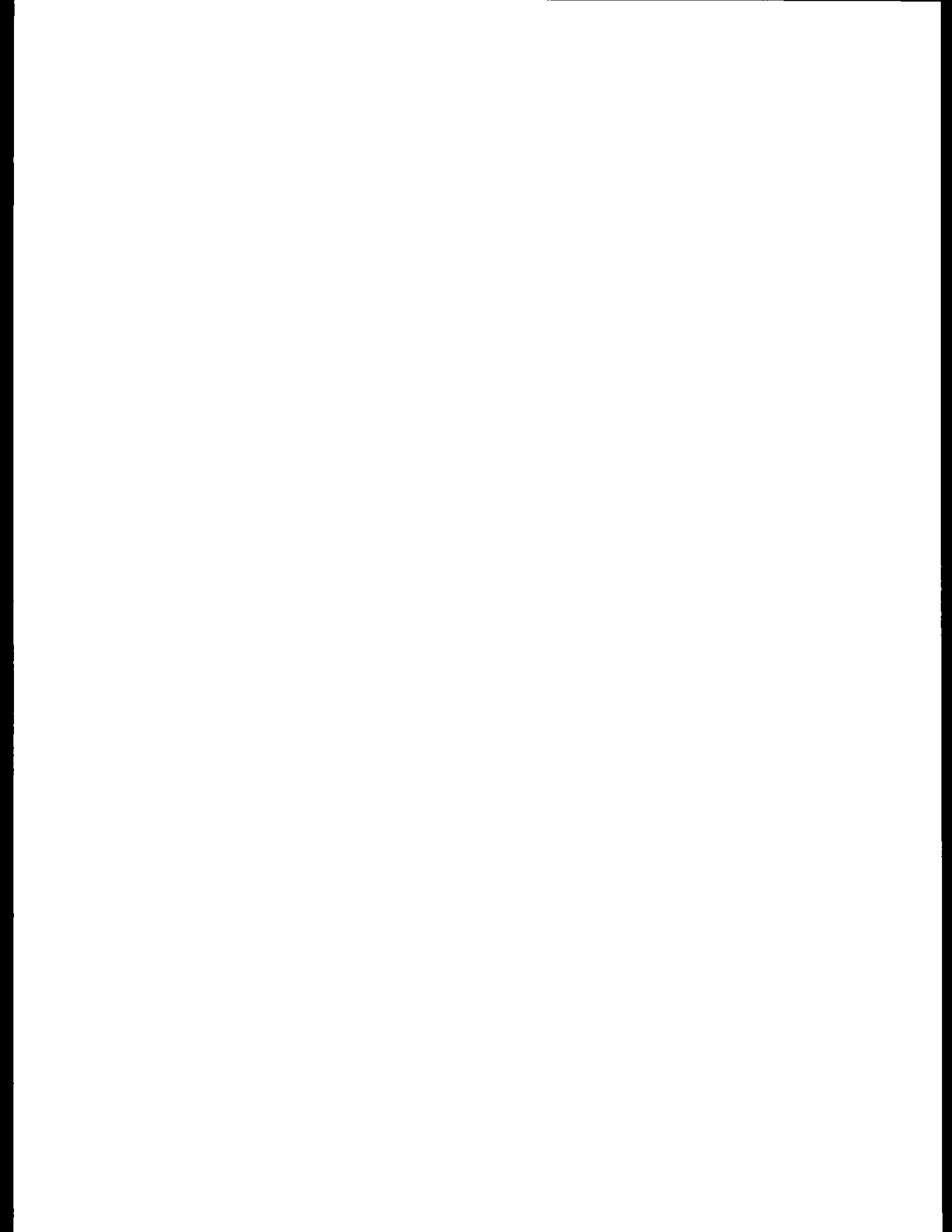
NCTRP NETWORK #5
Receipt of Preliminary Draft Report
through Project Close Out

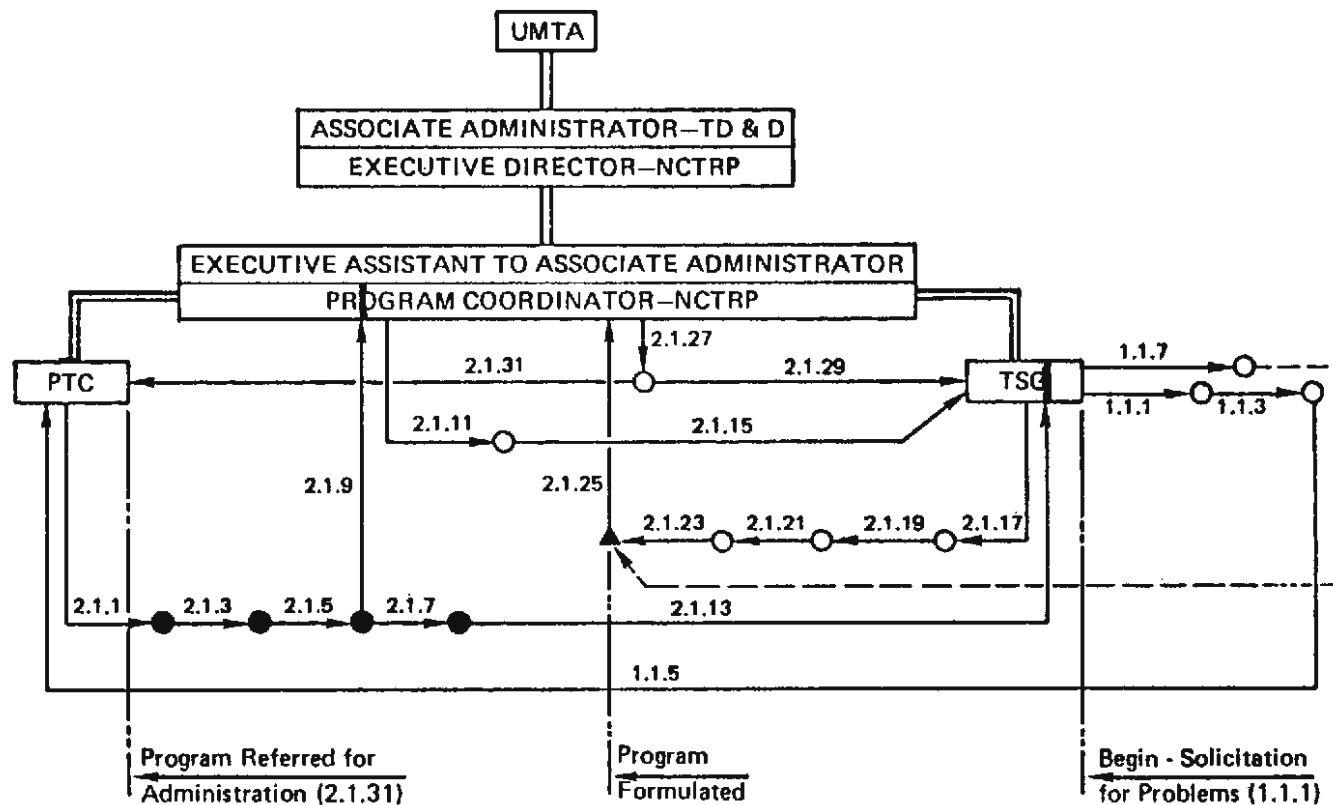
KWH - May '79

RE: FY 1980 PROGRAM
30 June 1982



Networks
FY 1981 Program



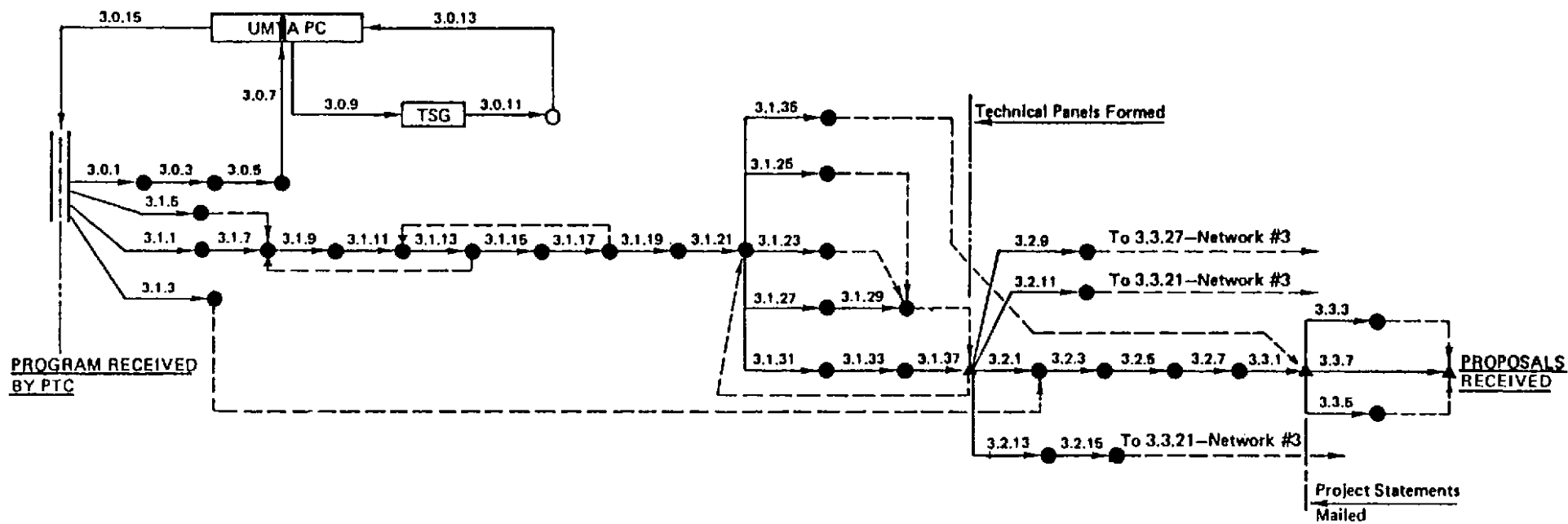


NCTRP NETWORK #1
 TSG Initiation of Program
 through Referral to PTC
KWH - May '79

RE: FY 1981 PROGRAM
 30 June 1982

NOTE:

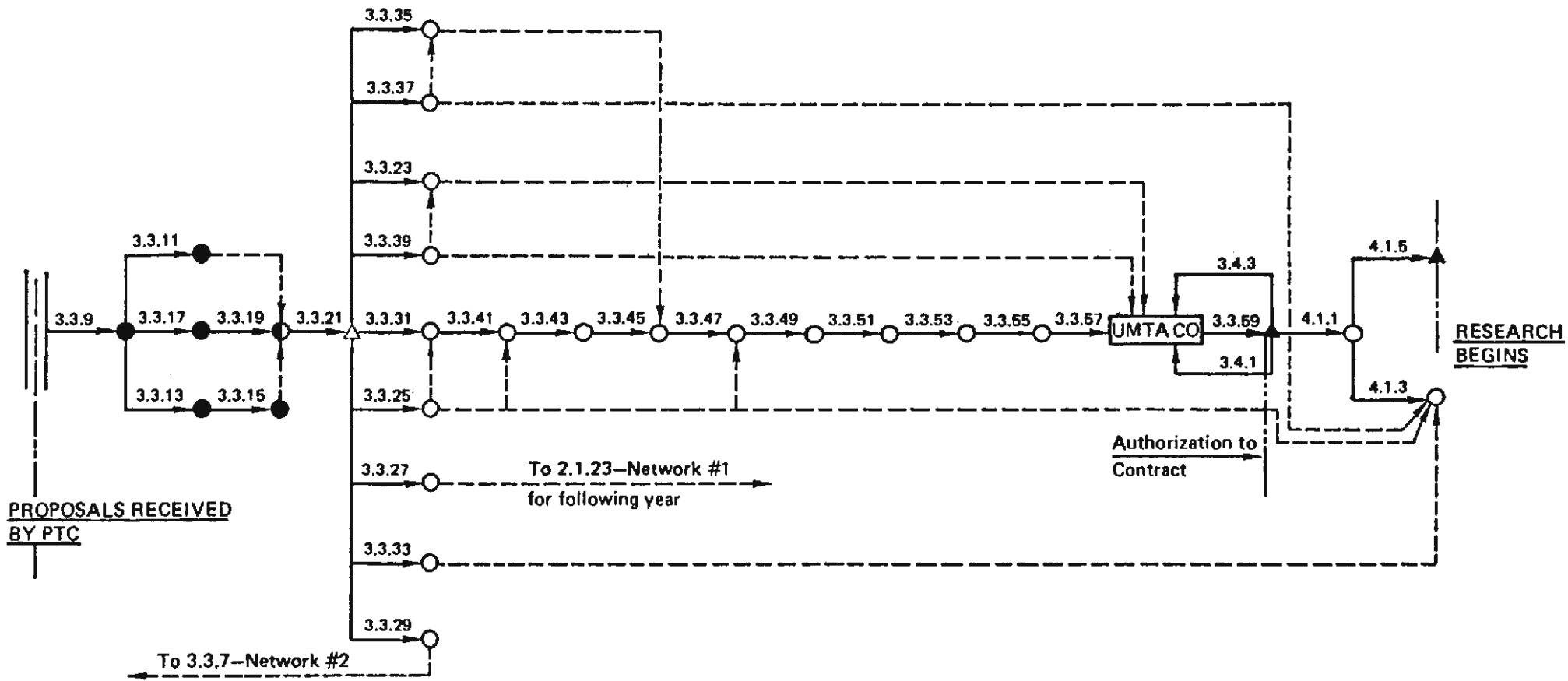
Fully shaded nodes represent completed subtasks;
 partially shaded nodes indicate relative degree of
 subtask completion.



