UP/SP Merger—Wichita Mitigation Study

Preliminary Mitigation Plan

Wichita, Kansas—September 1997







Office of the Secretary
SEP 16 1997
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SURFACE TRANSPORTATION BOARD



Surface Transportation Board
Section of Environmental Analysis

Issue Date: September 15, 1997
Comment Due Date: October 15, 1997

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SURFACE TRANSPORTATION BOARD
Washington, DC 20423

Section of Environmental Analysis

September 15, 1997

Re: Finance Docket No. 32760, Union Pacific/Southern Pacific Merger;
Issuance of Wichita Mitigation Study Preliminary Mitigation Plan.

To: Interested Parties

The Section of Environmental Analysis (SEA) is pleased to provide you with the attached Preliminary Mitigation Plan (PMP) for the City of Wichita and Sedgwick County. This PMP has been prepared by SEA pursuant to an 18-month mitigation study ordered by the Surface Transportation Board (Board), as a condition of its August 12, 1996 approval of the Union Pacific/Southern Pacific (UP/SP) merger.

SEA invites public review and comment on the PMP. All recommendations made by SEA in the PMP are **preliminary**. After considering public comments on the PMP, SEA will prepare the Final Mitigation Plan (FMP) for public review and comment. After full consideration of the public comments on the PMP and FMP, SEA will then make its final recommendations to the Board. The Board will make its decision after considering both the PMP and FMP, the final recommendations of SEA, and the public comments.

SEA will conduct a public information meeting September 30, 1997 to provide the public with an opportunity to comment on the PMP and receive additional information. The meeting will be held in the Mary Jane Teall Theater at the Century II Convention Center, 225 West Douglas, Wichita, KS. The meeting will include an informal open house from 6:00 p.m. - 7:00 p.m., and a formal public meeting beginning at 7:00 p.m.

SEA acknowledges and appreciates all the efforts of interested parties involved in the PMP process. The PMP incorporates comments and recommendations received from many Federal, state, and local agencies, community leaders, the Union Pacific, and private citizens. SEA invites you to submit specific written comments on the proposed environmental mitigation measures and the PMP. In addition to distributing copies of the PMP to interested parties, SEA has made available copies of the PMP at the Wichita and Sedgwick County Library and Wichita State University Library.

Your written comments must be submitted to SEA by October 15, 1997, the close of the 30-day public comment period for the PMP.

To file comments, please submit an original plus 10 copies to the Board at the following address:

Office of the Secretary
Case Control Unit
Finance Docket No. 32760
Surface Transportation Board
1925 K Street, NW, Room 700
Washington, DC 20423-0001

Attn: Elaine K. Kaiser
Chief, Section of Environmental Analysis
Environmental Filing - Wichita

Thank you for your continued interest and participation in the mitigation study.

Sincerely yours,

Elaine K. Kaiser
Chief
Section of Environmental Analysis

Administratively Confidential
WORKING DRAFT

UP/SP Merger
Wichita Mitigation Study

PRELIMINARY MITIGATION PLAN

September 15, 1997

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Executive Summary
WICHITA MITIGATION STUDY

This report, the Preliminary Mitigation Plan for the UP/SP Merger Wichita Mitigation Study, presents the history and background of the mitigation study, a description of activities performed in conducting the study, and a discussion of how the mitigation study team developed, evaluated, and identified potential mitigation measures. The report concludes with preliminary recommendations to be presented after public review and comment to the Surface Transportation Board (Board) as it decides final mitigation measures to impose on the UP/SP merger.

ES.1 Study Background

On August 12, 1996, the Board approved the merger of the Union Pacific Railroad Company (UP) and the Southern Pacific Transportation Company (SP). During the merger review process, the Board's Section of Environmental Analysis (SEA) prepared an Environmental Assessment (EA) and a Post Environmental Assessment (Post EA) to evaluate the potential environmental impacts associated with the merger. As a result of its environmental review, SEA concluded that the UP/SP merger would not have a significant impact on the quality of the human environment in areas affected by the merger as long as certain conditions were applied to the merger approval.

In Decision No. 44 approving the UP/SP merger, the Board imposed a number of conditions, including environmental conditions recommended by SEA. Among these conditions was Condition No. 23 requiring SEA to conduct an additional mitigation study in Wichita, Kansas. The purpose of this study was to develop further mitigation specifically tailored to address the environmental effects of the merger-related increase in rail traffic through the City of Wichita and Sedgwick County on the existing UP line. The Board stated that the study should focus only on *merger-related* train traffic.

Regarding the Board's jurisdiction to require UP to implement further mitigation measures, the Board has broad authority to impose conditions in railroad merger cases, but its power is not limitless. Any conditions imposed by the Board must be reasonable and must address issues directly related to the merger. These Board considerations particularly apply when considering a condition to mitigate potential environmental impacts that result from a merger that otherwise satisfies all of the substantive standards for merger approval. The National Environmental Policy Act (NEPA) and the implementing regulations of the President's Council on Environmental Quality require that agencies take a "hard look" at the environmental consequences of their decisions including railroad mergers, and they served as SEA's guide in conducting the Wichita Mitigation Study. (See Section 2)

ES.2 Public Outreach

Beginning in October 1996, the SEA study team coordinated a comprehensive public outreach program to parallel the study's technical activities. This program included the coordination of monthly meetings of the Wichita Mitigation Committee, meetings with agency and elected officials and community leaders, a public meeting and open house, publication of information materials, and media coverage.

Key issues raised by the public focus on the projected train traffic volumes; advantages and disadvantages of various proposed mitigation measures; funding options; environmental impacts including traffic delay, rail and pedestrian safety, air quality, noise; business-related impacts of the merger; and study methodology and data. The public will have opportunities to review and comment on this Preliminary Mitigation Plan (PMP) and the Final Mitigation Plan when it is issued.

Officials representing the City of Wichita and Sedgwick County played an important role throughout the mitigation study, providing constant feedback and participating regularly in mitigation committee meetings and the study team's technical data collection. Other community and business leaders participated through the mitigation committee, while the general public attended a public meeting in January 1997 and submitted comments throughout the study.

Throughout the mitigation study, SEA encouraged a privately negotiated resolution among UP and interested local parties. In March 1997, Governor Graves convened a meeting of Wichita Mayor Knight, Sedgwick County Commission Chair Winters, and UP President Davis to discuss possible solutions. These parties agreed to conduct a joint feasibility study of options to route through trains around Wichita. The results of the bypass study are expected to be available in early September 1997. (See Section 2)

ES.3 Study Overview

SEA and an independent third-party contractor under SEA's direction conducted the Wichita Mitigation Study in three phases. During Phase 1, SEA collected necessary data, identified preliminary mitigation options, developed evaluation criteria, and conducted public outreach activities to identify key issues and concerns. During Phase 2, SEA evaluated preliminary mitigation options and prepared this PMP for public review. During Phase 3, SEA will consider public comments and prepare a Final Mitigation Plan, solicit additional public comments, and prepare final recommendations to the Board. Based on SEA's recommendations and public input, the Board will issue its decision imposing final additional environmental mitigation measures for Wichita.

Wichita Background Information: SEA's work during the mitigation study included careful consideration of the historical background of the Wichita and Sedgwick County area, local population and demographic characteristics, community events and characteristics, and the location of and impacts to residences and business operations. The SEA study team performed a detailed

review of Wichita's planning policies as outlined by the Wichita-Sedgwick County Metropolitan Area Planning Department. (See Section 3)

UP Train Activities: Railroad operations that are the subject of the mitigation study include through trains on UP's Lost Springs-Wichita and Wichita-Chickasha rail line, which bisects Wichita and Sedgwick County. UP proposes to increase through trains passing through central Wichita from an average of 4.0 trains per day to an average of 9.6 trains per day. Although the UP merger proposes to increase daily train traffic by approximately 5.6 trains per day, Decision No. 44 placed a limit on the increase in the number of freight trains allowed through Wichita during the 18-month mitigation study period. The limit imposed by the Board is no more than a daily average of 6.4 freight trains per day, which represents the 1995 baseline average of 4.4 trains per day plus an average of two additional freight trains. (See Section 4)

Data Collection: Contacting numerous agencies, associations, businesses, elected officials and UP representatives, the study team collected extensive data during Phases 1 and 2 of the Wichita Mitigation Study. In addition to surveying existing data, the study team conducted field work in March 1997. The study data collected included information regarding motorist traffic delay and train noise. (See Section 5)

Potential Environmental Impacts: The SEA study team developed 10 potential environmental impact areas to evaluate the effect of the merger-related increase in train traffic. The following impact areas reflect Board directives and the concerns of local interests identified through the Wichita Mitigation Committee, the public meetings, and other public comments:

1. Traffic delay.
2. Public transit delay.
3. Emergency vehicle access.
4. Pedestrian safety.
5. Train-vehicle accidents.
6. Derailments and hazardous materials spills.
7. Air quality, total emissions.
8. Air quality, localized carbon monoxide concentrations.
9. Noise levels.
10. Vibration.

The study team analyzed each of these impact areas, developed criteria for evaluating and measuring impacts, and identified potential mitigation measures to address issues of concern. (See Section 6)

Categories of Potential Mitigation: In Decision No. 71 issued on April 15, 1997, the Board clarified its intent regarding mitigation requirements for the mitigation study. The Board defined the following two levels of mitigation to be developed:

- Tier 1, measures that will be mandated mitigation for UP to implement and fund entirely and
- Tier 2, alternative mitigation that might be a more far-reaching solution for all concerned, but which would require a voluntary agreement by UP *and* other parties to share costs or expend greater resources and can therefore not be mandated by the Board.

Through a mutually accepted and binding voluntary agreement among interested parties, Tier 2 measures would provide alternative mitigation measures to address more far-reaching solutions than those funded by UP alone. (See Section 8)

Potential Mitigation Measures: The study team evaluated a broad range of alternatives, which included increased train speeds, underpasses and overpasses at selected streets, an elevated trainway, constructing a new bypass, improved traffic and pedestrian safety measures, and additional improvements to address emergency response, air quality, and noise issues. SEA carefully considered a wide variety of Tier 1 and Tier 2 mitigation measures and their effectiveness at mitigating merger-related environmental impacts. (See Section 7)

SEA's Preliminary Recommendations: SEA's preliminary recommendation to the Board for mitigation measures to be required of UP address local concerns regarding traffic and pedestrian safety and delay and access for motorists, pedestrians, and emergency vehicles. SEA concludes that with the conditions mandated in Decision No. 44 and the recommended mitigation measures proposed in this Preliminary Mitigation Plan, the UP/SP merger would not have a significant impact on the quality of the human environment in Wichita or Sedgwick County. Detailed in Section 8 of this report and summarized again in Section 10, SEA's preliminary recommendation to the Board for mitigation measures to be mandated are the following:

1. Improved tracks and a centralized train control system that would allow increased train speeds on the UP rail line, and a requirement to operate at those increased speeds.
2. Elimination of train crew changes for through trains in Wichita.
3. Installation of a communications system to inform the emergency dispatch center of train locations on UP rail line.
4. New crossing gates and flashing lights at 16 grade crossings on the UP rail line in Wichita and Sedgwick County.
5. Fences and guardrails along Mead to separate train right-of-way from motorists.
6. Pedestrian crossing gates at four crossings to enhance elementary school children safety.
7. School safety education program conducted twice a year.
8. Rail safety information for employers, employees, and residents adjacent to the UP rail line.

9. Train defect detectors to identify potential problems and reduce the risk of derailments.

10. A community advisory panel to establish communications between UP and local representatives regarding railroad-related safety and environmental issues.

11. Quarterly monitoring reports to be submitted to the City of Wichita and Sedgwick County.

Funding Analysis: Tier 1 mitigation measures, by definition, are to be funded solely by UP. Although the Board cannot mandate Tier 2 measures, it directed SEA during the mitigation study to investigate possible funding sources for Tier 2 mitigation measures. SEA's work regarding funding included identifying and evaluating existing transportation funding structures on the Federal, State, and local levels and providing technical information to assist and facilitate funding discussions among interested public and private parties. (See Section 9)

ES.4 Public Comment on the PMP

SEA encourages broad participation in the review and comment of this Preliminary Mitigation Plan. Interested agencies and persons are invited to file comments regarding the Wichita Mitigation Study and Preliminary Mitigation Plan. To file comments please submit an original plus 10 copies to the Board at the following address:

Office of the Secretary
Case Control Unit
Finance Docket No. 32760
Surface Transportation Board
1925 K Street, NW, Room 700
Washington, DC 20423-0001

Attention: Elaine K. Kaiser
Chief, Section of Environmental Analysis
Environmental Filing—Wichita

ES.5 Acknowledgments

At this time, SEA wishes to thank Federal, State, County, City, and local agency and elected officials, UP representatives, members and alternates of the Wichita Mitigation Committee, and concerned members of the public who have devoted so much of their time and effort to work with SEA throughout the Wichita Mitigation Study.

Section 1
INTRODUCTION

1.1 Background

On August 12, 1996, the Surface Transportation Board (Board), in its Decision No. 44, Finance Docket No. 32760, approved the Union Pacific (UP)/Southern Pacific (SP) merger subject to conditions, including environmental conditions (See Appendix A). The environmental conditions included a further 18-month mitigation study for the City of Wichita and Sedgwick County. The study's purpose was to develop additional appropriate mitigation specifically tailored to address the environmental impacts of the merger-related increase in train traffic on the existing UP rail line through Wichita and Sedgwick County and to supplement the environmental mitigation already imposed in Decision No. 44.

To preserve the environmental status quo, the Board placed limits on the increase in the number of freight trains allowed through Wichita during the 18-month mitigation study. The limit is no more than a daily average count of 6.4 freight trains per day, which represents the 1995 baseline average of 4.4 trains per day plus an average of two additional freight trains.

As required in Decision No. 44, the Board's Section of Environmental Analysis (SEA) prepared this Preliminary Mitigation Plan (PMP). The Board also mandated preparation of a mitigation plan for Reno, Nevada, which SEA has prepared and issued concurrently with this PMP.

Under the sole direction and supervision of SEA, an independent third-party contractor team (SEA study team) assisted SEA in conducting this Wichita Mitigation Study. In this PMP, SEA provides its **preliminary** evaluation and recommendations. In preparing this PMP, SEA reviewed and considered the issues and concerns raised by all interested parties.

1.2 Public Review Process of Mitigation Plan

SEA is distributing this PMP to the public and providing an opportunity for a 30-day review and comment period. After reviewing the public comments on the PMP, SEA plans to issue a Final Mitigation Plan in December 1997. The Final Mitigation Plan will also be available to the public for review and comment. The Board will consider the public comments and the Preliminary and Final Mitigation Plans in imposing final mitigation measures in a decision expected to be issued in February or March 1998. Table 1.1-1 provides a projected schedule for the mitigation plan.

Table 1.1-1 Projected Schedule for Wichita Mitigation Plan	
September 15, 1997	SEA issues Preliminary Mitigation Plan, followed by a 30-day public review and comment period.
September 30, 1997	SEA conducts Wichita Mitigation Committee meeting to discuss Preliminary Mitigation Plan.
September 30, 1997	SEA conducts public meeting to discuss Preliminary Mitigation Plan and invites oral and written comments.
October/November 1997	SEA considers all public comments and prepares Final Mitigation Plan.
December 1997	SEA issues Final Mitigation Plan, followed by a public review and comment period.
February/March 1998	Board issues its decision imposing final additional environmental mitigation for Wichita and Sedgwick County.

1.3 Overview of Preliminary Mitigation Plan

Section 2 of the PMP provides an overview of the merger, the jurisdiction of the Board, the environmental review process to date, conditions already placed on UP under the merger, and public outreach performed during the study.

Section 3 describes the study area, its characteristics, a brief history of Wichita, and a summary of City planning policies regarding railroads. Section 4 provides information regarding Wichita's railroad facilities, railroad operations, and planned merger-related changes in rail traffic. Section 5 identifies the activities undertaken by SEA and its study team to collect necessary information and data for this study and to provide opportunities for input from all interested parties.

Section 6 provides a geographically focused analysis of the potential environmental impacts on Wichita and Sedgwick County of the merger-related increased freight train traffic. This section supplements the environmental analysis presented in the UP/SP Merger Environmental Assessment (EA) and Post Environmental Assessment (Post EA) that SEA prepared pursuant to the National Environmental Policy Act (NEPA). Evaluation criteria and methodology are provided, along with preliminary recommendations regarding potential mitigation measures to address potential environmental impacts.

Section 7 explains the mitigation options that have been reviewed and considered by SEA and discusses the effectiveness of these options in mitigating potential environmental impacts. This section also discusses additional potential environmental impacts associated with the mitigation options.

Section 8 discusses in detail SEA's **preliminary** recommended mitigation options for consideration by the Board. Mitigation measures are classified into two categories: (1) those that should be fully funded by UP and (2) those that could be implemented only with shared funding

agreed to by UP and various other sources. This section also addresses those mitigation options that SEA considered but is not recommending.

Section 9 outlines possible sources of shared funding. Section 10 outlines SEA's **preliminary** conclusions and recommendations.

SEA encourages broad participation in the review and comment of this Preliminary Mitigation Plan. Interested agencies and persons are invited to file comments regarding the Wichita Mitigation Study and Preliminary Mitigation Plan. To file comments please submit an original plus 10 copies to the Board at the following address:

Office of the Secretary
Case Control Unit
Finance Docket No. 32760
Surface Transportation Board
1925 K Street, NW, Room 700
Washington, DC 20423-0001

Attention: Elaine K. Kaiser
Chief, Section of Environmental Analysis
Environmental Filing—Wichita

Section 2
STUDY BACKGROUND AND PURPOSE

2.1 Overview of the Merger

On November 30, 1995, the Union Pacific Railroad Company (UP) and Southern Pacific Transportation Company (SP) applied to the Interstate Commerce Commission (ICC) for authority to merge their operations into a single Union Pacific Railroad Company. The merger proposed the creation of a single rail system with 34,000 miles of track in 24 states. A primary objective of the merger was to create a rail carrier that would be more competitive and efficient, resulting in benefits to shippers and the public. The merger application included the rerouting of train traffic within the combined system, the consolidation of yards and terminal facilities, changes in activities at rail yards and intermodal facilities, abandonment of some rail line segments, and construction of new rail line segments.

2.2 Surface Transportation Board Jurisdiction

In December 1995, Congress abolished the ICC and transferred certain of its railroad functions, including the merger functions at issue here, to the Surface Transportation Board (Board). The Board, which is part of the United States Department of Transportation, is a decisionally independent adjudicatory body with jurisdiction over certain surface transportation and economic regulatory matters related primarily to railroads. The Board's decisions are reviewable in the United States Court of Appeals under the Hobbs Act, 28 U.S.C.2321 and 2342.

The applicable decision standards for railroad merger applications are codified in 49 U.S.C. 11321-27 (formerly 49 U.S.C. 11341-51, the Interstate Commerce Act). The Act's single and essential standard of approval is that the Board find the transaction to be consistent with the public interest. To determine the public interest, the agency balances the benefits of the merger against any competitive harm that cannot be mitigated by conditions.

Normally, an existing railroad can increase its level of operations and make improvements to its rail lines without limitation and without coming to the Board for approval. If UP and SP had not proposed this merger, UP on its own could have increased the number of trains on its rail line in Wichita to any level it considered appropriate.

The Federal Railroad Administration (FRA) is the agency with primary expertise and jurisdiction in railroad safety and has promulgated numerous regulations that the Board considers in assessing railroad safety issues and in imposing safety conditions in railroad mergers (See Section 4.1).

Because the review and approval of the UP/SP merger is a major Federal action, the proposed merger is subject to environmental review under the National Environmental Policy Act

(NEPA), 42 U.S.C. 4321, *et. seq* and the implementing regulations of the President's Council on Environmental Quality. The Board has adopted environmental rules consistent with NEPA to guide its environmental review of proposed mergers, 49 CFR 1105. Those rules generally call for the preparation of an Environmental Assessment (EA) for railroad merger cases, 49 CFR 1105.6(b)(4). The EA, prepared by the Board's Section of Environmental Analysis (SEA) with assistance of an independent third-party contractor, considers information supplied by the applicant, comments from interested parties and government agencies, and the results of SEA's independent investigations and verification, 49 CFR 1105.7 and 1105.10(b)-(d).

The EA is made available for public review and comment. Before rendering its final decision in the proceeding, the Board then considers the EA, the public comments, and SEA's post-EA recommendations, 49 CFR 1105.10(b)-(f).

In developing and evaluating environmental mitigation options, SEA and the Board are also guided by the historical authority of the ICC and Congressional intent for railroad regulation. Over the last 20 years, Congress has reduced the regulatory role of the ICC and the Board to promote competition and efficiency throughout the national railroad network. The United States Congress provides its policies regarding railroad regulation in the 1995 ICC Termination Act (Pub. L. No. 104-88; December 29, 1995), which states in part:

In regulating the railroad industry, it is the policy of the United States Government:

(1) to allow, to the maximum extent possible, competition and the demand for services to establish reasonable rates for transportation by rail;

(2) to minimize the need for Federal regulatory control over the rail transportation system and to require fair and expeditious regulatory decisions when regulation is required;

(3) to promote a safe and efficient rail transportation system by allowing rail carriers to earn adequate revenues, as determined by the Board;

(4) to ensure the development and continuation of a sound rail transportation system with effective competition among the rail carriers and with other modes, to meet the needs of the public and the national defense;

(5) to foster sound economic conditions in transportation and to ensure effective competition and coordination between rail carriers and other modes;

(6) to maintain reasonable rates where there is an absence of effective competition and where rail rates provide revenues which exceed the amount necessary to maintain the rail system and to attract capital;

(7) to reduce regulatory barriers to entry into and exit from the industry;

(8) to operate transportation facilities and equipment without detriment to the public health and safety;

(9) to encourage honest and efficient management of railroads;

(10) to require rail carriers, to the maximum extent practicable, to rely on individual rate increases, and to limit the use of increases of general applicability;

(11) to encourage fair wages and safe and suitable working conditions in the railroad industry;

(12) to prohibit predatory pricing and practices, to avoid undue concentrations of market power, and to prohibit unlawful discrimination;

(13) to ensure the availability of accurate cost information in regulatory proceedings, while minimizing the burden on rail carriers of developing and maintaining the capacity of providing such information;

(14) to encourage and promote energy conservation; and

(15) to provide for the expeditious handling and resolution of all proceedings required or permitted to be brought under this part. (Section 101)

The Board licenses railroads as common carriers, meaning that the railroads are required to accept goods and materials for transport from all customers upon reasonable request and at a reasonable rate.

The Board has broad authority to impose conditions in railroad merger cases under 49 U.S.C. 11324(c). However, the Board's power to impose conditions is not limitless. To survive judicial review, the record must support the imposition of the condition at issue. Moreover, there must be a sufficient nexus between the condition imposed and the proposed merger, and the conditions must be reasonable.

These considerations apply with particular force where a condition is sought to mitigate environmental damage that results from a merger that satisfies all of the substantive standards for approval. It is well outlined that NEPA does not require an agency to arrive at any particular substantive results, but only requires that agencies take a "hard look" at the environmental consequences of their decision for railroad mergers. It has long been agency policy to focus on the potential environmental impacts related to changes in rail traffic patterns on existing rail lines. The agency's practice consistently has been to mitigate only those environmental impacts that result directly from the merger. The Board (like the ICC) has not imposed mitigation measures to remedy preexisting conditions that might make the quality of life in a particular community better but are not a direct result of the merger before the Board.

On April 15, 1997 in Decision No. 71, the Board clarified that two tiers of mitigation measures will be considered in developing final mitigation measures (See Appendix A). Specifically, the final environmental mitigation will include, in addition to the mitigation that has already been imposed in Decision No. 44, the following: (1) Tier 1, or baseline mitigation, which the Board will require UP to implement and entirely fund and (2) Tier 2 alternative mitigation measures that might be a more far-reaching solution for all concerned but that will be binding only if there is a voluntary agreement by UP and other interested parties to share costs or expend greater resources.

In short, for the Wichita Mitigation Study, SEA has considered a broad range of environmental mitigation options in addition to those that have already been imposed in Decision No. 44. These include those that may be mandated of and solely funded by UP and other measures that would require voluntary participation or funding from UP and other entities. SEA has also worked to foster discussions and negotiations among affected parties to reach mutually acceptable solutions to potential environmental impacts and other local concerns.

2.3 Environmental Review Process for UP/SP Merger

SEA is responsible for the preparation of the environmental review of all railroad mergers including the UP/SP merger. SEA reviews each merger application separately and makes its environmental recommendations to the Board based on the specific circumstances of each case.

In compliance with the Board's environmental rules, 49 CFR 1105.6(b)(4), SEA prepared a comprehensive, five-volume Environmental Assessment (EA) of the proposed UP/SP merger. On April 12, 1996, SEA distributed the EA for review and comment to approximately 1600 interested parties in 35 states, the District of Columbia, and Canada. The agency's environmental review process included an extensive public outreach program. SEA established a toll-free environmental hotline; prepared and distributed fact sheets and information packets about the merger; notified more than 500 Federal, State, and local agencies; conducted phone consultations and more than 150 site visits; published display ads in local newspapers; and issued press releases and Federal Register notices.

SEA received approximately 160 comments following issuance of the EA (including comments filed by the City of Wichita). To address those comments, and other environmental comments received throughout the environmental review process, SEA conducted additional environmental analysis, which culminated in the issuance of a detailed Post Environmental Assessment (Post EA) issued on June 24, 1996. In the Post EA, SEA refined the discussion and mitigation recommended in the EA.

During the review process, SEA conducted site visits to Wichita, during which concerns such as noise levels, grade crossing activity, and safety were evaluated. SEA recommended numerous general and regional mitigation measures addressing safety, hazardous materials transport, air

quality, and noise that pertain to Wichita and other areas potentially affected by increased rail traffic as a result of the merger.

SEA concluded that, overall, the merger would result in several environmental benefits, including a system-wide annual net reduction of consumption of 35 million gallons of diesel fuel (based on 1994 figures) from rail operations and truck-to-rail diversions; system-wide improvements to air quality from reduced fuel use; and a reduction in long-haul truck miles, highway congestion and maintenance, and motor vehicle accidents.

SEA also concluded that the merger and related rail line abandonments and constructions could have potential environmental effects regarding safety, air quality, noise, and/or transportation, including the transportation of hazardous materials. In the EA and Post EA, SEA proposed extensive mitigation measures, including the Wichita Mitigation Study, that address environmental concerns (e.g., issues raised by the City of Wichita). The specific mitigation imposed is discussed in more detail below. SEA concluded that, with the Post EA mitigation measures, the proposed merger would not significantly affect the quality of the human environment on a system-wide, regional, or local basis. Therefore, SEA concluded that a full environmental impact statement (EIS) was not needed here.

Notwithstanding the extensive analysis that already had been done to identity environmental concerns and arrive at appropriate mitigation for Wichita, SEA determined that a further, more focused mitigation study for Wichita should be undertaken. SEA recommended: (1) an 18-month further study of additional mitigation measures for Wichita and (2) that during the mitigation study period, UP should be permitted to add only an average of two freight trains per day to the affected rail line segment. SEA explained that this increase would be below the threshold level for environmental analysis in the Board's environmental regulations. Therefore, the environmental status quo essentially would be preserved in Wichita during the mitigation study period.

On August 12, 1996, the Board issued its written decision approving the merger (Decision No. 44), which gave extensive consideration to environmental issues. The Board agreed that the mitigation measures in the Post EA, including the environmental conditions applicable to Wichita, will adequately mitigate the potential environmental impacts identified during the environmental review process, and it imposed those measures here. In addition, the Board adopted SEA's recommendations concerning the additional Wichita Mitigation Study, including the recommendation that freight rail traffic increases be limited to an average of two additional trains a day, pending completion of the study.

The Board rejected the argument of various parties that a full EIS should have been prepared, noting that the environmental mitigation measures imposed in this case are far-reaching and comprehensive. The Board concluded that no EIS is required, because the environmental mitigation conditions specifically address the potential environmental impacts associated with the merger and ensure there will be no significant environmental effects.

In Decision No. 44, the Board set up a process that will provide for full public participation during the Wichita Mitigation Study. The Board explained that SEA will issue Preliminary and Final Mitigation Plans for Wichita that will be made available to the public for review and comment before being submitted to the Board for its review and approval. The Board will then issue a decision imposing additional specific mitigation measures. This entire process will be completed within 18 months of consummation of the merger (i.e., by March 1998).

In the meantime, to preserve the environmental status quo, the Board placed limits on the increase in the number of freight trains allowed through Wichita during the 18-month mitigation study. The limit is no more than a daily average count of 6.4 freight trains per day, which represents the 1995 baseline average of 4.4 trains per day plus an average of two additional freight trains. The two additional trains are below the threshold for environmental analysis in the Board's environmental rules. This traffic cap essentially delays the merger for Wichita by ensuring that no adverse effects to the environment will occur pending determination of the exact additional mitigation measures to be required for Wichita.

2.4 Merger Conditions and System-Wide Mitigation Measures

In Decision No. 44, the Board imposed system-wide and corridor-specific environmental mitigation conditions on UP. The purpose of these conditions was to mitigate potential system-wide and corridor-specific environmental impacts, including those in Wichita. The system-wide mitigation measures address safety, hazardous materials, emergency response, air quality, and noise. The following system-wide and corridor-specific measures directly apply to Wichita:

- For all highway grade crossing signals, UP/SP shall provide visible instructions designating a [toll free] number to be called if signal crossing devices malfunction. (Condition #3)
- UP/SP shall provide [toll free] numbers to all emergency response forces in all communities. These numbers shall provide access to UP/SP supervisors who shall provide train movement information and work cooperatively with communities in emergency situations. These numbers are not to be disclosed to the general public. (Condition #4)
- UP/SP shall participate on a system-wide basis in the TRANSCARE program to develop hazardous material and emergency response plans in cooperation with communities. (Condition #5)
- UP/SP shall convert all railroad locomotives to the standards for visible smoke reduction that are established in the South Coast Air Quality Basin (Condition #11)
- UP/SP shall comply with all applicable FRA rules and regulations in conducting rail operations on the merged system. (Condition #13)
- To address noise impacts, UP/SP shall consult with the affected counties that have communities that would experience an increase of 3 dBA or more as a result of the increased rail traffic over rail lines in the States of California, Colorado, Illinois, Kansas, Louisiana, Nebraska, Nevada, Oregon, Oklahoma, and Texas. If appropriate, UP/SP shall develop a

noise abatement plan. UP/SP shall submit the results of these consultations to SEA who will review these findings with FRA. (Condition #16)

- UP/SP shall consult with the states and appropriate local officials as well as FRA to develop a priority list for upgrading grade crossing signals, where necessary, due to increases in rail traffic resulting from the proposed merger. This process shall be undertaken for all rail line segments in the States of Arkansas, California, Colorado, Kansas, Nevada, Oregon, and Texas. UP/SP shall advise SEA as to the status and the results of these consultations. (Condition #18)

Condition 23, shown in Figure 2.4-1, pertains specifically to Wichita. It directs SEA to conduct an 18-month mitigation study to arrive at a tailored mitigation plan to address the unique circumstances of Wichita in addition to the system-wide and regional mitigation measures that have been imposed. SEA's final mitigation study and recommended mitigation measures (which will be developed in consultation with the public) are intended to address increased rail traffic on the existing UP rail line in Wichita. The Board directed a similar mitigation study and train cap for the City of Reno, Nevada.

In Decision No. 44, the Board specifically directed

> that the studies will focus only on the mitigation of the environmental effects of additional rail traffic through Reno and Wichita resulting from the merger. Mitigation of conditions resulting from the preexisting development of hotels, casinos, and other tourist-oriented businesses on both sides of the existing SP rail line in Reno, or the preexisting switching operations that are a primary source of the congestion associated with the existing UP line in Wichita, are not within the scope of the studies.

Figure 2.4-1 Surface Transportation Board Condition 23 for UP/SP Merger

23a. UP/SP shall operate no more than a daily average count of 6.4 trains per day through the City of Wichita. (This reflects the Base Year daily average of 4.4 trains plus 2 additional trains.) The addition of two trains per day essentially maintains the environmental status quo. The 6.4 average train count per day does not include the following types of movements: (1) maintenance-of-way trains, (2) light locomotive movements, (3) local and industry switching train movements, (4) emergency trains operated under detour authority, for snow removal, for fire or other natural disaster purposes, and wreck removal purposes. This condition will be effective upon consummation of the merger and will continue in effect for 18 calendar months in total.

23b. For the purpose of monitoring the preceding condition, UP/SP shall file on a monthly basis with the Board verified copies of station passing reports of train movements through Wichita, KS, for each day of each preceding month in the specified 18-month period. These reports shall also identify those train movements, specified in the above condition, that are excluded from the 6.4 trains per day average count.

23c. UP/SP, in consultation with and subject to the approval of SEA, shall retain an independent third-party consultant to prepare a specific mitigation study to address the potential environmental effects on the City of Wichita of the additional rail freight traffic projected as a result of the proposed merger. This study shall be prepared under the sole direction and supervision of SEA. It shall include a final mitigation plan based on a study of the railway, highway, and pedestrian traffic flows and associated environmental effects on the City of Wichita. This study would tailor mitigation to address environmental effects such as safety, hazardous materials transport, air quality, and noise. UP/SP shall comply with the final mitigation plan developed under this study.

The study, which shall be completed within 18 months from the date of consummation of the merger, shall include the following:

- Projected post-merger increases in rail freight traffic on the Chickasha to Wichita line segment.
- Consultations with the City of Wichita, Sedgwick County, the Federal Railroad Administration, affected Native American Tribes, and other appropriate Federal, state and local agencies, and other interested parties.
- Consultations with UP/SP.
- Review of all existing information and studies including those prepared by the City of Wichita, Sedgwick County and UP/SP.
- Feasibility of a bypass route.
- With respect to vehicular and pedestrian safety, mitigation measures that identify the number and location of highway/rail grade separations in Wichita.
- Funding options.
- Submission of a draft study to the public for review and comment and then issuance of a final mitigation study.

23d. SEA will submit the final mitigation study and its recommendations to the Board, which shall then issue a decision imposing mitigation. In the event UP/SP and the City of Wichita and other appropriate parties reach agreement on a final mitigation plan, UP/SP and the City of Wichita shall immediately notify SEA, and the Board will take appropriate action consistent with such an agreement.

2.5 Benefits of the Merger

The approval of the UP/SP merger substantially changed the nation's railroad system west of Illinois and the Mississippi River. In the merger proceedings, UP/SP identified several beneficial and operational improvements of the merger, including:

- Improved, direct routes through major rail corridors.
- Consolidation of redundant rail line segments and facilities.
- Capital investment to improve system capacity and efficiency.
- Increased efficiency of rail yards and intermodal facilities.
- Reduced switching of rail cars and improved shipping times.

In the Post EA, SEA noted that system-wide consolidation and efficiency improvements would reduce the impacts on the human and natural environment. These system-wide improvements are expected to result in the following environmental benefits:

2.5.1 Energy

- System-wide net reduction of 35 million gallons of diesel fuel (based on 1994 operations) from rail operations and truck-to-rail diversions.

2.5.2 Air Quality

- System-wide improvements to air quality resulting from reduced use of fuel.
- System-wide efficiency improvements for rail operations and truck-to-rail diversions.

2.5.3 Transportation/Safety

- System-wide improvements from truck-to-rail diversions, reducing long-haul truck-miles by 283 million miles, which in turn would reduce roadway congestion, maintenance, and motor vehicle accidents.
- Removal of approximately 550 grade crossings and associated safety improvements.

UP/SP also pointed to several other environmental benefits that would occur in those areas where rail line segments would be abandoned, such as:

- Reduced human disturbance of the natural environment and gradual reestablishment of natural vegetation.
- Reduced loss of wildlife from train-animal collisions.
- Reduced noise exposure to adjacent land uses.

The Board fully considered these benefits in the approval of the merger.

2.6 Study Organization

2.6.1 Role of Independent Third-Party Contractor

The Wichita Mitigation Study is being conducted by SEA with the assistance of an independent third-party contractor. The President's Council on Environmental Quality regulations, 40 CFR 1506.5(c), allow a Federal agency to select a contractor to prepare an environmental document, provided that: (1) the contractor is selected solely by the lead agency, (2) the contractor has no conflict of interest, (3) the contractor executes a disclosure statement prepared by the lead agency specifying that the contractor has no financial or other interest in the outcome of the project, (4) the responsible Federal official furnishes guidance and participates in the preparation of the document, (5) the responsible Federal official independently evaluates the document prior to approval, and (6) the responsible Federal official is responsible for the scope and content of the document. SEA has applied these standards to its independent contractor in the preparation of this Preliminary Mitigation Plan (PMP).

The contractor's scope of work, approach, and activities are under the sole supervision, direction, and control of SEA. SEA's involvement, oversight, guidance, and participation in the development of the PMP has been extensive, including frequent meetings, briefings, and discussions concerning the methodology, data collection, analyses, and recommendations contained in this PMP. Furthermore, SEA independently reviewed the PMP prior to its issuance.

Although retained by UP/SP, the contractor was selected by SEA. SEA selected De Leuw, Cather & Company (DCCO) and associated subconsultants as the independent third-party contractor. Prior to selection, SEA reviewed in depth the qualifications of the lead firm and all technical subconsultants. The third-party contractor and its subconsultants provided disclosure statements that indicating they have no conflict of interest.

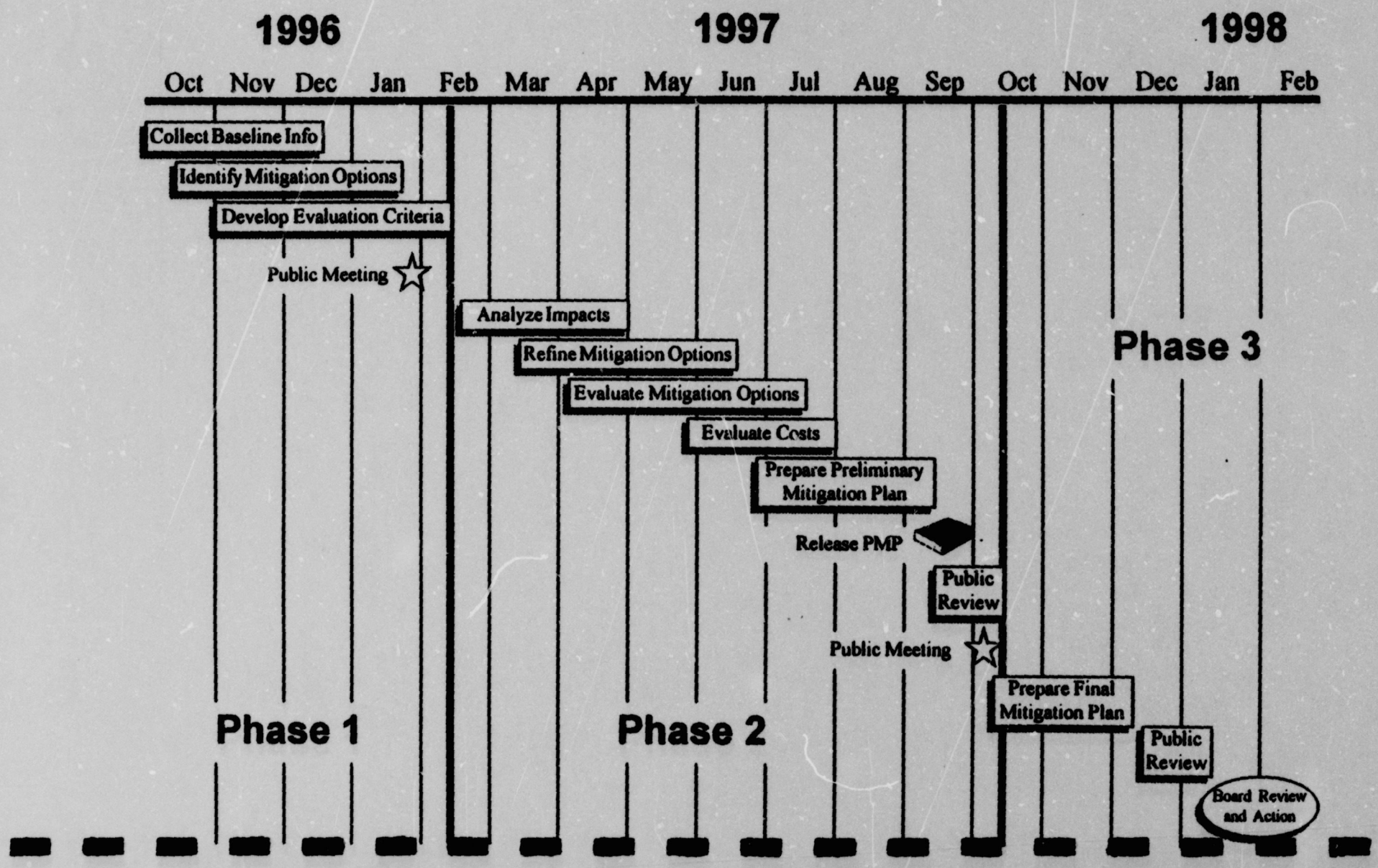
2.6.2 Study Objectives

SEA and its independent third-party contractor began the Mitigation Study in October 1996. In an effort to develop a specifically tailored mitigation plan for Wichita as directed by the Board, SEA establisl ed the following objectives for the study:

- Identify an appropriate number of and precise location(s) for highway/rail grade separations.
- Explore innovative mitigation options.
- Examine private and public funding options to share the cost of additional mitigation measures.
- Provide an opportunity for public input and a forum to exchange ideas and concerns.
- Facilitate the negotiation of a mutually acceptable agreement among the interested parties.

To meet these objectives within the mandated time frames, SEA divided the study into three phases. During Phase 1, SEA collected necessary data, identified preliminary mitigation options, developed evaluation criteria, and conducted public outreach activities to identify key issues and concerns. During Phase 2, SEA evaluated the mitigation options and prepared a preliminary mitigation plan for public review and comment. During Phase 3, SEA will consider public comments and prepare a Final Mitigation Plan, solicit additional public comments, and prepare its final recommendations to the Board. Then the Board will issue its decision imposing final environmental mitigation for Wichita. Figure 2.6.2-1 shows the general schedule for these activities.

Figure 2.6.2-1 Wichita Mitigation Study Schedule



2.7 Public Involvement Process

Decision No. 44 specified that SEA's mitigation study include consultations with a variety of City, County, State, and Federal agency representatives and other interested parties (Condition 23c). These consultations have occurred through meetings and correspondence with agencies. In addition, the SEA study team coordinated a comprehensive public outreach program to apprise the public of the study and provide a forum for all interested parties to present their views and concerns. The Wichita Mitigation Committee, an advisory group established in November 1996, also has provided a way to exchange information and ideas.

2.7.1 Goals

The purpose of SEA's public outreach program during the Wichita Mitigation Study has been to maintain a two-way flow of information between the SEA study team and interested parties in Wichita and Sedgwick County. SEA set the following goals to increase public awareness of the mitigation study and to ensure that the concerns of the general public would be heard and addressed by study team members:

- To exchange information and ideas.
- To establish and maintain contact with agency and elected officials representing the City, County, and State; leaders of local businesses, neighborhood organizations, and community groups; and members of the media and the general public.
- To distribute to these contacts on a regular basis accurate information regarding the study process, baseline information, data collection and analysis, and mitigation options.
- To provide frequent opportunities for individuals to review the study findings and to submit oral and written comments to SEA for consideration by the study team and the Board.

2.7.2 Wichita Mitigation Committee & Governor's Task Force

In cooperation with the Kansas Governor's Office, Sedgwick County, and the City of Wichita, SEA established the Wichita Mitigation Committee as a local forum to disseminate study information to the community and hear community concerns. The committee has 10 members representing the State of Kansas; Sedgwick County; the Cities of Wichita, Haysville, and Kechi; and local businesses and community groups. See Appendix B for a list of mitigation committee members.

To date, the committee has met eight times to discuss the progress of the mitigation study, technical information, and mitigation options. Meetings have promoted dialogue among interested parties and have provided opportunities for community representatives, City and County officials, and railroad representatives to review analysis results. Specific topics for discussion at the meetings have included train operations, negotiations between local and railroad officials, data gathering and analysis, mitigation options such as grade separations and increasing train speeds, evaluation criteria,

funding for mitigation measures, and environmental impacts regarding safety, air, and noise. Table 2.7.2-1 shows the topics discussed at each of the eight Wichita Mitigation Committee meetings.

Table 2.7.2-1
Wichita Mitigation Committee Meeting Topics

Date	Topics	Date	Topics
November 18, 1996	• Study Purpose & Organization	April 16, 1997	• Evaluation of Future Conditions Without Further Mitigation - Traffic - Safety
December 10, 1996	• Mitigation Options • BNSF Bypass • Railroad/City/County Discussions • Evaluation Criteria	May 21, 1997	• Evaluation of Future Conditions Without Further Mitigation - Traffic - Safety - Air - Noise
January 15, 1997	• Study Purpose • Railroad Operations • Information Collection • Mitigation Options • Evaluation Criteria • Public meeting	June 25, 1997	• Preliminary Mitigation Options Evaluation Results - Traffic - Safety - Air - Noise and Vibration
February 19, 1997	• Train Numbers • Public Meeting Follow-Up • Funding Analysis	July 30, 1997	• Refined Mitigation Options • Cost • Property Impacts

In addition to the Wichita Mitigation Committee, Governor Bill Graves established a task force to review Union Pacific railroad issues in western Kansas and the Wichita area. Co-chaired by Lt. Governor Gary Sherrer and Secretary of Transportation Dean Carlson, the task force includes Wichita Mayor Bob Knight, Sedgwick County Commission Chairman Tom Winters, and Sedgwick County District Attorney Nola Foulston. SEA representatives attended three meetings of the Governor's Task Force during Phases 1 and 2 to report on study activities and progress.

2.7.3 Briefings & Public Meetings

At the start of the Wichita Mitigation Study in October 1996, SEA study team members held a series of introductory meetings with City, County, and State agency and elected officials and with local business leaders. During these meetings, SEA distributed an information packet providing background information about the study, details of the study's purpose and schedule, and contact information for SEA study team members.

SEA held an open house/public meeting in Wichita on January 28, 1997, to allow for public review of preliminary mitigation options and maps illustrating the study area. At the meeting, SEA

staff and study team members made presentations detailing the history of the UP/SP merger and the Surface Transportation Board, an overview of railroad operations nationwide and locally, the results of Phase 1 and plans for Phase 2 of the mitigation study, and opportunities for public participation in the study.

Approximately 160 people attended the open house/public meeting, during which SEA study team members were available to answer questions and hear concerns of those present. SEA provided comment sheets so that anyone interested in doing so could submit written comments to the Board. SEA incorporated these public comments into the public meeting summary, which was distributed to local and state officials as well as members of the Wichita Mitigation Committee. The technical activities of Phase 2 of the study took into consideration oral comments from the public meeting and the approximately 13 written comments submitted during and after the meeting.

To conclude their 10-week series on the impacts of the railroad merger (See Section 2.7.5), Wichita's KWCH Channel 12 and the *Wichita Eagle* sponsored an hour-long televised town meeting on May 21, 1997. Mayor Bob Knight, Lt. Governor Gary Sherrer, County Commission Chairman Tom Winters, and James Roseboro of Wichita Independent Neighborhoods participated in a panel discussion regarding the railroad merger's impacts on Wichita. U.S. Representative Todd Tiahrt participated in the town meeting through a satellite hook-up. Mike Dalton, SEA's Wichita Mitigation Study Director, attended the meeting and answered several questions from the audience regarding the mitigation study and the role of the Surface Transportation Board.

SEA has scheduled another public meeting for September 30, 1997 during which SEA study team members will present the findings of Phase 2 of the study and the recommendations in this Preliminary Mitigation Plan. The meeting will also provide the opportunity for members of the public to ask questions about and comment on Phase 2 findings, the analysis, and the Preliminary Mitigation Plan.

2.7.4 Noticing

Before the January 28, 1997 open house/public meeting, SEA coordinated efforts with City and County officials and members of the Wichita Mitigation Committee to ensure the widest possible notification of the meeting. SEA mailed meeting announcement fliers to over 200 agency representatives and elected officials, business and economic concerns, and other interested parties. Furthermore, SEA provided multiple copies of the meeting notice to local organizations, such as Wichita Independent Neighborhoods and the Wichita Area Chamber of Commerce, for inclusion in their mailings.

To inform the general public about the open house/public meeting, SEA ran a display ad twice in the *Wichita Eagle* and sent meeting notices to local media outlets. The Board also issued a press release and placed a notice in the Federal Register announcing the meeting purpose, date, and location.

SEA is implementing similar notification efforts to announce the availability of this Preliminary Mitigation Plan and the purpose, location, and time of the public meeting scheduled for September 30, 1997.

2.7.5 Media

In October 1996, SEA held a press briefing to familiarize the local media with plans for the mitigation study and provide reporters with contact information for study team members. SEA study team members answered questions and distributed study information packets during the press briefing (See Section 2.7.3). Throughout the study, SEA continued to provide information on request and during site visits to reporters from local newspapers and radio and television stations.

The extensive media coverage of study-related issues included a joint effort by KWCH Channel 12 and the *Wichita Eagle*. The two teamed to produce a 10-week series of newspaper articles and television reports highlighting the potential impacts of increased train traffic through Wichita. Reports covered topics such as traffic concerns in the suburbs, impacts of various mitigation options, funding sources for mitigation measures, and similar train-related issues in Reno, Nevada. This media coverage culminated in a televised town hall meeting on May 21, 1997 (See Section 2.7.3).

During the mitigation study, SEA study team members also monitored the local news coverage and information produced on-line on web sites sponsored by the *Wichita Eagle* and Wichita Independent Neighborhoods. Close attention to media coverage allowed the study team to identify and respond to issues of public concern promptly as they arose.

2.7.6 Public Review and Comment

SEA will provide a 30-day period for public review and comment on this Preliminary Mitigation Plan. During this time, SEA encourages individuals to submit comments regarding the mitigation study findings and preliminary conclusions as presented in the plan. To file comments please submit an original plus 10 copies to the Board at the following address:

Office of the Secretary
Case Control Unit
Finance Docket No. 32760
Surface Transportation Board
1925 K Street, NW, Room 700
Washington, DC 20423-0001

Attention: Elaine K. Kaiser
Chief, Section of Environmental Analysis
Environmental Filing–Wichita

All comments submitted to SEA will be entered in the public record, will be considered during preparation of the Final Mitigation Plan, and will be available to the Board as it makes its final decision regarding mitigation measures for the City of Wichita and Sedgwick County at the conclusion of the study.

2.8 Key Study Issues Raised by the Public

Since the beginning of the Wichita Mitigation Study, SEA maintained a dialogue with local and state officials as well as interested members of the public. To facilitate this dialogue, SEA provided a variety of opportunities for public input through participation in public meetings, meetings of the Wichita Mitigation Committee, and phone consultations with SEA study team members. SEA also received formal comment letters requesting information or raising concerns, all of which were entered into the public record upon receipt. SEA considered these comments during the Mitigation Study and development of the Preliminary Mitigation Plan. As outlined below, the key issues raised by the public throughout the study fall into the following topic areas: potential environmental impacts, other potential impacts, train operations, study scope and Board jurisdiction, and mitigation options. A table of public issues and where they are addressed in this report is included in Appendix C.

The public involvement process is characterized by the broad diversity of interests providing comments. The mitigation committee has represented local and state agencies, businesses, and neighborhoods. The City of Wichita and Sedgwick County elected officials and agency staff have been active participants in the mitigation study process. Key issues raised by local leaders have included traffic delay, emergency response, safety for school children, accident risk, air quality, and funding of mitigation options. Neighborhood interests have been most concerned with quality-of-life issues such as motorist delay, inconvenience, and potential for dividing neighborhoods.

Local leaders and many residents have expressed strong support for options that would reroute train traffic around Wichita. Many have also expressed support for grade separations on major streets. Governor Graves, Lt. Governor Sherrer, and Congressman Tiahrt have actively participated in the mitigation study. They have supported efforts to address funding issues and both short-term and long-term railroad conflicts in Wichita

Local business leaders have raised concerns about workers' access to employment sites and potential impacts on downtown development and business districts. Some local business owners have expressed concern about property impacts from grade separation options.

Some citizens have submitted letters noting the value of the railroad to the local economy. Others have noted that the City and County should be more active in planning and funding potential solutions. UP representatives have participated in meetings with local officials and the mitigation committee to clarify railroad operating plans and discussion mitigation options for Wichita and Sedgwick County.

2.8.1 Potential Environmental Impacts

Safety

Emergency Response Delays: Community leaders have expressed concern that local emergency response times may increase as a result of emergency vehicles having to wait longer and more often at railroad tracks while trains pass. Furthermore, access to Via Christ-St. Francis medical facility may be blocked more frequently by increased train traffic, causing potentially life-threatening delays for emergency services, physicians, and organ retrieval teams. Police, fire, and ambulance representatives provided information about existing emergency response procedures and preliminary counts of emergency response delay incidents.

Pedestrian Safety: UP tracks bisect the boundaries of 11 elementary schools and four middle schools in the Wichita area. One hundred and forty-nine elementary school children in the study area must cross over the UP tracks each day going to and coming home from school. School officials, teachers, and parents fear that increased numbers of trains will exacerbate current safety hazards posed by the tracks' proximity to the schools.

The offices of Wichita Industries & Services for the Blind, Inc. are adjacent to UP and Burlington Northern Santa Fe (BNSF) tracks on East Lincoln. As many as 100 blind pedestrians employed by or using their facilities daily may face increased danger as they cross from bus stops on one side of the tracks to the offices on the other side. Currently, the pedestrians use sound cues to know when it is safe to cross the tracks, but echoes, idling traffic, and the Doppler effect can be confusing regarding the direction and location of the trains. The director of Wichita Industries & Services for the Blind noted that increased train traffic will intensify the danger, and he suggested installing tiles with truncated domes that provide a tactile warning at strategic areas to facilitate safe crossings.

Traffic Delays: Community leaders and local residents expressed concerns about the increased inconvenience of motorist delay caused by train traffic. Neighborhood residents are concerned about the impacts of blocked crossings on neighborhood cohesiveness and community access. Business leaders stated concerns about worker and delivery access.

Train/Vehicle Accidents: Many of the grade crossings in Wichita do not have crossing gates or flashing lights. Residents are concerned that the risk of train/vehicle accidents at these locations will only rise with the increase in train numbers. There is also concern that the number of accidents will increase as more motorists try to race trains to avoid waiting for them to pass.

Derailments: An increase in number and length of trains may result in a parallel increase in the risk of train derailments. Since the railroad tracks pass through downtown Wichita and residential areas, derailments could potentially affect a large number of individuals.

Air Quality

Local officials expressed concerns about additional air pollution caused by more trains passing through Wichita and by pollutant emissions from automobile exhaust of motorists waiting at blocked crossings. Under the 1977 Clean Air Act Amendments, Sedgwick County was declared a non-attainment area for carbon monoxide (CO) based on violations of CO standards in the central business district. After implementing measures to reduce emissions in this area, Sedgwick County was designated a maintenance area for CO in the late 1980s. Local officials are concerned that the increased train traffic might cause the County to violate the CO standards again, resulting in possible fines and penalties for the County.

Noise and Vibration

Although local officials noted that they have received few noise complaints about trains, some members of the Wichita Mitigation Committee raised concerns about potential vibration impacts of additional train traffic. Committee members are concerned about the potential for structural damage to buildings caused by vibration. They also raised the issue of human perception or annoyance from the vibration caused by increased train traffic.

2.8.2 Other Potential Impacts

Property Impacts and Business Losses

Constructing grade separations may limit access to some nearby businesses or require their relocation. Furthermore, business owners in areas with potential grade separations expressed concern that construction of grade separations may result in a loss of business as street traffic will no longer pass by their businesses. Several elected officials noted that traffic delays caused by additional trains could undermine extensive community investment in downtown development.

Community and Neighborhood Access

Community, business, and neighborhood organization leaders are concerned that increased train traffic may have negative impacts on the development of the downtown area and the cohesiveness of Wichita's neighborhoods. Neighborhood representatives expressed concerns about mitigation options that would include closing grade crossings with low traffic volumes. Street closures may separate currently close-knit neighborhoods. In particular there is concern that inner-city neighborhoods are most affected. Furthermore, if businesses are forced to relocate to fringe areas, those who live in neighborhoods now located near their places of work may have less convenient commutes.

2.8.3 Train Operations

Local officials have questioned the accuracy and reliability of the data being used in the mitigation study regarding train numbers, lengths, and speeds through Wichita. The potential for

additional increases in the future was a particular concern. The announcement of the proposed acquisition of Conrail by Norfolk Southern and CSX raised questions as to whether that transaction might affect UP's projections of future operations.

