U.S. Department of Transportation
Federal Railroad Administration

U.S. Army Corps of Engineers

U.S. Department of Energy

National MAGLEV Initiative

Annual Report - November 1991

11 - Advanced Systems

Moving America
New Directions, New Opportunities

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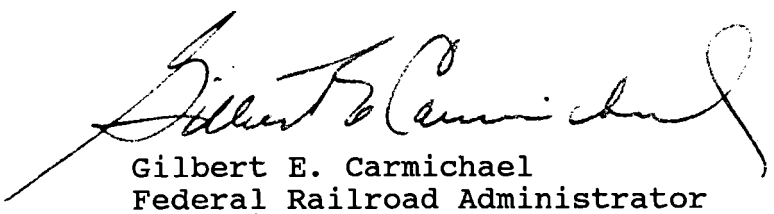
FOREWORD

High-speed magnetically levitated ground transportation (maglev) is an exciting new technology that may be able to provide relief from congestion in dense air traffic and highway corridors. The National Maglev Initiative (NMI) was created in May 1990 to assess the role of maglev in the Nation's future. This unique cooperative partnership of the Federal Railroad Administration, the U.S. Army Corps of Engineers, and the Department of Energy, with support from the Environmental Protection Agency and other Federal agencies, has moved effectively since its inception towards accomplishing a common goal.

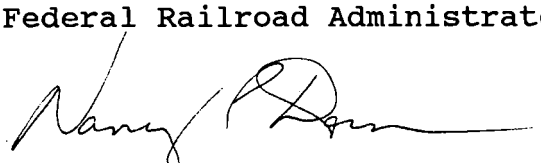
The NMI team, located in an office in the Department of Transportation headquarters building in Washington, D.C., has been supplemented by personnel from the Huntsville Division of the Corps of Engineers, the Argonne National Laboratory of the Department of Energy, and the Volpe National Transportation Center of the Department of Transportation.

During the last eighteen months, significant progress has been made, culminating in contract awards to a large number of industrial firms and academic institutions to supply needed information to the program. A number of outreach activities have taken place to emphasize the need for Government/industry interaction and to involve state and local government in the process. In addition, a substantial effort was initiated to address economic, market, and institutional issues.

These important technical and economic studies will develop information necessary for the Administration and the Congress to determine the potential for maglev to play a major role in the transportation system of the United States in the next century.



Gilbert E. Carmichael
Federal Railroad Administrator



Nancy P. Dorn
Assistant Secretary of the Army (Civil Works)

Preface

The National Maglev Initiative (NMI) represents a major commitment by the Administration and the Congress to support technical and economic studies to assess the potential for magnetically levitated transportation systems in the United States.

The NMI is working with experts in the private sector and with state governments to perform this assessment. This Annual Report is intended to inform all interested parties of the progress of the NMI program. We welcome your comments and inquiries. These may be directed to Marilyn (Mickey) Klein at 202/366-0358.

NATIONAL MAGLEV INITIATIVE ANNUAL REPORT

NOVEMBER 1991

I. Summary

This National Maglev Initiative (NMI) Annual Report summarizes activities carried out since the NMI's inception in the spring of 1990 through October 1991. The NMI is a cooperative effort of the Federal Railroad Administration (FRA) of the U.S. Department of Transportation (DOT), the U.S. Army Corps of Engineers (USACE), and the Department of Energy (DOE), with support from other Federal agencies. This interagency partnership is conducting studies to evaluate the potential for magnetically levitated high-speed ground transportation (maglev) systems in the United States -- to complement existing transportation systems and help meet transportation demand with an environmentally sound alternative, independent of petroleum-based fuels. A major purpose of these studies is to address the opportunities for the United States to be a supplier of maglev rather than simply a customer of internationally developed maglev systems.

The NMI has completed a number of important steps between the time the interagency effort was initiated and the end of October 1991. **A FRA preliminary feasibility assessment report,** Assessment of the Potential for Magnetic Levitation Transportation Systems in the U.S. and **a USACE report,** A Preliminary Implementation Plan, were submitted to Congress in June 1990. **Market and economic studies were initiated.** A **Transportation Research Board (TRB) Committee of experts** was established in April 1991 to critique and oversee the NMI research program. The 1991 fiscal year culminated in the **award of 27 contracts for technology assessments** and **negotiation of multiple contract awards for system concept definition analyses, which were awarded in late October 1991.** Other important activities leading up to these principal accomplishments are listed in chronological order below:

- A maglev forum in May 1990 in Washington, D.C., with participation by industry, government, and the academic community to exchange ideas about the scope of NMI work.
- An in-depth industry survey of senior executives of 22 major U.S. corporations to identify their interest in participation in a maglev program. A report on survey findings, An Industry Perspective on Maglev, was issued in June 1990.
- An NMI-sponsored government-industry maglev workshop, held at the Argonne (Illinois) National Laboratory (ANL) in July 1990. A report was issued in November 1990.
- The first maglev regional meeting in Sacramento, California, in January 1991, to exchange information with state Departments of Transportation and local officials.

- Development and wide distribution of a brochure describing the goals and activities of the NMI.

- An NMI/TRB sponsored industry workshop in April 1991 to determine additional safety research needed to assist development of safety guidelines, standards, or regulations for this unprecedented technology.

- Initiation of strategic planning in April 1991 to establish a framework for the analysis underway in the NMI planning and assessment phase (Phase I). The strategic plan describes research and development activities leading to recommendations for alternative research and development strategies in Phase II. The Executive Summary of the Strategic Plan is included as Appendix III.

- Establishment and interagency staffing of an NMI Project Office.

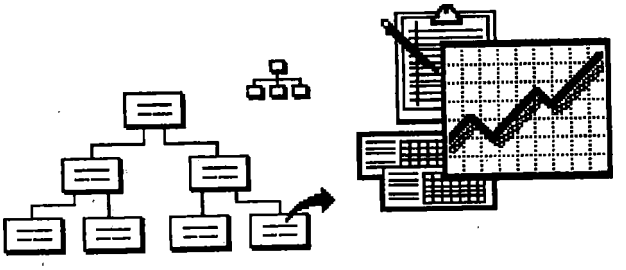
- Symposium for technology assessment and potential system concept definition contractors and other interested parties to exchange ideas, at the Volpe National Transportation Systems Center (VNTSC) in Cambridge, Massachusetts in late September 1991.

This Annual Report also describes NMI goals, premises, management, studies and other activities that were underway in FY 1991 and those projected for FY 1992.

II. The National Maglev Initiative

The NMI was established in the spring of 1990 to coordinate the efforts of the three primary Federal agencies involved in maglev. NMI near-term goals are to evaluate the potential for maglev to improve intercity transportation and to develop the information necessary for the Administration and the Congress to determine the appropriate role for the Federal Government in advancing this technology.

To achieve these goals, the NMI has embarked on an ambitious program of technical and economic analyses and market feasibility studies of maglev concepts, as well as research on associated energy, environmental, health and safety issues. A strategic plan has been developed to provide a framework for this extensive program and for arriving at recommendations for further maglev research and development. An extensive outreach program is underway to identify and involve industry and academic experts, state and local governments, and others interested in this technology.



A. Premises

The NMI is guided by the following premises:

- o High-speed maglev and steel wheel ground transportation systems could be implemented in the U.S. in this decade.
- o Market, economic, and technological feasibility are basic ingredients for success.
- o Industry, potential operators, and state and local governments will play the principal role in formulating a U.S. program.
- o Federally sponsored research will reduce risks and costs and involve U.S. industry in developing maglev expertise.
- o Maglev systems must be fully integrated with the evolving U.S. transportation system.
- o The Federal oversight role for safety, health, and technical standards will be maintained.
- o Potential legal, regulatory, and institutional constraints to development should be removed, to the extent appropriate.

B. Management

The NMI is under the direction of the Interagency Maglev Executive Committee, co-chaired by Federal Railroad Administrator Gilbert E. Carmichael and Assistant Secretary of the Army (Civil Works) Nancy P. Dorn. Program oversight is the responsibility of James T. McQueen, FRA Associate Administrator for Railroad Development, and Major General Arthur E. Williams, USACE Director of Civil Works. The Executive Committee includes Federal Aviation Administrator James B. Busey, Federal Highway Administrator Thomas D. Larson, Urban Mass Transportation Administrator Brian W. Clymer, Research and Special Programs Administrator Travis P. Dungan, DOT's Assistant Secretary for Policy and International Affairs Jeffrey N. Shane, EPA's Assistant Secretary for Air and Radiation William Shapiro, and DOE's Assistant Secretary for Conservation and Renewable Energy J. Michael Davis. The Maglev Executive Committee holds meetings to review progress, provide direction, and approve actions and recommendations.