NCTRP NETWORK #2
 PTC Receipt of Program
 through Receipt of Proposals

KWH - May '79

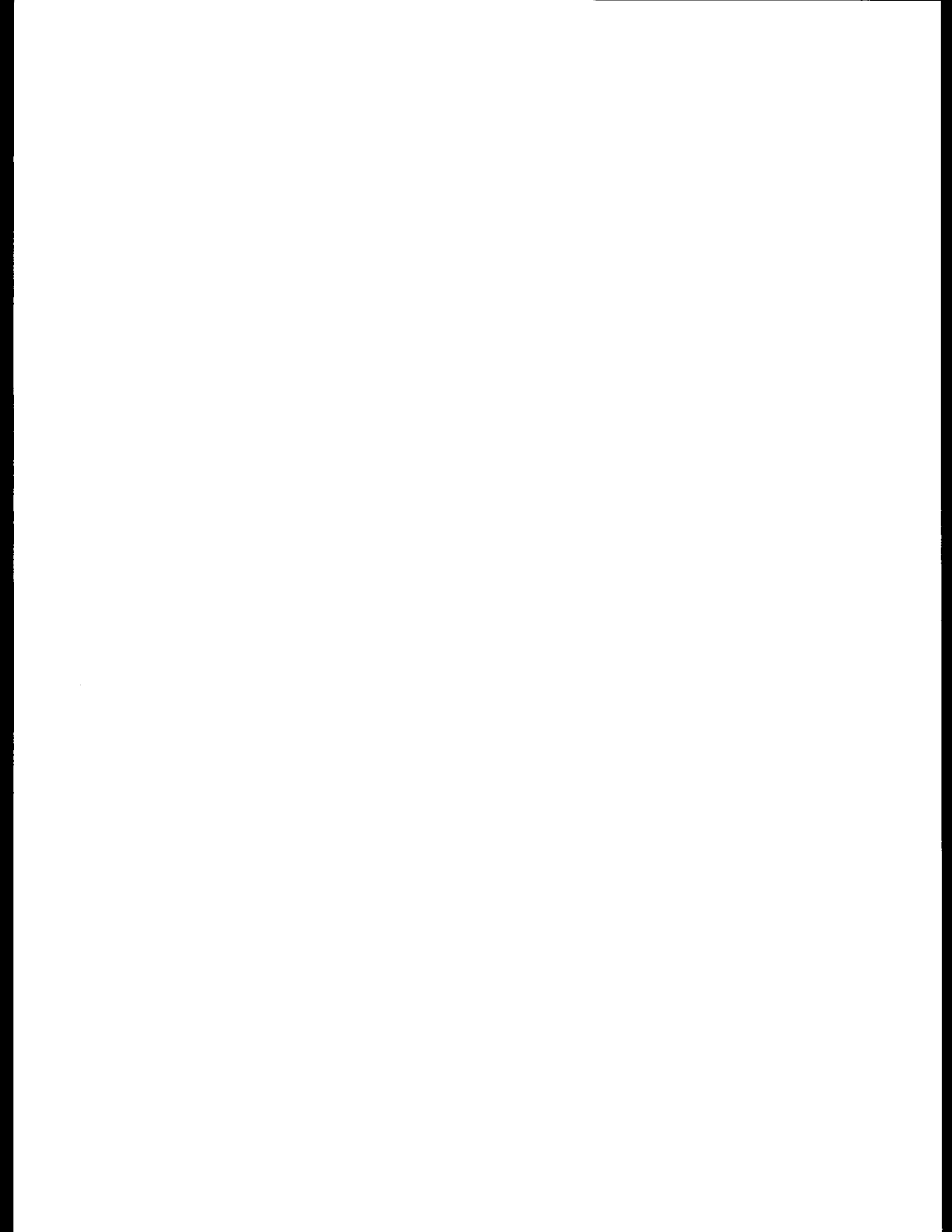
RE: FY 1981 PROGRAM
 30 June 1982



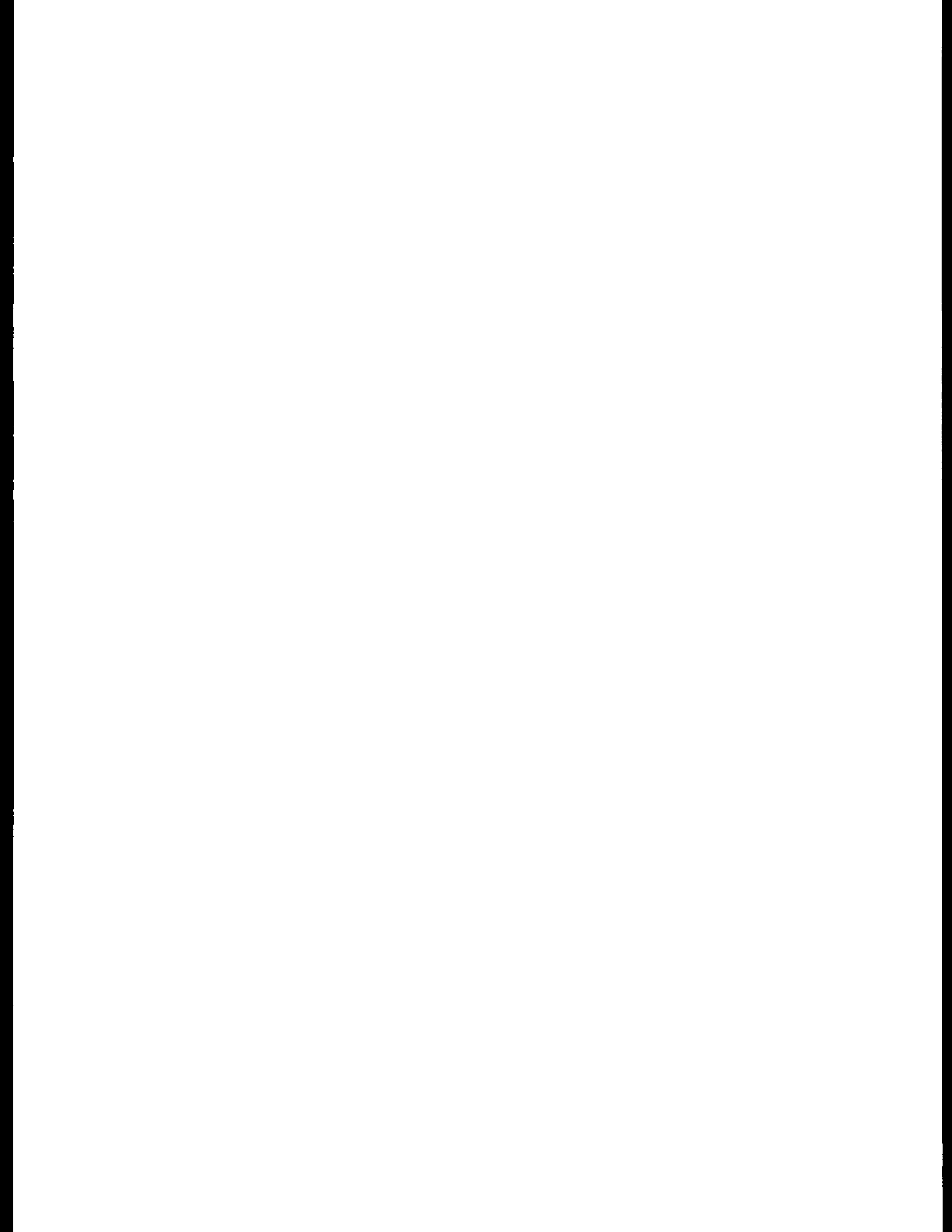
NCTRP NETWORK #3
 Receipt of Proposals through
 Initiation of Research

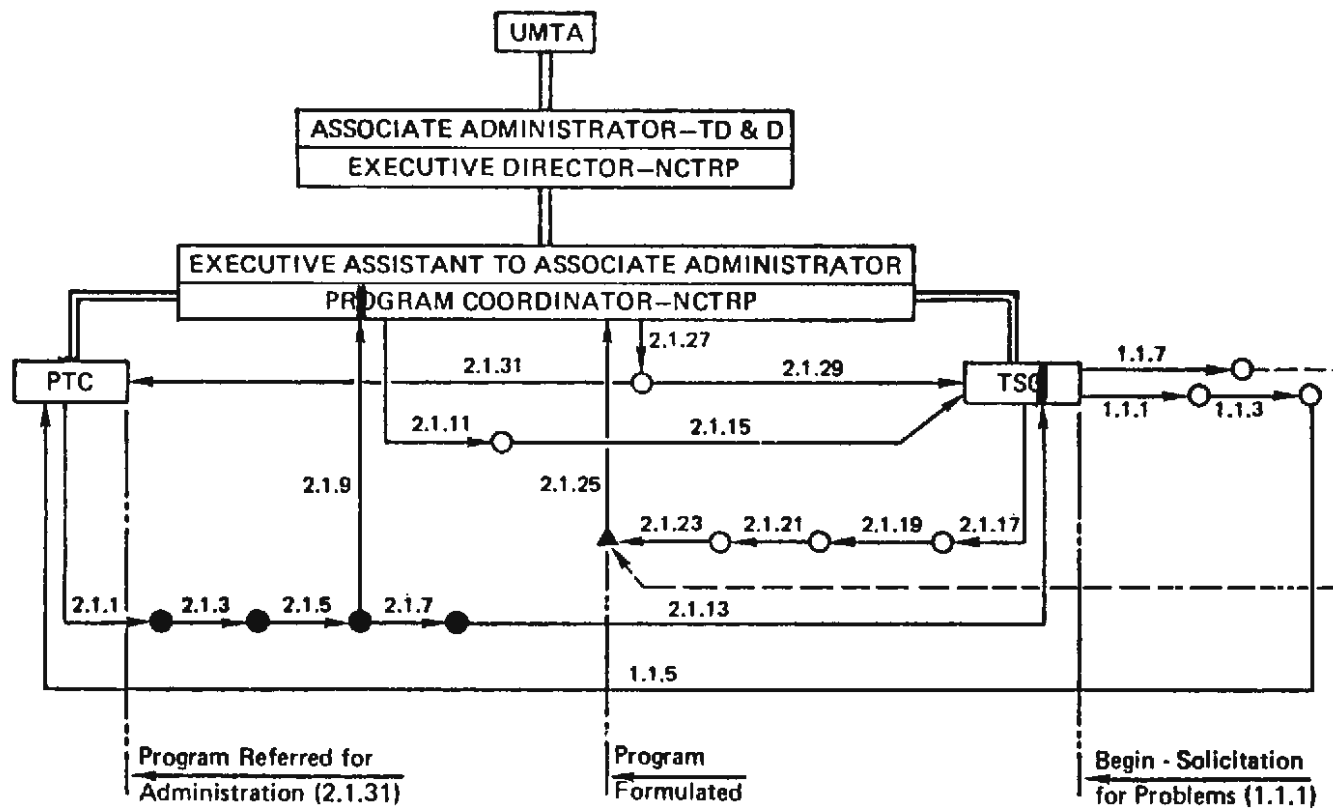
KW4-May 78

RE: FY 1981 PROGRAM
 30 June 1982



Networks
FY 1982 Program





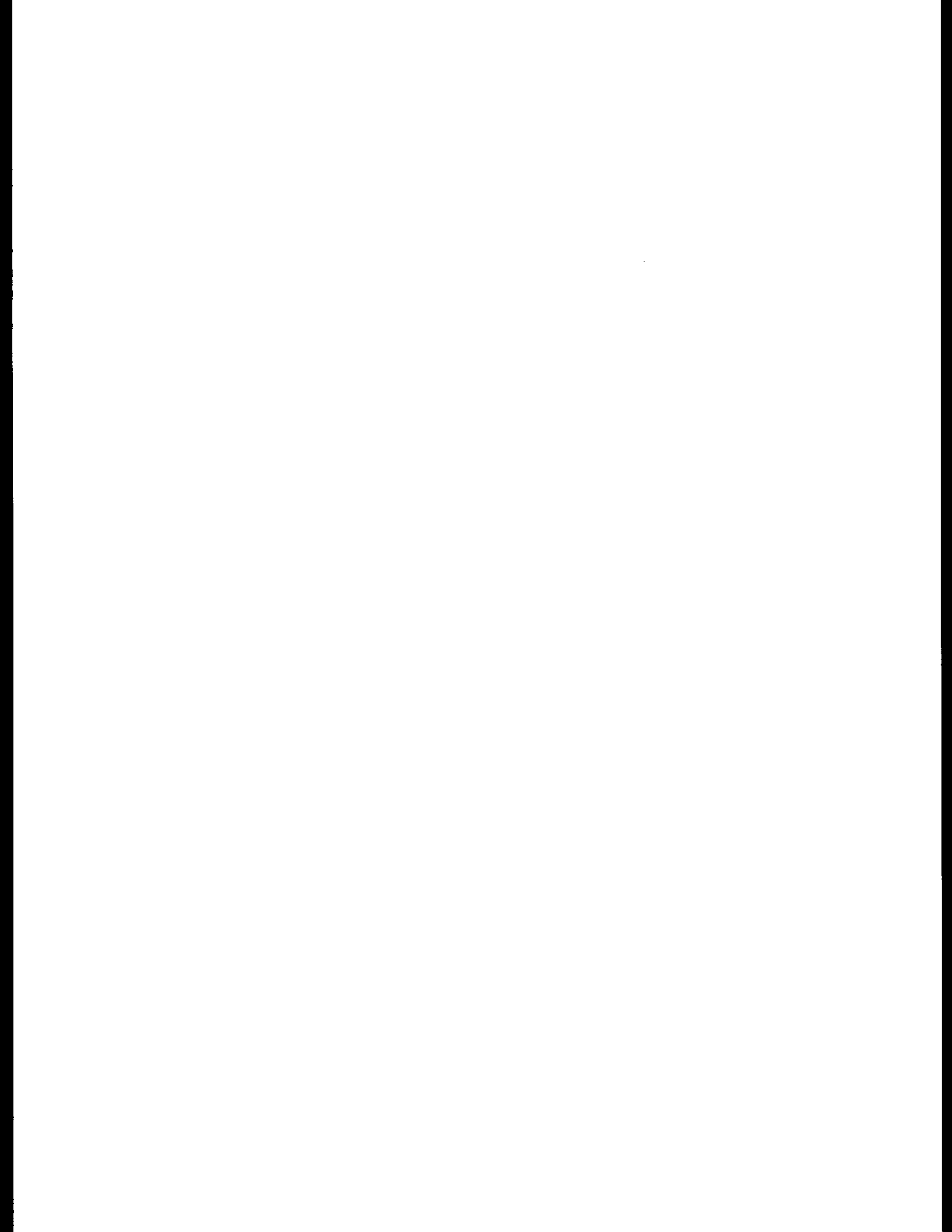
NCTRP NETWORK #1
 TSG Initiation of Program
 through Referral to PTC

