

April 24, 2001

S. Mark Lindsey, Esq.
Acting Deputy Administrator
Federal Railroad Administration
1120 Vermont Avenue, N.W.
Washington, D.C. 20590

Dear: Mr. Lindsey:

The TRB Committee for Review of the Federal Railroad Administration (FRA) Research and Development (R&D) Program held its seventh meeting on March 15–16, 2001, in Washington, D.C. FRA staff have indicated that they would like this review of the program to continue in the future; nonetheless, the committee wants to take this opportunity to review its original charge, its prior recommendations, and the evolution of the R&D program during the 3 years since the committee was formed.

The March 15–16 meeting was divided into two parts: the Safety R&D program was addressed on the first day, and the Next Generation High-Speed Rail (NGHSR) program on the second day. This meeting also provided an opportunity for the committee to perform its annual review of FRA's R&D program, although the fiscal year (FY) 2002 budget proposals were not yet available. The committee roster provided as Enclosure 1 indicates the members who attended the meeting.* Following an open session with staff from FRA and the Volpe National Transportation Systems Center (Volpe Center), as well as invited speakers, the committee met in executive session to deliberate on the information presented and to develop this report.

The committee wants to thank all the FRA and Volpe Center staff who participated in the meeting (see Enclosure 2 for a list of these individuals). We would also like to thank the invited speakers who made presentations to the committee during the meeting. External views of industry, labor, transit, and state government customers of the Safety R&D and NGHSR programs were presented by Alan Lindsey, Steve Kenyon, Jeff Kovacs, Robert Harvey, Frederick Gamst, and Randall Wade. Bob Blank and Adam Mastrangelo reported on joint industry–FRA research work. (See Enclosure 3 for speakers' affiliations and the subjects they addressed.)

In the following sections of this report, the committee first briefly summarizes its prior recommendations and FRA's related actions, and then presents its findings and recommendations on the Safety R&D and NGHSR programs.

SUMMARY OF COMMITTEE'S PAST LETTER REPORTS

When this committee began its work 3 years ago, it was asked to perform four annual reviews of FRA's R&D effort, encompassing both the safety-oriented Railroad R&D and NGHSR programs.¹ This work was to build on that of the earlier Committee for an Assessment of Federal High-Speed Ground Transportation R&D (which issued four letter reports during its 1996–1997 term).

Specifically, in conducting its reviews, the committee was asked to address the following aspects of FRA's R&D activities:

- The management structure and approach
- The current direction and allocation of funds to the various program areas
- The balance of federal, state, and private-sector input and cost sharing
- Directions and objectives in the 5-year R&D strategic plan

In addition, the committee was asked to examine whether a Railroad Safety Institute should be established. Throughout its reviews, the committee was asked to maintain as a focal point the question of whether the FRA R&D program could better serve the agency's safety mission.

Following each annual program review, the committee was required to submit a formal letter report summarizing its findings and recommendations; this is the fourth and final report of the series. In addition, the committee chose to hold three interim meetings in an effort to better understand the program's relationship and joint research activities with both the Transportation Technology Center, Inc. (TTCI) and the Volpe Center, as well as to obtain more detail in some research areas. Two interim letter reports were generated as a result of the meetings at TTCI and the Volpe Center.

The committee addressed the question of cost sharing early on, and found that FRA and the rail industry have an established history of significant sharing of the costs of R&D related to track, structures, and other engineering projects. The NGHSR program has benefited from substantial cost sharing on most of its major projects. However, the committee cautioned FRA to consider the implications of cost sharing for safety-related research when those being asked to share costs may also be subject to the resultant safety requirements and have to bear associated implementation costs.

¹ Because the work of FRA's Office of R&D is devoted almost entirely to supporting the agency's safety mandate, the R&D program is referred to interchangeably as the Railroad and/or Safety R&D program.

At its March 2000 meeting, the committee addressed the question of whether a Railroad Safety Institute should be established. The committee found that FRA's R&D program draws on a considerable pool of diverse researchers and identified potential disadvantages of a university-based institute (including a diversion of resources from ongoing programs and the limited, incremental benefits to be gained). As a result, the committee did not support creation of such an institute, but recommended more outreach to university researchers.

