National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: 8/30/99

In reply refer to: R-99-37 through -45

Mr. Gerald R. Hanas
General Manager
Northern Indiana Commuter Transportation District
33 East U.S. Highway 12
Chesterton, Indiana 46304

About 4:31 a.m. central daylight time on June 18, 1998, a westbound Northern Indiana Commuter Transportation District (NICTD) two-car passenger train struck the second trailer of a long combination vehicle that consisted of a tractor pulling two flatbed semitrailers loaded with steel coils at a grade crossing near Portage, Indiana. When the vehicles collided, the second semitrailer broke away from the first semitrailer and was dragged by the front of the NICTD train while the chain securing a steel coil to the second semitrailer broke. The released steel coil entered the first train car through the front bulkhead and moved into the passenger compartment. Three fatalities and five minor injuries resulted from the accident.[1]

In a June 18, 1998, letter to National Transportation Safety Board Chairman Jim Hall, U.S. Senator Richard Lugar and U.S. Congressman Peter J. Visclosky cited three previous accidents that had involved the NICTD system and expressed concern about NICTD's long-term safe operation. The Safety Board reviewed the accident history of the NICTD system and determined that, given the series of incidents experienced on the NICTD line, an evaluation of NICTD's overall safety should be conducted.[2]

The intent of this special investigation was not to determine whether NICTD is a "safe" or "unsafe" railroad but to examine those elements of its overall operation known to affect safety and to indicate where improvements could be made in these areas. The Safety Board recognizes that factors not examined in this investigation may also affect NICTD safety, either positively or negatively.

[1] National Transportation Safety Board, *Collision of Northern Indiana Commuter Transportation District Train 102 with a Tractor-Trailer, Portage, Indiana, June 18, 1998*, Railroad/Highway Accident Report NTSB/RAR-99/03 (Washington, D.C.: National Transportation Safety Board, 1999).

[2] For additional information, read *Northern Indiana Commuter Transportation District Railroad Safety Assessment*, Railroad Special Investigation Report NTSB/SIR-99/03 (Washington, D.C.: National Transportation Safety Board, 1999).

The special investigation examined numerous factors, including NICTD's history and operations. For instance, the investigation found that, in 1990, the Federal Railroad Administration (FRA) had performed a systems assessment of various Chicago commuter rail operations, including NICTD. Following this assessment, the FRA recommended that NICTD eliminate AC line circuits and convert to DC line circuits to reduce the potential for grounding.

In an interview with Safety Board staff, the NICTD chief electrical engineer stated that NICTD's installation of electronic track circuits and conversion of signal control line circuits is about 75 percent complete. The Safety Board acknowledges that NICTD has made progress in converting its signal system since the FRA's recommendation in 1990. However, in light of the safety problems (such as false proceed signal indications) that can result from electrical grounding and the nearly 9 years since the FRA made the recommendation, the Safety Board is concerned about the pace at which the project is being completed. The Safety Board concluded that NICTD's failure to complete the elimination of AC line circuits and conversion to DC line circuits on its signal system may have reduced the system's safety. Because the conversion of signal control circuits would reduce the potential for grounding, it would result in increased NICTD system safety and should be completed as soon as possible.

One of the major issues reviewed during the special investigation concerned safety at NICTD grade crossings. NICTD told the Safety Board that the NICTD system currently contains 151 crossings, of which 103 are public, 37 are private, and 11 are pedestrian railroad crossings at grade. Forty-two crossings have passive railroad warning devices (crossbuck signs), and 11 crossings have no warning devices. Thus, 53 crossings, about one-third of all NICTD grade crossings, currently have passive or no warning devices. Fifteen of the 42 locations with railroad crossbucks are on private crossings, and all 11 crossings with no warning devices are on private crossings.

On July 21, 1998, the Safety Board adopted a safety study of passive grade crossings that detailed the dangers inherent in many passive grade-crossing arrangements.[3] The study noted that

> In 1996, passive grade crossings accounted for about three-quarters of all grade crossings in the United States; although there is less highway and train traffic at passive crossings than at active crossings, passive crossings accounted for 54 percent of all grade-crossing accidents and 60 percent of all grade-crossing fatalities in that year.[4]

The report further found that

> A systematic and hierarchic approach to improving passive grade crossing safety is needed, an approach that does not depend primarily on the ability of the driver approaching the crossing to see an oncoming train. The hierarchic approach

[3] National Transportation Safety Board, *Safety at Passive Grade Crossings, Volume I: Analysis*, Safety Study NTSB/SS-98/02 (Washington, D.C.: National Transportation Safety Board, 1998).