KWH - May '79

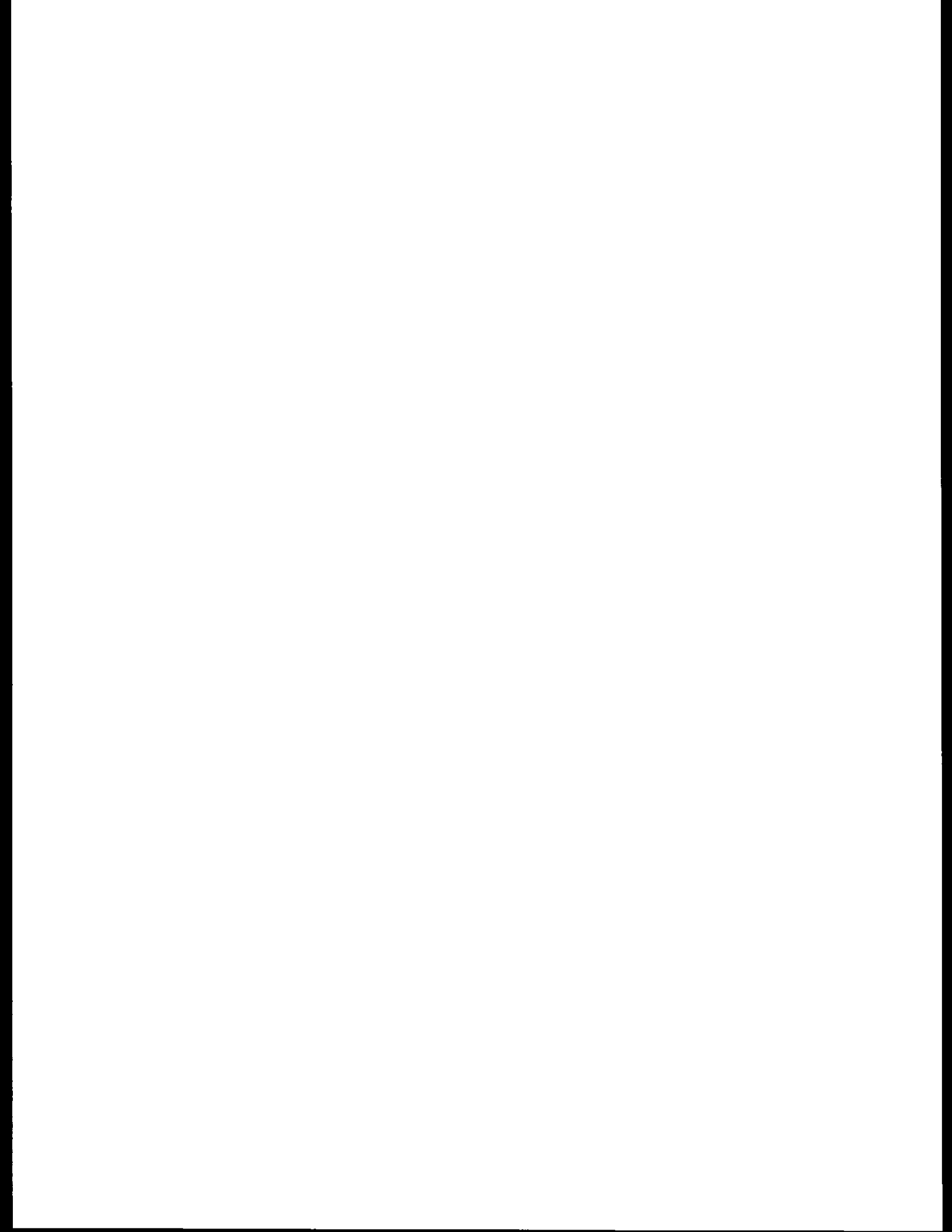
RE: FY 1982 PROGRAM
 30 June 1982

NOTE:

Fully shaded nodes represent completed subtasks;
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**Activity Descriptions
for
All Networks**



ACTIVITY DESCRIPTIONS FOR NCTRP NETWORKS

TASK	SUBTASK AND DESCRIPTION OF ACTIVITIES	DELIVERY DATE
1.1	1.1.1 TSG solicits problem statements in detailed format	
	1.1.3 Problem statements prepared and submitted	
	1.1.5 As received, problem statements are forwarded to PTC (TRB)	
	1.1.7 TSG sets date for meeting to formulate annual work program	
2.1	<u>2.1.1</u> PTC (TRB staff) extracts key words and sends to TRIS	As required
	<u>2.1.3</u> TRIS searches files, forwards output to TRB	As required
	<u>2.1.5</u> PTC staff screens out nonrelevant materials	As required
	<u>2.1.7</u> PTC staff prepares evaluations	As required
	<u>2.1.9</u> PTC sends copy of problem statement and TRIS output to UMTA Program Coordinator to obtain UMTA evaluation	
	2.1.11 UMTA staff prepares evaluations	
	<u>2.1.13</u> As made, PTC staff evaluations and TRIS output are forwarded to TSG	As required
	2.1.15 As made, UMTA evaluations are forwarded to TSG	
	2.1.17 Based on evaluations, TSG modifies details of problem	
	2.1.19 By letter ballot, TSG members rate revised problem statements	
	2.1.21 TSG ratings are converted to rankings and circulated to membership	
	2.1.23 TSG meets to formulate annual work program	
	2.1.25 TSG sends annual work program to UMTA for approval	
	2.1.27 UMTA acts on approval of program	
	2.1.29 UMTA and TSG Coordinate as needed if revision of recommended program is necessary	
	2.1.31 UMTA refers approved program to PTC, with copy of correspondence to TSG	
	2.1.33 Staff participates in TSG meeting	As required
3.0	<u>3.0.1</u> TRB ballots Executive Committee subcommittee for the NCTRP on acceptability of problems to be identified with the Academy	+ 1 week*

*Accumulative from date PTC receives work program.

<u>TASK</u>	<u>SUBTASK AND DESCRIPTION OF ACTIVITIES</u>	<u>DELIVERY DATE</u>
3.0	<u>3.0.3</u> Subcommittee acts on ballot	+ 3 weeks
	<u>3.0.5</u> TRB recommends acceptance action to PTC	+ 3.5 weeks
	<u>3.0.7</u> PTC acts on acceptance recommendation and so notifies UMTA	+ 4.0 weeks
	3.0.9 UMTA notifies TSG of PTC acceptance	
	3.0.11 TSG acts as appropriate re PTC rejections of problems or programs	
	3.0.13 TSG submits revisions to UMTA	
	3.0.15 UMTA submits revisions to PTC	
	<u>3.0.17</u> 3.0.1 through 3.0.9 repeated as needed	As required
3.1	<u>3.1.1</u> Concurrently with 3.0.1, Director, CRP, assigns problems to research areas and staff	+ 4.2 weeks
	<u>3.1.3</u> Director sets panel meeting dates	+ 4.5 weeks
	<u>3.1.5</u> PTC prepares background materials for letters soliciting nominees for panels	+ 6.0 weeks
	<u>3.1.7</u> Staff determines balance of expertise required by problem	+ 6.0 weeks
	<u>3.1.9</u> Solicitation letters are mailed	+ 6.5 weeks
	3.1.11 Nominees are submitted	
	<u>3.1.13</u> Staff balances nominee expertise against problem needs and recommends panels to Director	As required
	<u>3.1.15</u> Director and staff agree on tentative rosters	As required
	<u>3.1.17</u> Director sends invitation-to-serve letters	As required
	3.1.19 Responses are returned	
	<u>3.1.21</u> Director sends additional invitations in instances of turndowns	As required
	<u>3.1.23</u> Director sets tentative rosters	As required
	<u>3.1.25</u> Director sends acknowledgment letter to those accepting	As required
	<u>3.1.27</u> Concurrently with 3.1.25, Director submits tentative rosters to Academy for approval	As required
	<u>3.1.29</u> Academy acts on approvals and notifies Director	As required
	<u>3.1.31</u> Concurrently with 3.1.27, Director prepares formal appointment letters for TRB Executive Director's signature	As required
	<u>3.1.33</u> Appointment letters are mailed	+ 15 weeks
	<u>3.1.35</u> Director begins coordination with UMTA and TSG to develop mailing list for Project Statements	+ 12 weeks
	3.1.37 Cards confirming acceptance of appointment are mailed to TRB	

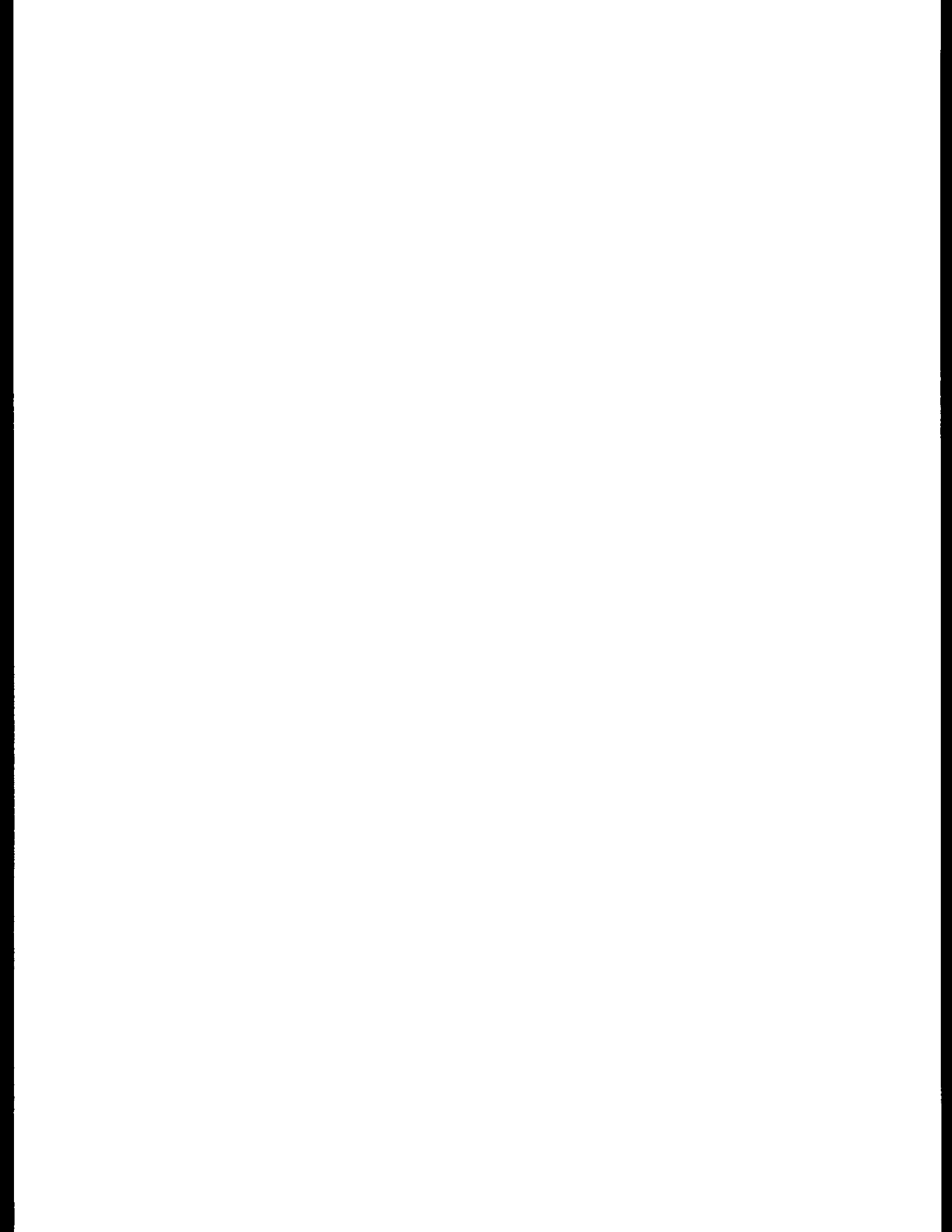
<u>TASK</u>	<u>SUBTASK AND DESCRIPTION OF ACTIVITIES</u>	<u>DELIVERY DATE</u>
3.2	<u>3.2.1</u> Technical panels meet to prepare Project Statements	+ 19.5 weeks
	<u>3.2.3</u> Project Statements are submitted to editorial and production processes	As required
	<u>3.2.5</u> Project Statements are printed	As required
	<u>3.2.7</u> Project Statements are forwarded to mailer	+ 23.5 weeks
	<u>3.2.9</u> Panels prepare Problem Evaluation Forms	+ 19.5 weeks
	<u>3.2.11</u> Panels review guidelines for proposal evaluation and agree on weights for key elements	+ 19.5 weeks
	<u>3.2.13</u> Staff drafts meeting notes and circulates for approval	+ 21.5 weeks
	<u>3.2.15</u> Meeting notes types, duplicated, and mailed	+ 23.5 weeks
3.3	<u>3.3.1</u> Project Statement mailed	+ 24 weeks
	<u>3.3.3</u> Staff responds to inquiries as necessary	As required
	<u>3.3.5</u> Staff coordinates with Minority Business Enterprises	As required
	<u>3.3.7</u> Agencies prepare and submit proposals	
	<u>3.3.9</u> Proposals processed	+ 32.5 weeks
	<u>3.3.11</u> Notifications of rejections mailed	As required
	<u>3.3.13</u> Conflicts determined	As required
	<u>3.3.15</u> Letters dropping conflicts from panels mailed	As required
	<u>3.3.17</u> Proposals mailed to panel	+ 33 weeks
	<u>3.3.19</u> Panels evaluate proposals and prepare pros and cons	As required
	<u>3.3.21</u> Panels meet to rank proposals and make selections	+ 41-45 weeks
	<u>3.3.23</u> Panels prepare statements of reasons behind selections	+ 41-45 weeks
	<u>3.3.25</u> Panels prepare Proposal Review and Recommendation Form (PRRF)	+ 41-45 weeks
	<u>3.3.27</u> Panels update Problem Evaluation Form (PEF)	+ 41-45 weeks
	<u>3.3.29</u> Notification to unsuccessful proposers prepared and mailed	+ 42-46 weeks
	<u>3.3.31</u> 1st-choice letters prepared and mailed	+ 42-46 weeks
	<u>3.3.33</u> 2nd-choice letters prepared and mailed	+ 42-46 weeks
	<u>3.3.35</u> PTC's Senior Project's Officer sent 1st-choice proposal and asked to determine agency's financial responsibility	+ 41.5-45.5. weeks
	<u>3.3.37</u> Comptroller's Office sent 1st-choice proposal	+ 41.5-45.5. weeks
	<u>3.3.39</u> PTC report to UMTA on agency selections is prepared and mailed to UMTA, copy to TSG	+ 47 weeks
	<u>3.3.41</u> Agencies respond to PRRF	As required
	<u>3.3.43</u> Panels act on approvals of agencies' responses	As required
	<u>3.3.45</u> Contract Information Summary (CIS) is prepared and sent to PTC's SPO	+41.5-45.5 weeks
	<u>3.3.47</u> PTC's SPO prepares preliminary draft subcontract and forwards to NCTRP staff for approval	+ 43.5-47.5 weeks