The committee has focused its attention primarily on the Safety R&D program and has recommended that FRA take the following actions:

- **Use risk analysis to identify problem areas and high-return projects.** From the beginning, the committee was concerned about the process for identification, evaluation, and prioritization of research projects that make up the R&D program. A series of committee recommendations focused on the need to develop an explicit rationale for priority setting, linked to a risk assessment process.
- **Develop better accident cause statistics by mining existing sources, including relevant research literature, instead of issuing rulemakings to expand accident reporting.** As FRA worked on developing for each major program area the safety information needed to undertake a risk assessment process, some of the deficiencies in existing data became clear, including the lack of data on multiple causes of accidents and on near-miss events. Recognizing that a formal rulemaking to change accident and incident reporting is not an immediate remedy, the committee recommended that FRA enhance its understanding of accident root causes and their relative importance by exploiting a number of existing disparate information sources that may be relatively difficult to access. (See the section on "Accident Data" and Recommendation 2 below.)
- **Strengthen the human factors research area, both broadening its scope and engaging a more diverse pool of researchers.** Human factors is a good example of an area in which accident and incident causes are not well known or understood, and research on root causes could yield significant benefit. Research in other modes and by other researchers than those already engaged in FRA's program could increase the benefit of already completed work that may be applicable in the railroad domain.
- **Strengthen grade-crossing and trespasser research in view of the large number of associated fatalities and injuries each year.** Examination of total losses (or harm) related to railroads clearly reveals that these are the largest sources of fatalities and injuries each year. Thus the committee has encouraged FRA to increase R&D in this area

and to ensure coordination of grade-crossing research within the U.S. Department of Transportation (USDOT).

- **Conduct contextual research on technological and operational developments within the railroad industry that may influence the need for safety R&D.** In recent years, the work of the Office of R&D has been devoted almost entirely to safety research in support of FRA's regulatory mandate. Because of the long time frame involved in planning and conducting research, results may be produced long after the need has arisen. FRA should try to anticipate tomorrow's safety issues, technology challenges, and related research needs by conducting research on the future context of freight and passenger railroad operations. Aspects of the future context of railroad operations from which safety issues could arise include increased traffic flows and strains on capacity; the relative mix of commodities in freight traffic; the mix of freight and passenger services; the introduction of new technology and equipment, both freight and passenger; mergers of rail companies; and changes in public policy concerning passenger rail.
- **Seek additional management resources to support the large number of projects under way, the needs of the Office of Safety, and special requests from the Railroad Safety Advisory Committee (RSAC).** The program's resources are frequently strained by competing scheduled and nonscheduled demands.
- **Conduct research on how the application of performance standards in safety regulation can be expanded.** Performance standards facilitate the introduction of new technology by expressing safety requirements as an outcome—for example, a maximum failure rate for a specific accident type—rather than as design requirements and operating and maintenance procedures.

The committee is heartened to see that FRA has responded to the above recommendations by developing a rational method for assigning priority to research projects, increasing research on human factors and on grade crossings, coordinating grade-crossing activities with other modal administrations within USDOT, and initiating a research project on how to make the transition to performance standards.

Relatively few recommendations related to the NGHSR program have been offered, as the course of its major projects was set early in the committee's tenure. (Recommendations from this committee's predecessor, which reviewed only the NGHSR program, helped shape the program's direction.) In past reports this committee has expressed the view that the themes of the program—reducing grade-crossing hazards, developing nonelectric motive power, developing positive train control, and addressing needs for mixed freight and passenger

operations—are correct and appropriate to meet the needs of states that are developing incremental high-speed rail. Moreover, the committee is pleased to see that there has been substantial progress on NGHSR projects. The nonelectric turbine locomotive is nearing completion, the train control projects in Michigan and Illinois are making progress on technology that is seen by the program's customers as a critical need, and an evaluation of the sealed corridor approach to grade-crossing improvements is under way.

At the committee's March 2001 meeting, customers of both the Safety R&D and NGHSR programs were asked to share their views on appropriate future directions for the respective programs. The remaining sections of this report present customer perspectives, project updates, and the committee's related findings and recommendations for each program.

