RECORD OF DECISION

MAGLEV DEPLOYMENT PROGRAM
FINAL PROGRAMMATIC
ENVIRONMENTAL IMPACT STATEMENT

Summary

On March 30, 2001, the Acting Deputy Federal Railroad Administrator approved the Final Programmatic Environmental Impact Statement (PEIS) for the Magnetic Levitation Technology Deployment Program (Maglev Deployment Program) and the PEIS notice of availability was published in the Federal Register by the Environmental Protection Agency on May 4, 2001. The PEIS analyzed the environmental impacts of the Maglev Deployment Program and culminated a 24-month environmental assessment effort led by the Federal Railroad Administration (FRA) with the assistance of the seven participating states or regional authorities. The Maglev Deployment Program was authorized by Congress in the Transportation Equity Act for the 21st Century and represents an effort to evaluate the transportation and other benefits of this new technology. After carefully considering all of the information in the public record including: technical support documents, the final PEIS, state or regional authority environmental assessments, all public and regulatory agency comments submitted on the draft PEIS and final PEIS, public comments at meetings and hearings, and the Project Descriptions submitted by the project sponsors, the Department of Transportation has decided to proceed with the Action Alternative focusing on a potential Maglev project in Pennsylvania or Maryland. The Action Alternative was identified as the agency's preferred alternative in the final PEIS. This Record of Decision (ROD) explains the agency's decision.

Proceeding with the Maglev Deployment Program is known as the Action Alternative. The Action Alternative has two types of environmental impacts: short term and long term. In the short term, assuming funds are appropriated by Congress and the sponsors of one of the two projects selected by the Secretary in 2003 could raise the remainder of funds needed to build it, a Maglev project would be constructed and operated to serve airport access and other trips in a metropolitan area, either between Washington, D.C. and Baltimore, Maryland or in the Pittsburgh, Pennsylvania area. In the PEIS, FRA found that there would be no adverse environmental impacts associated with the construction of any of the seven competing projects that could not be mitigated. In any case, no project would be constructed with Federal funds until FRA completed a separate site-specific environmental impact statement in the future.

In the longer term, the Action Alternative could increase the probability of building the first intercity Maglev system in the United States by demonstrating desirable operating characteristics and relatively benign environmental impact of this new technology to the American public. If the No-Action Alternative were selected, the Maglev Deployment Program would not proceed and the first Maglev project would not be constructed at this time. If the first Maglev project were not constructed, it is unlikely that an intercity Maglev system would be built in the near term, effectively denying the potential benefits of this new technology to the United States. These benefits include a number of favorable environmental impacts compared to the consequences of continued reliance on air and automobile modes of transportation in the intercity corridor(s) where it would be built. These include: high-speed, rapid acceleration rate, high capacity, safety, energy efficiency, minimum pollution, and minimized right-of-way requirements.

FRA has determined that the Action Alternative is not only the preferred alternative from an overall standpoint, but also the preferred alternative from an environmental standpoint, and therefore selects the Action Alternative for implementation.

1.0 Background

This Record of Decision (ROD) considers the proposal by the Federal Railroad Administration (FRA) to develop and construct an operating transportation system employing magnetic levitation, capable of safe use by the public at a speed in excess of 386 kilometers/hour (km/h) (240 miles/hour (mph)). FRA's proposal is part of the Maglev Deployment Program that was the subject of a Final Programmatic Environmental Impact Statement (PEIS) approved by the Acting Deputy FRA Administrator on March 31, 2001. Congress authorized the Maglev Deployment Program in the Transportation Equity Act for the 21st Century (TEA 21). Maglev is an advanced transportation technology in which magnetic forces lift, propel, and guide a vehicle over a specially designed guideway. Utilizing state-of-the-art electric power and control systems, this configuration eliminates contact between vehicle and guideway and permits cruising speeds of almost two times the speed of conventional high-speed rail passenger service.

In order to comply with the TEA 21 legislation, the FRA is conducting a competition to select a project for the purpose of demonstrating the use of Maglev to the American public. FRA published a final regulation outlining the process the agency would follow in implementing the Maglev Deployment Program on January 14, 2000, see 49 C.F.R. Part 268. The EA process reflected in the PEIS is one aspect of the selection process. After receiving and evaluating eleven initial applications, the Secretary of Transportation on May 24, 1999, announced financial assistance grants to seven participants (California, Florida, Georgia, Louisiana, Maryland, Nevada, and Pennsylvania) for pre-construction planning. FRA entered into cooperative agreements with each of the selected states. These agreements required each participating state or authority to prepare and submit to the FRA a technical review of environmental considerations affecting their proposed project. The participants incorporated the results of these technical reviews into individual documents referred to as Environmental Assessments (EAs). The purpose of these technical documents was to provide the baseline environmental data to be used by FRA in the preparation of the DPEIS and FPEIS.

In light of the nature of the program established by Congress for developing an operating Maglev project, FRA decided, consistent with Council on Environmental Quality guidance (40 C.F.R. §1500.4(i), 1502.4, and 1502.20), that the agency's decisionmaking process would be aided if the agency first prepared a programmatic EIS that addressed the larger program level issues. After completion of the PEIS and a favorable decision on proceeding with the project, a site specific EIS or EISs could be prepared to address project and location specific issues. This process is known as tiering and it enables the agency with respect to more complicated projects, to focus specifically on the issues that are ripe for decision at each stage.