Local officials and residents expressed concerns that the longer and heavier coal trains expected through Wichita will intensify all of the impacts already expected. They have asked whether it is realistic for UP to consider running 135-car coal trains, and if not, whether the projected number of trains would then increase to accommodate more cars. In March 1997, UP submitted a revised operating plan for the planned trains through Wichita. UP rerouted the planned coal trains through Kansas City instead of Wichita. UP's revised plan is described in Section 4.

2.8.4 Mitigation Study & Board Jurisdiction

Scope of Analysis

During the early stages of the Wichita Mitigation Study, local officials asked for clarification of the rail lines subject to the additional analysis and the geographic scope of the study area. SEA subsequently clarified that the study team would examine the merger-related increase in train traffic on the two Sedgwick County rail line segments, Lost Springs-Wichita and Wichita-Chickasha. SEA also clarified that the study would consider merger-related environmental impacts to the Cities of Kechi and Haysville and throughout Sedgwick County.

Options Considered

Many individuals expressed concern that the range of options considered by SEA during the mitigation study was too narrow and should have included options that would entirely eliminate increased train traffic through Wichita, such as bypasses or rerouting trains around Wichita.

Public Involvement & Understanding

Some Wichita community members felt that there was a lack of Board presence at the public meeting to capture local concerns. Some attendees of the January 28, 1997 public meeting felt that they had little opportunity to present their concerns and that SEA was not receptive to their ideas. Citizens also raised questions regarding the relation of the mitigation study to the Kansas/UP bypass study, and how the Board will consider the results of the Kansas/UP study (See Section 2.8.6).

Limits of Board's Oversight

There is a concern that after the five-year period of Board oversight of the merger, UP has no commitment to maintaining the level of its currently predicted train counts, lengths, and speeds. UP will be allowed to increase the numbers of trains as much as market forces or freight needs change, and City officials are concerned they will have no means to keep UP committed to the figures stated in current projections. Several local officials specifically highlighted the market for

coal from the Powder River Basin and potential future increases in transport of this coal from Wyoming to the southeastern United States.

UP representatives expressed concerns that mitigation options should not restrict the railroad's ability to meet its responsibilities to transport freight for its customers and to respond to market demands.

Jurisdiction Over Other Parties

Because many local interests favor a bypass option, officials requested clarification on whether the Board could require BNSF to participate in specific mitigation options.

Representatives of City agencies questioned whether the Board had the authority to require the City of Wichita or other parties to fund or otherwise participate in mitigating the impacts of UP's increased train traffic.

2.8.5 Mitigation Measures

Mitigation Options

Suggestions for mitigation measures offered by various officials and local interests included building elevated tracks, building over/underpasses, increasing train speeds, moving coal trains at night, scheduling trains, and implementing bypass options such as rerouting trains on existing routes or constructing new tracks that bypass Wichita. In general, many individuals seemed to favor some form of bypass option. UP representatives suggested several actions or improvements to address local issues, including grade crossing safety measures and safety training.

Local interests expressed a desire to know what criteria the Board will use to select the various mitigation options. They also asked whether the study team would consider further impacts caused by the mitigation options themselves and who would be responsible for mitigating those impacts if any were found.

Funding

City officials have stated that the Board should require UP to pay the entire costs to mitigate the environmental impacts of the railroad merger. The City of Wichita and Sedgwick County filed a lawsuit appealing the Board's merger approval. After the Board issued Decision No. 71 (See Appendix A and Section 9.3) clarifying that it would require UP to pay for measures to mitigate environmental impacts of the merger-related increase in train traffic, the City and County withdrew their lawsuit.

Some community members suggested that the City also should take some responsibility for traffic delay resulting from community growth and development and that present traffic delay has

been caused by the City's past inaction. Other residents expressed concern that their taxes may rise if they need to fund mitigation measures.

Since Wichita School District 259 has a policy of busing school children over tracks in hazardous areas, officials asked if busing is necessary, who will be responsible for funding the continuing costs associated with busing.

Monitoring and Compliance

City officials requested that the post-merger cap placed on increases in train traffic during the study be maintained until the chosen mitigation measures can be implemented. They also asked who would ensure compliance with the final mitigation plan and how compliance would be monitored. Mitigation measures related to rail operations rather than construction, such as increasing train speeds, would require continued monitoring.

2.9 Private Negotiations

Throughout the study, SEA has encouraged local and state leaders and UP to discuss possible joint solutions to local concerns. On March 18, 1997, Governor Graves convened a meeting of Jerry Davis the president of UP, Mayor Bob Knight, and County Commission Chairman Tom Winters. At that meeting, the parties agreed to participate in a joint study of bypass options and the cost of grade separations. The study will identify two possible routes and estimated costs for constructing a rail bypass around Wichita for BNSF and UP through trains. The study is funded jointly by the State of Kansas and UP. Wichita and Sedgwick County provided the preliminary results of their study to SEA on August 26, 1997.

Section 3
STUDY AREA

3.1 Introduction

This section provides an overview of the Wichita, Kansas study area, its history, and community characteristics. The section also highlights certain planning policies contained in adopted city plans that pertain to the railroad activities and that the SEA study team reviewed.

3.2 Community Characteristics

3.2.1 Historical Background

Railroads have played an important role in the establishment and development of Wichita. Originally established as a temporary settlement by the Wichita Indian Confederation, Wichita was incorporated in 1870. It gained its first rail service only two years later. Wichitans saw railroads as a necessary part of economic development of the community, and they competed with other towns to attract the railroad companies. Public bond issues were used to subsidize rail development.

The Wichita and Southwestern Railroad, built with the support of County-issued bonds, established the first rail service in the area with a branch line connecting Wichita to the Santa Fe at Newton. This branch allowed Wichita to become the shipping point for cattle driven north from Texas. Wichita's place as the railhead for cattle drives faded as the railroads were extended, and by 1876, the cattle trade there had ended. The railroads continued to serve the agriculture industry that developed, including meat packing, flour and feed mills, and agricultural supply. At one point, the City dominated the broom-corn market nationally.

To assure that the Santa Fe would not have the pricing advantage of a monopoly in rail service, the community sought to attract a second railroad, the St. Louis, Wichita, and Western, which began service in 1880. County bonds were sold to support this line as well, but the County avoided payment when the new railroad quickly came under the control of the Santa Fe. Other railroads reached Wichita in 1883, 1887, and 1900, all supported with public bonds.

The right-of-way for the UP line that is the subject of this study was granted by a City of Wichita ordinance in 1886. The ordinance granted the right to construct, operate, and maintain railroads in street and alley rights-of-way within the City. The rights were granted for 999 years.

The arrival of the later railroads sparked a local debate about the best location for them, as some residents thought that a new terminal should be in a suburban location. The resolution of the debate called for the terminal to be located in the established part of town in the interest of supporting the businesses there. The new terminal was built near the existing Santa Fe terminal, concentrating railroad tracks into a central rail corridor near the center of the City. Railroad

construction sparked land speculation in the vicinity of each depot. Real estate in Wichita boomed, and in 1887, Wichita ranked third in the country in the volume of real estate transactions.

Freight rates continued to be a concern. In 1892, the City Council, feeling that the railroads had violated their pledges regarding rates, urged the Kansas Congressional delegation to support strengthening the Interstate Commerce Commission. In 1895, the business community organized the Committee of Fifty to advise the City Council; its main concern was the regulation of freight rates.

The effect of trains in the north-south central railroad corridor east of downtown created concern as the eastern suburbs grew and auto traffic increased on the streets that crossed the tracks. Calls for grade separation of the tracks increased, and in 1907, the city engineer designed plans to elevate the tracks from Kellogg to 13th Street North at a cost of $900,000. The City and the railroads reached agreement on a more limited plan in 1911, and construction began the following year. The City paid the cost of modifying several streets to pass under the tracks and agreed to pay the cost of a viaduct that carried Kellogg over the tracks. The railroads built a union station in conjunction with the track modifications. The tracks at the station had a capacity of 20 trains per hour, although the number of trains using the station at that time was 30 a day. The total cost of the entire improvement was $2.5 million.

Wichita grew and its economy diversified during the first three decades of the century. One of the most important changes was the introduction of aircraft manufacturing in the 1920s. Community leaders determined that the aircraft industry had great potential, and they aggressively pursued and successfully attracted aircraft builders. This was a major factor in the City's growth during World War II, when the aircraft companies and related businesses in Wichita received large government contracts. The City and County experienced large and rapid increases in population as defense workers moved to the area.

In 1988, the Metropolitan Area Planning Department (MAPD) issued a report, *Wichita Rail Service and Facilities Plan*. The study was intended to develop a railroad improvement program that balanced the City's goals for rail consolidation with the railroads' economic needs. The report notes that there had been few recent studies of railroad impacts on the City, but that the study was prompted by interest in downtown redevelopment, concern about traffic congestion, and the changing ownership of railroads because of mergers.

The MAPD's report focused mostly on tracks other than the UP line which is the subject of the current Wichita Mitigation Study. The 1988 report does, however, mention the line now being studied. In May 1988, the Interstate Commerce Commission approved the Union Pacific Railroad's acquisition of the railroad company that owned the line, then known as the OKT line. As highlighted below, the report describes the effect of the merger on Wichita:

> Likely impacts will be an increase of traffic on the OKT trackage since this merger provides greater north-south mobility for Union Pacific through the Wichita area.

This increased traffic is likely to include some redistribution of current traffic in Wichita as well as the routing of new rail traffic through the City. Any Wichita transportation plans that are based on the current low volume of traffic on the OKT trackage should be reviewed in light of possible rail volume increases.

The possible increase of OKT traffic highlights the continued importance of the main north-south rail corridor through Wichita and the limited potential for further rail consolidation of lines in this corridor. From discussions with railroad officials, this corridor will remain an important route for north-south movement of loads, especially grain and grain products, and an important access link to Wichita grain elevators, other local industry, and the local yards in north Wichita.

While some very limited consolidation of the OKT and Union Pacific trackage in the north area may be possible, further rail consolidation (which would likely include other railroad companies, such as the Santa Fe) will require a detailed determination and assessment of the following: needed track sharing agreements (including the cost of trackage rights), provisions for service to local shippers in the north corridor, and provision for access to the north rail yards. It is likely that any consolidation improvements in the corridor will be at the City's expense.

Serious consideration of that consolidation occurred more recently, when discussions among Burlington Northern, Santa Fe, Union Pacific, and the City and County led to a Union Pacific study addressing the consolidation of rail facilities in the Wichita central railroad corridor. The study resulted in a four-phase plan, which proposed routing of UP traffic onto Burlington Northern (now Burlington Northern /Santa Fe or BNSF) tracks and elevation of the rail corridor between 17th Street North and Douglas, with grade separations at Central, Murdock, and 13th Street North. The plan also called for yard consolidation and new track connections. A conceptual design for the physical changes outlined in the plan estimated the project cost to be $60-$65 million.

An engineering review of the four-phase plan done for the MAPD found that the costs were reasonable. According to the review, "[t]he benefits of the rail consolidation would appear to be shared between the community and the railroad." The report noted that all the affected railroads had expressed a willingness to participate in funding the plan commensurate with the benefit they would receive. By March 1996, however, negotiations among the railroads and the City ended without reaching an agreement.

3.2.2 Population and Demographics

Wichita, located in south-central Kansas, is the State's largest city, and it is an important center of industry and commerce. Wichita is the County seat of Sedgwick County.

Wichita's estimated population in 1996 was 320,753, and that of Sedgwick County was 432,604. The City population increased 16,742 between 1990 and 1996, while the county's total

increase was 28,942. The City's highest growth has been in its far western, eastern, and northeastern areas. While those areas are growing, central Wichita is losing population. The population of Wichita is projected to be 324,586 by 2000.

3.2.3 Housing and Business

The largest industries in the Wichita metropolitan statistical area, which includes Sedgwick, Butler, and Harvey Counties, are services (providing 27 percent of the total employment), retail trade (24 percent), and manufacturing (22 percent). Manufacturing includes a large component of aviation manufacturing companies and related suppliers.

3.3 Key Planning Policies

3.3.1 Comprehensive Plan

The City of Wichita and Sedgwick County, acting through their governing bodies and the MAPD, are authorized by Kansas law to perform comprehensive planning. *Planning for Change: The Wichita-Sedgwick County Comprehensive Plan* is the current comprehensive plan for the region.

The comprehensive plan addresses transportation, including roadways, mass transit, airports, bicycle facilities, and railways. In the plan's chapter entitled "Existing Conditions, Issues, Trends, and Projections" the discussion of railways states:

> Railways are important to commerce in the Wichita area, moving raw and manufactured products in and out of the region. The location of future industrial land use should maximize the availability of railways and at the same time be located in areas where conflicts with other future land use and transportation modes can be reduced.
>
> Numerous rail crossings are located in the central industrial corridor as well as the downtown and midtown areas, and some of the most important east-west streets are impacted by train-auto conflicts. Four railroads with separate tracks (Santa Fe, Union Pacific, Oklahoma-Kansas-Texas, and the Burlington Northern) create a frequency of train movements that is especially irritating to motorists. A recent study, *Rail Service and Facilities Plan*, searched for affordable solutions and concluded that the only viable option would be to either separate auto and rail traffic in this area or relocate some of the existing rail routes.

The "Planning Considerations" section that addresses transportation issues notes that separation or relocation may offer solutions to overcoming congestion problems.

The plan's discussion of existing transportation conditions notes that Wichita and Sedgwick County were spending $4 million and $8 million, respectively, on the arterial roadway and intersection improvements, and that a new generation of improvements was needed.

The plan's "Policy Guidance" chapter addresses railroad operations in several ways. The following is the transportation objective and supportive strategy that applies to railroads:

> OBJECTIVE: Provide and maintain a roadway network which promotes safety, convenience, and aesthetics.
>
> Strategy: Eliminate or reduce rail/auto conflict points through abandonment, grade separation or realignment of rail corridors in the central areas of Wichita and along major arterials.

The environmental quality discussion includes an objective and strategy that affects the transportation of toxic substances:

> OBJECTIVE: Approach environmentally hazardous situations proactively in order to prevent serious contamination problems from occurring or spreading.
>
> Strategy: Maintain an ongoing information collection system to identify existing and proposed locations of toxic substances and catalog the method of storage, handling, transportation, and disposal within Sedgwick County.

The future public facilities section of the plan includes a description of planned transportation improvements for 1992-2001. It lists 75 projects that are in approved capital improvement plans (CIPs) and seven projects that are needed but not in CIPs. It also lists 32 projects as additional needs for the years 2002-2010. All of the projects are roadway improvements, mostly widening and paving projects. No projects that would affect railroads are included, but the text notes, "Plans have been proposed to relocate the Union Pacific tracks from Midtown and downtown Wichita, in order to reduce rail/automotive conflicts, but this is not a part of the CIP."

3.3.2 Transportation Plan

In compliance with the requirements of the Federal Intermodal Surface Transportation Efficiency Act of 1991, the Wichita-Sedgwick County metropolitan area has a long-range transportation plan. The current long-range plan is *2020 Transportation Plan for the Wichita-Sedgwick County Metropolitan Area*, adopted in December 1994. The plan does not address railroad projects, although the introduction to the plan lists seven "mobility issues" that the plan must address, one of which is that "[m]otorists are frustrated by frequent stoppages associated with train movements."

The plan analyzes three primary alternatives. It recommends the adoption of the alternative that "accommodates the projected traffic demand" instead of either a financially constrained plan or an energy-constrained plan. The recommended plan would "complete the freeway network that has been planned for more than thirty years, and upgrade over 160 miles of City and County primary roadways." Two highway projects, overpasses at 13th and Central, relate to railroads. The financial section of the plan includes a cost estimate of $13.6 million for the overpass at 13th and $12 million for the overpass at Central, both in 1994 dollars.

The plan estimates the cost of all improvements at $983 million in 1994 dollars. It identifies a $35-million shortfall for projects in Wichita and more funds than would be needed for projects in Sedgwick County.

3.3.3 Transportation Improvement Program

Federal law also requires the development of a short-term transportation improvement program (TIP) that identifies the projects to be built in the next three years. The most recent TIP for the Wichita-Sedgwick County metropolitan area is *1996 Transportation Improvement Program.* It contains projects that would cost approximately $397 million for the three-year period, and it also lists projects planned for 1998-2000. The reconstruction of highway-railroad grade crossings at unspecified locations is included in the program in each year. The reconstruction of the existing grade separations at 1st Street North and 2nd Street North is programmed for engineering in 1995 and construction in 1996 and 1997. Neither list includes any new highway-railroad grade separations.

3.3.4 Kansas Rail Plan

The *Kansas Rail Plan 1995 Update* is the Kansas Department of Transportation's overview of the state's rail system. The plan does not define needed improvements, as such improvements are under the control of the private-sector railroad companies. Instead it describes the condition of the system and the issues that affect railroads in the State. The plan describes the UP/SP merger and the expected effects reflecting Union Pacific's original plan to use the line through Wichita as a bypass for Kansas City.

Section 4
RAILROAD OPERATIONS IN WICHITA

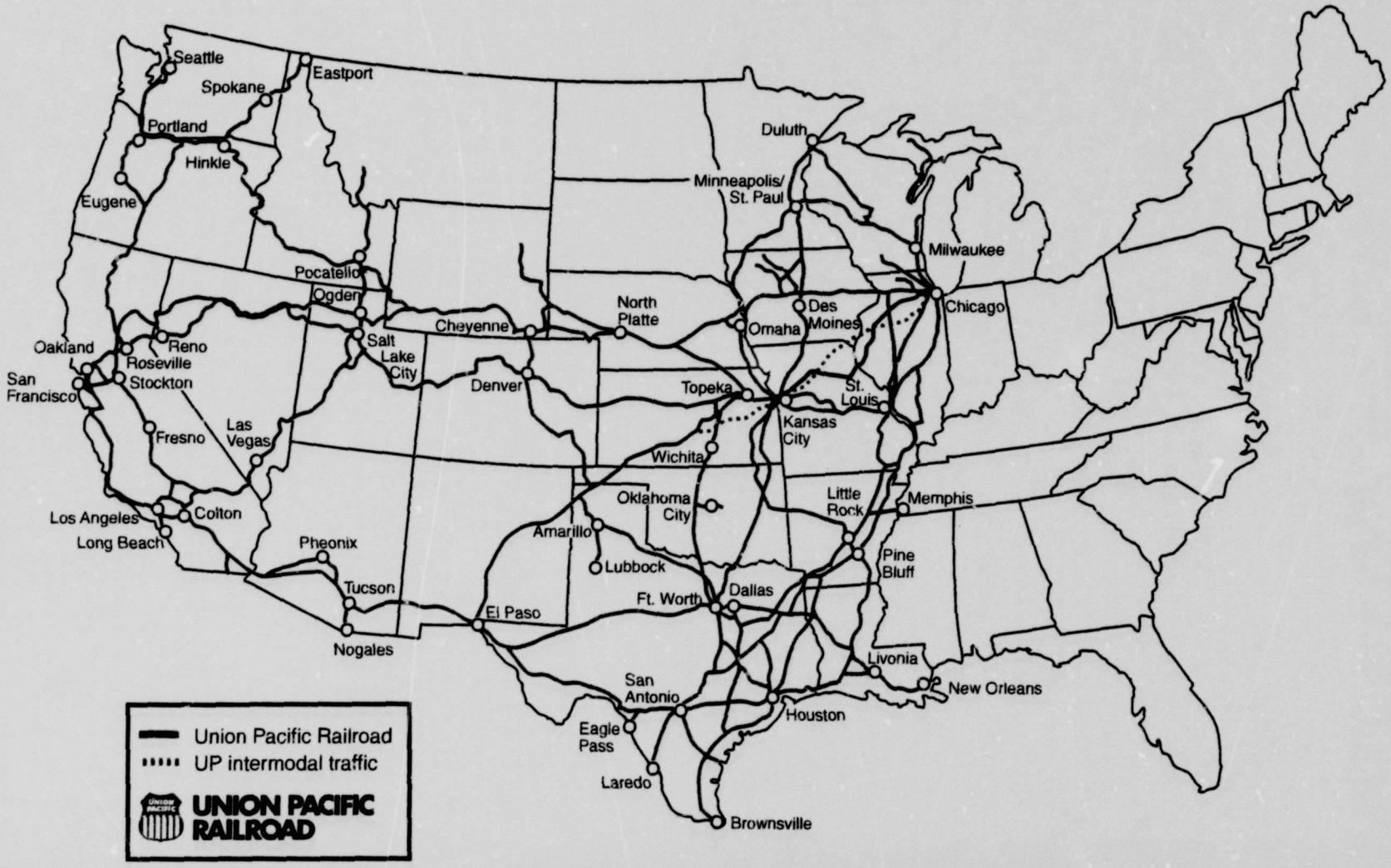
4.1 Rail Activities in Wichita

The Wichita Mitigation Study examined the merger-related environmental impacts on the UP north-south secondary mainline through Sedgwick County (See Figure 4.1-2). The rail line includes two segments, Lost Springs-Wichita and Wichita-Chickasha. The Lost Springs-Wichita segment is part of a rail line known as the Herington Branch, which runs from Herington, Kansas to a point just north of 21st Street North in Wichita. There it meets the UP Wichita-Chickasha segment, part of a line known as the OKT Subdivision, which continues south through central Wichita to Chickasha, Oklahoma and on to Ft. Worth, Texas. The portions of the Lost Springs-Wichita segment and the Wichita-Chickasha segment within Sedgwick County are the subject of the mitigation study and are usually referred to in this plan simply as the UP rail line. Figure 4.1-1 shows the combined UP/SP rail system.

There are other rail lines in Wichita that are not the subject of this study, but their operations affect present conditions in the city. Railroad operations on these lines affect present noise and air quality levels and also create traffic delays where they cross streets at grade. These other lines are also shown in Figure 4.1-2. The UP line known as the Wichita Branch runs from the northeast at El Dorado to the Wichita Yard. From the Wichita Yard the line is called the Hutchinson Industrial Branch, and it cuts through downtown between Waco and Wichita and crosses the Arkansas River near Douglas, turning northwest to Hutchinson. Another north-south secondary mainline through the County is owned by Burlington Northern Santa Fe (BNSF). It runs from Newton south through Wichita along Broadway and Southeast Boulevard, and it continues on to Texas. BNSF also has a branch line that runs down the center of Mosley, east of and parallel to the BNSF mainline in north Wichita.

Union Pacific's two rail yards in Wichita, Cline Yard and Wichita Yard, are also relevant to the UP rail line in the study. Cline Yard is located north of 21st Street North, at the junction of the Lost Springs-Wichita segment and the Wichita-Chickasha segment. Wichita Yard is the beginning and ending point for trains that use the UP rail line, although the yard itself is located north of 21st Street North on the Wichita Branch, which is not part of the study. The yard limits for both yards extend from north of 37th Street North to south of 55th Street South. In effect, all of UP's operations through Wichita are within the yard limits. Yard limits define the area of a track where all trains must travel slowly enough so that they can stop on sight of another train or an open track switch.

In 1911, the railroads in Wichita created the Wichita Union Terminal Railroad Co. (WUT), which UP and BNSF now own jointly. Creation of the WUT allowed the consolidation of different railroads' tracks through the central part of the City. WUT tracks run from North Junction, near Central, to South Junction, near Lincoln, and they function as a part of both the UP and BNSF mainlines. The crossings of the WUT at 1st and 2nd Streets, Douglas, Waterman, and Kellogg are grade-separated.



SURFACE TRANSPORTATION BOARD - *Section of Environmental Analysis*

PRELIMINARY MITIGATION PLAN

UP/SP MERCER MITIGATION STUDY WICHITA

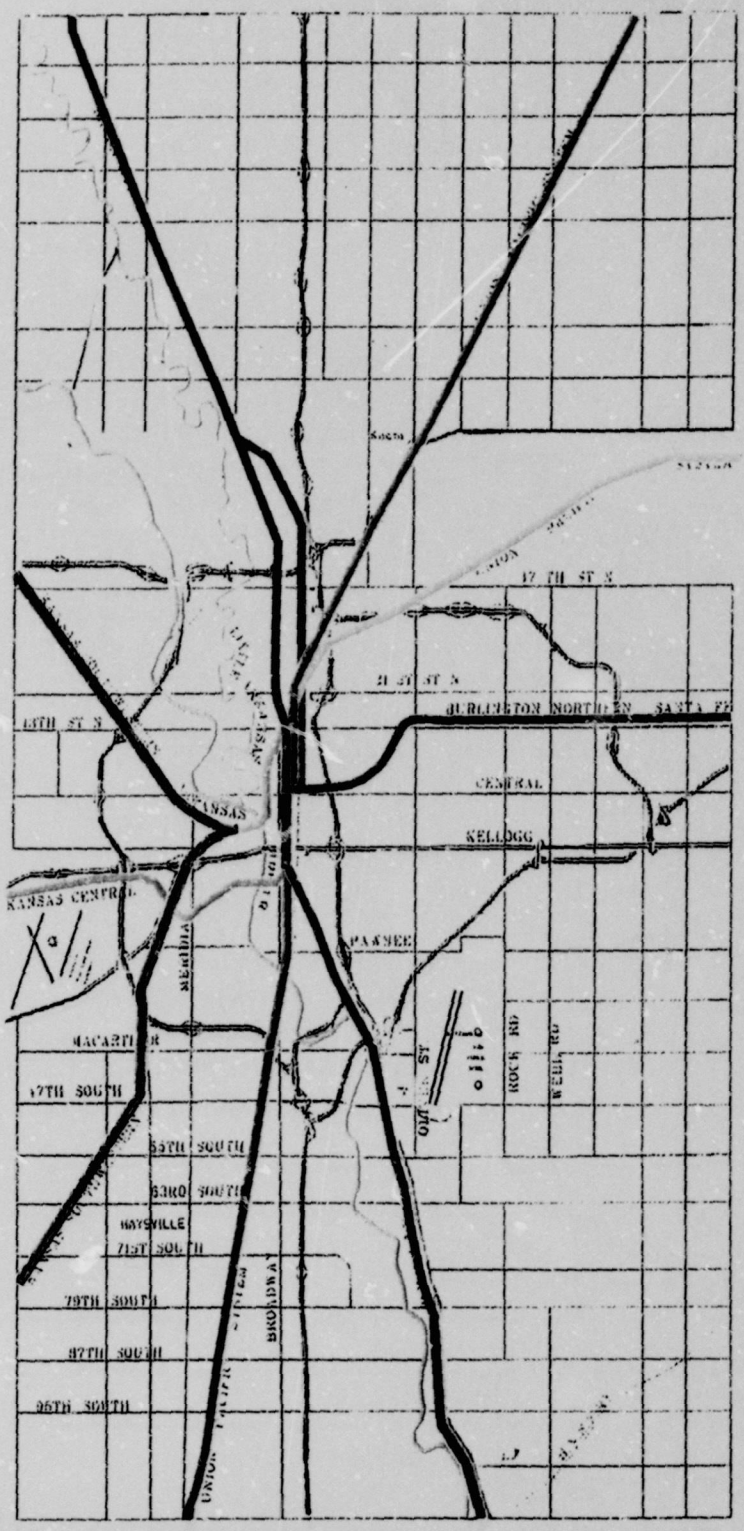
September 1997

FIGURE 4.1-1

Union Pacific System Map

LEGEND

- UNION PACIFIC (IN STUDY)
- UNION PACIFIC (NOT IN STUDY)
- BURLINGTON NORTHERN SANTA FE
- CENTRAL KANSAS RAILWAY
- KANSAS SOUTHWESTERN RAILWAY
- WICHITA UNION TERMINAL



SURFACE TRANSPORTATION BOARD - *Section of Environmental Analysis*

PRELIMINARY MITIGATION PLAN

UP/SP MERGER MITIGATION STUDY WICHITA

September 1997

FIGURE 4.1-2

Railroad Lines in Wichita and Sedgwick County

UP and BNSF also jointly own the Wichita Terminal Association (WTA), which serves industries in North Wichita. South of 21st Street North, WTA tracks are adjacent to the BNSF mainline as far south as 10th Street North. North of 21st Street North, WTA tracks are west of UP's Herington Branch line, serving industries up to 33rd Street North. The WTA crossing at 21st Street North is adjacent to the UP rail line. WTA trains use UP locomotives half of the year and BNSF locomotives half of the year.

Two regional railroads also have lines in Wichita. The Kansas Southwestern Railway (KSW) connects to the end of the UP Wichita Branch west of the Arkansas River. KSW trains operate over the Wichita Branch to Wichita Yard. The Central Kansas Railway (CKRY) has a line from Kingman to Wichita that connects to the WUT at South Junction, where the CKRY has a yard. Its trains also operate over the BNSF rail line to the yard north of 21st Street North. Omnitrax, Inc. operates both KSW and CKRY.

Other short connecting tracks and sidings allow trains to move from one rail line to another and provide rail service to businesses in Wichita.

4.2 Pre-Merger Train Operations

All trains in Wichita are freight trains; there is no rail passenger service through Wichita. Freight train operations are generally divided into two types, *road* and *yard*. Road trains carry freight from one place to another. Yard trains operate in or near rail yards to assemble freight trains.

There are two types of road trains, *through freights* and *local freights*. Through freights operate between major terminals. They may operate regularly, but their departure and arrival times vary significantly because of operating conditions over their entire route and the movement of other trains in the rail system. Pre-merger UP through freights stop at Wichita Yard to pick up or drop off cars and change crews. One through freight, which carries grain, does not stop in Wichita.

There are several different types of through freight trains. UP's *manifest trains* carry general freight in a variety of car types. Manifest trains may make a limited number of pick-ups and set-offs of freight cars at intermediate points along their routes. *Intermodal trains* carry highway trailers or containers. *Unit trains* consist of similar cars carrying a single commodity, such as grain, coal, or stone. Unit trains operate from a single origin to a single destination without service to intermediate shippers.

In contrast, *local freight* trains serve sidings in a designated territory. These trains consist of cars destined for shippers along the route, generally placed in an order that corresponds to the sequence in which they will be delivered.

Yard operations consist of switching movements conducted primarily within yards to make up trains. *Yard switching* operations involve sorting cars on parallel tracks according to their

destinations. *Industry switching* is a type of yard operation that resembles local freight. Instead of serving a shipper near a yard with a local freight train, industry switching moves freight cars between the shipper and the yard where they are collected for inclusion in a local or through freight train. Because the UP yard limits include central Wichita, industry switching is possible throughout this area.

All of these types of operations occur in Wichita, both on the UP rail line and on the other rail lines. BNSF and UP operate both through and local freight trains. Yard switching trains frequently block 21st Street North, which is near both Cline Yard and Wichita Yard. KSW local grain trains frequently block the street crossings in downtown Wichita on the Hutchinson Industrial Branch. Both BNSF and CKRY trains frequently block street crossings on the BNSF mainline. Industry switching trains operated by BNSF, UP, and WTA move in and out of the various sidings, and they also block streets.

The number of UP trains on the Lost Springs-Wichita segment differs from the number on the Wichita-Chickasha segment. One cause of the difference is that the UP Wichita Yard serves as a beginning or ending point for some trains. Also, trains carrying gravel from the south to the cement plant north of MacArthur Road operate only as far north as the cement plant, although their locomotives continue north to the yard.

As part of the merger application, Union Pacific and Southern Pacific submitted verified statements regarding pre-merger train traffic on each of the rail line segments within the two rail systems. The pre-merger rail traffic data were assembled from actual 1994 train records, the last complete year available for the merger application. Since final approval of the merger in September 1996, UP has provided monthly passing reports as a condition of the merger. These passing reports include the number and type of trains, the date and time, and the number of railcars and locomotives on the Wichita-Chickasha rail line segment. To prepare the passing reports, UP compiled the information recorded at an electronic scanner located near 19th Street North (at Milepost 242.2) on the rail line segment. As part of the mitigation study, the SEA study team requested passing report information from UP for several months prior to the merger approval. Union Pacific submitted passing reports for May 1996 through September 1996.

The SEA study team reviewed the passing reports from May 1, 1996 through February 28, 1997 to verify the pre-merger train traffic data submitted with the merger application. The study team concluded that UP's verified statement accurately accounts for pre-merger through train traffic, with consideration for seasonal variations. Using the train type information in the passing reports, the SEA study team determined more specific train traffic information for three areas within Wichita. The average daily train traffic for these three areas is shown in Table 4.2-1. Additional detailed analysis of pre-merger train traffic is included in Appendix D.

Table 4.2-1 Number of Pre-Merger UP Through Trains by Location in Wichita	
Location	**Average Daily Pre-Merger UP Through Trains**
Lost Springs to Wichita Yard (Lost Springs-Wichita segment)	3.6
Wichita Yard to Pawnee (Wichita-Chickasha segment)	4.0
MacArthur to Chickasha (Wichita-Chickasha segment)	4.4

Source: UP/SP Merger Application (December 1995) and UP Passing Reports (May 1996 to February 1997).

The second location listed in Table 4.2-1 (Wichita Yard to Pawnee) affects Wichita the most, as it represents the stretch of rail line from 21st Street North to Pawnee. The third location reflects numbers of trains that affect areas from MacArthur south, including Haysville.

The SEA study team used the passing reports and other information provided by UP to identify the average number of local and yard trains operating over the Lost Springs-Wichita and Wichita-Chickasha rail line segments. Union Pacific operates an average of 6.7 local and yard trains daily, for a total of 10.7 UP trains in central Wichita, although some of those local trains use BNSF tracks south of South Junction. The yard trains from Wichita Yard in north Wichita operate over varying lengths of the track south of 21st Street North, depending on pickup and drop off needs and other yard operations.

The SEA study team also contacted BNSF to determine the number of trains operating through central Wichita on the BNSF tracks and jointly with UP on the WUT tracks (Central to Lincoln). BNSF operates an average of 8.2 through trains per day in this area, resulting in a total of 18.9 UP and BNSF through, local, and yard trains in central Wichita between Central and Lincoln before the merger.

The SEA study team also used the passing reports to determine the average length of each train type. Table 4.2-2 shows the results of the analysis of train lengths. Additional details on train length calculation are included in Appendix D.

Table 4.2-2 Length of Pre-Merger Trains			
Average Pre-Merger Train Lengths (May 1996 through September 1996)			
Length	**UP Through Trains**	**UP Local Trains**	**UP Yard Trains**
Average	3,380 feet	2,906 feet	498 feet
Maximum	7,848 feet	6,936 feet	2,065 feet
Minimum	70 feet	140 feet	70 feet

Source: UP Passing Reports (May 1996 to September 1996).

The SEA study team completed a statistical analysis of the pre-merger train traffic data to determine the variability of train traffic. The five months of train traffic data provided by UP (May through September 1996) show the following characteristics:

- Average number of through trains = 4.63 per day
- Median number of through trains = 5 per day
- Minimum number of through trains = 0 per day
- Maximum number of through trains = 10 per day
- Standard deviation of daily through trains = 1.86

4.3 Train Cap Imposed During Mitigation Study

As part of Condition No. 23 of Decision No. 44, the Board placed a limit on the increase in the number of freight trains allowed through Wichita during preparation of the 18-month mitigation study. As shown in Figure 2.4-1, the limit imposed by the Board during the study is no more than a daily average count of 6.4 freight trains per day. This daily average limit represents the 1995 baseline average of 4.4 trains per day plus two additional trains.

4.4 Train Projections

Because the mitigation study addresses the environmental impacts of the merger-related increase in UP trains on the existing right-of-way, the projected increase in those trains is the only change in train traffic considered by this study.

UP provided train traffic projections through verified statements to the Board. The projections reflect UP's judgment about business volumes and detailed planning for railroad operations. Changes in train traffic in Wichita and Sedgwick County described in the 1995 merger application resulted from a plan for rail operations throughout a combined UP/SP system. This plan included the addition of eight unit coal trains from the Powder River Basin in Wyoming through Wichita to points in Texas. In February 1997, UP submitted a revised operating plan which rerouted the planned Powder River Basin coal trains though Kansas City (See Section 4.4.3).

4.4.1 Train Projection Methodology

UP used detailed computer modeling to develop its train and traffic density projections. UP used actual 1994 train traffic counts for UP system movements and a one-percent waybill sample for off-system moves. An outside consultant then simulated the flow of this traffic through the merged 34,000-mile railroad system to develop line densities. Individual cars were routed through the system based on the most efficient route between origin and destination.

The model also tracked yard activity and assigned cars to particular tracks and trains. Tonnage and number of car parameters were set for various types of trains (e.g., unit, intermodal, manifest). The model used a set of basic assumptions to estimate traffic diversions from/to other railroads. Use of these "extended haul rules" has precedent in other merger cases.

UP developed train density projections through several analytical steps. First, a base case was produced that replicated 1994 conditions. The base case was then used to calibrate the train planning model. UP made adjustments to reflect traffic changes resulting from the BNSF merger and the settlement agreements included as part of the UP/SP merger proceeding. In addition, UP's traffic department and outside consultants retained by UP provided estimates of new train traffic resulting from the proposed merger. These data were included in the traffic model. The result was a detailed and comprehensive post-merger train traffic density projection developed with state-of-the-art analytical techniques.

During its environment review for rail mergers, SEA normally considers future projections of rail traffic for a period of three years, as is being done for the CSX/Norfolk Southern/Conrail transaction. In the case of the UP/SP merger, UP provided a five-year projection, stating that it represents UP's projection for the reasonably foreseeable future for a combined UP/SP system.

4.4.2 Independent Review

As a part of the review process for the EA and Post EA, SEA's third party contractor interviewed UP officials regarding the methodology and databases that were used to develop the train projections. To further verify the data, parity checks were performed on rail line segments to confirm continuous traffic flows. During the course of the pre-merger proceedings, UP supplemented traffic density figures twice to reflect changes resulting from settlement agreements with BNSF and the Chemical Manufacturers' Association.

4.4.3 Additional Review

In response to local concerns about planned increases in train traffic and additional coal trains through Wichita, SEA asked UP to review the planned traffic increases for Wichita and identify possible alternate routes to reduce environmental impacts in Wichita. On February 19, 1997, UP submitted a revised verified statement on train traffic projections reducing the planned increase in train traffic through Wichita. In the revised plan, Powder River Basin unit coal trains would not operate through Wichita; they would be routed through Kansas City. Instead, additional manifest trains and a smaller number of unit grain and coal trains would operate on the rail line through Wichita. The increase in trains would be smaller than previously planned. UP plans to route 5.6 additional through trains on the rail line through Wichita (compared to an increase of 8.0 trains per day planned previously). Based on its independent review of the train traffic projections submitted by UP, SEA finds these projections to be a reasonable estimate of future train traffic on the UP rail line through Wichita and Sedgwick County.

The increased train traffic planned for the rail line segment through Wichita and evaluated in the mitigation study is shown in Table 4.4.3-1. Because trains originate and terminate at the Wichita Yard, there is a difference in UP's reported additional trains north and south of the yard. Table 4.4.3-2 presents a breakdown of the post-merger trains by location.

Table 4.4.3-1
Projected Average Daily Post-Merger UP Trains Through Wichita

Train Identifier	Predicted Frequency	Type	Predicted Length in Feet
FWHK	Daily	Manifest	4634
FWDV	Daily	Manifest	6376
FWWT	Daily (south of UP Wichita yard only)	Manifest	4765
WTKC	Six times per week (north of UP Wichita yard only)	Manifest	4023
KCWT	Six times per week (north of UP Wichita yard only)	Manifest	4205
HKFW	Daily	Manifest	6835
DVFW	Daily	Manifest	6040
WTFW	Daily (south of UP Wichita yard only)	Manifest	4237
OWTCK/OCKWT	Two times per week in each direction (south of Dolese Cement only)	Unit rock train	4012
Unit coal trains between Utah/Colorado mine and Texas utilities	Approximately 10.5 trains per week	Unit coal trains and empty returns	6210
Unit grain trains to/from Texas ports	Approximately 11.2 trains per week north of Wichita yard; 14.7 per week south of Wichita yard	Unit grain trains and empty returns	5789 or less

Source: UP/SP Operating Plan and Verified Statements filed with the Surface Transportation Board in 1995 and 1996.

Table 4.4.3-2 Post-Merger UP Trains by Location in Wichita		
Location	Average Daily Post-Merger UP Through Trains	Increase
Lost Springs to Wichita Yard (Lost Springs-Wichita segment)	9.0	5.4
Wichita Yard to Pawnee (Wichita-Chickasha segment)	9.6	5.6
MacArthur to Chickasha (Wichita-Chickasha segment)	10.0	5.6

Source: UP Verified Statement to the Section of Environmental Analysis dated March 7, 1997.

The SEA study team also determined the average length of post-merger through trains. The study team used the train lengths shown in Table 4.4.3-3 for the evaluation of environmental impacts.

Table 4.4.3-3 Length of Post-Merger Trains			
Average Post-Merger Train Lengths (May 1996 through September 1996)			
Average Length	UP Through Trains	UP Local Trains	UP Yard Trains
Lost Springs to Wichita Wichita Yard to MacArthur MacArthur to Chickasha	5,897 feet 5,618 feet 5,554 feet	2,906 feet 2,906 feet 2,906 feet	498 feet 498 feet 498 feet
Maximum Length	NA	6,936 feet	2,065 feet
Minimum Length	NA	140 feet	70 feet

4.4.4 Train Characteristics Used in Analyses

Although only through-train traffic will change as a result of the merger, the study analysis also included UP local trains and switching movements where necessary. It did not include trains operated by other railroad companies. The analysis held the number and characteristics of local trains and switching movements constant for all conditions analyzed, both pre-merger and post-merger. Local trains and switching movements were included in the analysis of some environmental impacts because some are related to the total number of trains, not just through trains. Unless otherwise stated, the analyses described in this mitigation plan included both UP through trains and UP local trains and switching movements.

Section 5
DATA COLLECTION

5.1 Purpose and Activities

The SEA study team collected extensive data during Phase 1 of the study. This data-collection process was designed to ensure a complete and focused understanding of the existing and anticipated merger-related environmental impacts in Wichita and to allow for careful evaluation of possible mitigation options during Phase 2.

Based on the types of impacts identified in the EA and the analyses needed to evaluate potential mitigation options, the SEA study team identified the types of data needed for the mitigation study. Identified data needs included air quality, noise, and safety characteristics. In addition, the study team needed data on the characteristics of Wichita and on nearby development that would be affected.

The study team contacted and held meetings with both public and private organizations in Wichita and elsewhere in Kansas to gather data relevant to the study. The study team also performed field work to obtain new data.

5.2 Agency and Railroad Contacts

UP submitted verified statements to the Board describing planned operations after the merger. UP also provided engineering drawings of its facilities in Wichita, passing reports of train operations, information on local train operations, and train characteristics such as length. The study team visited the UP office in Omaha to review merger-related files and to identify information that would support the analysis in the mitigation study. After UP announced the revision in its planned post-merger operations, UP supplied additional information on how the change would affect future operations. Although BNSF operations are not a part of the study, BNSF also provided information regarding its rail traffic through Wichita.

The Metropolitan Area Planning Department (MAPD), a joint Wichita-Sedgwick County agency, provided information from their monitoring of pre-merger train speeds, projections of future motor vehicle traffic volumes, regional demographic and geographic information, the area's comprehensive plan, and the transportation plan and program. MAPD staff reviewed the study team's estimate of motor vehicle traffic volumes for the year 2000 and suggested refinements to reflect anticipated changes in the roadway network. The MAPD also provided its calculations of traffic delay at grade crossings.

The Wichita Metropolitan Transit Authority provided information describing the operation of the public transit system and data on ridership.

Emergency response by police, fire, and ambulance services is also related to traffic delay. The Sedgwick County Department of Emergency Communications, which receives all 911 calls and dispatches all emergency services, provided information on present dispatch procedures and capabilities. The Wichita Police and Fire Departments described their operating practices and experience.

The Federal Railroad Administration provided information on physical characteristics and accident data for grade crossings in Wichita. The City of Wichita provided information on school locations and the numbers of students who must cross the tracks on their way to and from school.

The Wichita-Sedgwick County Department of Community Health provided noise information from an earlier study. Sedgwick County agreed to allow the use of its new geographic information system (GIS), an electronic means of storing, mapping, and analyzing data that are geographically related, for analyzing noise impacts.

The Kansas Department of Health and Environment supplied historical data describing air quality conditions based on monitoring in Wichita. The Wichita-Sedgwick County Department of Community Health supplemented the data by describing local efforts to achieve and maintain compliance with air quality standards.

Several agencies provided financial information. The City of Wichita described its financial capabilities, bonding practices, and use of financing mechanisms to support City investments. MAPD supplied financial elements of the long-range regional transportation plan and the short-range transportation improvement program. The Kansas Department of Transportation provided information on the state funding sources for transportation, its highway construction and grade-crossing improvement programs, financial forecasts, and potential changes that would affect these areas.

5.3 Field Work

The study team gathered data in Wichita on a number of occasions to supplement or verify data that was provided by others. The most extensive data collection efforts were gathering traffic information at grade crossings to measure both driver behavior and traffic patterns in Wichita and monitoring noise at selected locations to reflect actual noise transmission and dissipation patterns in Wichita.

5.3.1 Traffic Monitoring

The study team performed traffic monitoring during the week of March 10, 1997. The data collection consisted of field surveys at five grade crossings selected to have different land use and traffic characteristics. These grade crossings are shown in Table 5.3.1-1.

Table 5.3.1-1 Traffic Monitoring Locations		
Roadway	**Description**	**Adjacent Land Use and Setting**
37th Street N.	two-lane roadway	industrial, outlying
13th Street N.	four-lane undivided street	commercial, urban
Central	four-lane undivided street	commercial, urban
Pawnee	four-lane undivided street	retail/residential, outlying
MacArthur	four-lane divided street	industrial, outlying

Only one short train crossed 37th Street on the day of data collection, providing an inadequate sample for this study. As a result, the SEA study team used the data from the other four roadways. The City of Wichita took directional automatic traffic recorder counts on these roadways for approximately a week. The purpose of the traffic counts was to obtain actual traffic demand during the hours when trains passed the crossings.

Personnel stationed for an entire day at each of the five crossings measured vehicle delay when trains passed throughout the day. The information collected as a train passed a crossing included the following:

- Train identification.
- Train speed.
- Amount of time the warning device was activated before train arrival and after the train passed.
- The number of vehicles in the queue at 30-second intervals after the initial warning activation. Included in this count are the queue build up while the train passed and queue dissipation after the train passed.
- The total time vehicles were delayed.

This data collection resulted in observations of vehicular delay for different volumes of highway traffic and for different amounts of time that highway traffic was stopped. The SEA study team used these data to calibrate a series of equations that would calculate the average vehicle delay and the total delay experienced at each crossing.

5.3.2 Noise Monitoring

The study team performed noise monitoring during the week of March 17, 1997. The measurements served to verify and refine the assessment of pre-merger noise conditions and to obtain a basis for modeling post-merger conditions. The EA and Post EA included estimates of pre-

merger noise levels based on a typical train. The noise measurements in this study take into account site-specific sound issues, such as actual train horn equipment, shielding due to buildings, ground absorption, and the variability of horn-sounding sequences. The EA relied on estimates of these effects.

The study team measured ambient noise (i.e., the noise environment without trains) and the noise associated with the passage of trains. Noise monitoring of passing trains occurred at six locations. At each of the six locations, noise was measured at two distances from the tracks to characterize the site-specific sound issues noted above. The locations were representative of suburban areas with some building shielding, and included grade crossing locations that have train horn noise and locations that do not have train horn noise because there is no grade crossing nearby. These conditions provided sufficient data to characterize the entire study area and to quantify how train noise decreases with distance, shielding, and ground effects. Table 5.3.1-2 lists the noise monitoring locations.

Table 5.3.1-2
Noise Measurement Locations

Location	Type	Measurement Distances from Tracks (feet)
71st Street S. (Haysville)	Suburban grade crossing—with some shielding	100 and 200 feet
59th Street S. and Southern	No horns (train engine and wheel noise only)	50 and 100
53rd Street S.	No horns	75 and 150
Pawnee	Suburban grade crossing—with some shielding	100 and 200
Osie	Urban/industrial grade crossing—with some shielding	100 and 200
61st Street N. (Kechi)	Suburban grade crossing—no shielding	100 and 200

For each location in Table 5.3.1-2, noise monitoring determined how noise decreases with distance for every measured train noise event. This information could be used to determine the distance from the tracks to the location of given train-related noise levels.

Section 6
EVALUATION OF IMPACTS

6.1 Introduction

This section describes the evaluation of environmental impacts resulting from the merger-related increase in train traffic on UP's existing right-of-way through Wichita and Sedgwick County. The evaluation examines pre-merger conditions and conditions that would exist after the merger if no environmental mitigation measures were implemented other than those system-wide conditions imposed by the Board in its Decision No. 44.

This section supplements the environmental analysis provided in the EA and Post EA prepared by SEA during the merger review proceedings. Consistent with the Board's direction, this section provides a more focused analysis of the environmental impacts in Wichita and Sedgwick County. This section identifies potential mitigation options, which are analyzed in Section 7 of this Preliminary Mitigation Plan.

The SEA study team developed evaluation criteria as outlined below to assess the changes resulting from the merger. Section 6.2 describes the evaluation methodology and evaluation results and lists options to mitigate environmental impacts associated with the merger.

The Board's environmental review regulations, which are in compliance with the National Environmental Policy Act, served as the SEA study team's guide for developing evaluation criteria. The study team established 10 criteria to evaluate potential environmental impacts of the merger-related increase in train traffic and to consider the issues and concerns identified by local interests through the Wichita Mitigation Committee, the Governor's Task Force, the public meeting, and other public comments. The criteria address the following environmental impact issues:

- Safety
  - Traffic Delay (Section 6.2.1)
  - Public Transit Delay (6.2.2)
  - Emergency Vehicle Access (6.2.3)
  - Pedestrian Safety (6.2.4)
  - Train-Vehicle Accidents (6.2.5)
  - Derailment and Hazardous Materials Release Risk (6.2.6)
- Air Quality
  - Total County-Wide Emissions (6.2.7)
  - Localized Carbon Monoxide Concentrations (CO Hot Spots) (6.2.8)
- Noise
  - Noise Levels Resulting from Trains (6.2.9)
  - Vibration Resulting from Trains (6.2.10)

The SEA study team developed the criteria to be objective and measurable using readily available information. Some community members commented that the criteria should also include several "quality of life" considerations, such as impacts on neighborhood character, downtown development, and community cohesiveness. The team reviewed these issues and determined that they are related to objective criteria already being addressed, such as traffic delay and crossing blockage. To avoid measuring impacts or benefits twice in the analysis, the study team did not add any non-objective measures of impacts on quality of life to the analysis.

6.2 Impact Analysis and Potential Mitigation Measures

This section offers a detailed analysis of the 10 subject areas listed above. Each of the analyses includes discussion of the following four topics:

- Criteria for evaluation, including the issue, objective, and measure.
- Methodology for evaluation.
- Discussion of the environmental impacts in Wichita and Sedgwick County associated with the merger-related increased train traffic.
- Potential mitigation measures.

6.2.1 Traffic Delay

Evaluation Criteria

Issue: Vehicle delay at grade crossings.
Objective: Mitigate increase in vehicle delays resulting from merger-related increased train traffic.
Measure: Total average daily vehicle delay in vehicle-hours at grade crossings of major roadways and the UP rail line in Wichita and Sedgwick County.

Methodology

Overview: The SEA study team obtained data on crossing blockage time by measuring actual conditions at the grade crossings in Wichita and Sedgwick County. The number of affected vehicles could be readily calculated using data available regarding traffic levels and the variation of traffic from hour to hour during the day. The study team developed a methodology to calculate total vehicle delay at railroad grade crossings resulting from the projected merger-related increase in freight train traffic.

Delay Calculation: The measure of traffic delay is vehicle hours per day (i.e., the number of motor vehicles delayed multiplied by the amount of time each is delayed). This measure reflects the fact that either a larger amount of traffic or a longer waiting time can result in more delay. The study calculated the sum of this measure for 26 major roadways in Wichita and Sedgwick County that have grade crossings with the UP rail line. The sum is a good representation of the total county-

wide traffic-delay impact because it adds together the effect at all major roadways. The roadways included in the analysis are the ones with high traffic volumes because those are the ones that would have the greatest traffic-delay impact. The measure is not intended to represent the effect at a single grade crossing or the effect upon an individual motorist.

To calculate traffic delay, the study team developed a computer mathematical model including the factors that affect delay. These factors include the amount of time that a crossing would be blocked based upon the number of daily trains, the times of day that they run, train lengths and speeds, and the additional time before and after train passage that warning devices are activated.

Two factors contribute to traffic delay. One is the delay caused by the blockage of grade crossings by trains. The other is the added delay caused by the queue of motor vehicles that must dissipate once the crossing is no longer blocked. Vehicles at the back of a queue of waiting traffic must wait not only for the train to pass but also for the vehicles ahead of them to clear before they can start to move. The vehicles at the back of a long queue are therefore delayed longer than vehicles at the front of the queue or those in a short queue.

Because a longer queue adds delay, the more traffic there is on a road, the more motor vehicles will be stopped by a given train, and the greater the delay. High-traffic roadways have more vehicle hours of delay both because more vehicles are affected and because those vehicles create a longer queue, which then takes longer to clear. The number of roadway lanes and the amount of traffic at a given hour of the day also affect the length of traffic queues.

The percentage increase in vehicle delay is greater than the percentage increase in train traffic because added crossing blockage time would cause more vehicles to be stopped, which would in turn increase the queue of waiting vehicles. Examination of the delay at individual crossings illustrates this point because the increase in delay is greater on the streets and roads with higher traffic volumes. A detailed description of delay calculation is provided in Appendix F.

Vehicle Traffic Volumes: The study team paid particular attention to the assumptions used for traffic volumes because those assumptions affect traffic delay, public transit delay (See Section 6.2.2), train-vehicle accidents (See Section 6.2.5), and air quality (See Section 6.2.7 and 6.2.8). To evaluate reasonably foreseeable conditions, the SEA study team used future traffic volumes projected for 2000. Calculations of both pre-merger and post-merger conditions used these projected 2000 traffic levels to assure that the difference between pre-merger and post-merger environmental impacts could be attributed solely to changes in train traffic and not to changes in motor vehicle traffic.

Measured traffic information for 1995 and projected traffic volumes for 2020 were the basis for projection of 2000 traffic volumes. The traffic volume information for 1995 is based upon City of Wichita actual traffic counts (See Appendix E). The MAPD produced the projected 2020 traffic volumes using a computer model as part of the transportation planning process for the Wichita/ Sedgwick County area. Table 6.2.1-1 shows annual average daily traffic assumptions for the streets analyzed in Wichita and Sedgwick County.

The study team assumed that changes in traffic between 1995 and 2020 would be constant from year to year, allowing the calculation of projected 2000 traffic volumes. MAPD staff reviewed the resulting projections and suggested the impending widening of Murdock would increase traffic there, so the study team shifted some of the projected traffic on other streets to Murdock, but kept the total projected east-west traffic the same as the total of the original projection.

Table 6.2.1-1
Annual Average Daily Traffic Volumes

Grade Crossing	1995 Traffic Volumes (vehicles per day)	2000 Traffic Projections (vehicles per day)
Greenwich	784	835
101st Street North	527	561
61st Street North	2,009	2,139
Oliver	1,491	1,587
45th Street North	2,366	2,519
Hillside	3,185	3,391
37th Street North	3,603	3,836
21st Street North	13,853	14,747
17th Street North	3,916	4,169
13th Street North	15,420	16,415
9th Street North	1,666	1,774
Murdock	10,376	12,000
Central	16,309	17,362
Lincoln	11,282	12,010
Harry	14,150	15,063
Mt. Vernon	5,676	6,042
Pawnee	25,338	26,973
MacArthur	14,358	15,285
47th Street South	12,198	12,985
55th Street South	4,643	4,943
63rd Street South	5,651	6,016
71st Street South	10,281	10,945
79th Street South	980	1,043
103rd Street South	1,28	1,372
Meridian	786	837
119th Street South	148	158

Impacts

Traffic delay for pre-merger and post-merger conditions is shown in Table 6.2.1-2. The table shows that total traffic delay at the intersections analyzed would increase from 98 vehicle hours per day under pre-merger conditions to 291 vehicle hours per day under post-merger conditions without further mitigation.