SAFETY R&D PROGRAM

Customer Perspectives

Customers external to FRA, representing Class 1 freight railroads, commuter railroads, and rail labor, were asked to participate in the meeting. (See Enclosure 3.) They were invited to present their views on the usefulness and relevance of R&D to railroad safety, on the dissemination of information about research in progress and research results to the industry, and on future research needs. The following key points were made:

- Timely distribution of research results is essential and has been lacking in the past. Customers are encouraged by FRA's new approach of publishing research notes on its website and suggested that FRA could also develop a list for mail distribution. (The committee notes and commends the efforts by R&D staff to publish their results in technical journals and to make presentations at technical and industry conferences.)
- Engineering-based research on track and components, track–train interaction, and related subjects was widely praised by customers attending the meeting and by committee members.
- Research on human factors accidents is difficult because it can impinge on sensitive labor–management and regulatory issues. Examples are the adversarial process under the Federal Employers' Liability Act of 1908 (FELA) for compensating employee injuries, and the railroad industry's fears that FRA will use research results in regulatory and enforcement actions. Customers suggested that the R&D Office should proactively seek ways of conducting this sensitive but important research that would not affect the legal liability of railroads or their employees. These steps should include consulting with FRA legal counsel and reviewing relevant

resources on the conduct of this kind of research, including Federal Aviation Administration (FAA) procedures and National Transportation Safety Board (NTSB) sources.²

Review of FRA's Program Updates

Project Evaluation. The committee is pleased with FRA's development of a project evaluation methodology and encourages the agency to continue using this approach for setting research priorities. However, the committee would like to see greater focus on root causes, rather than simply evaluation of a list of projects. For example, contributing causes to a broken-rail derailment could lie in rail quality from the steel company, use of an inappropriate rail quality for a specific location, wrongly set inspection thresholds or intervals, poorly maintained inspection equipment, an untrained inspector, or a breakdown in the implementation of corrective action³. At the same time, FRA should continue to use the methodology in an effort to reduce the number of projects undertaken and thereby ensure optimum allocation of program resources.

Recommendation 1. FRA should continue using its project evaluation methodology, incorporating root-cause analysis (see the section on "Accident Data" and Recommendation 2 below).

Accident Data. Complaints are frequently voiced that railroad accident data are insufficient to support effective research. This is the case primarily because FRA reports identify only one cause, whereas in reality most accidents have several contributing causes. The reporting system does not provide for root-cause analysis, only identification of the immediate failure that caused an accident. While further detail may be required in future reporting, especially with regard to near-misses, root-cause analysis for individual accidents is unlikely ever to be a reporting requirement. Such a requirement would simply be viewed as too burdensome. The most desirable course of action is to research the root causes of different types of accidents using existing resources to the extent possible, supplemented by limited data-gathering efforts as part of the research program where needed to fill gaps. (See the annex to this report on existing sources of accident data that could be used for root-cause analysis.)

Recommendation 2. Root-cause analysis should be part of the research agenda to aid in the development of effective

² On April 25–26, 2000, NTSB held the Symposium on Transportation Safety and Law. See www.nts.gov/events/2000/symp_legal/default.htm for some relevant papers and presentations.

³ Root-cause analysis is a process of identifying all possible contributing causes to accidents that are then ordered in a logic diagram showing how individual causes combine sequentially or in parallel to produce the accidents. The relative importance of each contributing factor can be determined by analyzing existing accident data or doing field research. With this understanding of contributing causes, their relationship to each other, and their relative importance, research efforts can be focused on remedial actions and strategies for preventing accidents.

countermeasures. The analysis would likely involve cooperative efforts with industry and labor. Past research results should be reviewed and available accident data extracted before new data-gathering efforts are initiated.

Human Factors Research. As recommended in its prior letter reports (particularly that of April 28, 2000) and noted above, the committee believes there are benefits to be gained from engaging a broader range of researchers in the human factors area.⁴ The program's customers have pointed out the need for research to reflect cognizance of sensitivities related to labor-management relations and industry fears of regulatory or enforcement actions.

Recommendation 3. FRA should continue to strengthen human factors research by engaging a broader range of researchers and drawing to a greater extent on research results from other domains. The R&D Office should proactively seek ways of conducting research in this sensitive area that do not affect the legal liability of railroads or their employees. (See Safety R&D Program Customer Perspectives above.)