In addition to the EAs, each of the seven projects were required to prepare and submit to FRA a Project Description that: documented the preliminary design; identified the route and limits of the project; described the status and characteristics of the technology to be used; estimated ridership, revenues and other project benefits; estimated construction, operating and maintenance costs; presented a proposed financial plan and schedule; and provided a description of the public/private partnership that would construct and operate the project.

FRA published a Notice of Intent to prepare a PEIS on December 29, 1999. The FRA published a Maglev Deployment Program webpage on the agency's internet site (http://www.fra.dot.gov/o/hsgt/maglev.htm). The Draft PEIS (DPEIS) was approved by the F RA Administrator on June 29, 2000 and made available on the internet. The DPEIS was also sent to major stakeholders, identified by the states, for review and comment. In addition, copies were sent to libraries in the areas of each of the seven alternative sites.

An official comment period commenced after distribution of the DPEIS and closed on September 19, 2000. Interested parties were invited to submit comments on the DPEIS and could send them to the Federal Docket Management System or to the FRA (see Volume II of the PEIS). After release of the DPEIS, public information meetings were held in the vicinity of each of the seven Maglev Deployment Program alternative sites. Locations and dates of the public information meetings were advertised locally and the meetings were well attended. FRA held a public hearing on the DPEIS on August 24, 2000, in Washington, D.C. Comments received during the public information meetings and public hearing, and through the Docket Management System and at the FRA, were incorporated in the FPEIS, and are addressed in Volume II of the FPEIS. As discussed above, the FPEIS was approved on March 30, 2001.The PEIS was made available on an accompanying webpage (http://www.fra.dot.gov/s/env/maglev/MagPEIS.htm). The PEIS was distributed to attendees at the public meetings and public hearings, those individuals who provided a mailing address in the comments to the Document Management

System, interested organizations, appropriate federal, state and local agencies, appropriate elected officials, public libraries, interested corporations, and concerned individuals.

2.0 Purpose and Need for the Proposed Action

The FRA's mission is to promote railroad transportation that meets both current and future needs of the Nation. The Program is intended to demonstrate Maglev technology as a next generation of America's high-speed ground transportation by identifying a viable Maglev project in the U.S., and assisting a public/private partnership formed to plan, finance, construct, and operate the project.

The deployment of Maglev systems would partially address several of the main problems associated with inter- and intra-regional transportation in the U.S. Maglev would serve as an alternative transportation system, reducing the congestion at airports and on highways that results from increasing travel demand and would extend the usefulness of existing airport and highway infrastructure.

Associated benefits could include:

- Regional economic development
- Joint development at stations
- Support of comprehensive land use planning
- Improved air quality
- Reduced consumption of non-renewable resources
- Increased productivity of business travelers

The high performance of Maglev transportation would provide air-competitive trip times at longer trip distances between metropolitan areas than other high-speed ground transportation (HSGT) alternatives. In addition, Maglev technology would potentially maximize the utilization of airports' potential by providing inter-modal connections between airports and business districts and between two or more airports serving the same region, thereby supporting airports as centers for inter-modal transfer and travel. By providing a high-speed link connecting two or more airports serving a single region, additional air travel demand can be shifted from congested airports to under-used airports that have unused capacity, thereby avoiding or delaying the need to expand existing major airports.

3.0 Alternative High Speed Systems

FRA has been evaluating rail and Maglev related HSGT systems that could satisfy city-to-city transport for a number of years. Options that FRA has evaluated include:

- **Accelerail.** Accelerail consists of upgrading intercity rail on existing rail corridors, which mostly share rights-of-way with freight traffic. Top speeds are in the range of 145 to 241 km/h (90 to 150 mph). One Accelerail example is the Empire Regional service between New York City and Albany, NY.

- **New High-Speed Rail (HSR).** New HSR systems represent the advanced steel-wheel-on-rail systems that operate on almost exclusive rights-of-way. Using electric propulsion, these systems achieve revenue service operating speeds of 300 km/h (186 mph) and have achieved a record speed of 515 km/h (320 mph). HSR examples include Japan's *Shinkansen*, France's *train a grande vitesse* (or TGV), and Germany's Intercity Express (ICE). At the higher speeds, maintaining HSR systems becomes more costly than Accelerail. However, information from the French TGV manufacturers suggest that this system could be used on new projects in sustained revenue service speeds of up to 350 km/h (217 mph).

- **Maglev.** Magnetic levitation (Maglev) uses magnetic forces to lift, propel, and guide the train over a special guideway. The power to propel the train is provided in the guideway. Maglev does not require wheels or other mechanical parts at higher speeds for support or propulsion**.** Without wheels or other components to cause resistance, cruising speeds up to 500 km/h (310 mph) are practical. This speed would allow Maglev to achieve air-competitive trip times at longer trip distances than other HSGT options.

FRA has identified a number of factors that are relevant to transportation planners in deciding which type of HSGT will satisfy the transportation needs of particular corridors. The three high-speed system options were compared with the screening factors. The screening factors included:

- Shorter Trip Times
- High Reliability During Peak Demand
- Convenience
- Shared Corridors
- High Capacity
- Safety

- Petroleum and Other Fuels Independence

Maglev systems appear to best meet all of these factors and achieve the program objective of demonstrating the feasibility of this new technology.