An interagency NMI program office was established in early 1991 in DOT headquarters to conduct the NMI program. This office is directed by Robert L. Krick, FRA's Deputy Associate Administrator for Technology Development. Figure 1 shows current staffing. There were 10 full-time professionals on the NMI staff in FY 1991. Four additional positions were authorized for FY 1992.

Additional staff support is provided by professionals from other FRA Offices, the DOT's VNTSC the USACE Huntsville Division, and the DOE Argonne National Laboratory (ANL). A copy of the Memorandum of Agreement among the participating agencies is included as Appendix I. The Maglev Interagency Coordinating Committee, composed of representatives from participating Federal agencies, meets on a monthly basis to review NMI progress.

Sixteen experts from the private sector and the academic community

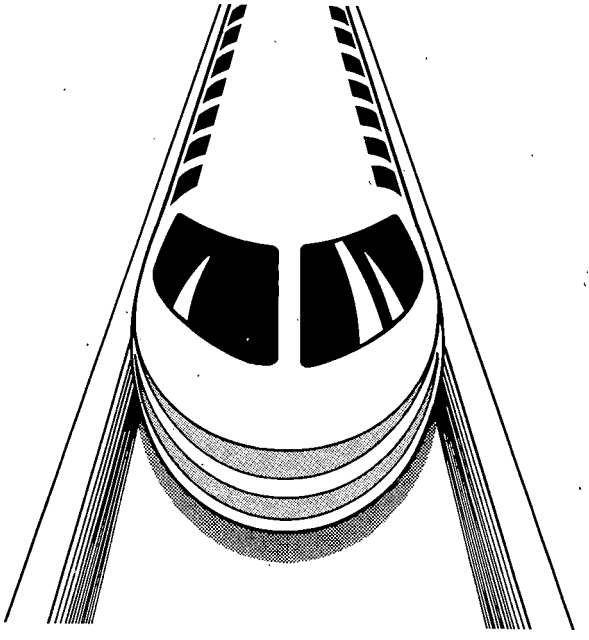
serve on the NMI's blue ribbon Advisory Committee, organized by the Transportation Research Board of the National Research Council to provide general program review and guidance. The first meeting of the Advisory Committee was held in May 1991, with the second meeting scheduled for December 1991. (Members of this Committee are listed in Appendix II.)

C. Overview of Activities

The NMI, through contracts with the private sector and agreements with government support organizations, is assessing the economic, technical, environmental, and safety aspects of maglev systems in an effort to determine maglev's institutional, and economic feasibility. Special efforts will be made to identify existing obstacles to public-private partnerships and to U.S./foreign joint-ventures and to address the legal, financial, and institutional impediments and incentives that affect maglev success. The information generated will provide the basis for recommendations on further implementation actions. Alternative levels of Federal involvement range from participation in the development of an advanced U.S. system, to supporting U.S. industry participation in a joint-venture with foreign countries, to supporting states and the private sector as customers of foreign developers, as well as the option of no further Federal involvement.

The private sector and the academic community are the principal source of expertise throughout the NMI work. Assessments of critical component technologies and identification of maglev systems concepts will be accomplished by private companies. Finally, if a decision is made to develop an advanced U.S. designed prototype maglev system, the private sector is expected to play a major role in development and implementation.

As a part of the NMI work, USACE's Huntsville Division, ANL, and VNTSC are all engaged in the research activities in technical and economic study areas that will support informed decision-making. Findings from these research efforts will be shared with private sector contractors and non Federal Government agencies as appropriate.



National Maglev Initiative Organization

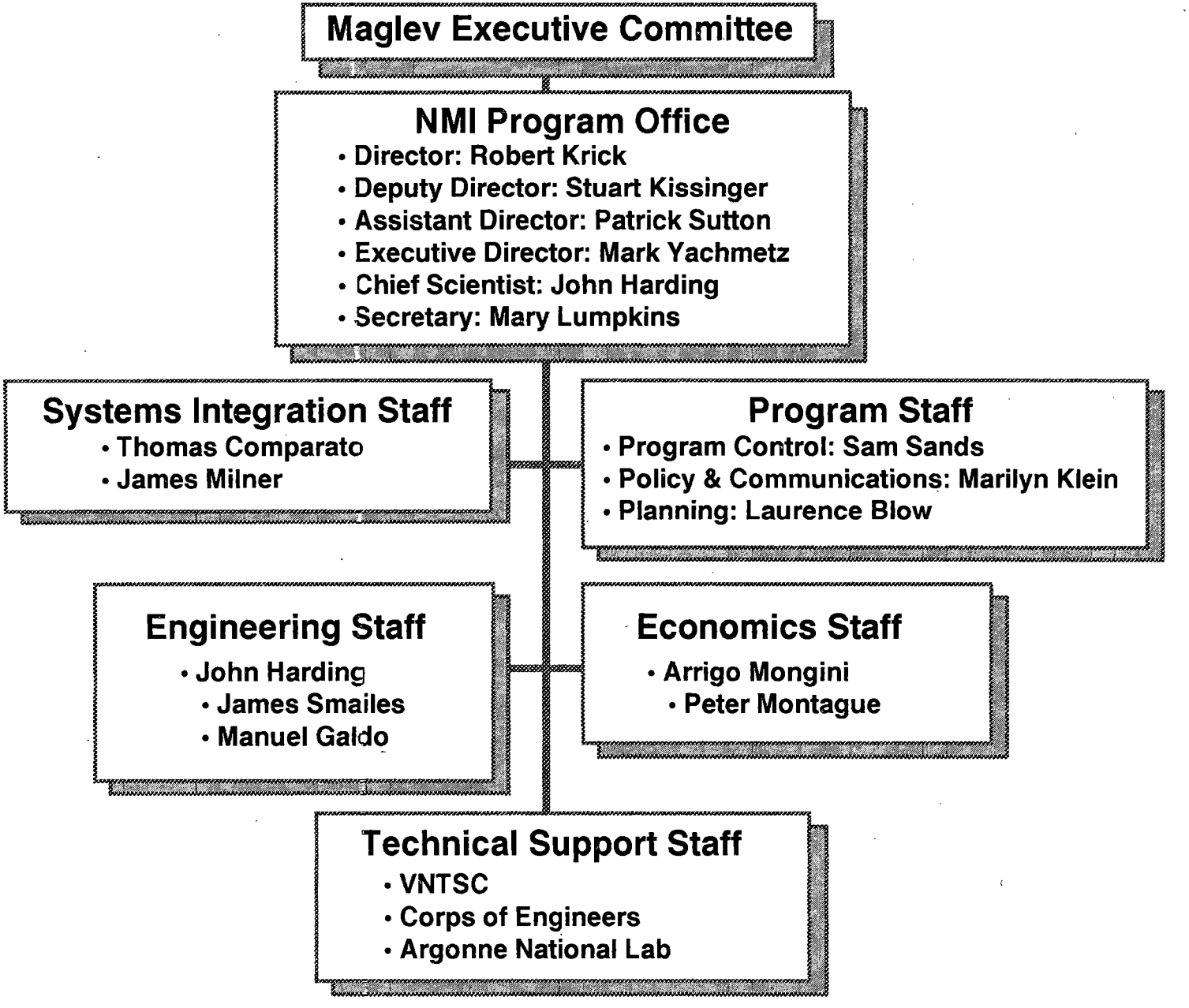


Figure 1

III. NMI Accomplishments - Fiscal Years 1990-1991

A. Fiscal Year 1990 - Preliminary Planning Phase

In December 1989, an interagency maglev coordinating committee was formed to coordinate maglev efforts within the Federal Government. Membership included the Departments of Transportation and Energy and the U.S. Army Corps of Engineers, together with other agencies, including the Environmental Protection Agency, the Department of Commerce, and the National Aeronautics and Space Administration. This committee subsequently formed the National Maglev Initiative.

In May of 1990, the NMI held a forum in Washington, D.C., which brought together more than 200 industry and government officials, as well as representatives of the academic community, to discuss NMI work programs. A nationwide survey was also conducted to obtain the views of major firms that were interested in involvement in maglev. In June 1990, the FRA's preliminary feasibility assessment and USACE's draft program implementation reports were submitted to Congress. These reports concluded that maglev appears to be technically and economically feasible, but considerable study is required to determine whether and how maglev should be integrated in the U.S. transportation system. In July 1990, a workshop was held at the Argonne National Laboratory (near Chicago) to identify research needs and to refine maglev system parameters.

B. Fiscal Year 1991 - Advanced Assessment Phase and Strategic Planning

For fiscal year 1991, Congress appropriated $8.2 million for FRA and $2.0 million for the USACE, totalling $10.2 million for NMI research activities. This was in addition to $1.3 million for ongoing maglev safety research and $500,000 for high-speed rail safety studies.

With FY 1991 NMI funding, the following studies are underway: maglev technology assessment contracts totalling $4.3 million, to define the state-of-the-art and opportunities for improving operational performance and reducing costs and risks of sub-systems; economic and market studies, including assessment of specific markets for maglev potential; analyses of right-of-way and intermodal connectivity issues; and analyses of public policy issues.