Table 6.2.1-2 Traffic Delay Caused by UP Trains at Major Crossings of UP Tracks in Study			
Street	Pre-Merger Delay (vehicle-hours)	Post-Merger Delay (vehicle-hours)	Change (vehicle-hours)
Greenwich	0.09	0.23	0.14
101st Street North	0.06	0.16	0.10
61st Street North	0.27	0.69	0.42
Oliver	0.21	0.54	0.33
45th Street North	0.47	1.31	0.84
Hillside	0.71	2.00	1.29
37th Street North	1.09	3.13	2.04
21st Street North	11.77	31.51	19.74
17th Street North	3.10	8.29	5.19
13th Street North	12.85	35.28	22.43
9th Street North	1.21	3.30	2.09
Murdock	8.94	24.49	15.55
Central	13.23	36.25	23.02
Lincoln	5.14	16.98	11.84
Harry	6.32	20.84	14.52
Mt. Vernon	2.71	8.96	6.25
Pawnee	15.26	51.01	35.75
MacArthur	5.34	17.40	12.06
47th Street South	3.73	12.07	8.34
55th Street South	1.18	3.88	2.70
63rd Street South	1.49	4.37	2.88
71st Street South	2.40	7.00	4.60
79th Street South	0.14	0.40	0.26
103rd Street South	0.14	0.38	0.24
Meridian	0.08	0.23	0.15
119th Street South	0.02	0.04	0.02
Total	97.95	290.74	192.79

Potential Mitigation Measures

There are two types of mitigation measures for decreasing the amount of time that trains delay motorists waiting at grade crossings—those that reduce the amount of time the trains block the crossing and those that eliminate grade crossings entirely.

Increasing train speeds would allow trains to pass through Wichita faster and would therefore reduce the amount of time that motorists must wait at crossings while trains block at-grade crossings.

Mitigation measures with the potential for eliminating traffic delay entirely involve separating the road from the railroad. Grade separations can be made by creating an elevated or depressed trainway or by building overpasses and/or underpasses for vehicles and pedestrians. Any of these options would mean vehicular traffic would not have to wait at grade-separated crossings while trains passed through Wichita. Another mitigation option category would be for the trains to bypass Wichita, either on existing routes or on track that would need to be constructed around the City.

6.2.2 Public Transit Delay

Evaluation Criteria

Issue: Merger-related delay to passengers on WMTA transit buses.
Objective: Mitigate increase in delay resulting from merger-related increased train traffic.
Measure: Total delay in person-hours per weekday at grade crossings of the UP rail line.

Methodology

Because transit buses are part of motor vehicle traffic, the calculation of delay for buses is similar to the calculation of traffic delay but with additional factors to reflect one important difference. Unlike general motor vehicle traffic, buses do not operate in a constant stream but run periodically on fixed schedules. Whereas all trains could be expected to create general motor vehicle traffic delay, they would delay buses only if they happened to cross a street at the same time that a bus was scheduled to run on that street. For example, a train that crossed a street at 23 minutes after the hour would not affect buses scheduled to run on the same street at 12 and 42 minutes after the hour. To account for this difference, the calculation of public transit delay includes a calculation similar to the calculation of traffic delay with the addition of a probability factor that a train would block a crossing at the same time a bus was scheduled to use the crossing.

The measure used for public transit delay is person-hours per day. This measure is similar to the one used for traffic delay in that it reflects both the number of people affected as well as the amount of time they are delayed. It accounts for the fact that delay to a bus route with more riders has more impact than delay to a route with fewer riders. Like the traffic delay analysis, the public transit analysis uses the sum of the delay on the affected bus routes as the basis for measuring the impacts.

Information provided by the Wichita Metropolitan Transit Authority (WMTA) identified the bus routes that cross UP tracks at grade crossings, the schedules for those routes, and the ridership on each. The route and schedule information describe October 1996 operations, and the ridership data are from April 1996. The analysis assumed that these conditions would also be applicable to operations in 2000. The study team calculated the probability that buses on each route would be delayed based on the number of times the buses cross the tracks per day. The probability of delay of buses, the average delay for motor vehicles on the street that the buses use, and the ridership on

each route were the basis of the calculation of the person delay caused by trains on UP rail line. The method used for calculation is described in more detail in Appendix F.

Impacts

Six of the seventeen WMTA bus routes are affected because they use streets that have grade crossings with the UP tracks in the study. Table 6.2.2-1 shows the affected routes, the streets on which they cross the tracks, and the probability of a bus on each being delayed by a train in both pre-merger conditions and post-merger conditions without further mitigation.

Table 6.2.2-1
Buses Subject to Delay by Trains per Weekday

Route	UP Track Crossing Location	Average Pre-Merger Buses Delayed per Day	Average Post-Merger Buses Delayed per Day w/o Further Mitigation
North Broadway	21st Street North	0.66	1.89
East 17th	13th Street North	0.74	2.09
East Central	Central	0.69	1.93
East Harry	Harry	0.58	1.67
South Broadway	Mt. Vernon	0.61	1.73
South Main	Pawnee	0.72	2.05

Table 6.2.2-2 shows the daily number of riders on each route as reported by WMTA. Based on the probability of delayed buses, Table 6.2.2-2 also shows the daily delay by route in person-hours. The table shows that delay would increase from approximately two person-hours per day under pre-merger conditions to more then seven person-hours per day in post-merger conditions without further mitigation.

Table 6.2.2-2
Transit Rider Delay Because of UP Trains

Route	Total Daily Riders (April 1996)	Average Pre-Merger Delay per Day (Person-Hours)	Average Post-Merger Delay per Day w/o Further Mitigation (Person-Hours)
North Broadway	800	0.45	1.62
East 17th	797	0.56	1.95
East Central	717	0.43	1.54
East Harry	517	0.15	0.55
South Broadway	475	0.29	1.04
South Main	416	0.16	0.56
Total	3,722	2.04	7.26

Potential Mitigation Measures

Because buses are part of motor vehicle traffic, measures to mitigate traffic delay would have the same effect upon public transit delay (See Section 6.2.1).

6.2.3 Emergency Vehicle Access

Evaluation Criteria

Issue: Emergency vehicle delay at grade crossings.
Objective: Mitigate increase in delays resulting from merger-related increased train traffic.
Measure: Total daily time that grade crossings of major roadways and the UP rail line are blocked and the average time that a crossing is blocked per train.

Methodology

Ambulances, fire engines and trucks, and police cars can be delayed at grade crossings that are blocked by trains. This delay must be calculated differently from that for general motor vehicle traffic because emergency vehicles operate differently. Emergency vehicles do not sit in the queue of vehicles waiting at a crossing. Instead, the analysis assumed that emergency vehicles would bypass other vehicles and go to the head of the queue to avoid added delay caused by waiting for the queue to clear when the train has passed.

The analysis calculated two measures that reflect two different aspects of emergency vehicle delay. One measure, total daily crossing blockage time, is an indicator of the risk of delay because it is a measure of the probability that a crossing would be blocked at the time that an emergency vehicle would need to cross the tracks. This measure is the sum of the blockage time at grade crossings on the same 26 roadways analyzed for traffic delay.

This measure does not reflect actual emergency vehicle delays for several reasons. One is that emergency facilities exist on both sides of the UP tracks, so that many emergency runs need not cross the tracks, making crossing blockage time irrelevant. A second reason is that emergency runs occur at random times; every crossing blockage does not necessarily delay emergency vehicles that must cross the tracks. Third, emergency vehicle drivers typically drive around trains when they can so that they can use unblocked crossings, and they are unhampered by traffic restrictions such as one-way streets and traffic signals as they drive to unblocked crossings.

The other measure that was calculated is the average crossing blockage time per train. This measure is based on the recognition that only some emergency vehicle runs are blocked by trains. When an emergency vehicle is blocked by a train, the most important concern is the length of time the vehicle is delayed. The average time that a crossing is blocked by a single train is an indicator of the delay that each train would create. This measure does not reflect the probability that a crossing will be blocked, but it does reflect the impact on those emergency vehicles that are affected by blocked crossings.

Measuring the delay for emergency vehicles should rely on actual experience to reflect the ability of drivers to avoid problems. The City of Wichita and Sedgwick County provided data for a two-month period on emergency vehicle delay at all grade crossings in the City and County, but the data do not separately identify delay at individual rail lines. The data show an average of 2.7 emergency vehicles, including police, fire, and emergency medical service vehicles, blocked per day at all rail lines in the City and County. Ninety-five percent of those blockages affected police units. Because there is no complete information on actual emergency vehicle delays caused by trains on the UP rail line, the study team used the amount of time that crossings on the UP rail line blocked as the measure for this criterion, but also used the knowledge of how present operations cope with blocked crossings.

The calculation of the time that crossings are blocked uses some of the same information as that used in the calculation of traffic delay. The crossing blockage time is based upon the number of daily trains, the times of day that they run, train lengths and speeds, and the additional time that warning devices are activated before and after train passage.

Emergency Response Service Characteristics: To obtain information on emergency response services, the study team interviewed the chief of the Wichita Fire Department, an assistant to the chief of the Wichita Police Department, and the acting manager of the Sedgwick County Department of Emergency Communications to obtain information on emergency response operations.

The interviews with the senior staff of the emergency services did not identify severe problems with trains blocking emergency vehicles. Emergency response personnel are aware of the problem that trains create and have developed means to cope with the blockages. The emergency response senior staff could not identify any emergency incident that was made worse by a train blocking a grade crossing. Specific details of each type of emergency service are outlined below.

Fire Department: The City of Wichita Fire Department has 17 stations that house 19 pumpers, seven ladder trucks, three rescue squads, one heavy rescue unit, and 14 quick-response squads. The distribution of fire stations provides good coverage, with stations located on both sides of the central rail corridor, as shown in Figure 6.2.3-1. The Fire Department considers 10 stations and the heavy rescue unit to be directly affected by grade-crossing blockage. Dispatchers select the nearest fire station to respond to each call based on the "as the crow flies" distance.

Police Department: The City of Wichita Police Department uses four divisions for service delivery. Rail traffic on the central rail corridor affects the north and south divisions; both have a high call load. Each division is subdivided into nine beats, with boundaries that somewhat follow the railroad tracks. Officers in the north division, which is divided by the rail corridor, must be familiar with the potential for streets to be blocked by trains and be able to develop alternate access routes, which can include the grade separation on 29th Street North. The Police Department uses 350 geographic control points within the beats to identify the locations of units to allow the dispatcher to determine response priority.

Emergency Medical Service: The Sedgwick County Emergency Medical Service (EMS) operates ambulances. There are four hospitals; three are east of the central rail corridor, as shown in Figure 6.2.3-1. Dispatchers select the nearest unit based on distances "as the crow flies." The Fire Department often assists with EMS calls.

A June 24, 1997 letter from an attorney for the City notes that the EMS staff had begun recording delays by rail line, but had not experienced any delays at the UP rail line. The letter notes that over the three-year period 1994-1996, EMS vehicles averaged a total of 16 train-related delays per year. The letter includes a list of 16 EMS vehicle delays in the first five months of 1997 that shows the destinations of the calls but not the locations of the delays. The locations of the destinations suggest that at most three of the calls were delayed at the UP rail line, although that number cannot be stated with certainty.

Emergency Dispatch Center: The Sedgwick County Department of Communications receives 911 calls and dispatches fire, police, and emergency medical services. They have computer-aided dispatch (CAD), but the CAD system does not include a mapping capability and does not provide information on the blockage of grade crossings by trains.

General: Emergency response differs among police, fire, and EMS. Fire trucks typically respond from a known location (i.e., a fire station), while police units could be anywhere within their beat. Trains blocking railroad crossings have more of an impact on field-based units, since the units could be anywhere in their area and the dispatcher may not know their exact location.

Impacts

Results of the calculations of the sum of the time that crossings would be blocked for both pre-merger conditions and post-merger conditions without further mitigation are shown in Table 6.2.3-1. The results show the sum of the pre-merger daily crossing blockage times at the 26 grade crossings analyzed to be about seven hours and that the sum of the post-merger crossing blockage times would be about 17 hours without further mitigation. The percentage increase in emergency vehicle crossing blockage time is smaller than the percentage increase in traffic delay because of the assumption that emergency vehicles do not wait in traffic. Unlike the increase in traffic delay, the increase in emergency vehicle delay does not include the additional delay caused by longer queues of motor vehicles at crossings.

The average time that a crossing would be blocked by a pre-merger through train would be about 2.6 minutes and the average post-merger time without further mitigation would be about 3.1 minutes. The average time would increase because the additional merger-related trains would be slightly longer than the pre-merger through trains.

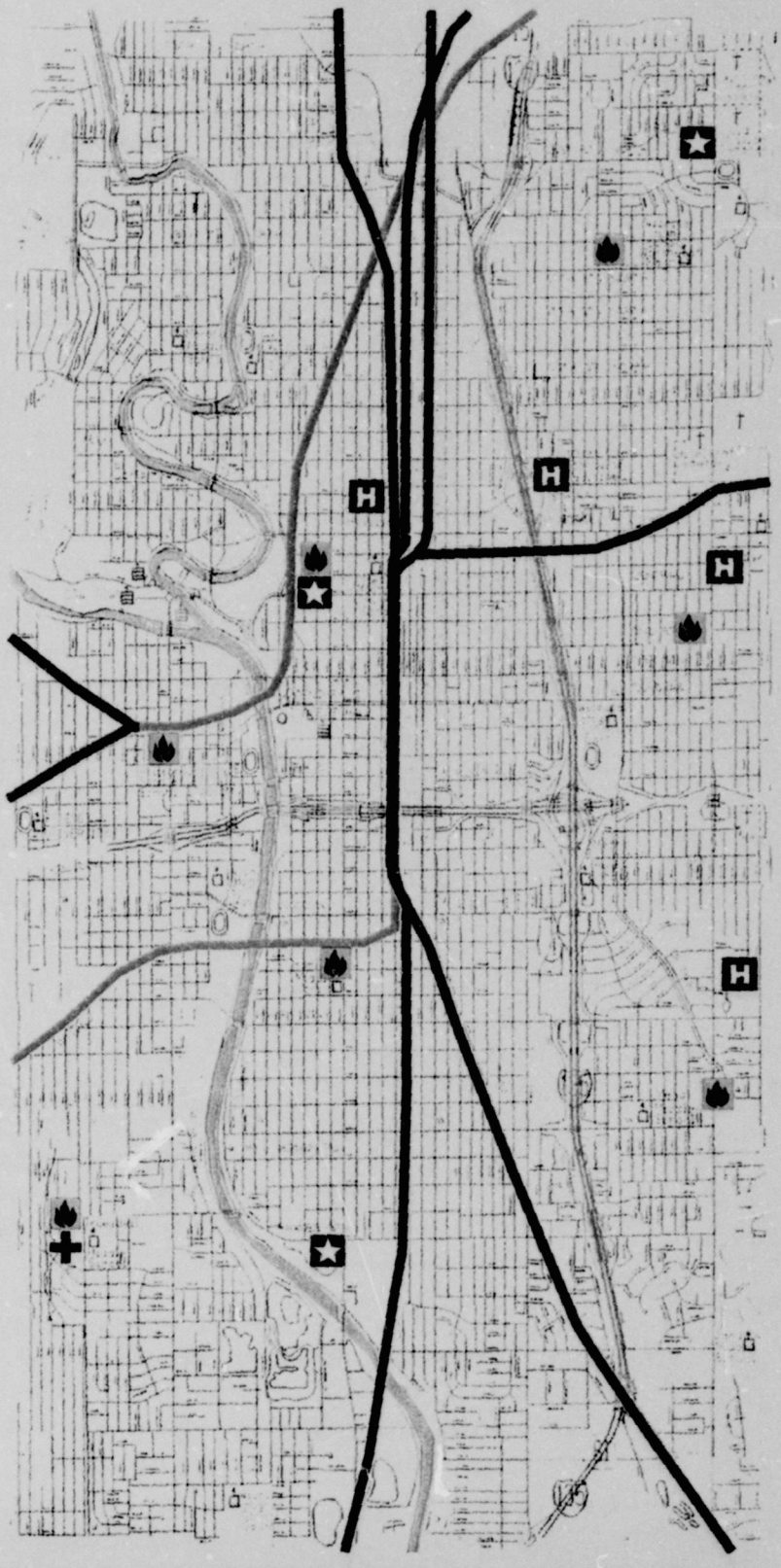
LEGEND

EMERGENCY FACILITIES:

- FIRE STATION
- POLICE
- HOSPITAL OR HEALTH FACILITY
- EMERGENCY MEDICAL SERVICES

RAILROAD LINES:

- UNION PACIFIC (IN STUDY)
- UNION PACIFIC (NOT IN STUDY)
- BURLINGTON NORTHERN SANTA FE
- CENTRAL KANSAS RAILWAY
- KANSAS SOUTHWESTERN RAILWAY
- WICHITA UNION TERMINAL



UP SP MERGER MITIGATION STUDY WICHITA

SURFACE TRANSPORTATION BOARD - *Section of Environmental Analysis*

PRELIMINARY MITIGATION PLAN

September 1997

FIGURE 6.2.3-1

Locations of Emergency Facilities

Table 6.2.3-1 Total Daily Crossing Blockage Time			
Street	Total Crossing Blockage Time (Hours)		
	Pre-Merger	Post-Merger	Change
Greenwich	0.15	0.35	0.20
101st Street North	0.15	0.35	0.20
61st Street North	0.17	0.38	0.21
Oliver	0.17	0.39	0.22
45th Street North	0.20	0.48	0.28
Hillside	0.22	0.52	0.30
37th Street North	0.24	0.59	0.35
21st Street North	0.53	1.08	0.55
17th Street North	0.53	1.08	0.55
13th Street North	0.45	1.00	0.55
9th Street North	0.45	1.00	0.55
Murdock	0.45	1.00	0.55
Central	0.44	0.98	0.54
Lincoln	0.28	0.76	0.48
Harry	0.28	0.74	0.46
Mt. Vernon	0.29	0.78	0.49
Pawnee	0.30	0.80	0.50
MacArthur	0.25	0.67	0.42
47th Street South	0.22	0.61	0.39
55th Street South	0.19	0.55	0.36
63rd Street South	0.20	0.53	0.33
71st Street South	0.19	0.50	0.31
79th Street South	0.16	0.41	0.25
103rd Street South	0.13	0.35	0.22
Meridian	0.13	0.35	0.22
119th Street South	0.13	0.35	0.22
Total	**6.90**	**16.60**	**9.70**

Potential Mitigation Measures

Although the delay for emergency vehicles is calculated differently than that for traffic delay, the same types of mitigation measures would mitigate impacts for both. Similar to mitigating traffic delay, there are two types of mitigation measures appropriate for mitigating impacts to emergency vehicle response—those that decrease the amount of time trains block access and those that separate the tracks and the street to eliminate blockages entirely (See Section 6.2.1).

In addition to measures outlined in Section 6.2.1 for general traffic delay, emergency vehicle delays could be reduced by establishing a communication system for informing dispatchers of the approach of each train so they could dispatch emergency vehicles already located on the appropriate side of the tracks. Because dispatchers do not now have information on the locations of trains and the grade crossings that are blocked, providing information on those locations could improve dispatchers' ability to inform emergency vehicle drivers of the location of trains so that the drivers could better avoid the blockage.

6.2.4 Pedestrian Safety

Evaluation Criteria

Issue: Risk of accidents between trains and pedestrians.
Objective: Mitigate merger-related increase in risk to school children and other pedestrians crossing the tracks.
Measure: Number of students who cross the UP rail line.

Methodology

The study team contacted the Federal Railroad Administration (FRA) to determine whether there is an accepted method of analyzing risk for pedestrians crossing railroad tracks. The team found that there is no standard method to calculate risk because the patterns of pedestrian behavior are so complicated and site-specific that they cannot be measured in statistically valid ways applicable to any grade crossing. The analysis performed for pedestrian safety did not attempt to predict risk statistically but focused instead on reducing the exposure of pedestrians to trains.

The primary pedestrian concern is children who cross the UP tracks going to and from their schools. The analysis identified the estimated number of students who cross the tracks at each street to determine how many students were affected and at what locations.

The study team requested information from Unified School District 259 about students walking to and from schools (See Appendix G). Although school officials do not maintain records on the walking patterns of children, they were able to provide information on the number of students who cross the UP tracks daily. To be conservative, the study team assumed that all of the identified students walk. If some students are driven to and from school, the number who walk across the UP tracks would be less. The study team developed assumptions about which streets the students use based on the locations of school entrances and then estimated the numbers of students who cross the UP tracks at each street. The estimated numbers of students at each street indicated which streets might experience the largest impacts. Because Haysville school boundaries do not cross the UP tracks, Haysville students need not walk across the tracks and so were not considered.

The school district has a policy to provide bus transportation for students where there are hazardous traveling conditions. The procedures for this policy (See Appendix G) define hazardous conditions for railroads as a crossing with "two or more adjacent railroad tracks where the posted

speed is 35 miles per hour or more, lack of pedestrian controlled or automatically controlled crosswalks, and moderate or heavy traffic flow—23,000 vehicles or more on an average daily count taken by the Traffic Engineering Department of the City of Wichita." No crossing on the UP rail line meets these criteria to be considered hazardous.

Impacts

The estimated numbers of students who cross the UP tracks at each street are shown in Table 6.2.4-1. The figure shows that the highest number of affected children attend Gardiner Elementary and cross the tracks at Skinner and Mt. Vernon.

Table 6.2.4-1
Students Crossing UP Tracks to Reach Elementary Schools

Street	School	Number of Students	Crossing Warning Device
17th Street North	Irving	5	Flashing Lights
15th Street North	L' Ouverture	7	Crossbucks
13th Street North	Horace Mann Irving	12 5	Gates
11th Street North	Horace Mann Riverside	12 2	Flashing Lights
10th Street North	Ingalls Park Riverside	3 16 2	Flashing Lights
Central	Washington	5	Gates
2nd Street North	Washington	5	Grade Separated
Skinner	Gardiner	22	Flashing Lights
Mt. Vernon	Gardiner	53	Gates

In addition to the risk associated with children crossing tracks on the way to and from school, another impact concern was raised by representatives of Wichita Industries & Services for the Blind, Inc (See Section 2.8.1, Pedestrian Safety). A November 7, 1996 letter from the organization to the Board noted that its facilities are located on Lincoln between the UP and BNSF tracks. The letter recommended the installation of truncated-dome detectable warning tiles to improve safety for the organization's employees. The City of Wichita has agreed to install truncated dome tiles, which will mitigate merger-related safety impacts for visually impaired people, so the study team did not develop further mitigation options for this impact.

Potential Mitigation Measures

There are two types of mitigation options appropriate for decreasing risk to school children and other pedestrians—those that improve at-grade safety features and those that eliminate entirely the need for pedestrians to cross tracks. Safety mechanism improvements could include installation of pedestrian gates, flashing lights, and warning signals. Crossing guards could increase the enforcement of safe crossing practices. Extensive public education programs and increased enforcement measures might also be used to lessen the safety risk to children.

As described in Section 6.2.1, the way to eliminate entirely the danger of crossing tracks is to separate pedestrians from the tracks by one of two ways—building a bypass or constructing grade separations. Either a general grade separation for all traffic or one built specifically for pedestrians could address this impact.

6.2.5 Train-Vehicle Accidents

Evaluation Criteria

Issue: Accidents between trains and vehicles.
Objective: Mitigate merger-related increased risk of accidents.
Measure: Accident rate at grade crossings on the UP line.

Methodology

The method for calculating the risk of train-vehicle accidents is a standard accident-rate prediction method developed by the FRA (See Appendix H). Described in *Summary of the DOT Rail-Highway Crossing Resource Allocation Procedure–Revised*, it uses a set of three mathematical equations that produce an estimate of accidents for an individual grade crossing based upon the specific characteristics of that crossing. These characteristics include the following:

- Number of trains per day.
- Number of through trains operating during daylight hours.
- Number of mainline tracks.
- Maximum train timetable speed.
- Average annual daily vehicle traffic.
- Number of highway lanes and whether or not the streets are paved.
- Type of warning device in place.
- Actual accident experience at that crossing in the previous five years.

Using numbers of trains as described in Section 4 and train timetable speeds provided by UP, the study team calculated predicted accident frequency for all grade crossings in Wichita and Sedgwick County for which FRA data are available. FRA provided information regarding crossing characteristics from U.S. DOT-AAR Crossing Inventory Information and accident history data from

Rail-Highway Grade Crossing Accident/Incident Reports, and the SEA study team verified crossing characteristics in the field.

The analysis includes 40 grade crossings in Wichita and Sedgwick County. Forty is more than the number of grade crossings in the traffic delay analysis. These additional crossings were not needed in the traffic delay analysis because they carry less traffic. They were added to the accident analysis to ensure that safety concerns were addressed as comprehensively as possible.

Impacts

Table 6.2.5-1 shows results of the calculations of pre-merger conditions and post-merger conditions without further mitigation at the 40 analyzed grade crossings. The results show that the total accident frequency for all the grade crossings is 1.65 accidents per year. Without additional mitigation, the post-merger frequency would increase to 1.95 accidents per year as a result of the merger-related increase in train traffic. The percentage increase in accident rates is less than the percentage increase in train traffic because more effective types of crossing warning devices, such as the gates that are at 13 of the 40 crossings, can prevent large increases in accidents as the number of trains increases.

The results show that many of the largest increases in the accident frequency would occur at crossings on streets with high traffic volumes or less effective warning devices. Crossing gates are the most effective warning devices. Crossing gates are more effective than flashing lights, which are in turn more effective than crossbucks. All crossings analyzed have at least crossbucks and many have flashing lights or gates.

Table 6.2.5-1 Train-Vehicle Accidents				
Street	**Crossing Warning Device**	**Pre-Merger Accident Frequency (Accidents per Year)**	**Post-Merger Accident Frequency (Accidents per Year)**	**Change (Accidents per Year)**
Greenwich	Flashing Lights	0.0188	0.0225	0.0037
101st Street North	Crossbucks	0.0278	0.0392	0.0114
61st Street North	Gates	0.0535	0.0632	0.0097
Oliver	Gates	0.0176	0.0238	0.0062
45th Street North	Gates	0.0155	0.0210	0.0055
Hillside	Gates	0.0153	0.0213	0.0060
37th Street North	Gates	0.0579	0.0689	0.0110
21st Street North	Gates	0.0362	0.0437	0.0075
19th Street North	Crossbucks	0.0146	0.0190	0.0044
18th Street North	Crossbucks	0.0636	0.0727	0.0091
17th Street North	Flashing Lights	0.1671	0.1719	0.0048
15th Street North	Crossbucks	0.0297	0.0375	0.0078
13th Street North	Gates	0.0344	0.0426	0.0082
11th Street North	Flashing Lights	0.0308	0.0334	0.0026
10th Street North	Flashing Lights	0.0219	0.0240	0.0021
9th Street North	Flashing Lights	0.0299	0.0324	0.0025
Murdock	Flashing Lights	0.2231	0.2326	0.0095
Central	Gates	0.0348	0.0431	0.0083
Gilbert	Crossbucks	0.0316	0.0426	0.0110
Lincoln	Flashing Lights	0.0595	0.0651	0.0056
Bayley	Flashing Lights	0.0182	0.0210	0.0028
Zimmerly	Flashing Lights	0.0181	0.0209	0.0028
Boston	Crossbucks	0.0312	0.0421	0.0109
Harry	Gates	0.0245	0.0360	0.0115
Osie	Flashing Lights	0.0191	0.0220	0.0029
Funston	Crossbucks	0.0163	0.0230	0.0067
Skinner	Flashing Lights	0.0153	0.0177	0.0024
Mt. Vernon	Flashing Lights	0.0391	0.0439	0.0048
Clark	Crossbucks	0.0216	0.0299	0.0083
Kinkaid	Crossbucks	0.0307	0.0416	0.0109
Pawnee	Gates	0.0355	0.0451	0.0096
MacArthur	Flashing Lights	0.0643	0.0691	0.0048
47th Street South	Gates	0.0302	0.0387	0.0085
55th Street South	Flashing Lights	0.0345	0.0400	0.0055
63rd Street South	Gates	0.0191	0.0257	0.0066
71st Street South	Gates	0.0280	0.0366	0.0086
79th Street South	Crossbucks	0.1554	0.1878	0.0324
103rd Street South	Flashing Lights	0.0227	0.0268	0.0041
Meridian	Crossbucks	0.0323	0.0442	0.0119
119th Street South	Flashing Lights	0.0103	0.0124	0.0021
Total		**1.65**	**1.95**	**0.30**

Potential Mitigation Measures

As with pedestrian safety issues, there are two types of mitigation options appropriate for decreasing the risk of train-vehicle accidents—those that improve at-grade safety features and those that eliminate entirely the grade crossing. Improving grade crossing safety features would include installation of crossing gates and signals. Grade separations or bypass options would eliminate the grade crossing.

In addition to those options described in Section 6.2.4, local street modifications such as closing some streets or making certain streets one-way would also eliminate the opportunity for train-vehicle accidents. As with pedestrian safety issues, a public education campaign and increased enforcement measures would also mitigate the risk of train-vehicle accidents.

6.2.6 Derailment and Hazardous Material Release Risk

Evaluation Criteria

Issue: Risk of derailments or hazardous material releases.
Objective: Mitigate merger-related increase in risk of derailments.
Measure: Estimated derailment and hazardous materials release rate per year on the UP rail line.

Methodology

Overview: For the EA and Post EA, SEA conducted a system-wide analysis of railroad safety, derailment risk, and hazardous materials transport. As part of that analysis, SEA reviewed national railroad accident statistics from UP and the FRA. The results of the analysis indicated that there would be a slight system-wide increase in rail accidents, including derailments, as a result of the UP/SP merger. In its approval of the merger, the Board required UP to implement several measures to reduce the system-wide risk of train derailments and hazardous materials releases.

In the Wichita Mitigation Study, the SEA study team evaluated in more detail the potential increased risk of mainline derailments and hazardous materials incidents on the UP rail line in Sedgwick County.

The Federal agency responsible for railroad safety is the FRA, which has regulatory and enforcement powers over such railroad activities as dispatching procedures, track safety standards and safe track speeds, train crew hours of service, accident reporting, and inspection and testing of cars and locomotives, railroad signals, and trains. At the time of this writing, the FRA is conducting in-depth reviews of recently merged railroads, including UP.

FRA defines a derailment as occurring when on-track equipment leaves the rail for a reason other than a collision, explosion, highway-rail crossing impact, etc. A derailment must be reported when at least one of the following also occurs: (1) the cost of any resulting damages to on-track

equipment, signals, track, track structures, or roadbed is greater than $6,300; (2) one or more persons is killed; (3) medical treatment is required as a result of injury to one or more persons; or (4) an employee's work status is restricted or otherwise changed as a result of the accident. In 1994, 93 percent of derailments did not involve any casualties, 29 percent involved only one car in the affected train, 24 percent occurred at speeds below 10 mph, and 38 percent occurred at speeds below 15 mph.

FRA maintains national data on train collisions and derailments. The data provide information in three categories: (1) those train collisions and derailments that occur within a rail yard or intermodal facility or on a siding or industrial track, (2) those that occur at grade crossings as a result of train-vehicle collisions, and (3) those that occur on rail lines or connections (outside of rail yards and intermodal facilities). FRA national rail accident data indicate that approximately 58 percent of rail accidents and derailments occur in yards or intermodal facilities or on sidings or industrial tracks, approximately 7 percent occur at grade crossings, and approximately 35 percent occur on rail lines or connections.

When derailments involve rail cars carrying hazardous materials, the cars may release some of those hazardous materials. Hazardous materials transport by rail is much safer than on highways, but different rail lines have different degrees of risk. Trains operating on the UP rail line carry hazardous materials, requiring an assessment of the change in experience to be expected as a result of the merger.

The DOT regulates the transportation of hazardous materials. These materials are defined as "a substance or material which the Secretary of Transportation has determined to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce." There are 11 principal classes of hazardous materials. Classes are based on chemical and/or physical properties, i.e., gases, flammable liquids, oxidizers and organic peroxides, corrosive materials, etc.

UP has specific instructions regarding hazardous materials. They are contained in the booklet, *Instructions for Handling Hazardous Materials*, and UP employees must have a copy of, be familiar with, and comply with the instructions when working on UP property. This booklet contains eight sections: (1) general, (2) required documentation, (3) placards and markings, (4) car inspections, (5) switching, (6) placement in the train, (7) train operations, and (8) emergency response. A review of the booklet illustrates that the movement of hazardous substances is highly regulated. The rules require that each car (or block of cars) containing hazardous materials has the proper documentation, including identification of the material and an emergency response telephone number. Hazardous materials cars must display placards and/or other markings. The placards must use words, numbers, symbols, and colors to indicate the type of material by DOT hazard class. Hazardous materials cars must be inspected for mechanical condition and leakage before they are accepted from a shipper and once accepted the rail cars must be moved promptly, usually within 48 hours. The location of hazardous materials cars in a train is also regulated and cars containing incompatible commodities are not to be located next to each other.

A train carrying specified numbers of loaded rail cars, trailers, and containers of hazardous materials is designated as a "key train" and is subject to special operating practices. Key trains contain five or more tank cars having environmentally sensitive chemicals, inhalation-hazardous materials, a combination of both, or 20 or more loaded hazardous materials shipments. These trains are limited to a length of 6,000 feet or 100 cars and a maximum speed of 50 mph, and, when practical, do not use sidings.

Pre-merger trains carried three types of freight through Wichita and Sedgwick County: grain, stone, and manifest shipments that include a variety of types of cars and contents. Manifest trains are the only type of the three that carry hazardous materials. UP's pre-merger operating data show that the number of cars carrying hazardous materials on the UP rail line averaged 20 cars per day (7.6 percent of all cars) north of the yard and 7 cars per day (2.2 percent of all cars) south of the yard. UP's planned train traffic increase includes manifest trains, one coal train, and one grain train. The post-merger operating plan includes estimates that the number of cars carrying hazardous materials will average 43.7 cars per day (5.8 percent of all cars) north of the yard and 23.7 cars per day (4.8 percent of all cars) south of the yard.

Experience in Sedgwick County: The study team examined FRA Rail Equipment Accident/Incident Reports for derailments on the UP line for 1991 through 1995. The data show three derailments, all in 1994, in Wichita during those five years. All three happened when the trains were traveling at speeds of 10 mph or less and caused no deaths or injuries. None of the trains involved in the derailments included cars carrying hazardous materials.

The study team also examined data from the Hazardous Materials Information System (HMIS), maintained by the Research and Special Programs Administration of the U.S. Department of Transportation. The HMIS contains information on unintentional releases of regulated hazardous materials being transported in commerce, which may be as insignificant as a vapor release from a venting tank car or as serious as the spillage of the entire contents of a cargo tank. The HMIS identifies 57 hazardous materials releases reported by UP in Wichita since 1986. All but two of the liquid releases were of ten gallons or less; they range from 0.25 gallons to 495 gallons. These releases include all those reported by UP anywhere in Wichita. Recent reports include more information; comments in the reports indicate that at least 89 percent of the releases in 1990 and later occurred in a yard or during switching. This information on actual hazardous materials releases is not applicable to calculations of potential releases from merger-related trains because they are to be through trains that do not switch or enter a yard in Wichita or Sedgwick County.

Risk Calculation: Table 6.2.6-1 shows the annual estimated change in system-wide rail accidents estimated to occur as a result of the merger.

Table 6.2.6-1 Estimated of Change in UP/SP System-Wide Accident Rate—Pre to Post Merger		
Type of Accident	**Annual Change**	**Percent Change**
Mainline	14.90	1.9%
Yard	2.63	0.2%
Industry, sidings	1.30	1.9%
Total	18.83	0.9%

On a system-wide basis, the percentage increase in the expected number of accidents per year is less than the anticipated rail traffic growth. The combined UP/SP system is likely to be safer per ton-mile carried than in the pre-merger state. In general, a concentration of traffic on higher-density rail lines, where higher track inspection standards and more advanced signaling techniques are used, should reduce risk to both employees and the general public. Overall, a system-wide increase of 1.7 percent is expected in accidental hazardous materials releases.

The SEA study team used national accident frequency and rail operations factors to estimate the potential increase in derailments in Sedgwick County. The formula used to calculate the potential risk of derailment includes the following four factors:

- Total train miles in Sedgwick County on the UP rail line.
- Total rail car miles in Sedgwick County on the UP rail line.
- Actual derailment history in 1991 through 1995 on the UP rail line.
- 1994-96 FRA national accident history for Class 3 and Class 4 mainline tracks.

Track class defines the standard to which the track is maintained and the allowable safe speed. The UP line in Wichita and Sedgwick County is designated Class 3 mainline track, so the calculation of both the estimated pre-merger derailment rate and the post-merger derailment rate without further mitigation used accident history data for Class 3.

The analysis also identified the risk created by hazardous materials in derailments. The study team reviewed FRA nationwide data on hazardous materials releases from mainline derailments on Class 3 and Class 4 mainline tracks. The data indicate that an average of about 16 percent of hazardous-materials-carrying cars that derail release some of the hazardous material. The analysis applied this probability to the estimated number of hazardous-materials cars that would be involved in mainline derailments in Sedgwick County.

Impacts

Based on the FRA formula for rail line derailment risk, the SEA study team estimated that the pre-merger risk of derailments in Sedgwick County is 0.186 derailments per year, or approximately one derailment every 5.37 years. With the increased merger-related rail traffic, the derailment risk would increase to 0.434 derailments every year, or approximately one derailment every 2.3 years. The increase in derailments would be greater than the increase in the number of

trains because the added through trains would be longer than the pre-merger through trains. Derailments are inherently random; the actual number of derailments in any location varies considerably from year to year.

The analysis of hazardous materials releases found that pre-merger conditions would produce an estimated 0.0030 hazardous materials releases per year caused by mainline derailments in Sedgwick County, or one hazardous material release because of a derailment every 331 years. The merger-related increase in train traffic would increase this estimated rate to 0.0105 hazardous materials releases caused by mainline derailments per year, or one hazardous material release caused by mainline derailments every 95 years.

Possible Mitigation Measures

In addition to the system-wide conditions required in the Board's Decision No. 44 regarding derailment and hazardous material transport (See Section 2.4), potential additional mitigation measures include improved train movement control systems, upgrading the track, and the installation of train-defect detectors.

6.2.7 Total County-Wide Air Quality

Evaluation Criteria

Issue: Locomotive and motor-vehicle emissions.
Objective: Mitigate merger-related increase in emissions.
Measure: Total emissions of carbon monoxide (CO), oxides of nitrogen (NO_x), volatile organic compounds (VOCs), and particulate matter (PM).

Methodology

The methodology used for the mitigation study analysis of air quality (See Appendix J) differs from the EA and Post EA analyses in the following ways:

- It focuses specifically on Wichita and Sedgwick County.
- It includes emissions from queuing automobiles, local seasonal conditions and topography, and an analysis of potential CO hot spots at grade crossings.

To calculate locomotive emissions, the study team multiplied EPA-recommended locomotive emissions factors by the amount of train fuel burned. The calculation of motor vehicle emissions also used the amount of time that motor vehicles wait at crossings, which was calculated in the traffic delay analysis (See Section 6.2.1). The time that vehicles wait was multiplied by emission factors produced by EPA's mobile-source emissions models. The calculations in both instances include only emissions from through trains and vehicles delayed by through trains, because the emissions and delay from local trains and switching movements would not change as a result of the merger.

The analysis estimated how the increase in emissions of each pollutant would compare to total emissions from all other sources in the County. This comparison helped the SEA study team determine if the increases in emissions would cause the County to violate the National Ambient Air Quality Standards (NAAQS), which are set at levels necessary to protect public health and welfare. Because the County is now in compliance with the NAAQS, it is not required to maintain an inventory of emissions. To allow this comparison, the study team made rough estimates of County-wide emissions based upon comparisons with other areas. Appendix J is a detailed air quality analysis report.

Impacts

The evaluation of pre-merger conditions and post-merger conditions without further mitigation found the emissions levels shown in Table 6.2.7-1. The table shows that the merger-related increase in train traffic, without further mitigation, would increase the emissions of all four pollutants. The additional trains would increase the locomotive emissions in the County, and the added delay at grade crossings would increase the emissions from motor vehicles because cars would spend added time idling at the crossings.

Table 6.2.7-1
Emissions for Pre-Merger Conditions and Post-Merger Conditions without Further Mitigation
(Tons per Year)

Pollutant and Source		Pre-Merger	Post-Merger w/o Further Mitigation
VOCs	Locomotives	3.7	8.9
	Motor vehicles	1.1	3.7
	Total	4.8	12.6
NO_x	Locomotives	86.1	206.7
	Motor vehicles	0.3	1.1
	Total	86.5	207.8
PM_{10}	Locomotives	2.0	4.9
	Motor vehicles	0.01	0.01
	Total	2.0	4.9
CO	Locomotives	10.9	26.2
	Motor vehicles	12.1	40.9
	Total	23.1	67.2

Comparing these emissions to the estimate of total emissions from all sources in the County indicates that the emissions resulting from the merger-related additional trains would be less than one percent of the total County-wide emissions. Because Sedgwick County now comfortably meets

the current NAAQS, the comparatively small increases in emissions because of the merger-related additional train traffic would be unlikely to affect the County's attainment status under the current standards and would not jeopardize public health or welfare.

An additional concern regarding air quality is that the EPA has proposed stricter NAAQS for ozone and particulates. The proposed NAAQS could not be used for analysis because they have not been adopted, and any revision to the standards could be different from those proposed. The standard for particulates would apply to a smaller size particulate, $PM_{2.5}$, than is now regulated. The smaller particulates have not been monitored, so no data exist on their levels in Sedgwick County. The EPA has estimated that if the standards were adopted as proposed, the County may be classified as non-attainment based upon present (pre-merger) characteristics, which would not include any impacts resulting from the merger-related increased train traffic. A definitive analysis of the effects of a revised standard cannot be done until a standard is adopted and data are available from monitors.

Potential Mitigation Measures

Motor vehicle emissions could be decreased by mitigation options that would reduce traffic delay at crossings (See Section 6.2.1). Reducing the time that motor vehicles would be delayed would reduce the amount of time that motor vehicles would spend idling at crossings and so reduce their emissions of all four pollutants. Total emissions could also be decreased by measures that would decrease locomotive emissions, such as the introduction of low-emission locomotives on the UP rail line.

6.2.8 Carbon Monoxide Hot Spots

Evaluation Criteria

Issue: Carbon monoxide (CO) concentrations as a result of locomotive and motor-vehicle CO emissions.
Objective: Mitigate any CO hot spots created by merger-related increases in CO emissions.
Measure: Concentrations at selected locations of carbon monoxide in parts per million (ppm).

Methodology

The analysis estimated CO concentrations at selected locations in or near the area in Wichita that had previously been in violation of the NAAQS for CO. The analysis addressed three grade crossings where CO concentrations would be highest—Pawnee, Central, and 13th Street North.

The analysis used a CO dispersion model that predicts concentrations of CO or other inert pollutants generated by motor vehicles at intersections. EPA enhanced the model and found it to be a reliable tool for this purpose.

The assumptions used for the calculations are based on worst-case scenarios and therefore produce conservatively high results. For example, the SEA study team assumed that all trains would pass through Wichita eight hours of the day because the CO standard applies to an eight-hour period. The study team assumed that each train was as long as the longest through train reported by UP. The study team used an assumption that the weather was stagnant air and January temperatures, with background CO levels assumed at the second-highest eight-hour average level measured in 1996.

The results of the analysis provided the basis for comparisons against the NAAQS for CO to determine whether the merger-related additional train traffic would create any new CO hot spots.

Impacts

The results of the analysis, detailed in Table 6.2.8-1, show that the increase in CO emissions as a result of the merger-related increased train traffic would, under highly conservative estimates, increase CO levels by 0.5 to 0.6 ppm, to a peak level of 8.2 ppm at Pawnee, the location of the highest concentration. Because all of the results are within the EPA standard of 9 ppm, the analysis shows that the merger-related increase in CO would not affect Sedgwick County's attainment status.

Table 6.2.8-1
Estimated Pre-Merger and Post-Merger Worst-Case CO Concentrations at Selected UP Grade Crossings (ppm, 8-hour average)

Crossing	Pre-Merger	Post-Merger w/o Further Mitigation
13th Street North	7.3	7.8
Central	7.5	8.1
Pawnee	7.7	8.2

Potential Mitigation Measures

The same types of measures as those identified for general air quality impacts would also mitigate CO concentrations (See Section 6.2.7).

6.2.9 Noise Level

Evaluation Criteria

Issue: Train noise.
Objective: Mitigate merger-related increase in train noise.
Measure: Total number of sensitive receptors (e.g., residences, schools, churches, libraries, hospitals, retirement communities, and nursing homes) subject to a UP train-related noise level of 65 decibels (dBA) or an increase of 3 dBA or greater.

Methodology

The Board's environmental rules at 49 CFR 1105.7(e)(6) require the identification of noise impacts on rail line segments where the increase in the number of trains is eight or more or where the increase in annual gross ton-miles is 100 percent or greater. The largest increase in the number of through trains related to the merger at any location in Wichita and Sedgwick County would be only 5.6 trains per day, but the increase in annual gross ton-miles would be greater than 100 percent, which exceeds the threshold for noise analysis. Local officials in Wichita noted that noise has not been a public concern.

Noise factors analyzed in this study include train horn noise, wheel-rail noise, and diesel locomotive noise. Train horn noise generally has the greatest impact. Noise impacts typically are greatest near grade crossings, where the area of train horn noise can extend as far as 400 feet from the track into the adjacent community, while wheel-rail noise impacts typically extend up to 80 feet from the track. These impact distances depend on a number of factors, including train speed and the number of trains per day.

The noise descriptor used in this study is the day-night average sound level (L_{dn}), which is the average noise levels obtained over a 24-hour period. The average includes a 10 decibel (dBA) adjustment added to the nighttime levels (10:00 P.M. to 7:00 A.M.) to account for increased sensitivity during nighttime noise events.

A noise impact requires analysis under the Board's environmental rules when either of the following occurs:

- Noise levels increase by three dBA or more, as measured by the day-night average sound level (L_{dn}) or

- Noise levels increase to an L_{dn} of 65 dBA or greater.

These criteria apply to noise-sensitive receptors (e.g., residences, schools, churches, libraries, hospitals, retirement communities, and nursing homes) that are in the area where the Board thresholds will be exceeded. A 3 dBA increase in L_{dn} normally requires a 100 percent increase in train traffic, different equipment, or a shift of daytime operations to night hours.

The study team monitored train noise in Wichita during the week of March 17, 1997 to verify and refine the noise assessment of pre-merger noise conditions and to obtain a basis for modeling post-merger conditions. The noise measurements in this study take into account site-specific sound issues, such as actual train horn equipment, shielding by buildings, ground absorption, and the variability of train horn sounding sequences. The EA and Post EA analyses relied on estimates of these same effects.

The SEA study team calculated noise levels using a freight train noise model that incorporates the results of on-site noise measurements to characterize train horn, engine, and wheel-

rail noise and sound propagation effects, including the rates at which the noise level decreases with distance away from the tracks (See Appendix K). The noise model allowed efficient analysis of different scenarios.

Sedgwick County provided its new geographic information system (GIS) for use in the noise analysis. The GIS includes mapping of property boundaries. The study team overlaid graphic representations of noise levels on the GIS parcel records to identify the individual properties that would be exposed to different noise levels. The use of the GIS allowed the direct identification of the affected parcels and the type of land use of each parcel.

The analysis readily identified sensitive receptors that would be subject to an L_{dn} of 65 dBA or greater, the numbers of which are reported in following sections. The identification of other sensitive receptors that would experience an increase of 3 dBA or greater is much more difficult. Identifying the sensitive receptors that would be affected by such increases requires data on the background or ambient noise at the location of each receptor. Assembling complete data on ambient noise at the locations of all potentially affected receptors would require noise monitoring at those locations. The large number of potentially affected receptors makes such monitoring impractical. To avoid that problem, the analysis used assumed ambient noise levels. That assumption allowed the determination of whether any sensitive receptors would experience a 3 dBA increase, but not a precise calculation of the number that would be affected.

Impacts

The noise analysis found that under pre-merger conditions, the number of sensitive receptors that would exceed an L_{dn} of 65 dBA is 295. Under post-merger conditions without further mitigation, that number would increase to 380. Additional sensitive receptors would experience an increase of 3 dBA or greater.

Potential Mitigation Measures

There are two types of mitigation measures appropriate for lessening the impact of merger-related increased train traffic on noise levels in Wichita and Sedgwick County–options to reduce the noise produced by the train traffic and options that would provide a noise buffer separating the train and the sensitive receptors.

Constructing grade separations, building a bypass, and closing streets would remove grade crossings and end the need to sound train horns. Methods for decreasing the noise produced by the train traffic include establishing quiet zones with four-quadrant gates and street median barriers, implementing source noise controls to lessen wheel/rail and diesel engine noise, and using local grade crossing warning devices such as directional horns located at the grade crossings instead of using train-mounted horns. Installing noise barriers around the tracks or insulating buildings that are sensitive receptors, while not decreasing the noise produced, would reduce the transmission of noise.

6.2.10 Vibration

Evaluation Criteria

Issue: Vibration created by trains.
Objective: Mitigate merger-related increase in vibration created by trains.
Measure: Total number of buildings that would exceed the standards for ground-borne vibration velocity level.

Methodology

Vibration is a concern raised by the Wichita Mitigation Committee. The effects of ground-borne vibration include perceptible movement of building floors, rattling of windows, and shaking of items on shelves or hanging from walls. In extreme cases, vibration can cause cosmetic or structural damage to buildings. Vibration raises two types of concern. One is human perception, when vibration is noticeable to people in affected structures. The other is building damage that may be created by vibration.

Several guidelines exist for judging the acceptability of vibration related to railroads, although there has been limited research on human response to building vibration. None of the guidelines was developed explicitly for vibration created by freight trains, but they provide a basis for analysis that can be applied to freight trains. The Federal Transit Administration (FTA) has developed guidelines for human perception of vibration created by rail transit systems. The guidelines are based on land use and event frequency. The Bureau of Mines has developed guidelines for building damage caused by blasting (See Appendix K).

Ground-borne vibration is a complex phenomenon that is difficult to model and predict accurately. Most prediction procedures for railroad projects rely on experience. Vibration is related to train speed and suspension, wheel and track type and condition, track support system, soil type, soil rock layering, depth to water table, and building construction type.

Impacts

Based on generalized railroad characteristics, pre-merger vibration levels may exceed the FTA guidelines for human perception at buildings within 120 feet of the UP tracks. Because an increase in train traffic would not affect the intensity of the vibration, the merger will not further exacerbate any existing problem, if there is one.

Freight train operations are highly unlikely to cause damage to buildings in Wichita. Ground- borne vibration levels expected from the trains are substantially below the cosmetic damage criterion, and even further below the structural damage criterion. See Appendix K for a more detailed discussion of vibration.

Potential Mitigation Measures

Because the merger-related vibration impacts would be substantially below generally accepted levels, there is no need for potential mitigation measures.

Section 7
MITIGATION OPTIONS

7.1 Method of Defining Mitigation Options

The mitigation study identified and defined mitigation options intended to reduce merger-related environmental impacts in Wichita and Sedgwick County. The SEA study team developed the mitigation options described in this Preliminary Mitigation Plan based on team members' engineering and safety knowledge and on suggestions and comments received from members of the public and from local, State, and Federal agency and elected officials.

Mitigation options considered by the SEA study team fall into the following two categories: (1) general mitigation measures to address multiple environmental impacts and (2) additional specific improvements, each of which is designed to mitigate a specific environmental impact. The following is a list of the general mitigation options:

- Bypass (Section 7.2.1)
- Increased train speeds (7.2.2)
- One grade separation–Pawnee (7.2.3)
- Two grade separations–Pawnee and Central (7.2.4)
- Three grade separations–Pawnee, Central, and 13th Street North (7.2.5)
- Four grade separations–Pawnee, Central, 13th Street North, and 21st Street North (7.2.6)
- Elevated trainway with consolidated railroad operations (7.2.7)

The SEA study team developed an initial list of mitigation measures that appeared to be reasonable and technically feasible and that, based upon preliminary analysis, had a high probability of mitigating the environmental impacts resulting from the merger-related increase in trains. After the study team presented preliminary findings in Wichita, local representatives requested analysis of additional general mitigation options including more grade separations. In response to the local request for broader analysis, the study team added the options that include three and four grade separations shown in the above list.

The following discussion describes the above mitigation options, their costs, and the degree to which they would mitigate merger-related environmental impacts.

7.2 General Mitigation Options and Evaluation

7.2.1 Bypass

A bypass that would carry trains around the City would not eliminate all train traffic in Wichita because only some trains would be able to use it. Through trains stopping at the yard in Wichita and local trains serving industries in the City would still need to use the existing tracks in

the central rail corridor. A bypass could use either existing tracks or a combination of existing and newly constructed tracks. The SEA study team considered both possibilities.

Suggestions for a bypass using existing tracks included two options. One, suggested as a comment on the EA, would use Burlington Northern Santa Fe (BNSF) mainline tracks between Topeka and Wellington. The other, suggested more recently by local representatives, would use BNSF mainline tracks from Topeka to Hutchinson, the Central Kansas Railway tracks from Hutchinson to Harper, and the BNSF mainline from Harper to Wellington.

Ordinarily, The Board does not have authority to require one carrier to permit another carrier to operate over its tracks. Thus, UP trains could use BNSF bypasses in the Wichita area only with permission from BNSF. SEA conferred with BNSF regarding both bypass options, and BNSF stated that for operational and competitive reasons it would not allow UP trains on its tracks for either bypass option. Based on BNSF's response, SEA did not further analyze these options.

SEA also analyzed the reasonableness of constructing a bypass around Wichita. The construction of new tracks would raise additional environmental concerns. New construction would have the potential to create noise and air quality impacts in areas where there are now no railroad tracks. New construction could also create natural resource, cultural resource, property, and land use impacts. Such construction would require a separate application to the Surface Transportation Board and the preparation of new environmental documentation.

The City of Wichita requested that the Board specifically address the possibility of a newly constructed bypass around Wichita. The Board's General Counsel responded that the Board's authority to impose conditions in merger cases is broad but not limitless and that the conditions the Board imposes must be reasonable. The response noted that neither the Board nor its predecessor, the Interstate Commerce Commission (ICC), had ever required a railroad in a merger to construct a new rail line to bypass a city. It stated that types of remedies typically required are those being studied as potential Tier 1 mitigation in Wichita. The Board could impose additional types of mitigation if necessary, but the proposed increase in train traffic at issue here does not demonstrate that a bypass would be reasonable mitigation for the potential environmental impacts in the circumstances of this case. The General Counsel's response is included in Appendix A.

Independent of SEA's Wichita Mitigation Study, the City of Wichita, Sedgwick County, the State of Kansas, and Union Pacific agreed to cooperate to conduct a separate study of bypass options for Wichita. Estimated costs for the two bypass alternatives being evaluated in that study are $247 million for a bypass to the west of Wichita and $228 million for a bypass to the east. The complete results of the study are expected to be available around the same time as the completion of this Preliminary Mitigation Plan.

7.2.2 Increased Train Speeds

In the City of Wichita, the UP rail line is within yard limits, where operating procedures require locomotive engineers to watch for other trains and be capable of stopping within half the

distance to any observed potential obstruction on the track. Yard limits are in effect between milepost 239, which is near Hillside, and milepost 251, which is south of 55th Street South. UP set the pre-merger train speed limit within Wichita at 20 mph because of these yard limit requirements. Although speeds are low within the yard limits, outside the yard limits, trains may travel up to 40 mph.

Observed train speeds provided by the MAPD indicate average actual speeds of approximately 13 mph in Central Wichita. This low speed average can be attributed to a number of factors. There was a pre-merger speed restriction that lowered the speed to 10 mph for approximately two miles from north of 21st Street North to near Central because of track conditions that have since been improved. Pre-merger through trains other than grain trains stop in the yard north of 21st Street North to change crews, and they reduce their speed in that area. The slower trains travel through Wichita, the longer crossings are blocked. Increased train speeds is one mitigation option to address grade crossing blockage and delays.

The study team defined this option as an increase in train speeds to 30 mph through the City. The increase would apply only to through trains; local trains and trains involved in switching movements would not be able to operate at higher speeds because of the nature of their operation.

Increased train speeds through Wichita would require removing the yard limits and establishing some form of train movement control. Speeds could not be increased with the yard limits in place because trains must operate at a speed low enough to allow them to stop in half the distance to a visible obstruction. The minimum form of train control is a track warrant system, which requires a dispatcher to grant authority to a train before it can occupy a main line. The train and the dispatcher usually communicate by radio, and procedures require that the oral instructions between the train and the dispatcher be repeated and written down. More sophisticated types of train control include automatic block signals (ABS) or a centralized traffic control (CTC) system. The latter is an especially effective method because the dispatcher has a video display continuously showing the location of trains and is able to align switches for train routing from his or her control console. Increasing train speed to 30 mph through Wichita would also require minor track geometry improvements. These improvements include banking (superelevating) six relatively small curves one to 3.5 inches and leveling the track profile south of Harry.