Grade-Crossing Research. FRA's presentation on "ONE DOT Highway-Rail Grade Crossing Team" offered an encouraging look at the extent to which FRA and the other modal administrations within USDOT have adopted a common and coordinated direction for grade-crossing research. As noted earlier, this research continues to be a priority because of the large numbers of incidents and fatalities in this area each year. In particular, studies aimed at finding root causes of grade-crossing accidents and associated behavior of road vehicle drivers are needed to help industry and government develop cost-effective countermeasures.

The committee also heard a presentation from Adam Mastrangelo of the Norfolk Southern (NS) Research and Test Department on the use of video cameras mounted on locomotives to record driver behavior at grade crossings, particularly at the time of accidents. A proposed collaborative project between NS and FRA to use the resulting video data in research holds promise for informing future

⁴ The April 28, 2000, letter report states as follows: The committee is pleased to learn of cooperation with the Federal Aviation Administration (FAA) and other outside researchers on projects and as program consultants. The committee understands that only a small proportion of the R&D budget is available for contracts to researchers outside the organizations that provide ongoing support to the program (including the Transportation Technology Center, Inc. [TTCI], the Volpe Center, and other contractors retained on a work order basis). Within these constraints, however, the committee encourages FRA to continue to seek opportunities for outreach to other researchers. **Recommendation 7.** Within budgetary and contractual constraints, the committee strongly encourages FRA to engage a broad range of researchers in the human factors R&D program, especially in the areas of information management and the design of advanced displays.

safety improvements. It will be necessary, however, to find a way of addressing train crews' privacy concerns while still obtaining the required data.

Recommendation 4. The committee supports FRA's continued focus on grade-crossing and trespasser-related research in cooperation with other USDOT modal administrations. The committee strongly encourages studies aimed at identifying root causes of grade-crossing accidents and associated behavior of road vehicle drivers. Video data from the NS project and from similar efforts involving other railroads, such as Amtrak, could be valuable as documentation of crossing accidents, incidents, and near-misses and help in the development of new countermeasures.

Recommendation 5. Much valuable grade-crossing research has already been completed (including projects such as the North Carolina Sealed Corridor project under the NGHSR program, discussed below). FRA should facilitate the distribution of research notes on this work, summarizing information that would be useful to state and local officials and other decision-makers in selecting particular grade-crossing improvements to be implemented. (The website uiairpave.ce.uiuc.edu/transport/trba3a05/index.htm may be a good starting place for collecting this information.)

Track and Vehicle–Track Systems Research. Research in this area has been useful to the industry and should be continued. The project evaluation methodology discussed above has been helpful in focusing project selection and program resources.

Recommendation 6. The highly successful applied engineering research on track and vehicle–track systems should be continued, with the results of the project evaluation process being used to give priority to selection of projects with the highest expected benefits.

Performance Standards. In response to earlier committee recommendations, FRA budgeted for a project this year on the application of performance standards to railroad safety requirements, which will be initiated soon. The committee fully endorses the importance of this study, especially to clarify misconceptions about what the term "performance standards" means. The committee believes performance standards (referred to as "performance-based regulations" in earlier letter reports) are critical in reducing barriers to the railroad industry's application of new technology, inspection methods, and operating practices. For example, the wayside systems for monitoring the condition of trucks and wheels that are the subject of a cooperative program with industry might reduce the need for conventional inspections, but reducing inspections would be precluded by current regulations. Without an offsetting benefit, there is a reduced incentive to invest in such new technology.

Recommendation 7. The committee urges the FRA Office of R&D, in partnership with the Office of Safety, to continue and accelerate research on performance standards. In conducting this research, FRA should also consider the effectiveness of process-oriented approaches to safety improvement, such as the System Safety Plan Program, Dupont Safety Resources, and the Safety Assurance and Compliance Program, as compared with traditional regulations. It is important that the Office of Safety be engaged in planning this research project to ensure that the results can be implemented, and that performance standards can be shown to provide a level of safety at least equal to that provided by traditional safety standards.

Dissemination of Research Results. The R&D program is producing useful information in all its major areas, and increased effort should be made to share these results in a timely way with industry and others who can benefit.