4.0 Alternative Maglev Technologies

The concept of magnetically levitated trains was first published almost 100 years ago. In 1968, two Americans (Danby and Powell) were granted patents on their Maglev design. Since then, extensive research on Maglev technologies has been conducted in several countries, including the U.S., Germany, and Japan. Germany and Japan have the most experience in high-speed technology development. Both have test tracks and have performed extensive testing of vehicles, systems, and guideways.

There are two Maglev technologies that were proposed for the Maglev Deployment Program and were part of the PEIS. Of the seven participants, all but one chose the German-developed Transrapid International (TRI) TR08 system. Florida DOT chose the Maglev 2000 technology, which is based on the original Danby/Powell design. There are significant differences between the two technologies. The major technical characteristics of the two Maglev technologies as presented in the PEIS are summarized below.

Transrapid International (TRI) Maglev System

Suspension and Guidance - The TRI train vehicle is supported and guided by electromagnetic forces between steel rails attached to the guideway and electromagnets housed on the underside of the vehicle. The gap between the top of the guideway and the underside of the vehicle is servo controlled to about 1 cm (0.4 in).

Guideway - The guideway structure is usually a continuous "T" shape that can be elevated on typical bridge style columns, mounted at grade on a continuous foundation, or using other configurations. The guideway structure can be fabricated from steel or concrete. A unique steel guideway crossover has been developed to enable switching to adjacent guideway.

Propulsion - Unlike conventional trains, the active part of the TRI propulsion system is in the guideway, not the vehicle. A traveling magnetic field in the guideway propels the vehicle. By adjusting the frequency of the electric current in the guideway, speed is controlled.

Train - Two or more attached TRI vehicles are called a consist. Seating capacity in a consist depends on consist length and level of comfort and can be approximately 240, 340, and 440 seats respectively for the 3-, 4-, and 5-section TRI train sets. A three-section train weighs 189 metric tons (416,674 lbs), when loaded.

Control/Communications/Electric Substations - Trains are controlled and monitored from a central operations center, and the system is fully automated. The guideway is powered from electric substations located along the guideway structure.

Stations/Maintenance Facility - Stations could resemble conventional rail stations. However, for safety considerations, doors on platforms would prevent access to the guideway, opening only when passengers are accessing the train. A maintenance facility is required for vehicle servicing, maintenance, and storage.

Safety - The system is inherently safe as the vehicle carriage wraps around the "T" shaped guideway, severely restricting derailment. The train's location is monitored from the control center at all times, and on-board attendants can assist in emergencies. In the event of a stop at a location other than a station, the train will have the capability to continue to an auxiliary stopping area, where passengers can disembark. The TRI design will be required to satisfy requirements for fire safety, emergency planning, emergency exits, special lighting, and signage in the FRA's Passenger Equipment Safety Standards (49 C.F.R. Part 238).

Maglev 2000 System

Suspension and Guidance - The Maglev 2000 System uses high magnetic field superconducting electromagnets on the vehicle and ordinary coils mounted on the guideway. The motion of the vehicle induces currents in the guideway coils that levitate the vehicle in a stable manner about 150 mm (6 inches) from the guideway.

Guideway - The guideway structure is composed of a single hollow reinforced concrete box-beam. Attached to the sides of this structure are thin panels of polymer concrete in which are imbedded aluminum wire loops that act to levitate, guide, and propel the vehicle. The Maglev 2000 guideway is designed with a high-speed electromagnetic switch that enables movement between tracks without mechanical means.

Propulsion - The Maglev 2000 system employs a linear synchronous motor, in which electric current introduced into the propulsion wire loops on the guideway interacts with the high field strength superconducting magnets on the vehicle to produce a longitudinal thrust that keeps the vehicle moving.

Train - The vehicle carries 92 passengers and has four wheelchair positions. The vehicles are designed to operate as single units, but can be coupled into 2 or 3 car consists, allowing for a passenger carrying capacity of up to 276 people. The system has been designed to allow for freight carrying capability in Maglev 2000 vehicles that are designed to transport containers or truck trailers.

Control/Communications/Electric Substations - Movement of the Maglev 2000 vehicles on the Maglev 2000 system would be controlled from a central traffic facility and not by operators on the individual vehicles. Sensors on the guideway will instantaneously determine the location and speed of all vehicles, and transmit the data back to the central facility. A 69 kV alternating current (AC) power line running the length of the guideway provides power to the system, and transformers spaced about every 10 km (6 mi) reduce the voltage to 6 kV direct current (DC).

Stations/Maintenance Facility - The Maglev 2000 train stations would resemble conventional rail stations. The operations control facility will be located at the maintenance facility.

Safety - The guideway is elevated above grade to restrict access, and all portions of the guideway are continuously monitored by the central control facility, both by video cameras and guideway sensors. If levitation were to fail due to an event such as the loss of power or superconductivity, the system is designed so that the vehicle would come down safely on the guideway and slide to a controlled, non-injurious stop. The Maglev 2000 will be required to satisfy the requirements pertaining to fire safety, emergency planning, emergency exits, special lighting, and signage in the FRA's Passenger Equipment Safety Standards (49 C.F.R. Part 238).