The study team determined that increased train speeds are feasible and requested that UP review the concept. UP responded that 30 mph operation through Wichita would be possible and provided a schematic track layout showing a plan to accomplish it. UP would install a CTC system for a distance of about 43 miles through Wichita, from near the Harvey-Butler County line on the north to Riverdale, Kansas on the south. CTC is the highest level of nonexperimental traffic control system available. Maximum authorized speed in the CTC territory would be 60 mph with a 30 mph speed restriction through Wichita between the present north yard limit at milepost 239, which is near Hillside, and milepost 247, which is near Pawnee. The improvements would allow UP to remove the present yard limits on the mainline tracks. UP's plan also includes the necessary track geometry improvements. UP has already replaced the track through Wichita with new continuous welded rail. The UP proposal would not only increase train speeds to 30 mph in central Wichita but would also

increase speeds in the southern part of Wichita and in Sedgwick County outside the City to 60 mph, where speeds are now limited to 40 mph.

UP also proposed to relocate its crew-change base from Wichita to either Herington or Salina. Through trains that had no reason to stop in Wichita other than to change crews would no longer have to do so, allowing these trains to maintain speed through the City.

UP's other proposed improvements include the installation of flashing lights and gates with constant warning-time devices at those crossings that now have flashing lights. This would improve the crossing warning devices at Greenwich; 17th, 11th, 10th, and 9th Streets North; Murdock; Lincoln; Bayley; Zimmerly; Osie; Skinner; Mt. Vernon; MacArthur; and 55th, 103rd and 119th Streets South. The evaluation of these safety improvements is discussed in Section 7.3, Additional Potential Improvements.

Cost of Increased Train Speed

UP estimates the cost of its proposal for increased train speed to be slightly more than $10 million. The study team found this to be a reasonable estimate.

Effectiveness in Mitigating Impacts

Increased train speeds could reduce motor vehicle traffic delay to below the pre-merger amount. Increased train speeds would reduce the amount of time that crossings are blocked, which would in turn reduce the number of motor vehicles that would form queues when the crossings are blocked. The study team tested the effects of train speeds of 30 mph and 60 mph in the segments designed for those speeds. At grade crossings where trains would be accelerating or decelerating, the analysis used lower train speeds calculated from train acceleration and deceleration characteristics. The increased train speeds would reduce the sum of total delay at major roadways to about 92 vehicle-hours per day, less than the pre-merger amount of 98 vehicle-hours per day.

The reduction of crossing blockage time and the reduction in traffic queues would result in transit bus delay of less than two person-hours per day, slightly less than the approximately two person-hours per day under pre-merger conditions.

As noted in Section 6.2.3, available data do not allow the determination of actual delay for emergency vehicles, so the sum of the time that the analyzed crossings would be blocked was calculated as a measure of the risk of emergency vehicle delay. Even with increased train speeds, the sum of the time that the crossings would be blocked would be higher than the pre-merger amount because of the merger-related increase in train traffic. With increased train speeds, the crossing blockage time would be more than ten hours per day, which is greater than the pre-merger crossing blockage time of seven hours per day.

Table 7.2.2-1
Effectiveness of Increased Train Speeds

Evaluation Criteria	Pre-Merger	Post-Merger With Increased Train Speeds
Total Traffic Delay (vehicle-hours per day)	97.95	91.92
Public Transit Delay (person-hours per day)	2.03	1.90
Emergency Vehicle Access (hours per day) Average Crossing Blockage Time (minutes per through train)	6.90 2.6	10.30 1.8
Train-Vehicle Accidents (accidents per year)	1.65	2.00
Derailment Risk (derailments per year) Hazardous Materials Releases from Derailments (releases per year)	0.19 0.003	0.35 0.012
Total County-Wide Emissions (tons per year)		
VOCs	4.8	11.5
NO_x	86.5	245.0
PM_{10}	2.0	5.8
CO	23.1	42.3
Localized CO Concentration (parts per million)		
13th Street North	7.3	7.3
Central	7.5	7.5
Pawnee	7.7	7.7
Noise Impacts (number of receptors subject to L_{dn} of 65 dBA or greater)	295	434

Although the total time that crossings would be blocked would increase, the average time that each crossing would be blocked by each train would decrease. If an emergency vehicle were delayed by a train, the amount of the delay would be less with increased train speeds than the pre-merger delay. The average time that a crossing would be blocked would drop from a pre-merger average of 2.6 minutes per through train to about 1.8 minutes per through train with increased train speeds. The average crossing blockage time per through train would be reduced at every crossing analyzed in both the City of Wichita and Sedgwick County.

Increased train speed would increase the projected accident rate compared to post-merger conditions without further mitigation. The FRA accident prediction formulas used for analysis indicate that train speed has no effect on accident risk at crossings that have flashing lights or gates because of the effectiveness of those types of warning devices, but train speed does affect accident rates at crossings that have less-effective crossing warning devices. In Wichita and Sedgwick County, high-traffic-volume streets have flashing lights or gates, but low-traffic-volume streets have crossbucks, which provide a less-effective warning. The amount by which accidents would increase is small because traffic volumes on those streets are low. The accident rate with increased train speeds would be 2.00 accidents per year, an increase from the pre-merger rate of 1.65 accidents per

year. The added crossing gates in the UP proposal, which are discussed in Section 7.3.5, would reduce this rate to 1.61 accidents per year.

A review of FRA derailment data does not indicate that increased train speeds would affect the risk of derailments. However, UP's proposed physical improvements to allow the increased speed would reduce the derailment risk. The installation of a centralized traffic control system would reduce the risk by helping to avoid conditions that could cause derailments. Where the timetable speed is to increase to 60 mph, track will be improved from Class 3 to Class 4. This change in track class requires a higher standard of inspection and maintenance, which will also reduce derailment risk. The result would be a rate of 0.35 derailments per year in Wichita and Sedgwick County, or one every 2.8 years. This is above the pre-merger rate of 0.19 but below the post-merger rate without further mitigation of 0.43. This reduced risk of derailments would also not reduce the risk of hazardous materials releases, as a higher number of cars would be expected to be involved in a derailment at higher speed. The rate of hazardous materials releases caused by derailments would be 0.012, or one every 85 years. This is above both the pre-merger rate of 0.003 releases per year and the post-merger rate without further mitigation of 0.010 releases per year.

Increased train speeds would reduce the emissions from motor vehicle traffic to less than the pre-merger amounts for all four air pollutants analyzed because of the reduction in traffic delay. Fewer motor vehicles would sit idling at crossings, and they would sit there for shorter amounts of time, so they would produce less emissions. Increased train speeds would increase locomotive emissions compared to the post-merger amounts without further mitigation because of the added fuel burned as trains accelerated to the higher speeds. As noted in Section 6.2.7, the increase in emissions resulting from the merger-related increase in train traffic is not significant, as it would not cause Sedgwick County to violate the National Ambient Air Quality Standards (NAAQS).

For localized carbon monoxide (CO) concentrations, increased train speeds would fully mitigate the impact of the additional merger-related trains. With increased train speeds, the worst-case 8-hour average CO concentration at the three grade crossings analyzed would be the same as for pre-merger conditions, which is below the concentration that would cause a CO hot spot. Increased train speeds would create this positive effect by reducing vehicle delay, the amount of time that vehicles idle at crossings, and would therefore reduce the amount of CO generated at potential hot spots.

With increased train speeds, noise impacts would be greater than post-merger conditions without increased train speeds. Increased train speed would add to wheel/rail noise. The result would be 434 sensitive receptors exceeding an L_{dn} of 65 dBA, which is more than the 295 sensitive receptors for pre-merger conditions. Additional sensitive receptors would experience a 3 dBA or greater increase in noise.

7.2.3 One Grade Separation—Pawnee

A grade separation could be constructed at a crossing, either as an underpass where the roadway would be depressed to allow it to pass under the tracks or as an overpass where the

roadway is elevated to pass over the tracks. The existing crossings at Waterman, Douglas, and 1st and 2nd Streets are examples of underpasses. The crossing at Kellogg is an overpass.

A grade separation would have the benefit of completely eliminating delay, safety, and train-horn noise impacts and reducing air-quality impacts at the location of the grade separation. However, a grade separation may also create secondary impacts of its own. It may reduce the visibility of nearby businesses, block access to adjacent properties, and even displace businesses or residences entirely if the structure of the grade separation encroaches upon nearby land parcels. Depending upon the design, nearby streets parallel to the railroad may need to be closed.

Grade separations could be combined with increased train speeds or could be built with unchanged speeds. The analysis considered both possibilities, but the information presented here is for a combination of grade separations and increased train speeds, which would improve conditions at grade crossings as well as the grade-separated ones.

A grade separation on a street with high traffic volume generally would have more benefit than one on a street with low traffic volume. The SEA study team began the process of considering grade separations by examining the higher-traffic-volume streets in Wichita and Sedgwick County to identify the constraints to the construction of grade separations. The lists of constraints identified by grade crossing is in Appendix L. This analysis indicated that a grade separation at Pawnee would have no problems of interference from BNSF tracks. A grade separation at Pawnee should create large benefits because Pawnee has by far the highest traffic volume of the east-west streets that cross the UP tracks at grade. Because of these advantages, the study team selected a grade separation at Pawnee as one of the mitigation options to analyze.

The study team developed conceptual designs for both an overpass and an underpass at Pawnee. An underpass would be simpler and less expensive because the railroad is higher than the Pawnee roadway, so the analysis used the conceptual design for an underpass. The underpass would lower the roadway for a distance of 1,200 feet to pass under the railroad and under Mead. The underpass includes Mead so that street would not have to be closed, but Mead could be deleted from the plan with some cost saving. The concept is illustrated in Figures 7.2.3-1 and 7.2.3-2.

Cost of One Grade Separation

The estimated cost for the conceptual plan for a grade separation at Pawnee is $10.1 million, not including the cost of purchasing additional right-of-way. This amount added to the cost of the improvements to allow increased train speed creates an estimated cost for this mitigation option of $20.1 million.

Effectiveness in Mitigating Impacts

A grade separation at Pawnee would mitigate some traffic delay. If the grade separation were built in combination with increased train speeds, it would reduce traffic delay to 77 vehicle-hours per day compared to 98 vehicle-hours per day for pre-merger conditions. This analysis does

not account for shifts in traffic to Pawnee from other nearby streets to take advantage of the grade separation. Some traffic would shift, but the amount of the shift was not estimated. Such a shift would reduce the total traffic delay.

Table 7.2.3-1
Effectiveness of One Grade Separation–Pawnee

Evaluation Criteria	Pre-Merger	Post-Merger With One Grade Separation
Total Traffic Delay (vehicle-hours per day)	97.95	77.00
Public Transit Delay (person-hours per day)	2.03	1.74
Emergency Vehicle Access (hours per day) Average Crossing Blockage Time (minutes per through train)	6.90 2.6	9.86 1.8
Train-Vehicle Accidents (accidents per year)	1.65	1.95
Derailment Risk (derailments per year) Hazardous Materials Releases from Derailments (releases per year)	0.19 0.003	0.35 0.012
Total County-Wide Emissions (tons per year) VOCs NO_x PM_{10} CO	 4.8 86.5 2.0 23.1	 11.3 245.0 5.8 40.1
Localized CO Concentration (parts per million) 13th Street North Central Pawnee	 7.3 7.5 7.7	 7.3 7.5 6.4
Noise Impacts (number of receptors subject to L_{dn} of 65 dBA or greater)	295	410

A grade separation at Pawnee would improve emergency vehicle access at Pawnee only, saving about one-half hour per day. In combination with increased train speeds, a Pawnee grade crossing would result in blockage time for the crossings analyzed of less than ten hours per day compared to seven hours per day for pre-merger conditions. The average time that a crossing would be blocked would drop from a pre-merger average of 2.6 minutes per through train to a post-merger average of about 1.8 minutes per through train with a grade separation at Pawnee. The grade separation would have a small effect on the average because it would affect only one crossing.

A grade separation at Pawnee would improve the operation of the bus route that uses Pawnee, reducing public transit delay to zero at Pawnee. In combination with increased train speeds, it would reduce the average total delay for the six routes that cross the UP tracks at grade to one and three-quarters person-hours per day, below the approximately two person-hours for pre-merger conditions.

A grade separation at Pawnee shows no effect on pedestrian safety. The information on the number of school children crossing the tracks does not indicate any children crossing at Pawnee.

A grade separation at Pawnee would reduce the risk of train-vehicle accidents by eliminating the potential for collisions at Pawnee. If trains were to operate at increased speed, the grade separation would result in a total risk of accidents of 1.95 accidents per year compared to the pre-merger rate of 1.65 accidents per year.

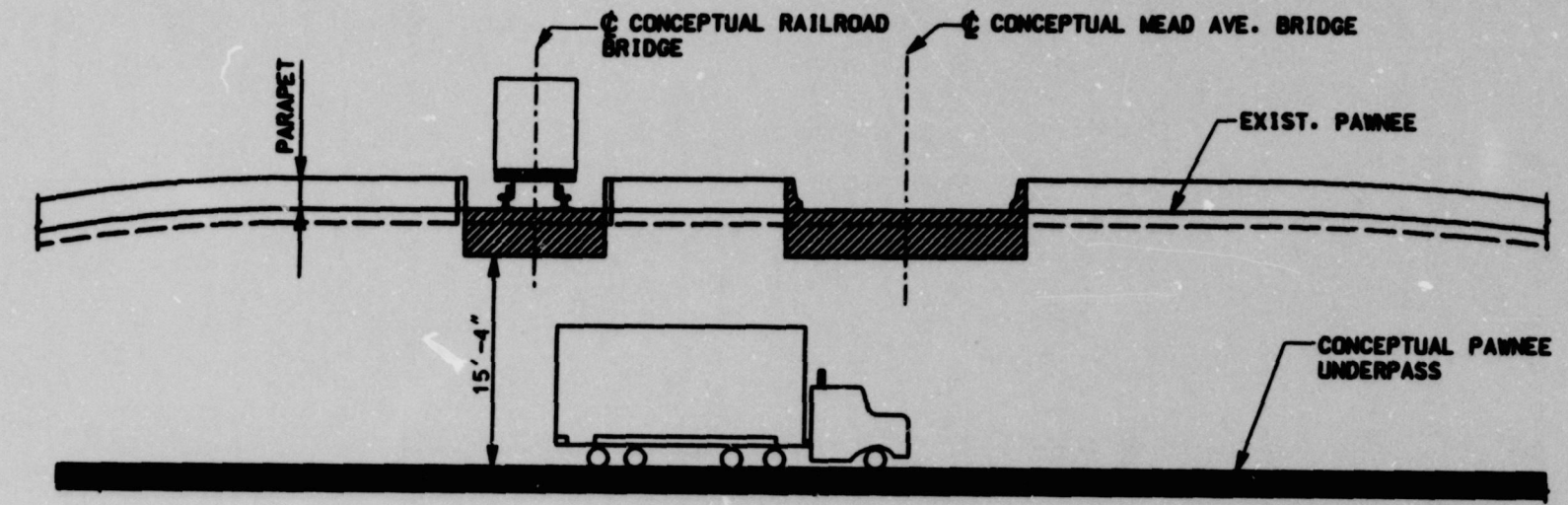
Adding a grade separation would further reduce the emissions of all four air pollutants from motor vehicles below those that would occur with increased train speeds alone. A grade separation at Pawnee would create this further mitigation by removing the cause of vehicle delay that contributes to emissions at this one location. The grade separation would have no effect on locomotive emissions, so they would be the same as for the mitigation option that includes increased train speeds alone. As noted in Section 6.2.7, the increase in emissions resulting from the merger-related increased train traffic would not be significant, as it would not cause Sedgwick County to violate the NAAQS.

For localized CO concentrations, a grade separation at Pawnee would be especially effective in avoiding a hot spot. The calculations of pre-merger CO concentrations show Pawnee to have the highest CO concentration of the grade crossings analyzed. A grade separation at this location would eliminate vehicle delay that contributes to the CO concentration. The grade separation combined with increased train speed would further reduce the worst-case 8-hour CO concentration at Pawnee to 6.4 ppm, below the pre-merger worst-case concentration of 7.7 ppm.

A grade separation at Pawnee would reduce noise levels resulting from trains because it would remove the need to sound train horns at that location. A grade separation at Pawnee would reduce the number of affected sensitive receptors by 24, resulting in 410 sensitive receptors exceeding an L_{dn} of 65 dBA, which is still more than the 295 sensitive receptors for pre-merger conditions. Additional sensitive receptors would experience a 3 dBA or greater increase in noise. A grade separation would have no effect on vibration resulting from trains.

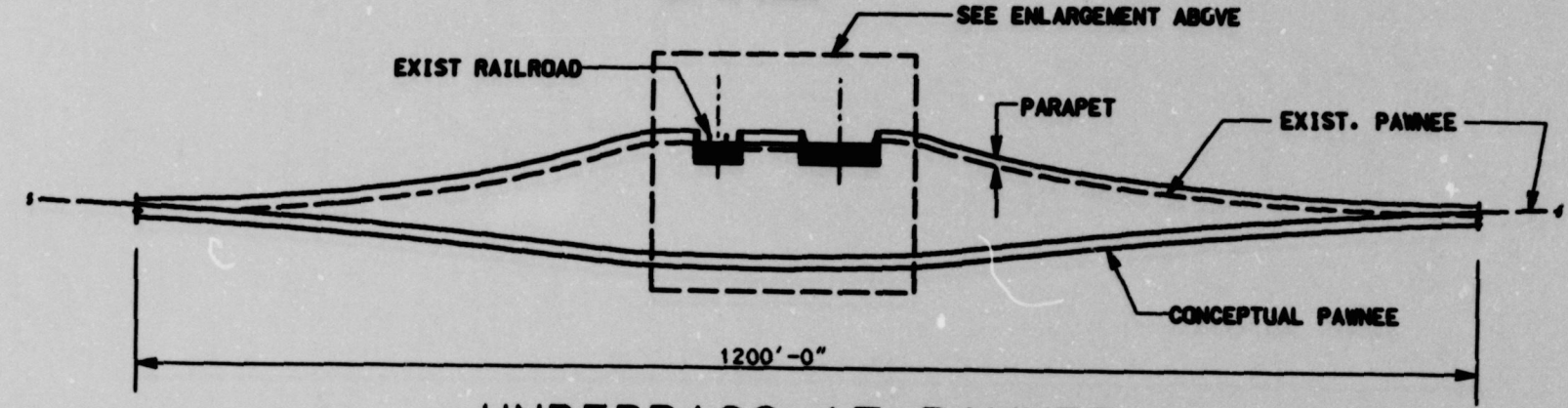
Secondary Impacts Created by One Grade Separation

Grade separating Pawnee would have secondary impacts introduced by the mitigation measure. A 20-foot-wide strip of additional right-of-way would have to be acquired for about 1,200 feet on each side of Pawnee. If Mead were reconstructed to allow it to stay open, about 3,500 square feet of property from the adjacent business would have to be acquired for right-of-way. The grade separation would require the closure of Santa Fe, Mosely, and three alleys on the north side of Pawnee. Entrances from Pawnee to several retail establishments would be closed, as would residential driveways on Pawnee. Frontage roads would need to be built to maintain access to these properties.



ENLARGEMENT

NOT TO SCALE



UNDERPASS AT PAWNEE

NOT TO SCALE

7.2.4 Two Grade Separations—Pawnee and Central

This mitigation option includes building a grade separation at Central in addition to the one at Pawnee. Central has the second highest traffic volume on east-west streets across the tracks, so it is a logical location for a grade separation. A grade separation at Central is one of two grade separations included in the region's long-range transportation plan.

Selecting any high-traffic-volume street in central Wichita for a grade separation raises a concern because of the BNSF tracks. Many east-west streets cross BNSF tracks close to but not at the crossing with the UP tracks. Because of the proximity of the tracks, there is inadequate room for a grade separation for one set of tracks and not the other, so a grade separation would have to be long enough to cross both. At Central, UP and BNSF use the same tracks, so a grade separation there would not require a long or complex structure.

The study team developed conceptual designs for both an overpass and an underpass at Central. The railroad is at about the same elevation as the roadway there, so unlike the crossing at Pawnee, the simplest engineering solution would be an overpass that would carry the roadway over the railroad. The overpass would be 1,840 feet long. The concept is illustrated in Figure 7.2.4-1.

Cost of Two Grade Separations

The estimated cost for the conceptual plan for a grade separation at Central is $9.4 million, not including the cost of purchasing additional right-of-way. This amount added to the cost of improvements to allow increased train speeds and the cost of a grade separation at Pawnee creates a total estimated cost of $29.5 million for this mitigation option.

Effectiveness in Mitigating Impacts

Grade separations at Pawnee and Central would remove traffic delay at those locations. If the grade separations were built in combination with increased train speeds, they would reduce traffic delay to 65 vehicle-hours per day compared to 98 vehicle-hours per day for pre-merger conditions.

Grade separations at Pawnee and Central would improve emergency vehicle access at those locations only. Combined with increased train speeds, they would reduce the sum of the crossing blockage time for the grade crossings analyzed to about 9.3 hours per day compared to seven hours per day for pre-merger conditions. The average time that a crossing would be blocked would drop from a pre-merger average of 2.6 minutes per through train to a post-merger average of about 1.7 minutes per through train with grade separations at Pawnee and Central. The grade separations would have a small effect on the average because they would affect only two crossings.

Table 7.2.4-1 Effectiveness of Two Grade Separations–Pawnee and Central		
Evaluation Criteria	**Pre-Merger**	**Post-Merger With Two Grade Separations**
Total Traffic Delay (vehicle-hours per day)	97.95	65.11
Public Transit Delay (person-hours per day)	2.03	1.35
Emergency Vehicle Access (hours per day) Average Crossing Blockage Time (minutes per through train)	6.90 2.6	9.29 1.7
Train-Vehicle Accidents (accidents per year)	1.65	1.91
Derailment Risk (derailments per year) Hazardous Materials Releases from Derailments (releases per year)	0.19 0.003	0.35 0.012
Total County-Wide Emissions (tons per year) VOCs NO_x PM_{10} CO	 4.8 86.5 2.0 23.1	 11.2 245.0 5.8 38.9
Localized CO Concentration (parts per million) 13th Street North Central Pawnee	 7.3 7.5 7.7	 7.3 6.4 6.4
Noise Impacts (number of receptors subject to L_{dn} of 65 dBA or greater)	295	409

Grade separations at Pawnee and Central would improve the operation of the bus routes that use those streets. They would reduce public transit delay to zero at Pawnee and Central, and combined with increased train speeds, they would reduce the total delay for the six routes that cross the UP tracks at grade to 1.35 person-hours per day compared to the two person-hours for pre-merger conditions.

A grade separation at Central would have minor benefits for pedestrian safety. The information on the number of school children crossing the tracks indicates that five of the 149 students use this crossing, so the relative benefit would be small. The crossing now has gates.

Grade separations at Pawnee and Central would reduce the risk of train-vehicle accidents by eliminating the opportunity for collisions at those two crossings. If trains were to operate at increased speeds, this option would create a total risk of accidents at all crossings analyzed of 1.91 accidents per year compared to the pre-merger rate of 1.65 accidents per year.

Adding a second grade separation would further reduce the emissions of all four air pollutants from motor vehicles below those that would occur with one grade separation and increased train speeds alone. A grade separation at Central would create this further mitigation by

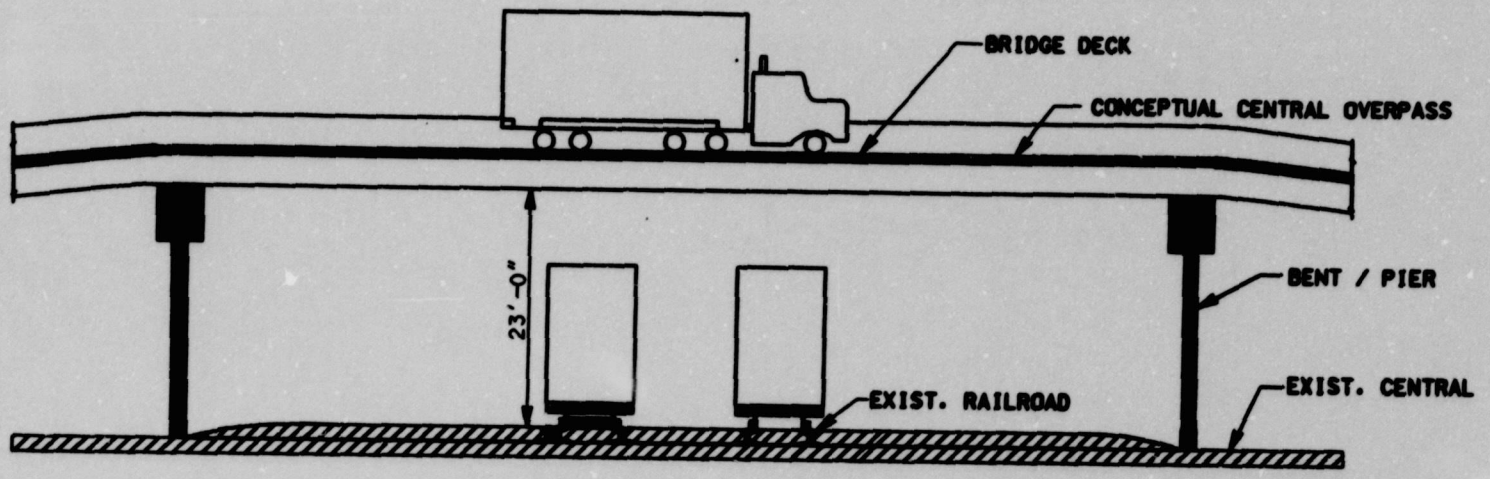
eliminating vehicle delay and related emissions at this one location. Grade separations have no effect on locomotive emissions. As noted in Section 6.2.7, the increase in emissions resulting from the merger-related increased train traffic would not be significant, as it would not cause Sedgwick County to violate the NAAQS.

For localized CO concentrations, a grade separation at Central would help to avoid a hot spot, as Central is one of the grade crossings that has the potential to be a hot spot. A grade separation at this location would remove the cause of the vehicle delay that contributes to the CO concentration. The grade separation combined with increased train speed would further reduce the worst-case 8-hour CO concentration at Central to 6.4 ppm, below the pre-merger worst-case concentration of 7.5 ppm.

Grade separations at Pawnee and Central would reduce noise levels resulting from trains because they would remove the need to sound train horns at those locations. A grade separation at Central would reduce the number of affected sensitive receptors by one, resulting in 409 sensitive receptors exceeding an L_{dn} of 65 dBA, which is still more than the 295 sensitive receptors for pre-merger conditions. Additional sensitive receptors would experience a 3 dBA or greater increase in noise. A grade separation at Central would have no effect upon vibration.

Secondary Impacts Created by Two Grade Separations

This mitigation option would have secondary impacts resulting from the construction of a grade separation at Central as well as the impacts identified for a grade separation at Pawnee. Emporia, St. Francis, and Mosley would have to be closed to through traffic at Central. Santa Fe would have to be paved to provide access to the dairy adjacent to the overpass. Entrances to several parking lots would have to be relocated. Additional right-of-way about 20 feet wide and 500 feet long would need to be purchased for frontage roads on both sides of Central.



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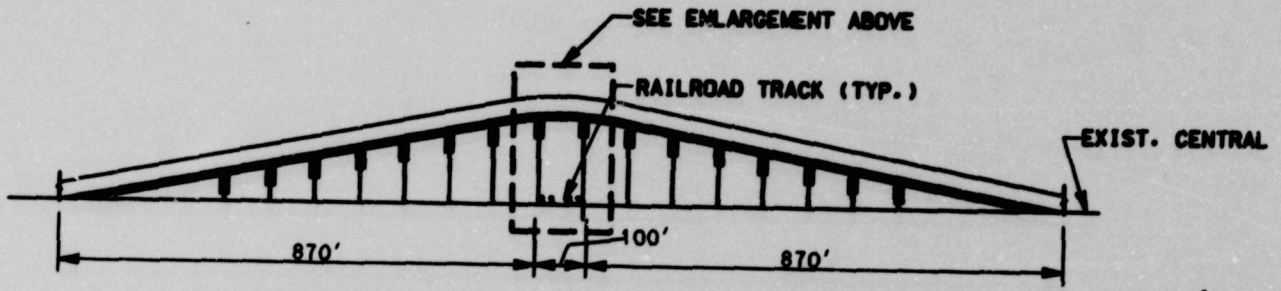


OVERPASS AT CENTRAL
NOT TO SCALE

7.2.5 Three Grade Separations—Pawnee, Central, and 13th Street North

This mitigation option entails construction of a grade separation at 13th Street North in addition to the two previously described. This location was chosen because 13th Street North has the next highest traffic volume. Along with Central it is one of two locations proposed for grade separations in the region's long-range transportation plan.

A grade separation at 13th Street North would suffer from complexity caused by the proximity of the BNSF tracks. At 13th Street North, the BNSF tracks are close but not immediately adjacent to the UP tracks. A grade separation here would be about 2,880 feet long, just over half a mile.

The SEA study team developed conceptual plans for both an overpass and an underpass, as at other locations. The estimated cost of an underpass is slightly less than the estimated cost of an overpass, but the overpass would provide added benefit for roadway traffic operations by creating grade separations at some other streets in the vicinity that would have to be closed for an underpass. The overpass is the conceptual design included in the analysis.

Cost of Three Grade Separations

The estimated cost of the conceptual plan for an overpass at 13th Street North is $20 million, not including the cost of purchasing additional right-of-way. This amount added to the cost of improvements to allow increased train speeds and the cost of the two other grade separations creates an estimated cost for this mitigation option of $49.5 million.

Effectiveness in Mitigating Impacts

Grade separations at Pawnee, Central, and 13th Street North would reduce traffic delay. If the grade separations were built in combination with higher train speeds, they would reduce traffic delay to 54 vehicle-hours per day compared to 98 vehicle-hours per day for pre-merger conditions.

Grade separations at Pawnee, Central, and 13th Street North would improve emergency vehicle access at those locations. In combination with higher train speeds, they would reduce the sum of the crossing blockage time at the grade crossings analyzed to less than nine hours per day compared to seven hours per day for pre-merger conditions. The average time that a crossing would be blocked would drop from a pre-merger average of 2.6 minutes per through train to a post-merger average of about 1.6 minutes per through train with grade separations at Pawnee, Central, and 13th Street North. The grade separations would have a small effect on the average because they would affect only three crossings.

Table 7.2.5-1
Effectiveness of Three Grade Separations–Pawnee, Central, and 13th Street North

Evaluation Criteria	Pre-Merger	Post-Merger With Three Grade Separations
Total Traffic Delay (vehicle-hours per day)	97.95	53.87
Public Transit Delay (person-hours per day)	2.03	0.88
Emergency Vehicle Access (hours per day) Average Crossing Blockage Time (minutes per through train)	6.90 2.6	8.71 1.6
Train-Vehicle Accidents (accidents per year)	1.65	1.86
Derailment Risk (derailments per year) Hazardous Materials Releases from Derailments (releases per year)	0.19 0.003	0.35 0.012
Total County-Wide Emissions (tons per year)		
VOCs	4.8	11.1
NO_x	86.5	244.9
PM_{10}	2.0	5.8
CO	23.1	37.8
Localized CO Concentration (parts per million)		
13th Street North	7.3	6.4
Central	7.5	6.4
Pawnee	7.7	6.4
Noise Impacts (number of receptors subject to L_{dn} of 65 dBA or greater)	295	409

Three grade separations would improve the operation of the bus routes that use Pawnee, Central, and 13th Street North. They would reduce public transit delay to zero at those locations and would reduce the total delay for the six routes that cross the UP tracks at grade to approximately one person-hour per day, below the two person-hours for pre-merger conditions.

Adding a grade separation at 13th Street North shows no benefits for pedestrian safety. The information on the number of school children crossing the tracks does not indicate any children crossing at 13th Street North. There are gates at this crossing.

Three grade separations would further reduce the risk of train-vehicle accidents by eliminating the opportunity for collisions at the three grade crossings. If trains were to operate at the higher speeds, the grade separation would create a total risk of accidents of 1.86 accidents per year compared to the per-merger rate of 1.65 accidents per year.

Adding a third grade separation would further reduce the emissions of all four air pollutants from motor vehicles below those that would occur with increased train speed and two grade separations. A grade separation at 13th Street North would eliminate vehicle delay and related emissions at this one location. As noted earlier, grade separations have no effect on locomotive

emissions. As noted in Section 6.2.7, the increase in emissions resulting from the merger-related increased train traffic would not be significant, as it would not cause Sedgwick County to violate the NAAQS.

For localized CO concentrations, a grade separation at 13th Street North would help to avoid a hot spot, as 13th Street North is one of the grade crossings that has the potential to be a hot spot. A grade separation at this location would remove the cause of the vehicle delay that contributes to the CO concentration. The grade separation combined with increased train speed would further reduce the worst-case 8-hour CO concentration at 13th Street North to 6.4 ppm, below the pre-merger worst-case concentration of 7.3 ppm.

Three grade separations would reduce noise levels resulting from trains because they would remove the need to sound train horns at those locations. Because there are no sensitive receptors near 13th Street North, a grade separation there would not reduce the number of affected sensitive receptors. The result would be 409 sensitive receptors exceeding an L_{dn} of 65 dBA, which is more than the 295 for pre-merger conditions. Additional sensitive receptors would experience a 3 dBA or greater increase in noise. A grade separation at 13th Street North would have no effect upon vibration.

Secondary Impacts Created by Three Grade Separations

This mitigation option would have secondary impacts resulting from the grade separation at 13th Street North in addition to those created by the grade separations at Pawnee and Central. The length of the 13th Street North overpass–more than half a mile–would cause many of the secondary impacts. Wabash, Ohio, St. Francis, and Emporia would be closed to through traffic at the overpass. An industrial business, several retail stores, a gasoline station, a school, and residences would lose their existing entrances, but would gain new entrances from new frontage roads. Acquisition would be required of 15-foot-wide strips of land on both sides of 13th Street North between Santa Fe and Emporia and between Ohio and Washington.

7.2.6 Four Grade Separations—Pawnee, Central, 13th Street North, and 21st Street North

This mitigation option would add a fourth grade separation at 21st Street North to the three previously described. This location has the next highest traffic volume.

A grade separation at 21st Street North would be an overpass. The study team did not consider an underpass at this location because two streams flow through the area, creating the potential for difficult water-related problems. The overpass would be more complex than one at 13th Street North because the track layout is more complex near the rail yards north of 21st Street North. The overpass would be 2,850 feet long, about the same length as an overpass at 13th Street North.

Cost of Four Grade Separations

The cost estimate for the conceptual plan for the overpass at 21st Street North is $22 million, not including the cost of purchasing additional right-of-way. This amount added to the cost of improvements to allow increased train speeds and the cost of the other three grade separations creates an estimated cost for this mitigation option of $71.5 million.

Effectiveness in Mitigating Impacts

Grade separations at four locations would further reduce traffic delay. If the grade separations were built in combination with increased train speeds, they would reduce traffic delay to 43.5 vehicle-hours per day compared to 98 vehicle-hours per day for pre-merger conditions.

Table 7.2.6-1
Effectiveness of Four Grade Separations–Pawnee, Central, 13th Street North, and 21st Street North

Evaluation Criteria	Pre-Merger	Post-Merger With Four Grade Separations
Total Traffic Delay (vehicle-hours per day)	97.95	43.53
Public Transit Delay (person-hours per day)	2.03	0.49
Emergency Vehicle Access (hours per day) Average Crossing Blockage Time (minutes per through train)	6.90 2.6	8.06 1.5
Train-Vehicle Accidents (accidents per year)	1.65	1.82
Derailment Risk (derailments per year) Hazardous Materials Releases from Derailments (releases per year)	0.19 0.003	0.35 0.012
Total County-Wide Emissions (tons per year) VOCs NO_x PM_{10} CO	 4.8 86.5 2.0 23.1	 11.0 244.9 5.8 36.8
Localized CO Concentration (parts per million) 13th Street North Central Pawnee	 7.3 7.5 7.7	 6.4 6.4 6.4
Noise Impacts (number of receptors subject to L_{dn} of 65 dBA or greater)	295	409

Four grade separations would improve emergency vehicle access at those four locations. In combination with increased train speeds, they would reduce the sum of the crossing blockage time at the grade crossings analyzed to just over eight hours per day compared to the seven hours per day for pre-merger conditions. The average time that a crossing would be blocked would drop from a pre-merger average of 2.6 minutes per through train to a post-merger average of about 1.5 minutes

per through train with grade separations at Pawnee, Central, 13th Street North, and 21st Street North. The grade separations would have a small effect on the average because they would affect only four crossings.

Bus routes use all four streets that would have grade separations, so this mitigation option would further improve the operation of the bus system. This mitigation option would reduce public transit delay to zero at the four grade separations, and in combination with increased train speeds, it would reduce the total delay for the six routes that cross the UP tracks at grade to about one-half of a person-hour per day, below the approximately two person-hours for pre-merger conditions.

Adding a grade separation at 21st Street North appears to have no effect on pedestrian safety. The information on the number of school children crossing the tracks does not indicate any children crossing at 21st Street North. This grade crossing now has gates.

Four grade separations would further reduce the risk of train-vehicle accidents. If trains were to operate at increased speeds, this would create a total risk of accidents for all crossings analyzed of 1.82 accidents per year compared to the pre-merger rate of 1.65 accidents per year.

Adding a fourth grade separation would further reduce the emissions of all four air pollutants from motor vehicles below those that would occur with increased train speeds and three grade separations. A grade separation at 21st Street North would remove vehicle delay that contributes to emissions at this one location. The grade separation would have no effect on locomotive emissions, so they would be the same as for the mitigation option that includes increased train speeds alone. As noted in Section 6.2.7, the increase in emissions resulting from the merger-related train traffic would not be significant, as it would not cause Sedgwick County to violate the NAAQS.

A grade separation at 21st Street North would reduce localized CO concentrations, but the amount of the reduction was not estimated because the grade crossing at 21st Street North was not identified as a potential CO hot spot.

A fourth grade separation at 21st Street North would reduce noise levels because it would eliminate the need for sounding train horns at that crossing. As at 13th Street North, there are no sensitive receptors near grade crossing at 21st Street North, so the grade separation would not reduce the number of affected sensitive receptors. The result would be 409 sensitive receptors exceeding an L_{dn} of 65 dBA, which is more than the 295 for pre-merger conditions. Additional sensitive receptors would experience a 3 dBA or greater increase in noise. A grade separation at 21st Street North would have no effect upon vibration.

To compare the benefits of grade separations with the benefits of increased train speeds, the study team analyzed the effectiveness of four grade separations if trains continued to operate at pre-merger speeds. The results show that at pre-merger train speeds four grade separations would be less effective in mitigating traffic delay, public transit delay, emergency vehicle access, total county-wide air pollutant emissions, and localized carbon monoxide concentrations. For example, the traffic delay with four grade separations and pre-merger train speeds would be approximately 137

vehicle-hours per day, a less beneficial condition than the 92 vehicle-hours per day with increased train speeds and no grade separations. Similarly, for emergency vehicle access, four grade separations with pre-merger train speeds would block crossings for almost 13 hours per day, but increased train speeds with no grade separations would block crossings for 10.3 hours per day.

Grade separations would be more beneficial than increased train speeds in increasing pedestrian safety, reducing train vehicle accidents, and reducing noise. Additional mitigation for these environmental impacts is addressed in Sections 7.3.4, 7.3.5, and 7.38.

Secondary Impacts Created by Four Grade Separations

This mitigation option would have secondary impacts resulting from the construction of a grade separation at 21st Street North in addition to those introduced by the grade separations at Pawnee, Central, and 13th Street North. The grade separation at 21st Street North would be over a half-mile long. It would remove access for some businesses on 21st Street North. The interchange of 21st Street North and I-135 would have to be modified. Several industrial businesses would have to use access roads instead of using 21st Street North for access to their loading docks. Fifteen-foot wide strips of land approximately 1,500 feet long would have to be acquired on either side of 21st Street North to allow the construction of access roads.

7.2.7 Elevated Trainway and Consolidation of Railroads

In 1995, UP developed a four-phase plan to consolidate UP and BNSF operations between 21st Street North and Central onto a single set of tracks in the central rail corridor. The plan included the phased construction of new track connections, yard consolidation, and the elevation of the mainline tracks to create an elevated trainway that would create underpasses at Central, Murdock, and 13th Street North, as well as an overpass at 21st Street North. The plan would simplify the construction of grade separations because it would raise the railroad. The plan would provide the traffic delay, safety, and noise benefits of grade separations and would avoid the complexity of multiple close-together tracks. It would provide advantages for the railroads because they could focus future capital investments and maintenance expenditures on a single set of tracks. It would provide advantages to the City by consolidating crossings and grade separating selected ones, reducing both the extent and the severity of impacts.

Cost of Consolidation of Railroads and Elevated Trainway

The plan included a cost estimate of $60-65 million in 1995 dollars. Inflated at an assumed inflation rate of four percent per year, the cost estimate would be approximately $65-70 million in 1997 dollars. The study team did not have detailed cost estimates for the plan.

Effectiveness in Mitigating Impacts

The elevated trainway would address traffic delay by grade separating four crossings between Central and 21st Street North. The effects upon traffic would be similar to the preceding

mitigation option that would include four grade separations except that it would include a grade separation at Murdock but would not include a grade separation at Pawnee. This mitigation option would affect multiple streets in north Wichita because those streets between Central and 21st Street North that would not be grade separated would be closed to through traffic at the railroad. This would shift traffic among streets, increasing traffic volumes on those that were grade-separated. The result would be 47 vehicle-hours of delay per day, less than half of the 98 vehicle-hours per day for pre-merger conditions.

Table 7.2.7-1
Effectiveness of Elevated Trainway

Evaluation Criteria	Pre-Merger	Post-Merger With Elevated Trainway
Total Traffic Delay (vehicle-hours per day)	97.95	46.85
Public Transit Delay (person-hours per day)	2.03	0.65
Emergency Vehicle Access (hours per day) Average Crossing Blockage Time (minutes per through train)	6.90 2.6	6.69 1.4
Train-Vehicle Accidents (accidents per year)	1.65	1.23
Derailment Risk (derailments per year) Hazardous Materials Releases from Derailments (releases per year)	0.19 0.003	0.35 0.012
Total County-Wide Emissions (tons per year) VOCs NO_x PM_{10} CO	 4.8 86.5 2.0 23.1	 11.1 244.9 5.8 37.8
Localized CO Concentration (parts per million) 13th Street North Central Pawnee	 7.3 7.5 7.7	 6.4 6.4 7.7
Noise Impacts (number of receptors subject to L_{dn} of 65 dBA or greater)	295	430

The elevated trainway would improve emergency vehicle access by creating grade separations but could also worsen access by closing other streets. The crossing blockage time would be less than the seven hours per day for pre-merger conditions. The average time that a crossing would be blocked would drop from a pre-merger average of 2.6 minutes per through train to a post-merger average of about 1.4 minutes per through train with the elevated trainway.

This option would improve the operation of the bus routes that use Central, 13th Street North, and 21st Street North, as those three streets would be grade separated. It would reduce public transit delay to zero at those three streets and would reduce the total delay for the six routes that cross the UP tracks at grade to about two-thirds of a person-hour per day, below the approximately

two person-hours for pre-merger conditions. On this measure, the elevated trainway would be less beneficial than four grade separations because the elevated trainway option does not include a grade separation at Pawnee, which is the location of a bus route.

Unlike the four mitigation options that include grade separations, the elevated trainway would have beneficial effects upon pedestrian safety. The streets between Central and 21st Street North would be either closed or grade separated. The only places where school children could cross the tracks would be at locations that would be grade separated. This would impose some inconvenience on the children, as their walking routes would be longer than they are now. School district data indicate that 69 of the 149 students who cross the tracks do so on the streets that would be either closed or grade separated by this mitigation option.

Of the mitigation options analyzed, the elevated trainway would have the greatest beneficial effect on the risk of train-vehicle accidents. Because the crossings between 21st and Central would be either closed or grade-separated, all risk of vehicle accidents would be eliminated at those crossings. In combination with increased train speeds, this would lower the total accident risk for all crossings analyzed to 1.23 accidents per year from the pre-merger rate of 1.65 accidents per year, assuming that all traffic from streets that were closed shifted to grade-separated streets.

The elevated trainway combined with increased train speeds would produce emissions of the four air pollutants from motor vehicles that would be about the same as the mitigation option described in Section 7.2.5 that includes three grade separations, although the locations of the grade separations would be different. The elevated trainway would have no effect on locomotive emissions, so they would be the same as for the mitigation option that includes increased train speeds alone. As noted in Section 6.2.7, the increase in emissions resulting from the merger-related increased train traffic would not be significant, as it would not cause Sedgwick County to violate the NAAQS.

For localized CO concentrations, the elevated trainway would reduce the potential for hot spots at Central and 13th Street North, but would not have any effect at Pawnee, the grade crossing that showed the highest worst-case 8-hour CO concentration.

The elevated trainway would create noise impacts on the fewest sensitive receptors of the mitigation options analyzed. Train horns would be unnecessary between 21st Street North and Central because all streets would be either grade separated or closed. The result would be 430 sensitive receptors exceeding an L_{dn} of 65 dBA, which is still more than the 295 sensitive receptors for pre-merger conditions. Additional sensitive receptors would experience a 3 dBA or greater increase in noise.

Secondary Impacts Created by Elevated Trainway

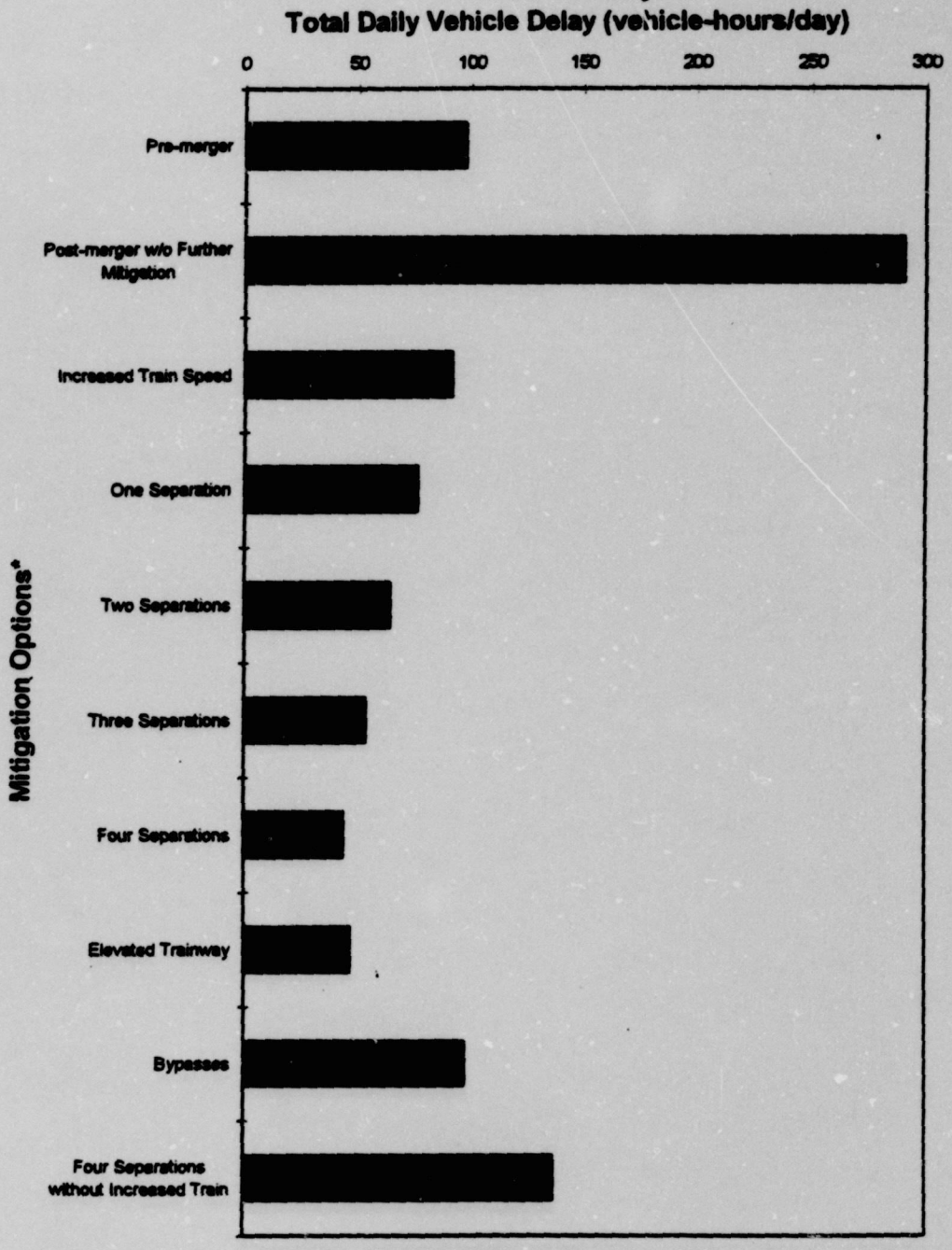
The elevated trainway would create secondary impacts over a wide area. Although the mitigation option includes grade separations at the same locations as the individual ones in the other mitigation options, the secondary impacts would differ. Unlike the individual grade separations,

which are overpasses, the elevated trainway would raise the tracks to allow roadways to be built as underpasses. Property acquisition would extend along the railroad instead of along the roads, and the property and access impacts would be focused at the crossings.

Figures 7.2.7-1 and 7.2.7-2 show the total traffic delay and estimated capital cost for each of the general options evaluated.

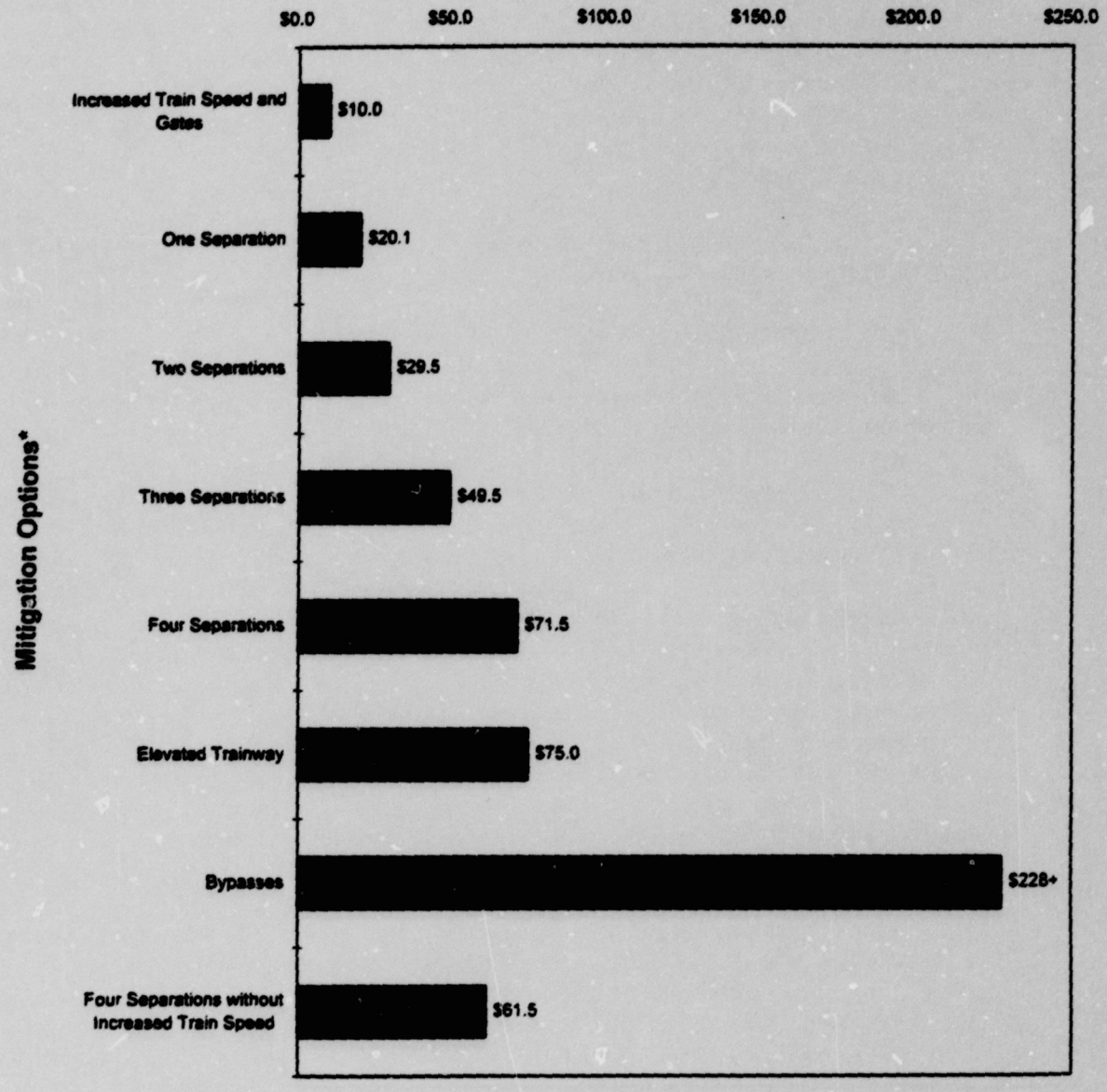
Figure 7.2.7-1

Traffic Delay



* All grade separation options include increased train speed except "Bypasses" and "Four Separations without Increased Speed."

Figure 7.2.7-2
Capital Costs
Total Capital Cost ($ millions)



*All grade separation options include increased train speed except "Bypasses" and "Four Separations without Increased Train Speed." Costs for grade separations and "Elevated Trainway" do not include the cost for property acquisition.

7.3 Additional Potential Improvements

The analysis of the general mitigation options showed that they would mitigate some environmental impacts but not others. The study team designed additional improvements to mitigate those environmental impacts that would not be entirely mitigated by the general mitigation options. The following discussion describes these additional improvements, their costs, their effectiveness in mitigating the environmental impacts for which they were designed, and any secondary impacts that the improvements would create. The discussion is organized by the ten criteria used to evaluate mitigation options.

7.3.1 Traffic Delay

No additional improvements are needed for traffic delay because the general mitigation options adequately address this issue.

7.3.2 Public Transit Delay

No additional improvements are needed for public transit delay because the general mitigation options adequately address this issue.

7.3.3 Emergency Vehicle Access

The lack of data on actual experience of emergency vehicle delay at crossings hampers the analysis of the need for additional mitigation. Both increased train speeds and grade separations would still leave some increase in the amount of time that crossings are blocked compared to pre-merger conditions. However, as noted in Section 6.2.3, emergency vehicles are not delayed every time a crossing is blocked because emergency vehicle runs are random. In addition, increased train speeds would reduce the amount of time that each crossing would be blocked by each train to less than the pre-merger amount, and grade separations would reduce that time to zero at individual locations. Because crossing blockage time represents only the risk of emergency vehicle delay and not actual delay, a change in this measure does not necessarily represent a change in conditions. However, additional consideration of emergency access is worthwhile because of the importance of assuring that safety is maintained.

An additional possible measure to enhance emergency vehicle access is a communication system to inform dispatchers of the approach of each train. A communication system could provide information on train location to the dispatcher. Installation of the communication system would assist the emergency vehicle dispatchers in determining the location of trains and would enable them to reroute emergency vehicles accordingly. Cameras near the tracks and monitors in the new communication center would serve a similar purpose.

An opportunity exists to coordinate the development of an emergency response communication system with broader system development. The Metropolitan Area Planning Department is beginning a study of local needs and opportunities to apply intelligent transportation

system (ITS) technology in Wichita. ITS generally consists of high-tech data, communications, and management systems to enhance the performance of transportation facilities and services. The MAPD study will include analysis of railroad operations in ITS applications.

The UP proposal to install a CTC system through Sedgwick County could also be coordinated with this concept. A CTC system could be a source of the information needed by dispatchers.

Cost of a Communication System

A communication system that would use the CTC system would cost approximately $300,000, according to UP estimates.

Effectiveness in Mitigating Impacts

The ability of the dispatcher to inform the emergency vehicles of the location, speed, and direction of trains could be important in directing drivers to alternate routes, alternative destinations (e.g., health care facilities), or alternative resources for dispatch. Such a mitigation measure could have a beneficial effect on response time for emergency vehicles. Training of personnel, communications connections, and equipment upgrades will be required to implement this mitigation measure.