Recommendation 8. FRA should strengthen efforts to distribute research results in a variety of ways, including the FRA website and papers and presentations at technical conferences. FRA should also minimize the time between the completion of research and the distribution of results.

Relationship with the Office of Safety. The committee is pleased to see the R&D program becoming data driven, and would like to see safety initiatives driven by data as well. The Office of Safety tends to approach the Office of R&D with specific requests, such as analysis of a waiver request or support for RSAC, which are unplanned by the Office of R&D and divert resources from scheduled work. There needs to be a more strategic relationship, whereby the two offices formulate a research agenda appropriate to the Office of Safety's plans for new or amended rules, the results of the project evaluation process, and the government planning/budget cycle, although the committee recognizes that short-term demands will always arise.

Recommendation 9. To the extent possible, the Office of Safety should be more engaged in R&D strategic planning to reduce the number of unplanned tasks. Such planning could also help to ensure alignment among critical safety issues revealed by the data, the Office of Safety's agenda for regulatory development, and the Safety R&D program.

NEXT GENERATION HIGH-SPEED RAIL PROGRAM

Customer Perspectives

Representatives from three state DOTs spoke as customers of the NGHSR program, whose products are intended to facilitate the development of incremental HSR. These customers confirmed that the original selection of train control, a nonelectric locomotive, and grade crossings as the major issues to be addressed by the program was appropriate, and that these issues should continue to be the focus of further program efforts. They agreed that positive train control to allow for operations above 79 mph is key to their respective plans and should be the highest research priority. Other concerns of these customers included the following:

- Research results and lessons learned from NGHSR efforts, such as the North Carolina Sealed Corridor Project, should be made available to other states. States are in various stages of planning HSR initiatives, but find it difficult to access needed information and are in danger of reinventing the wheel.
- States planning HSR services need guidance on what infrastructure is needed to accommodate different levels of mixed freight and passenger traffic while ensuring high-quality service for both. Those undertaking corridor development must take into account the likelihood that a freight railroad that owns the property will want to deliver at least the same level of service into the future. Further, the owner will generally want to retain access to the surplus capacity of a route.
- State planners will also need to know the point at which it becomes desirable or essential to provide separate tracks for freight and passenger service, taking into account factors such as volume, frequency, speeds, and schedules of both freight and passenger trains. They will also require information on what tools or models are available for high-quality analyses of route capacity that will be acceptable to all parties jointly operating on a particular route.

Review of Major Projects

- Nonelectric locomotive—High-speed testing of the gas turbine–electric locomotive is just starting at TTCI in Pueblo, Colorado. Good progress has been made, and the committee looks forward to examining the test results if its review function continues.
- North Carolina Sealed Corridor Project—This very successful approach to improving grade-crossing safety will likely result in substantial reductions in grade-crossing risk. FRA should document the entire planning process

for the project, what was and will be done and why, and actual and expected results. Preparation of an assessment report is a good step to take, but the committee questions an analysis provided at the meeting. The findings presented were based on a sample comprising only eight crossings, each of which had a fatal accident during the period analyzed. The committee hopes the assessment report will include the use of field data to estimate reductions in violations (such as driving around gates) and collisions, and to derive from these data an estimate of fatality reduction. In addition, the committee recommends that a statistician/peer review of the analyses be conducted.

- Michigan Incremental Train Control System (ITCS) Project—The ITCS is close to being operational. The committee strongly encourages FRA to document the project, including what difficulties were encountered—both institutional and technical (including the FRA approval process); how they were overcome; which technical difficulties were associated with the ITCS architecture; and what the timeline for the project was, including factors contributing to delays. Such information would be of great use in developing the many proposed corridors now in the detailed planning stage.
- Advanced Locomotive Propulsion Systems Project—Encouraging progress is being made, especially with the high-speed alternator, a desirable replacement for the cumbersome existing arrangement in the turbine locomotive.
- North American Joint Positive Train Control Initiative—Progress is being made on this project, and initial operations are planned for early 2003. The committee looks forward to hearing about future progress if its review function continues.