5.0 Alternatives Identified for Further Analysis in the PEIS

Action Alternative. The Action Alternative is to proceed with the Project development and completion of a site-specific EIS for one or more of the following the projects:

California - The California Maglev alternative corridor extends between Los Angeles International Airport (LAX) through to Union Station in downtown Los Angeles (LA) (and further east to Ontario International Airport (ONT) and then March Air Force Base, a distance of approximately 133 km (83 mi). The area is mostly developed. The project is planned to be a part of, and compatible with, the larger north-south high-speed rail system proposed to serve the entire state. The California Business, Transportation, and Housing Agency is developing this project.

Florida - The Florida Maglev alternative corridor extends 29 km (18 mi) corridor from Port Canaveral to the Kennedy Space Center (KSC) and the Space Coast Regional Airport is the Florida Maglev alternative. The area is lightly developed. This alternative can link to a future extension along the Beeline Expressway connecting to Orlando International Airport. The Florida Department of Transportation (FDOT) is the project sponsor.

Georgia - The Georgia Maglev alternative is a 50 km (31 mi) corridor extending from

Hartsfield-Atlanta International Airport (ATL) to a multi-modal station north of the airport. The exact location of the northern station has not been finalized. The area is mostly developed. The alternative could be extended in the future to a larger 178 km (110 mi) corridor serving the cities of Atlanta and Chattanooga. The project sponsor is the Atlanta Regional Commission.

Louisiana - The Louisiana Maglev alternative traverses the central section of the Gulf Coast High Speed Ground Transportation Corridor. The alternative extends from downtown New Orleans through to the New Orleans International Airport (MSY), across Lake Pontchartrain, and ends on the northern side of the lake, a distance of approximately 78 km (48 mi). The area consists of approximately half developed area and half lake crossing. The Greater New Orleans Expressway Commission is the project sponsor.

Maryland - The Maryland Maglev alternative is approximately 64 km (40 mi) in length, and extends from Washington, D.C. north, to the Baltimore-Washington International Airport (BWI) and the City of Baltimore. In addition to the two larger cities, several suburban communities are located within the alternative. The area contains several large tracts of land owned by the Federal Government. The alternative could be extended north to Boston and south to Charlotte, creating an Eastern Seaboard Maglev system. The Maryland Mass Transit Administration is the project sponsor.

Nevada - The Nevada Maglev alternative is a 56 km (35 mi) corridor linking Primm, located on the Nevada-California state border, with downtown Las Vegas. The majority of the alternative is located within the Nevada Department of Transportation (NDOT) right-of-way for I-15 and traverses an area of sparse development and gentle topography. The alternative could be extended in the future to complete the California-Nevada Interstate Maglev Project linking Las Vegas with Anaheim. The California-Nevada Super Speed Train Commission is the project sponsor.

Pennsylvania - The Pennsylvania Maglev alternative extends from Pittsburgh International Airport (PIT) to the City of Greensburg, passing through downtown Pittsburgh and Monroeville, a distance of about 76 km (47 mi). The alternative traverses hilly topography bisected by numerous watercourses. Elevations range between 213 - 457 m (700 - 1,500 ft). The alternative could be extended in the future to be part of a larger corridor connecting Pittsburgh and Philadelphia, and continuing to Washington, D.C. to the east; West Virginia to the south; Cleveland to the west, and New York to the north. The Port Authority of Allegheny County is the project sponsor.

No-Action Alternative. The Maglev Deployment Program has been established as a way to demonstrate the potential of a new transportation technology as an alternative to increasing the capacity of the airway and automotive systems that will be required to address congestion resulting from increasing demand for travel. Under the No-Action Alternative as addressed in the PEIS, the Maglev Deployment Program would not proceed. Economic and population growth will continue around the country, causing associated increases in inter-city travel demand and congestion, and inducing additional airport, railway, and highway expansion projects. If the program does not proceed, it is less likely that Maglev would be seriously considered in future transportation corridor planning than if the program proceeds. This may foreclose the fastest high-speed ground transportation technology currently available not only in the candidate corridors, but also throughout the Nation.

6.0 Preferred Alternative

FRA's Maglev Deployment Program regulation (49 C.F.R. Part 268) establishes the administrative process for the Program and requires the Secretary, if he decides to proceed with the program, to select one or more of the most promising projects for additional studies that could ultimately lead to the selection of a single project for federal capital assistance for construction, depending upon the appropriation of funds by Congress. To be selected a project must: meet the project eligibility standards specified in the Rule; rate highly in the project selection criteria specified in the Rule; and be judged by FRA to have a good chance of being constructed with the Federal funds authorized for this program, and be successfully operated by a public/private partnership.

The Administrator appointed a seven member multi-disciplined Technical Advisory Group (TAG) composed of senior U.S. Department of Transportation staff to assist the Administrator and Secretary in evaluating the projects. In the aggregate, the group represented over 200 years of professional experience in physics, engineering, economics, environmental analysis, finance and management. The TAG reached an initial consensus that all seven of the projects would probably meet the eligibility standards specified by the Final Rule and then evaluated the Project Descriptions submitted by each project to develop a consensus on which of the projects have a good chance of being constructed with the Federal funds authorized for this program and could be successfully operated by a public/private partnership. The TAG identified the strengths and weaknesses of each project relative to the factors listed below:

- State and Community Support
- Purpose of the Project
- Service Characteristics
- Environmental Impact
- Construction Financing
- Financing Ongoing Operations
- Total Project Benefits vs. Costs

- Technical Readiness and Implementation Schedule
- Status of Public/Private Partnership
- Status of Project Eligibility

These ten factors serve to distinguish the projects from one another in different dimensions correlated with the statutory criteria for eligibility and selection. The strength of a project regarding each of these factors influence the probability that a project can actually be planned, financed, constructed and operated, and whether continued federal participation in the funding of the project would be justified.