Secondary Impacts

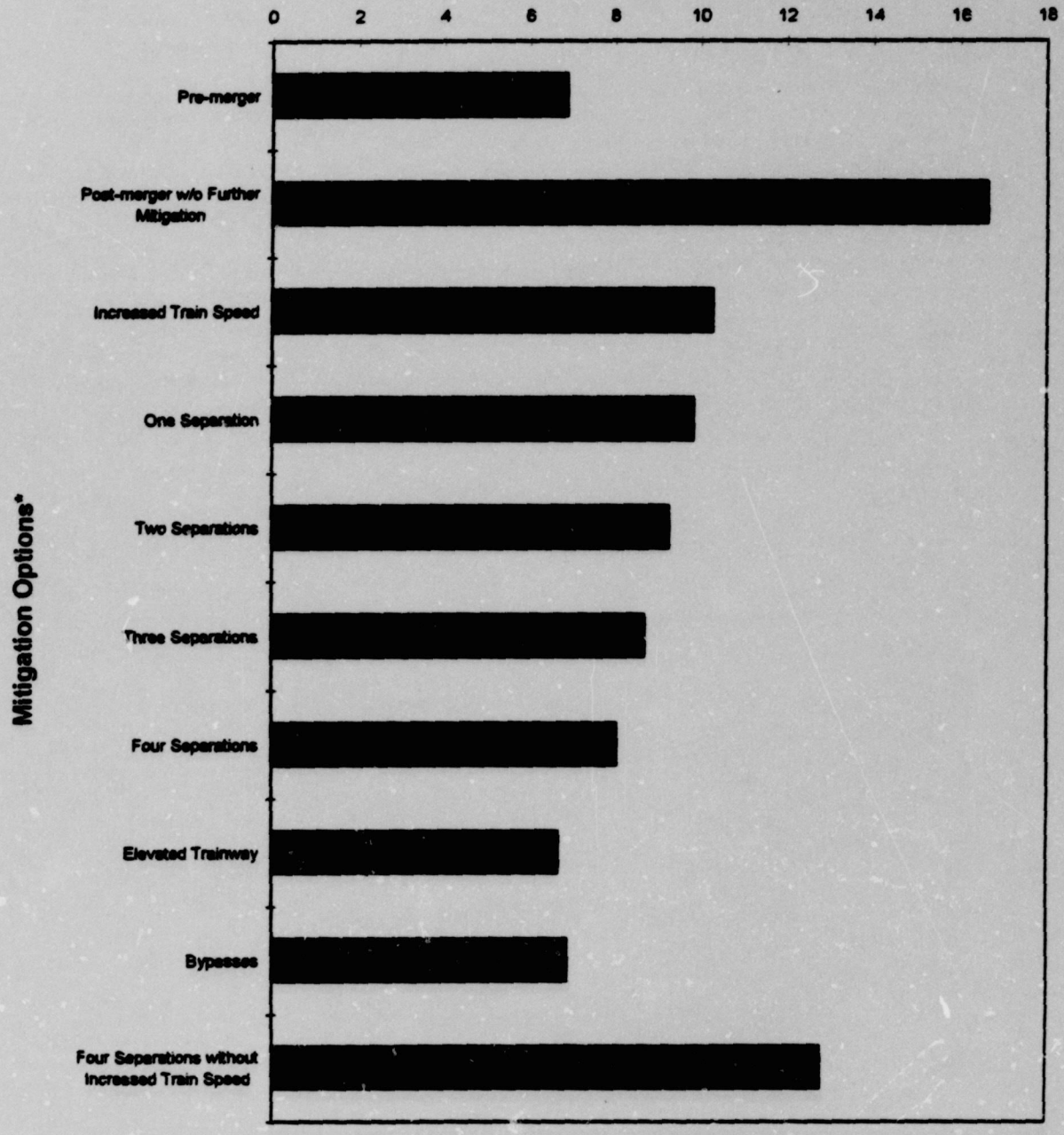
No secondary impacts appear to be associated with the installation of a communication system.

Figure 7.3.3-1 shows the evaluation results for total crossing blockage time for the general options evaluated.

Figure 7.3.3-1

Emergency Vehicle Access

Total Crossing Blockage Time (hours/day)



*All options include increased speed except "Bypasses" and "Four Separations without Increased Train Speed."

7.3.4 Pedestrian Safety

The primary pedestrian safety concern is the children who cross the UP tracks going to and from their schools, although safety for all pedestrians must be assured. Possible mitigation measures specifically directed at increasing pedestrian safety are:

- Pedestrian overpasses.
- Pedestrian gates at crossings with vehicle gates.
- School training programs.
- Safety information for people who live and work near the UP rail line.
- Crossing guards.

A pedestrian overpass could be built at a crossing that has a high number of students crossing the tracks. To be accessible to handicapped people, a pedestrian overpass would consist of a spiral concrete ramp at each end and an elevated walkway high enough to provide clearance for trains. The spiral ramps would require the purchase of additional right-of-way on each side of the tracks. The effectiveness of this improvement is questionable because using a pedestrian overpass would be less convenient than walking across the tracks. Children might be unwilling to use an overpass unless the street were closed and they had no alternative path. Mt. Vernon, the location with the largest number of children, has a relatively high volume of motor vehicle traffic and would be difficult to close.

Pedestrian gates could be built at crossings with either existing or new vehicle crossing gates. The cost would be reasonable because the circuitry would be in place to serve the vehicle gates. The pedestrian gates would have to be appropriately designed to assure student compliance. Such a design should include flexible skirts under the gates to prevent walking under them and fences next to the gates.

Safety training in schools is a standard practice for many railroads, including UP. People who live and work near the UP rail line should be informed of the merger-related increase in train traffic and the increase in speed of the trains so that they can continue to cross the tracks safely. Crossing guards are also standard practice at many high-traffic-volume streets for many school systems, although stationing crossing guards at rail crossings is not typical practice.

Cost of the Mitigation Option

The cost estimate for a pedestrian overpass is $957,000 not including the cost of purchasing additional right-of-way for a ramp at each end, but this cost would vary considerably depending upon the length, design standards, and complexity of the structure. Pedestrian gates would cost about $200,000 per crossing, assuming that each crossing would require four gates to control the four sidewalk approaches to each crossing. The costs of training, information for nearby employees and residents, and crossing guards would vary by the extent of their use and, unlike an overpass or gates, would be continuing costs.

Effectiveness in Mitigating Impacts

Predicting the effectiveness of pedestrian overpasses and the school safety training is difficult, as the effectiveness is dependent on student behavior. Properly designed pedestrian gates would be effective in reducing pedestrian risk.

School safety training would have the advantage of increasing awareness of the need for care in crossing tracks, not only among the 149 students identified as crossing the tracks but also among the general student population. Information for nearby employees and residents would help to spread awareness more widely among the people most directly exposed to train traffic.

Crossing guards could be effective in assuring safety, depending upon the reliability of the individual guards. Their effectiveness may be limited by the fact that few students use many of the crossings compared to highway crossings where guards are typically used.

Secondary Impacts

Construction of a pedestrian overpass would have visual effects in the neighborhood where it was built. Safety and security of school children in the pedestrian overpass could also be a concern. Pedestrian gates would have no secondary impacts. Neither school safety training nor crossing guards would have secondary impacts other than the disadvantage of continuing costs.

7.3.5 Train-Vehicle Accident Risk

The merger-related increase in trains increases the risk of train-vehicle accidents. Increased train speed would not mitigate the increased risk, and grade separations would be effective only at the locations where they would be built, not at other locations.

Additional improvements to train-vehicle accident safety include the following:

- Upgrading crossing warning devices.
- Installing barriers along Mead.
- Conversion of existing two-way streets to one-way streets.
- Closing streets.
- Gate-violation enforcement cameras.
- Safety training program.

Gates are the most effective form of warning device at grade crossings. The highest-traffic grade crossings in Wichita and Sedgwick County have gates, but other crossings have flashing lights or crossbucks. Upgrading the type of warning device at those other crossings by installing gates would mitigate the risk of train-vehicle accidents. In order to increase the safety of operations in the mitigation options that include higher train speeds, UP proposed installing gates at the sixteen crossings in Wichita and Sedgwick County that now have only flashing lights.

Mead is a special concern because of the proximity of trains and motor vehicle traffic. Although the effect cannot be quantified, increased train speeds in that area increase the possibility of accidents between trains and motor vehicles. Fences or steel guardrails next to the tracks would prevent motor vehicles from infringing upon the tracks and would reduce the potential for accidents.

Conversion of two-way streets to one-way streets would prevent motorists from driving around closed gates, as gates would be installed to block both approach lanes. Conversion to one-way streets would need to be part of a broader transportation, land-use and property-access planning process for the areas surrounding the grade crossings.

Closing streets is effective in eliminating crossings that have lower-effectiveness crossing warning devices but do not have sufficient traffic to justify installing gates. Where streets are closed, traffic is diverted to other streets with more-effective crossing warning devices. Many streets in Wichita could be closed at the UP tracks because streets are close together, allowing convenient alternative routes. Closing streets in areas outside the City would be more difficult because the streets are farther apart. The study team reviewed the physical characteristics of the following streets that carry low traffic volumes:

- 19th Street North
- 18th Street North
- 15th Street North
- 11th Street North
- 10th Street North
- 9th Street North
- Gilbert
- Bayley
- Zimmerly
- Boston
- Osie
- Funston
- Skinner
- Clark
- Kincaid

One option for enforcement is to mount cameras at specific crossings to monitor vehicles violating the crossing gates. Such a strategy would require special equipment and the personnel to issue tickets to violators.

SEA considers safety training programs, particularly in the schools, an effective way to help drivers or prospective drivers understand the dangers associated with trains and warning signals. The current Operation Lifesaver program is an example of the training that can occur in the community and the schools. Providing information to people who work and live near the UP rail line, included above in the discussion of pedestrian safety, would also reduce the train-vehicle accident risk because those people closest to the rail line also drive across it.

Cost

The estimated cost of adding crossing gates at crossings that have flashing lights is $50,000 per grade crossing. Adding constant-warning-time devices would add $70,000 per crossing. The cost of upgrading the crossing warning devices to gates at sixteen crossings is included in the cost

of the UP plan for increased train speeds. The estimated cost of installing fences and steel guardrails at appropriate locations along Mead between 21st Street North and Pawnee is $150,000, although the cost could vary depending upon the design and extent of the barriers.

The cost of converting two-way streets to one-way streets would depend upon the number and location of streets and their physical characteristics. If all streets were closed that are candidates for closing, concrete barriers to block the railroad crossing would cost an estimated $233,000.

The estimated cost of gate violation enforcement cameras is $200,000 each. Use of surveillance cameras would also require staff to monitor them and a facility to house the monitors. The continuing cost of staff and facilities were not estimated.

Effectiveness in Mitigating Impacts

Installation of gates at crossings that do not now have them would improve the effectiveness of crossing warning devices. Table 7.3.5-1 shows the effect of upgrading those grade crossings that have only flashing lights to gates. The resulting accident risk rate of 1.61 would be below the pre-merger accident risk rate of 1.66 accidents per year.

Table 7.3.5-1
Effect on Train-Vehicle Accidents of Upgrading Existing Flashing Lights to Gates

Street	Crossing Warning Devices With No Further Mitigation	Pre-Merger Accident Frequency (Accidents per Year)	Crossing Warning Devices With Additional Gates	Post-Merger Accident Frequency With Additional Gates (Accidents per Year)
Greenwich	Flashing Lights	.0188	Gates	.0093
101st North	Crossbucks	.0278	Crossbucks	.0440
61st North	Gates	.0535	Gates	.0632
Oliver	Gates	.0176	Gates	.0238
45th North	Gates	.0155	Gates	.0210
Hillside	Gates	.0167	Gates	.0226
37th North	Gates	.0579	Gates	.0689
21st North	Gates	.0362	Gates	.0437
19th North	Crossbucks	.0146	Crossbucks	.0218
18th North	Crossbucks	.0636	Crossbucks	.0783
17th North	Flashing Lights	.1671	Gates	.1099
15th North	Crossbucks	.0297	Crossbucks	.0421
13th North	Gates	.0344	Gates	.0426
11th North	Flashing Lights	.0308	Gates	.0147
10th North	Flashing Lights	.0219	Gates	.0100
9th North	Flashing Lights	.0299	Gates	.0142
Murdock	Flashing Lights	.2231	Gates	.1509
Central	Gates	.0348	Gates	.0431
Gilbert	Crossbucks	.0316	Crossbucks	.0476
Lincoln	Flashing Lights	.0595	Gates	.0344
Bayley	Flashing Lights	.0182	Gates	.0086
Zimmerly	Flashing Lights	.0181	Gates	.0086
Boston	Crossbucks	.0312	Crossbucks	.0446
Harry	Gates	.0312	Gates	.0401
Osie	Flashing Lights	.0191	Gates	.0091
Funston	Crossbucks	.0163	Crossbucks	.0245
Skinner	Flashing Lights	.0153	Gates	.0072
Mt. Vernon	Flashing Lights	.0391	Gates	.0204
Clark	Crossbucks	.0216	Crossbucks	.0318
Kinkaid	Crossbucks	.0307	Crossbucks	.0440
Pawnee	Gates	.0355	Gates	.0451
MacArthur	Flashing Lights	.0643	Gates	.0375
47th South	Gates	.0302	Gates	.0387
55th South	Flashing Lights	.0345	Gates	.0182
63rd South	Gates	.0191	Gates	.0257
71st South	Gates	.0280	Gates	.0366
79th South	Crossbucks	.1554	Crossbucks	.2017
103rd South	Flashing Lights	.0227	Gates	.0114
Meridian	Crossbucks	.0323	Crossbucks	.0494
119th South	Flashing Lights	.0103	Gates	.0049
Total		1.66		1.61

The review of streets that are candidates for closing showed that all streets examined could be closed without interfering with emergency access or general access to adjacent properties. This would reduce accidents by diverting traffic to other crossings with more-effective crossing warning devices. The review did not address wider transportation system issues and other reasons that a street should not be closed, such as access to a nearby hospital or other emergency facility. Such further analysis would be necessary before serious consideration is given to closing streets.

The effectiveness of both safety training and surveillance cameras would be dependent upon the extent of their use.

Secondary Impacts

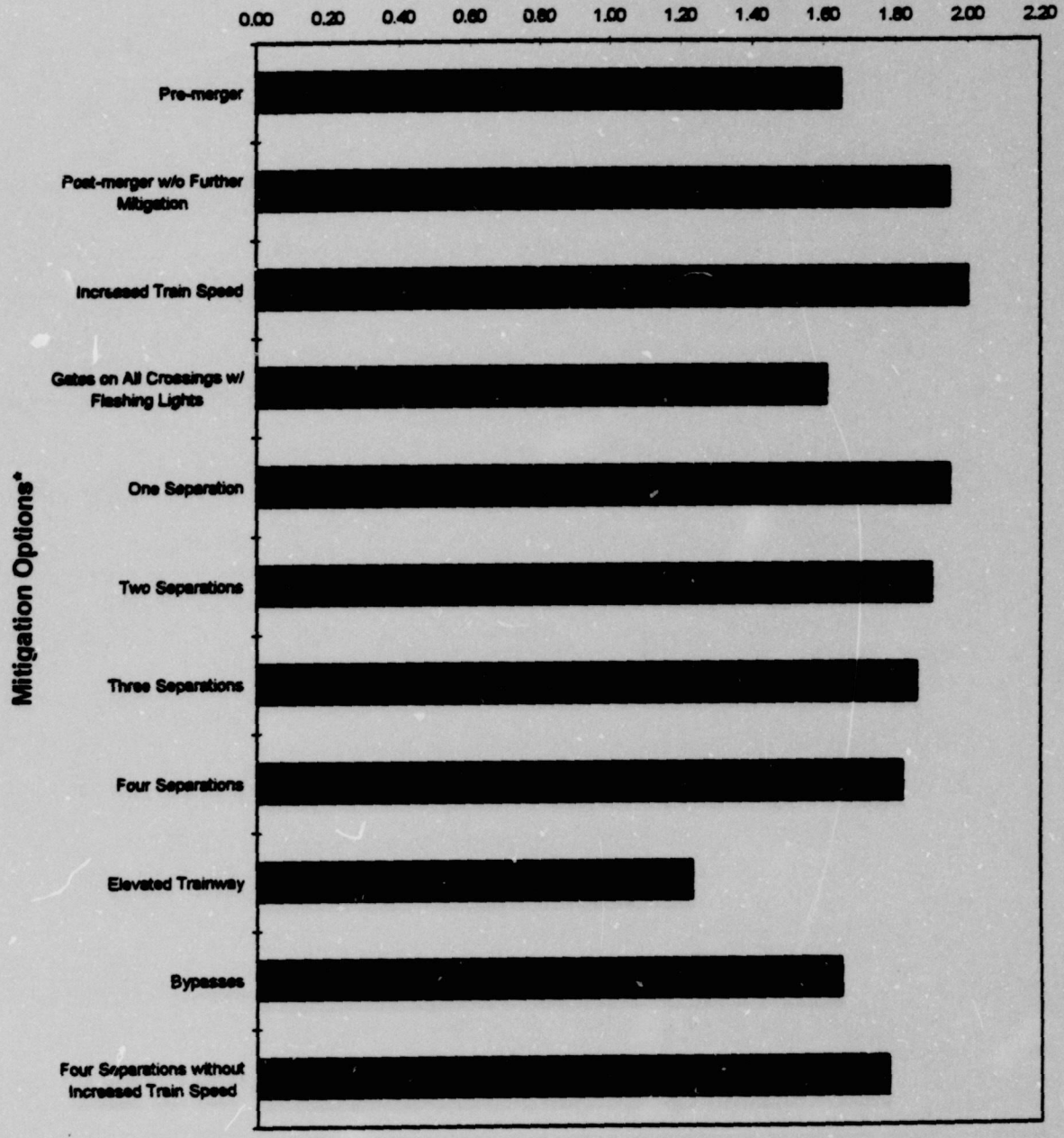
Upgrading crossing warning devices would have no secondary impacts.

Installing barriers along Mead could create concerns about limitations on vehicular access to some businesses, but careful design, as shown in Appendix L, would avoid such problems. Creating one-way streets and closing streets could create concerns about community cohesion, access to emergency facilities, and making traffic patterns more circuitous.

Safety training would have no secondary impacts. Cameras would also have no secondary impacts other than the continuing cost of staff and facilities to monitor them, although in some communities the use of surveillance cameras has raised privacy concerns.

Figure 7.3.5-1 shows the estimated total accident risk for each of the general options considered and for installing additional crossing gates.

Figure 7.3.5-1
Train-Vehicle Accident Risk
(Total Predicted Accidents per Year)



*All options include increased train speed except "Bypasses" and "Four Separations without increased Speed."

7.3.6 Derailment and Hazardous Materials Release Risk

Derailments and hazardous materials releases are addressed by following system-wide requirements already imposed by the Board in Decision No. 44:

- Signs at grade crossings with a toll-free number to call if signal crossing devices malfunction.
- Provision of UP's toll-free numbers for emergency response forces to call.
- Hazardous material and emergency response plans.

In addition, the improvements to the UP rail line described in Section 7.2.2, including improved track, regraded rail curves, and centralized traffic control, would reduce the risk of train collisions that could cause derailments and hazardous materials releases. The proposed train speed increase from 40 mph to 60 mph north of Hillside and south of Pawnee would require higher track maintenance standards, improving the track from Class 3 to Class 4. The higher maintenance standards would reduce the risk of derailments in the areas where they are applied.

Additional potential mitigation measures include the installation of train-defect detectors and the establishment of a community advisory panel.

Train-defect detectors would reduce the risk of derailments and hazardous materials releases. These detectors are designed to identify various types of potential problems. The detectors are located under or beside the track and automatically scan passing trains. When a detector identifies an unsafe condition on a train, it notifies by radio either the train engineer or the dispatcher, who stops the train. Common types of detectors include:

- Hot-box detectors, which sense overheated wheel bearings on locomotive and car wheels. An overheated wheel bearing can melt the wheel-bearing assembly, causing a derailment.
- Dragging equipment detectors, which detect equipment or other objects hanging from the bottom of a locomotive or car. Equipment that is dragging can damage rails, ties, and switches or become lodged between a wheel and the rail, causing a derailment.
- High, wide, shifted-load detectors, which identify loads or other items protruding from the top and side of a train. Protruding loads can strike trains on adjacent tracks, tunnel walls, bridges, bridge supports, and other wayside structures.

No defect detection devices are located on the UP rail line in Wichita and Sedgwick County.

A community advisory panel would ensure regular communication between UP and local representatives regarding safety and environmental issues. Community representatives deserve accurate and timely information on the potential for hazardous materials releases and UP's

management efforts to avoid such releases. A community advisory panel would provide the forum for the exchange of information on this subject and others that are important to the residents of Wichita and Sedgwick County. It would provide for continuing communications between UP and the community and would support efforts by the citizens of Wichita and Sedgwick County to ensure compatibility between railroad operations and a safe and healthy community.

Cost of the Mitigation Option

The estimated cost of installing one complete set of hot box detectors; dragging-equipment detectors; and high, wide, shifted-load detectors is $300,000.

The costs of a community advisory panel cannot be estimated because of the possible variations in the organization and practices of such a body.

Effectiveness in Mitigating Impacts

In its research, the study team did not find a statistical measure that could be applied to the effectiveness of the train-defect detectors, so no change in derailment rate was calculated. The effect of the train-defect detectors would be positive, as it would remove major causes of train derailments.

Secondary Impacts

Train-defect detectors would have not secondary impacts.

7.3.7 Air Quality

No additional improvements are needed for air quality because the general mitigation options adequately address this issue. The reduction in traffic delay would mitigate the potential for CO hot spots, and the County would continue to meet the NAAQS. However, the reduction in delay would have no effect on locomotive emissions in the County. Emissions from locomotives would increase as a result of the merger-related increase in train traffic, although the impact would not be significant. Additional measures could be imposed to reduce locomotive emissions.

Low-emission locomotives could be required on the UP rail line through Wichita as a means of reducing air quality impacts. UP could manage its fleet to assign low-emission locomotives to trains that operate through Wichita and Sedgwick County.

Costs of Low-Emission Locomotives

The requirement for low-emission locomotives would not entail the purchase of new locomotives but would require the assignment of low-emission locomotives within UP's fleet to the rail line through Wichita. UP's loss of flexibility in fleet management would impose costs that cannot be estimated.

Effectiveness in Mitigating Impacts

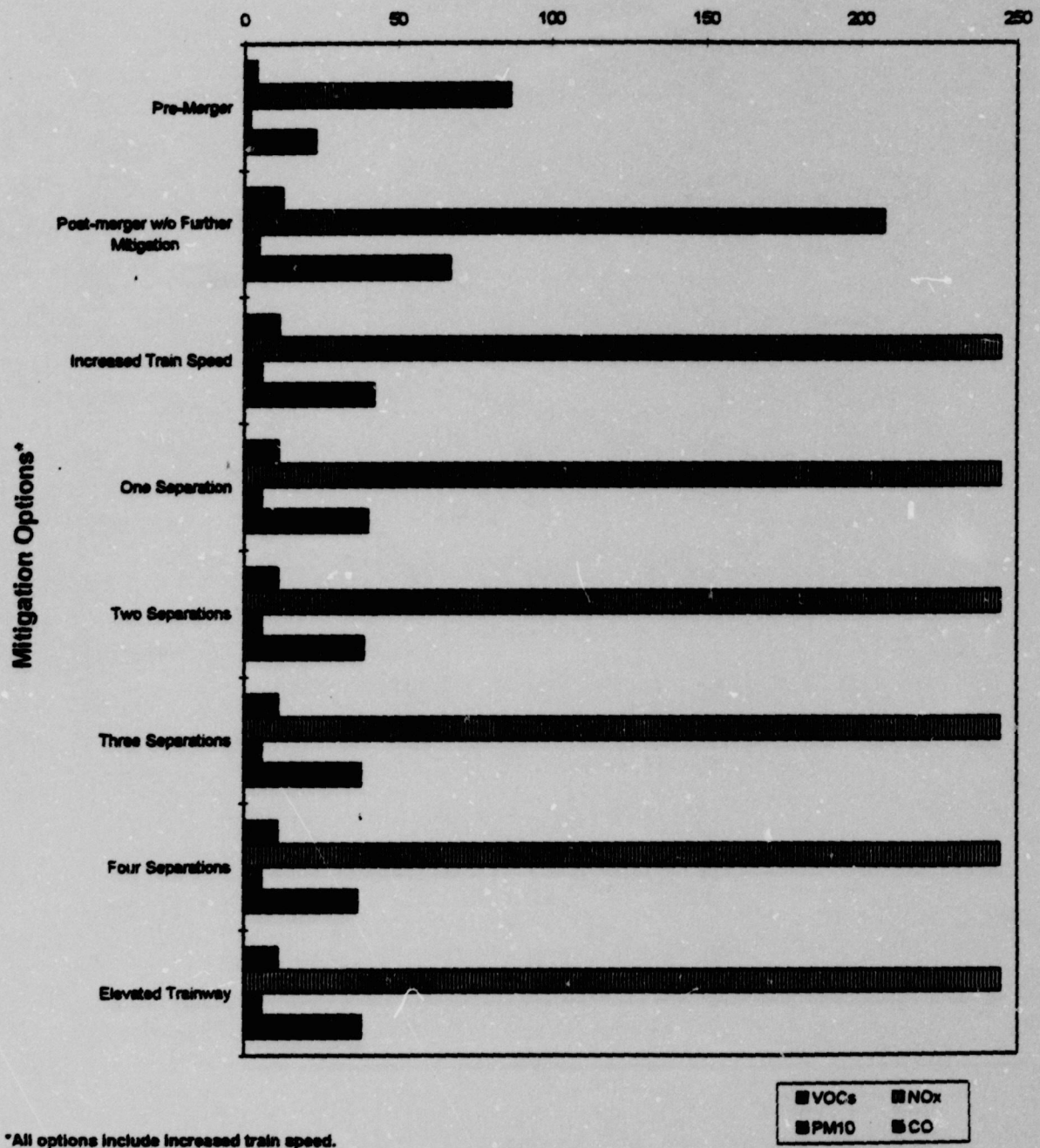
Low-emission locomotives would reduce emissions on the UP rail line, although not to the pre-merger amount. The analysis did not include detailed calculations of the effects of assigning low-emissions locomotives to the UP rail line through Wichita.

Secondary Impacts

Requiring low-emission locomotives on this rail line would require that they not be operated on other lines, in effect transferring the environmental impact from one location to another. In addition it would reduce UP's flexibility in assigning locomotives.

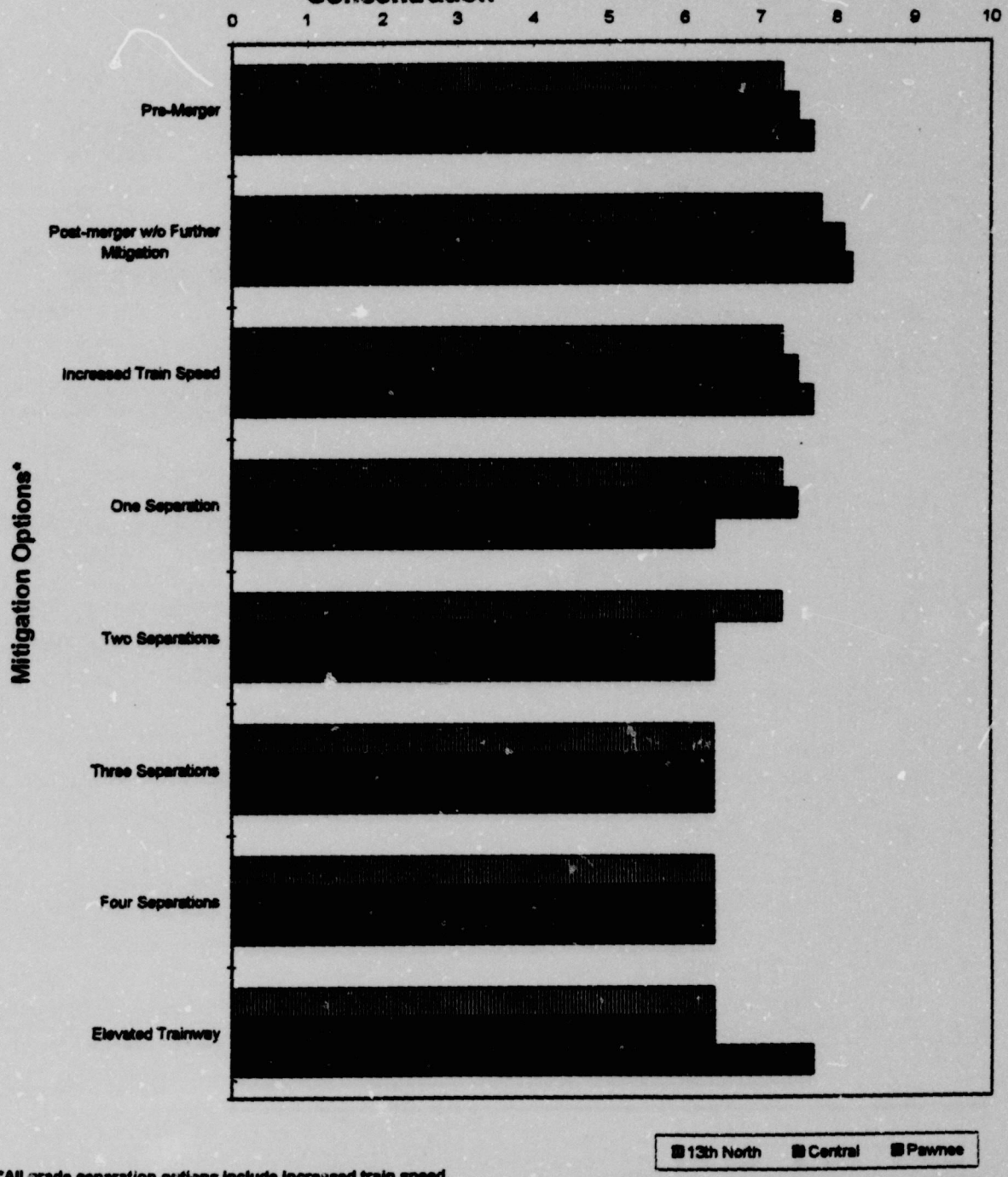
Figures 7.3.7-1 and 7.3.7-2 show the County-wide train emission and localized CO concentrations for the general options evaluated.

Figure 7.3.7-1
Air Pollutant Emissions
Total Emissions in Sedgwick County Caused by Through Trains on UP Line (tons)



*All options include increased train speed.

Figure 7.3.7-2
Localized Carbon Monoxide Concentration



*All grade separation options include increased train speed.

7.3.8 Noise and Vibration

Noise and vibration impacts in Wichita from merger-related increased train traffic are evaluated in Sections 6.2.9 and 6.2.10. As described in Section 6.2.10, no mitigation is needed for vibration, so none was considered. Possible additional noise mitigation measures include four-quadrant gates and "quiet zones," local grade-crossing warning devices (directional horns or automated horn systems), restricted nighttime train operations, source noise control, noise barriers, and building sound insulation.

The FRA is currently evaluating the establishment of quiet zones, areas where train horns need not be sounded. Quiet zones would include four-quadrant gates and median barriers as supplemental safety measures to keep motorists from driving around crossing gates as a train approaches. If permissible under future Federal regulations, this approach could eliminate train horn noise (hence the term *quiet zone*) at specific grade crossings. A quiet zone must be at least half a mile long under present draft FRA regulations.

The FRA and UP are also reviewing the use of local grade-crossing warning devices, such as a horn or loudspeaker at a grade crossing. The purpose of such devices is to replace train horns in a way that would direct the sound to the roadway where it is needed rather than to the surrounding community. Currently, train horns are sounded a quarter mile from a grade crossing, resulting in noise exposure to sensitive receptors in a fairly large area. Since the sole purpose of the horn is to warn motorists and others at the crossing, a device that delivers horn noise only to the area at or near the crossing may be preferable.

The FRA has tested a prototype automated horn system (AHS) designed to increase the warning effectiveness at grade crossings while minimizing community noise impact. The system consists of a single electronic horn placed directly at a grade crossing and directed along the approaching roadways. Because the horn is located at the grade crossing, the community noise exposure due to horn noise on the train is eliminated. The directionality of the system results in sound levels that are higher directly in front of the horn and lower to the rear and the sides, and the area of impact is reduced. This directionality allows the horns to be designed to produce a sound of 85 dBA instead of the 110 dBA that is produced by train-mounted horns.

Source noise control is the reduction of noise at the source. Freight train source noise controls apply to wheel-rail and diesel engine noise. Source noise controls could reduce the area of impact in regions where noise impacts are not due to horn noise.

Noise barriers reduce wheel/rail noise that reaches the community, but they have little effect upon train horn noise. They are less effective for reducing the impact of train horn noise, which is the main source of train-related noise impacts. Locations with impacts from wheel/rail noise stand to benefit most from the construction of noise barriers.

Building sound insulation would reduce the intrusion of outdoor noise into the building. Sound insulation treatments usually involve improving the noise insulation characteristics of

windows, as windows are often the weak acoustical link. Special acoustical windows or modifications to existing windows can provide up to 10 dBA increased noise reduction.

Costs

The cost of four-quadrant gates and a quiet zone would depend upon the extent of the zone. The approximate cost of an AHS installation at a grade crossing is $12,000 to $15,000. The range of costs depends on whether the road is two lanes or is a divided highway, which affects the complexity of the installation. This cost assumes that the crossing is state-of-the-art with appropriate circuitry for the AHS.

Restrictions on nighttime train operations would have nominal cost. Source noise controls would have high cost, as they would require modification of a large portion of UP's locomotive fleet.

Noise barrier costs would depend upon their extent. Insulating buildings generally costs on the order of $10,000 to $20,000 per dwelling unit, depending upon whether or not a dwelling unit must be air conditioned.

Effectiveness in Mitigating Impacts

Four-quadrant gates and quiet zones would be effective in reducing horn noise at the grade crossings where they are used, as would directional horns or an AHS, but their effect upon safety, which is an overriding concern, cannot be estimated with assurance until their testing is completed.

Restricted night operations would effectively reduce train-produced noise at night. Both source noise controls and noise barriers would have limited effect because they do not address horn noise, which is the primary train noise source in Wichita.

Building insulation is effective only for those buildings where the owner agrees to the improvement. This option reduces noise only inside the buildings.

Secondary Impacts

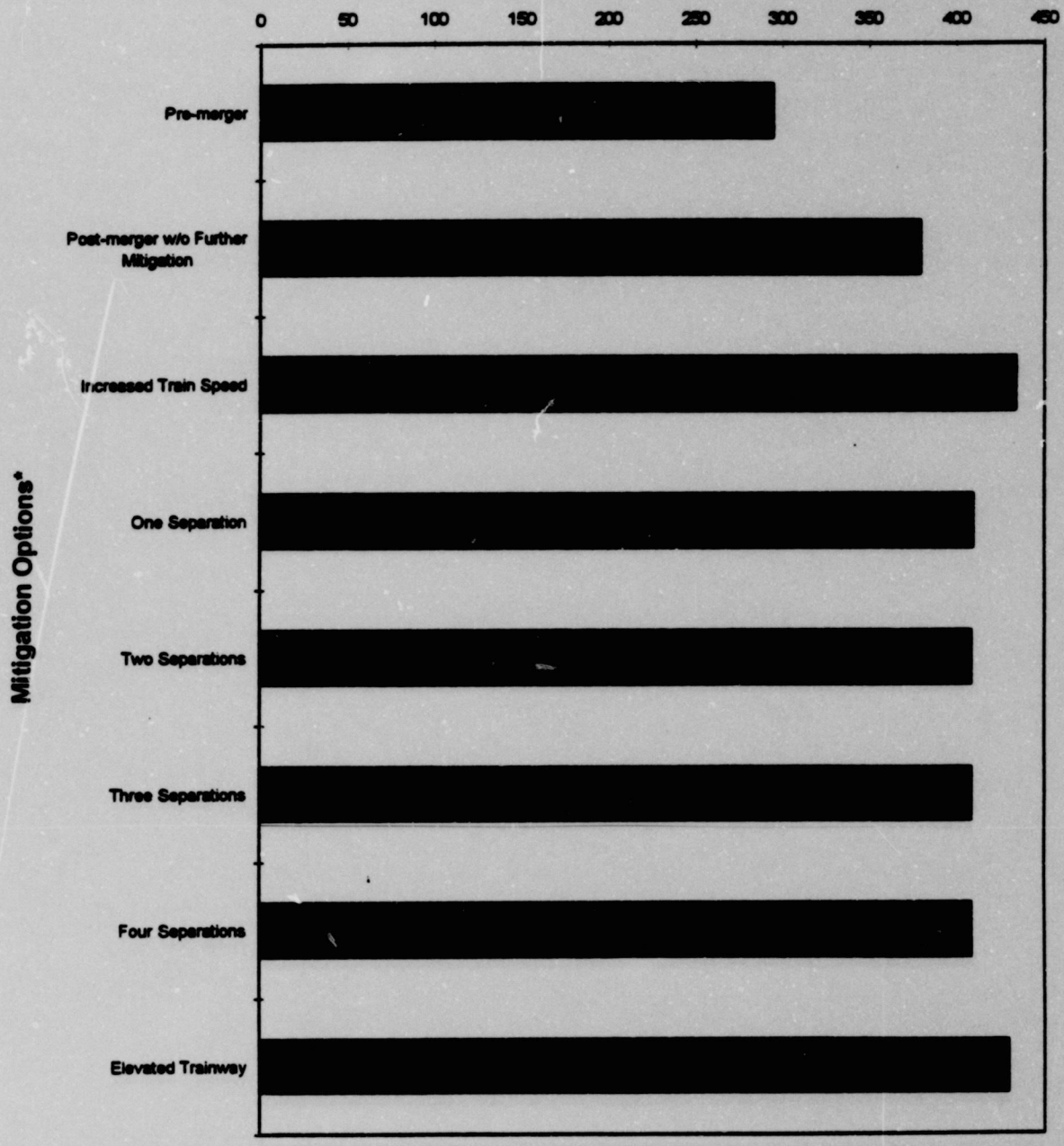
Quiet zones and local horn grade-crossing warning devices are not yet in general use and do not have regulatory approval. Restricted nighttime train operations would force train movements into daylight hours, which could increase the amount of traffic delay, public transit delay, and emergency response concerns. Restricted nighttime train operations could also create operational problems for UP.

Figure 7.3.8-1 shows the evaluation of affected sensitive receptors for the general options evaluated.

Figure 7.3.8-1

Noise Impacts

Number of Sensitive Receptors Exceeding L_{dn} of 65 dBA



*All grade separtion options include increased train speed.

Section 8
PRELIMINARY RECOMMENDED MITIGATION MEASURES

8.1 Introduction

As directed by the Surface Transportation Board (Board) in Decision No. 44 (See Appendix A), the Board's Section of Environmental Analysis (SEA) conducted the Wichita Mitigation Study to consider additional mitigation measures that could be appropriate to address further the environmental impacts of the merger-related train traffic on the unique local concerns of Wichita and Sedgwick County. As described in Sections 6 and 7, the study team evaluated the potential environmental impacts and possible additional mitigation options for the merger-related increase in train traffic on the Union Pacific (UP) rail line through Wichita and Sedgwick County. UP plans to increase train traffic by 5.6 through freight trains per day from a pre-merger average of 4.0 trains per day to 9.6 trains after the merger. Through freight trains are ones that operate between major terminals; the additional trains through Wichita would not stop in Wichita or Sedgwick County. SEA notes that local conditions are affected by other train traffic that is outside the scope of the merger and therefore the Wichita Mitigation Study. This traffic includes that of Burlington Northern Santa Fe (BNSF), short line railroads, and local and yard switching trains.

Based on currently available information, further environmental analyses completed for the Wichita Mitigation Study, and public input received to date, SEA's preliminary recommendation is that the Board require UP to implement additional mitigation measures beyond those imposed in Decision No. 44 to respond to the unique local conditions in Wichita and Sedgwick County. SEA's preliminary recommendations for additional mitigation measures are set forth in this section for public review and comment. After consideration of the public comments received on this Preliminary Mitigation Plan (PMP), SEA will issue a Final Mitigation Plan (FMP), which will also be available to the public for review and comment. SEA will then make its final recommendations to the Board. After reviewing the PMP, the FMP, SEA's recommendations, and the public comments, the Board will issue a decision imposing final additional mitigation measures for Wichita and Sedgwick County.

Throughout the environmental review process, SEA has consistently encouraged discussion and negotiation between UP and other interested parties. SEA recognizes that parties generally can achieve more far-reaching solutions to issues facing the community by negotiating mutually accepted voluntary agreements among themselves. Such agreements, which might alleviate both preexisting and merger-related concerns, would go beyond what the Board would impose. As further detailed in Section 8.2, the SEA study team examined two types of potential additional mitigation measures. Tier 1 measures are those that the Board would require UP to implement and fund entirely. Tier 2 measures are those that might be a more far-reaching solution for all concerned but that, in the circumstances of this case, the Board would not impose absent a voluntary agreement among the affected parties.

This section describes SEA's mitigation selection process, SEA's preliminary recommendations regarding mandatory and UP-funded additional mitigation (Tier 1). It also

contains a discussion of voluntary mitigation options that might be the subject of further discussion among affected parties (Tier 2).

8.2 Identifying Proposed Preliminary Mitigation Measures

In developing preliminary recommendations for environmental mitigation measures, SEA considered numerous factors, including the results of the EA, the Post EA, and SEA's further environmental impact analysis (Section 6); the study team's evaluation of mitigation options (Section 7); and the scope of the Board's authority to impose conditions (i.e., Board-imposed conditions must be reasonable and address merger-related issues).

In determining whether additional mitigation measures to supplement the mitigation imposed in Decision No. 44 are reasonable, SEA asked the following questions for each option:

- Is it consistent with the Board's directives in Decision No. 44 and Decision No. 71?
- Does it apply directly to the environmental impacts of the merger-related increased through trains on existing right-of-way in Wichita and Sedgwick County?
- Is it effective in achieving a high degree of mitigation for Wichita and Sedgwick County with little or no detriment to public health and safety?
- Is the degree of mitigation tailored to the degree of environmental impacts from the merger-related increase in train traffic?
- Does it unduly interfere with UP's right to conduct business and provide rail freight service to its customers?

Regarding the issue of whether each potential mitigation option addressed merger-related concerns, SEA followed the Board's long-standing policy of mitigating potential environmental impacts related to train traffic changes on existing rail lines that result from the transaction that the Board is licensing. Under the National Environmental Policy Act (NEPA), the Board has the responsibility to address the environmental effects of the federal action it is licensing (i.e., the merger). The Board (and previously the Interstate Commerce Commission) has consistently mitigated only those conditions that result directly from the merger. The Board does not mitigate pre-existing conditions, which are not a direct result of the merger.

In this mitigation study, SEA further studied the environmental effects of the merger-related increased traffic in Wichita and Sedgwick County (See Section 6) and potential options to mitigate its environmental effects (See Section 7). Based on this analysis and all the information available to date, SEA developed preliminary mitigation options that reasonably address the unique environmental impacts in Wichita and Sedgwick County (See Section 8.4). SEA also examined options that might have more far-reaching benefits for the community, but would not be imposed by the Board absent a voluntary agreement by the affected parties because these options address existing local conditions caused by existing train and vehicle traffic (Section 8.5). These options

go beyond what is necessary to mitigate the environmental impacts of the increased train traffic resulting from the merger.

8.3 Two Levels of Mitigation Measures

In Decision No. 71 (See Appendix A) issued on April 15, 1997, the Board clarified its intent regarding mitigation requirements for the Wichita Mitigation Study. Decision No. 71 states that there will be two levels of mitigation developed for Wichita and Sedgwick County. The first level, or Tier 1 mitigation, will be mandated or baseline mitigation, which the Board will require UP to implement and entirely fund. The second level, or Tier 2 mitigation, will be alternative mitigation that might provide more far-reaching solutions for all concerned, but that would not be implemented absent a mutually accepted voluntary agreement among the parties to share in costs or to expend greater resources.

While the Board cannot compel the parties to reach a voluntary agreement, this PMP assesses potential Tier 2 actions to encourage discussion and agreement among interested parties. SEA recognizes that Tier 2 mitigation measures would provide benefits beyond mitigation of the potential environmental impacts of the merger-related increase in train traffic and that these measures could effectively address a variety of local concerns as well as benefit UP. For example, some Tier 2 measures would reduce local traffic delay substantially below the levels experienced before the merger, providing an improvement to local conditions and benefits to residents and businesses.

SEA reviewed all potential mitigation options (see Section 7) to determine which of the options that have been raised in this case could be considered Tier 1 options (i.e., implementation of such options would be funded fully by UP). Tier 1 mitigation measures were selected using the following rationale:

- They are a reasonable exercise of the Board's jurisdiction and are consistent with the Board's directives in Decisions No. 44 and No. 71.
- They would be fully funded by UP.
- They would further mitigate the environmental impacts of the merger-related increase in train traffic.

8.4 SEA's Preliminary Recommendation for Tier 1 Mitigation

Based on the rationale discussed above in 8.3, the SEA study team developed preliminary recommendations for additional mitigation. The recommendations assume that there is no voluntary agreement for more far-reaching mitigation (i.e., Tier 2 mitigation). To develop the recommendations, the study team considered the following mitigation measures as potential Tier 1 options:

- Increased train speeds.
- Highway/rail grade separations.
- Grade crossing safety measures, including vehicular and pedestrian gates and warning devices.
- Pedestrian overpasses.
- Train operations changes such as locomotive selection or modification.
- Improvements and/or construction in the railroad right-of-way.

SEA evaluated the effects of these potential Tier 1 options using criteria that address 10 environmental impacts:

- Safety

  Traffic delay.
  Public transit delay.
  Emergency vehicle access.
  Pedestrian safety.
  Train-vehicle accidents.
  Derailment and hazardous materials release risk.

- Air Quality

  Total County-wide emissions.
  Localized carbon monoxide concentrations.

- Noise

  Noise levels resulting from trains.
  Vibration resulting from trains.

SEA's initial approach was to address grade crossing blockage, which is the cause of five of these 10 environmental impacts (i.e., traffic delay, emergency vehicle delays, public transit delay, and the effects of air pollution from delayed vehicles on total County-wide emissions and carbon monoxide concentrations). SEA examined how increasing train speed and/or constructing grade separations would affect grade crossing blockage and the delay that it causes.

Based on the analysis described in Section 7.2, SEA determined that increased train speeds would mitigate merger-related traffic delay and substantially mitigate merger-related crossing blockage. Increased train speeds would reduce motorist and transit bus delay at grade crossings to amounts less than pre-merger delay. Emergency vehicles would also wait for less time if they were stopped by a train, although the potential for being stopped by a train would still be increased due to the increase in the number of trains. By reducing the delay time, the air pollution from waiting vehicles at the crossing would also be reduced.

Grade separation options would eliminate traffic delay and crossing blockage at each specific grade separation, but they would not reduce delay or blockage at other locations. The SEA study team found that the overall crossing delay and blockage improvements for four grade separations (at a substantially higher cost) would not be as effective as increased train speeds. Based on these results, SEA concluded that increased train speed is an effective general option for mitigating environmental impacts related to crossing blockage and subsequent traffic delay. Additional measures are required to address other environmental impacts.

Because safety is of paramount concern, as described by the Board in Decision No. 44, SEA examined the impacts on safety of the planned increase in through trains and of the potential increased train speed. The SEA study team evaluated additional measures to address potential increases in train-vehicle accidents and pedestrian safety (see Section 8.4.1). The SEA study team also examined additional mitigation measures to address remaining environmental impacts and local concerns, including emergency response delay, derailment risk, and noise impacts. Section 7 describes the evaluation of the additional mitigation measures.

8.4.1 Safety

Traffic and Public Transit Delay

Increased train speeds through Wichita and Sedgwick County would reduce the duration of delays at grade crossings. Trains passing through crossings faster would achieve substantial benefits for traffic and public transit delay, reducing the delay of motorists and buses waiting at crossings to less than pre-merger amounts. SEA's preliminary recommendation is that the Board require UP to make the improvements necessary to increase train timetable speeds in Wichita to 30 mph between milepost 239.0 and milepost 247.0 and to 60 miles per hour between mileposts 222.76 and 239.0 and mileposts 247.0 and 266.4.

Further, SEA's preliminary recommendation is that the Board require UP to install a centralized traffic control system in Sedgwick County and to operate trains at timetable speeds consistent with safe operating practices dictated by conditions present at the time each train traverses the segment. SEA's preliminary recommendation is also that the Board require UP to eliminate crew changes in Wichita and Sedgwick County for through freight trains to allow those trains that do not serve local businesses to continue through the County without stopping.

Emergency Response

Reducing grade crossing blockage time would reduce adverse impacts to emergency vehicle access. The study team determined that, with increased train speed, an emergency vehicle stopped by a passing train would be delayed for a shorter time. Because there would be more trains, however, there is an increased possibility of an emergency vehicle being stopped by a train. The SEA study team considered additional measures to further reduce impacts to emergency vehicle access by providing notification to the emergency response dispatch center of the location and movement of trains on the UP tracks. SEA concludes that such a notification system would be a

reasonable, effective measure to offset the impacts to emergency response access. SEA's preliminary recommendation is that the Board require UP to implement a communication system to alert the Sedgwick County emergency response dispatch center of train locations and movements on the UP rail line in Sedgwick County. This system would provide a visual location display of trains and closed crossing gates so dispatchers could reroute emergency vehicles around potential delays.

Train-Vehicle Accidents

Given that the preliminary recommendation is to increase train speeds, SEA examined the potential for increased train speeds to increase the likelihood of train-vehicle accidents and to have a detrimental effect on the consequences of such an accident. The analysis indicates that increased train speeds would increase the risk of train-vehicle accidents and the possibility of a fatality if an accident occurs. Accordingly, the SEA study team identified additional measures to address grade crossing safety concerns.

The accident-analysis m[illegible]scribed in *Summary or the DOT Rail-Highway Crossing Resource Allocation Procedure-*[illegible]lished by the Federal Railroad Administration (FRA), indicate that increased train spe[illegible]crease the risk of accidents at a grade crossing that is equipped with gates or flashin[illegible]he U.S. DOT-AAR Crossing Inventory Information maintained by FRA lists 40 grade crossings within Wichita and Sedgwick County. Twenty-nine of these grade crossings are equipped with gates or flashing lights and 11 crossings have crossbucks. The study team conducted a safety analysis of these grade crossings and potential improvements to grade crossing warning devices.

As discusse[illegible]n Section 7.3.5, upgrading grade crossing warning devices from flashing lights to gates would result in a reduction of merger-related train-vehicle accident risk. Installing gates at all crossings in the county that now have flashing lights would physically block traffic lanes when trains pass by to reduce the accident risk substantially below the pre-merger level. This reduction would be sufficient to offset any increase in accident risk resulting from increased train traffic and train speed. Accordingly, SEA's preliminary recommendation is that the Board require UP to install gates at the 16 grade crossings in Wichita and Sedgwick County that now have only flashing lights:

- Greenwich
- 17th Street North
- 11th Street North
- 10th Street North
- 9th Street North
- Murdock
- Lincoln
- Bayley
- Zimmerly
- Osie
- Skinner
- Mt. Vernon
- MacArthur
- 55th Street South
- 103rd Street South
- 119th Street South

SEA's further preliminary recommendation is that the Board require UP to consult with the City of Wichita and, in locations agreed upon by the City, to install fencing or guardrails along the tracks between 21st Street North and Pawnee as identified in Appendix L. The recommended barriers would maintain separation between UP trains and vehicle traffic on Mead and further reduce the potential for train-vehicle collisions.

Pedestrian Safety

The City identified safety of elementary school children as the primary pedestrian safety issue. SEA recognizes the importance of pedestrian safety, especially the safety of elementary school children, so the study team analyzed the location and potential walking routes for elementary school students who cross the UP rail line on their way to and from school, and considered mitigation options to ensure safety for these children as they go to and from school.

Based on the analysis of grade crossings used by elementary school children, SEA's preliminary recommendation is that the Board require UP to install pedestrian crossing gates with skirts (i.e., flexible barriers below the gates) and fencing at the following four grade crossings on the UP rail line in Wichita: 10th Street North, 13th Street North, Skinner, and Mt. Vernon. These gates, skirts, and fencing would impede elementary school students' access to the UP rail line and provide safety warning at the four grade crossings with the most elementary student traffic. SEA invites comments from the City of Wichita, Unified School District 259, and UP on the specific locations for these pedestrian gates, skirts, and fencing. SEA's further preliminary recommendation is that the Board require UP to sponsor and participate twice during the school year in a rail safety education program with schools whose boundaries cross or are adjacent to the UP tracks in Wichita and Sedgwick County.

Although the safety of elementary school children is the primary pedestrian safety issue raised by the City, SEA recognizes the importance of pedestrian safety for the general public. Efforts to ensure public awareness of the change in train operations on the UP rail line would have safety benefits. SEA's preliminary recommendation is for the Board to require UP to provide safety-related information to all employers and residents in properties adjacent to the UP rail line in Wichita and Sedgwick County. The information should be designed for employers to pass along to their employees. This information should notify the employers and residents of changes in the numbers of trains resulting from the merger and of the changes in train speed to ensure that pedestrians can continue to cross the UP rail line safely.

Derailment and Hazardous Materials Release Risk

The SEA study team evaluated the potential merger-related changes in risk of train accidents, derailments, and hazardous materials releases.

Train Derailments and Collisions: For train collisions and derailments, the study team considered the potential increase in accidents resulting from more trains on the UP rail line and evaluated mitigation options to offset any increased accident risk. As noted in Section 6.2.6, FRA

data on train collisions and derailments show that the majority of railroad accidents occur in yards and intermodal facilities or on sidings or industrial tracks. The merger-related increase in through trains would not increase the risk of rail accidents in Wichita or Cline yards because the additional through trains will not stop at either rail yard. Approximately 35 percent of rail accidents occur on rail lines or connections (outside of rail yards and intermodal facilities), which includes the UP rail line. As described in Sections 6 and 7, the potential for rail accidents would increase because of the increased merger-related train traffic.

SEA's preliminary recommended improvements to allow for increased train speeds (e.g., improved track, regraded rail curves, centralized traffic control) and the rail and tie replacement already performed by UP will reduce the risk of derailments or collisions on the UP rail lines and connections through Wichita and Sedgwick County. The centralized traffic control system will reduce the likelihood of derailments in Sedgwick County by improving the notification to trains of track blockages, switch misalignment, broken rails, switch tampering, and switching errors and by improving the routing of trains, which reduces the likelihood of train collisions.

To further reduce the risk of derailments, UP should install hot box detectors; dragging equipment detectors; and high, wide, shifted-load detectors on the UP rail line both north and south of Wichita. These detectors would subject every train entering Wichita on the UP rail line to a thorough automated examination that would identify any potential problems and allow them to be corrected before a derailment occurs.

Hazardous Materials: Of the three types of freight currently shipped through Wichita and Sedgwick County, only manifest shipments (i.e., trains made up of a variety of types of cars and contents) contain hazardous materials. UP's planned train traffic increase includes manifest trains, one coal train, and one grain train. The risk of hazardous materials release will increase as a result of the merger-related additional train traffic.

FRA Rail Equipment Accident/Incident Reports indicate that there has been no hazardous materials release caused by a derailment in Sedgwick County over the past five years. Information from the U.S. Department of Transportation Hazardous Materials Information System shows that most of the hazardous materials releases in Wichita not caused by a derailment have been in yards or during switching. Increased merger-related train traffic would not increase the number of such releases because the trains would not switch or enter the yards in Wichita.

To address the risk of hazardous materials spills, the Board in Decision No. 44 imposed a condition requiring UP to establish more effective local emergency response notification and communication with UP in the event of a spill. This condition will ensure that local emergency response officials have immediate access to UP to assess the nature and type of materials and appropriate response techniques. As noted above, several of SEA's preliminary recommendations in this PMP would further reduce the risk of a train accident or derailment that could result in a spill or release.

In addition, SEA's preliminary recommendation is that UP should establish a community advisory panel to ensure regular and continuing communication between UP and local representatives regarding railroad-related safety and environmental issues, including the movement of hazardous materials though Wichita and Sedgwick County. The panel should include community representatives who will work cooperatively with UP management to ensure safe railroad operations and effective community procedures for responding to railroad incidents. The panel should serve as a forum for the exchange of information on railroad operations issues and community concerns about them.

8.4.2 Air Quality

Air pollution resulting from idling vehicles that are delayed longer or more frequently by the increased train traffic is an important local concern. SEA's preliminary recommended measure of increased train speeds through Wichita and Sedgwick County would eliminate any merger-related increase in traffic delay at grade crossings (See Section 7.2.2). Eliminating the increase in delay also would eliminate any increase in emissions from idling vehicles. There will be a slight increase in total emissions in the county from the increased number of locomotives, but this amount will be less than one percent of total county-wide emissions for each pollutant. SEA concludes that this increase is not significant and is likely to be addressed by new locomotive emissions requirements proposed by the U.S. Environmental Protection Agency (EPA).

8.4.3 Noise and Vibration

Noise is recognized as a distinct and separate area of environmental concern, particularly due to the interrelationship of train horns and safety. The overwhelming majority of noise generated by rail operations is that provided by warning horns for safety purposes. This source of noise poses an unusual and complex issue. Unlike other adverse environmental impacts, train horn noise is a deliberately created annoyance. It is loud and attention-getting to produce a desirable safety warning to protect the public. Reducing loudness below certain levels could increase train-vehicle accidents. Reducing the duration of the horn sound can be expected to have a similar negative impact on safety.