Contracts for system concept definition studies to evaluate possible maglev systems were negotiated in late FY 1991, and four eleven-month contracts, totalling over $8.6 million, were awarded in late October 1991.

Congress appropriated $16.0 million ($8.0 million to the FRA and $8.0 million to the USACE) for FY 1992, to continue the maglev assessments initiated in FY 1991 and to advance the definition of concepts through simulation and some subsystem level testing.

Critical Technologies

Certain subsystems are critical to successful maglev development. To identify opportunities for

improvements of existing maglev components, the NMI issued a Broad Agency Announcement (BAA) in September 1990.

After a competitive process, with 250 abstracts submitted and 68 proposals reviewed, agreements for 27 technology assessment contracts were signed in the summer of 1991 for analyses in the most immediate areas of interest. The 8 to 18-month studies by technical experts will explore innovative approaches to enhancing performance and reliability and reducing costs, identifying areas where United States expertise in science and industry can lead to major advancements in maglev technology. The technology assessments awarded will be focused on four main areas: vehicle systems, guideways, control systems, and system-wide considerations. The information generated will be the first independent assessments of what it may be possible to accomplish in these technical areas. A full annotated list of the technology assessment studies is provided in Appendix IV.

The first of two industry symposia was held at the VNTSC in Cambridge, Massachusetts, September 26 and 27, 1991, to foster interaction through an exchange of information among BAA contractors, potential system contract definition contractors, and other interested parties. Over 200 persons participated. The second symposium will be held in the spring of 1992.

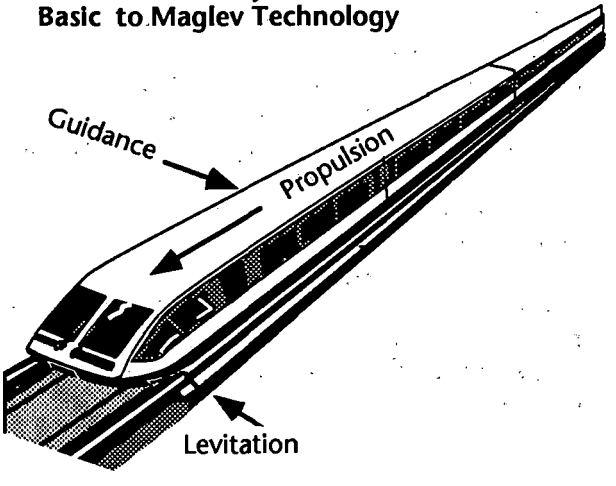
Examples of this work include:

- Innovative approaches to guideway design and construction.
- Cost-effective propulsion alternatives.
- Influence of levitation height on guideway cost and vehicle performance.
- Alternative cooling techniques for superconducting magnets.
- Assessment of magnetic/electric fields and noise exposures.
- Technical solutions for moving maglev into urban centers.

Conceptual Maglev Systems

Critical elements of maglev include the vehicle, guideway, levitation, suspension, propulsion, guidance, braking, and control. To assess the most promising ways of combining these major elements into a complete transportation system, the NMI solicited proposals in February 1991 for conceptual definitions of maglev systems, to define technical feasibility, performance, and costs for technology that could be available for application in the United States around the year 2000.

The Three Primary Functions Basic to Maglev Technology



Final negotiations were completed by the end of FY 1991 for multiple 11-month contracts, which were awarded in late October 1991 to the following industry teams:

Bechtel (San Francisco, CA); with Hughes Aircraft; EMD division of General Motors; Massachusetts Institute of Technology (MIT); and Draper Lab. Concept featuring repulsive superconducting levitation and a box beam girder guideway. $1,769,776.

Foster-Miller, Inc. (Waltham, MA); with DeLeuw Cather; Boeing Aerospace and Electronics; Morrison Knudsen; Bombardier; General Dynamics; General Atomics; and AYA & Associates. Concept featuring repulsive superconducting levitation and integration of lift, guidance, and linear synchronous motor (LSM) propulsion functions. $1,712,582.

Magneplane International (Wayland, MA); with MIT Plasma Fusion Center; MIT Lincoln Labs; Raytheon, Bromwell and Carrier; Failure Analysis Associates; and Koch Process Systems. Concept featuring repulsive superconducting magnets with a semi-circular guideway which permits self-banking. $2,676,610.

Grumman Corporation (Bethpage, LI/NY); with Parsons Brinckerhoff Inc.; Gibbs & Hill; Battelle Labs; Intermagnetics General; and NY State University at Buffalo. Concept featuring attractive levitation using superconducting magnets and V-shaped guideway. $2,474,108.

Each study will address technical feasibility, performance, capital, operating, and maintenance costs for a system that could be available around the year 2000. The NMI is providing a hypothetical route against which the contractors will test their concepts, in order to provide information for the NMI to make performance and cost comparisons among alternative system concepts. The concepts will be developed in sufficient detail to estimate capital and operating costs, forecast market penetration, and complete a financial and economic analysis for specific market applications. The system concept contractors will have the benefit of maglev technology assessments as they become available.

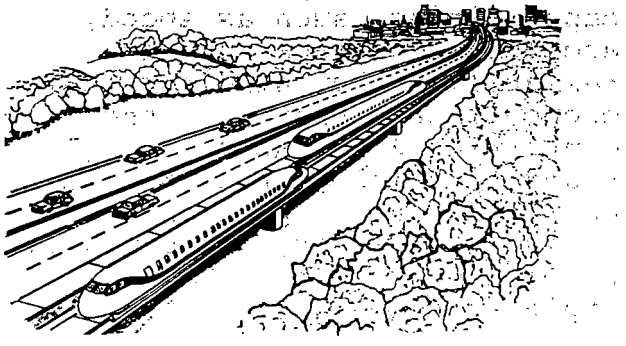
Market and Economic Analysis

Market and economic viability are critically important to the potential success of maglev. Maglev system concepts will be evaluated not only with regard to their technical performance capabilities, such as speed, acceleration, capacity, and reliability, but also for their economic performance in the context of 20-25 actual transportation markets in the United States -- with emphasis on those U.S. markets where maglev has the most potential to be implemented.

Economic studies were initiated in August 1990 with ANL and in January 1991 with the VNTSC. The ANL is developing information on projected travel growth and service characteristics for existing transport modes, with particular attention to those trips in the 100 to 600-mile range. The VNTSC analysis will estimate the ability of maglev to attract passengers in competition with other modes, including high-speed rail, using design concepts from the system concept definition studies in specific markets, taking into account speed and service characteristics, estimating the number of passengers, the potential for freight, and the revenues likely to be generated by each concept. Capital, operating, and maintenance costs of each system will be estimated. Indirect benefits, such as congestion reduction in other modes and energy and environmental effects,

will be also be estimated as well as other economic impacts, such as jobs generated and R&D spinoff benefits. The costs and benefits of implementing each maglev system concept and alternative transportation investments, such as high-speed rail, will then be compared considering different degrees of technology development.

Maglev Use of Highway and Railroad Rights-of-Way

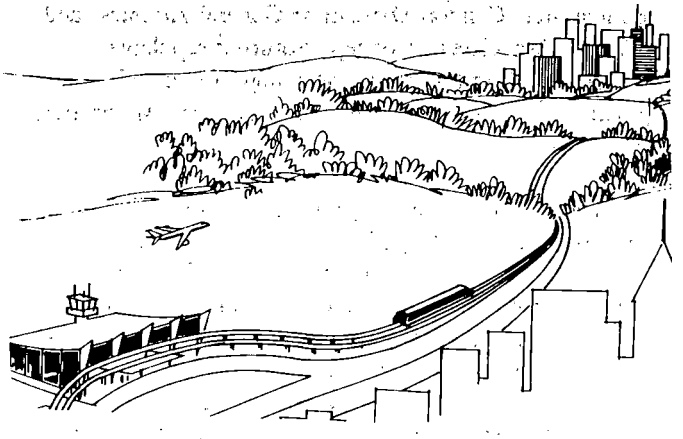


There is considerable interest in accomodating maglev systems, which require minimal guideway space, within the rights-of-way of Interstate Highways or railroads. However, the curvature and other attributes of existing routes may limit maglev system performance.

The NMI has initiated an intensive effort to identify key safety and operational/passenger comfort issues associated with joint uses of rights-of-way, as well as the tradeoffs among cost, land use, and average speed. The economic analysis will assess the practicality of using highway and rail rights-of-way for maglev and the costs involved in bringing maglev into downtown centers and major terminals such as airports.

Intermodal Connections

Maglev systems must be designed to let passengers connect directly and easily with existing transportation systems. To maximize the benefits of high speed, it will be essential to have highly efficient transfers between modes. Stops at major urban or suburban centers and at air terminals, with good transit connections, will increase the effectiveness of the high-speed service and enhance the use of the transit system. Incorporating convenient arrangements to carry small package and other freight will also be investigated.