<u>TASK</u>	<u>SUBTASK AND DESCRIPTION OF ACTIVITIES</u>	<u>DELIVERY DATE</u>
3.3	<u>3.3.49</u> NCTRP staff acts on approval and returns draft	+ 44-48 weeks
	<u>3.3.51</u> PTC's SPO prepares final draft and mails to agencies	+ 46-50 weeks
	<u>3.3.53</u> Agencies review and respond to SPO	
	<u>3.3.55</u> SPO and NCTRP staff coordinates as needed re agency response	As required
	<u>3.3.57</u> SPO prepares formal subcontract and sends copy to UMTA	+ 48-52 weeks
	<u>3.3.59</u> UMTA coordinates, as required, with SPO subcontract	+ 51-55 weeks
3.4	<u>3.4.1</u> PTC provides UMTA with a statement of safeguards against personal or organizational conflicts of interest	As required
	<u>3.4.3</u> PTC provides UMTA with copy of Procedural Manual for Agencies Conducting Work in the NCTRP	As required
4.1	<u>4.1.1</u> SPO forwards subcontract to agency for execution	+ 52-56 weeks
	<u>4.1.3</u> Agencies execute subcontracts and return to SPO	+ 53-57 weeks
	<u>4.1.5</u> Research begins	+ 53-57 weeks
4.2	<u>4.2.1</u> Agencies submit Working Plan (WP)	+ 55-59 weeks
	<u>4.2.3</u> Staff forwards WP to panels for review and approval	As required
	<u>4.2.5</u> Panels act and notify staff	As required
	<u>4.2.7</u> Panel review comments on WP sent to agencies	As required
	<u>4.2.9</u> Agencies revise as needed and resubmit	
	<u>4.2.11</u> Staff coordinates with panels as necessary re revised submittal	As required
	<u>4.2.13</u> Agencies notified of approval action	As required
	<u>4.2.15</u> PTC staff makes first surveillance visit	As required
	<u>4.2.17</u> PTC staff monitors research in progress through contacts, visits, progress reports - monthly and quarterly	Continuous
	<u>4.2.19</u> PTC staff keeps panels abreast of work	Continuous
	<u>4.2.21</u> PTC staff distributes quarterly progress reports from agencies and coordinates re review comments	Calendar quarter
	<u>4.2.23</u> PTC staff prepares semi-annual progress report for UMTA and TSG	December & July
	<u>4.2.25</u> PTC staff participates in briefings as required	As required
	<u>4.2.27</u> PTC staff prepares annual report on PTC progress in administration of NCTRP activities	December annually
	<u>4.2.29</u> Annual report is distributed	March 15 annually
	<u>4.2.31</u> Staff checks and approves agency invoices	As required

<u>TASK</u>	<u>SUBTASK AND DESCRIPTION OF ACTIVITIES</u>	<u>DELIVERY DATE</u>
5.2	<u>5.2.1</u> As necessary and appropriate to circumstances, PTC staff will see to preparation and distribution of digests, technical articles, etc., reporting to the transit community on useful products soon after they are developed	As required
5.4	<u>5.4.1</u> Final report received in preliminary draft	As completed
	<u>5.4.3</u> Copy is sent to editor	On receipt
	<u>5.4.5</u> Copy is sent to responsible staff engineer	On receipt
	<u>5.4.7</u> Acknowledgment of receipt prepared and sent to Principal Investigator	On receipt
	<u>5.4.9</u> Staff engineer advises SPO of receipt and asks SPO to request inventory of data and equipment from subcontractor and final audit through Comptroller's Office if final bill is in	On receipt
	<u>5.4.11</u> Staff engineer prepares and mails memo requesting panel review of report re technical compliance with subcontract requirements	On receipt
	<u>5.4.13</u> Panels complete reviews and mail to staff engineer	As required
	<u>5.4.15</u> Two (2) copies are sent to file	On receipt
	<u>5.4.17</u> Staff engineer completes his review	Receipt + 30 days
	<u>5.4.19</u> Staff engineer summarizes review comments and mails to Principal Investigator	Receipt + 7 weeks
	<u>5.4.21</u> Principal Investigator prepares point-by-point letter response to review comments and mails to TRB	As required
	<u>5.4.23</u> Principal Investigator revises report according to panel review comments and ships prescribed number of copies to PTC	As required
	<u>5.4.25</u> Copy of final draft is sent to staff engineer	On receipt
	<u>5.4.27</u> Staff engineer reviews final draft and accumulates information, materials, etc., as appropriate to needs of editorial and publication processes	As necessary
	<u>5.4.29</u> Staff engineer sends copy of report to SPO as evidence of fulfillment of contract	On receipt
	<u>5.4.31</u> Director sends fifty (50) copies of report to UMTA and requests approval	On receipt
	<u>5.4.33</u> Director sends fifty (50) copies of report to TSG	On receipt
	<u>5.4.35</u> PTC staff arrives at decision as to manner of publication and distribution of report, copy to TSG	As necessary
	<u>5.4.37</u> Reports not to be published are submitted by PTC to University Microfilms International (UMI)	As appropriate

<u>TASK</u>	<u>SUBTASK AND DESCRIPTION OF ACTIVITIES</u>	<u>DELIVERY DATE</u>
5.4	<u>5.4.39</u> UMTA reviews report and forwards approval to PTC, copy to TSG	Receipt + 30 days
	<u>5.4.41</u> Subcontractor prepares and mails response re data and equipment inventory to PTC (SPO)	As required
	<u>5.4.43</u> SPO requests TRB comments on agency recommendation for disposition of data and equipment	As required
	<u>5.4.45</u> Staff engineer advises SPO of instructions to agency	As required
	<u>5.4.47</u> SPO responds to agency	As required
	<u>5.4.49</u> Agency acknowledges instructions	
	<u>5.4.51</u> DCAA performs audit and notifies PTC SPO of results	
	<u>5.4.53</u> SPO sends DCAA report to TRB for comments	As received
	<u>5.4.55</u> Staff engineer and Program Director agree on comments re final payment and forward them to SPO	As required
	<u>5.4.57</u> SPO instructs agency to submit final (completion) voucher and Contractor's Certification	As required
	<u>5.4.59</u> Agency prepares and submits final voucher and Contractor's Certification	
	<u>5.4.61</u> SPO forwards voucher through Comptroller's Office for TRB approval	As received
	<u>5.4.63</u> TRB acts on approval and sends voucher to Comptroller's Office	As required
	<u>5.4.65</u> Comptroller's Office invoices UMTA	As necessary
	<u>5.4.67</u> UMTA acts on invoice and forwards to Treasury	
	<u>5.4.69</u> Treasury forwards payment to PTC	
	<u>5.4.71</u> PTC makes final payment to agency	As appropriate
	<u>5.4.73</u> Staff engineer writes Foreword and puts report into editorial and publication process	As appropriate
	<u>5.4.75</u> Staff engineer forwards report abstract to TRIS	On receipt
	<u>5.4.77</u> Staff editor places copy of Foreword in suspense file for retrieval at galley stage	On receipt
	<u>5.4.79</u> Staff editor acquires Library of Congress number	As appropriate
	<u>5.4.81</u> Editor and staff engineer review Foreword to ensure relevancy to current circumstances at galley stage	As appropriate
	<u>5.4.83</u> Staff engineer forwards Foreword to Principal Investigator for checking	As prepared
	<u>5.4.85</u> Principal Investigator reviews and returns to staff engineer with comments	
	<u>5.4.87</u> Editor completes work and sends report for publication	As appropriate

<u>TASK</u>	<u>SUBTASK AND DESCRIPTION OF ACTIVITIES</u>	<u>DELIVERY DATE</u>
5.4	<u>5.4.89</u> Report is published	As appropriate
	<u>5.4.91</u> Staff editor coordinates with staff engineer to prepare summary sheet necessary for placing published report in NTIS (Form NTIS-35, Rev. 10/73)	As appropriate
	<u>5.4.93</u> Report is distributed through PTC (TRB) selective distribution processes to UMTA, TSG, and many others	As appropriate
	<u>5.4.95</u> PTC staff prepares and mails letters sending published report to panel members	As appropriate
	<u>5.4.97</u> TRB advises Academy of panel disbandment	As appropriate
	<u>5.4.99</u> PTC prepares and mails letter of appreciation to Principal Investigator (includes copy of published report)	As appropriate
	<u>5.4.101</u> PTC mails copies as prescribed in subcontract, of published report to subcontractor's contracts officer	As appropriate
	<u>5.4.103</u> Comptroller's Office forwards to TRB notification of amount of final payment and closure of project account	As appropriate
	<u>5.4.105</u> PTC project records closed on receipt of final payment information	As appropriate
	<u>5.4.107</u> When decision is made re publication of report, panel is so notified via letter of appreciation. They are also told that we will take steps to disband panel but that they will receive copy of report when published	As appropriate
	<u>5.4.109</u> UMTA is advised of publication decision, copy to TSG	As appropriate
	<u>5.4.111</u> Principal Investigator is advised of publication decision	As appropriate



PROGRESS BY PROJECTS

The following pages present detailed status reports on those projects continuing beyond June 30, 1982. The status of *all* projects can be found in Table I.

TABLE I
PROJECTS FOR FY '80 THROUGH FY '81—SUMMARY OF STATUS THROUGH JUNE 30, 1982

PROJECT		RESEARCH AGENCY	COST (\$) CONTRACT AMOUNT OR CONTRACT
NO.	TITLE		
AREA 30: ADMINISTRATION—ECONOMICS			
30-1	Small Transit Buses: A Manual for Improved Purchasing, Use, and Maintenance	—	\$300,000
AREA 31: ADMINISTRATION—FINANCE			
31-1	The Impacts of Federal Grant Requirements on Transit Agencies	Booz-Allen	50,000
AREA 33: ADMINISTRATION—PERSONNEL MANAGEMENT			
33-1	Transit Bus Operator Selection and Training for Dealing with Stress	GAMS Inc.	150,000
33-2	Assessment of Job Enrichment Programs for the Transit Industry	—	100,000
AREA 36: PLANNING—ALTERNATIVE ANALYSIS			
36-1	Improving Decision-Making for Major Urban Transit Investments	Systems Des. Concept	150,000
AREA 38: PLANNING—SYSTEM PLANNING			
38-1	National Transit Computer Software Directory	—	100,000
AREA 39: PLANNING—ROUTE PLANNING			
39-1	A Modular Approach to On-Board, Automatic Data Collection Systems	—	150,000
AREA 40: PLANNING—IMPACT ANALYSIS			
40-1	Simplified Guidelines for Evaluating Transit Options in Small Urban Areas	—	150,000
AREA 43: DESIGN—TRACK AND ANCILLARY SYSTEMS			
43-1	Detection of Low-Level Fault Currents on Rail Transit Systems	—	100,000
AREA 47: MATERIALS AND CONSTRUCTION—GENERAL MATERIALS			
47-1	Improved Service Life of Urban Transit Coach Brakes	Battelle Mem Inst	300,000
AREA 54: OPERATIONS—ENERGY EFFICIENCY			
54-1	Improve Transit Bus Energy Efficiency and Productivity	Booz-Allen	39,976
54-2	Energy Management of Electric Rail Transit Systems	Carnegie-Mellon	135,115
AREA 60: SPECIAL PROJECTS			
60-1	Synthesis of Information Related to Transit Problems	TRB	210,000 ^a
	TS-1: Cleaning Equipment and Procedures for Transit Buses	ATE Mgmt	75,000 ^b
	TS-2: Priority Treatment for Buses on Urban Streets	PAWA	75,000 ^b
	TS-3: Cost-Benefit Analysis of Fuel Additives and Alternative Fuel Grades	—	30,000 ^b
	TS-4: Standard for Allocation of Time for Maintenance Workers	—	30,000 ^b

^a Continuing activity supported in FY '80 and FY '81 at amount shown.
^b Allocated—balances are carried forward to support future synthesis studies.