Recognizing this dilemma, Congress, by statute in the Swift Act (49 U.S.C. 20153), directed the Secretary of Transportation to issue regulations that identify supplementary safety measures. If approved, these safety measures would permit the establishment of "quiet zones," where train horns need not be sounded. The FRA, the Federal agency responsible for train horn requirements, is currently developing these implementing regulations, which are not likely to be finalized before 1999.

When these new regulations are issued, they will establish Federal standards to identify alternative safety measures that could be used in lieu of train horns. Officials within Wichita and Sedgwick County will have the opportunity to apply to the FRA for alternatives to sounding train horns.

As described in Section 6.2.9, the merger-related increase in train traffic would result in an increase in the number of sensitive receptors (e.g., residences, schools, hospitals, nursing homes) that exceed the noise threshold established by the Board. SEA examined this increase, considered the overriding importance of the safety purpose of the train horn, and determined that the increase in the sensitive receptors will not be significant.

Until the new FRA regulations for supplementary safety measures are in place, there are no safe, reliable, legally established alternatives to sounding horns, so SEA cannot recommend alternatives to horn noise. Because of the critical safety risks and related liability issues associated with not sounding train horns, SEA is not in a position to recommend alternative mitigation to address train horn noise.

8.4.4 Monitoring and Compliance

During SEA's public process for developing this PMP, questions arose regarding SEA's ability to enforce the mitigation conditions imposed by the Board. The Board has established a five-year oversight period for reviewing the merger. The Board's continued monitoring of UP's compliance with the environmental mitigation measures for Wichita and Sedgwick County is important to ensure that UP properly implements the required mitigation of the merger-related environmental impacts. The Board has continuing jurisdiction over the actions it licenses (including mergers) and can use this jurisdiction to ensure compliance with its mitigation conditions.

UP is required to submit quarterly progress to the Board on its implementation of the conditions imposed by the Board in Decision No. 44. SEA's preliminary recommendation is that the Board require that during the Board's five-year oversight period UP, provide to the City of Wichita and to Sedgwick County copies of the sections of the quarterly reports that describe the status of the implementation of environmental mitigation measures related to the UP rail line.

8.4.5 Summary of Tier 1 Mitigation

Based on currently available information, SEA's further environmental analyses completed for the Wichita Mitigation Study, and the review of public comments received to date, SEA's preliminary recommendation is that the Board require UP to implement the following mitigation measures in addition to the system-wide mitigation measures already imposed by Decision No. 44. Section 10 of this PMP presents the specific, proposed language for SEA's recommended mitigation measures for Wichita and Sedgwick County. The following preliminary recommended additional mitigation measures for UP to implement address the effect of the merger-related increase in train traffic on the unique characteristics of Wichita and Sedgwick County:

1. Improve the track and install a centralized traffic control system on the UP rail line to allow for a train timetable speed of 30 miles per hour between milepost 239.0 near Hillside and milepost 247.0 near Pawnee. Those improvements should also allow a train timetable speed of 60 miles per hour between milepost 222.76 near the Butler/Harvey County line and milepost 239.0 and between milepost 247.0 and 266.4 in Riverdale. UP should operate all

through trains at the timetable speed consistent with safe operating practices dictated by conditions at the time each train traverses the rail line segment.

2. Eliminate crew changes in Wichita and Sedgwick County for merger-related through trains.

3. Consult with the City of Wichita and Sedgwick County concerning appropriate technology to report the locations of trains to the Sedgwick County Department of Communications emergency dispatch center, and inform SEA of the results of the consultation. Install electronic circuitry (compatible with City and County technology) to alert emergency dispatchers of the location and movement of trains on the UP rail line in Sedgwick County.

4. Install pedestrian crossing gates with skirts and fences at 10th Street North, 13th Street North, Skinner, and Mt. Vernon.

5. Sponsor and participate twice during the school year in a rail safety education program with schools whose boundaries cross or are adjacent to UP tracks in Wichita and Sedgwick County.

6. Before increasing train speed, provide railroad safety information to employers, employees, and residents at properties abutting the UP right-of-way in Wichita and Sedgwick County.

7. Install gates at crossings in Wichita and Sedgwick County where flashing lights are now the only warning device:

- Greenwich
- 17th Street North
- 11th Street North
- 10th Street North
- 9th Street North
- Murdock
- Lincoln
- Bayley
- Zimmerly
- Osie
- Skinner
- Mt. Vernon
- MacArthur
- 55th Street South
- 103rd Street South
- 119th Street South

8. Consult with the City of Wichita and, in locations agreed upon by the City, install fences or guardrails along the UP tracks between 21st Street North and Pawnee where it is necessary to prevent vehicle access to the tracks.

9. Install hot box detectors; dragging equipment detectors; and high, wide, shifted-load detectors at two locations, one in the vicinity of milepost 248 (about 6 miles south of Wichita) and the other in the vicinity of milepost 239 (about 3 miles north of Wichita).

10. Create a community advisory panel to establish regular and continuing communications between UP and local representatives regarding railroad-related safety and environmental issues.

11. During the Board's five-year oversight period when UP is required to submit quarterly progress reports to the Board on its implementation of the conditions imposed by the Board in Decision No. 44, provide copies to the City of Wichita and to Sedgwick County of the sections of the quarterly reports that describe the status of the implementation of the environmental mitigation measures related to the UP rail line.

Table 8.4.5-1 summarizes the preliminary recommendation for Tier 1 mitigation. Table 8.4.5-2 shows the evaluation results for the proposed Tier 1 mitigation package for traffic delay, emergency response, train-vehicle accident risk, air quality, and noise.

Table 8.4.5-1 Proposed Tier 1 Mitigation Package	
Measure	**Reason for Recommendation**
Improved track and train movement control, increased train speeds	Reduces traffic delay, public transit delay, and motor vehicle emissions to near or below pre-merger amounts; reduces emergency-response delay, all at reasonable cost.
Elimination of crew changes in Wichita and Sedgwick County for merger-related through trains	Eliminates need to stop in Wichita and Sedgwick County for trains that are not serving local businesses.
Communication system	Increases ability of emergency vehicle drivers to avoid blocked crossings by providing better information on train location.
Crossing gates where there are now flashing lights	Reduces risk of train-vehicle accidents on UP rail line to below pre-merger amount.
Fences or guardrails at tracks along Mead	Reduces risk of train-vehicle accidents where tracks and street are within same right-of-way.
Pedestrian crossing gates	Reduces risk of pedestrian accidents by reducing access to tracks when trains are passing.
Safety training in schools	Increases the awareness of students of the safety issues created by trains.
Safety information for employers, employees, and residents adjacent to tracks	Increases awareness of train safety in vicinity of tracks.
Train defect detectors	Improves ability to identify potential problems and reduces the risk of derailments.
Community advisory panel	Creates means of communication between UP and the community on safety and environmental issues.
Quarterly reports on the status of mitigation measures	Provides basis for ensuring continuing efforts to mitigate environmental impacts resulting from merger-related trains.

Table 8.4.5-2 Evaluation of Proposed Tier 1 Mitigation Package		
Evaluation Criteria	**Pre-Merger**	**Post-Merger with Package**
Total Traffic Delay (vehicle-hours per day)	97.95	91.92
Public Transit Delay (person-hours per day)	2.04	1.90
Emergency Vehicle Access (hours per day) Average Crossing Blockage Time (minutes per through train)	6.9	10.3
Train-Vehicle Accidents (accidents per year)	1.65	1.61
Derailment Risk (derailments per year) Hazardous Materials releases from Derailments (releases per year)	0.09 0.003	0.26 0.012
Total County-Wide Emissions (tons per year) VOCs NO_x PM_{10} CO	 5.8 100.1 2.4 28.8	 11.5 245.0 5.8 42.3
Localized CO Concentrations (parts per million) 13th Street North Central Pawnee	 7.3 7.5 7.7	 7.3 7.5 7.7
Noise Impacts (number of receptors subject to L_{dn} of 65 dBA or greater)	295	434

8.5 Tier 2 Mitigation

Each of the Tier 2 mitigation measures described below would require voluntary participation, shared funding, and a mutual binding agreement by UP and the interested parties, such as the City of Wichita and Sedgwick County. The Tier 2 measures that SEA has identified are expected to offer more far-reaching, long-term benefits by reducing conflicts and environmental impacts resulting from existing land uses and pre-merger train traffic (UP, BNSF, short lines, and yard trains). Because they could directly address effects that are not related to the merger (preexisting conditions), SEA believes these measures could have a benefit for the long-term economic development of Wichita and Sedgwick County and the efficiency of railroad operations in the county. SEA encourages concerned parties, UP, and other railroads in Sedgwick County to continue constructive discussions and explore the possibilities described here.

8.5.1 Grade Separations

As described above in Section 8.4, the SEA study team determined that grade separations would not be as effective as increased train speed for addressing environmental impacts related to

crossing blockage and traffic delay. When combined with increased train speed, however, a grade separation would provide further benefits by eliminating crossing blockage and delay at a specific crossing. The four grade separations the SEA study team evaluated are the four highest-traffic grade crossings in Wichita and Sedgwick County.

One Grade Separation—Pawnee

As described in Section 7.2.3, a grade separation at Pawnee would have additional benefits for traffic delay, emergency response, noise, and air quality, when combined with increased train speeds. The grade separation at Pawnee would be the least complex and lowest-cost separation to build because of the larger distance between the UP and BNSF tracks than in north Wichita. Because the City of Wichita is preparing plans to widen and improve Pawnee to five lanes, a grade separation could be included in those plans. This option could be implemented through participation of the City and UP.

Two Grade Separations—Pawnee and Central

An additional grade separation would provide additional benefits by eliminating any crossing blockage or traffic delay at Central, the grade crossing with the second highest vehicle traffic levels. This option would provide additional benefits for traffic delay, emergency response, air quality, and noise. The proximity of the Via Christi medical facility is an important consideration for emergency response benefits of this option. Participation in this option would likely include BNSF, the City, and UP. This option, however, would have more substantial property impacts for businesses in the vicinity, who expressed some concerns about this option. The complete analysis of this option is described in Section 7.2.4

Three Grade Separations—Pawnee, Central, and 13th

Adding a third grade separation to the package would provide further benefits for traffic delay, emergency response, air quality, and noise. A 13th Street North overpass would be more complex than a separation at Central because there are separate BNSF and UP tracks. An overpass at 13th Street North would have to be longer to cross both UP and BNSF rail lines. Participation in this option would likely include BNSF, the City, and UP. See Section 7.2.5 for a full description of the evaluation of this option.

Four Grade Separations—Pawnee, Central, 13th, and 21st

As described in Section 7.2.6, adding a fourth grade separation at 21st Street North to the package would further increase engineering complexity. An overpass at 21st Street North would be a half mile long to pass over the UP and BNSF tracks in the vicinity. The separation would provide additional benefits for traffic delay, emergency response, noise, and air quality. The separation at 21st Street North would provide a particular benefit for traffic delay caused by pre-existing yard trains and switching activities in the Wichita Yard. Participation in this option would likely include BNSF, the City, and UP.

8.5.2 Elevated Trainway

Combining UP and BNSF tracks in north Wichita and elevating them to construct underpasses at major streets would have substantial benefits in all environmental impact areas. In 1995 and 1996, the City and the railroads operating through Wichita and Sedgwick County discussed options for rail consolidation and line removal as part of a four-phase plan. The fourth phase of this plan included consolidating UP and BNSF rail operations in north Wichita on an elevated rail line between 21st North and Central. This approach would achieve substantial progress toward resolving railroad, transportation, and land use conflicts. This option has more visual impacts and potential for physically and visually separating neighborhoods. Constructing this option could create significant disruption for businesses and railroad operations in north Wichita. Participation in this option would likely include BNSF, the City, and UP. Because of the magnitude of the effort required, funding from state and Federal programs is likely to be involved. The evaluation of the elevated trainway is described in Section 7.2.7.

8.5.3 Constructed Bypass

As mentioned in Section 7.2.1, the state and UP have jointly funded a study of bypass options, coordinated by the City of Wichita and Sedgwick County. The study is developing route locations, preliminary engineering plans, and cost estimates for one bypass option on the west side of Wichita and one on the east. The results of that study are expected to be available at the beginning of September 1997. Preliminary information indicates that these options have a high cost (at least $213 million) and potential opposition from communities on the proposed routes. Because of the strong interest in reducing train traffic through Wichita, continued discussion of these options is likely to occur. Participation in this option would likely include BNSF, the City, and UP. Because of the magnitude of the effort required, funding from state and Federal programs is likely to be involved. If a detailed plan is developed, the Board would review an application for the new construction, including an environmental review. The evaluation of bypass options is discussed in Section 7.2.1.

8.5.4 Street Closures

Closing streets with low traffic volumes has potential safety benefits because street closure reduces the potential for pedestrians or vehicles to enter the railroad right-of-way. As part of its *Rail-Highway Crossing Safety Action Plan* (June 1994), the U.S. Department of Transportation supports street closures to improve safety by reducing the number of grade crossings. Closing streets is inexpensive. The study team reviewed each low-traffic-volume grade crossing and determined that all of them could be closed without limiting access to adjacent properties. Street closures may have a negative impact on neighborhood cohesiveness. Closing streets is within the jurisdiction of the City of Wichita. Street closures are discussed in Section 7.3.5.

8.5.5 Quiet Zones and Directional Horns

As noted above in Section 8.4, the FRA is developing regulations to allow communities to adopt certain safety measures as an alternative to train horns. Although these regulations will not be complete until 1999 at the earliest, the City or County may want to begin discussions with the railroad about the feasibility and noise reduction potential for quiet zones or other alternative measures. Quiet zones in Wichita would only be effective with participation of the City and all of the railroads in Wichita, because a consistent approach is necessary to avoid confusing motorists and to make the quiet zones most effective. Directional horns are a promising new approach to warning motorists of oncoming trains at grade crossings by locating fixed horns at grade crossings where they can be targeted at motorists, reducing neighborhood impacts along the rail line. UP, in coordination with the City of Wichita and/or Sedgwick County, could work with the FRA to establish a pilot program to test the feasibility and effectiveness of directional horns at one or more grade crossings in Wichita or Sedgwick County.

8.5.6 Evaluation of Tier 2 Measures

To provide interested parties with additional information about the Tier 2 options, the graphs in Section 7 compare the major Tier 2 options with the preliminary recommended Tier 1 mitigation package. The comparisons show estimated traffic delay, emergency response, and train-vehicle accident risk.

8.6 Summary of Other Mitigation Measures Considered and Not Recommended

The SEA study team conducted an extensive evaluation of the mitigation measures in Table 8.6-1, as described in Section 7, but SEA does not deem these mitigation measures as appropriate for Tier 1. Other parties may choose to pursue implementation of these measures outside of the context of this study.

Table 8.6-1
Mitigation Measures Evaluated and Not Recommended

Measure	Reasons for Rejection
Bypass on Existing Tracks	• Requires agreement of BNSF. • Moves merger-related environmental impacts to another location. • Outside the jurisdiction of Board for this application. • Existing train traffic would remain in central Wichita.
Pedestrian Safety	
• Pedestrian Overpass	• Difficult to ensure usage. • Other options proposed as Tier 1—pedestrian gates.
• Crossing Guards	• Ongoing costs • Other options proposed as Tier 1—pedestrian gates.
Train-Vehicle Accidents	
• Conversion of existing two-way streets to one-way	• Needs to be considered as part of a broader transportation plan. • Limited opportunities to create one-way pairs.
• Gate violation enforcement cameras	• Would require ongoing personnel costs and enforcement costs.
Air Quality Measures	
• Concentrating operation of new EPA-certified low-emission locomotives in Wichita and Sedgwick County	• EPA regulations not yet in place. • Would be applicable to all locomotives operating through Wichita and Sedgwick County and would introduce unknown costs. • Inadequate information exists to recommend at this point. • Impacts do not warrant.
• Early introduction of low-emission locomotives	
• Diesel engine modifications	
• Improved diesel fuels	
• Diesel exhaust after treatment	
• Use of alternative fuels	
• Offsetting the increase in locomotive emissions	• County air quality attainment status not affected by merger. • County inventory of sources as potential offsets is not available.
Noise Measures	
• Restricted nighttime train operations	• Would adversely affect transport of goods over rail, posing a restriction on interstate commerce.
• Source noise controls	• Would require retrofit of entire fleet of locomotives that would pass through Wichita and Sedgwick County. • Retrofit may have other secondary impacts on train crews.
• Noise barriers	• Generally ineffective for horn noise due to height of horns on the locomotives and the height of receptors.
• Sound insulation	• Impacts do not warrant.

Section 9
FUNDING ANALYSIS

9.1 Introduction–Purpose and Scope

As outlined in Section 10, SEA recommends Tier 1 mitigation that will be mandated and funded by UP. SEA also has defined Tier 2 mitigation, which is more far-reaching and would involve other parties. In its guidance for the study, the Board directed SEA to study funding options. Responding to community requests, SEA has included in its review a range of funding sources. This section presents the result of the funding review.

Many of the Tier 2 mitigation measures go beyond the Board's authority because they would involve agreement by private property owners, governmental entities, or both. In addition, some measures result in benefits to third parties beyond that which is necessary to mitigate the merger-related environmental impacts. It would be unreasonable to require UP to fund such measures. SEA hopes that the City and County will give full consideration to this Preliminary Mitigation Plan and further cost-sharing approaches.

In conjunction with the identification of Tier 2 options, or joint funding mitigation measures, the SEA study team analyzed funding strategies potentially available to local government and the Wichita business community. The funding work program had three primary objectives:

- Define the current framework, resources, and commitments of surface transportation funding programs.
- Identify potential funding strategies with revenue yield sufficient to cover that share of cost of any suggested joint-funding mitigation measures not borne by UP. These should include specific local funding sources.
- Provide technical information to assist and facilitate funding discussions among key stakeholders, including local and state government, downtown business interests, UP, and any other relevant local public or private interests.

The work program consisted of four sequential tasks, as follows:

1. Define approach and obtain data.
2. Assess existing funding potential.
3. Identify and describe potential new revenue sources and mechanisms.
4. Define and assess potential funding strategies.

The results of the funding analysis are discussed in the following sections, which parallel tasks 2, 3, and 4 of the work program.

9.2 Existing Transportation Funding—Structure, Resources, and Outlook

9.2.1 Overview

Transportation improvements are planned, funded, and implemented at four levels of government (Federal, State, regional, and local) and in the private sector. Each level of government employs some version of a capital expenditure programming system to match project needs with available financial resources over the short term (annual capital program), near term (State or regional implementation program), and long term (State or regional transportation plan). Federal funds employed by State and local governments are controlled by an extensive body of Federal law and regulation, and the same often applies to State-generated funds utilized by local governments.

Principal sources of revenue for surface transportation projects are:

- Federal fuel taxes.
- State fuel taxes and other auto user charges.
- Regional/local sales taxes and/or fuel taxes.

Other sources and mechanisms commonly employed include:

- State sales taxes.
- Local property taxes (general funds).
- Federal general revenue (largely for mass transit purposes).
- Development impact fees.
- Special financing districts (e.g., special assessment districts).

Both State and local governments employ general obligation, special obligation, or revenue bonds secured with one or more of the revenue streams listed above. Traditionally, Federal funds have not been available for debt repayment, but indications are that this may change in the near future.

In general, transportation funding resources at all levels of government fall well below what are deemed minimum needs by State and local transportation officials. A number of the revenue sources do not adjust to account for inflationary cost increases, and the public has resisted tax increases, even to maintain purchasing parity. Thus, revenue yield in real, inflation-adjusted dollars has declined over the past 25 years, and will continue to decline indefinitely under current policy.

As a result, transportation funding is keenly competitive—with forecasts of needs and resources now reaching out 20 years and more. Inclusion of new, unacknowledged projects can only

be accomplished by excluding another, already-recognized project. Railroad crossing improvements, in particular, have not historically been given a high priority in the context of all transportation needs. Existing Federal safety funds are used for the installation of warning devices and minor geometric improvements, not for grade separations or wholesale relocations.

In response to the chronic funding shortfall, innovative funding strategies involving new local government taxes or public-private initiatives have been routinely examined by planners since the mid-1970s. Generally, these approaches will succeed only where there exists either (1) a widespread public perception of a serious, aggravating, and escalating problem or (2) one or more well-capitalized private entities who see a tangible benefit from participation in the funding of a public improvement.

Characteristics of those existing surface transportation funding programs/revenue sources applicable to highway, street, and bridge projects are summarized in Table 9.1-1, below. In particular, the listed programs/sources include those that would potentially apply to railroad/highway traffic mitigation projects such as grade separations street relocations. Brief descriptions of the funding programs or sources are provided after the table.

TABLE 9.1-1

SUMMARY OF EXISTING TRANSPORTATION FUNDING PROGRAMS

Program/Revenue Sources	Applications	Relative Funding Level	Relative Availability
FEDERAL (Fuel Taxes; Motor Carrier Fees; General Revenue)			
Surface Transportation Program (STP)			
· Safety Projects			
Rail Crossing Protective Devices	Rail Crossing Protective Devices	Low	None
Rail Crossing Hazard Elimination	Rail Crossing Hazard Elimination	Low	Very Low
Intersection Hazard Elimination	Intersection Hazard Elimination	Low	None
· Enhancement Activities (TEA)	Environmental/Cultural	Low	Very Low
· Urban Suballocation (>200K Pop.)	Most Projects	Moderate	Low
· Other Urban Suballocation	Most Projects	Not Available	None
· State Discretion	Most Projects	High	Moderate
Congestion Management and Air Quality Improvement (CMAQ)	Projects contributing to air quality improvement.	Low	Very Low
Local Freight Rail Assistance	Minor demo projects.	Minimal	None
National Highway System (NHS)	Improvements on NHS facilities; Can transfer to STP.	High	Low
STATE OF KANSAS (Fuel Taxes; Vehicle Fees; Sales Taxes; Other User Fees)			
Comprehensive Highway Program (CHP)			
· Substantial Maintenance	Major Reconstruction	Moderate	None
· **Major Modifications**			
Economic Development	Projects w/Economic Development	Low	Low
Geometric Improvement	Benefits		None
RR/Highway Crossing Hazard Elimination	Geometric Improvement	Not Available	Low
Railroad Grade Separations	RR/Highway Crossing Hazard	Low	Low
Intersection Hazard Elimination	Elimination		None
Guard Fence Upgrades	Railroad Grade Separation/NHS Only	Low	
· Priority Bridges	Intersection Hazard Elimination	Not Available	None
· System Enhancements	Guard Fence Upgrades	Not Available	None
	Bridges	Not Available	None
	Capacity/Efficiency Improvements	None	
CITY OF WICHITA/SEDGWICK COUNTY			
Regional Transportation Improvement Program/Federal Aid and State Projects (Federal and State Revenues)	State Highway System improvements.	See Fed & State Descript.	Low

9.2.2 Federal Programs

Current Structure and Funding Level

With the exception of small amounts of funding for mass transit, Federal surface transportation investment is funded through the Federal motor fuel tax. The current Federal surface transportation funding structure—the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA)—includes two categorical programs that have potential applicability to any of the more capital-intensive Tier 2 mitigation projects in Wichita. These are the Surface Transportation Program (STP) and the Congestion Management and Air Quality Improvement Program (CMAQ).

The STP is the broadest element of the Federal funding structure—funds can be applied to any valid transportation project (any recognized mode) on any state or local system, excluding only minor arterial roads and collector streets. Funds are apportioned to States and to urban and rural areas within States. Ten percent of each State's apportionment is earmarked for safety projects, including railroad grade-crossing hazard elimination; another 10 percent is earmarked for environmental and cultural enhancements. The remainder is suballocated to specific large and small urban areas and retained by the state DOT for use throughout the state. With rare exception, the Kansas DOT earmarks its statewide STP funds for projects on the rural state highway system outside of urban limits.

CMAQ program funds can be applied to projects on the state or local transportation systems within EPA-designated air quality non-attainment areas. Wichita-Sedgwick County is not at present one of these areas. Projects must have demonstrated emissions reduction potential. In practice, most projects that reduce congestion can utilize CMAQ funding.

Kansas' total STP apportionment has averaged $40 to $45 million per year under the ISTEA, with approximately $4.5 million of that directly allocated to the Sedgwick County region. Kansas receives the statutory minimum level of CMAQ funding, which was about $4.9 million in fiscal year 1996-97. Of this, Wichita's allocation was approximately $2 million. Statewide annual railroad safety funding has averaged about $1 million.

Funding through the Federal Railroad Administration (FRA) is limited to small demonstration grants, typically $250,000 or less. A small amount of funding for economic development and redevelopment purposes is available through the Community Development Block Grant Program (CDBG). In Kansas, these funds are controlled at the state level and are not typically allocated to transportation projects.

Outlook

Federal funding authority under the ISTEA is due to expire at the end of the current Federal fiscal year (September 30, 1997). At this writing, reauthorization activity in Congress has all but stopped due to intense infighting among competing interests. The struggles surround a number of related issues, including but not limited to (1) the authorized funding level for the entire program,

in the context of the 2002 balanced budget goal; (2) the return of the existing 4.3 cents/gallon fuel tax to the highway trust fund (it is now applied to the general fund for deficit reduction); (3) the issue of whether to take the highway trust fund off budget and restore it to a true trust fund structure; (4) donor states who believe they contribute more revenue than they receive back in grants and wish to establish a firm return-to-source policy; (5) conversion of the present categorical program to one based on formula block grants to states, potentially affecting such programs as CMAQ; (6) the issue of how (or whether) to fund Amtrak operations; and (7) whether to include demonstration projects (those with funding earmarked in the legislation).

Activity in Congress to date suggests that present annual funding level will be continued in nominal terms (not adjusted for inflation), resulting in a slow, inflation-adjusted decline in purchasing power. Those seeking a block grant program are unlikely to succeed, while donor states are likely to obtain some type of new return-to-source guarantee, making the currently complex apportionment formulas even more complex. A modest amount of money will be specified for certain projects, though the great majority of the 1,500 projects submitted to Congress in February 1997 will not be included in final legislation.

9.2.3 State Programs

Current Structure and Funding Level

Like most states, Kansas controls transportation investment as a statewide programming process, funded almost entirely through the State's Comprehensive Highway Program. The program is supported by revenue from a motor fuel tax, State sales tax, vehicle registration fees, driver's license fees, and other miscellaneous sources. The program is permanent under current State law and does not require reauthorization. However, the State legislature has, in practice, made periodic modifications to the program, typically involving a revenue increase associated with a committed construction program.

State highway revenue currently averages approximately $650 million annually (including State sales tax revenue used for debt service) and can be used only on the designated State highway system. Projects are classified as (1) Substantial Maintenance, (2) Major Modifications, (3) Priority Bridges, or (4) System Enhancements. Funds are programmed largely on the State system linking urban areas. A limited amount of funding is allocated to connecting links within urban areas, such as U.S. Route 54 (Kellogg) within Wichita. Under current practice, virtually no State funds are expended on other Federal-aid routes within urban areas, except for maintenance purposes.

Outlook

The state transportation program is currently funded at a level sufficient to meet short-term needs through the first part of the next decade (2002). Given that some form of revenue enhancement will be needed by that time, some discussion is now under way concerning a possible legislative initiative to increase transportation funding in the 1998 or 1999 legislative session. Aside from interstate maintenance and a small amount of Major Modifications funding allocated to the

U.S. Route 54/Kellogg freeway project and other smaller urban projects, the Kansas DOT will remain focused on the rural highway system in Sedgwick County and throughout the state.

9.2.4 Regional and Local Programs

Wichita-Sedgwick County Metropolitan Area Planning Department

Surface transportation projects within Sedgwick County are coordinated and funded through the Wichita-Sedgwick County Metropolitan Area Planning Department (MAPD) using a mix of the following Federal and locally generated revenue:

- Federal STP, Bridge Replacement, and CMAQ Funds (Urban Suballocation).
- Local sales tax.
- Local property tax.

Only those projects included in the Department's adopted 2020 Transportation Plan and near-term Transportation Improvement Program are eligible for Federal and regional funding through the Department. Projects eligible for funding through MAPD include new construction, reconstruction, and overlays on the regional street system. The region's long-range plan includes an estimated $1 billion in needs through 2020, all of which is expected to come from the Federal and local sources listed above—25 percent from Federal programs, just under 50 percent from the local sales tax, and the remaining 25 percent from the local property tax.

City of Wichita and Sedgwick County

Local street and related improvements within the City of Wichita and Sedgwick County are funded principally through a local share of the state fuel tax and Motor Carrier Property Tax. Local general funds, special district revenue, and various private contributions also help fund these improvements. Current average annual funding levels from these sources are $12.5 million for Wichita and $4.5 million for Sedgwick County. Such funds are typically dedicated to street and local bridge maintenance, repair, and reconstruction. They are not diverted to other uses except under extraordinary circumstances.

Outlook

At present, based on current economic, legal, and political conditions, there is little or no funding potential from existing local sources for major capital mitigation projects along the UP rail line through Wichita. Future regional economic growth, while healthy, will generate revenue barely sufficient to serve the increasing travel demand associated with that growth. At a minimum, agencies will need to work hard at meeting ongoing service commitments and basic facility needs.

9.3 Potential New Local Funding Mechanisms

An excess of 30 local and regional revenue sources and associated mechanisms have received attention from transportation planners in recent years. A few of these sources are considered almost standard tools for funding locally sponsored transportation improvements, while others are much more speculative in nature. Those most frequently compiled in any list of candidate approaches are listed in Table 9.3-1 below. Apart from the legal issues, a nontraditional funding strategy should focus on (1) ensuring adequate revenue yield, (2) ensuring perceptions of fairness, and (3) evaluating the local precedent in another similar jurisdiction.

TABLE 9.3-1
FREQUENTLY CONSIDERED LOCAL FUNDING SOURCES

General Taxes	
• Sales Tax	• Income Tax
• Property Tax	• Payroll/Head Tax
Special Taxes	
• Fuel Tax	• Utility Excise Tax
• Auto Registration Fee (Flat Rate)	• Parking Tax (Assessment)
• Auto License Tax (Value Based)	• Transient Occupancy Tax (Lodging)
• Driver's License Tax or Fee	• Excise Taxes
• Commuter Payroll Tax	• Business Licenses/Fee
• Real Estate Transfer Tax	
Special Financing Districts	
• Service/User Fees	• Special Benefit
• Ad Valorem Taxes	• Dependent or Independent
Growth-Related Mechanisms	
• Impact Fees	• Other Exactions
• In-Kind Contributions	• Tax Increment Financing
Public-Private Partnerships	
• Turnkey/Full Service Delivery	• Vendor Financing
• Joint Development	
Other Mechanisms	
• Tax-Exempt Debt (Federal Subsidy)	• Currency Swaps
• Advertising, Concession Rents/Fees	• Congestion Pricing (Roads)

Many of the mechanisms shown in Table 9.3-1 are self-explanatory. Descriptions of some of the less-common approaches, however, are summarized below.

- The *payroll/head tax* is typically a flat-rate assessment per employee. It is usually levied on employers operating within a jurisdiction. For payroll tax purposes, some jurisdictions split the levy between employer and employee.

- The *parking tax* is most commonly thought of as a flat or sales-based tax levied on paid commercial parking, typically in downtown commercial districts. As considered by transportation planners, the parking tax has evolved in concept into a per-space assessment to be levied on commercial property owners to discourage free parking and drive-alone behavior. To date, a parking tax in this form has not been implemented.

- A *commuter tax* can be structured in the form of a payroll head tax, an income tax, or some other form of payroll tax. The income tax method of taxing commuters is relatively complex and is not widely used.

- *Special financing districts* are defined and structured to fund specific activities or projects to serve (benefit) a defined geographical area that is smaller than the jurisdiction of the enabling entity. Allowable district powers, uses, and structures vary considerably from state to state. The taxing methods used in most districts, however, typically fit into one of three types: Unitary—a flat assessment or assessment based on physical units of area or length; Ad Valorem—a special property tax (based on property value); or Special Benefit—an assessment on property tied to an estimate of actual benefit derived from the proposed project. Districts are often distinguished by their degree of independence from general purpose governmental units and other special districts, and by their primary function, which is to fund a specific capital project only or to provide a specific ongoing service (e.g, water supply, mosquito abatement) or both.

- *Impact fees* are one-time assessments on new development intended to offset the cost of new facilities and infrastructure necessary to serve the new development. They are often calculated as a fixed amount per residential unit or square foot of commercial/industrial space.

- *Other land development exactions*, including *in-kind contributions*, are alternatives to impact fees, but are typically assessed (negotiated) for the same basic purpose—to fund new infrastructure. In-kind contributions may include land, existing facilities, or outright construction of new facilities by a developer.

- *Tax increment financing*, as defined for this analysis, would involve an *administrative* allocation of incremental property tax revenue (growth above a specified baseline) to the transportation program. Such revenue could be used to secure debt through a mechanism known as *Limited Obligation Bonds*. Note that this approach is similar in

concept to, but different in scope from tax increment financing as used in redevelopment project areas (and as used with *Tax Allocation Bonds*).

- *Turnkey* or *full service* project delivery involves full delegation of project development responsibilities to a single design/build or design/build/operate entity, typically for a fixed price. Cost savings potentially can be realized by internalizing the various functions within the single entity.

- *Joint development* involves co-locating public-service improvements (e.g., a transit station) and private, for-profit development (e.g., a mixed-use development) in a coordinated manner on the same site or on adjacent sites. Typically, a public entity owns or controls the underlying land and derives lease income from the arrangement, although other structures are possible.

- *Vendor financing* involves the extension of credit by an equipment vendor, typically at favorable terms.

- *Federally tax-exempt debt financing* translates the Federal tax exemption into lower interest cost, and is therefore an implicit Federal subsidy.

- *Currency swaps* and other strategies aimed at profiting from currency exchange rate fluctuations can occasionally yield significant revenue for a sophisticated purchaser of foreign equipment (e.g., transit vehicles).

- *Congestion pricing* involves the imposition of a schedule of tolls on a free facility, or on an existing toll road with the objective of discouraging use during peak periods. Tolls are set highest during congested periods, and lowest during noncongested periods.

Those mechanisms that have received the greatest attention in many communities include the following:

- Sales tax.
- Hotel room occupancy tax.
- Fuel tax.
- Real estate transfer tax.
- Development impact fees.

Of these, the sales tax and the hotel room occupancy tax offer the greatest potential revenue yield, along with the greatest potential for acceptance by the public.

9.4 Potential Funding Strategies

9.4.1 Overview

Four general strategies exist for obtaining funding for new and/or controversial projects. Each strategy corresponds to a level of government or the private sector. Typically, project proponents must plan on five years at minimum to achieve success. The strategies are as follows:

- **Federal:** Work through the region's Congressional delegation to secure earmarked transportation or economic development funding.

- **State:** Work with State elected officials and staff to restructure current fund programs or work to enact a multiyear infrastructure catch up investment program that includes the desired project or project type.

- **Local:** Work with local elected officials to create a multiyear, multiproject investment program based on a sales or fuel tax, plus other equity mechanisms such as impact fees or special financing districts.

- **Public-Private Partnerships:** Work with downtown business interests and private developers to define land development projects that potentially include all or some of the desired infrastructure. Use this arrangement to leverage funds and help secure support for more traditional funding.

The ultimate strategy could involve a combination of all four approaches, given that one or two funding sources is rarely sufficient in today's extremely competitive environment.

9.4.2 Federal and State Strategies

Federal Funding

Traditionally, Federal funding for projects such as railroad grade separations or elevated trainways has been very limited. Projects of this type are commonly viewed as not falling into any of the standard project categories, which include streets and roads, bridges, and mass transit. Given that reauthorization of the Federal surface transportation program is still pending, two possible approaches to obtaining some Federal support are (1) to continue efforts to obtain some kind of project-specific funding allocation, even if only for preliminary studies and/or right-of-way acquisition and (2) to work to restructure the Federal categorical set-asides such that any increase in funding levels could be applied to this project.

Neither of these options is simple or straightforward. Kansas DOT officials would be involved in any plan to change the distribution of funds with the State. Nevertheless, the current situation in Congress suggests that there is substantial support for an increase in total funding over the next five years, and the City should be prepared to take advantage of whatever Federal changes

may be forthcoming. One element of that preparation should involve promoting any railroad mitigation projects more intensively at local, regional, and State forums, such as the Wichita and Sedgwick MAPD and with Kansas DOT itself.

State Funding

As mentioned earlier, there is, at present, no significant pressure on State legislators to increase the fuel tax or other sources of transportation funding, though there are indications that a funding initiative may be mounted in 1998 or 1999. There is general satisfaction that KDOT is getting the job done with available resources, and significant revenue shortfalls are not projected for at least another five to seven years.

Communities in a number of states, however, have been successful in developing statewide capital investment programs designed to rehabilitate and upgrade existing transportation infrastructure. These programs are often described in terms of economic development, competitiveness, and job creation. They have been approved by legislators and the public by defining a specific program of projects and providing for a firm termination date for the new fuel tax or other revenue mechanism employed. Any proposal for State assistance should be described in terms of matching locally generated funds for a locally sponsored infrastructure program, which in turn may become sufficiently attractive to win a majority of legislators. The key to that success will be first to find a significant source of local funding.

9.4.3 Local and Public-Private Funding Strategies

Desirable Characteristics

If a local funding strategy is desirable, it should do the following:

1. Generate enough local revenue to demonstrate a firm local commitment.

2. Incorporate the broadest possible group of beneficiaries to spread the funding burden equitably and fairly.

3. Pose no major legal challenges.

4. Be sufficiently familiar to legislators and the public to receive maximum favorable consideration.

5. Allow the greatest possible degree of flexibility in future decisions regarding extent, timing, and application of funds.

The funding strategy should include not only specific sources of revenue, but also a plan of specific actions necessary to achieve consensus and necessary approvals, and an institutional structure designed to match roles and responsibilities with appropriate participants.

Most-Feasible Funding Sources

A set of local funding sources defined to address the required characteristics listed immediately above almost certainly should comprise a mix of affected parties, while at the same time should meet minimum standards with respect to revenue sufficiency and reliability, socioeconomic and fiscal impact, and administrative complexity and cost. Considering the list of sources outlined in Table 9.3-1 above, the following sources appear to be the most promising:

General/Broad-Based Taxes
- Sales tax.
- Payroll or head tax.

Special/Targeted Taxes
- Fuel tax.
- Other auto user charges.
- Transient occupancy (hotel room) tax.

Special Financing Districts
- Special assessment districts (SADs).

Growth Related Mechanisms
- Tax-increment financing.

Public-Private Partnerships
- Negotiated contributions of funds and/or other useful assets (e.g., real property).
- Joint public-private management and implementation structure.

9.5 Suggested Actions

The City of Wichita now has the authority to ask the voters for an additional one-half-cent special sales tax. The City and the County have begun to take steps in search of funds for one or more railroad grade separation projects, including participation in discussions with UP, the Governor's office, Kansas DOT officials, local and State elected officials and participation in a jointly funded study to examine railroad bypass options.

City and County officials will make a policy decision if they want to support a joint funding effort to implement an elevated railway in north Wichita or other joint-funded mitigation measures. If they decide to move forward, some possible steps to consider are as follows:

- Formulate a conceptual funding strategy or program with one or more potential allocations of cost among participants/beneficiaries and specific revenue mechanisms. Establish a multiyear time line for implementation.

- Look to capture (at least temporarily) incremental revenue growth from one or more City general fund sources. Create a financial plan showing how the results of the diverted funding can either generate additional income to the City, or can be repaid over a fixed period of time.

- Obtain seed money contributions early on from stakeholders, including UP. Apply investment income to buy down some of the project cost.

- Continue to pursue State and Federal funding as described in Section 9.4.2 above.

Section 10
CONCLUSION AND PRELIMINARY RECOMMENDATIONS

10.1 Conclusion

Based on the analyses completed for the EA, the Post EA, and the Wichita Mitigation Study and on a review of public comments and currently available information, SEA concludes that, with the implementation of the mitigation required in Decision No. 44 and the additional mitigation measures described below in Section 10.2, the UP/SP merger will not result in a significant impact on the human environment in Wichita and Sedgwick County. SEA's preliminary recommendation is that the Board require the additional mitigation described below.

SEA further recommends that UP continue discussions with the City and County and other railroads operating in Wichita to evaluate several promising options to address the long-term relationship among railroad activities, local land uses, and economic development. SEA finds that several of the options described below in Section 10.3 have the potential for mutual benefit to local residents and businesses and the railroads. SEA encourages the City of Wichita, Sedgwick County, UP, Burlington Northern Santa Fe (BNSF), the short line railroads, and the State of Kansas to continue discussions about the feasibility of these measures and possible funding sources.

10.2 Preliminary Recommendations for Additional Mitigation to Require of UP

SEA's preliminary recommendation is that the Board adopt the following additional mitigation requirements as part of the decision regarding the UP/SP merger approved on August 12, 1996:

1. UP shall make the necessary capital improvements to its track and appurtenances to enable trains to operate over the UP rail line at an operating timetable speed of 60 miles per hour from milepost 222.76 near the Butler/Harvey County line to Hillside in Sedgwick County and from milepost 247.0 near Pawnee to milepost 266.4 in Riverdale and to allow a speed limit of 30 miles per hour between Hillside and Pawnee. UP shall operate all through trains at the timetable speed through Sedgwick County consistent with safe operating practices dictated by conditions at the time each train traverses the rail line.

2. UP shall eliminate train crew changes in Wichita and Sedgwick County for all merger-related through trains.

3. Subject to the concurrence of the City of Wichita and Sedgwick County, UP shall install appropriate circuitry, compatible with new technology being planned by the City and County, to communicate to emergency vehicle dispatchers the exact location of each train on the UP rail line in Sedgwick County.

10.3 Tier 2 Measures

The following long-term measures show promise for addressing existing railroad and land use conflicts in Wichita and Sedgwick County. SEA encourages the affected parties to continue planning discussions, design development, technical evaluations, and funding considerations to seek agreement on a long-term solution to development conflicts.

10.3.1 Elevated Trainway and/or Grade Separations

The elevated trainway concept would achieve several benefits for Wichita and the railroads. Consolidating rail lines and yards could eliminate grade crossings, reduce maintenance costs, and simplify grade separations. Elevating consolidated train tracks in north Wichita would be a cost-effective way to separate several crossings and would be consistent with the existing elevated tracks in central Wichita. There are, however, potential visual, property, and neighborhood impacts of constructing elevated tracks. Existing connections to local businesses and other rail lines must also be considered.

Several local officials have noted that the elevated trainway concept would do little to address train impacts in south Wichita or the rest of Sedgwick County. Grade separations at other locations could eliminate blocked crossings and reduce accident risk. Traffic volumes indicate that separations at Pawnee and in north Wichita would be the highest priority. South of Kellogg, the City identified 47th Street South, 55th Street South, and 71st Street South in Haysville as the most feasible locations for separations. SEA recommends that the City and County work with the railroads and the Kansas Department of Transportation to explore further the feasibility of the elevated trainway and the priorities for grade separations.

10.3.2 Street Closures

Closing streets with low traffic volumes eliminates the risk of train-vehicle or train-pedestrian accidents at those crossings. Several streets in north and south Wichita warrant further investigation regarding the acceptability of their closure. Local residents have raised several neighborhood concerns, such as traffic circulation, emergency access, and neighborhood cohesiveness. Closing streets is a decision to be made by local officials after consultation with local residents. SEA recommends that City officials consult with local residents, the FRA, the Kansas DOT, and UP regarding the feasibility, acceptability, and funding for street closures in Wichita.

10.3.3 Noise Abatement

As noted in Sections 7 and 8, train horn noise is a deliberate action to increase vehicle and pedestrian safety. Unfortunately, nearby residents and other sensitive receptors also are affected by the train horns. Although there are at present few accepted alternatives to train horns, recent Federal legislation requires the FRA to develop regulations that would permit quiet zones or other alternatives to train horn requirements. In Wichita, safety issues are more complicated due to the fact that several railroads operate through the City. To avoid confusion among motorists, a

Appendix A Board Decisions and Communication

A-1 Decision No. 44 - Environmental Conditions
A-2 Decision No. 71
A-3 Letter from Board General Counsel to Mayor Knight regarding Board's authority to require bypass

B.02

SURFACE TRANSPORTATION BOARD

Finance Docket No. 32760

UNION PACIFIC CORPORATION, UNION PACIFIC RAILROAD COMPANY, AND MISSOURI PACIFIC RAILROAD COMPANY--CONTROL AND MERGER--SOUTHERN PACIFIC RAIL CORPORATION, SOUTHERN PACIFIC TRANSPORTATION COMPANY, ST. LOUIS SOUTHWESTERN RAILWAY COMPANY, SPCSL CORP., AND THE DENVER AND RIO GRANDE WESTERN RAILROAD COMPANY

Decision No. 44

Decided: August 6, 1996

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ENVIRONMENTAL CONSIDERATIONS.

Extensive Environmental Review Process. Under the National Environmental Policy Act (NEPA) and related environmental laws, the environmental effects of the merger and the ancillary abandonment and construction projects that were proposed by applicants must be considered, and we have thoroughly done so. Our environmental staff, the Section of Environmental Analysis (SEA), conducted various public outreach activities to inform the public about the proposed merger and to encourage and facilitate public participation in the environmental review process.[1]

As part of its environmental review, SEA prepared detailed analyses not only of the systemwide effects of the proposed merger, but also of particular merger-related activities that would affect individual rail line segments, rail yards, and intermodal facilities to a degree that would meet or exceed our thresholds[2] for environmental analysis. See 49 CFR

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[1] SEA sent approximately 400 consultation letters to various agencies seeking their comments. In addition, SEA consulted with federal, state, and local agencies, affected communities, UP and SP, and UP/SP's environmental consultants to gather and disseminate information about the proposal, identify potential environmental impacts, and develop appropriate mitigation measures.

[2] These thresholds ensure that those rail line segments and facilities that would experience a substantial increase in

(continued...)

1105.7(e)(5)(i) and (ii).[3] SEA conducted a thorough independent analysis, which included verifying projected rail operations; verifying and estimating noise level impacts; estimating increases in air emissions; assessing potential impacts on safety; and performing land use, habitat, surface water and wetlands surveys, ground water analyses, and historic and cultural resource surveys.

Based on the information provided by the parties and other agencies, SEA issued a comprehensive Environmental Assessment (EA) on April 12, 1996. SEA received approximately 160 comments following issuance of the EA. To address those comments and the other environmental comments received throughout the environmental review process (approximately 400 in total), SEA undertook additional environmental analysis, which culminated in the issuance of a detailed Post Environmental Assessment (Post EA) on June 24, 1996, refining some of the discussion and mitigation recommended in the EA.

As a result of its investigation, SEA concluded that the merger would result in several environmental benefits, including a systemwide net reduction of 35 million gallons of diesel fuel consumption (based on 1994 figures) from rail operations and truck-to-rail operations, systemwide improvements to air quality from reduced fuel use, and a reduction in long-haul truck miles, highway congestion and maintenance, and motor vehicle accidents.

SEA also concluded that the merger and related rail abandonments and constructions could have potential environmental effects regarding safety, air quality, noise, and transportation, including the transportation of hazardous materials, and, in the EA, SEA proposed mitigation measures addressing the environmental concerns that were raised. In the Post EA, based on further analysis and review of the environmental comments, SEA developed more comprehensive and specifically tailored mitigation recommendations. As a result of consultations with SEA, UP/SP agreed to undertake particular mitigation measures. In addition, several local communities negotiated memoranda of understanding with UP/SP to implement mitigation measures and take other appropriate actions to address their particular environmental concerns.

SEA concluded that, with the Post EA mitigation measures, the proposed merger would not significantly affect the quality of the human environment on a systemwide, regional, or local basis. We agree that the conditions recommended in the Post EA will adequately mitigate the potential environmental impacts identified during the course of the environmental review, and we will impose those conditions here (see Appendix G).[4] We also

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[3](...continued)
traffic as a result of the transaction are thoroughly analyzed for potential air quality, noise, transportation, and safety impacts.

[3] SEA and its independent third-party consultant conducted approximately 150 site visits. They also analyzed UP/SP's Environmental Report, operating plan, Preliminary Draft Environmental Assessment and other pleadings, all of the settlement agreements entered into during the environmental review process, and technical studies.

[4] We note that the mitigation recommended in the Post EA for two proposed abandonments in Colorado (Sage to Leadville and

(continued...)

adopt SEA's environmental analysis and the conclusions reached in the EA and the Post EA.

No Need for Environmental Impact Statement. We have considered the arguments of some parties that an environmental impact statement (EIS) is required here, but do not believe that one is needed. An EIS is required only for "major federal actions significantly affecting the quality of the human environment." 42 U.S.C. 4332(2)(C).[5] Under our environmental rules, 49 CFR 1105.6(b)(4), an EA is normally sufficient environmental documentation in rail merger cases to allow us to take the requisite "hard look" at the proposed action.[6] Moreover, interested parties received essentially the same benefits they would have received with an EIS. As the EA and Post EA show, SEA conducted a thorough and comprehensive environmental review. There was extensive notice and opportunity for input from the public and appropriate agencies throughout the process. In addition to the EA, SEA issued a detailed Post EA which contains SEA's individual responses to the comments on the EA and thus reflects not only the work of SEA but also the critical views of interested parties and agencies.

Finally, the environmental mitigation we are imposing here is far reaching and comprehensive.[7] As appropriate, it addresses impacts on a variety of levels: systemwide, rail corridor-specific, and local. There is mitigation for particular rail line segments, rail yards, intermodal facilities, and rail

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[4](...continued)
Malta to Cañon City) has been modified to reflect our decision to permit only discontinuance of rail service, and not abandonment, at this time. Other clarifying changes have been made as well.

[5] The identification of such actions is a matter for the agency to determine, as long as the determination is not arbitrary or capricious. See Goos v. ICC, 911 F.2d 1283, 1292 (8th Cir. 1990), citing Marsh v. Oregon Natural Resources Council, 490 U.S. 360, 377 (1989).

[6] While this merger involves somewhat more trackage than other merger proposals that have come before our predecessor agency, the ICC, that does not mean that the qualitative environmental effects of this merger are greater (or different) than those of the other railroad mergers that have been considered. Similarly, the extensive trackage rights that we are granting in this decision to preserve competition generally will not create additional traffic (or potentially significant environmental impacts). Traffic that can be efficiently handled by train would be handled by train whether or not the trackage rights at issue here were granted.

[7] For example, with respect to safety, our mitigation includes more frequent track and train car inspections, signs on grade crossings identifying toll free numbers to call in the event of a signal malfunction, and a requirement that UP/SP provide emergency response personnel with information regarding anticipated train movements and work with communities to develop plans to deal with the transportation of hazardous materials, emergencies, and the upgrading of grade crossing signals. In addition, UP/SP will be required to equip certain trains carrying hazardous materials with two-way end-of-train devices to enhance braking capabilities on particular line segments. In response to concerns involving air pollution, UP/SP will have to reduce idling of locomotives, close box car doors on empty cars, and use more efficient locomotives when the equipment becomes available.

abandonments and constructions. In short, no EIS is required because our environmental mitigation conditions specifically address the potential environmental impacts associated with the merger and ensure there will be no significant environmental effects.[8]

Reno and Wichita. As discussed in the Post EA, in developing mitigation for two cities, Reno, NV, and Wichita, KS, SEA concluded that further, more focused mitigation studies are warranted, notwithstanding the extensive analysis (including site visits and meetings with city officials, emergency response representatives and business interests) that already has been done to identify environmental concerns and arrive at appropriate mitigation for these two communities. Nothing in the record here, however, suggests that the potential environmental effects of the merger in Reno or Wichita are so severe that implementation of the merger should not proceed prior to the completion of the studies.[9] To the contrary, in both Reno and Wichita the environmental impacts are limited to the effects of an increase in traffic on existing rail lines. Also, the mitigation conditions that we are imposing now assure that, while SEA conducts these studies, the environmental status quo will essentially be preserved in Reno and Wichita.[10]

As the EA and Post EA show, SEA already has carefully assessed the impact of the merger on Reno and Wichita and identified its likely environmental effects. Based on its analysis, SEA concluded that, with the systemwide and corridor-specific mitigation already imposed and the conditions to be arrived at following the independent mitigation studies, there will be no significant environmental impacts to Reno and Wichita, and we agree.

The sole purpose of the mitigation studies will be to arrive at specifically tailored mitigation plans that will ensure that localized environmental issues unique to these two communities are effectively addressed. For example, with respect to vehicular and pedestrian safety, SEA has determined that separated grade crossings and pedestrian overpasses and/or

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[8] See, e.g., Sierra Club v. DOT, 753 F.2d 120, 127 (D.C. Cir. 1985); Cabinet Mountains Wilderness v. Peterson, 685 F.2d 678, 682 (D.C. Cir. 1982).

[9] We note that the Supreme Court has rejected arguments that NEPA demands the formulation and adoption of a plan that will fully mitigate environmental harm before an agency can act. Robertson v. Methow Valley Citizens Council, 490 U.S. 332, 352-53 (1989). Rather, the deferral of a decision on specific mitigation steps until more detailed information is available is embraced in the procedures promulgated under NEPA. See Public Utilities Comm'n of California v. FERC, 900 F.2d 269, 282-3 (D.C. Cir. 1990). NEPA "does not require agencies to adopt any particular internal decisionmaking structure." Baltimore Gas & Electric Co. v. NRDC, 462 U.S. 87, 100 (1983). It is well settled that NEPA does not repeal other statutes by implication and that if the agency meets NEPA's basic requirements, it may fashion its own procedural rules to discharge its multitudinous duties. Vermont Yankee v. NRDC, 435 U.S. 519 (1978); United States v. SCRAP, 412 U.S. 669, 694 (1973).

[10] The courts have recognized that there is no violation of NEPA where proposed actions will not effect a change in the status quo. See Sierra Club v. FERC, 754 F.2d 1506, 1509-10 (9th Cir. 1985).

underpasses will be needed to address safety concerns on the existing rail lines in Reno and Wichita. Accordingly, the studies will identify the appropriate number and precise location of highway/rail grade separations and rail/pedestrian grade separations in Reno and Wichita. With respect to air quality, we have imposed mitigation measures that reduce locomotive fuel consumption and air pollution, call for more efficient railroad equipment and operating practices, and require consultation with air quality officials.[11] As further insurance, the studies will consider additional mitigation to address the air quality effects unique to Reno and Wichita. In this merger, noise impacts would result from more frequent exposure to horn noise rather than greater intensity of sound. No additional types of noise would be introduced. To address noise impacts, we are requiring UP/SP to consult with affected counties to develop focused noise abatement plans. As the Post EA notes, however, safety dictates that railroads sound their horns at grade crossings.[12] Any attempt significantly to reduce noise levels at grade crossings would jeopardize safety, which we consider to be of paramount importance.

The studies will be conducted by SEA with the assistance of an independent third party contractor. Although retained by UP/SP, SEA will select the contractor. The contractor will work under the sole supervision, direction, and control of SEA.

The mitigation studies will include consultations with the affected communities, counties, and states, Native American tribes, the FRA, and other appropriate agencies, as well as UP/SP. There will be public notice and participation. The public will be consulted regarding the range of additional mitigation to most effectively address increased rail traffic on the existing rail lines in Reno and Wichita. SEA will prepare draft mitigation studies and make them available to the public for review and comment. After SEA assesses the comments, it will design the most effective mitigation for these particular communities to add to the mitigation that has already been imposed.

SEA's final mitigation studies and its recommended mitigation plans for Reno and Wichita will be made available to the public and will be submitted to us for our review and approval. We will then issue a decision imposing specific mitigation measures. This entire process will be completed within 18 months of consummation of the merger.

In the meantime, as explained in the Post EA, during the 18-month study period UP/SP will be permitted to add only an average of two additional freight trains per day to the affected rail line segments (Chickasha, OK, to Wichita and Roseville, CA, to Sparks, NV),[13] which is below the threshold level for

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[11] Because trains are mobile, rather than stationary sources, air quality impacts associated with locomotive emissions are spread over a large area. Therefore, the impacts at any individual location are typically relatively minor.

[12] SEA indicates that FRA has been directed by the Swift Act generally to require that horns be sounded at all grade crossings.

[13] For nonattainment areas such as Reno, our rules permit railroads to operate up to three additional trains per day. The threshold for attainment areas such as Wichita is normally an

(continued...)

environmental analysis.[14] UP/SP will be prohibited from increasing traffic to the levels they projected under the merger (11.3 daily trains for Reno and 7.4 trains for Wichita) without our approval.[15] Thus, there will be no significant adverse environmental impacts to these communities while SEA, the Board, and the parties work to arrive at additional tailored mitigation for those cities.