The NMI is making a special effort to investigate ways to improve intermodal connections. For example, a site-specific study is considering physical as well as institutional arrangements, such as joint ticketing and baggage handling for the stations at both ends of the Orlando Maglev Demonstration Project. Also, a contract has been negotiated that will explore intermodal design concepts for high-speed ground transportation, taking account of experience in developing intermodal terminals in foreign countries. In addition, the NMI will benefit from FRA-supported planning for intermodal terminal projects in several cities, to integrate rail with other modes at downtown stations.

Safety

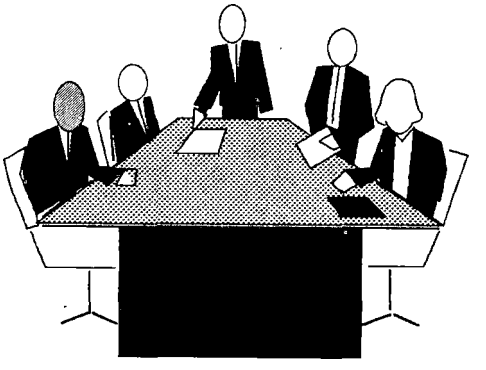
Safety research for high-speed rail and maglev is funded and managed by the FRA separately from the NMI. This effort received $1.3 million for fiscal year 1991 to review safety assurance features in existing prototype systems, such as the German Transrapid. In addition, investigations are underway into: 1) collision avoidance and accident survivability; 2) safety implications and requirements for shared use of existing rights-of-way; and 3) health effects of maglev electromagnetic fields.

Congress appropriated $4 million for high-speed rail and maglev safety in FY 92. The continuing review will determine safety requirements for any maglev system likely to be implemented in the United States. The NMI will build on the knowledge gained from this initial safety research program, and safety concerns will be explored as part of the assessment and development of critical technologies. Incorporation of the appropriate safety assurance features into the conceptual systems will be a major factor in their evaluation. The NMI will provide timely and constructive information to system concept definition contractors.

C. Outreach Program

Outreach efforts are particularly important to the NMI, to ensure full participation by those likely to play a major role in the future of maglev. The outreach program thus far has included forums, presentations at conferences, including the Annual High Speed Rail Association Meetings and legislative forums, and wide distribution of a brochure describing the goals and activities of the NMI. The first maglev regional meeting with state Departments of Transportation and local officials was held in Sacramento, California, in January 1991. A second regional meeting was held in Albany, New York on October 8-9. The BAA Symposium at the VNTSC was a major outreach effort to the maglev technical community. Additional meetings and information exchange sessions are being scheduled as needed.

D. Strategic Planning



Strategic planning was initiated in April 1991, and a draft strategic plan was subsequently prepared. The plan envisions the different directions that a decision on Federal involvement in maglev technology might take, as well as steps to implement these decisions. The plan is a dynamic document that will be updated and revised as needed to reflect accomplishments and any changes in priorities. More detailed planning is currently underway for near-term NMI work.

E. The Decision Plan

As the analyses are completed in 1992, the NMI will present preliminary findings to the Maglev Executive Committee and to the TRB Advisory Committee. A draft report will be available to the NMI Executive Committee for review, followed by circulation among the participating agencies prior to Office of Management and Budget review. If substantial further R&D is recommended, a draft document will also be submitted to the Transportation Systems Acquisition Review Council (TSARC) for review of the NMI recommendations.

IV. Report on the Results of the NMI - Phase I

The results of the first phase of the NMI will be the subject of a report in early 1993. Figure 2 is a preliminary diagram of the decision process logic. A specific decision process plan will be completed by January or February 1992.

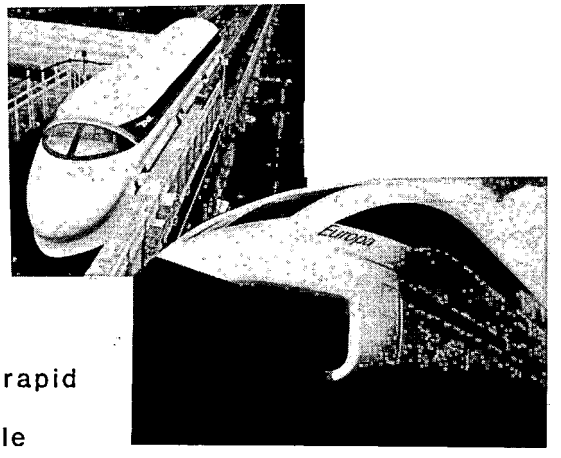
A. Additional Phase I Studies

In order to evaluate the potential for maglev, the NMI must be fully cognizant of the characteristics of existing maglev systems and the framework of public policy within which maglev development can flourish. To evaluate these issues, the following activities will be undertaken in FY 1992.

Evaluation of Japanese and German Maglev Systems

The NMI is negotiating a data exchange agreement with the developer of the Japanese maglev system in order to evaluate its applicability to the U.S. market. A visit to the Japanese Railways (JR) Group is scheduled for late December 1991, to obtain detailed information on the Japanese Electrodynamic Suspension System. Information about the German Transrapid system has been obtained.

Japanese Linear Express Test Vehicle



Transrapid Test Vehicle

Joint Ventures

One of the options for implementing maglev in the U.S. is for industry to participate in U.S./foreign joint-ventures. In Fiscal year 1992, the NMI will evaluate issues involved in joint-venture agreements. Institutional constraints, private sector concerns, and the possible need for a government role in facilitating these arrangements will be explored.

Public Policy Issues

To implement any new system, innovative financing and institutional approaches may be required. In the June 1990 FRA report to Congress, current legal, institutional and regulatory constraints to maglev and high-

NATIONAL MAGLEV INITIATIVE

Decision Process

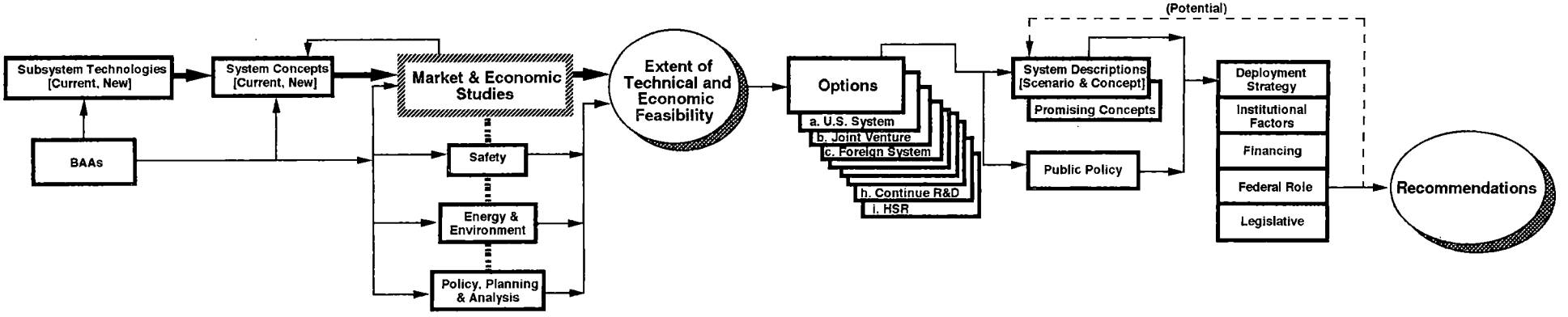


Figure 2

speed rail system development were identified. The NMI is examining these and other public policy issues as they emerge to formulate recommended solutions. Strategies currently being considered by states developing high-speed ground transportation plans and current legislative initiatives will also be reviewed and analyzed, as relevant. The range of public policy issues being addressed is illustrated by the summary of legislation introduced in 1991, included as Appendix V.

Under existing law, interstate maglev systems would be subject to economic regulation by the Interstate Commerce Commission (ICC). The NMI is working with the DOT, which is considering making a formal request to the ICC that it exempt high-speed rail and maglev operations from its regulations. The process by which these systems are to be developed involves sufficient market discipline, including direct competition with the deregulated airline industry, so as to make ICC oversight unnecessary.

B. The Issues to be Addressed for Phase I Recommendations

The challenge of the NMI is to integrate economic and technology findings to provide a basis for recommendations on the prospects for maglev in the United States. In preparing recommendations on the future of maglev, the NMI team will consider the following issues:

- The status of foreign maglev technology;
- Opportunities for U.S./foreign joint-ventures;
- The competitive, commercial viability of proposed maglev system concepts;
- The readiness of U.S. industry to advance these concepts;
- Public benefits, such as energy savings, environmental improvements, congestion relief, land use efficiency, and technology spinoffs;
- Public policy initiatives that improve the economics of maglev, facilitate private investments and involvement, and remove unwarranted constraints to maglev development;
- Potential for new U.S. jobs and types of jobs, compared to a "business as usual" situation, without government stimulus or support;
- Cost-sharing by states and the private sector.