In an initial report to the FRA Administrator, the TAG described the strengths and weaknesses of each of the seven Maglev projects based solely upon the material included in the Project Descriptions submitted by each of the projects on June 30, 2000. The TAG members used their professional experience to make assumptions regarding the quality and reliability of the information that was presented by the project sponsors. In several cases, information presented (e.g., ridership, revenues, and benefit/cost calculations) was discounted to reflect what were felt to be over-optimistic forecasts. In other cases, the presented capital and/or operating costs needed adjustment, or project refinements made since the June submission were not adequately reflected.

To be certain that the information presented in the sponsor's June reports was being correctly interpreted, and to ensure that the judgement exercised by the TAG was reasonable, representatives of the TAG met with representatives of each project to discuss identified concerns that the TAG had with each project, and to give them the opportunity to correct any misconceptions by TAG members regarding the projects. As a result of clarification or new information provided at these meetings with the sponsors, the TAG reconsidered some of the ratings of strengths and weaknesses that were previously assigned to the projects. The results of this reevaluation were presented to the Administrator and the Secretary.

After considering the TAG evaluation and after careful analysis all of the relevant factors, including environmental issues, Secretary of Transportation Rodney Slater, on January 18, 2001, identified the Action Alternative as the agency's Preferred Alternative and the Pennsylvania and Maryland projects as offering the greatest promise for developing an operating Maglev system. The Secretary determined that construction of a Maglev system would have substantial transportation benefits for the areas served by the selected alternatives and would demonstrate a promising new technology that could provide transportation benefits to many areas of the country in the future. Moreover, the Secretary concluded, based on the information available at that time, that at the program level there were no inherent aspects of the proposed Maglev technology deployment that would raise environmental concerns to the level that would suggest that the program not advance to the next phase of design development. The FPEIS, issued on March 30, 2001, identified the Action Alternative as the agency's Preferred Alternative.

7.0 Environmentally Preferred Alternative

After considering the human and natural environmental effects, FRA has determined that the Action Alternative is the Environmentally Preferred Alternative. In the short term, the Action Alternative, to continue planning for a demonstration of the technology in revenue service in the United States, is less damaging to the environment than the consequences of No-Action. In the long term, deployment of Maglev technology in densely traveled corridors will have the potential for substantial benefits to the environment as compared to the No-Action Alternative.

Projections of travel demand for the first quarter of the 21st Century indicate that extensive investments in new or expanded transportation capacity will be needed to accommodate forecasted increases in intercity travel demand on already congested facilities. As economic and population growth continues around the country, increased intercity travel demand and ensuing congestion on already burdened highways, airports and rail lines will result. Roadways would continue to operate with severe and worsening congestion at lower levels of service and with increasing travel times. Increases in operational congestion due to increased motor vehicle, air and rail travel will accelerate and could lead to safety deficiencies in current transportation systems. Increased commuter flights would exacerbate airport delays. Increased highway vehicle-miles traveled (VMT) and resulting congestion increase energy consumption. The increase in air and motor vehicle intercity and long-distance travel and operational congestion would result in greater air-pollutant emissions (including greenhouse gases) with potentially significant impacts to air quality at the local, regional, and national levels potentially exacerbating air quality problems even further.

Maglev systems may provide an environmentally attractive and economical alternative to expanding conventional transportation modes to meet future capacity needs. However, only by demonstrating the desirable operating characteristics, relatively benign environmental impact, and the ability of this new technology to attract passengers in revenue service, will Maglev be seriously considered as a tool for solving forecasted transportation congestion problems in the United States.

Under the No-Action Alternative, the Maglev Deployment Program would not proceed, and the opportunity to demonstrate the attractiveness and ability of Maglev technology to satisfy the need for additional capacity in our most congested travel corridors would be lost. Regardless of its benefits (e.g. high-speed, rapid acceleration rate, high capacity, safety, energy efficiency, minimum pollution, etc.), Maglev would likely not be seriously considered as an alternative to the expansion of conventional transportation modes, until the first project in the U.S. is successfully deployed to clearly demonstrate the desirable operating characteristics, relatively benign environmental impact, and the ability of this new technology to economically transport passengers in revenue service.

Maglev implementation addresses the major shortcomings of the No-Action Alternative. Travel demand by highway, air and rail is expected to be significantly lower under the Action Alternative than under the No-Action Alternative. Reductions in VMT with Maglev development would forestall the need for transportation infrastructure expansions of roadways, airports or rail lines; thus avoiding the environmental impacts associated with the No-Action Alternative. Maglev deployment has a much lesser impact in several key environmental areas than the development associated with the No-Action Alternative. The Action Alternative has no identified insurmountable or non-mitigatable environmental impacts. Maglev technology exhibits the following inherent environmental benefits:

- Reduced congestion/Improved capacity - VMT reduction from diverted automobile trips on the highway. The decreased operational congestion could also lead to safety advantages on existing transportation systems. Roadways could operate at higher levels of service with decreased travel times and safer conditions. Reduced commuter flights would have a ripple effect of reducing airport delays. This reduction would help alleviate already severe and worsening congestion. Ground and air traffic congestion is hampering mobility and economic opportunity throughout the country; Maglev would help to achieve acceptable mobility targets. Higher speed, reliable travel would improve access between employment and population centers and help to accommodate the significant growth in population and travel demands projected for the future.