Train Control

Given progress on the nonelectric locomotive and on the grade-crossing issue, train control remains the greatest barrier to U.S. incremental high-speed operations. Practical application of the results of the North American Joint Positive Train Control Initiative will occur at some future time, following testing in 2003. ITCS may not be supported in the future by Harmon/GE Harris (making it even more important to extract lessons learned from the project). Burlington Northern Santa Fe has applied to the Office of Safety for permission to use a Santa Fe-type automatic train stop system only for passenger trains that would reach 90 mph in three corridors, but the Office of Safety has not approved the request and has asked for additional justification. Retrofitting freight locomotives with on-board train-control systems is presently viewed as cost prohibitive by the freight railroads, given their need to retain full flexibility to use locomotives anywhere on the system. The committee wonders whether progress could be

made by using a train-control approach that would provide acceptable safety while requiring equipment only on intercity and commuter passenger trains.⁵

Future Directions for the NGHSR Program

In relation to future directions for the NGHSR program, the committee makes the following recommendations:

Recommendation 10. FRA should give priority to train control projects in future NGHSR program allocations, with emphasis on ways of avoiding the need to equip all trains on a corridor and applications to different traffic mixes.

Recommendation 11. FRA should develop tools for operations and safety planning needed to support the development of HSR corridors and to aid in negotiations by the HSR developer with both freight railroad track owners and the FRA Office of Safety. FRA should also create an inventory of infrastructure and operations data on the HSR corridors, including, for example, track diagrams, actual and proposed traffic flows and schedules, train performance calculator and capacity simulators, indexed moving digital images, grade-crossing pictures and hazard data, civil engineering estimates and data, and design information on changes. It is now possible to develop such inventories so that they are readily accessible from PCs. Developing new tools as required and making inventories available would permit easier analysis of potential corridor questions.

Nationwide Differential Global Positioning System (NDGPS)

The committee does not understand the rationale for moving the funding for NDGPS to FAA, reducing the funds, and thus delaying completion of the system for many more years. Therefore, the committee reiterates its prior recommendation (from the April 28, 2000, letter report) that completion of this important system be made a priority within USDOT:

The committee supports FRA's role as program sponsor for development of the Nationwide Differential Global Positioning System (NDGPS) and urges continued funding to keep this important project on schedule. NDGPS is an essential component of PTC and of advanced train control and traffic management systems in general, and essential safety projects will be delayed unless the system is completed on schedule.

Recommendation 6. The committee believes completion of NDGPS is a matter of very high priority for the nation, offering benefits that more

⁵ Perhaps a more advanced intermittent train-control system, such as an adaptation of the Advanced Civil Speed Enforcement System portion of the Northeast Corridor system or the European Train Control System Level 1, could be examined. Also meriting consideration could be the next generation of ITCS and the combining of train control with other safety improvements.

than offset the system's installation and operation costs and extend far beyond railroads, or indeed transport. The committee recommends that the Administrator make an effort to communicate this sense of urgency to the Secretary of Transportation, and that the Secretary make completion of the system a priority within USDOT.

CONCLUSION

All committee members want to express their gratitude to Steve Ditmeyer and the R&D staff for their continued cooperation, support, and collegial spirit, without which the committee's work would not have been possible.

Sincerely yours,

Alan J. Bing
Chair, Committee for Review of the FRA Research and Development Program

Enclosures

cc: The Honorable Ted Stevens
The Honorable Robert C. Byrd
The Honorable Richard S. Shelby
The Honorable Patty Murray

The Honorable C. W. Bill Young
The Honorable David R. Obey
The Honorable Harold Rogers
The Honorable Martin Olav Sabo

*As is standard policy for National Research Council committees, the members of this committee meet in executive session at the outset of each meeting to discuss any potential or perceived conflicts of interest that might have arisen for any of them. The committee has agreed to abide by TRB policies for dealing with conflicts of interest that may arise in the bidding for or winning of FRA contracts by firms with which members are associated. In the interest of full disclosure, we note the following FRA-related activities.

First, FRA funds a research program from its Next Generation High-Speed Rail (NGHSR) program that TRB administers on FRA's behalf, as described below. TRB has established policies and procedures to ensure that this committee can evaluate the HSR R&D program independently of any impact its evaluation might have on TRB or the National Research Council. The Innovations Deserving Exploratory Analysis (IDEA) program for intelligent transportation systems (ITS) includes a component that supports projects on ITS applications for the development and deployment of advanced rail system technologies, including HSR systems.