APPENDIX I

MEMORANDUM OF AGREEMENT
BETWEEN
U.S. FEDERAL RAILROAD ADMINISTRATION
U.S. DEPARTMENT OF THE ARMY
U.S. DEPARTMENT OF ENERGY
AND
U.S. ENVIRONMENTAL PROTECTION AGENCY

SUBJECT: Execution of the National Magnetic Levitation Initiative

1. **PURPOSE:**

The purpose of this Memorandum of Agreement (MOA) is to define the roles and responsibilities for the Federal Railroad Administration (FRA), the Department of Army (DA), the Department of Energy (DOE), and the Environmental Protection Agency (EPA) (collectively, the "participating agencies") for execution of the National Magnetic Levitation Initiative (Initiative).

2. **BACKGROUND:**

The Initiative is a multi-agency supported program with the goal of determining the role of magnetic levitation (maglev) in meeting the Nation's transportation requirements. This includes developing information to support a decision in 1992 as to whether and how to proceed with development and implementation of U.S. maglev systems. The Initiative will provide the framework and facilitate the process for the private sector and state and local governments to proceed with the implementation of maglev transportation system applications in the U.S., through government and industry partnerships.

3. **SCOPE:**

The support which any agency provides to another agency may include its headquarters, field operating offices, laboratories, operation offices, and subordinate installations.

4. **RESPONSIBILITIES:**

The following programmatic and organizational responsibilities are defined to support the Initiative:

a. The FRA of the U.S. Department of Transportation (DOT) is the Federal agency responsible for high speed intercity ground transportation, as authorized by the High Speed Ground Transportation Act (HSGTA) of 1965 (PL 89-220) and the Railway Safety Improvement Act of 1988 (PL 100-342). FRA, as the lead Federal agency in the Initiative, will provide the overall transportation framework to accomplish the objectives of the Initiative. In cooperation with the other participating agencies, FRA will support the Initiative in the system concept assessment and technology assessment areas, as well as market, economic, and institutional analysis areas.

b. The DA, acting through the Corps of Engineers (USACE), will provide technical and management expertise and will support research for the Initiative, particularly in the areas of guideway technology, composite material applications, construction techniques, system concepts and systems integration.

c. The DOE will provide market and economic analyses and technical expertise and support in vehicle system development, levitation and propulsion technologies and evaluation of system concepts, especially issues concerning energy, superconductivity and biomedical effects of magnetic fields.

d. The EPA will provide technical advice and assistance to protect public health from possible adverse health effects of non-ionizing electromagnetic fields and to evaluate and comment on other environmental issues that relate to maglev development.

5. AUTHORITY:

Participating agencies may carry out activities in accordance with their respective missions and authorities. For instance, the HSGTA, as amended, provides FRA with broad authority to develop high speed ground transportation systems and carry out demonstration programs. The DA is authorized to conduct and provide research and development activities on maglev technology under Section 417 of the Water Resource Development Act of 1990 (P.L. 101-640). In addition, participating agencies may contract with other agencies to perform specific tasks, on a reimbursable basis, in accordance with the provisions of the Economy in Government Act (31 U.S.C. 1535).

6. INTERAGENCY POLICY COORDINATION:

The Initiative will be directed by the Federal Maglev Executive Committee (FMEC), which will provide overall program guidance and

direction. This committee will be co-chaired by FRA and DA and will be composed of senior policy executives from DOT, DA, DOE and EPA. The Committee will determine overall program policy and program direction.

7. **MAGLEV DEVELOPMENT PROGRAM MANAGEMENT:**

a. The execution of those plans and tasks necessary to meet the goals and objectives associated with the research, development and implementation of the Initiative will be the responsibility of the Interagency Maglev Development Team (Team). The Team will be comprised of representatives from the FRA, USACE, and DOE. The Director of the Team will be provided by FRA, the Deputy Director will be provided by the USACE and the Assistant Director will be from the DOE. The Team will coordinate with EPA on subjects of concern to the FMEC.

b. The Team will coordinate the maglev technology research and development efforts of the participating agencies. It will develop research plans, provide technical guidance to the Contracting Officer's Technical Representatives (COTR) (as described below), supply technical direction to the contractors, evaluate results and make recommendations for follow-on research. It will develop recommendations regarding the development of program and work plans, out year program development strategies, and budgets.

c. The Team will also be responsible for preparing the report and recommendations on whether and how to proceed with maglev development and implementation. The Team's recommendation will include a refined multi-year program plan. The plans, strategies and report will be submitted to the FMEC for its review and appropriate action. The Team will also be responsible for coordinating the periodic preparation of preliminary budget estimates and annual operating plan describing the activities recommended to be accomplished during the next fiscal year, reflecting appropriations, program requirements, and allocation of Initiative-related activities among the participating agencies. These also will be submitted to the FMEC for review and appropriate action.

8. **FUNDING:**

Each agency may obtain direct appropriations through the normal budgeting and appropriations process to support this Initiative. An agency may, in accordance with the Economy Act, contract with

another agency to perform specified tasks in support of the Initiative. In that event, the task and funding level will be documented in an Interagency Agreement between the tasking and the receiving agencies.

9. **CONTRACTING:**

Contracts in support of the Initiative will be awarded by various agencies. Each agency will follow its own acquisition policies and procedures. However, in formulating its procurement approach, each agency will coordinate with the Team on the proposed procurement approach, including the type of contract, special clauses, process to be followed and expected lead-time and award dates. Each solicitation will include language which clearly identifies that the acquisition is part of the Initiative, including a brief description of the Initiative and the Federal Government's goal. All procurements will be under the direction of the Contracting Officer (CO) for the applicable agency, who will administer the contract. The CO will designate a Contracting Officer's Technical Representative (COTR) for each contract. The COTR may be from an agency other than that awarding the contract; however, the COTR must be a Government employee and the CO's delegation must be in writing.

10. **REPORTING:**

A standard cost and schedule reporting system will be established by the Team for use in contracts under this Initiative to allow analysis and monitoring of actual performance versus the original baseline data. Specific requirements will be defined in the Interagency agreements for work done or contracted for by another agency.

11. **EFFECTIVE DATE, AMENDMENT AND TERMINATION:**

a. This MOA shall become effective on the date that two or more of the parties sign the Agreement. Thereafter, the MOA shall come into effect with respect to any other party on the date of the party's signature.

b. This MOA may be modified or amended only by written agreement of all parties to the Agreement.

c. This MOA shall remain in effect until the Agreement is superseded or terminated in writing by all parties to the Agreement. Any party wishing to terminate its rights and obligations under this agreement must submit written notification 60 days prior to the projected termination date. At that time, the

Agreement shall no longer be in effect with respect to the party requesting termination.

d. In the event that a tasking agency desires to terminate this agreement the tasking agency shall notify the receiving agency by written order. The receiving agency shall immediately comply with this order and take reasonable action to minimize incurrence of costs allocable to the tasking, including, as appropriate, termination of supporting contracts. The tasking agency shall remain responsible for costs incurred as result of the original tasking and subsequent termination.

U.S. Federal Railroad Administration

U.S. Department of Army

U.S. Department of Energy

U.S. Environmental Protection Agency

May 20, 1991 @ 3:20 pm. EST

APPENDIX II

Transportation Research Board
Committee for the Critique of the
Federal Research Program on Magnetic
Levitation Systems

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APPENDIX III

NATIONAL MAGLEV INITIATIVE STRATEGIC PLAN

EXECUTIVE SUMMARY

Introduction

The Department of Transportation's "Statement of National Transportation Policy" (NTP) recognizes that "in the face of the expense and difficulty of expanding or building airports and highways in crowded corridors, other forms of transportation can offer relief for congestion and more efficient service options." High-speed magnetically levitated ground transportation (maglev) is widely considered as a promising, energy-efficient and environmentally sound transportation alternative, particularly in high-density corridors. The NTP and the National Energy Strategy support research to assess the role of maglev in the Nation's transportation future.

In response to initiatives within the Administration and by the Congress, an interagency partnership was formed to work with the private sector and state governments to develop an extensive research program to evaluate maglev's potential. That partnership, among the Federal Railroad Administration, the U.S. Army Corps of Engineers and the Department of Energy, with support from the Environmental Protection Agency and other Federal agencies, is called the National Maglev Initiative (NMI). Its near-term goals are to evaluate the potential for maglev to improve intercity transportation and to develop the information necessary for the Administration and the Congress to determine the appropriate role for the Federal Government in the advancement of this technology.

An interagency NMI project office has been established to achieve these goals. The NMI staff is undertaking an ambitious program of technical and economic analyses of maglev concepts, as well as research on energy, environmental, health, and safety issues associated with maglev. Extensive outreach is underway to identify and involve industry experts, state and local governments, academic experts, and others interested in this technology.