- Energy savings - Maglev is not petroleum dependent and would reduce motor vehicle fuel use. Savings can result where diverted automobile and commercial traffic energy use offset the energy requirements for Maglev operation.

- Improved air quality and climate - Diverting trips from other more polluting modes of transportation to the Maglev system would work as a mitigation approach and could lessen greenhouse gas emission levels. Reduced VMT will benefit regional air quality and help in achieving Clean Air Act requirements. The construction of a Maglev system could have long-term benefits or impacts to climate from changes in CO2 emissions. Pollutants involved in ozone formation (VOC's, CO and NOx) would potentially be reduced. Analysis conducted for the Action Alternative showed that air emissions from regional power plants that generate power for the Maglev system could be favorable when compared to decreased air emissions from the anticipated reduction in VMT as a consequence of Maglev implementation. In most cases, a net benefit, or a reduction in criteria pollutant emissions, would occur with the implementation of an operational Maglev system. Overall, no significant impacts or exceedances of National Ambient Air Quality Standards (NAAQS) are anticipated for the Maglev Action Alternative.

- Increased safety - the use of Maglev over other forms of transportation would mean a number of lives being saved from accidents -- due to both the safety of Maglev, as well as the fact that Maglev ridership would mean a decrease in people using car, plane, and traditional rail travel. The Maglev vehicle/guideway design improves safety by reducing the risk of derailment and avoided VMT increases safety in existing transportation corridors.

- Decreased noise - Reduction in traffic volume and transportation infrastructure expansion would result in less potentially adverse noise and vibration effects that would escalate otherwise. Maglev vehicles emit much lower noise levels at any given speed than roadway traffic or conventional trains operating on steel rail.

- Improved land use - The implementation of a high-speed Maglev system with conveniently accessible passenger transfer stations could serve as the focus of transit-oriented development, if such a land-use strategy were desired and implemented by local planning and zoning officials. Transit-oriented development could focus on the creation of commercial activity centers with associated housing components and could negate potentially adverse land-use impacts.

- Topography, geology, soils and flood hazards - Maglev has the advantage of a relatively small foot print on the land and would have fewer impacts to topography, geology and soils than the highway, rail and airport infrastructure expansion which would be required without Maglev. Maglev development could require less alteration to existing local topography than the infrastructure development that would be experienced under the No-Action Alternative, which would require extensive blasting, excavating, grading etc. Such construction is likely to result in permanent disruption of drainage patterns, as well as erosion and sedimentation and loss or damage to mineral deposits to a greater extent than the elevated Maglev guideway system.

- Natural ecosystem and wetlands **-** The Maglev Action Alternative has distinct advantages over the transportation expansions that would accompany the No-Action Alternative. The construction of Maglev would have lower impacts on ecological resources (vegetation, wildlife, and wetlands) including endangered species from encroachment, habitat fragmentation and destruction, disrupted animal-movement patterns, and wetlands contamination and loss. In addition, decreased motor-vehicle, air and rail travel and congestion would have positive effects on air quality at the local, regional, and national levels. The improvements in air quality and resulting water quality would also have more positive effects on ecological systems, including lesser particulate deposition and acidrain effects on vegetation and wetlands. The Maglev Action Alternative would present no significant adverse impact to coastal zone management and any selected site within a Coastal Zone District would be in compliance with State Coastal Management Plans.

- Water quality - The Maglev Action Alternative would utilize elevated guideways, so support structures would occupy a minimal amount of surface area, grading would be minimized, and drainage patterns are not expected to be impacted. The development associated with Maglev implementation increases impervious surfaces to a much lesser extent than the No-Action Alternative.

Other areas that could be impacted to a lesser extent by the Action Alternative than by the No-Action Alternative include:

- Negative socioeconomic impacts such as property acquisitions and displacement of residential and business populations, community cohesion disturbance, and stresses on locally provided services.

- Elevated Maglev guideway in land-use-sensitive areas and maximum use of existing transportation and utility rights-of-way will minimize impacts to land use (general, farmlands, and recreation areas and parklands) and historic Archaeological and cultural Resources.

- Visual and aesthetic impacts - Maglev has the potential to impact visual and aesthetic resources to a lesser extent than airport or highway expansion projects.

In conclusion, high-speed Maglev technology has the potential to satisfy the need for additional transportation capacity in our most congested and environmentally impacted intercity corridors in a more environmentally benign manner than the conventional travel modes. Deployment of Maglev would help to alleviate the growing congestion of the Nation's airways and highways and could reduce the need for additional highway or airport construction. Against the background of existing and future transportation demand and congestion problems, Maglev should be viewed as a potential part of the solution. Maglev technology is one of the most advanced ground transportation systems available today, and it complies with the high performance requirements established by US DOT for high-speed, competitive ground transportation service. The diversion of intercity trips from air, auto, and rail modes to Maglev could result in net reductions in energy usage, petroleum consumption, emissions of most airborne pollutants, and accidents. Higher speed, reliable travel would improve access between employment and population centers and help to accommodate the significant growth in population and travel demands projected for the future. Strategic economic goals of job creation, technological advancement, and international competitiveness would be enhanced by the development and building of Maglev systems.