FRA also provides funds for an HSR IDEA program that solicits technological innovations that may be useful in upgrading the existing U.S. rail system to accommodate operations up to 125 mph and beyond in support of the NGHSR program. In FY2000, FRA allocated \$1,000,000 for the ITS and HSR IDEA programs. FY2001 funding for these programs is also planned. The IDEA programs are administered by the Special Programs Division of TRB. IDEA investigations explore the feasibility of innovative and unproven new concepts or evaluate novel applications of advanced technologies from defense or industry to ITS or HSR practice. An IDEA award is a pass-through of funds to provide one-step, short-term support.

Second, individuals with the expertise and experience necessary to review the FRA R&D program generally have some prior or ongoing relationship with the sponsor. For example, Alan Bing's employer has had prior contracts with the Volpe Center for FRA research projects. At the end of September 1999, Bing's employer, Arthur D. Little, Inc. (ADL), was awarded a 5-year task order contract by the Volpe Center for rail-vehicle crashworthiness research. Two firms received such awards and will normally compete for individual tasks. Most of the research to be carried out under the contract is funded by FRA. ADL has completed one task for Volpe, at a cost of about \$150,000, that involved studying the buckling and override behavior of Talgo trainsets in collisions, and recently received two new tasks: for continued analysis of Talgo collision performance (\$250,000) and for a prototype crushable structure for the ends of a passenger car to absorb collision energy (\$400,000). Bing is making minor contributions to these projects. In addition, ADL is a subcontractor on a team that was awarded a 5-year R&D support contract by FRA in March 2001. Three contractor teams received such awards and will normally compete for individual tasks. No tasks have yet been announced by FRA.

Third, John Samuels is chairing the management committee for the North American Joint Positive Train Control Program, which is partially funded by the FRA Office of R&D and is being managed by Transportation Technology Center, Inc. staff with guidance from the management committee. Thomas Schmidt is also a member of the management committee.

Enclosure 1

**Committee for Review of the Federal Railroad Administration
R&D Program**

Committee Members Attending March 15–16, 2001, Meeting

Chairman

Dr. Alan J. Bing
Senior Manager
Arthur D. Little, Inc.
March 15 and 16

Members

Ms. Anna M. Barry
Director of Railroad Operations
Massachusetts Bay Transportation
Authority
March 15 and 16

Mr. John G. Bell
Program Director, High Speed Trainsets
National Railroad Passenger Corporation
March 15 and 16

Dr. Sherwood C. Chu
Bethesda, Maryland
March 15 and 16

Mr. Nazih K. Haddad
Manager, Intercity Rail Passenger
Service
Florida DOT
March 15 and 16

Dr. John M. Samuels
Senior Vice President
Operations, Planning and Support
Norfolk Southern Corporation
March 15 and 16

Dr. Nadine B. Sarter
Department of Industrial, Welding and
Systems Engineering
The Ohio State University

Mr. Thomas P. Schmidt
Vice President-Engineering
CSXT
March 16

Mr. Louis S. Thompson
Railways Adviser
The World Bank
March 15 and 16

Mr. Warren D. Weber
Rail Program Manager
California Department of Transportation
March 15 and 16

Mr. William Weinstein
Principal Member of the Technical Staff
The Charles Stark Draper
Laboratory, Inc.
March 15 and 16

Liaison Representative

Mr. Steven R. Ditmeyer
Director, Office of Research &
Development
Federal Railroad Administration
March 15 and 16

**FRA and Volpe Center Staff Participating in
March 15–16, 2001, Meeting**

FRA Participants

Mark Yachmetz, Associate Administrator for Railroad Development (March 15)

Arrigo Mongini, Deputy Associate Administrator for Railroad Development
(March 15, p.m. and March 16)

Steve Ditmeyer, Director, Office of R&D (March 15 and 16)

Claire Orth, Chief, Equipment & Operating Procedures Research Division,
Office of R&D (March 15 and 16)

Magdy El-Sibaie, Chief, Track Research Division, Office of R&D
(March 15 and 16)