The private sector and academic community are actively engaged throughout the NMI, particularly in studies of critical component technologies and development of maglev system concepts. Other experts from the private sector and the academic community serve on the NMI's blue ribbon advisory panel, organized by the Transportation Research Board of the National Research Council to provide general oversight. Finally, the private sector will play the major role in developing concepts and in implementing maglev.

The remainder of this Summary briefly outlines a strategic plan that will provide a framework for arriving at recommendations on the future of maglev in the United States. The plan reflects the NMI's best judgment as to how to proceed at this point; however, if priorities change, the plan will be amended to reflect these changes. The plan includes consideration of the range of options available to Administration and Congressional decision-makers and describes a process for evaluating and selecting among these options for implementation actions by the Federal Government. It recognizes that there is a range of possible levels of Federal support, from no further Federal support for the NMI, to support for research only, to a major Federal role in developing and testing a full scale prototype maglev system.

Implementing Maglev in the U.S.

The strategic plan defines two basic phases. Phase I, currently underway, involves the evaluation of maglev leading to recommendations in early 1993.

Phase II will involve the implementation of the selected strategy.

Phase I - Recommendations for Implementation of Maglev

In support of a detailed evaluation of the performance and economics of maglev, the research program includes: maglev technology assessment contracts to define the state-of-the-art and opportunities for improving operational performance and for reducing costs and risks of sub-systems; parallel contracts for system concept studies defining possible maglev systems; economic and market studies, including assessment of specific markets for maglev potential; analyses of right-of-way and intermodal connectivity issues; analyses of public policy issues; and ongoing safety, health, and environmental evaluations. Outreach efforts are particularly important in this phase, to ensure full participation by all potential players in the future of maglev.

The technology assessment and systems concept studies are critical to defining possible maglev system options. The cost and service parameters of key technology options will be simulated in 20-25 major travel corridors and markets to evaluate how well they would perform economically and technically in the United States. The culmination of the first phase of the NMI will conclude with the issuance in the spring of 1993 of a report summarizing findings on the benefits, feasibility, and commercial viability of selected maglev concepts in the United States and including recommendations about further maglev development.

Recommendations will be based on an assessment of: 1) the competitive/commercial basis of proposed maglev system concepts; 2) the readiness of industry to advance these concepts; 3) public

benefits, such as energy savings, environmental improvements, congestion relief, land use efficiency, and technology spinoffs; 4) public policy initiatives that improve the economics of maglev and facilitate investments and U.S. industry involvement; and 5) the degree to which states and the private sector are able to cost-share maglev's development.

Implementation recommendations will include recommendations for associated research and development. Different implementation strategies will be likely to require different levels of research and development effort. For example, a strategy of accommodation of existing technology would probably not require development of prototype systems. By contrast, development and implementation of a U.S. maglev design may require extensive prototype testing.

Phase II: Maglev Development

The Federal maglev strategy ultimately recommended in Phase I will be influenced largely by what industry can deliver. Alternative levels of Federal involvement range from substantial financial participation in the development of an advanced U.S. system, to supporting industry participation in a joint-venture with foreign countries, to supporting states and the private sector as customers of current foreign developers. A minimal Federal role could be to promulgate appropriate environmental and safety regulations to accommodate the introduction of foreign maglev systems. The implications of a development program for a U.S. system, participating in a joint-venture, and an accommodation approach are briefly outlined below.

U.S. System

An advanced U.S. system designed to regain U.S. leadership in maglev technology would call for an aggressive development program, involving prototype development. There are several options for such a program. The example displayed in Figure 1 targets early 2001 for full scale testing and mid-2004 for revenue service. This schedule provides for systematic identification and reduction of technical risk throughout development. The schedule is based on an assumption that competitors would need to take an evolutionary building block approach, especially in the early phases, due to the embryonic nature of maglev technology and U.S. industry capabilities. This assumption is reflected in the provision in the schedule of a 3-year phase for preliminary design and proof-of-concept tests; a two-year detailed design and subsystem testing phase; two years for prototype fabrication and testing at the contractor's facility; and four years of full scale testing (two at an off-line test site and two at a revenue service site), before initiating revenue service.

This schedule can be used as a baseline for evaluating other

alternatives. Programs that would allow less time in some phases and more overlap of certain phases could reduce the overall schedule, permitting the initiation of revenue service at an earlier date. Such an approach would increase technological risks and, potentially, development costs. Specific costs and technological risks depend on the complexity of the technology proposed. However, it is likely that a tight development schedule may, because of the press of time, lead to even greater dependence on foreign designs. These risks may nonetheless be justified if the Administrqation and Congress decide to move quickly and aggressively to develop a U.S. based technology. A careful risk assessment analysis will be an important component of the Phase I activities.

Joint-Venture or Accommodation Program

A joint-venture could require a significant level of research to position U.S. industry for full participation and for future initiatives. R&D would include: 1) creating a public-private base of technology expertise to support informed private sector investment and Government decision making; (2) evaluation of innovative technology ideas and technology transfer; (3) analyzing high-risk, long-term technical issues, in such areas as guideway components, construction techniques and materials, and high-tech superconducting magnet design; and (4) examination of alternative approaches to technical problems in maglev development.

An accommodation approach would provide an opportunity to the private and non-Federal government sectors to pursue options that use existing prototypes currently under development outside the United States. As such, this approach would have lower development costs but also lower development benefit potential. A modest continuing research and development program would be needed, but a prototype would be unnecessary under this approach.

Summary of the Strategic Plan

There are two objectives of this strategic plan. The first is to outline the steps that must be taken in Phase I to make a fully supportable recommendation regarding Phase II. The second objective of this plan is to describe in some detail the Phase II alternatives. These preliminary descriptions facilitate the long term planning process and help to ensure that there are no "gaps" in implementation. Clearly, if a decision is made to proceed with maglev, the Federal Government must be ready to move quickly to position the United States to take full advantage of the existing market and technological opportunities.