[4] *Safety at Passive Grade Crossings, Volume I: Analysis*, Safety Study NTSB/SS-98/02, p. 61.

> includes grade separation and closure, installation of active warning devices, improved signage, and intelligent transportation systems technology.[5]

The passive grade-crossing safety problems and possible solutions identified in the safety study are applicable to a wide range of rail operations, including NICTD. Eleven passive grade crossings on the NICTD system had no signage or advance warning devices. All were private crossings.

Advance signage and warning devices are not required at passive grade crossings, and the Safety Board understands that NICTD has only limited authority over and responsibility for private crossings. NICTD's main purpose, however, is to provide safe and reliable transportation services to the public. With this charge comes the responsibility to ensure the safety of NICTD's customers and vehicular traffic.

Poor or nonexistent signage provides insufficient information for motorists to make prudent decisions regarding safe courses of action at grade crossings. When motorists make uninformed decisions at grade crossings, the safety of both vehicle and train traffic is jeopardized. Therefore, the Safety Board concluded that the lack of adequate signage and advance warning devices at some NICTD passive grade crossings poses a risk to NICTD's customers and motorists.

In its 1998 passive grade-crossing study, the Safety Board studied the use of stop signs at passive grade crossings in depth.[6] The Board found that

> Despite concerns about the use of stop signs at passive crossings, the Safety Board believes that the benefits of stop signs at passive crossings outweigh the concerns. Foremost, in the Safety Board's opinion, is the need for a system-wide approach that provides consistent information and instruction to the driver. Specifically, (1) the action required by a stop sign is well understood by drivers, (2) a driver stopped at a crossing has more time in which to detect an approaching train, and (3) sight distance along the tracks when viewed from a stop sign is generally accurate, according to study accident data.

The safety benefits provided by use of stop signs at passive crossings are applicable to the passive grade crossings on the NICTD system that lack signage and advance warning devices. When a stop sign is placed at a passive grade crossing, the driver knows where the crossing is and what action must be taken. Such clear communication of critical information would improve safety at passive grade crossings.

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[5] *Safety at Passive Grade Crossings, Volume I: Analysis*, Safety Study NTSB/SS-98/02, p. 64.

[6] *Safety at Passive Grade Crossings, Volume I: Analysis*, Safety Study NTSB/SS-98/02, pp. 68-74.

NICTD participates in Operation Lifesaver[7] and makes presentations designed to educate interested parties about the dangers of grade crossings. The NICTD chief of police is on the Indiana Operation Lifesaver Committee and participates in Operation Lifesaver programs. Since the Portage grade-crossing accident in June 1998, NICTD has given two Operation Lifesaver education programs at the Midwest Steel grade crossing, during which NICTD representatives provided truckers with Operation Lifesaver materials about the dangers of highway-rail grade crossings. NICTD has also employed a grade-crossing "near-miss" identification program since the mid-1980s.

The Safety Board acknowledges NICTD's efforts to decrease the number of violations that motorists commit at highway-rail grade crossings. Nonetheless, NICTD records show that, between 1995 and 1998, a total of 215 highway-rail grade-crossing violations were reported on the NICTD system and 109 traffic citations were issued. NICTD sent 54 highway-rail grade accident or incident reports to the FRA between January 1, 1993, and July 31, 1998. Five fatalities and five injuries were reported to have resulted from these accidents or incidents. Also, on October 21, 1998, while riding in a NICTD cab car en route to Chicago, Illinois, two Safety Board investigators observed four vehicles violating railroad grade-crossing signals. Therefore, the Safety Board concluded that, despite the NICTD near-miss program to educate motorists who violate highway-rail grade crossings, significant numbers of highway-rail grade-crossing violations continue on the NICTD system.