It should be noted that the studies will focus only on the mitigation of the environmental effects of additional rail traffic through Reno and Wichita resulting from the merger. Mitigation of conditions resulting from the preexisting development of hotels, casinos, and other tourist-oriented businesses on both sides of the existing SP rail line in Reno, or the preexisting switching operations that are a primary source of the congestion associated with the existing UP line in Wichita, are not within the scope of the studies. Similarly, the construction of a new rail line now under consideration by Reno is too preliminary to be assessed now.[16]

The studies will carefully examine private and public funding options, as we believe that the cost of mitigation for Reno and Wichita should be shared. Finally, the studies will provide the parties with additional time to pursue and agree to independent and innovative mitigation plans (such as the memorandum of understanding executed by UP/SP and Truckee, CA, whereby UP/SP will share in the cost of an underpass construction project and contribute to a fund to buy back obsolete wood burning stoves).

In sum, pending determination of the exact mitigation measures to be required for Reno and Wichita, UP/SP will be subject to a traffic cap on the affected rail lines to ensure

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[13](...continued)
increase of eight trains or more a day. Here, we are taking a more conservative approach and will permit for Wichita only an average increase of two trains per day. In short, these limited increases for Reno and Wichita are at or below the threshold levels, and the environmental status quo will essentially be maintained. This addition of an average of two trains a day includes BNSF trains but does not include Amtrak trains, which are unrelated to the merger.

[14] We note that an existing railroad can increase its level of operations without coming to us, and without limitation. Thus, if UP and SP had not proposed this merger, SP on its own could have increased the number of trains on its line in Reno to any level it considered appropriate. Allowing an increase of up to two trains per day during the interim period takes into account that the number of trains going through Reno and Wichita might have been increased even without the merger.

[15] UP/SP will be required to file verified copies of station passing reports of train movements for Reno and Wichita on a monthly basis with SEA for the duration of the study period. We will review them to ensure compliance.

[16] Plans for such a line are only in the development stage. SEA indicates that such a project could take up to 10 years to finalize. If the contemplated construction reaches the stage of an actual proposal requiring our approval, SEA would prepare an appropriate environmental document at that point. See Kleppe v. Sierra Club, 427 U.S. 390, 410 n.20 (1976); Crounse Corp. v. ICC, 781 F.2d 1176, 1193-96 (6th Cir. 1986).

that no adverse effects to the environment will occur and existing environmental conditions will essentially remain unchanged. Because we already know the nature and general parameters of the appropriate mitigation measures for Reno and Wichita, based on our analysis of the environmental impacts and imposition of systemwide and regional mitigation, we find that, with the more specific mitigation that will be developed, the merger will not significantly affect the quality of the environment in those two locations.

Comments of EPA. On July 12, 1996, we received comments from the United States Environmental Protection Agency (EPA) on various aspects of the EA and the Post EA.[17] EPA notes that, in analyzing air quality, the EA failed specifically to identify "maintenance" areas,[18] which it believes may have caused air quality concerns to be overlooked.[19] But maintenance areas were not ignored in SEA's analysis. For those areas that were not classified as nonattainment, SEA applied the EPA conformity emission threshold levels applicable to maintenance areas. This means that SEA analyzed both attainment and maintenance areas under the more rigorous standards applicable to maintenance areas, and that, if anything, the anticipated effects of the proposed merger on air quality are conservative. We believe that air quality has been thoroughly analyzed, and that the mitigation we are imposing here, along with the more specific measures which will be arrived at in the further mitigation studies for Reno and Wichita,[20] adequately mitigates any potential adverse air impacts.

EPA further states that the EA used the terms NO_2 and NO_x incorrectly. We recognize that NO_x is not a criteria pollutant under EPA and state ambient air quality standards. In assessing air quality emissions, SEA looked at emission factors applicable to NO_x, instead of NO_2, because NO_x emission factors are readily available through EPA documents and other sources, while NO_2

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[17] SEA agreed to EPA's request for an extension of time to comment on the Post EA. We welcome EPA's input after reviewing our environmental analysis, since, as EPA notes, it generally does not comment on EAs.

[18] There are three classifications for air quality: attainment areas, in which levels of certain pollutants are considered equal to or better than federal and state ambient air quality standards; nonattainment areas, in which levels of one or more pollutants do not meet federal and state ambient air quality standards; and maintenance areas, which were at one time nonattainment areas but have subsequently improved their air quality and are now in attainment for the relevant pollutant(s).

[19] We note that EPA does not disagree with SEA's determination that the proposed merger is not subject to EPA's regulations entitled "Determining Conformity of General Federal Actions to State or Federal Implementation Plans" (General Conformity). The General Conformity criteria do not apply directly to railroad operations, except for future locomotive emission standards. SEA properly concluded that the proposed merger does not meet the definitions in the General Conformity regulations at 40 CFR 51.852 because, as a regulatory agency, the Board does not maintain program control over railroad emissions as part of its continuing responsibilities.

[20] SEA will take into account EPA's concerns and consult with them in conducting its mitigation studies for Reno and Wichita.

emissions are not. SEA based its calculations on the conservative assumption that all NO_x emissions are composed of NO_2. This conservative approach, which is widely accepted, ensured that the criteria pollutant NO_2 was adequately assessed in SEA's analysis. Moreover, by using this approach, SEA used higher NO_2 emissions than would actually be emitted.

EPA also expressed some difficulty understanding SEA's estimates of the projected net increase and decrease in air emissions with the mitigation measures we are imposing. While we believe that the text of the Post EA adequately explains the data in Tables 3-5 and 4-4, we have generated and attached as Appendix H an additional table to furtner clarify the net emissions reflecting mitigation.

EPA notes that some of the proposed rail line abandonments in Colorado run through or near EPA-designated Superfund sites. EPA is troubled that soil in and around the railroad lines could require remediation, that UP/SP might not be obligated to honor a consent decree, and that possible future trail use could expose the public to hazardous substances. These concerns are premature because, as discussed above, we are permitting only the discontinuance of rail service, and not abandonment of the involved lines. Thus there will be no salvage of these lines or opportunity for trail use unless and until UP/SP obtains our authority to abandon these lines.[21]

While trail use requests can be made if the abandonments are granted, any trail arrangement would not supersede the requirements of the specific laws that govern Superfund sites.[22] Nor would we thereby become involved in negotiating or enforcing consent decrees involving remediation of those sites.

EPA does not view requiring UP/SP to comply with existing federal, state, and local regulation as mitigation. We believe, however, that requiring compliance with other laws and regulations, such as FRA's safety regulations, can assist in reducing the potential environmental impacts of the actions before us. If the railroad fails to comply with conditions that we have imposed, parties can notify us and request that we (as well as the agency that has promulgated the regulation) take appropriate action.

In any event, the mitigation we are imposing here goes well beyond requiring compliance with other laws and regulations. For example, it includes more frequent track and train car inspections to reduce anticipated safety impacts and reduced idling of locomotives and the use of more efficient locomotives to offset air pollution emissions associated with the merger. Moreover, to enhance safety, UP/SP will be required to equip certain trains carrying hazardous materials with two-way end-of-train devices to improve braking capabilities on particular line segments.

EPA suggests that we failed to discuss the environmental impacts associated with the handling and disposal of waste materials for the proposed abandonments and constructions. But we have included detailed mitigation for these actions. See Appendix G, including conditions #26, #27, #62 and #63.

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[21] At that point, we will analyze the potential environmental impacts of the proposed abandonments.

[22] See Union Pac. R.R. -- Abandonment -- Wallace Branch, ID, Docket No. AB-33 (Sub-No. 70) (ICC served Dec. 2, 1994).

EPA questions whether SEA considered all the settlement agreements reached with competing railroads and trade associations. SEA specifically took all settlement agreements into account in its analysis, as the EA and Post EA show.

Finally, we disagree with EPA's suggestion that SEA should revisit its consultation efforts with Native American tribes. SEA's efforts to contact and consult with Native American tribes have been extensive. As part of its outreach activities, SEA contacted approximately 11 area offices of the Bureau of Indian Affairs to inform them about the proposed merger; three offices commented and provided the names of tribes that should be contacted. Both the EA and Post EA were distributed to 31 American Indian tribes. In addition, there was newspaper and Federal Register notice to inform all affected tribes and communities about the proposed merger and how they could participate. To ensure continued participation, SEA will contact the affected Native American tribes when initiating its mitigation studies for Reno and Wichita and invite them to participate.

APPENDIX G: ENVIRONMENTAL MITIGATING CONDITIONS

The environmental mitigating conditions imposed in Finance Docket No. 32760 are categorized as follows: (A) Systemwide, (B) Corridor-Specific, (C) Rail Line Segments, (D) Rail Yards and Intermodal Facilities, (E) Proposed Abandonments, and (F) Construction Projects. These mitigation conditions are numbered sequentially.

A. SYSTEMWIDE MITIGATION

The following systemwide mitigation conditions apply to rail line segments, rail yards, intermodal facilities, and rail line construction projects on new right-of-way.

1. UP/SP shall adopt UP's existing formula-based standards for track inspection for all rail lines of the merged system, which will increase the frequency of inspections on SP rail lines.

2. UP/SP shall adopt UP's existing tank car inspection programs for all appropriate facilities on the merged system.

3. For all highway grade crossing signals, UP/SP shall provide visible instructions designating an 800 number to be called if signal crossing devices malfunction.

4. UP/SP shall provide 800 numbers to all emergency response forces in all communities. These numbers shall provide access to UP/SP supervisors who shall provide train movement information and work cooperatively with communities in emergency situations. These numbers are not to be disclosed to the general public.

5. UP/SP shall participate on a systemwide basis in the TRANSCARE program to develop hazardous material and emergency response plans in cooperation with communities.

6. UP/SP shall redistribute personnel to respond to hazardous materials emergencies in unprotected areas on the SP rail lines, such as in Arizona, New Mexico, and West Texas.

7. UP/SP shall adopt UP's training program for community and emergency response personnel for locations on the SP rail lines, and include personnel from SP served locations in UP's school at Pueblo, CO, for additional emergency response training.

8. UP/SP shall adopt existing UP training and operating practices that are designed to reduce locomotive fuel consumption and air pollution. These include: throttle modulation, use of dynamic braking, increased use of pacing and coasting trains, isolating unneeded horsepower, shutting down locomotives when not in use for more than an hour when temperatures are above 40 degrees, and maintaining and upgrading SP locomotives to UP standards.

9. As suggested by UP/SP, UP/SP shall extend to SP rail lines UP's program of closing boxcar doors on empty cars before movement on the system in order to reduce wind resistance and, thereby, fuel consumption.

10. As suggested by UP/SP, UP/SP shall use its own security forces to conduct its own arrests and bookings, reducing reliance on local police forces.

11. UP/SP shall convert all railroad locomotives to the standards for visible smoke reduction that are established in the South Coast Air Quality Basin.

12. UP/SP shall adopt UP's existing policy of using head-hardened rail on curves in mountainous territory for SP rail lines to promote safer operations.

13. UP/SP shall comply with all applicable FRA rules and regulations in conducting rail operations on the merged system.

B. CORRIDOR MITIGATION

General

The following mitigation conditions apply to the Central, Southern, Northern, Illinois-Gulf Coast, and Pacific Coast (I-5) Corridors.

14. UP/SP shall implement the draft emissions standards for diesel-electric railroad locomotives that the Environmental Protection Agency (EPA) has developed. It is the Board's understanding that EPA plans to propose these standards and make them available for public comment in December 1996. Under these standards, UP/SP shall utilize newly manufactured or re-built locomotives that are more fuel efficient and produce less emissions. When this equipment becomes available, UP/SP shall assign these locomotives on a priority basis to the corridors or portions thereof specified below:

- Southern Corridor:
  - Fort Worth, TX, to West Colton, CA.
- Central Corridor:
  - Cheyenne, WY, to Hinkle, OR.
  - Chicago, IL, to Fremont, NE.
  - Ogden, UT, to Roseville, CA.
  - Denver, CO, to Grand Junction, CO.
- Pacific Coast (I-5) Corridor:
  - Seattle, WA, to West Colton, CA.
  - Sacramento, CA, to Bakersfield, CA.

15. To further facilitate the improvement of air quality for specific locations, UP/SP shall consult with appropriate state and local air quality officials in the States of Arizona, California, Colorado, Illinois, Nevada, Oregon, Texas, Washington, and Wyoming, through which the Pacific (I-5), Southern, Central, and Northern Corridors extend in part. UP/SP shall advise SEA as to the status and the results of these consultations.

16. To address noise impacts, UP/SP shall consult with the affected counties that have communities that would experience an increase of 3 dBA or more as a result of the increased rail traffic over rail lines in the States of California, Colorado, Illinois, Kansas, Louisiana, Nebraska, Nevada, Oklahoma, and Texas. If appropriate, UP/SP shall develop a noise abatement plan. UP/SP shall submit the result of these consultations to SEA who will review these findings with FRA.

Specific

The following mitigation conditions apply to specific rail line segments within the Central, Southern, and Illinois-Gulf Coast Corridors.

17. UP/SP shall give priority to equipping key trains, as defined by Union Pacific Railroad Form 8620, on the corridor segments listed below with two-way end of train devices. This requirement also applies to BNSF key trains operating between Iowa Junction, LA, and Avondale, LA.

- Central Corridor
  - North Platte, NE, to Oakland, CA (UP and SP).
  - Cheyenne, WY, to Denver, CO (UP).

- Southern Corridor
  - Houston, TX, to Avondale (New Orleans), LA (SP).
  - Iowa Junction, LA, to Avondale, LA, via Kinder and Livonia (UP).
  - Houston, TX, to West Colton, CA (SP).
- Illinois-Gulf Coast Corridor
  - St. Louis, MO, and East St. Louis/Salem, IL, to Houston, TX, and Avondale, LA (UP and SP).

C. RAIL LINE SEGMENT MITIGATION

General

The following mitigation conditions apply to all of the rail line segments in the states identified below.

18. UP/SP shall consult with the states and appropriate local officials as well as FRA to develop a priority list for upgrading grade crossing signals, where necessary, due to increases in rail traffic resulting from the proposed merger. This process shall be undertaken for all rail line segments in the States of Arkansas, California, Colorado, Kansas, Nevada, Oregon, and Texas. UP/SP shall advise SEA as to the status and the results of these consultations.

Specific

The following detailed mitigation conditions apply to the specific rail line segments and/or locations identified below.

Martinez, CA, to Oakland, CA:

East Bay Regional Park District

19. UP/SP shall comply with the terms of the Memorandum of Understanding executed with the East Bay Regional Park District and UP/SP.

Roseville, CA, to Sparks, NV:

Town of Truckee

20. UP/SP shall comply with the terms of the Memorandum of Understanding executed with the Town of Truckee and UP/SP.

Placer County

21. UP/SP shall comply with the terms of the Memorandum of Understanding executed with Placer County and UP/SP.

City of Reno

22a. UP/SP shall operate no more than a daily average count of 14.7 freight trains per day through the City of Reno. (This reflects the Base Year daily average of 13.8 trains -- 12.7 freight trains and 1.1 passenger trains -- plus 2 additional freight trains.) The addition of two freight trains per day does not exceed the Board's threshold for environmental analysis at 49 CFR 1105.7(e)(5)(ii). The 14.7 average freight train count per day does not include the following types of movements: (1) maintenance-of-way trains, (2) light locomotive movements, (3) local and industry switching train movements, (4) emergency trains operated under detour authority, for snow removal, for fire or other natural disaster purposes, and wreck removal purposes. This condition will be effective upon consummation of the merger and will continue in effect for 18 calendar months in total.

22b. For the purpose of monitoring the preceding condition, UP/SP shall file on a monthly basis with the Board verified copies of station passing reports of train movements through Reno, NV, for each day of each preceding month in the specified 18-month period. These reports shall also identify those train movements, specified in the above condition, that are excluded from the 14.7 trains per day average count.

22c. UP/SP, in consultation with and subject to the approval of SEA, shall retain an independent, third-party consultant to prepare a specific mitigation study to address the environmental effects on the City of Reno of the additional rail freight traffic projected as a result of the proposed merger. This study shall be prepared under the sole direction and supervision of SEA. It shall include a final mitigation plan based on a further study of the railway, highway, and pedestrian traffic flows and associated environmental effects on the City of Reno. This study would tailor mitigation to address environmental effects such as safety, hazardous materials transport, air quality, noise and water quality. UP/SP shall comply with the final mitigation plan developed under this study.

The study, which shall be completed within 18 months from the date of consummation of the merger, shall include the following:

- Projected post-merger increases in rail freight traffic on the Sparks to Roseville line segment.
- Consultations with the City of Reno, Washoe County, the Federal Railroad Administration, affected Native American Tribes, and other appropriate Federal, state and local agencies, and other interested parties.
- Consultations with UP/SP.
- Review of all existing information and studies including those prepared by the City of Reno, Washoe County and UP/SP.
- Independent analyses.
- With respect to vehicular and pedestrian safety, mitigation measures that identify the number and location of highway/rail grade separations and rail/pedestrian grade separations in downtown Reno.
- Funding options.
- Submission of a draft study to the public for review and comment and then issuance of a final mitigation study.

22d. SEA will submit the final mitigation study and its recommendations to the Board, which shall then issue a decision imposing mitigation. In the event UP/SP and the City of Reno and other appropriate parties reach agreement on a final mitigation plan, UP/SP and the City of Reno shall immediately notify SEA, and the Board will take appropriate action consistent with such an agreement.

Chickasha, OK, to Wichita, KS:

<u>City of Wichita, Kansas</u>

23a. UP/SP shall operate no more than a daily average count of 6.4 trains per day through the City of Wichita. (This reflects the Base Year daily average of 4.4 trains plus 2 additional trains.) The addition of two trains per day essentially maintains the environmental status quo. The 6.4 average train count per day does not include the following types of movements: (1) maintenance-of-way trains, (2) light locomotive movements, (3) local and industry switching train movements, (4) emergency trains operated under detour authority, for snow removal, for fire or other natural disaster purposes, and wreck removal purposes. This condition will be effective upon consummation of the merger and will continue in effect for 18 calendar months in total.

23b. For the purpose of monitoring the preceding condition, UP/SP shall file on a monthly basis with the Board verified copies of station passing reports of train movements through Wichita, KS, for each day of each preceding month in the specified 18-month period. These reports shall also identify those train movements, specified in the above condition, that are excluded from the 6.4 trains per day average count.

23c. UP/SP, in consultation with and subject to the approval of SEA, shall retain an independent, third-party consultant to prepare a specific mitigation study to address the potential environmental effects on the City of Wichita of the additional rail freight traffic projected as a result of the proposed merger. This study shall be prepared under the sole direction and supervision of SEA. It shall include a final mitigation plan based on a study of the railway, highway, and pedestrian traffic flows and associated environmental effects on the City of Wichita. This study would tailor mitigation to address environmental effects such as safety, hazardous materials transport, air quality, and noise. UP/SP shall comply with the final mitigation plan developed under this study.

The study, which shall be completed within 18 months from the date of consummation of the merger, shall include the following:

- Projected post-merger increases in rail freight traffic on the Chickasha to Wichita line segment.
- Consultations with the City of Wichita, Sedgwick County, the Federal Railroad Administration, affected Native American Tribes, and other appropriate Federal, state and local agencies, and other interested parties.
- Consultations with UP/SP.
- Review of all existing information and studies including those prepared by the City of Wichita, Sedgwick County and UP/SP.
- Feasibility of a bypass route.
- With respect to vehicular and pedestrian safety, mitigation measures that identify the number and location of highway/rail grade separations in Wichita.
- Funding options.
- Submission of a draft study to the public for review and comment and then issuance of a final mitigation study.

23d. SEA will submit the final mitigation study and its recommendations to the Board, which shall then issue a decision imposing mitigation. In the event UP/SP and the City of Wichita and other appropriate parties reach agreement on a final mitigation plan, UP/SP and the City of Wichita shall immediately notify SEA, and the Board will take appropriate action consistent with such an agreement.

D. RAIL YARDS AND INTERMODAL FACILITIES

24. UP/SP shall consult with appropriate state and local agencies to develop noise abatement plans for rail yards in the following cities: Herington, KS; Salem, IL; and Bellmead, TX. UP/SP shall advise SEA of the results of these consultations and provide SEA with a copy of any resulting noise abatement plans.

25. To further facilitate the improvement of air quality in the States of California and Illinois, UP/SP shall consult with appropriate state and local air quality officials concerning the intermodal facilities in East Los Angeles, CA, and the Global II and Canal Street intermodal facilities in Chicago, IL. UP/SP shall advise SEA as to the status and the results of these consultations.

E. ABANDONMENTS

The following 15 abandonments and two related discontinuances are subject to the mitigation conditions specified below:

- Gurdon to Camden, AR (UP) - Docket No. AB-3 (Sub-No. 129X).
- Whittier Junction to Colima Junction, CA (UP) - Docket No. AB-33 (Sub-No. 93X).
- Magnolia Tower to Melrose, CA (UP) - Docket No. AB-33 (Sub-No. 94X).
- Alturas to Wendel, CA (SP) - Docket No. AB-12 (Sub-No. 184X).
- Towner to NA Junction, CO (UP):
  - Docket No. AB-3 (Sub-No. 130) - UP Abandonment.
  - Docket No. AB-8 (Sub-No. 38) - Discontinuance of Service by SP.
- Edwardsville to Madison, IL (UP) - Docket No. AB-33 (Sub-No. 98X).
- DeCamp to Edwardsville, IL (UP) - Docket No. AB-33 (Sub-No. 97X).
- Barr to Girard, IL (UP) - Docket No. AB-33 (Sub-No. 96).
- Whitewater to Newton, KS (UP) - Docket No. AB-3 (Sub-No. 132X).
- Hope to Bridgeport, KS (UP):
  - Docket No. AB-3 (Sub-No. 131) - UP Abandonment.
  - Docket No. AB-8 (Sub-No. 37) - Discontinuance of Service by SP.
- Iowa Junction to Manchester, LA (UP) - Docket No. AB-3 (Sub-No. 133X).
- Seabrook to San Leon, TX (SP) - Docket No. AB-12 (Sub-No. 187X).
- Suman to Benchley, TX (SP) - Docket No. AB-12 (Sub-No. 185X).
- Troup to Whitehouse, TX (UP) - Docket No. AB-3 (Sub-No. 134X).
- Little Mountain Junction to Little Mountain, UT (UP) - Docket No. AB-33 (Sub-No. 99X).

General

At all abandonment locations, the general mitigation conditions listed below apply to reduce or avoid potential environmental impacts.

26. UP/SP shall observe all applicable Federal, state, and local regulations regarding handling and disposal of any waste materials, including hazardous waste, encountered or generated during salvage of the proposed rail line.

27. UP/SP shall dispose of all materials that cannot be reused in accordance with state and local solid waste management regulations.

28. UP/SP shall restore any adjacent properties that are disturbed during right-of-way salvaging activities to pre-salvaging conditions.

29. Before undertaking any salvage activities, UP/SP shall consult with any potentially affected American Indian Tribes adjacent to, or having a potential interest in, the right-of-way.

30. UP/SP shall use Best Management Practices to encourage regrowth in disturbed areas and to stabilize disturbed soils.

31. UP/SP shall use appropriate signs and barricades to control traffic disruptions during salvage operations at or near grade crossings.

32. UP/SP shall restore roads disturbed during salvage activities to conditions as required by state or local jurisdictions.

33. UP/SP shall comply with all applicable Federal, state, and local regulations regarding the control of fugitive dust. Fugitive dust emissions created during salvage operations shall be minimized by using such control methods as water spraying, installation of wind barriers, and chemical treatment during salvaging.

34. UP/SP shall control temporary noise from salvage equipment through the use of work hour controls and maintenance of muffler systems on machinery.

35. If previously unknown archaeological remains are found during salvage operations, UP/SP shall cease work in the area and immediately contact the appropriate State Historic Preservation Officer.

36. As appropriate, UP/SP shall use appropriate technologies, such as silt screens, to minimize soil erosion during salvaging. UP/SP shall disturb the smallest area possible around streams and tributaries and shall revegetate disturbed areas immediately following salvage operations.

37. As appropriate, UP/SP shall transport all hazardous materials generated by salvage activities in compliance with U.S. Department of Transportation Hazardous Materials Regulations (49 CFR parts 171 to 180).

38. As appropriate, UP/SP shall assure that all culverts are clear from debris to avoid potential flooding and stream flow alteration, in accordance with Federal, state and local regulations.

39. As appropriate, UP/SP shall obtain all necessary Federal, state, and local permits if salvaging activities require the alteration of wetlands, ponds, lakes, streams, or rivers, or if these activities would cause soil or other materials to wash into these water resources. UP/SP shall use appropriate techniques to minimize impacts to water bodies and wetlands, such as positioning salvaging equipment on barges, matting, or skids.

Specific

The following mitigation conditions specifically apply to the abandonment under which they appear.

Gurdon to Camden, AR (UP)
Docket No. AB-3 (Sub-No. 129X)

40. UP/SP shall limit salvage activities within 1,000 feet of residences to daytime hours to mitigate noise impacts on nearby receptors.

41. To further assess the potential occurrence of threatened and endangered plants, UP/SP shall coordinate with U.S. Fish & Wildlife Service and the Arkansas Department of Game and Fish, prior to salvage activities, to determine whether surveys of vegetation types in areas of potential disturbance due to salvage activities are needed and shall conduct any such surveys during an appropriate time of year.

42. UP/SP shall retain its interest in and take no steps to alter the through-plate girder bridge at MP 436.70, until the Section 106 process of the National Historic Preservation Act (16 USC 470f, as amended) has been completed for this structure.

43. Prior to the start of salvage operations in the vicinity of the three Emergency Response Notification System (hazardous waste) spill sites, UP/SP shall contact the Arkansas Pollution Control and Ecology Department, Hazardous Waste Division, to confirm that remediation has been completed to agency satisfaction.

Whittier Junction to Colima Junction, CA (UP)
Docket No. AB-33 (Sub-No. 93X)

No specific mitigation is imposed.

Magnolia Tower to Melrose, CA (UP)
Docket No. AB-33 (Sub-No. 94X)

44. UP/SP shall retain its interest in and take no steps to alter the Magnolia Tower or WP Oakland Depot until the Section 106 process of the National Historic Preservation Act (16 U.S.C. 470f, as amended) has been completed for these structures.

Alturas to Wendel, CA (SP)
Docket No. AB-12 (Sub-No. 184X)

45. UP/SP shall retain its interest in and take no steps to alter the integrity of the 9 eligible and 11 potentially eligible prehistoric sites along this abandonment until the Section 106 process of the National Historic Preservation Act (16 U.S.C. 470f, as amended) has been completed for these sites.

Sage to Leadville, CO (SP)
Docket No. AB-8 (Sub-No. 36X) - Discontinuance of Service by SP

46. UP/SP shall provide continued access for Viacom International, Inc. to the Eagle Mine site to facilitate ongoing remediation activities.

Malta to Cañon City, CO (SP)
Docket No. AB-8 (Sub-No. 39) - Discontinuance of Service by SP

No specific mitigation is imposed.

Towner to NA Junction, CO (UP)
Docket No. AB-3 (Sub-No. 130) - Abandonment by UP
Docket No. AB-8 (Sub-No. 38) - Discontinuance of Service by SP

47. To further assess the potential occurrence of the seven threatened and endangered species of plants and animals, UP/SP shall coordinate with U.S. Fish & Wildlife Service and the Colorado Department of Natural Resources to determine if surveys in areas of potential disturbance due to salvage activities are needed and shall conduct any such surveys during an appropriate time of the year.

48. UP/SP shall consult with the Colorado Department of Public Health and Environment to confirm that assessment and remediation has been completed to the agency's satisfaction.

Edwardsville to Madison, IL (UP)
Docket No. AB-33 (Sub-No. 98X)

49. Prior to the start of abandonment activities in the vicinity of any known hazardous waste sites, UP/SP shall consult with the Illinois Environmental Protection Agency to assess procedures necessary to address issues related to the sites.

DeCamp to Edwardsville, IL (UP)
Docket No. AB-33 (Sub-No. 97X)

50. UP/SP shall retain its interest in and take no steps to alter the historic integrity of the one historic bridge until the Section 106 process of the National Historic Preservation Act (16 U.S.C. 470f, as amended) is completed.

Barr to Girard, IL (UP)
Docket No. AB-33 (Sub-No. 96)

51. UP/SP shall retain its interest in and take no steps to alter the historic integrity of the three historic bridges until the Section 106 process of the National Historic Preservation Act (16 U.S.C. 470f, as amended) is completed.

Whitewater to Newton, KS (UP)
Docket No. AB-3 (Sub-No. 132X)

No specific mitigation is imposed.

Hope to Bridgeport, KS (UP)
Docket No. AB-3 (Sub-No. 131) - UP Abandonment
Docket No. AB-8 (Sub-No. 37) - Discontinuance of Service by SP

No specific mitigation is imposed.

Iowa Junction to Manchester, LA (UP)
Docket No. AB-3 (Sub-No. 133X)

No specific mitigation is imposed.

Seabrook to San Leon, TX (SP)
Docket No. AB-12 (Sub-No. 187X)

52. U.S. Fish & Wildlife Service indicated a possible desire to obtain permission to determine if Windmill-grass is present along the rail line. Should U.S. Fish & Wildlife Service follow up with such a request, UP/SP shall cooperate in granting the necessary authorizations.

53. UP/SP shall retain its interest in and take no steps to alter the historic integrity of the through-plate girder bridges at MPs 31.99 and 38.77 until the Section 106 process of the National Historic Preservation Act (16 U.S.C. 470f, as amended) has been completed for these structures.

54. UP/SP shall continue Section 106 consultation with the Texas State Historic Preservation Officer to determine the need and extent of a recovery and treatment program for the three known archaeological sites along this segment.

55. Prior to the start of abandonment activities in the vicinity of any known hazardous waste sites, UP/SP shall contact the Texas Natural Resources Conservation Commission, Waste Management Office, to assess procedures necessary to address issues related to the sites.

56. UP/SP shall limit construction work within 1,000 feet of residences to daytime hours to mitigate noise impacts on nearby receptors.

Suman to Benchley, TX (SP)
Docket No. AB-12 (Sub-No. 185X)

57. To further assess the potential occurrence of Navasota Ladies'-tresses (*Spiranthes parksii*), a federally listed endangered species, UP/SP shall conduct a survey and consult with the U.S. Fish & Wildlife Service and the Texas Parks and Wildlife Department prior to salvage operations to determine if this species is present in any areas to be cleared or modified by the proposed abandonment.

58. UP/SP shall continue Section 106 consultation with the Texas State Historic Preservation Officer to determine the need and extent of a recovery and treatment program for the known archaeological site.

59. Prior to the start of abandonment activities in the areas containing copper slag ballast, UP/SP shall contact the Texas Natural Resources Conservation Commission, Waste Management Office, as required to assess procedures necessary to address issues related to the sites.

60. UP/SP shall retain its interest in and take no steps to alter the historic integrity of the three deck plate girder bridges at MPs 109.73, 112.96, and 117.55, until the Section 106 process of the National Historic Preservation Act (16 U.S.C. 470f, as amended) has been completed for these structures.

Troup to Whitehouse, TX (UP)
Docket No. AB-3 (Sub-No. 134X)

61. Prior to the start of abandonment activities in the vicinity of any known hazardous waste sites, UP/SP shall contact the Texas Natural Resources Conservation Commission, Waste Management Division, and other appropriate agencies as necessary to assess procedures for addressing issues related to the sites.

Little Mountain Junction to Little Mountain, UT (UP)
Docket No. AB-33 (Sub-No. 99X)

No specific mitigation is imposed.

F. CONSTRUCTION PROJECTS

General

The following mitigation conditions apply to all new construction sites not on existing right-of-way and also apply to the new construction projects that result from the BNSF agreement.

62. UP/SP shall observe all applicable Federal, state, and local regulations regarding handling and disposal of any waste materials, including hazardous waste, encountered or generated during construction of the proposed rail line connection.

63. UP/SP shall dispose of all materials that cannot be reused in accordance with state and local solid waste management regulations.

64. UP/SP shall consult with the appropriate Federal, state and local agencies if hazardous waste and/or materials are discovered at the site.

65. UP/SP shall transport all hazardous materials in compliance with U.S. Department of Transportation Hazardous Materials Regulations (49 CFR parts 171 to 180). UP/SP shall provide, upon request, local emergency management organizations with copies of all applicable Emergency Response Plans and participate in the training of local emergency staff for coordinated responses to incidents. In the case of a hazardous material incident, UP/SP shall follow appropriate emergency response procedures contained in its Emergency Response Plans.

66. UP/SP shall use appropriate signs and barricades to control traffic disruptions during construction.

67. UP/SP shall restore roads disturbed during construction to conditions as required by state or local jurisdictions.

68. UP/SP shall obtain all necessary Federal, state, and local permits if construction activities require the alteration of wetlands, ponds, lakes, streams, or rivers, or if these activities would cause soil or other materials to wash into these water resources. UP/SP shall use appropriate techniques to minimize impacts to water bodies and wetlands.

69. UP/SP shall use Best Management Practices to control erosion, runoff, and surface instability during construction, including seeding, fiber mats, straw mulch, plastic liners, slope drains, and other erosion control devices. Once the track is constructed, UP/SP shall establish vegetation on the embankment slope to provide permanent cover and prevent potential erosion. If erosion develops, UP/SP shall take steps to develop other appropriate erosion control procedures. UP/SP shall use Best Management Practices to encourage regrowth in disturbed areas and to stabilize disturbed soils.

70. UP/SP shall use only EPA-approved herbicides and qualified contractors for application of right-of-way maintenance herbicides, and shall limit such application to the extent necessary for rail operations.

71. UP/SP shall comply with all applicable Federal, state, and local regulations regarding the control of fugitive dust. Fugitive dust emissions created during construction shall be minimized by using such control methods as water spraying, installation of wind barriers, and chemical treatment.

72. UP/SP shall control temporary noise from construction equipment through the use of work hour controls and maintenance of muffler systems on machinery.

73. UP/SP shall restore any adjacent properties that are disturbed during construction activities to their pre-construction conditions.

74. Before undertaking any construction activities, UP/SP shall consult with any potentially affected American Indian Tribes adjacent to, or having a potential interest in, the right-of-way.

75. If previously undiscovered archaeological remains are found during construction, UP/SP shall cease work and immediately contact the State Historic Preservation Officer to initiate the appropriate Section 106 process.

Specific

The following mitigation conditions apply to the specific construction sites identified below.

Arkansas - Camden

76. UP/SP shall restrict mechanized equipment to upland areas to complete construction activities. UP/SP shall obtain and comply with all applicable permits for any construction activity within streams or wetlands. Also, UP/SP shall submit its final construction plans to appropriate state and local agencies for review.

77. Prior to construction, UP/SP shall provide final plans to the Arkansas Department of Transportation (Arkansas DOT) and appropriate local agencies for review.

Arkansas - Fair Oaks

78. Prior to construction, UP/SP shall provide final plans to the Arkansas DOT and appropriate local agencies for review.

Arkansas - Pine Bluff (East)

79. Prior to construction, UP/SP shall provide final plans to the Arkansas DOT and appropriate local agencies for review.

Arkansas - Pine Bluff (West)

80. Prior to construction, UP/SP shall provide final plans to the Arkansas DOT and appropriate local agencies for review.

Arkansas - Texarkana

81. Prior to construction, UP/SP shall provide final plans to the Arkansas DOT and appropriate local agencies for review.

California - Lathrop

82. UP/SP shall retain its interest in and take no steps to alter the historic integrity of the Sharpe Army Depot, until the Section 106 process of the National Historic Preservation Act (16 U.S.C. 470f, as amended) has been completed for this property.

California - Stockton (El Pifal)

83. UP/SP shall monitor noise resulting from train operations over the connection and implement mitigation measures to control excessive wheel squeal.

California - West Colton (UP to SP)

No specific mitigation is imposed.

California - West Colton (SP to UP)

No specific mitigation is imposed.

Colorado - Denver (Utah Jct.)

84. UP/SP shall retain its interest in and take no steps to alter the historic integrity of the North Yard water tower, until the Section 106 process of the National Historic Preservation Act (16 U.S.C: 470f, as amended) has been completed for this property.

Colorado - Denver

85. In and near the South Platte River and associated wetland areas, UP/SP shall restrict mechanized equipment to the area required to complete construction activities.

86. UP/SP shall perform hydrologic and hydraulic analyses for any modifications to the South Platte River bridge, to ensure the changes would have no effect on the 100-year floodplain.

87. Prior to construction, UP/SP shall consult with the Army Corps of Engineers and obtain and comply with any permits under Section 404 of the Clean Water Act.

Illinois - Girard

88. UP/SP shall consult with the District Soil Scientist of the U.S. Department of Agriculture, Natural Resources Conservation Service, for recommendations to reduce impacts to prime farmland soils.

89. Prior to construction, UP/SP shall consult with the Army Corps of Engineers and obtain and comply with any permits under Section 404 of the Clean Water Act.

Illinois - Salem

90. Prior to construction, UP/SP shall consult with the Army Corps of Engineers and obtain and comply with any permits under Section 404 of the Clean Water Act.

Kansas - Hope

91. Prior to construction, UP/SP shall consult with the Army Corps of Engineers and obtain and comply with any permits under Section 404 of the Clean Water Act.

Louisiana - Kinder

92. In and near the areas of Kinder Ditch and the fringe wetlands, UP/SP shall restrict mechanized equipment to the area required to complete construction activities.

93. UP/SP shall design all drainage structures to maintain existing flows for the Kinder Ditch.

Louisiana - Shreveport

94. UP/SP shall coordinate the design and construction of the U.S. Highway I-71 overpass pier replacement with the Louisiana Department of Transportation and the Louisiana Division of the Federal Highway Administration.

95. UP/SP shall monitor noise resulting from trains operating over the curved section of the connection and implement mitigation measures to control excessive wheel squeal.

96. Prior to construction, UP/SP shall consult with the Army Corps of Engineers and obtain and comply with any permits under Section 404 of the Clean Water Act.

Missouri - Dexter

97. Prior to construction, UP/SP shall consult with the Army Corps of Engineers and obtain and comply with any permits under Section 404 of the Clean Water Act.

98. In and near the two small wetland areas, UP/SP shall restrict mechanized equipment to the area required to complete construction activities.

Missouri - Paront

99. Prior to construction, UP/SP shall consult with the Army Corps of Engineers and obtain and comply with any permits under Section 404 of the Clean Water Act.

100. In and near the wetland areas, UP/SP shall restrict mechanized equipment to the upland areas to complete construction activities.

101. UP/SP shall coordinate with the Missouri Department of Conservation prior to final design of the project to avoid adverse impacts to the state-endangered gold-striped darter. UP/SP shall not conduct in-stream construction activities during the breeding season of this species.

Texas - Carrollton

102. UP/SP shall monitor noise from train operations over the new connection and implement mitigation measures to control excessive wheel squeal.

Texas - West Point

No specific mitigation is imposed.

Texas - Houston (Tower 26)

103. UP/SP shall monitor noise resulting from train operations over the new connection and implement mitigation measures to control excessive wheel squeal.

Texas - Houston (Tower 87)

104. UP/SP shall store all construction equipment, petroleum products, and other hazardous materials outside the area of the 100-year floodplain.

105. Prior to construction, UP/SP shall consult with the Army Corps of Engineers and obtain and comply with any permits under Section 404 of the Clean Water Act.

Texas - Houston (SP to UP)

106. UP/SP shall monitor noise resulting from train operations over the new connection and implement mitigation measures to control excessive wheel squeal.

Texas - Fort Worth (Ney Yard)

107. UP/SP shall monitor noise resulting from train operations over the new connection and implement mitigation measures to control excessive wheel squeal.

Texas - Fort Worth (UP to SP)

108. UP/SP shall monitor noise resulting from train operations over the new connection and implement appropriate mitigation measures to control excessive wheel squeal.

<u>Constructions That Result from the BNSF Agreement</u>

Richmond, CA

No specific mitigation is imposed.

Stockton, CA

No specific mitigation is imposed.

Robstown, TX

No specific mitigation is imposed.

APPENDIX H: NET EMISSIONS (AIR QUALITY)

NET EMISSIONS CONSIDERING MITIGATION MEASURES

AQCR	STATE	NAME	HC	CO	NOX	SO2	PM-10
20	AR	Northeast Arkansas	49.07	152.56	1142.00	82.75	24.76
501	AZ	Southeast Arizona	10.17	52.99	159.83	28.74	5.71
502	AZ	Pima	15.31	71.35	270.73	38.70	8.37
503	AZ	Mohave-Yuma	10.89	64.29	143.86	34.87	6.32
504	AZ	Maricopa	11.41	62.65	151.93	30.93	7.04
505	AZ	Central Arizona	13.21	65.40	219.61	35.48	7.32
24	CA	Metropolitan Los Angeles	14.6[illegible]	80.34	32.67	7.84	14.79
27	CA	Northeast Plateau	-4.[illegible]	-9.39	-114.36	-5.09	-2.06
28	CA	Sacramento Valley	-18.[illegible]	-39.90	-484.66	21.64	-8.74
30	CA	San Francisco Bay Area	10.78	39.39	184.33	12.43	7.22
31	CA	San Joaquin Valley	12.69	124.73	-43.70	61.38	9.85
33	CA	Southeast Desert	37.83	180.82	652.62	98.08	20.80
508	CA	Mountain Counties	-5.29	64.50	-446.54	28.72	0.66
34	CO	Commanche	-3.07	-9.54	-71.44	-5.18	-1.55
35	CO	Grand Mesa	-80.91	-195.49	-2084.93	-106.04	-39.31
36	CO	Metropolitan Denver	41.51	148.26	877.82	76.69	22.14
37	CO	Pawnee	22.61	70.29	526.11	38.12	11.41
40	CO	Yampa	15.93	76.06	275.03	41.25	8.75
88	IA	Northeast Iowa	-35.68	29.73	- 1337.25	16.13	-14.20
91	IA	Southeast Iowa	-5.43	4.82	-204.60	2.61	-2.15
93	IA	Southwest Iowa	-37.70	102.52	-1669.40	55.60	-13.08
65	IL	Burlington-Keokuk	-4.93	-15.33	-114.74	-8.31	-2.49
66	IL	East Central Illinois	12.26	38.12	285.34	20.68	6.19
67	IL	Metropolitan Chicago	2.01	100.68	-508.98	12.22	11.24
69	IL	Metropolitan Quad Cities	-28.46	29.78	-1088.57	16.15	-11.16
70	IL	Metropolitan St. Louis	-2.64	-1.11	-142.00	-11.41	0.82
71	IL	North Central Illinois	-9.39	23.57	-408.83	12.79	-3.31
73	IL	Rockford-Janesville-Beliot	-7.48	32.22	-373.86	17.47	-2.27
74	IL	Southeast Illinois	37.05	115.19	862.25	62.48	18.69
94	KS	Metropolitan Kansas City	39.20	-114.95	-990.68	-72.88	-17.68
95	KS	Northeast Kansas	-64.72	-201.23	-1506.28	-109.15	-32.66
96	KS	North Central Kansas	-28.66	-89.11	-667.05	-48.33	-14.46
97	KS	Northwest Kansas	3.00	9.33	69.81	5.06	1.51
99	KS	South Central Kansas	57.98	180.28	1349.43	97.78	29.26
100	KS	Southwest Kansas	-42.10	-130.90	-979.81	-71.00	-21.24
138	MO	Southeast Missouri	8.53	26.53	198.55	14.39	4.30
85	NE	Metro Omaha-Council Bluffs	-19.99	-15.28	-634.30	-8.29	-8.62
145	NE	Lincoln-Beatrice-Fairbury	1.72	5.35	40.05	2.90	0.87
146	NE	Nebraska	58.10	211.58	1240.49	114.76	30.15
12	NM	New Mexico Southern Border	29.47	147.27	485.37	79.88	16.37
154	NM	Northeastern Plains	11.88	36.94	276.50	20.04	5.99
155	NM	Pecos-Permian Basin	7.64	23.75	177.75	12.88	3.85
147	NV	Nevada	-22.61	152.87	-1330.41	82.92	-5.37
148	NV	Northwest Nevada	-10.17	0.83	-353.66	0.45	-4.25
184	OK	Central Oklahoma	34.84	108.31	810.77	8.75	17.58
185	OK	North Central Oklahoma	22.23	69.11	517.32	37.49	11.22
187	OK	Northwestern Oklahoma	13.39	41.64	311.72	22.59	6.76
189	OK	Southwestern Oklahoma	20.69	64.32	481.44	34.89	10.44
190	OR	Central Oregon	13.59	48.21	294.93	26.25	7.02
191	OR	Eastern Oregon	-50.35	42.63	-1889.72	23.12	20.02
193	OR	Portland	36.77	139.61	679.92	59.05	22.25
22	TX	Shreveport-Texarkana-Tyler	49.69	154.49	1156.43	83.80	25.07
106	TX	So. Louisiana-SE Texas	18.90	58.75	439.80	31.87	9.53
153	TX	El Paso-Las Cruces-Almagordo	13.78	122.61	33.33	66.50	9.11
210	TX	Abilene-Wichita Falls	45.00	194.89	849.01	105.71	24.19
211	TX	Amarillo-Lubbock	39.51	122.85	919.59	66.63	19.94
212	TX	Austin-Waco	-27.02	-84.00	-628.74	-45.56	-13.63
215	TX	Metropolitan Dallas-Ft. Worth	-4.37	21.72	-260.23	5.64	-0.14
217	TX	Metropolitan San Antonio	-43.63	-131.00	-1067.91	-78.12	-20.61
218	TX	Midland-Odessa-San Angelo	28.03	159.27	392.35	86.39	16.09
219	UT	Utah	15.97	108.60	159.18	58.91	9.65
220	UT	Wasatch Front	-85.51	-257.43	-2020.39	-139.63	-42.92
228	WA	Olympic-Northwest Washington	0.79	3.42	15.03	1.86	0.43
229	WA	Puget Sound	4.58	19.99	67.68	7.25	3.12
239	WI	Southeastern Wisconsin	0.81	2.51	18.82	1.36	0.41
242	WY	Metropolitan Cheyenne	8.89	110.03	-89.92	59.68	6.72
243	WY	Wyoming	-27.81	158.91	-1531.43	86.19	-7.39

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EB

SERVICE DATE - APRIL 17, 1997

SURFACE TRANSPORTATION BOARD[1]

DECISION

Finance Docket No. 32760

UNION PACIFIC CORPORATION, UNION PACIFIC RAILROAD COMPANY, AND MISSOURI PACIFIC RAILROAD COMPANY--CONTROL AND MERGER--SOUTHERN PACIFIC RAIL CORPORATION, SOUTHERN PACIFIC TRANSPORTATION COMPANY, ST. LOUIS SOUTHWESTERN RAILWAY COMPANY, SPCSL CORP., AND THE DENVER AND RIO GRANDE WESTERN RAILROAD COMPANY

[Decision No. 71]

Decided: April 15, 1997

In Decision No. 44 (served August 12, 1996), we approved the common control and merger of the rail carriers controlled by Union Pacific Corporation (Union Pacific Railroad Company and Missouri Pacific Railroad Company) and the rail carriers controlled by Southern Pacific Rail Corporation (Southern Pacific Transportation Company, St. Louis Southwestern Railway Company, SPCSL Corp., and the Denver and Rio Grande Western Railroad Company)(collectively UP/SP), subject to various conditions, including numerous environmental mitigating conditions. As pertinent here, the environmental conditions imposed in Decision No. 44 call for further, more focused, mitigation studies to arrive at specifically tailored mitigation plans for Wichita, KS and Reno, NV, in addition to the environmental mitigation that already has been imposed, to assure that localized environmental issues unique to those two communities are effectively addressed.

After Decision No. 44 was issued, the City of Wichita and the Board of County Commissioners of Sedgwick County, KS (Wichita/Sedgwick) filed an environmental court challenge in the United States Court of Appeals for the District of Columbia Circuit. No. 96-1293, City of Wichita v. Surface Transportation Board (pet. for review filed Aug. 21, 1996) (Wichita).[2] From pleadings filed in that litigation, it became apparent that the Wichita appeal is addressed solely to the sentence in Decision No. 44 (at p. 223) stating, "The [mitigation] studies [that are

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[1] Proceedings pending before the Interstate Commerce Commission (ICC) on January 1, 1996, must be decided under the law in effect prior to that date if they involve functions retained by the ICC Termination Act of 1995, Pub. L. 104-88, 109 Stat. 803. This proceeding was pending with the ICC prior to January 1, 1996, and to functions retained under Surface Transportation Board (Board) jurisdiction pursuant to new 49 U.S.C. 11323-27. Citations are to the former sections of the statute, unless otherwise indicated.

[2] Another environmental court challenge is pending in the D.C. Circuit in No. 96-1418, City of Reno v. Surface Transportation Board (Reno). The D.C. Circuit, on its own motion, ordered the Reno and Wichita appeals consolidated with the petitions for review raising issues other than environmental issues that were filed in that court. The Board and the United States have moved to sever the Reno and Wichita appeals from the other cases seeking review of Decision No. 44 and to hold briefing in abeyance in these two cases because, unlike the other petitions seeking review of Decision No. 44, the Reno and Wichita petitions are environmental court challenges that are not ripe or final for judicial review at this time. That motion remains pending in the court.

now underway for Wichita and Reno] will carefully examine private and public funding options, as we believe that the cost of mitigation for Reno and Wichita should be shared." Then, following an inquiry looking toward settlement of the Wichita litigation, petitioners' counsel in the Wichita case advised our General Counsel, by letter dated April 7, 1997,[3] that if the Board issues a decision clarifying that UP/SP will be required to pay 100% of the cost of mandated environmental mitigation, Wichita/Sedgwick will withdraw their appeal.

Petitioners' counsel states that Wichita/Sedgwick understands that, consistant with Decision No. 44, the Board is considering both "base line" mitigation, *i.e.*, mitigation including, but not limited to, the type discussed in Decision No. 44, that UP/SP would be required to implement and fund in order to increase the number of through trains operating through Wichita/Sedgwick, and alternative mitigation, *i.e.*, more expensive options. As to the latter, Wichita/Sedgwick understands that the Board may suggest funding alternatives, but such suggestions would be in no way binding. See Addendum A.

Having ascertained that UP/SP has no objection to the issuance of a decision clarifying the intent of the sentence at page 223 of Decision No. 44, quoted above, in the manner requested by Wichita/Sedgwick, it appears to us appropriate to clarify our intent with respect to developing final mitigation for Wichita and Reno. Specifically, the final environmental mitigation that will be developed for Wichita and Reno following the completion of the ongoing mitigation studies will include (in addition to the mitigation that has already been imposed) both (1) mandated or base line mitigation, which the Board will require UP/SP to implement and entirely fund, and (2) alternative mitigation that might be a more far reaching solution for all concerned, but which will not be binding absent a voluntary agreement by the parties to share costs or expend greater resources.

This action will not significantly affect either the quality of the human environment or the conservation of energy resources.

It is ordered:

1. The discussion of environmental mitigation in Decision No. 44 is clarified as set forth in this decision.

2. This decision is effective on the date of service.

By the Board, Chairman Morgan and Vice Chairman Owen.

Vernon A. Williams
Secretary

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[3] A copy of that letter is attached as Addendum A.

COPY

SURFACE TRANSPORTATION BOARD
Office of the General Counsel
Washington, D.C. 20423-0001

Tel: (202) 565-1558
Fax: (202) 565-9001

April 1, 1997

Honorable Bob Knight
Mayor
City of Wichita
455 North Main Street
Wichita, KS 67202

Re: Finance Docket No 32760: Union Pacific — Control and Merger — Southern Pacific: Wichita Mitigation Study

Dear Mayor Knight:

Elaine Kaiser, Chief of the Section of Environmental Analysis, has asked that I provide you with further clarification of my views on the issue of whether, based on the record developed in this case, the Board could order UP to construct a bypass around Wichita as an environmental mitigation measure to address the impacts of increased train traffic resulting from its approval of the UP/SP merger.

The Board has broad authority to impose conditions in railroad merger cases. 49 U.S.C. 11324(c). However, the Board's power to impose conditions is not limitless. To survive judicial review, the record must support the imposition of the condition at issue. Moreover, there must be a sufficient nexus between the condition imposed and the transaction before the agency, and the condition imposed must be reasonable. See United States v. Chesapeake & O. Ry., 426 U.S. 500, 514-15 (1976); Consolidated Rail Corp. v. ICC, 29 F.3d 706, 714 (D.C. Cir. 1994).

These considerations apply with particular force where, as here, the condition is sought to mitigate environmental damage that results from approval of a merger that satisfies all of the substantive standards for approval. It is well settled that NEPA does not require an agency to arrive at any particular substantive result, but only requires that agencies take a hard look at the environmental consequences of their decisions. E.g., Roberston v. Methow Valley Citizens Council, 490 U.S. 332, 350-51 (1989); Baltimore Gas & Elec. Co. v. NRDC, 462 U.S. 87, 97 (1983); Vermont Yankee Nuclear Power Corp. v. NRDC, 435 U.S. 519, 558 (1978). Neither the Board nor its predecessor, the ICC, has ever required an applicant in a merger case to construct a new

rail line to bypass a city, and, for the reasons discussed below, it is unlikely that a court would find that the agency acted reasonably if it were to impose such a far reaching environmental condition in the circumstances of this case.

Specifically, there is no support in agency precedent or the case law for requiring a railroad seeking merger authority to construct a new railroad line to bypass a city. Rather, as the Board indicated in its decision of August 12, 1996 (STB Decision) approving the merger (at p. 221), it has long been agency policy in developing environmental mitigation conditions to focus on the environmental impacts related to changes in traffic patterns on existing rail lines. The agency's practice consistently has been to mitigate only the conditions that result directly from the merger. The Board (like the ICC) has not imposed mitigation to remedy preexisting conditions that might make the quality of life in a particular community better, but are not a direct result of the merger before it (i.e., congestion associated with the existing UP rail line in Wichita, or the traffic of other railroads such as BN).

In short, the agency typically has used its conditioning power to require the sorts of environmental mitigation measures being considered in the Board's ongoing Wichita mitigation study: i.e., separated grade crossings and pedestrian overpasses and/or underpasses and/or more efficient railroad equipment and operating practices. That sort of mitigation, addressed to curing the effects of traffic changes on existing rail lines as a result of the merger, of course, is substantially different in scope from ordering a railroad seeking merger authority to construct an entirely new line.

The Board could impose additional types of mitigation if necessary to remedy a problem resulting from the merger itself. But I do not believe the present record shows that the merger will cause a problem in Wichita that is so significant that ordering the construction of a new rail line would be found to be reasonable. The fact that there will be a merger-related increase in traffic of eight trains a day (now potentially reduced to five trains per day) does not demonstrate that a bypass is required. As the Board noted (id. at 222 n. 268), an existing railroad can increase its level of operations without coming to the Board, and without limitation. Thus, if UP and SP had not proposed this merger, UP on its own could have increased the number of trains on its line in Wichita to any level it considers appropriate. Moreover, no concrete proposal or application for a new rail line has been presented to the Board. In the absence of an actual proposal in the record before the agency, it would be unreasonable, if not impossible, for the Board to assess a bypass project at this time.

Finally, in the ICC Termination Act of 1995 (ICCTA), Congress made it clear that the Board should approve mergers that will result in efficiency gains such as cost reductions, cost savings, and service improvements that permit a railroad to provide the same level of rail services with fewer resources or a greater level of rail service with the same resources. 49 U.S.C. 11324(b); STB Decision at 99. Requiring a railroad to undertake mitigation beyond that which is necessary to ameliorate the environmental impacts that flow directly from changes in traffic patterns that result from the merger on existing lines would undermine Congress' intent by making mergers unimaginably costly.

For these reasons, I do not believe a reviewing court would uphold a Board order requiring UP to build a bypass around Wichita based on the present record.