NATIONAL MAGLEV INITIATIVE

STRATEGIC PLAN

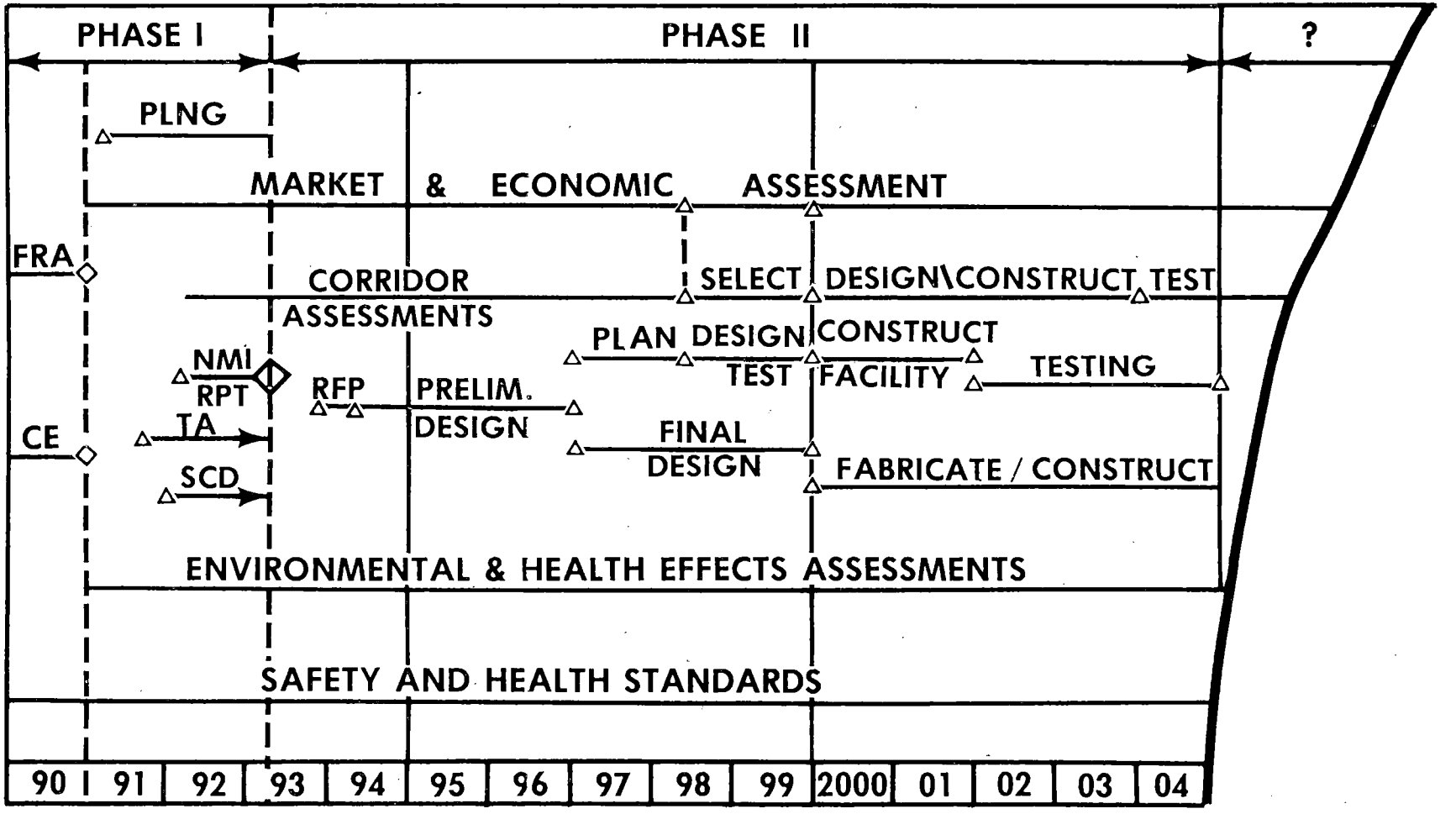


Figure ES-1

APPENDIX IV

BAA SYNOPSIS

No.	Company	Title	Description	Total Cost	Duration (Months)	Start Date
24	Charles Stark Draper Labs	Comparison of Major Parameters in Electrodynamic and Electromagnetic Levitation. Transport Systems	SCOPE: Generate design parameters for electrodynamic and electromagnetic systems. Results will contribute to a first order evaluation of viable magnetic levitation systems.	178,000	12	07/24/91
26	Foster-Miller	Power Transfer to High-Speed Vehicles	SCOPE: Develop a two-phase plan to analytically and experimentally investigate and assess methods of reliably transferring high power to/from a Maglev vehicle travelling at high and low speeds.	96,287	18	07/09/91
32	General Atomics	Adaptive Suspension Using ER-Fluid Dampers	SCOPE: Investigate the application of electrorheological (ER) fluids to a secondary suspension system which may be operated in an adaptive method to relieve tolerances on guideway irregularities.	182,881	11	06/28/91
34	General Atomics	Advanced Power Conditioning for Maglev Systems	SCOPE: Assess power conversion unit (PCU) performance characteristics attainable with today's technology, recommend optimum candidates for Maglev application, and prepare parametric design data. Perform design optimization studies and recommend design concepts.	124,259	12	08/01/91
35	General Electric Company	Novel Cryogen-Free, Actively Shielded Superconducting Magnets for Maglev Vehicles	SCOPE: Develop the preliminary design of a superconducting magnet system for Maglev applications that increases the reliability and safety of the magnet systems by eliminating the need for liquid helium cooling and incorporating alternate shielding approaches.	250,391	9	07/31/91
45	Intermagnetics General	Superconducting Linear Induction Motor (SLIM)	SCOPE: Evaluate the technical and economic feasibility of using Superconducting Linear Induction Motors (SLIM) to provide propulsion and, if feasible, provide a conceptual design for a SLIM and estimate cost and operating characteristics.	171,487	12	07/02/91

No.	Company	Title
49	Kaman Science Corporation	Parametric Studies of Suspension and Propulsion Subsystems in a Maglev Transportation System
53	MIT Plasma Fusion Center	Application of Cable-In-Conduit-Conductors (CICC) to Maglev Systems
79	Charles Stark Draper Labs	Aerodynamic Forces on Maglev Vehicles
98	Babcock & Wilcox	Guideway Sensor Systems
102	Babcock & Wilcox	Guideway Structural Design (2.1) and Power/ Propulsion/Braking in Relation to the Guideway (2.2)

Description	Total Cost	Duration (Months)	Start Date
SCOPE OBJECTIVES: 1) Provide tools for performing a trade-off study of subsystem performance for various parameter values; 2) Apply the tools to a detailed parametric study of performance of a combined suspension and propulsion subsystem and a combined suspension subsystem using both permanent magnets and electromagnets; 3) Develop passive or active shielding schemes to reduce level of magnetic fields in passenger and electronics compartments.	99,304	10	06/24/91
SCOPE: Illustrate that superconducting cables in conduit conductors are superior to bath-cooled systems.	141,599	10	06/28/91
SCOPE: Evaluate aerodynamic forces to determine the relationship between vehicle shape and drag, determine potential for reducing energy per passenger, quantify ride quality improvements through use of aerodynamic control devices and quantify energy penalty for use of aerodynamic control devices.	139,150	12	07/30/91
SCOPE: Investigate the use of various types of sensors for guideway diagnostics and control systems to monitor the guideway, including guideway integrity, obstacles, snow, ice, and location and speed of vehicles.	181,802	12	07/09/91
SCOPE: Evaluate cost, performance characteristics, and fabrication techniques for Maglev power, propulsion, and braking designs and their effects in relation to the guideway. Several guideway designs will be evaluated for relationships among guideway construction costs, fabrication techniques and support systems. Develop the construction cost estimate for a complete Maglev guideway system capable of speeds up to 300 mph.	420,265	18	08/09/91

No.	Company	Title
106	Foster-Miller	Thermal Effects and Mitigation Methods for Continuous Sheet Guideways
107	Foster-Miller	Advanced Low-Cost High Performance Guideway Concepts
108	MIT	Low-Cost Guideways for Maglev
109	MIT	Low-Cost LSM Propulsion Systems for Maglev
111	Martin Marietta	Maglev Guideway Route Alignment and Right-of-Way Requirements

Description	Total Cost	Duration (Months)	Start Date
SCOPE: Identify thermal problems in continuous sheet guideways and primary support structures which effect smooth vehicle operation and cause buckling, fracture, and fatigue failures due to thermal cycles in the service life of the structure. Select/develop necessary analytical structural tools for quantification of thermal effects in typical continuous guideway and support structures to facilitate design optimization of structures. Prepare a design database for use by future structural designers.	79,039	8	06/18/91
SCOPE: Identify and quantify key guideway design drivers for a U.S. system. Develop concepts for alternate guideway structural configurations and advanced fabrication methods which yield high performance and low cost, and prepare structural and cost analyses of candidate configurations.	122,612	8	06/27/91
SCOPE: Study wide gap EDS systems with active guideway LSM propulsion, develop recommendations for a national standard guideway design, define the relationship between guideway construction costs, dimensional tolerances, span deflections, span lengths, vehicle size and weight and guideway life expectancy, recommend cost reduction methods, evaluate cost- effectiveness of remote alignment capability, and predict guideway dynamic behavior.	112,925	12	06/28/91
SCOPE: To establish a database for the design specifications of a linear synchronous motor including cost, life expectancy, and parameters.	119,691	12	06/28/91
SCOPE: Perform a cost/benefit analysis of operational considerations as they relate to route alignment and siting considerations for 23 city pairs.	203,712	12	07/03/91

No.	Company	Title
113	Parsons Brinckerhoff	Influence of Guideway Flexibility on Maglev Vehicle/Guideway Dynamic Forces
129	West Virginia University	State-of-the-Art Assessment of Guideway System for Maglev Applications
138	Battelle	Evaluation of Concepts for Safe Speed Enforcement
146	Martin Marietta	Maglev Guideway and Route Integrity Requirements
154	Charles Stark Draper Labs	Verification Methodology for Fault Tolerant, Fail-Safe Computers Applied to Maglev Control Systems.
187/8	Electric Research & Management	Sample Measurement and Analysis of Magnetic Fields from Several Existing Transportation Systems

Description	Total Cost	Duration (Months)	Start Date
SCOPE: Develop realistic computer simulation models of the interaction between flexible guideways and Maglev vehicles. Evaluate the results against objective standards relating to structures, ride quality, and noise and vibrations.	190,272	9	07/09/91
SCOPE: Examine the designs of existing high-speed guideway systems and proposed Maglev guideways which use structural steel and steel-reinforced structural concrete as their major load bearing members. Also investigate the impact of electromagnetic fields on the structural steel and possible interference with control systems. Examine the potential for use of innovative non-conductive materials in place of steel, and determine the limitations and costs of these materials.	249,809	12	08/09/91
SCOPE: Investigate speed control systems using a three-point approach: identify speed control system needs, survey existing speed control options, and determine the applicability of those systems. The final product will define what research and development, if any, is needed for the U.S. Maglev effort.	66,502	8	07/24/91
SCOPE: Develop a three-task approach to define Maglev guideway and route integrity requirements: identify risks, assess current mitigation technology with an emphasis on active sensors, and summarize the communication and sensor architecture required.	165,718	11	06/18/91
SCOPE: Develop a methodology for verification of fault-tolerant and fail-safe computer control systems.	169,900	9	07/30/91
SCOPE: Use portable multiwave instruments to measure the electromagnetic fields of several existing transportation systems. Conduct an analysis of the measured magnetic flux density data and incorporate the results into a database of EMF characteristics for future assessment.	381,589	12	06/12/91