The Safety Board considers that the NICTD near-miss program could be improved. In particular, the current program does not provide NICTD employees feedback about the outcomes of their reports. NICTD employees reporting near-miss incidents and providing identification information about the motorist causing the incident are not told what use is made of the information they provide. They do not know, for example, whether the motorist is issued a traffic citation or other penalty based on their report. In other words, no one tells them the specific results of their participation in the near-miss reporting program. Some NICTD employees told Safety Board representatives that if the NICTD employee reporting the violation were made aware of the result of his or her near-miss report, the employee would be encouraged to continue to report incidents.

In summary with regard to grade-crossing safety on the NICTD system, the Safety Board found through its investigation that several factors point to possible problems in this area. First, NICTD has a relatively high density of grade crossings on its system (approaching two crossings per mile of track), which provides substantial opportunity for grade-crossing accidents to occur. Also, about one-third of NICTD grade crossings have passive or no warning devices, and 11 passive grade crossings on the NICTD system have no signage or advance warning devices.

[7] Operation Lifesaver is a nonprofit, nationwide public education program designed to eliminate collisions, deaths, and injuries at highway-rail intersections and on railroad rights of way. It is sponsored cooperatively by a variety of partners, including Federal, State, and local government agencies, highway safety and transportation organizations, and the Nation's railroads. The program is designed to increase public awareness about the danger where roadways cross train tracks and on railroad rights of way. Operation Lifesaver also seeks to improve driver and pedestrian behavior at highway-rail intersections by encouraging compliance with traffic laws relating to crossing signs and signals. Operation Lifesaver also emphasizes the enforcement of existing traffic and trespassing laws, the consolidation and closure of redundant highway-rail crossings, and the improvement of crossing engineering.

Further, NICTD has experienced a number of grade-crossing accidents and incidents in recent years, and, despite steps taken by NICTD to improve grade-crossing safety, near-miss and other incidents continue to occur at NICTD grade crossings. In addition, NICTD personnel repeatedly expressed concerns about the risks posed by grade crossings. The Safety Board considered that all these factors indicate that a systematic effort on the part of those agencies best equipped to develop methods to improve NICTD grade-crossing safety is needed.

The Safety Board also examined NICTD's safety programs, including its System Safety Program Plan (SSPP), during the course of this special investigation. Following the Safety Board's investigation of the 1996 collision of a Maryland Rail Commuter train with an Amtrak train in Silver Spring, Maryland,[8] the FRA issued Emergency Order 20, requiring certain inspections and modifications to commuter train operations and passenger equipment. Among other provisions, Emergency Order 20 required each property to submit an emergency preparedness plan and an effective safety program to the FRA. In the section "Interim system safety plans," the order stated that

> The plan shall take into consideration the overall safety of all passengers and crewmembers and shall, at a minimum, address the following opportunities for risk reduction: (A) Use of cab car/multiple unit car… (B) Operating rules… (C) Adverse conditions… (D) Short-term technology enhancements… (E) Crew management… (F) Highway-rail grade crossings… (G) Emergency exit notification… .[9]

Subsequently, the commuter railroads agreed among themselves to fulfill this element of Emergency Order 20 by developing and implementing SSPPs with the assistance of the FRA and the American Public Transit Association (APTA). The FRA planned to review the interim SSPPs to "determine whether other mandatory action appears necessary to address hazards associated with the subject rail passenger service." With respect to reviewing and approving SSPPs, the FRA is working in partnership with APTA, because APTA has personnel trained and knowledgeable in assessing SSPPs.

APTA, working with the FRA, drafted a *Manual for the Development of System Safety Program Plans for Commuter Railroads*[10] to provide more detailed direction to commuter railroads developing SSPPs in accordance with Emergency Order 20. The manual lists 29 elements that should be addressed in every SSPP and states that

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[8] National Transportation Safety Board, *Collision and Derailment of Maryland Rail Commuter MARC Train 286 and National Railroad Passenger Corporation AMTRAK Train 29 Near Silver Spring, Maryland, on February 16, 1996*, Railroad Accident Report NTSB/RAR-97/02 (Washington, D.C.: National Transportation Safety Board, 1997).

[9] FRA, *Commuter and Intercity Passenger Railroads, Including Public Authorities Providing Passenger Service, and Affected Freight Railroads—Emergency Order Requiring Enhanced Operating Rules and Plans for Ensuring the Safety of Passengers Occupying the Leading Car of a Train*, Emergency Order No. 20, Notice No. 1, February 20, 1996 (Washington, D.C.: U.S. Department of Transportation, 1996).