TABLE II
PUBLISHED REPORTS OF THE NATIONAL COOPERATIVE TRANSIT RESEARCH & DEVELOPMENT PROGRAM

Synthesis of Highway Practice		
No.	Title, Pages, Price	
1	Cleaning Transit Buses: Equipment and Procedures (Proj. 60-1, Topic TS-1), 39 p., \$6.80	
2	Enforcement of Priority Treatment for Buses on Urban Streets (Proj. 60-1, Topic TS-2), 30 p., \$6.40	

START- ING DATE	COMPLE- TION DATE	PROJECT STATUS (for details, see latest Summary of Progress)	PROJECT NO.
	21 months	In developmental stage	30-1
11/30/81	8/31/82	Research in progress	31-1
10/15/81	10/14/83	Research in progress	33-1
	12 months	In developmental stage	33-2
11/2/81	2/1/83	Research in progress	36-1
	12 months	In developmental stage	38-1
	18 months	In developmental stage	39-1
	15 months	In developmental stage	40-1
	15 months	In developmental stage	43-1
12/1/81	11/30/83	Research in progress	47-1
10/1/81	6/30/82	Report in editorial and publication process	54-1
10/1/81	12/31/82	Research in progress	54-2
11/7/80	*	Research in progress	60-1
2/16/81	12/31/81	Completed—Published as NCTRP Synthesis 1	(TS-1) 60-1
3/16/81	12/31/81	Completed—Published as NCTRP Synthesis 2	(TS-2) 60-1
—	—	Project details will be developed in July 1982	(TS-3) 60-1
—	—	Project details will be developed in July 1982	(TS-4) 60-1

TABLE III
NCTRP RESEARCH RESULTS DIGESTS *

DIGEST NO.	PROJ. NO.	TITLE, PAGES, PRICE
1	33-1	Review of Literature Related to Bus Operator Stress, 15p, \$3.00

* See Table I for project titles. Orders must be prepaid if for less than \$10.00. Make request to Publications Office, Transportation Research Board, 2101 Constitution Avenue NW, Washington, DC 20418.

AREA THIRTY: ECONOMICS

Project: 30-1, FY '81
 Title: Small Transit Buses: A Manual for Improved Purchasing, Use, and Maintenance

Research Agency: In Developmental Stage
 Principal Investigator:

Effective Date: (21 months)
 Completion Date:

AGENCY PERFORMANCE

1. Is the project on schedule? Percent project complete
2. Is the research in keeping with the approved research plan?
3. Contract Amount:
4. Estimated Expenditures to 6/30/82:
5. Are the expenditures in keeping with the project progress?

PROJECT DESCRIPTION

One of the important decisions facing both rural and urban transit decisionmakers is whether to invest scarce funds in more expensive or less expensive small transit buses. Available small buses (i.e., ranging from van conversions to 31-ft heavy-duty small buses) are highly diverse in both capital costs and technology. Their uses are also highly diverse, spanning the range from large transit fleets in major urban areas to small rural operators, and including fixed-route, demand-responsive, shuttle and other services. The complexity of both needs and possible solutions has led to many poor choices of buses for specific duties. In addition, uncertainties with respect to the small bus market have led to a lack of continuity in design and development; perceived problems in bus operation, maintenance, and reliability; a lack of clear definition of bus demand; and little standardization within realistic price ranges. Consequently, no guidelines exist with which transit providers, seeking to purchase or replace small buses, can make objective decisions concerning the best bus type to be procured.

The general objective of this research is to develop a workbook-style manual for local transit operators and to identify key recommendations that might feasibly be taken by transit operators, local governments, states, and UMTA to substantially improve the procurement, appropriate use, and maintenance processes for small transit buses. The manual is intended for use by individuals experienced and inexperienced in the procurement and operation of small transit buses. Furthermore, the manual is intended to assist individuals in the cost-effective procurement, maintenance, and operation of buses in a wide range of local, institutional, service, and operating environments. (Included in the definition of service and operating environments are maximum and average loads; type of service; range requirements (i.e., distance between refueling); wheelchair-lift or ramp needs, and actual usage; types, conditions, and grades of roads/streets; dwell-time constraints; weather extremes; frequency and degree of acceleration/braking; communication equipment requirements; and fare collection equipment requirements). The manual will be based on research requiring the collection, tabulation, and analyses of primary information and data. While performing the research, investigators must be particularly cognizant of bus maintainability and fuel efficiency. (Included in the definition of maintainability are life expectancy of the bus's power train, body, and major components; minimum mean time before failure (MTBF) rates of components; availability and cost of parts; maintenance and servicing facilities required; skill levels and representative times and costs required for servicing and repair; complexity of subsystems (i.e., lifts and air conditioning).) Fuel efficiency studies should consider duty cycle, propulsion technology, maintenance, bus size and weight, gearing, etc. Transit operators will be the principal users of the research results, although they should also be of interest to manufacturers and funding agencies. To accomplish this objective the following tasks are considered essential but not limiting:

Task 1 - Determine the present capital and operating costs, and performance of small transit buses in U.S. operations as affected by (1) service and operating environments, (2) institutional environments, and (3) maintenance availability and sophistication.

A. Develop a classification system for small buses by type (life expectancy, maintainability, operating cost) and size.

B. Develop a classification system for operational environments and maintenance programs.

C. Develop a detailed data collection plan for use in determining capital and operating costs for various classes of buses, maintenance programs, and operating environments.

D. Collect data and summarize results for various bus and component classes to provide transit operators with relevant design characteristics and operating experience. Analyze MTBF data (as developed in this study or available elsewhere), design characteristics, and general operating experience for key components, subsystems, chassis types, etc. that are critical to the development of minimum specifications for various service and operating environments, appropriate maintenance actions, and realistic replacement intervals. Develop from these data an engineering analysis of each bus class describing its suitability for various types of service and likely operating results. Assess the practicality of using life-cycle costs to assist in the description of operating results.

Project 30-1 continued

E. Identify problems for transit operators and manufacturers in using or producing small transit buses that are supported by the data.

Task 2 - Develop practical recommendations for resolution of key problems, identified in the research, for improving the purchase, maintainability, and cost-effective use of small transit buses. These recommendations should be oriented towards actions that can be taken by transit operating agencies to improve delivery of service.

Task 3 - Based on the results of Task 1, develop a workbook (flow-chart type) manual that can be used by transit operators to make appropriate small bus choices. The manual should be designed to take as input such planning factors as service type, anticipated passenger loads, typical speeds, maintenance and institutional factors. Its output should include the classes of small transit buses that are best suited to the projected operating environment, special specification items or options that should be required, the range of maintenance and fuel costs likely to be experienced, and special maintenance provisions that should be undertaken.

Funds Available: \$300,000

PROBABILITY OF SUCCESS:

REPORT(S) AVAILABILITY: None

PRINCIPAL INVESTIGATOR(S):

RESPONSIBLE NCTRP STAFF ENGINEER: R. Ian Kingham - 202/334-3224

AREA THIRTY-ONE: FINANCE

Project: 31-1, FY '80
 Title: The Impacts of Federal Grant Requirements on Transit Agencies

Research Agency: Booz, Allen & Hamilton, Inc.
 Principal Investigator: Subhash R. Mundle

Effective Date: November 30, 1981
 Completion Date: August 31, 1982

AGENCY PERFORMANCE

1. Is the project on schedule? No* Percent project complete 93
2. Is the research in keeping with the approved research plan? Yes
3. Contract Amount: \$50,000
4. Estimated Expenditures to 6/30/82: \$35,050
5. Are the expenditures in keeping with the project progress? Yes

*Project is 1 1/2 months behind schedule due to delays caused by interview scheduling.

PROJECT DESCRIPTION

As the federal transit program has grown, this growth has been accompanied by a proliferation of federally imposed requirements. The costs and effects of grant requirements are causing increasing concern to transit agencies. A Section 3 grant application for a new bus purchase requires approximately 21 exhibits to comply with UMTA requirements. Additionally, several annual submissions are required if the grant approval process takes more than one year.

Such requirements have forced many transit operators to allocate scarce resources to federally required procedural work. The costs of compliance may include (1) inflationary cost escalations, (2) allocation funds to administrative detail, (3) project delays, (4) revisions of project scope, (5) reductions in management flexibility, and (6) increased capital costs.

There is a need to quantify the impacts of federal requirements on the capacity of a transit system to (1) comply and (2) serve effectively the intent of the legislation. Furthermore, there is a need to develop recommendations to improve the grant application process.

Presently available funds are sufficient to address but a portion of the entire problem; therefore, research needed beyond that described below will depend on provision of additional resources from future years.

The general objective of this study is to determine the costs and effects of federal legislation, regulations, UMTA circulars, administrative letters and formal administrative guidelines for the Section 3 capital grant application process and to make recommendations for its improvement. The study results are anticipated to be useful to (1) transit agencies in their decision to apply for federal grants, (2) legislators drafting legislation, and (3) the Urban Mass Transportation Administration in amending requirements. In recommending improvements consideration will be given to the intent of legislation, regulations, circulars, letters, and guidelines.

Because of the limitation on available funds, the research specifically excludes consideration of Section 13(c) and 504 requirements. Additionally, the research will not consider Section 5 capital and operating grants; applicability to fixed guideway systems; project management requirements for approved grants; and applicability to specialized transit services.

Toward the general objective stated above, the following tasks will be performed.

Task 1--Develop four scenario(s) that will describe medium-sized transit agencies qualifying for and applying for an increase in size of their bus fleet by 25 percent. Such scenario(s) will identify the requirements that the agency would have to meet in order to be eligible for funding under UMTA Section 3. Scenario elements will include but not necessarily be limited to (1) project justification and planning (SRTP-TIP), (2) grant application and documentation, (3) bus maintenance requirements, (4) human resource regulations, and (5) public hearing requirements.

Task 2--Conduct and analyze six case studies based on the scenarios developed in Task 1. On-site interviews will be conducted.

Task 3--Determine applicability of the cost and impact results of Tasks 1 and 2 to larger and smaller agencies. Telephone interviews will be conducted with eight to ten agencies.

Task 4--Compare the actual results of Tasks 1 and 2 with the procedural intents of the regulations.

Task 5--Develop recommendations: (a) procedural reform to expedite UMTA's obligation of funds, and (b) strategies to reduce costs to transit agencies.

STATUS OF RESEARCH

Progress through June 30, 1982, includes completion of all research tasks. Six case studies of transit agencies (medium size) were completed early in the calendar year followed by telephone surveys of four large agencies and four small agencies. Furthermore, officials of UMTA, APTA, and Congressional staff were interviewed. On the basis of the case studies and interviews, recommendations for reforming the capital grant application process have been formulated. The recommendations developed in Task 5

Project 31-1 continued

address both procedural reforms to expedite application processing and strategies to reduce costs currently incurred by transit agencies. Substantial progress has been made on the final report.

PROBABILITY OF SUCCESS: Good

REPORT(S) AVAILABILITY: None

PRINCIPAL INVESTIGATOR(S): Mr. Subhash R. Mundle
Booz, Allen & Hamilton, Inc.
400 Market Street
Philadelphia, PA 19106
(215) 627-5450

RESPONSIBLE NCTRP STAFF ENGINEER: R. Ian Kingham - 202/334-3224

AREA THIRTY-THREE: PERSONNEL MANAGEMENT

Project: 33-1, FY '80
 Title: Transit Bus Operator Selection and Training for Dealing with Stress

Research Agency: Group Associated Management Services, Inc.
 Principal Investigator: Dr. Brownlee Elliott

Effective Date: October 15, 1981
 Completion Date: October 14, 1983

AGENCY PERFORMANCE

1. Is the project on schedule? Yes Percent project complete 25
2. Is the research in keeping with the approved research plan? Yes
3. Contract Amount: \$150,000
4. Estimated Expenditures to 6/30/82: \$44,000
5. Are the expenditures in keeping with the project progress? Yes

PROJECT DESCRIPTION

Some bus operators possessing the basic skills to operate the vehicle may still experience difficulties in performing their job satisfactorily because of inability to cope effectively with the public. Use of all possible training and disciplinary action does not help when the individual hired does not have the psychological strengths necessary to deal effectively with continuous public contact, and the resultant stress may lead to more workers' compensation claims for nonvisible physical injury (i.e., heart and psychological problems) as well as to more accidents, absenteeism, and personnel turnover.

Various selection and training methods are currently being used by individual transit agencies. Some of these methods have been developed specifically for application in the transit industry, some have evolved from practice within individual agencies, and others represent modifications to methods originally developed for agencies outside of the transit industry. At present, however, no one single method of selecting or training bus operators from the viewpoint of their ability to deal with stress is considered to be generally acceptable for wide application by transit agencies. To ensure that methods have general applicability, the range of needs and capabilities of different size transit agencies, regional differences, and the makeup of the bus operator population (i.e., male/female and minorities) must be fully considered.

The objective of this research is to provide an evaluative device or questionnaire for use as part of the bus-driver-selection process that will validly indicate the applicant's susceptibility to stress which is likely to affect job performance. The research will also provide two training modules: one designed to help newly hired operators anticipate and deal with typical stressful situations, and one designed to help supervisors recognize stress symptoms displayed by operators and provide guidance on appropriate courses of action.