No.	Company	Title
191	Harris Miller Miller & Hanson	Noise from High-Speed Maglev Systems
203	Martin Marietta	Maglev Program Test Plan
204	MIT	Magnetic Levitation Suspension-Guideway Interaction
206	Parsons Brinckerhoff	Maglev-Rail Intermodal Equipment & Suspension
223	University of Washington	Design Assessment of Alternate Feeder Systems for Maglev Intermodal Stations

Description	Total Cost	Duration (Months)	Start Date
SCOPE: Define noise sources, develop criteria, establish design guidelines, and recommend testing facility requirements to minimize environmental noise.	92,256	12	07/10/91
SCOPE: Identify the test facility requirements needed for the development of Maglev program components, subsystems, and systems. Also identify high risk elements which would require special testing.	137,267	12	07/19/91
SCOPE: Develop a generic vehicle guideway interaction model capable of assessing guideway stiffnesses and irregularities with respect to vehicle suspension performance and ride quality.	88,693	12	07/03/91
SCOPE: Investigate and identify the right-of-way access envelope to large cities and investigate the viability of piggybacking Maglev into urban centers via rail.	173,577	18	07/09/91
SCOPE: Develop a computer package to design Maglev feeder routes. Also develop preliminary designs for intermodal stations. Note, a change will be proposed to reduce their scope of work to concentrate on the intermodal stations only.	81,689	18	07/19/91

APPENDIX V

LEGISLATION INTRODUCED IN THE 102nd CONGRESS

SENATE

S 811, the High Speed Rail Transportation Act of 1991, introduced by Sen. Hollings (D-SC) and Sen. Exon (D-Neb) and others, 4/11/91, would require the Secretary of Transportation to lead and coordinate Federal efforts in the development of magnetic levitation transportation technology and foster implementation of magnetic levitation and other high-speed rail transportation systems. The bill would appropriate $205 million over five years for Federal efforts, including cooperative agreements with industry, requiring a 20 percent non-Federal match. The Senate passed the bill on 10/22/91.

S 1492, Amendment to the Internal Revenue Code of 1986, introduced by Sen. Graham (D-Fla) with co-sponsors, 7/18/91, would amend the Internal Revenue Code to facilitate financing of tax-exempt high-speed rail projects by removing the requirement that an allocation under the state volume cap must be obtained for 25 percent of the bonds issued for intercity high-speed rail projects. This legislation would allow tax-exempt bonding for high-speed rail on the same basis as that now available for publicly-owned airports and seaports.

S 1493, High Speed Surface Transportation Development Corportation Act of 1991, introduced by Sen. Graham (D-Fla), 7/18/91, would establish a corporation to assist states, through loan guarantees and other incentives, with development and construction of new high-speed surface transportation systems (exclusive of rolling stock). The bill also encourages intermodal use of highway corridors where safety merits, and calls for a Federal policy "for the development of high-speed surface transportation that eases integration of such advanced systems with existing highway, air, transit, and rail modes."

S 1204, Surface Transportation Efficiency Act, introduced by Sen. Moynihan (D-NY) and Sen. Burdick (D-ND), passed by the the Senate on June 19, 1991, establishes a National Magnetic Levitation Design Program to be managed jointly by the Secretary of Transportation and the Assistant Secretary of the Army for Civil Works, in consultation with appropriate Federal officials, including the Secretary of Energy and the EPA Administrator. Calls for a National Strategic Plan for design and construction of a national maglev system within 18 months of passage. Initiates a $750 million maglev R&D program, financed through the Highway Trust Fund, with phase one multiple R&D grants requiring a 10 percent non-Federal match, phase two multiple R&D grants requiring a 20 percent non-Federal match, and a prototype development grant requiring a 25 percent match. The bill also directs the DOT Secretary to allow states to use Interstate Highway rights-of-way for high-speed trains, and includes high-speed rail as an eligible use for surface transportation program funds.

S 1474, Maglev Transportation Construction Loan Guarantee Pilot Program Act, introduced by Sen. Reid (D-Nev), 7/15/91, would provide Federal guarantees of state and local government employee pension funds for qualified maglev construction projects and would authorize Interstate Highway access for maglev systems. Also establishes National Centers for Maglev R&D at higher education institutions.

HOUSE OF REPRESENTATIVES

HR 422, Use of Rights-of-Way Along Federal-Aid Highways, introduced by Rep. Schumer (D-NY), 1/3/91, would direct DOT to develop regulations authorizing states to permit use of right-of-way along Federal-aid highways for construction of maglev systems.

HR 1087, High Speed Rail Transportation and Policy Development Act, introduced by Rep. Swift (D-WA), 2/21/91, would permit high-speed rail systems to qualify for $1 billion in already authorized but not appropriated Federal loan guarantees. FRA would be directed to conduct a high-speed rail commercialization study and to formulate a high-speed rail transportation policy. Bill reported to the Energy and Commerce Committee on 10/23/91.

HR 1452, Magnetic Levitation Research and Development Act of 1991, introduced by Rep. Torricelli (D-NJ), would stimulate implementation of a U.S. designed and constructed maglev system.

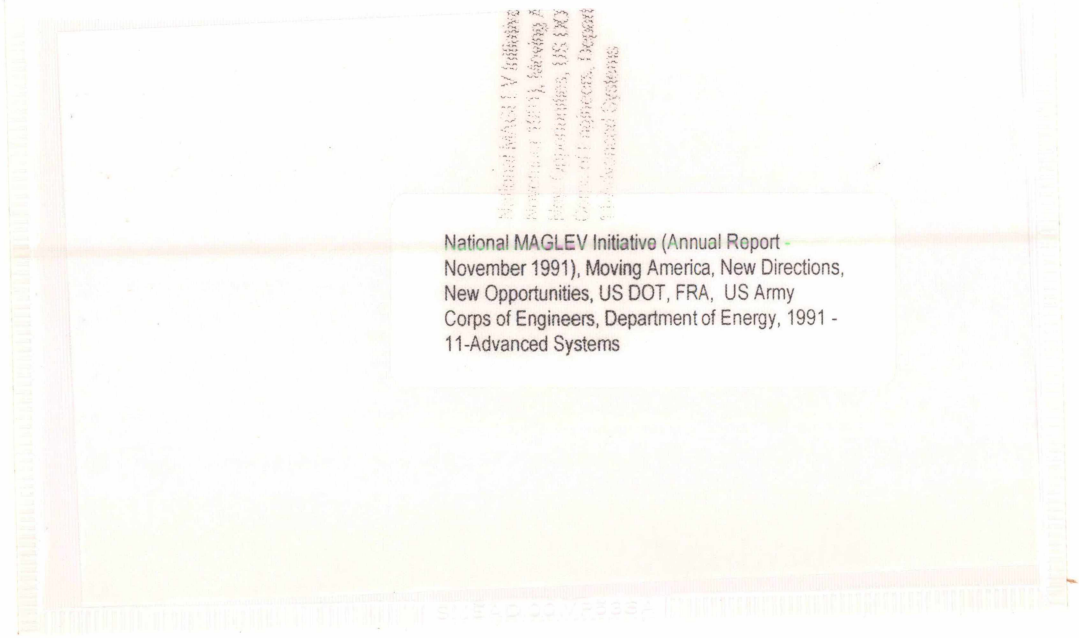
HR 2761, National Magnetic Levitation Design Program, introduced by Rep. Mrazek (D-NY), 6/29/91, is similar to Moynihan's maglev provisions in S 1204.

HR 2878, Magnetic Levitation Research, Development, and Construction Act of 1991, introduced by Rep. Panetta (D-CA) and Rep. Kasich (R-OH), 7/11/91, is similar to the maglev provisions in S 1204.

HR 2941, Surface Transportation Research and Development Act of 1991, introduced by Rep. Valentine (D-NC), 7/18/91, to authorize appropriations to DOT for surface transportation R&D and other purposes. Includes amendment by Rep. Gilchrest (R-NJ), requiring DOT research into maglev systems and an applied R&D program through a lead maglev R&D center, including an investigation into the possibility of international cooperation using superconducting maglev systems.

HR 2950, Intermodal Surface Transportation Infrastructure Act of 1991, introduced by Rep. Mineta (D-CA) and others, 7/18/91, would extend 1/2 of the recently added 5-cent gas tax through 1999. Contains provisions allowing states to use Interstate Highway rights-of-way for high-speed rail and to use Federal-aid highway funds to modify Interstate highways where necessary to accommodate other transportation modes.

HR 3348, introduced by Rep. Coyne (D-PA) and Rep. Shaw (R-FL), 9/17/91, to remove the requirement that 25 percent of tax-exempt bonds for high-speed rail must come under a state's volume cap. Equivalent to Senator Graham's S 1492.



National MAGLEV Initiative (Annual Report - November 1991), Moving America, New Directions, New Opportunities, US DOT, FRA, US Army Corps of Engineers, Department of Energy, 1991 - 11-Advanced Systems