[10] APTA, *Manual for the Development of System Safety Program Plans for Commuter Railroads* (Washington, D.C.: American Public Transit Association, 1998).

> A commuter railroad has the responsibility of maintaining oversight of its safety status and program to ensure all responsibilities are being carried out and coordinated. This process is known as system safety. A commuter railroad establishes an [SSPP] by formalizing this process in a written document.
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> The overall goal of a System Safety Program for commuter railroads is to identify, eliminate, minimize, and/or control safety hazards and their attendant risks by establishing requirements, lines of authority, levels of responsibility and accountability, and methods of documentation for the organization.[11]

On October 15, 1997, NICTD management submitted an SSPP to APTA. This draft SSPP largely reflected and formalized those safety practices that NICTD was already following. APTA did not approve the plan NICTD initially submitted; APTA returned it to NICTD with a critique that stated that the draft SSPP was not sufficiently thorough. Using the APTA comments and guidance, NICTD redrafted the SSPP and submitted a revised document that was broader in scope to APTA on April 8, 1998. NICTD included each of the 29 elements provided in the *Manual for the Development of System Safety Program Plans for Commuter Railroads* in its redrafted SSPP. APTA approved the second submission.

The NICTD superintendent of transportation began the drafting of the NICTD SSPP, and the manager of human resources completed the document and began its implementation. He told investigators that NICTD managers had met concerning the SSPP during the implementation process. NICTD accepted comments on the document format, and meeting participants discussed plans for SSPP implementation. No defined implementation plan was adopted. The original date for the SSPP implementation was May 1998. NICTD later postponed the implementation date to September 1998 and then delayed it further.[12] Ultimately, NICTD set no date for full implementation of the SSPP. The NICTD manager of human resources told investigators that "basically the plan is implemented [in effect] but not specifically, and now we have to live with it." He said NICTD should amend the plan and place it in a three-ring binder to make it more "user friendly," as well as develop a system for monitoring compliance with the SSPP. According to the NICTD general manager, NICTD is implementing the SSPP but has not completed the process.

The investigative team also interviewed the NICTD chief operating officer, chief engineer (mechanical department), track engineer, director of safety and training, and superintendent of transportation about SSPP compliance within NICTD. Those interviewed said that they knew the SSPP is a relatively new document mandated by the FRA. NICTD has issued the document to all its managers, and NICTD personnel can obtain it through their individual department managers.

Although the SSPP requires such action, NICTD has not developed an accident or investigation team (or manual) for determining the probable causes of accidents or incidents or for administering corrective action following accidents or incidents. The NICTD human resources department conducts all nonderailment accident and incident investigations, and the transportation

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[11] *Manual for the Development of System Safety Program Plans for Commuter Railroads*, pp. 3 and 6.

[12] NICTD told investigators that the complications caused by the June 18, 1998, Portage accident were one source of the implementation delay.

department investigates all derailments. Currently, corrective action is negotiated on-scene. A fully implemented SSPP would include a means of determining the probable causes of accidents and incidents and of providing corrective action.

Despite the fact that several NICTD managers have stated that the SSPP has been implemented, the consensus of those NICTD personnel providing comments to the Safety Board was that the SSPP has not yet become a well-known and accepted element of the NICTD safety structure. The Safety Board concluded that, until its SSPP required by the FRA in Emergency Order No. 20 is fully implemented, some program-related safety benefits may not be realized by NICTD. Full implementation should include the familiarization of NICTD personnel at all organization levels with the goals, components, and expected results of the SSPP.

The NICTD SSPP's implementation is under the jurisdiction of the NICTD director of safety and training (DST). The railroad established the DST position in March 1997 to formalize NICTD's safety and training practices. NICTD had no safety officer before March 1997. As defined in the SSPP, the DST has specific authority to conduct scheduled and unscheduled inspections aimed at identifying hazards and unsafe practices, operations, and conditions. The DST may halt unsafe activities or operations that present an immediate and serious hazard within the system. The DST reports safety conditions that require remedial action to the appropriate department head, the chief operating officer, the manager of human resources, and the general manager. The DST also coordinates safety training with department heads and ensures that safety rules are observed and enforced.