STATUS OF RESEARCH

Reference literature and existing training programs have been reviewed to identify the various environmental, psychological, and physiological factors commonly used in stress analysis. NCTRP Research Results Digest 1 provides a summary of the literature review. A preliminary set of factors and characteristics relevant to the bus operators' job has been prepared. This preliminary set is being reviewed and evaluated by managers, operators, and labor representatives from selected transit agencies for suggested additions and deletions. Agencies participating in this review include the Detroit Department of Transportation, Kansas City Area Transportation Authority, Regional Transit Service (Rochester, NY), Mercer County Metro (Trenton, NJ), Oklahoma City Mass Transit and Colorado Transit Management (Colorado Springs, CO).

Existing operator-selection-test mechanisms will be evaluated for general applicability in measuring an individual's tolerance for stress, and then either an existing device will be modified or a new test device will be developed. The resulting device will bring together current efforts dealing with the effects of stress, will have wide applicability in the transit industry, and will be primarily aimed at screening new applicants. The device will treat stress factors individually and in groups such as passenger contact, environment, management/union/employee relations, personal problems, and equipment. The device will be field tested by operators from selected transit agencies.

Two sample training modules will also be prepared: one for newly hired operator training (and perhaps for voluntary retraining) and one for supervisor training. The primary focus of the new operator training will be to alert the driver to typical stress-causing situations and provide specific guidance on how to cope with each situation. Typical situations include (1) passenger contacts, e.g., fights on the bus; (2) environmental factors, e.g., bad weather; (3) management/union/employee relations; (4) personal problems, and (5) equipment. The supervisor's training module will focus on the recognition of stress symptoms and tendencies (resulting from personal or job-related causes) and on the identification of appropriate courses of action. Both modules will be adaptable by an individual transit agency so that through property-specific modifications they can be made part of existing training programs.

Project 33-1 continued

A listing will be provided of pertinent data and resources (films, videotapes, surveys, models, books, papers, etc.) identifying concomitant costs, sources, and transit agencies that are using such methods for selection and stress management training of bus operators and supervisors.

PROBABILITY OF SUCCESS: Good

REPORT(S) AVAILABILITY: NCTRP Research Results Digest 1

PRINCIPAL INVESTIGATOR(S): Dr. Brownlee Elliott, Research Director
Group Associated Management Services, Inc.
Suite 3002, Woodward Tower
10 Witheral Street
Detroit, MI 48226
(313) 964-2790

RESPONSIBLE NCTRP STAFF ENGINEER: Robert E. Spicher - 202/334-3224

AREA THIRTY-THREE: PERSONNEL MANAGEMENT

Project: 33-2, FY '81
 Title: Assessment of Job Enrichment Programs for the Transit Industry

Research Agency: In Developmental Stage
 Principal Investigator:

Effective Date: (12 months)
 Completion Date:

AGENCY PERFORMANCE

1. Is the project on schedule? Percent project complete
2. Is the research in keeping with the approved research plan?
3. Contract Amount:
4. Estimated Expenditures to 6/30/82:
5. Are the expenditures in keeping with the project progress?

PROJECT DESCRIPTION

The political and fiscal environment of transit agencies is in a period of significant change. Scarcity of funds will mean a renewed emphasis on productivity and redoubled efforts to retain and motivate quality employees in the absence of financial incentives. New federal policies stressing local initiative will encourage management to be more sensitive to innovative ideas, and a changing work force will make different demands.

Although the transit industry is highly labor-intensive, a great deal of emphasis has been placed in the past on capital development, financial controls, and transportation planning. Potentially, one of the most important areas for improving transit agency effectiveness is the development and management of human resources through job enrichment programs. There is a need for a systematic investigation of the feasibility of job enrichment programs, such as job restructuring, quality circles, and other techniques that utilize the full talents and abilities of transit employees. It is anticipated that the greatest benefit of job enrichment efforts could be derived from first-line supervisors and those they supervise.

For purposes of this study, job enrichment is defined as making the elements of the job both physically and psychologically more stimulating, resulting in more productive behavior. The organization thus provides an environment that allows and influences self-esteem and promotes a positive attitude about one's employment through an individual's own initiatives. Job enrichment offers several possible benefits to the transit industry. For the organization, it provides the prospect of improving the operating environment by enhancing the effective management of human resources. For the individual employee, the concept fosters greater job satisfaction, improved self-esteem, and higher productivity.

The general objective of this research is to assess the feasibility of job enrichment programs for the transit industry for first-line supervisors and those they supervise. The assessment would include a survey and analysis of current techniques used to improve job satisfaction and productivity in transit as well as other fields with similar characteristics. The assessment would identify common barriers to the implementation of job enrichment programs in transit agencies including, but not limited to, cost, labor-management relationships, political climate, and resistance to change. The assessment would also include specific methods for measuring, monitoring, and evaluating the effectiveness and cost benefit of job enrichment programs. It is anticipated that these objectives will involve the following tasks:

- Task 1. Review of job enrichment literature.
- Task 2. Inventory and assessment of current status of job enrichment in transit.
- Task 3. Select and evaluate, for application, at least 5 job enrichment techniques from Tasks 1 and 2. The evaluation should include an assessment of the feasibility of these techniques when applied to different size properties (small, 50 buses or less; medium, 51 to 200 buses; and large, over 200 buses).
- Task 4. Develop sample detailed job enrichment programs for bus and rail operators, mechanics, first line supervisors, and one other support position.
- Task 5. Develop strategy for dissemination to the industry of job enrichment programs.
- Task 6. Prepare final report that also contains an appendix that catalogs specific job enrichment techniques applicable to the transit industry.

Funds Available: \$100,000

PROBABILITY OF SUCCESS:

REPORT(S) AVAILABILITY:

PRINCIPAL INVESTIGATOR(S):

RESPONSIBLE NCTRP STAFF ENGINEER: Crawford F. Jencks - 202/334-3224

AREA THIRTY-SIX: ALTERNATIVE ANALYSIS

Project: 36-1, FY '80
 Title: Improving Decision-Making for Major Urban Transit Investments

Research Agency: System Design Concepts, Inc.
 Principal Investigator: Joseph R. Stowers

Effective Date: November 2, 1981
 Completion Date: February 1, 1983

AGENCY PERFORMANCE

1. Is the project on schedule? No* Percent project complete 43
2. Is the research in keeping with the approved research plan? Yes
3. Contract Amount: \$150,000
4. Estimated Expenditures to 6/30/82: \$57,930
5. Are the expenditures in keeping with the project progress? Yes

*The project is 2 months behind schedule because of conflicting demands on agency time. Efforts are being made by the agency to accelerate research so that contract commitments can be met within the presently stipulated performance period.

PROJECT DESCRIPTION

The environment for transportation planning and investment decisions is in a period of dramatic change. Fiscal constraints, a possible reorientation of federal transportation policies, and an increasing reliance on local commitment and decision-making are all likely to influence significantly the future of transportation in urban areas. Even with these pressures, however, urban areas will still be facing decisions on major investments in transit systems. Thus, there will be a need in future years for a planning and analysis process that examines major transportation options and that informs decision-makers so that most cost-effective investment decisions can be effected.

Since 1975, the Urban Mass Transportation Administration has required, as a condition for federal funding support, a structured process termed alternatives analysis for proposed major investments in urban mass transit facilities. This process is used to identify priority corridors for possible major investments and to assess the cost-effectiveness of these investments in comparison to less costly transit improvements. Information generated in the process is used both by federal officials in administering a discretionary capital grant program and by state and local officials in determining priorities and identifying needed improvements in mass transportation services. Three important decision points occur within the UMTA major transit investment planning process. First, appropriate local officials identify the corridor(s) where major investments appear to be most needed. Second, local and federal officials agree on a small set of investment alternatives that encompass a reasonably broad range of options. Finally, local, state, and federal officials agree on one (or more) of these alternatives for advancement into preliminary engineering.

Since the advent of the alternatives analysis requirement, a significant number of urban areas have been involved in some aspect of the process. Concerns have been expressed with the process. For example, there is uncertainty regarding both the effect on the timing of transit investment decisions and the use of information in the federal review process and in local decision-making. Although adjustments to the process have been made to enhance its usefulness in local, state, and federal decision-making, no comprehensive assessment has been made of the degree to which analytical requirements have provided appropriate information at key decision points.

There is a need to evaluate past experience with alternatives analysis and to recommend improvements in the process that will result in more effective local, state, and federal decision-making. Such an assessment would be useful, for example, in identifying points where decision-makers have not had complete information, where the process has constrained appropriate decisions, or where significant efforts are invested in the development of information that is not used in decision-making. Although it is unclear what direction federal policy will take in regard to alternatives analysis, the need for some form of alternatives analysis for such investments will continue.

The general objective of this research is to assess the federal, state, and local decision-making process for major urban mass transportation investments by evaluating recent alternatives analysis experiences. The purpose of the assessment is to identify potential improvements in policy, procedures, and use of technical information; and to formulate planning procedures recommendations for use by federal, state, and local agencies. Such improvements would be in terms of time, costs, scale, presentation of information, role of participants, and the like. (The assessment is not intended to prescribe specific analytical techniques or to judge the appropriateness of previous major urban transit decisions.) Research tasks to satisfy the general objective will be as follows:

Task 1--Inventory all applicable regulations and requirements concerning the evaluation of proposed major urban mass transportation investments.

Task 2--Review relevant literature on alternatives analysis and transit investment decision-making.

Task 3--Prepare methodologies for (a) the analysis and assessment of recent alternatives analysis decision-making experiences and (b) the selection of case studies.

Project 36-1 continued

Task 4--Select and conduct case studies, including those undertaken pursuant to the 1976 guidelines as well as other cases.

Task 5--Evaluate the usefulness of information developed in alternatives analysis for decision-making at each level of government.

Task 6--Formulate recommendations to Federal DOT and to state and local agencies.

STATUS OF RESEARCH

Progress through June 30, 1982, includes completion of Tasks 1 through 3 and substantial progress on Task 4. Case studies were conducted in Baltimore and Houston. Six additional case studies will be conducted before analytical work will begin that in turn will lead to recommendations to improve the alternative analysis process.

PROBABILITY OF SUCCESS: Good

REPORT(S) AVAILABILITY: None

<u>PRINCIPAL INVESTIGATOR(S):</u> Joseph R. Stowers	Mr. Arlee T. Reno
Vice President	Director of Finance and
System Design Concepts, Inc.	Policy Studies
One Farragut Square South	System Design Concepts, Inc.
Washington, DC 20006	One Farragut Square South
(202)393-5910	Washington, DC 20006
	(202)393-5910

RESPONSIBLE NCTRP STAFF ENGINEER: R. Ian Kingham - 202/334-3224

AREA THIRTY-EIGHT: SYSTEM PLANNING

Project: 38-1, FY '81
 Title: National Transit Computer Software Directory

Research Agency: In Developmental Stage
 Principal Investigator:

Effective Date: (12 months)
 Completion Date:

AGENCY PERFORMANCE

1. Is the project on schedule? Percent project complete
2. Is the research in keeping with the approved research plan?
3. Contract Amount:
4. Estimated Expenditures to 6/30/82:
5. Are the expenditures in keeping with the project progress?

PROJECT DESCRIPTION

Over the past decade, computer (software) systems have gained widespread acceptance as important management and operating tools in public transit agencies. Representative software applications include planning (UTPS), scheduling (RUCUS), operations control, maintenance (SIMS), finance, and personnel. It is estimated that the public transit industry spends several million dollars each year on the design of software. Because there are great similarities in the structure and operation of transit agencies, software developed by one agency can often be adapted for use by other agencies with much less cost and effort than custom-designing completely new software. The lack of knowledge of existing software and its applications results in the spending of significant amounts of money by many transit agencies to develop new software that may not be as effective as it could be or may be "reinventing the wheel." Therefore, there is a need for the design and implementation of a detailed and complete national transit computer software directory that can be continuously updated to function as a central clearinghouse, making information available to individual public transit agencies that are planning software development. The anticipated benefit from the design and implementation of the directory is lower costs for software users. Use of the directory should lead directly to commonality of systems, faster software implementation, and public domain software that can be obtained at minimal cost. The benefit of identifying and using transportable software can only be realized if there are provisions for maintenance of the directory on a continuing basis.

The objective of this research is to develop and pilot test a methodology for the establishment and continuous updating of an automated directory of computer software useful to the public transit industry. The directory shall have the capability of including (1) software suitable for use by transit agencies of all sizes, and (2) existing and future software for use on computers of all types and sizes.

To accomplish the objective, the following tasks are to be conducted:

Task 1 -- Directory Content. Review and cite the applicable literature describing the availability of computer software programs for use by public transit agencies. Examples of such references include, but are not limited to, the American Public Transit Association (APTA) "Catalog of Management Information System Applications within the Transit Industry," the American Association of State Highway and Transportation Officials (AASHTO) "Computer System Index," and work of the Institute of Transportation Engineers (ITE). Using these references, and in consultation with the transit industry as appropriate, the researchers shall propose content, structure, and format for a directory of computer software. The content of the directory shall focus on the principal categories of transit operation, such as finance, operations, maintenance, administration, planning, as well as others deemed appropriate.

The researchers shall provide a detailed format, specifying the description for each principal category and software application. In order to assist users in identifying software that is potentially useful to them, sufficient detail should be provided, for example, hardware environment, operating system, programming language, and the like.

Task 2 -- Methodology. The researchers shall investigate existing information systems, such as the Transportation Research Information System (TRIS), the International Road Research Documentation, and others, to evaluate their capabilities regarding the recommended directory as part of those existing systems. The researchers shall review and evaluate other methods of designing and maintaining the automated transit directory. This evaluation should include:

- Description of methods reviewed.
- Review criteria used.
- Pros/cons of each method.
- Recommended method.