8.0 Mitigation

The implementation of Maglev technology is considered to be a potential part of the solution to the challenge of meeting transportation demand in a manner that is environmentally benign and feasible form an economic and social perspective. However, as with any project of this magnitude, the potential for adverse environmental impacts exists. In order to avoid or minimize the potential adverse impacts of the Maglev Deployment Program, mitigation strategies were proposed that could be implemented and adopted. Where impacts cannot be avoided or minimized, restoration and compensation strategies could be used.

This section includes a summary of the main mitigation strategies that would be used as a minimum to address potential adverse impacts to human and natural environment. During the Maglev programmatic environmental review process, many concerns were raised that were specific to a particular state or should be considered at the site-specific level of NEPA analysis. After the Final PEIS was made available to the public, additional comments were received indicating concerns that should also be considered at the site-specific level of analysis. The mitigation strategies described here are in part derived from the comments received on the Final PEIS. Those concerns were instrumental in developing the following mitigation strategies. At a minimum, these mitigation strategies would be considered in the site-specific Environmental Impact Statements developed by the two states selected for further planning.

Alignment Alternatives – If practicable, tunneling and other alignment shifts would be considered as a mitigation strategy to minimize noise and vibration, visual, historic, archaeological, and cultural, socioeconomic, and other impacts.

Noise and vibration – In the early planning stages of the Maglev Deployment Program, several potential mitigation strategies to minimize the effects of noise and vibration have been identified. These include upgrading guideway support columns, increasing elevation of guideway, increasing mass of guideway supports, increasing mass of guideway foundation, and the use of noise barriers. During the programmatic environmental analysis the TR-08 maglev vehicle was proposed. However, little technical information was available on this newer vehicle and TR-07 operational parameters were used in the analysis. As part of FRA's commitment to assuring that technical concerns are addressed accurately, a noise and vibration measurement program is being carried out at the Transrapid test track in Germany on the TR-08 vehicle. This information will be also used to address the startle effect of the maglev vehicle.

Electromagnetic fields – A variety of mitigation strategies could be implemented to minimize the potential adverse human health impacts from EMF exposure. These include careful siting of electric power distribution and conditioning facilities, EMF field reduction, refinement of power and propulsion of electromagnet levitation and guidance designs, and third rail power conditioning and supply systems, the use of buffer zones to minimize user and worker exposure, and focussed worker training, among many others. To assure the accuracy of the EMF profile of the TR-08 vehicle, an EMF measurement program of the TR-08 at the Transrapid test track in Germany is being performed. This measurement program is to assure that the exposure levels for workers and users meet current applicable U.S. and international human exposure safety standards and guidelines. In addition, this would require appropriate field-testing at the site-specific level to evaluate the current conditions in the areas where the system would operate in order to determine the significance of the potential effects of the added EMF from Maglev operation. FRA would also consider requiring monitoring and validating EMF after Maglev begins operation.

Safety – Public safety is one of the most important considerations with regard to the implementation of the Maglev Deployment Program. As part of the safety mitigation effort each state would address site-specific concerns including, analysis of the safety performance of the system in case of power failures, skid plate performance, potential system failures, evacuation of riders, platform safety of arriving and departing Maglev trains, and the potential hazards of on track debris.

Performance tests – FRA has responsibility for ensuring railroad safety and reliability throughout the Nation. Maglev would not begin commercial service without testing and performance validation. Thus, prior to public use of the Maglev system, FRA would require a detailed performance and safety-testing plan would be identified and implemented.

Financial analysis and ridership – A detailed evaluation of the construction and operating costs of the system, as well as of the potential demand from users, would be identified to assure the cost-effectiveness and revenue-producing potential of each state’s Maglev program. FRA plans to use a peer review panel to oversee the refinement of the ridership estimates and financial information regarding each of the projects.

Land use, farmland, and 4(f) resources – As part of the site-specific environmental analysis process, potential conflicts with local and regional land-use plans would be identified, and coordination with local governments would be carried out to minimize any anticipated adverse effects. In addition, coordination with the relevant agricultural and natural resource conservation agencies would be carried out to minimize impacts on farmland resources. Mitigation strategies could include the use of an elevated guideway. Finally, avoidance of impacts to 4(f) resources would be pursued. When avoidance is not feasible and prudent and there is a use of the resource, all possible measures to minimize harm would be developed and implemented through direct consultation with the appropriate authority having jurisdiction over the impacted public-recreational resource.

Natural ecosystems and wetlands – Mitigation plans would be implemented as a strategy for avoiding and minimizing the potential impact of the deployment of the Maglev Projects on natural ecosystems and wetlands. Avoidance of adverse impacts through project design is the preferred method to protect ecological resources and wetlands. Where impacts cannot be avoided, minimization strategies would be developed and implemented, to protect the functions and health of ecological systems and wetlands. Impacts on ecological systems and wetlands that cannot be avoided or minimized would be addressed through restoration and compensation strategies that could help in the reestablishment of those ecological functions lost from the imposed disturbance.

Where necessary, further mitigation strategies would be implemented and adopted for other resources (e.g., cultural and archaeological resources) not included above. The above list is considered a minimum and includes some of the most relevant resources that could be potentially affected by each of the State projects and identifies potential mitigation strategies. These could be applicable for minimizing adverse effects on other resources as well. New mitigation strategies would be identified as the site-specific environmental analysis progresses. The site-specific Environmental Impact Statements under development by the two selected states will include additional mitigation strategies proposed for adoption during the construction and operation phases of the project.