The DST told Safety Board investigators that he had been an assistant superintendent before assuming the role of DST and that he had received no specialized training on how to structure and implement a safety program either before or after assuming this post. The DST further stated that he had never met with NICTD's board of trustees, nor had he ever briefed them about the duties and responsibilities of the DST position.

The Safety Board has long advocated that transportation personnel be adequately trained to fulfill their job responsibilities. In particular, the person responsible for building, shaping, and managing the organization's safety system must be fully qualified to perform this duty. The DST had no experience in safety assurance before being selected for this position. He was unfamiliar with SSPPs and their functions. He was largely unaware of the vital role a DST plays in an organization. The Safety Board concluded that NICTD did not adequately prepare and train its DST to fulfill the responsibilities of the position. Because the SSPP forms the basis of the NICTD safety program, the most efficient means of preparing the DST to fulfill the responsibilities of his position would be to train him in the functions and implementation of SSPPs.

Within the current NICTD organizational structure, the DST reports to the human resources manager and not the general manager. The general manager said that this is a "good technique," since the human resources department is responsible for safety and the coordination of personnel activities. The DST said that the fact that his position is not at the department-head level has not proven to be an obstacle, and he further stated that if he had a problem, he would not hesitate to contact the general manager.

For years, the Safety Board has stated that the lead safety officer of any transportation organization should be situated at the highest managerial level within the organization. In the case of NICTD, reorganizing the management structure so that the DST reports directly to the general manager would allow the DST to provide prompt input concerning management policies and practices that might not sufficiently address safety issues. In addition, important safety information could be communicated more reliably, avoiding the potential for miscommunication should the DST's information be misinterpreted by the department head in reporting to the general manager or, conversely, should the general manager's messages to the DST be misconstrued by the department head. Finally, placing the DST at the department-head level would send an unambiguous message to employees, customers, and the public that NICTD considers safety a high priority that encompasses and permeates all aspects of the organization. Therefore, the Safety Board concluded that the efficiency of safety information communication would be enhanced and the profile of safety would be heightened within the NICTD organization if the DST reported directly to the general manager.

Another element of NICTD's safety structure that the Safety Board examined during the special investigation was emergency response. The NICTD emergency response plan details potential emergency scenarios, as well as standard procedures necessary to manage each situation. The document also stresses the importance of communication during an emergency and provides NICTD procedural guidelines and a directory listing various phone numbers and addresses of police, fire, and rescue agencies. The plan lists approved procedures for NICTD dispatchers and train crews to follow in the event of an emergency and outlines actions for responding to an emergency, as well as procedures for establishing an emergency response team.

When interviewed by Safety Board investigators, NICTD managers expressed concern about conducting emergency responses in areas with limited accessibility, such as regions with large waterways or swampy conditions. The NICTD system includes a number of bridges over waterways and significant areas of marshy land. The Safety Board has found in previous investigations[13] that when accidents take place in less accessible areas, emergency rescue procedures become both more difficult and more crucial. Therefore, the Safety Board concluded that safety would be enhanced if greater efforts were made to prepare local response agencies to deal with commuter train accidents in areas that are geographically difficult to access.

NICTD's corporate safety culture was another focus of the special investigation. Corporate safety culture is an organization's set of beliefs, norms, attitudes, roles, and social and technical practices that are concerned with minimizing the exposure of employees, customers, and members of the public to conditions considered dangerous or injurious.[14] To evaluate NICTD's corporate culture, Safety Board investigators reviewed NICTD safety programs, interviewed NICTD staff and managers, and studied NICTD's internal safety documents. While some NICTD employees stated that the organization could improve safety, the Safety Board's investigation did

[13] National Transportation Safety Board, *Derailment of Amtrak Train No. 2 on the CSXT Big Bayou Canot Bridge Near Mobile, Alabama, September 22, 1993*, Railroad-Marine Accident Report NTSB/RAR-94/01 (Washington, D.C.: National Transportation Safety Board, 1994).