Documentation of the recommended method should include an overview, description of major functions, copies of forms/screens/reports used for input/inquiry/output, and necessary procedures.

Task 3 -- Management Procedures. The ultimate success of this project requires the existence of an organization (not yet identified) that will be responsible for the provision and maintenance of an up-to-date directory. The researchers shall define the management function required of this

Project 38-1 continued

organization. This function shall be based on a thorough examination of existing software directories and their deficiencies. The management function should assure that the system will serve the need of both large and small transit agencies. It should include methods for attracting and holding participation by the transit agencies. Particular attention should be paid to providing incentives to the participants for supplying and updating the entries in the directory. Methods should be described for making all transit agencies, and others who can benefit from the services offered, aware of the existence of the directory. The description of the management function should also include the methods by which information can be collected from and disseminated to interested parties or transit agencies.

Task 4 -- Case Study. As a means of demonstrating the capabilities of the proposed methodology, the researchers shall provide an updated "1980 APTA Catalog of Management Information Systems Applications within the Transit Industry." This catalog is to be provided in both hardcopy and machine-readable format. It should contain all of the data elements as defined in Task 1.

Contact should be made in person with all APTA members to solicit updates to the existing data. The purpose of this contact is to demonstrate the procedures, forms, and incentives of the proposed methodology.

Additionally, agencies should be asked to request items from the directory as a method of testing the validity and flexibility of the recommended search criteria.

Researchers shall provide sample output reports that illustrate the output types as defined in Task 3.

Task 5 -- Directory Maintenance. Evaluate and recommend potential organizations that can provide the management functions as described in Task 3.

Consideration must be given to the following issues:

- How and by whom should the directory be maintained?
- How should directory information be disseminated?
- What will be the estimated cost of this function?
- What permanent funding sources are recommended?

Because the ultimate selection of the organization to maintain the directory will depend on these issues, a complete discussion should be provided, particularly with respect to recommending funding sources; including consideration of applicable laws, regulations, policies, and institutional inter-relationships.

Funds Available: \$100,000

PROBABILITY OF SUCCESS:

REPORT(S) AVAILABILITY:

PRINCIPAL INVESTIGATOR(S):

RESPONSIBLE NCTRP STAFF ENGINEER: Harry A. Smith - 202/334-3224

AREA THIRTY-NINE: ROUTE PLANNING

Project: 39-1 FY '81
 Title: A Modular Approach to On-Board, Automatic Data Collection Systems
 Research Agency: In Developmental Stage
 Principal Investigator:
 Effective Date: (18 months)
 Completion Date:

AGENCY PERFORMANCE

1. Is the project on schedule? Percent project complete
2. Is the research in keeping with the approved research plan?
3. Contract Amount:
4. Estimated Expenditures to 6/30/82:
5. Are the expenditures in keeping with the project progress?

PROJECT DESCRIPTION

Current economic conditions require that a transit system improve productivity while making the best use of limited resources. Increasing emphasis is being placed on improving route productivity through such means as better schedules, on-time performance, and service allocation. These requirements place an increasing importance on good ridership and schedule adherence data so that responsible decisions on routing and scheduling can be made. In addition, fare-box revenue is becoming increasingly important to the stability of transit systems. Accurate fare payment information by fare category is needed to calculate effects of alternative fare adjustment proposals, including an analysis of the equity of fare structures. The need for ridership, schedule adherence, and fare information is expected to continue for the foreseeable future.

Currently the most predominant form of gathering ridership data in the transit industry is collecting data manually by ride checks or load (point) checks. Information gathered in this manner is expensive to collect and process, limited in scope, and usually infrequent because of the number of "checkers" required. For example, some systems have reported that a point check may provide accurate load data at one location, but may understate true route ridership by as much as 50 percent. Fare/revenue data are generally available only on a systemwide basis. Special efforts that usually rely on driver participation or cumbersome fare-box handling are required to collect route-level fare-payment information.

In recent years, a few transit systems have turned to automated methods to collect ridership, schedule adherence, and fare data. The levels of sophistication of these systems have varied from real-time data collection and analysis systems to more basic systems that provide information in summary form on an historical basis. Although, in general, transit properties that have used these automated systems have been satisfied, widespread use has not occurred.

There are several reasons why the majority of transit systems have not implemented automated technology: (1) a general lack of understanding of the options available in terms of hardware to provide the information; (2) an uncertainty as to how much of what type of hardware and software is needed; (3) the lack of commitment by transit management to implement the technology; (4) the difficulty in quantifying benefits, together with costs, and in determining the net benefit to the transit system; (5) the general unavailability of funding for much of this equipment at the federal level; and (6) the lack of standardization of functional requirements of the technologies, which, in turn, dampens the availability of hardware and discourages manufacturer participation.

The general objective of this research is to develop requirements and implementation guidelines for the use of automated on-board passenger/fare information collection systems. The system hardware should be constructed on a modular basis. Depending on the complexity of information desired, the modules should include, but not be limited to: (1) basic passenger counters (e.g., treadle, infrared), (2) location detection devices (e.g., odometer, signposts), (3) fare category counter (e.g., electronic fare-box), and (4) data storage/retrieval equipment (e.g., radio, cassette, solid state). Functional specifications for each of these systems are to be developed so that one module or component is compatible with another regardless of manufacturer. Requirements for modules or components will depend on the decisions a transit property must make, which, in turn, determines the level of detail the data collection system must provide. The levels of detail range from systemwide information to detailed stop-by-stop information. The system should be designed so that a transit property can choose, in modular fashion, the level and type of hardware needed for the data desired. It is anticipated that research to satisfy the general objective will require at least the following tasks:

Task 1 - Review existing literature and acquire other information as needed to determine the state of the art of automated data collection systems and information needs requiring passenger counts, schedule adherence, and fare data.

Task 2 - Determine modular hardware requirements to provide the information desired for various levels of decision-making. Standardize the functional requirements and develop uniform specifications for the hardware by module type. Upon completion of this task, a technical paper containing the specifications will be submitted to NCTRP for review.

Task 3 - Develop methods to permit transit properties to select the modules and supporting hardware in sufficient quantity, on the basis of a sampling plan, to meet their data needs.

Project 39-1 continued

Task 4 - Develop a format for quantifying all benefits and all costs so that a transit property can determine the overall net benefit compared with alternative means of collecting the data.

Task 5 - Investigate other considerations that affect implementation, such as labor restrictions, organizational commitment, and maintenance support capability.

Task 6 - Define data processing requirements (hardware/software) and develop flow charts that describe how various outputs can be produced using the data collected, together with such external information as schedule data or mileage data.

Task 7 - Prepare a manual that describes the methods a transit property would follow to design, select, and implement an automated ridership and fare data collection system. Recommend two (2) transit properties of different sizes to test the application of the manual. NCTRP approval of the manual and the two transit properties recommended will be required before initiation of Task 8.

Task 8 - Demonstrate the validity of the procedures in the manual by applying the techniques to two (2) transit properties and revise the manual accordingly.

Task 9 - Prepare a technical specification for procurement that describes the electronic/mechanical requirements of the module interfaces.

Task 10 Prepare a final report that includes the revised manual as a stand-alone appendix.

Funds Available: \$150,000

PROBABILITY OF SUCCESS:

REPORT(S) AVAILABILITY:

PRINCIPAL INVESTIGATOR(S):

RESPONSIBLE NCTRP STAFF ENGINEER: Crawford F. Jencks - 202/334-3224

AREA FORTY: IMPACT ANALYSIS

Project: 40-1, FY '81
Title: Simplified Guidelines for Evaluating Transit Options in Small Urban Areas

Research Agency: In Developmental Stage
Principal Investigator:

Effective Date: (15 months)
Completion Date:

AGENCY PERFORMANCE

1. *Is the project on schedule?* *Percent project complete*
2. *Is the research in keeping with the approved research plan?*
3. *Contract Amount:*
4. *Estimated Expenditures to 6/30/82:*
5. *Are the expenditures in keeping with the project progress?*

PROJECT DESCRIPTION

Small transit systems, as well as larger systems, are caught in a continuing struggle of determining the impacts of transit system investment decisions on users as well as on the community at large. The actual impacts of a transit system are difficult to determine. In addition to the obvious potential impacts, such as changes in vehicle-miles of travel, fuel consumption, pollution, etc., there is also a group of not-so-obvious impacts that relate to the costs and benefits of a transit investment (e.g., vehicle accidents, peak-hour congestion, traffic volume changes, commercial parking space requirements, and changes in future capital costs for street construction). Nonquantifiable impacts must also be considered, such as changes in mobility for the economically disadvantaged and for those who cannot drive (i.e., handicapped, elderly, and young people).

To ensure that city managers and councils have information on which to make intelligent and consistent appraisals pertaining to such investments, many types of factors must be fully considered. Typical factors are (1) socioeconomic (e.g., percentage of elderly population, minority population, chronic unemployment problems, diversity of existing industries, existence of large institutions), (2) political (e.g., attitude of the "affected parties," social-economic advocate groups), (3) current local concerns (e.g., ecology, air quality, traffic congestion), (4) business decisions, and (5) geographic (e.g., climate, topography, proximity to major urban areas).

Transit planning methods for cost-benefit analysis and for alternatives analysis have been well documented in studies sponsored by AASHTO, FHWA, UMTA, and the Office of the Secretary, U.S. DOT. Typically, however, these studies have been too complex and, in many cases, too data intensive for understandable public presentation and use in small cities. Therefore, research is needed to prepare a technically based, yet simple, analytical tool for use in the public decision process relating to the potential impacts of transit alternatives.

The objective of Project 40-1 is to develop procedural guidelines for use by transit and municipal agencies in guiding their analysis of proposed transit and paratransit alternatives and in presenting their proposals to the decision-making bodies. Use of these guidelines will result in the public's better understanding of proposed investments for a new transit system or improvements to an existing system. Also, increased use of sound cost-benefit techniques to safeguard against inadequate analyses should result from the availability and use of these guidelines. The guidelines will be designed for application by nontechnical persons and will be directed to the types of decisions faced in urban areas up to 200,000 population. Considerations such as total costs, avoided costs, transportation alternatives, ridership, urban development factors, conservation of energy and other resources, and typical transit evaluation criteria will be addressed.

Priceable and nonpriceable factors will be identified that need to be included in the guidelines to address the specific concerns of small urban areas (i.e., the factors that are important to the community, city council, etc.). These factors will cover the anticipated impacts on the transit system itself, on transportation in general, and on the community at large (nonuser impacts). Relevant resource materials will be assembled that have applicability to the evaluation of alternatives for public transit. Existing literature and related studies will be reviewed, and a synthesis will be prepared of information relevant to decision-making for transit service options. Information requirements, availability, and sources used in existing analysis techniques will be assessed in relation to the actual needs of small areas.

Procedural guidelines will be developed using the best available techniques to describe how to handle both priceable and nonpriceable factors. For agencies that are generally familiar with cost-benefit analysis techniques, the guidelines will serve to focus the transit service evaluation to ensure that the pertinent information is available for presentation to decision-makers. For agencies with limited experience in conducting cost-benefit studies, the guidelines will include simple analysis techniques (based on accepted, technically sound procedures) for direct application. A portable educational package will also be developed for use in demonstrating the analysis procedures and the factors considered in evaluating transit improvements and alternatives. A package suitable for presentations to city councils and transportation planning boards is anticipated and, although based on a prototype application, it will be adaptable to local situations. Video-tape and/or slides will be included in the package.

Project 40-1 continued

Funds Available: \$150,000

PROBABILITY OF SUCCESS:

REPORT(S) AVAILABILITY:

PRINCIPAL INVESTIGATOR(S):

RESPONSIBLE NCTRP STAFF ENGINEER: Robert E. Spicher - 202/334-3224

AREA FORTY-THREE: TRACK AND ANCILLARY SYSTEMS

Project: 43-1, FY '81
 Title: Detection of Low-Level Fault Currents on Rail Transit Systems

Research Agency: In Developmental Stage
 Principal Investigator:

Effective Date: (15 months)
 Completion Date:

AGENCY PERFORMANCE

1. *Is the project on schedule?* *Percent project complete*
2. *Is the research in keeping with the approved research plan?*
3. *Contract Amount:*
4. *Estimated Expenditures to 6/30/82:*
5. *Are the expenditures in keeping with the project progress?*

PROJECT DESCRIPTION

Devices presently in use by the rail transit industry can adequately detect and respond to overload fault currents. Detection of less than overload fault currents is particularly difficult because the fault current characteristics tend to resemble characteristics normally associated with train or power switching operations. Rapid and reliable detection of low-current electrical faults on direct-current rail transit systems would provide a significant improvement to safety and operation of these systems.

The objective of this research is to identify and evaluate detection methods and equipment to enhance transit system safety through reliable detection of electrical faults that are not detected by circuit breaker overload protection. Cooperation by transit systems and associated industries is essential to the success of the project, inasmuch as this research seeks a solution that can easily be adapted to various transit systems.

To accomplish this objective, the following tasks shall be conducted:

Task 1 - Perform an in-depth survey of rail transit systems worldwide, under the auspices of an international institution, such as the International Union of Public Transport, to determine how the problem being researched is handled in each system. Concurrently, survey the electrical industry organizations and suppliers worldwide for methods and equipment that are potential solutions to the detection problem. Review the work of other industries that may also be relevant to the problem and its solution.

Task 2 - Using information obtained in Task 1, identify the electrical system characteristics that will define the parameters of the required detection systems for various types of vehicle propulsion systems and network configurations.

Task 3 - Using the parameters developed in Task 2, determine the extent to which available methods and equipment meet the research objectives.

Task 4 - Prepare a final report describing the research and its results, including a detailed evaluation of the performance and economics of available methods and equipment.