9.0 Decision

The decision process supporting this ROD included consideration of a substantial number of technical and financial analyses. The following documents summarize this work and shows the depth of analysis peculiar to Maglev: *Report to Congress, Assessment of the Potential for Magnetic Levitation Transportation Systems in the United States, Moving America, New Directions, New Opportunities; MAGLEV 93: 13th International Conference on Magnetically Levitated Systems and Linear Drives; Maglev Vehicles and Superconducting Technology Integration of High Speed Ground Transportation into the Air Travel System; Benefits of Magnetically Levitated High Speed Transportation for the United States, Volume 1 Executive Report*; *U.S. Congress, Office of Technology Assessment, New Ways: Tiltrotor Aircraft & Magnetically Levitated Vehicles; and High-Speed Ground Transportation for America*. FRA has also carefully considered the technical review of the affected environment and potential environmental consequences prepared by each participant, the DPEIS, comments received during the Maglev Deployment Program NEPA process, the PEIS, public meetings, and public hearing. The potential implementation of Maglev into the United States has been vigorously analyzed and found to be an appropriate transportation technology. The decision to proceed with the Maglev Deployment Program, and further consider the Maryland and Pennsylvania Maglev preferred project alternatives, is based on the potential benefit of Maglev to alleviate congestion and assure transportation capacity continues to support the economy and vitality of the nation. Proceeding with the program also ensures that Maglev will be seriously considered in future high-speed ground transportation corridor planning to improve intercity and regional transportation.

Implementing the Maglev Deployment Program could lead to faster trip times that would attract passengers off of congested highways and airports. Supporting the commercial development of Maglev would show that it is capable of cruising speeds of approximately 400 to 500 km/h (250 to 310 mph) to compete with airplanes and ultimately helping to alleviate airport congestion. Maglev would also satisfy reliability of service by achieving very close train departures and arrivals, which is critical to satisfying consumer demand during peak commuter times. Maglev would have the ability to provide frequent service to central business districts, airports, and other major metropolitan area travel nodes. Frequent service to these locations satisfies customer demands and alleviates congestion at major population areas. The unique ability of easily co-locating Maglev guideway with existing utility or transportation corridors reduces costs, requires less land, and minimizes impacts. The flexibility of Maglev to accommodate large surges of passengers well into the twenty-first century is critical to peak hour travel demand transport. Grade crossings and inappropriate pedestrian access to tracks are safety concerns and have the potential of being reduced while obtaining higher speeds with Maglev.

Maglev affords the potential of more efficient energy use than air and auto modes of travel that require the direct consumption of petroleum for power. This in turn could result in reduced air emissions and an enhanced environmental quality and sustainability. Compared to conventional modes of available travel in the United States and other rail high speed ground transport alternatives Maglev has a greater combined benefit of faster trip times, reliability during peak demand, convenience, ability to share corridors, achieving high capacity, safety, and petroleum independence.

Furthermore, environmental concerns were a key consideration in the decision process. Maglev deployment has potentially less impact in several key environmental areas than the development associated with the No-Action Alternative. The environmental benefits of Maglev include: reduced congestion; reduced travel time; less airport delays; petroleum independence and fuel use savings; improved air and water quality; reduced production of ozone producing pollutants; increased safety; noise reduction; and less intrusion on ecological resources, natural ecosystems, wetlands, vegetation and wildlife (including endangered species) than the No-action Alternative.

In light of the benefits of proceeding with a Maglev demonstration program, FRA was faced with determining which of the participating projects offered the most promising opportunity to achieve an operating Maglev system. After considering the strengths and weaknesses of each of the seven projects, FRA concludes that the Maryland project and the Pennsylvania project provide the highest probability of securing the non-federal resources and of establishing and maintaining the organization needed to construct and operate a project of the magnitude required to provide a good demonstration of the technology. In reaching this decision, the agency has considered the limited financial resources available to the program and the clear statutory intent that the program result in the timely deployment of Maglev technology. This factor requires the Department to focus its efforts on a very limited number of projects.

The Maryland Project and the Pennsylvania Project both presented proposals that included strong service characteristics, a strong financing plan, and appeared well on their way to putting together an effective public/private partnership that included substantial financial commitments from state sources. The Pennsylvania Project also has unique plans to use the plant needed to build the project as a platform for developing a high technology steel fabrication industry in the Pittsburgh area.

Although not selected to participate in the next phase of the Maglev Deployment Program, the projects in California, Florida, Georgia, Louisiana, and Nevada all showed promise, and FRA appreciates the efforts of each of the participants in developing proposals. However, these projects were judged by the agency to be not as strong as the two selected projects. At the direction of Congress in the FY2001 Department of Transportation and Related Agencies Appropriation Act, FRA has made available almost $1 million in federal funds for each of the projects to assist them in continuing to develop their projects.

The FRA selects the Action Alternative of proceeding with the Maglev Deployment Program, including the continued process of selecting a final project to demonstrate Maglev. The

Maryland and Pennsylvania projects will be considered for the next phase of the Maglev Deployment Program. The next phase will be initiated by each of the selected participants as soon as possible. Any decision to proceed with the construction phase of the Maglev program is contingent on receipt of Congressional appropriations and completion of additional site-specific environmental impact statements and other pertinent program considerations.

Original Signed 6/29/01 by: S. Mark Lindsey
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