Tom Raslear, Human Factors Program Manager, Office of R&D
(March 15 and 16)

Bob McCown, Chief, Program Development Division, Office of Railroad
Development (March 15 and 16)

James Smailes, Grade Crossing Program Manager, Office of Railroad
Development (March 15 and 16)

Steve Sill, General Engineer, Program Development Division, Office of
Railroad Development (March 16)

Volpe Center Participants

Robert Ricci, Director, Office of Safety and Security (March 15 and 16)

Robert Dorer, Chief, High-Speed Ground Transportation Division
(March 15 and 16)

Mike Coltman, Chief, Structures and Dynamics Division (March 15 and 16)

Jeffrey Gordon, Structures and Dynamics Division (March 15 and 16)

Anya Carroll, Senior Project Engineer (March 15 and 16)

Enclosure 3

Invited Speakers at March 15–16, 2001, Meeting

Customers of the Safety R&D Program

- **Class 1 railroads**

Alan Lindsey, General Director—Safety and Rules, Burlington Northern Santa Fe

Steve Kenyon, General Manager—Safety, Union Pacific Railroad

- **Commuter railroads**

Jeff Kovacs, Safety Director, New Jersey Transit Rail Operations

- **Labor**

Robert Harvey, Regulatory Research Coordinator, Brotherhood of Locomotive Engineers

Frederick C. Gamst, Professor, University of Massachusetts-Boston

Customers of the NGHSR Program

Randall Wade, Wisconsin DOT

Presentation on Norfolk Southern/FRA Cooperative Research Activities

Bob Blank, Director of Research and Test Department, Norfolk Southern

Presentation on Videotaping Grade Crossing Accidents and Trespassers

Adam Mastrangelo, Research Engineer, Norfolk Southern

ANNEX

EXISTING ACCIDENT DATA SOURCES FOR ROOT-CAUSE ANALYSIS

Existing accident data are not fully exploited because they are maintained only in raw form, are scattered among several separate databases, and include paper records. The potential to relate accident data to geographic railroad network or equipment data—for example, to identify problem locations or car types—is unrealized. Development of a more comprehensive relational database or databases devoted to specific accident types would be very helpful. Individual databases include the following:

- Railroad accident reports, often including multiple reports on each accident in accordance with regulations requiring that a report be filed for each train involved in an accident; also separate reports from the track owner and the train operator when a train is operating on track owned by a different railroad. Reports are required when damage to railroad property exceeds a specified dollar threshold. The reports usually contain a short narrative description of the accident that can be useful in helping to understand its causes.
- Railroad incident reports (injury events), required when the injury demands medical attention beyond simple first aid or when an employee loses more than a specified amount of work time. Trespasser casualties are included in this category.
- Rail–highway grade-crossing accident reports, required for any event in which moving railroad equipment hits or is hit by a highway user. Grade-crossing collisions leading to train damage are also reported as train accidents.
- Grade-crossing inventories for all grade crossings, giving details of the crossing layout, road and rail traffic levels, types of warning systems installed, and similar details.
- Research and Special Projects Administration hazmat accident reports, required for any event leading to a release of hazardous material, including both train accidents and such events as a defective valve or mishandling during loading and unloading.
- FRA paper files on selected accidents, containing, for example, inspector reports, photographs, and news clippings.

- Detailed NTSB reports on serious accidents.
- Lists of locomotives, passenger cars, and freight cars by number and type. These are useful for identifying the types of vehicles involved in accidents from accident reports that generally give just the vehicle number. Although such lists are widely available, they are not usually public information, and permission may have to be obtained from the organization that compiled a list or from the equipment owner to include these data in a database.
- A large body of research literature on individual accident types.

A notable effort to assemble a specialized accident database was carried out by the Volpe Center for the RSAC group working on positive train control (PTC). A total of 6,400 accidents from 1988 to 1995 were reviewed by a joint FRA–management–labor team to determine whether the accidents were PTC-preventable. Accidents identified as preventable were related to links in the railroad network and to railroad infrastructure and operating conditions, and used to develop a Corridor Risk Assessment Model. Details can be found in the report *Implementation of Positive Train Control Systems* (Report of the Railroad Safety Advisory Committee to the Federal Railroad Administrator, September 8, 1999).