Funds Available: \$100,000

PROBABILITY OF SUCCESS:

REPORT(S) AVAILABILITY:

PRINCIPAL INVESTIGATOR(S):

RESPONSIBLE NCTRP STAFF ENGINEER: Harry A. Smith - 202/334-3224

AREA FORTY-SEVEN: GENERAL MATERIALS

Project: 47-1, FY '80
 Title: Improved Service Life of Urban Transit Coach Brakes

Research Agency: Battelle Memorial Institute
 Principal Investigator: Dr. Thomas A. Dow

Effective Date: December 1, 1981
 Completion Date: November 30, 1983

AGENCY PERFORMANCE

1. Is the project on schedule? Yes Percent project complete 40
2. Is the research in keeping with the approved research plan? Yes
3. Contract Amount: \$300,000
4. Estimated Expenditures to 6/30/82: \$125,000
5. Are the expenditures in keeping with the project progress? Yes

PROJECT DESCRIPTION

The operation and maintenance history of advanced design urban transit coaches shows a dramatic decline in brake life compared with "new look" coaches. Major factors associated with this decline in brake life appear to be, but are not limited to: increased gross vehicle weight, increased operating speed, body configuration, and changed regulations.

The resultant increased brake temperatures are believed to be the cause of reduced brake life that has increased operational costs to unacceptable levels. Therefore, the need exists to identify and develop methods to increase brake life to previous levels.

The overall project objective is to develop methodologies for improving existing and future urban transit coach brake life. This will include quantification of in-service brake operating temperatures plus identification of methods of reducing brake operating temperatures and/or alternate friction materials.

The project objective will be accomplished in two phases. Phase I will include the following tasks:

Task 1--Confirmation of the premise that temperature is the cause of reduced brake life by the collection and evaluation of brake operating temperatures. This is to be accomplished in cooperation with a major metropolitan transit operator that has experienced the problem. As a minimum, temperature levels will be established for advanced design and early "new look" transit coaches.

Task 2--Development of practical methods for reduction of operating temperatures and/or identification of friction materials for compatibility with the service temperatures determined in Task 1. The following factors must be considered: (a) adaptability to coaches in service, (b) initial and operating costs, (c) regulations, (c) serviceability, (e) reliability, (f) public acceptability, and (g) feasibility.

Task 3--Cost-benefit prioritization of methods for increasing brake life based on Tasks 1 and 2.

Task 4--Preparation of an interim report with recommendations for implementation of Phase II demonstration.

The Phase II effort will include:

Task 5--Demonstration of one or more suggested corrective methods selected by the NCTRP from those recommended in Phase I. This will be accomplished in cooperation with a major metropolitan transit operator.

Task 6--Preparation and submittal of the final report.

STATUS OF RESEARCH

Research is under way on Phase I of the study. The researchers met with representatives of the Southern California Rapid Transit District (SCRTD) on December 2 and 3, 1981 at the main bus maintenance shop to make arrangements for instrumenting three types of buses to collect brake temperature data. The detailed work plan has been submitted and approved.

The design and experimental work on Task 1 is completed. Brake temperature data are being analyzed. Accomplishment of this task involved (1) detailed design and construction of brake drum and shoe instrumentation, (2) installation and trial testing of instrumentation on a bus in Columbus, Ohio, (3) obtaining and instrumenting brake drums and shoes for Los Angeles buses, (4) installation of instrumented brake drums and shoes on 3 buses in Los Angeles, and (5) collection of in-service brake temperature from instrumented buses in Los Angeles. Brake temperatures of up to 600F were recorded during the data collection phase. The data appear to verify and quantify the brake temperature problem. After further analysis of the data, acceptable brake operating temperatures will be defined and temperature reducing schemes evaluated.

PROBABILITY OF SUCCESS: Based on the background and experience of the research agency and cooperating agencies, prospects for success appear good at this time.

Project 47-1 continued

REPORT(S) AVAILABILITY: None

PRINCIPAL INVESTIGATOR(S): Dr. Allen T. Hopper
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RESPONSIBLE NCTRF STAFF ENGINEER: Harry A. Smith - 202/334-3224

AREA FIFTY-FOUR: ENERGY EFFICIENCY

Project: 54-2, FY '80
Title: Energy Management of Electric Rail Transit Systems

Research Agency: Carnegie-Mellon University
Principal Investigator: Dr. Richard A. Uher

Effective Date: October 1, 1981
Completion Date: December 31, 1982

AGENCY PERFORMANCE

1. *Is the project on schedule?* Yes Percent project complete 52
2. *Is the research in keeping with the approved research plan?* Yes
3. *Contract Amount:* \$135,115
4. *Estimated Expenditures to 6/30/82:* \$64,000
5. *Are the expenditures in keeping with the project progress?* Yes

PROJECT DESCRIPTION

Rapidly increasing electric energy costs have resulted in a dramatic increase in operating expenses of transit authorities operating electric rail systems. This problem is further augmented by additional increases in rates being sought by electric utilities. The peak demand component of these rates is directly associated with the electric energy generation, transmission, and distribution facilities cost. As major electric energy consumers, transit authorities are subject to allocated costs associated with these facilities. If transit authorities can improve the management of peak demand on their systems, energy costs can be significantly reduced. Several transit authorities have developed strategies for: reducing peak energy consumption (such as load management), improving vehicle energy efficiency, and more energy efficient operating practices.

The objective of this research is to provide guidelines for transit authorities to lower peak electric demand and, thereby, lower costs. It is anticipated that the proposed study will include but not be limited to:

1. Identification of the contributing factors that cause peak demand and the timing and significance of each.
2. Identification of monitoring strategies and conservation opportunities in order to be able to control peak demand.
3. Identification and evaluation of various load management techniques and their cost/benefits and effectiveness on reducing peak demand.
4. Development of strategies so that the benefits of peak demand management are reflected in rates.

It is intended that the research will result in the development of methodologies for : (1) forecasting the peak electric energy demand, (2) monitoring the actual demand, and (3) controlling the demand. It is also intended that a preliminary plan will be prepared for validating and demonstrating the developed methodologies.

STATUS OF RESEARCH

Research is in progress. Data have been collected from four transit agencies and analyzed to determine probable peak power demand cause factors. Monitoring strategies have been identified for controlling peak demand and the costs of the various strategies are being determined. Load management techniques are being evaluated using simulation models. The preliminary draft final report will be prepared during the next quarter.

PROBABILITY OF SUCCESS: Based on the background and experience of the research agency and the principal investigator, prospects for success appear good at this time.

REPORT(S) AVAILABILITY: None

PRINCIPAL INVESTIGATOR(S): Dr. Richard A. Uher
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RESPONSIBLE NCTRP STAFF ENGINEER: Harry A. Smith - 202/334-3224

Project: 60-1, FY '80 and continuing
 Title: Synthesis of Information Related to Transit Problems

Research Agency: Transportation Research Board
 Principal Investigator(s): Dr. Paul E. Irick
 Mr. Thomas L. Copas
 Effective Date: November 7, 1980
 Completion Date: Continuing

AGENCY PERFORMANCE

1. Is the project on schedule? Yes Percent project complete *
2. Is the research in keeping with the approved research plan? Yes
3. Contract Amount: \$210,000, FY '80 & FY '81
4. Estimated Expenditures to 6/30/82: \$117,000
5. Are the expenditures in keeping with the project progress? Yes

*Project is carried out on a continuing basis with new topics being incorporated each year. See below for status of each topic.

PROJECT DESCRIPTION

Transit administrators, engineers, and researchers are continually faced with problems on which much information already exists either in documented form or in terms of undocumented experience and practice. Unfortunately this information is often fragmented, scattered, and unevaluated. As a consequence, full information on what has been learned about a problem is frequently not brought to bear on its solution. Costly research findings may be unused, valuable experience may be overlooked, and due consideration may not be given to recommended practices for solving or alleviating the problem.

In this project, particular transit problems, or sets of closely related problems, will be selected by the NCTRP Technical Steering Group as topics for information syntheses.

For each topic the objectives are:

1. To locate and assemble documented information.
2. To learn what practice has been used for solving or alleviating the problem.
3. To identify all ongoing research.
4. To learn what problems remain largely unsolved.
5. To organize, evaluate, synthesize, and document the useful information that is acquired.

STATUS OF RESEARCH

The topics of concern and the status of each as of June 30, 1982 are:

TS-1 -- Cleaning Transit Buses: Equipment and Procedures

Topic Consultant: Peter E. Ward; ATE Management and Services Co., Inc.; Cincinnati, Ohio
 Effective Date (Consultant Agreement): February 16, 1981
 Expiration Date (Consultant Agreement): December 31, 1981

This study included mechanical equipment, processes, standards, and efficiency and cost-effectiveness of various equipment and methods for cleaning buses. The study has been completed, and the report has been published as NCTRP Synthesis 1.

TS-2 -- Priority Treatment for Buses on Urban Streets

Topic Consultant: John J. Roark; PAWA, Inc.; Dallas, Texas
 Effective Date (Consultant Agreement): March 16, 1981
 Expiration Date (Consultant Agreement): December 31, 1981

This study was concerned with current knowledge on implementation, operation, and enforcement of bus priority treatment on urban streets. Research has been completed, and the report has been published as NCTRP Synthesis 2.

On October 7, 1981, the Technical Steering Group formulated the FY 1981 program and designated two problems for syntheses. The topics are:

- TS-3 -- Cost-Benefit Analysis of Fuel Additives and Alternative Fuel Grades
 TS-4 -- Standard for Allocation of Time for Maintenance Workers

Utilizing funds carried forward from the synthesis allocation under the FY 1980 program, topic panels were structured and scheduled for meetings on July 1 (TS-3) and July 20, 1982 (TS-4). Meeting objectives will include discussion of the referred topics to arrive at final scopes of work, establishment of final topic titles reflecting the scopes of work, identification of possible topic consultants, identification of possible sources of information required by the scopes of work, and discussion of future meetings as to dates and objectives. Work will be halted on depletion of existing funds and will recommence on receipt of funds under the FY 1981 program.

Project 60-1 continued

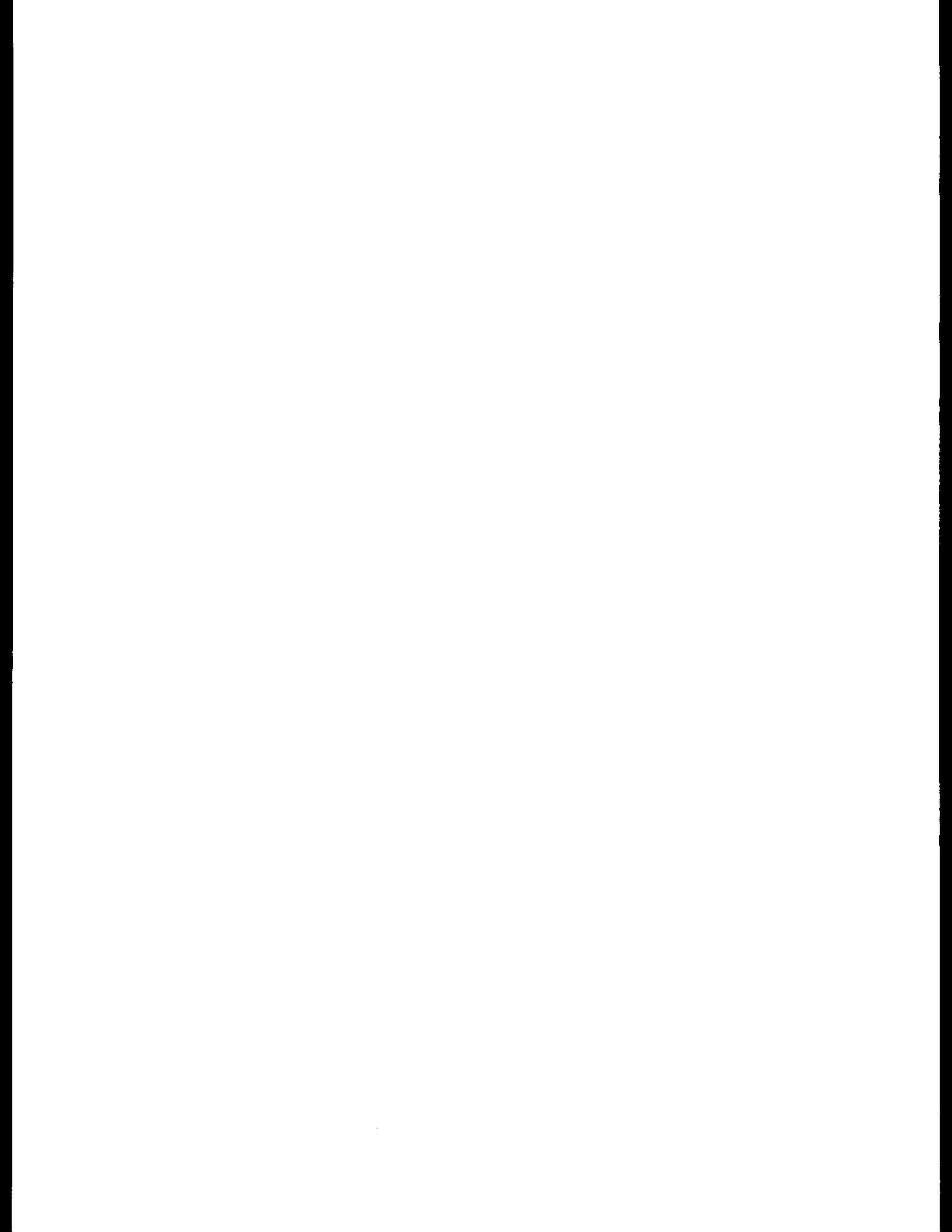
PROBABILITY OF SUCCESS: High

REPORT(S) AVAILABILITY: See Table II

PRINCIPAL INVESTIGATOR(S): Dr. Paul E. Irick
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