[14] B.A. Turner, N.F. Pidgeon, D.I. Blockley, and B. Toft, *Position Paper for the Second World Bank Workshop on Safety Control and Risk Management, November 6-9, 1989*, "Safety Culture: Its Importance in Future Risk Management" (World Bank: Karlstad, 1989).

not reveal any instances of blatant disregard for safety concerns. The fact that the various departments within NICTD convene safety meetings during which unsafe conditions and practices are identified and addressed shows that NICTD has developed a systematic means of publicizing and resolving workplace safety issues. Furthermore, consistent with the views of many safety professionals, who contend that management is responsible for the practices, customs, and attitudes that relate to safe operations, NICTD managers have shown by their testimony and actions that they are aware they must set the tone for safety by policy and example. In addition, NICTD has provided its employees exhaustive written guidelines that stress the importance of safety to the organization. Therefore, the Safety Board concluded that NICTD's corporate culture generally encourages safety awareness in rail operations.

In summary, the special investigation of NICTD indicated that, with respect to the particular issues the Safety Board reviewed, NICTD's operating practices generally adhere to accepted safety principles, NICTD has an established system of internal safety programs, and NICTD's corporate culture generally encourages safe employee behavior. Nevertheless, the investigation indicated that NICTD has problems, which NICTD recognizes and is attempting to address, regarding the serious issue of grade-crossing safety. To enhance NICTD's safety practices, the Safety Board urges NICTD to adopt the recommendations regarding grade-crossing safety, signal upgrading, SSPP implementation, emergency response drills, and the role of the DST within the organization.

The Safety Board emphasizes that these selected factors do not represent the full range of conditions that may affect an organization's safety. The Board also notes that, until the NICTD SSPP is fully implemented, significant elements will be absent from the NICTD safety system. Therefore, the Safety Board concluded that, in addition to the specific areas in which the Safety Board recommends that NICTD take action to improve safety, other safety-enhancement opportunities may remain for NICTD to pursue. In particular, the Safety Board is anxious that NICTD take steps to ensure that the implementation of its SSPP results in the production and maintenance of a NICTD safety program that is comprehensive and as effective as possible.

Therefore, the National Transportation Safety Board makes the following safety recommendations to the Northern Indiana Commuter Transportation District:

> Work with the U.S. Department of Transportation and the Indiana Department of Transportation to develop and implement a strategic plan to improve safety at Northern Indiana Commuter Transportation District highway-rail grade crossings. (R-99-37)
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> Work with the Indiana Department of Transportation and Indiana's Lake, Porter, LaPorte, and St. Joseph Counties to install stop signs at all your passive grade crossings, unless a traffic engineering analysis determines that installation of stop signs would reduce the safety of the crossing. Any Northern Indiana Commuter Transportation District crossings at which conditions are such that the installation of stop signs would reduce the level of safety should be upgraded with active warning devices or eliminated. (R-99-38)

Immediately and fully implement your System Safety Program Plan, as required by the Federal Railroad Administration under Emergency Order No. 20, dated February 20, 1996. (R-99-39)

Provide any individual holding the office of director of safety and training with appropriate training, including instruction on the functions, development, and implementation of System Safety Program Plans. (R-99-40)

Elevate the position of director of safety and training to the department-head level and require that the director of safety and training report directly to the general manager. (R-99-41)

Complete the conversion or elimination of signal control line circuits within 2 years. (R-99-42)

Revise your near-miss program to provide closure with individuals reporting violations. (R-99-43)

Develop training procedures and drills, in conjunction with local emergency response agencies, that address conducting emergency responses in all types of geographical conditions. (R-99-44)

Engage an independent safety auditing organization to conduct a comprehensive safety audit of Northern Indiana Commuter Transportation District operations. (R-99-45)

Also, the Safety Board issued safety recommendations to the Indiana Department of Transportation and Indiana's Lake, Porter, LaPorte, and St. Joseph Counties.

The National Transportation Safety Board is an independent Federal agency with the statutory responsibility "to promote transportation safety by conducting independent accident investigations and by formulating safety improvement recommendations" (Public Law 93-633). The Safety Board is vitally interested in any action taken as a result of its safety recommendations. Therefore, it would appreciate a response from you within 90 days regarding action taken or contemplated with respect to the recommendations in this letter. Please refer to Safety Recommendations R-99-37 through -45 in your reply. If you need additional information, you may call (202) 314-6435.

Chairman HALL, Vice Chairman FRANCIS, and Members HAMMERSCHMIDT, GOGLIA, and BLACK concurred in these recommendations.

Original Signed

By: Jim Hall
Chairman