Sincerely yours,

Henri F. Rush
General Counsel

cc: Honorable Gary Sherrer
Honorable Tom Winters
Mr. Chris Cherches
Mr. Willard L. Stockwell
Mr. Michael Hemmer

Appendix B Wichita Mitigation Committee Membership

Appendix B
UP/SP MERGER
WICHITA MITIGATION COMMITTEE MEMBERSHIP

State Representative Al Cathcart, Coordinating Engineer Kansas DOT	**State Alternate** John Jay Rosaker, Manager Office of Rail Affairs, KDOT
County Representative David Spears, Director Sedgwick Co. Bureau of Public Services	**County Alternate** Mark Borst, Deputy Director Sedgwick Co. Bureau of Public Services
Metropolitan Area Representative Willard L. Stockwell, Chief Planner Metropolitan Area Planning Department Transportation Division	**Metropolitan Area Alternate** Vic C. Shen, Senior Planner Metropolitan Area Planning Department Transportation
City Representative Michael Lindebak, City Engineer Wichita Public Works Department	**City Alternate** Michael Thull, Civil Engineer Wichita Public Works Department
Business Representative Pamela Doonan, VP & COO Kansas World Trade Center	**Business Alternate** Bernie Koch, Government Relations Wichita Area Chamber of Commerce
Community Representatives Elizabeth Bishop, Executive Director Wichita Independent Neighborhood, Inc.	**Community Alternates** James Roseboro Northeast Heights Neighborhood Assoc.
Jeanne Goodvin, Director Wichita Citizen Participation Org.	Cathy Holdeman Wichita Citizen Participation Org.
Margalee Wright, Coordinator Neighborhood Initiative	Jane Richards Project Freedom Family & Youth Coalition
Neighboring City Representative Mike McElroy, Captain Haysville Police Department	**Neighboring City Alternate** Carol C. Neugent Director of Government Services
Laura Hill, City Clerk City of Kechi	No City of Kechi Alternate Named

Appendix C Summary of Key Issues Raised by Public Agencies and Interested Parties

Appendix C: Public Comments

SUMMARY OF KEY ISSUES RAISED BY PUBLIC AGENCIES AND INTERESTED PARTIES*

Key Issue	Topic	Sub-Topic	Specific Comment/ Question/Issue	Discussed in PMP
Environmental Impacts	Safety	Emergency Response Delays	Total delays to emergency vehicles will increase by 55%, with a large impact on the average response times, threatening the safety of local residents	6.2.3, 8.3.3, 8.4.1
			Blocked access to St. Francis medical facility may cause delays for emergency services, physicians, and organ retrieval teams	6.2.3, 7.3.3, 8.4.1
			The City of Haysville has no alternative crossings close by to use if the crossings are blocked	6.2.3, 7.3.3, 8.4.1
			The study must consider both the number of emergency vehicles delayed and the amount of time those vehicles would be delayed	6.2.3, 7.3.3, 8.4.1
		Pedestrian Safety	Increased risk to approx. 230 school children attending 11 schools w/ boundaries bisected by train tracks	6.2.4, 7.3.4, 8.4.1
			Are Haysville school districts also being considered?	6.2.4
			Will UP pay damages to families of injured children?	Response #1, attached
			As many as 90 blind pedestrians coming to and from the offices of Wichita Industries & Services for the Blind will have increased safety risks	6.2.4
		Vehicle Traffic Delays	Would increased traffic over the joint trackage between N. and S. Junction mean that trains would have to stop and block crossings to the north and south of the area?	Response #2, attached
			180,000 cars and trucks blocked daily	6.2.1, 7.2, 8.4
			Why does delay only increase 150% when the number of trains and length increase about 200%?	6.2.1
			Congestion at 8 major crossings	6.2.1, 7.2, 8.4
			Are local trains included in delay calculations?	6.2.1
			Study should consider the number of trains increased as well as the increased length of the trains	4.4, 6.2.1
			With increased delay at crossings, motorists may choose alternate routes and thus decrease the actual delay	6.2.1
			Averaging the delay per vehicle might understate the changes in delay	6.2.1
			Traffic delay information should be presented in a format that will allow the general public to understand the relative importance in the change in traffic delay	6.2.1, 7.2.7
			Motorists perceive a two minute delay at a red light as a very long time	6.2.1

* This summary provides a listing of key issues raised in correspondence, public meetings, consultations, and mitigation committee meetings.

Key Issue	Topic	Sub-Topic	Specific Comment/ Question/Issue	Discussed in PMP
Environmental Impacts (Cont.)	Safety (Cont.)	Vehicle Traffic Delays (Cont.)	Trains may block access to local businesses and workplaces	6.2.1, 7.2
			The study should use ADTs and not ground counts for analyzing traffic volumes	6.2.1, Appendix E
			Increased numbers of coal trains may disturb the on-time schedules of the local bus system, which has fixed routes operating on a "pulse" service and services 8,500 riders daily	4.4, 6.2.2
			Why is the study using the year 2000 as the basis of analysis?	6.2.1, Appendix E
			Is the traffic projection a straight line projection from 1995 traffic counts?	6.2.1, Appendix E
			Are traffic projections to the year 2020?	6.2.1, Appendix E
		Train-Vehicle Accidents	Potential for lengthy delays may increase the number of motorists trying to race trains to avoid waiting	comment noted
			Many at-grade crossings do not have crossing gates or other warning devices	6.2.5, 7.3.6
			Are accident figures used based on actual accident history or estimates?	6.2.5, Appendix H
			The study should also look at vehicle to vehicle accidents caused by trains	6.2.5
			Predicted accident rate does not include any information for BNSF tracks and therefore understates the total accident risk	6.2.5
			The latest train traffic data from the FRA is from 1995, and improved grade crossing protection may have been implemented since then, so actual accident projections may overstate the potential risk	Response #3, attached
		Derailments	Does risk of derailment increase with increased train speed?	6.2.6 & 7.3.7
			Does the risk evaluation use national accident averages or averages for urban areas?	6.2.6
	Air Quality	Federal Air Standards	Traffic backups may put Wichita out of compliance with Federal clean air standards	6.2.7, 7.3.8
			Non-compliance may be punished by withholding of funds for road and highway projects	6.2.7, 7.3.8
			UP may be liable for fines and penalties or Wichita may have to sue UP to recover fines and penalties levied on the city if Wichita violates clean air standards	6.2.7, 7.3.8
		Public Health	Air quality problems may cause dizziness and nausea, impair breathing, and affect brain function, especially in the downtown area	6.2.7, 7.3.8
	Noise & Vibration		Perceptible increases in both noise and vibration may have a negative impact on quality of life	6.2.9 & 6.2.10
			What properties are considered sensitive receptors for noise?	6.2.9
			The potential for structural damage to buildings should be considered	6.2.10
Other Potential Impacts	Property/Business Impacts	Downtown	Wichita has invested $250 million into redeveloping downtown; all of this will be wasted if people don't come downtown because of trains	6.1
		Residential	Impacts to property value should be considered	6.1, Appendix K
Other Potential Impacts (Cont.)	Property/Business Impacts (Cont.)	Business	Companies such as Boeing, Cessna, Raytheon, and NationsBank may seek compensation from UP over lost revenues on contracts	comment noted

Key Issue	Topic	Sub-Topic	Specific Comment/ Question/Issue	Discussed in PMP
			Construction of grade separations may result in loss of business during and after construction	7.2, Appendix K
			Building grade separations may require removal of businesses at certain locations	7.2, Appendix K
			Impact on shippers is important to evaluate when considering mitigation options	Response #4, attached
			Who are UP's major shipping customers in Wichita and Sedgwick County?	Response #5, attached
	Community & Neighborhood Access		The impact on the cohesiveness of Wichita's neighborhoods and the social cost of increased rail traffic are important to consider, especially on the division between east and west Wichita.	6.1
			Access to educational institutions such as Wichita State University and local schools should be considered	6.2.1, 7.2
			The City of Kechi will be affected in many ways the same as Wichita	Response #6, attached
			Trains could create a barrier for east-west access	6.2.1, 7.2
			Inner-city neighborhoods seem to be most negatively affected by increased train traffic	6, 7
		Quality of Life	How will the study measure overall impact on the quality of life in the community?	6.1
			It is unacceptable for the study only to consider quantifiable evaluation criteria; quality of life, inconvenience, and loss of business for example are immeasurable but should be considered	6.1
			Relocating businesses may mean less convenient commutes	7.2, Appendix K
Train Operations	Increased Numbers		In the past, the Rock Island Railroad used to operate 24 to 30 trains/day and it was not a problem	4.1
			City officials did not complain when BNSF increased its train traffic	comment noted
			SEA's handouts and UP's figures seem to understate the number of through trains UP proposes to run through Wichita; 13.9 is the lowest number that should be used	4.4
			There seem to be inconsistencies in UP's figures regarding number, length, and speed of trains before the merger and projected for after the merger	4.4
	Projections		The City is concerned that train traffic will increase more than projected	4.4
			Can train information from other locations be used to develop more specific projections?	4.4
			Does UP agree with the average train lengths developed by the Board's consultant based on the Anderson/Naro statement?	4.4
	System Operation		Did the train system control mechanism change with the merger?	7.2.2
			Is there a difference in rail practice between track warrants and signalized lines?	7.2.2
Train Operations (Cont.)	System Operation (Cont.)		Can UP commit to operating annual averages of specific numbers of trains through specific routes during the five-year period? After the five-year period? For how long?	Response #7, attached
			Will the proposed merger of CSX and Conrail affect UP's system operation plans?	Response #8, attached

Key Issue	Topic	Sub-Topic	Specific Comment/ Question/Issue	Discussed in PMP
	Coal Trains		Unit coal trains are just passing through Wichita; Wichita reaps no benefits and should not shoulder any responsibility for mitigating their impact	4.4
			Longer and heavier coal trains will intensify all of the impacts already anticipated	4.4
			Beyond the five-year oversight period, train traffic is likely to increase and will probably include coal trains	4.4
			Although UP earlier said it would be unrealistic to run 135-car coal trains, the Anderson/Naro statement premises the number of coal trains on the assumption that UP will run 135-car trains; will there be more trains if they have only 110 cars each?	4.4
			Are any of UP's customers for the coal trains requiring UP to operate 135-car trains?	4.4
Mitigation Study	Study Data		Use of average train speeds to measure impacts would lead to meaningless results	4.4, 6
	Options Considered		It is not a viable study of a bypass when the only possibility involves asking BNSF to share track; the study should include an option to purchase right-of-way and build a bypass	7.2.1
			The range of options considered by SEA during the study is too narrow	7.1
	Public Involvement		Sending a Board staff person and several consultants to Wichita leaves impression that there are "impossible layers of bureaucracy" and decision-makers are not hearing local concerns	2.7.3
			At Jan. 28, 1997 public meeting, there was not enough opportunity for individual citizens to make statements regarding creative options	2.7
			At the Jan. 28, 1997 public meeting, SEA seemed unwilling to hear possible solutions	2.7
			Local citizens need more information about the study process and accountability; a simple description of the complexity of the process is needed	2.7
			There is confusion as to how the mitigation study relates to the Kansas/UP study and how the Board will consider the results of the Kansas/UP study.	2.8.5, 7.2.1
			How often does the Board meet, and what is its plan for reviewing recommendations?	1.2 & 2.9
Board Jurisdiction			If the City/County built a bypass, could the Board require UP and/or BNSF to use it?	Response #9, attached
			Can the Board and/or SEA help facilitate negotiations?	2.2, 8.5

Key Issue	Topic	Sub-Topic	Specific Comment/ Question/Issue	Discussed in PMP
Board Jurisdiction (Cont.)			Can the Board require BNSF to make its right-of-way available for UP to construct a line?	7.2.1
			Can the Board require the City or other parties to fund mitigation options or otherwise participate in mitigating the impacts of UP's increased train traffic?	2.2, 8.5
			If the Board has no authority to require other parties to participate in paying for mitigation measures, why does the study investigate joint funding options?	2.2, 8.5
			Can the Board restrict train traffic beyond the five-year oversight period?	8.4.4
			Does the five-year period commence on the date of the merger?	8.4.4
Mitigation	Evaluation Criteria		What criteria will the Board use when choosing from among the mitigation options?	7.1, 8.2
	Impacts of Mitigation		The study should perform impact analysis for each mitigation option	7
	Mitigation Options	Scheduling Trains	Wichita should issue an ordinance limiting the amount of time and designating specific times that trains can legally block streets	comment noted
			Trains should be scheduled so that people will know when to expect traffic delays and can plan accordingly	8.6
			Run coal-carrying trains at night	4.4
		Bypass	With the message from SEA that the bypass is not being considered, people feel there is nothing left to talk about	7.2.1
			It might be less expensive to buy land to build new tracks around the city	7.2.1
			The study should consider a bypass option that would reroute train traffic on existing routes to avoid Wichita	7.2.1
			If improvements had been made to Nebraska tracks, those tracks could be used to avoid routing trains near Wichita	4.4
			The study should consider a bypass to the west of Wichita (Herington-Hutchinson-Harper-Wellington)	7.2.1
		Train Speed	Upgrade tracks so that trains can travel at least 40 mph	7.2.2
			Motorists and children will have more respect for faster moving trains instead of playing on tracks or trying to race the trains	7.2.2
			With a 10 mph speed limit at the curve north of Central and no signals on the track, how can train speeds be increased?	7.2.2
			What are the currently authorized maximum speeds of UP trains operating through Wichita/Sedgwick?	7.2.2
		At-Grade Crossings	The study should consider the impacts of street closures on traffic and property values	7.3.3, 8.5.4
			All intersections must have lighted signals	7.3.6
			Busier streets should have crossing gates	7.3.6

Key Issue	Topic	Sub-Topic	Specific Comment/ Question/Issue	Discussed in PMP
Mitigation (Cont.)	Mitigation Options (Cont.)	At-Grade Crossings (Cont.)	Improving crossings and gates does not necessarily mitigate environmental impacts	7.3.6
			The MacArthur crossing warrants upgrading the warning device from flashers to a gate	7.3.6
		Grade separations	When considering future train traffic, six UP crossings need grade separation: 21st North, 13th North, Central, Harry, Pawnee, and MacArthur	7.2.3-7
			The historic midtown association prefers underpasses to overpasses	7.2.3-7
			Grade separations are only realistic for areas south of Kellogg (Mt. Vernon, Mac-Arthur, 47th, and 71st)	7.2.3-7
			When examining a grade separation at Pawnee, the study should consider that the City is developing a plan that may include increasing Pawnee to six lanes	7.2.3
			When determining the need for grade separations, proximity of alternate crossings should be considered	7.2.3
		Elevated Railway	Elevation of tracks south of Kellogg would allow separation of the UP and BNSF railroad track crossing near Lincoln	7.2.7
			Railroad grade is an additional constraint to consider	7.2.7
	Funding		Wichita stands to see no economic benefits from the merger and should not have to pay to mitigate its impacts	2.8.4
			Is ISTEA money available for funding mitigation measures?	9
			Taxpayers should not have to pay for a private company to profit; with annual cost savings of $750 million, UP can afford to pay entirely for mitigation	9
			Will mitigation settlement be one lump sum or will it be ongoing?	8 & 9
			Is $91 million for improvements on the line a fixed figure or could there be more money for mitigation measures?	10
			Local taxes may rise as a result of the city having to fund mitigation measures	9
			In a comparative benefits analysis, the cycle time benefits of the OKT route for UP should be considered	6
			If an option funded by UP alone does not mitigate the impacts, would the city and others be asked to pay for part of the costs?	8.3
			With School District 259's policy of busing children over tracks, who will be responsible for ongoing costs of busing?	6.2.4, 7.3.5
			Will UP be asked to pay the full cost if the only option that mitigates the impacts makes additional improvements?	8.3
			BNSF should be included as a potential funding source	8.3, 8.6

Key Issue	Topic	Sub-Topic	Specific Comment/ Question/Issue	Discussed in PMP
Mitigation (Cont.)	Funding (Cont.)		The study should examine innovative implementation structures such as an infrastructure bank	9
			The study should examine establishing a port authority under Kansas law	Response #10, attached
			Has UP or SP ever spent anything close to $90 million to allow the rerouting of less than 10 trains per day?	Response #11, attached
	Monitoring & Compliance		Will UP be allowed to increase numbers and lengths of trains as much as market forces or freight needs require after the five-year period ends?	2.2
			The post-merger cap on increases in train traffic should be maintained until the mitigation measures are implemented	8.4
			Who will ensure compliance with measures such as increased train speeds?	8.4.4
			What recourse will the city have against UP if trains are found not to be in compliance with mitigation measures?	8.4.4

Additional Responses

1. Will UP pay damages to families of injured children?

Compensation for injuries is typically addressed through civil actions in the courts. The Board cannot require UP to pay damages to families of children injured in potential train accidents.

2. Would increased traffic over the joint trackage between N. and S. Junction mean that trains would have to stop and block crossings to the north and south of the area?

UP and BNSF operate their through trains to avoid blockage of streets in Wichita. If the route through Wichita is not clear for passage, the train is held on track or sidings outside city limits in an area that minimizes blocked crossings.

3. The latest train traffic data from the FRA is from 1995, and improved grade crossing protection may have been implemented since then, so actual accident projections may overstate the potential risk.

The train-vehicle accident formula considers several factors, including the actual accident history and type of crossing protection at each grade crossing. The SEA study team used the latest FRA accident data from 1995 as the best available data.

4. Impact on shippers is important to evaluate when considering mitigation options.

The SEA Study team considered access to existing railroad customers in developing the mitigation options to be evaluated. Options that would not provide access to existing customers were not considered in the evaluation.

5. Who are UP's major shipping customers in Wichita and Sedgwick County?

UP moves a variety of freight for various customers in Wichita. UP transports grain with its unit grain trains, rock and gravel on a unit rock train, and manifest traffic through the Wichita Yard.

6. The City of Kechi will be affected in many ways the same as Wichita.

The SEA study team evaluated environmental impacts at each grade crossing in Sedgwick County. In Kechi, increased train speed provides a similar benefit as in Wichita -- traffic delay would be reduced to less than pre-merger levels.

7. Can UP commit to operating annual averages of specific numbers of trains through specific routes during the five-year period? After the five-year period? For how long?

UP projected train traffic through Wichita for the reasonable, foreseeable future is described in Section 4. As a common carrier, UP is required to transport all freight as requested by its customers. Because market conditions change, it is difficult to predict customer needs beyond the five year projection.

8. Will the proposed merger of CSX and Conrail affect UP's system operation plans?

UP currently carries Conrail traffic from the eastern U.S., which is included in the train traffic projections. The acquisition of Conrail by CSX and Norfolk Southern is not expected to change the traffic levels on the line through Wichita.

9. If the city and county built a bypass, could the Board require UP and/or BNSF to use it?

The Board has not typically used its authority to direct a railroad to operate over specified lines. If the City and County were to construct, own, and operate a bypass, they could offer the line for use by other railroads.

10. The study should examine establishing a port authority under Kansas law.

Establishing a port authority under Kansas law is beyond the scope of the Board's jurisdiction. This approach, however, may be considered by other interested parties as part of discussions of Tier 2 options (See Section 8.5).

11. Has UP or SP ever spent anything close to $90 million to allow the rerouting of less than 10 trains per day?

As part of UP's revised operating plan for the Wichita line (coal trains rerouted through Kansas City), UP will use approximately $60 million of the planned expenditure to upgrade rail lines and yards through Kansas City.

Appendix D Train Data Analysis

Appendix D
TRAIN DATA ANALYSIS

The SEA study team reviewed information regarding train movements, conducted site visits, and contacted UP representatives to determine the pre- and post-merger train counts, lengths, and scheduling. The information provided an in-depth indication of frequencies, destinations, and times of the day when various train movements occur. The team considered three types of trains: through freight trains, local freight trains, and yard switching or work trains (industrial switchers). The two primary UP contacts were Clyde Anderson, Transportation Research and Jerry Breedlove, Manager of Train Operations for Wichita.

The SEA study team used scanner-generated passing reports supplied by UP to develop a profile of pre-merger frequencies and lengths. The scanner is located near 19th Street North. Actual train and car counts were compiled from passing reports for the period from May through September 1996. The team also compiled information from passing reports for the period from October 1996 through February 1997 to verify train calculations.

Train Counts

The team reviewed separate daily counts of the following train types:

- Through trains
- Yard and local trains
- Ark City locals (LVB 55/60)
- Dolese rock trains (OWTCK/OCKWT)
- Locomotive and rail car counts of each train

The SEA study team used these counts to determine monthly averages for each type of train and for train length. Allowing for seasonal variations, the team determined that the passing reports correlated with the pre-merger train traffic described by UP in its verified statements. For the impact analysis relying on train counts, the team used counts from the verified statements. For train lengths, the team used the calculated average length for the period from May through September 1996.

The scanner reports recorded trains passing 19th Street North, which is within the central segment of the study alignment. Included in the scanner reports were unit rock trains destined for Dolese Cement, which is north of MacArthur. Because these trains drop off their cars at the cement plants, only the locomotives continue north across Pawnee and the other crossings in the central segment through 21st Street North. The reports were adjusted by subtracting the number of unit rock trains from the through train total because, with an average length of 195 feet, traffic delays associated with the unit rock trains were more consistent with those of switching movements than those of through freight trains. The locomotives from the unit rock trains were therefore counted as switching movements.

The full count at the scanner, including the unit rock trains and adjusted for the LVO and LVB local freight trains, was used for calculations for the south segment. The same count was used for the north segment because no other information was available, and it was known that traffic was heavier to the south than the north.

The Ark City Local (LVB 55/60) operates on the study alignment only as far south as South Junction on the Wichita Union Terminal (WUT), from which point it moves onto the Burlington Northern/Santa Fe (BNSF) line to Arkansas City. Gilbert is the southernmost crossing on the study alignment that the Ark City Local passes over. It crosses Lincoln on the BNSF line.

Train Lengths

The SEA study team calculated the weighted average train length for each train type (i.e., through, local, or yard). The following calculation illustrates as an example the method for calculating the weighted average train length for through trains. Similar calculation is used for the other train types.

1. Take the daily locomotive and rail car count recorded by the scanner.

2. Multiply the rail car count by an assumed average of 57 feet per car to get the total daily length of rail cars on through freight trains.

3. Multiply the locomotive count by an assumed average length of 70 feet to get the total daily length of locomotives on through freights trains.

4. Add together the daily length of rail cars and the daily length of locomotive cars for through trains.

5. Multiply the total daily length by the number of days in the period to calculate the total length of through freight trains for the period.

6. Divide the total length by the total number of through freight trains for the period.

The average train length for the unit rock trains was not available because the scanner reports showed only the locomotive passing. The car count assumed 70.4, which was taken from the *Second Joint Verified Statement of C. L. Anderson And R. M. Naro (Statement)*, which states a length of 4,012 feet. There is no projected change in the operation of the unit rock trains, and it was assumed that this number validly reflects present and future conditions. This length was divided by the assumed average of 57 feet to arrive at an average car count of 70.4 for all unit rock trains.

The team identified the typical longest and shortest trains directly from the scanner reports. One yard train, for example, had a count of 112 cars, but the next three highest counts were 35, 30, and 30 rail cars. The 112-car train was therefore not representative of a typical train and was not identified as the longest yard train.

Train Scheduling

The team reviewed the actual arrival times for each train to determine an average arrival time for use in the traffic delay calculations.

Train Projections

The SEA study team used the verified statements to determine projected train counts and lengths. The weekly averages of train movements shown in the verified statement were converted to daily averages to correlate them to the pre-merger information. For the analysis, the team assumed that added trains would arrive at random times.

Appendix E Street Traffic Volumes

Appendix E
STREET TRAFFIC VOLUMES

The SEA study team worked closely with the Wichita-Sedgwick County Metropolitan Area Planning Department (MAPD) to develop and agree on consistent at-grade crossing vehicle traffic volumes for the traffic delay analysis. Using a combination of 1995 traffic counts, local adjustment factors, and 2020 traffic projections, the SEA study team developed average daily traffic volumes for 2000. The team used the projected 2000 traffic volumes in calculating traffic delay. The methodology for calculating traffic delay is described in Appendix F.

Table E-1 shows the 1995 and 2000 average daily traffic volumes. Table E-2 shows the roadway traffic counts provided by the City of Wichita, as well as the related K factors. K factors reflect the portion of daily traffic on a roadway during one hour of the day, and are used to convert daily traffic volumes to hourly volumes.

Table E-1
Average Daily Traffic Volumes on Roadways Crossing Railroad Tracks

Roadway	Existing 1995 Volumes	Forecast 2000 Volumes
Greenwich	784	835
101st North	527	561
61st between W. ½ mile and Oliver	2,009	2,139
Oliver	1,491	1,587
45th between Hillside and E. ½ mile	2,366	2,519
Hillside	3,185	3,391
37th between Hydraulic and Hillside	3,603	3,836
21st between Broadway & Mosely	13,853	14,747
17th between Mosely & Hydraulic	3,916	4,169
13th between Emporia & Washington	15,420	16,415
9th Street N between I-135 and E. ½ mile	1,666	1,774
Murdock between Emporia & Washington	10,376	12,000
Central between Emporia & Washington	16,309	17,362
Lincoln between Emporia & Washington	11,282	12,010
Harry between Emporia & Washington	14,150	15,063
Mt. Vernon between Emporia & Washington	5,676	6,042
Pawnee between Emporia & Washington	25,338	26,973
MacArthur between I-235 and Broadway	14,358	15,285
47th S. between Seneca and E. ½ mile	12,198	12,985
55th S. between Seneca and E. ½ mile	4,643	4,943
63rd S. between Seneca and E. ½ mile	5,651	6,016
71st S. between Seneca and E. ½ mile	10,281	10,945
79th Street South	980	1,043
103rd Street South	1,289	1,372
Meridian	786	837
119th South	148	158
Total	182,285	195,007

Table E-2
Highway Traffic Volumes Provided by the City of Wichita

Time	37th St. North	21st St. North	17th St. North	13th St. North	Murdock	Central	Lincoln	Harry	Mount Vernon	Pawnee	MacArthur	47th St. South	55th St. South	Total	K Factor
Count Date	04/26/93	02/16/94	05/11/94	05/11/94	05/12/94	05/12/94	05/18/94	05/17/94	05/14/94	05/18/94	01/24/94	01/25/94	01/25/94		
12 A.M.	32	137	26	180	93	169	102	225	61	417	249	121	43	1,855	0.011
1 A.M.	36	72	19	92	45	85	78	124	27	240	166	78	36	1,098	0.007
2 A.M.	30	52	4	72	29	59	56	91	22	182	53	46	20	716	0.004
3 A.M.	6	31	12	60	35	45	30	61	17	77	58	50	11	493	0.003
4 A.M.	22	96	16	66	47	60	40	76	24	167	127	71	33	845	0.005
5 A.M.	65	214	49	191	113	156	113	167	65	367	424	151	82	2,157	0.013
6 A.M.	287	375	93	666	431	445	390	428	202	1,024	807	403	51	5,602	0.033
7 A.M.	460	976	290	1,237	993	1,326	955	841	385	1,465	893	521	31	10,373	0.062
8 A.M.	323	841	211	1,063	761	1,405	810	873	353	1,406	620	461	2	9,129	0.054
9 A.M.	305	817	217	911	582	1,283	634	796	263	1,293	588	452	1	8,142	0.048
10 A.M.	279	884	226	962	641	1,266	688	870	306	1,367	649	556	2	8,696	0.052
11 A.M.	327	993	270	1,073	726	1,556	687	974	344	1,593	712	769	216	10,240	0.061
12 P.M.	328	1,232	349	1,112	744	1,535	804	1,121	386	1,779	717	815	289	11,211	0.067
1 P.M.	306	1,060	287	978	767	1,539	815	1,014	323	1,658	781	758	273	10,559	0.063
2 P.M.	369	1,059	333	1,179	868	1,525	809	1,081	389	1,794	977	754	355	11,492	0.068
3 P.M.	425	1,077	376	1,282	898	1,595	1,060	1,200	533	2,187	1,478	1,021	501	13,633	0.081
4 P.M.	374	1,227	375	1,334	969	1,689	1,171	1,305	618	2,151	1,406	1,135	529	14,283	0.085
5 P.M.	386	1,152	379	1,129	866	1,646	1,194	1,262	581	2,115	1,029	1,133	590	13,462	0.080
6 P.M.	181	920	214	1,003	502	1,060	629	821	383	1,763	700	753	428	9,357	0.056
7 P.M.	139	538	155	760	414	782	489	622	303	1,467	477	535	268	6,949	0.041
8 P.M.	70	511	137	647	300	614	414	557	234	1,401	378	430	273	5,966	0.036
9 P.M.	73	428	125	620	271	573	363	523	242	1,299	341	306	214	5,378	0.032
10 P.M.	68	307	57	467	218	414	285	424	151	878	226	231	118	3,844	0.023
11 P.M.	58	178	48	341	204	211	133	251	88	542	215	160	91	2,520	0.015
Total	4,949	15,177	4,268	17,425	11,517	21,038	12,749	15,707	6,300	28,632	14,071	11,710	4,457	168,000	1.00

Appendix F Vehicular Traffic Delay

Appendix F
VEHICULAR TRAFFIC DELAY

The study team calculated the amount of time that vehicles are delayed at grade crossings when the crossings are blocked by trains. The calculation served to identify the effect that trains have upon traffic operations. The Environmental Assessment prepared during the merger review process addressed this issue, but the Wichita Mitigation Study offered the opportunity to develop a more detailed model and to use data collected in Wichita in the calculations and for calibrating the model.

Total traffic delay is measured in vehicle-hours. This measure represents the total delay for all affected vehicles. Another measure used by the study team is average vehicle delay, which represents the average amount of time a vehicle is stopped due to a train crossing. These two measures are useful because they indicate both the delay for the average driver and the sum of the individual vehicle delays.

Delay consists of two components: crossing blockage and queue dissipation. The crossing blockage delay begins when a vehicle enters the queue and ends when the gate goes up. The queue dissipation delay is the time between the end of crossing activation until the vehicle leaves the queue. The sum of these two components is the delay for the vehicle.

The study team created a computer model to estimate delay. The model takes into account the following factors:

- The amount of time that a crossing is blocked by a train. This factor depends upon the train length and speed.
- The additional time before and after train passes that the warning device is activated.
- The vehicle traffic volumes for each roadway during each hour of the day.
- The number of roadway lanes.
- The time from the end of the crossing activation until the first vehicle begins moving.
- The discharge rate at which vehicles leave the queue.

For each roadway and each train that would block the crossing, the model calculates the number of vehicles affected, the average and total vehicular delay, and the crossing blockage time. Since this procedure accounts for the queue dynamics resulting from varying traffic volumes and crossing blockage times, it is more accurate than the procedure used in the EA.

To enhance the applicability of the model to the Wichita Mitigation Study, the study team obtained field data in Wichita for use in the model. The study team performed field surveys at the following five grade crossings in the City of Wichita on the UP rail line:

- 37th Street North
- 13th Street North
- Central
- Pawnee
- MacArthur

The study team selected these locations to have varying land use and traffic characteristics so that the data would represent general traffic patterns and driver behavior in Wichita.

During the week of the data collection, the city of Wichita Traffic Engineering Department performed directional tube counts at these same crossing locations. The City staff reported the counts to the SEA study team by fifteen-minute increments for use in model calibration.

Due to a lack of train activity on the day the surveys were conducted at 37th Street, the other four locations provided the survey data points for this study. The study team obtained automatic directional traffic recorder counts along these roadways for approximately one week. The purpose of the traffic counts was to obtain actual traffic demand during the hours that trains passed a crossing.

Personnel were stationed at each of the five crossings for one day in order to measure vehicle delay when a train passed. The information the study team collected when a train passed included:

- Type of train.
- Direction of train.
- Train speed.
- Amount of time warning device was activated prior to train arrival and after the train passed.
- The number of vehicles in queue at 30-second intervals after the initial warning activation. Included in this count are the queue build-up while the train passed and queue dissipation after the train passed.
- The total time vehicles were delayed.

This data collection resulted in observations of vehicular delay for different volumes of highway traffic and for different amounts of time that highway traffic was stopped. The study team developed and calibrated a series of equations based upon the field measurements in order to

determine the average vehicle delay and the total delay experienced at each crossing. The equations were applied to the following conditions:

- Pre-merger train operations.
- Post-merger train operations without additional mitigation.
- Post-merger train operations with each mitigation option.

Pre-Merger Vehicular Delay

The pre-merger calculations were based upon the following information:

- Through train volumes identified in UP's verified statement, described in Appendix D.
- Local freight trains and yard train information obtained from UP, also described in Appendix D.
- Train speeds obtained from a combination of Wichita-Sedgwick County Metropolitan Area Planning Department (MAPD) observations and maximum timetable speeds.
- Train lengths for both through trains and local and yard trains obtained from reports from a UP scanner in Wichita.
- Times of the day of travel of trains reflecting actual times of operation during a sample period.
- Projected 2000 traffic volume forecasts derived from 1995 traffic counts and 2020 traffic projections and agreed upon by the MAPD staff and the SEA study team.

Post-Merger Vehicular Delay

The post-merger calculations, based on the following information were performed by adding the additional trains resulting from the merger to the pre-merger train activity:

- Through train volumes identified in UP's verified statement, described in Appendix D.
- Same local freight and yard operation trains used in pre-merger analysis.
- For analysis of no additional mitigation, same speeds as described in pre-merger condition. Train speeds were revised when considering increasing speeds as a mitigation measure.
- Train lengths for merger-related through trains as described in UP's verified statement.

- Times of day of the merger-related additional through trains derived from a random function to reflect the unpredictable times of train operation.

- Same times of day of travel by local and yard trains as used in pre-merger analysis.

- Projected 2000 traffic volume forecasts as described in pre-merger discussion.

Description of Analysis

In order to determine the pre-merger and post-merger vehicular delay at the rail crossings, the following basic equations were used.

Event Time = [Time of Crossing Activation] + [Traffic Start-up Time] + [Time of Vehicle Queue Dissipation]

Time of Crossing Activation = [Train Length/Train Speed] + [Crossing Activation Time Before and After Train Passes]

$$\text{Time of Vehicle Queue Dissipation} = \frac{\text{[Maximum Vehicular Queue]}}{\text{[Vehicle Departure Rate]} - \text{[Vehicle Arrival Rate]}}$$

Maximum Vehicular Queue = [Time of Crossing Activation] x [Vehicle Arrival Rate]

Average Vehicular Delay = Time of Crossing Activation//2

Volume of Traffic Delayed = [Highway Arrival Rate] x [Event Time]

Total Vehicular Delay = [Average Vehicular Delay] x [Volume of Traffic Delayed]

$$\text{Total Vehicular Delay can also be expressed as: } \frac{\text{[Highway Arrival Rate]} \times \text{[Event Time]}^2}{2}$$

The relationships shown in these equations indicate that (1) the event time decreases as the train speed increases, (2) the average vehicular delay is directly proportional to the event time, (3) the volume of traffic affected by the event is proportional to the event time, and (4) the total vehicular delay is proportional to the square of the event time.

A detailed description of these equations follows:

Delay Equations

In order to measure the average delay per vehicle and the total vehicular delay at each crossing, the following equations were used.

The total time the grade crossing indication was activated was determined as follows:

$$T_{CA} = [\frac{L}{Vx88/60} + (GD + GU)]/60$$

Where

T_{CA}	=	Total time crossing is activated, in minutes
L	=	Train length, in feet
V	=	Train speed, in miles per hour
88/60	=	Conversion factor from miles per hour to feet per second
GD+GU	=	Crossing activation time before and after train passes. Observations indicated 43 seconds as the typical amount of time
60	=	Conversion from seconds to minutes

The arrival rate per lane of highway traffic at the time the train was crossing was determined as follows:

$$A = \frac{VOL_{ADT} \times K \times D \times CAL_v}{60}$$

where:

A	=	Highway traffic arrival rate in vehicles per minute
VOL_{ADT}	=	Average daily traffic volume on highway
K	=	Percentage of daily traffic during the hour of the train crossing
D	=	Directional split of two-way traffic. Assumed even split in each direction, or 0.5
CAL_v	=	Volume calibration factor of 0.83
60	=	Conversion from hours to minutes

The maximum vehicle queue per lane on a highway approach was determined as follows:

$$Q_{max} = T_{CA} \times A$$

where:

Q_{max}	=	Maximum vehicle queue
T_{CA}	=	Total time crossing is activated, in minutes
A	=	Highway traffic arrival rate, in vehicles per minute

The time needed for queued traffic to completely disperse was determined as follows:

$$T_{DIS} = \frac{Q_{max}}{DEP - A}$$

where:

T_{DIS}	=	Time for queued traffic to completely disperse, in minutes.
Q_{max}	=	Maximum vehicle queue
DEP	=	Highway traffic departure rate per lane after crossing is no longer activated, in vehicles per minute. Observations indicated departure rate of 22.5 vehicles per minute per lane.
A	=	Highway traffic arrival rate, in vehicles per minute.

The total amount of time during which highway traffic flow is affected by a train crossing is called the event time and was determined as follows:

$$T_{EV} = T_{CA} + \frac{T_s}{60} + T_{DIS}$$

where:

T_{EV}	=	Event time, in minutes
T_{CA}	=	Total time crossing is activated, in minutes
T_S	=	Vehicle start-up lost time to reflect lower vehicle departure rates for first three vehicles in queue. A figure of 2 seconds was assumed in this study
T_{DIS}	=	Time for queued traffic to completely disperse, in minutes
60	=	Conversion from seconds to minutes

The volume of traffic on a single highway affected by a train crossing is called the event volume and was determined as follows:

$$VOL_{EV} = A \times T_{EV} \times N_A$$

where:

VOL_{EV}	=	Volume of highway traffic affected by a single train crossing, in vehicles
A	=	Highway traffic arrival rate, in vehicles per minute
T_{EV}	=	Event time, in minutes
N_A	=	Number of roadway approaches, 2 for a two-way road

The total volume of highway traffic on a highway affected by all trains crossing that highway is called the total event volume and was determined as follows:

$$\text{Total VOL} = \sum VOL_{EV\,(i + \ldots\ldots\ldots + n)}$$

where:

Total VOL = Total volume of traffic on a highway affected by all trains, in vehicles
n = Total number of trains per day

The average delay per vehicle at a crossing affected by a single train was determined as follows:

$$T_{AV,EV} = \frac{T_{CA}}{2} \times CAL_D$$

where:

$T_{AV,EV}$ = Average delay resulting from a train crossing a highway, in minutes per vehicle
T_{CA} = Total time crossing is activated, in minutes
2 = Based on assumption that vehicles arrive at a crossing in a uniformly distributed random manner.
CAL_D = Average delay calibration factor of 1.21

The total vehicular delay resulting from a train crossing a highway was determined as follows:

$$T_{TOT,EV} = T_{AV,EV} \times VOL_{EV}$$

where:

$T_{TOT,EV}$ = Total vehicular delay resulting from a train crossing a highway, in minutes
$T_{AV,EV}$ = Average delay resulting from a train crossing a highway, in minutes per vehicle
VOL_{EV} = Volume of traffic affected by a train crossing a highway, in vehicles

The total vehicular delay resulting from all trains crossing a highway is the overall vehicular delay. This was calculated as follows:

$$\text{Overall } T_{TOT} = \sum T_{TOT,EV\,(i + \ldots\ldots + n)}$$

where:

Overall T_{TOT} = Overall vehicular delay resulting from all trains crossing a highway, in minutes.

n = Total number of trains per day

The overall average delay per vehicle resulting from all trains crossing a highway was determined as follows:

$$Overall\ T_{TOT,AV} = \frac{Overall\ T_{TOT}}{Total\ VOL}$$

where:

Overall $T_{TOT,AV}$ = Average delay per vehicle resulting from all trains crossing a highway, in minutes per vehicle.

Overall $T_{TOT\,AV}$ = Overall vehicular delay resulting from all trains crossing a highway, in minutes

Total VOL = Total volume of traffic on a highway affected by all trains, in vehicles

Explanation of Values Contained in Equations

This section describes the values of various terms contained in the delay equations.

L *Length of trains.* The UP passing report for May to September 1996 showed the average length of pre-merger through trains to be 3,380 feet long. The additional merger-related through trains were assumed to be 5,618 feet long for central Wichita, 5,581 feet long for the Lost Springs to Wichita segment and 5,554 feet long for the Dolese Plant to Chickasha segment. The lengths of local and yard trains were assumed to vary depending upon the number of cars and locomotives. These lengths were 196, 442, 1497, and 2693 feet. The lengths of the local and yard trains did not change between pre- and post-merger conditions.

V *Train speed.* Train speeds under pre-merger conditions and post-merger without further mitigation were obtained from a combination of City of Wichita observations and maximum timetable speeds. The City measured speeds at various crossings within the Wichita yard limit. Speeds at locations near these crossings were calculated by interpolation or were assumed to be the same as observed speeds. Trains at crossings

outside the yard limit were assumed to operate at the maximum timetable speed considering the acceleration characteristics of the trains. Since there was no differentiation between northbound and southbound trains, train speeds for the two directions were assumed to be the same. In addition, local train speeds were assumed to be the same as through train speeds. Table F-1 shows the train speeds at the grade crossings.

GD+GU *Grade crossing activation time before and after train passes.* Measurements taken during the data collection effort showed an average of 43 seconds.

VOL_{ADT} *Average daily traffic volume.* The volumes used in this study were obtained from the city's compilation of existing and forecast ADT volumes. The city provided 1995 existing and year 2020 forecast ADT volumes for each of the crossings. The volumes for each of these two years were totaled. Volumes along each of the roadways were assumed to increase from 1995 to 2000 by the interpolated increase of the totals between 1995 and 2020. Adjustments were made to reflect the scheduled widening of Murdock Street to a five-lane cross-section and its resulting attractiveness as a travel route. The 1995 and the resulting 2000 ADT volumes are shown in Appendix E.

K *Percentage of daily traffic during the hour of train crossing.* The hours of through train operations are scattered in unpredictable patterns throughout the day. The UP stated that there is no regular schedule of through train activity. As a result, a random function was applied to assign pre-merger trains and the additional merger-related trains to hours of the day. Highway traffic volume information provided by the city was used to determine the percentage of daily traffic occurring during the hours of train operation. Appendix E shows a compilation of hourly and daily volumes and the resulting hourly percentages.

D *Directional split of two-way traffic.* Consistent with past city assumptions, this study used the assumption that hourly volumes are evenly split in each direction.

CAL_V & CAL_D *Calibration factors.* The volume calibration factor of 0.83 was applied to the highway traffic arrival rates due to discrepancies between field-measured arrival rates and the hourly traffic counts performed on that highway during the same hour. The average delay calibration factor of 1.21 was used to adjust computed average vehicle delay to observed field data. Testing during the model validation process indicated that use of these factors would result in an R^2 value for average vehicular delay of 0.94.

DEP *Highway traffic departure rate per lane.* Measurements taken during the data collection effort showed that the average departure rate of stopped traffic was 22.5 vehicles per lane per minute.

T_s *Time for highway traffic to start moving after the crossing is no longer activated.* Measurements taken during data collection showed a start-up time of 2 seconds.

n — *Total number of trains per day.* The average daily number of pre-merger through trains ranges from 3.6 to 4.4 per day, depending upon the location within the study area. To create whole number of daily trains, these averages were multiplied by five to represent the trains over five representative days. The resulting pre-merger train count is 18 to 22 trains on five days. The increase in the average daily number of through trains resulting from the merger ranges from 5.4 to 5.6 per day, depending upon the location within the study area. This represents 27 to 28 trains on five days. The resulting average daily total number of post-merger through trains ranges from 9 to 10 per day. This equals 45 to 50 through trains on five days, depending upon location within the study area.

The average number of local trains per day is 6.7. The operation of local trains was converted to a daily pattern to create whole numbers of trains per day. The pre-merger and post-merger number of local trains is the same.

$T_{AV,EV}$ — *Average delay from a train crossing a highway.* The average delay on a highway resulting from a single train was calculated by averaging the delay experienced by the first vehicle affected by the crossing event, which equals the total time the crossing is activated, and the delay experienced by the last vehicle that approaches while the crossing is activated, which is zero.

$T_{TOT,EV}$ — *Total vehicular delay resulting from a train crossing a highway.* This was calculated by adding the delays experienced by all vehicles affected by a train crossing a highway.

Overall T_{TOT} — *Overall vehicular delay resulting from all trains crossing a highway.* The overall delay that occurs daily from all trains crossing a highway was calculated by adding the total vehicular delays resulting from each of the trains. For the purpose of this study, the 5-day amount was divided by 5 to produce the daily delay.

Overall $T_{TOT,AV}$ — *Overall average delay per vehicle resulting from all trains crossing a highway.* This is the average delay per vehicle that results from all daily trains crossing a highway.

DESCRIPTION OF DATA COLLECTION

Data were collected at five railroad grade crossings in Wichita, Kansas in March 1997 in order to develop a model to be applied to at-grade crossings. These roadways have differing physical characteristics and traffic volumes. The roadways are as follows:

Roadway	Description	Adjacent Land Use and Setting
37th Street	two-lane roadway	Industrial, outlying
13th Street	four-lane street	Commercial, urban
Central Avenue	four-lane street	Commercial, urban
Pawnee Road	four-lane undivided	Retail/residential, outlying
MacArthur Avenue	four-lane divided	Industrial, outlying

Only one short train crossed 37th Street on the day of data collection. This provided an inadequate sample for this study. As a result, the model was based upon the other four listed roadways.

Two teams of two people each were involved in the data collection. The teams were positioned on opposite sides of the railroad tracks, enabling data to be collected for both directions of highway traffic. One person on each team (Person A) remained at the grade crossing during the entire event of the train crossing the roadway. The second person (Person B) moved with the vehicle queue away from the tracks as it formed. Each person carried a stopwatch.

Both people started their stopwatches at the time the crossing signal was activated, which represents the start of the train crossing event. Person B counted the number of vehicles in queue at 30-second intervals after the initial warning activation. After the grade crossing warning ended, Person B continued to count the number of vehicles still entering the queue at the 30-second intervals until the vehicle backup dissipated. After the grade crossing warning ended, Person A counted the number of vehicles crossing the tracks at 30-second intervals until the backup dissipated.

Person A also measured the amount of time the crossing warning device was activated before and after the train passed.

Other information obtained included train identification and train speeds. Train speeds were obtained either by measuring the amount of time needed for the train to pass two points along the tracks or by use of a radar gun, when one was available. In addition, Person B also placed a mark at the back of the 10th vehicle in queue in order to establish the actual number of feet per vehicle in order to assist in determining queue length in feet.

Each person completed a field data sheet for each train crossing. The crossing location, date, time of day, lead engine number, and automobile traffic direction were used to group the four data sheets for each event.

Data Reduction

During the five-day data collection period 40 events were recorded on the field data collection sheets. The data were condensed into a single ASCII text file. The data for each event were organized in the following manner:

1st Line:	Crossing location
2nd Line:	Day, Date, Time of crossing
3rd Line:	Train number, Direction, Type, Number of cars, Speed in m.p.h.
4th Line:	Begin warning time, train crossing time, end warning time
5th Line:	Traffic direction
6th - Line x:	Person A data (number of vehicles exiting queue during 30-second period)
Line x:	Time at end of queue
Line x+1 to Line y:	Person B data (number of vehicles entering queue during 30-second period)
Line y+1 to z :	Data for other direction of travel

Train speeds were not taken for all events. For those events where no speed data was available, the speed was listed as 0 mph.

A QBasic program was written to read the crossing data text file and create a summary for each event. The program input the crossing and event description lines. One-dimensional arrays containing the number of vehicles that arrived, departed, and remained in the queue for each 30-second interval were created with the array positions corresponding to the 30-second time intervals, (i.e. 1= 0 -30 seconds, 2= 30 seconds - 1 minute, etc.). The maximum number of vehicles in the queue was calculated at the time the gate was fully raised and the first vehicle began moving. The information noted by Person A on the data sheet identified the time the queue dissipated. In addition to the information regarding the 30-second intervals, the program also produced an event summary. The summary included crossing location, day, date, direction, type, and speed of train, time of crossing, begin and end warning times, total event time, vehicles affected, total delay, average delay, and maximum queue. A sample output for one event is listed below:

Central Avenue	Wednesday	3/12/97	6:40 AM	
Engine	Direction	Type	# cars	speed
UP 3305	SB	Manifest	112	10.9 mph
Beginning	End	End Warning		
0:31	7:38	7:50		
Direction	Total Delay	Total Vehs.	Max Queue	Av. Veh. Delay
Eastbound	7380 secs	28	28	4 min 23 secs
Westbound	8910 secs	36	35	4 min 7 secs

Model Calibration

The model calibration assumed uniform arrival rates for vehicles approaching the crossing and a uniform departure rate for vehicles crossing the tracks after the train passed. The observed vehicle arrival rate was lower than the observed vehicle departure rate. The queuing system was closed, which means that all vehicles remained in the system. In the case of multi-lane roadway approaches, traffic was observed to be evenly distributed to each lane.

The above assumptions and observations result in a triangular-shaped queue model with the maximum queue at the point at which the first vehicle is discharged from the queue. The following field data were used as parameters for the model:

1. Vehicle arrival rate equal to the tube-count hourly volume for the time of the crossing.

2. Vehicle departure rate equal to 22.5 vehicles/minute/lane (1350 vphpl). This rate is the average of the queue discharge for the 40 observations and does not account for the start up lost time of 2 seconds experienced by the first three vehicles in queue.

3. Crossing activation time of 35 seconds before the train passes and crossing activation time of 8 seconds after the train passes.

4. Actual train crossing time.

5. Vehicle spacing of 25 feet per vehicle (average of values measured in field).

Model development started with the following equations:

1. Event Time = Time Crossing is Activated + Traffic Start-Up Time + Vehicle Queue Dissipation Time

2. Queue Dissipation Time = Maximum Queue/(Vehicle Departure Rate - Vehicle Arrival Rate)

3. Maximum Queue = Vehicle Arrival Rate x Time Crossing is Activated

4. Average Vehicular Delay = Crossing Activation Time/2

5. Total Vehicles Delayed = Highway Arrival Rate x Event Time

6. Total Vehicle Delay = Event Time x Total Vehicles Delayed

These tube-count data collected by the City of Wichita were used in the model calibration process. Delay calculations using the model were performed using the appropriate directional volumes that were obtained from the tube counts and that correspond to the times that the trains passed the crossings. The results of these delay calculations are contained in Table F-1 which shows the grade crossing model calibration.

The results from the delay calculation using the calibrated model showed a one percent difference from observed results when comparing (1) vehicle arrival rates, (2) train crossing event times, and (3) vehicular delay times.

QBasic Computer Model Description

The calibrated delay model was coded in QBasic for application. The model used the formulas listed above.

The program input data from four ASCII text files. The XINGINFO.TXT file contained specific crossing information as shown below:

Sample:

Crossing	ADT	#Lanes	Post-Merger Speed	Pre-Merger Speed	Segment
Greenwich	835	1	40	40	1

Crossing is the name of the street. *ADT* is the 2000 average daily traffic on the street at the crossing. *Post-merger speed* is the post-merger train speed at the crossing in mph. *Pre-merger speed* is the pre-merger train speed at the crossing in mph. *Segment* is designated as *1* for the Lost Springs-Wichita segment, *2* for the central Wichita segment, and *3* for the Dolese Plant-Chickasha segment.

The ATTRIBS.TXT contained traffic volume K (hourly distribution) and d (directional) factors specific to the crossing. The file was organized in two line groups for each crossing. The first line contained the K factors for each hour from 12:00 midnight-1:00 A.M. to 11:00 P.M.-12:00 midnight. The second line contained the eastbound d factor for the crossing, again starting and ending at midnight.

The LOCALS.TXT file contained information on each local train, the crossings it affects and the hour each train passes the crossings. The file was organized in a matrix with the events as columns and the crossings as rows. For each crossing, the column contains either a 0 if the train does not cross the roadway or an integer from 1 to 24, representing the hour of the crossing if the train crosses the roadway.

Table F-1
Grade Crossing Model Validation

Highway Crossing	Date	Time	Highway Traffic Direction	Observed		Adjusted Tube Count Data			Activation Before Train (Min:Sec)	Train Crossing (Min:Sec)	Activation After Train (Min:Sec)
				Event Vol (Vehicles)	Arrival Rate (Veh./min.)	Hourly Vol (Veh./hr.)	Event Vol (Vehicles)	Arrival Rate (Veh./min.)			
13th	3/11/97	6:35 am	EB	9	6.0	159	4	2.7	00:29	00:45	00:08
13th	3/11/97	6:35 am	WB	8	4.8	332	9	5.5	00:29	00:45	00:08
13th	3/11/97	9:57 am	EB	25	7.1	287	15	4.8	00:38	02:06	00:06
13th	3/11/97	9:57 am	WB	20	5.7	564	34	9.4	00:38	02:06	00:06
13th	3/11/97	10:20 am	EB	17	7.7	574	21	9.6	00:39	00:58	00:06
13th	3/11/97	10:20 am	WB	6	3.3	306	10	5.1	00:39	00:58	00:06
13th	3/11/97	7:20 pm	EB	45	5.8	247	29	4.1	00:49	05:37	00:09
13th	3/11/97	7:20 pm	WB	55	6.9	259	30	4.3	00:49	05:37	00:09
Central	3/12/97	6:33 am	EB	5	2.0	157	6	2.6	00:33	01:29	00:13
Central	3/12/97	6:33 am	WB	5	2.0	209	8	3.5	00:33	01:29	00:13
Central	3/12/97	6:50 am	EB	17	4.3	209	12	3.5	00:29	02:56	00:13
Central	3/12/97	6:50 am	WB	8	2.1	157	10	2.6	00:29	02:56	00:13
Central	3/12/97	8:48 am	EB	55	6.3	564	82	9.4	00:31	06:11	00:24
Central	3/12/97	8:48 am	WB	99	11.7	403	55	6.7	00:31	06:11	00:24
Central	3/12/97	9:11 am	EB	24	4.3	516	45	8.6	01:11	03:31	00:16
Central	3/12/97	9:11 am	WB	48	8.4	430	36	7.2	01:11	03:31	00:16
Central	3/12/97	10:30 am	EB	28	9.4	483	26	8.1	00:23	01:53	00:07
Central	3/12/97	10:30 am	WB	23	8.2	541	29	9.0	00:23	01:53	00:07
Central	3/12/97	12:21 pm	EB	21	12.6	583	18	9.7	00:22	00:41	00:08
Central	3/12/97	12:21 pm	WB	15	10.6	673	21	11.2	00:22	00:41	00:08
Central	3/12/97	12:51 pm	EB	11	8.8	583	14	9.7	00:20	00:23	00:07
Central	3/12/97	12:51 pm	WB	15	13.6	673	17	11.2	00:20	00:23	00:07
Central	3/12/97	1:38 pm	EB	31	6.6	611	49	10.2	00:32	03:01	00:14
Central	3/12/97	1:38 pm	WB	60	12.0	652	54	10.9	00:32	03:01	00:14
Central	3/12/97	6:40 pm	EB	37	4.3	390	60	6.5	00:31	07:07	00:12
Central	3/12/97	6:40 pm	WB	39	4.7	340	51	5.7	00:31	07:07	00:12
MacArthur	3/14/97	6:29 am	EB	63	11.3	332	28	5.5	00:38	03:46	00:02
MacArthur	3/14/97	6:29 am	WB	24	5.0	228	19	3.8	00:38	03:46	00:02
MacArthur	3/14/97	3:07 pm	EB	48	8.9	656	59	10.9	00:48	03:21	00:02
MacArthur	3/14/97	3:07 pm	WB	72	13.4	784	75	13.1	00:48	03:21	00:02
MacArthur	3/14/97	4:34 pm	EB	28	7.6	523	37	8.7	00:35	02:40	00:04
MacArthur	3/14/97	4:34 pm	WB	21	5.7	676	51	11.3	00:35	02:40	00:04
Pawnee	3/13/97	11:14 am	EB	8	7.0	686	16	11.4	00:25	00:20	00:07
Pawnee	3/13/97	11:14 am	WB	17	15.0	611	14	10.2	00:25	00:20	00:07
Pawnee	3/13/97	2:24 pm	EB	16	12.6	814	16	13.6	00:36	00:08	00:05
Pawnee	3/13/97	2:24 pm	WB	9	8.7	714	14	11.9	00:36	00:08	00:05
Pawnee	3/13/97	6:11 pm	EB	51	11.3	675	47	11.3	00:37	02:23	00:08
Pawnee	3/13/97	6:11 pm	WB	78	17.3	746	53	12.4	00:37	02:23	00:08
Pawnee	3/10/97	7:03 pm	EB	87	10.5	591	76	9.9	00:37	05:17	00:08
Pawnee	3/10/97	7:03 pm	WB	76	8.6	581	74	9.7	00:37	05:17	00:08
Averages				33	8	488	33	8	00:35		00:08
Percent Difference							0%[1]	1%[2]			

[1] Comparison with average observed event volume.
[2] Comparison with average observed arrival rate.

Table F-1
Grade Crossing Model Validation (cont.)

Highway Crossing	Date	Time	Highway Traffic Direction	Event Time (Min:Sec)		Total Vehicle Delay (Sec./Veh.)			Average Vehicle Delay (Sec./Veh.)		
						Observed	Computed		Observed	Computed	
							Field Data	Assumptions		Field Data	Assumptions
13th	3/11/97	6:35 am	EB	01:30	01:36	519	446	226	57	50	53
13th	3/11/97	6:35 am	WB	01:40	01:42	424	397	503	52	50	53
13th	3/11/97	9:57 am	EB	03:30	03:11	1780	2571	1559	70	103	102
13th	3/11/97	9:57 am	WB	03:30	03:34	2590	2057	3439	129	103	102
13th	3/11/97	10:20 am	EB	02:13	02:09	980	1059	1259	57	62	61
13th	3/11/97	10:20 am	WB	01:48	01:56	513	374	607	85	62	61
13th	3/11/97	7:20 pm	EB	07:45	07:00	8658	10754	6634	192	239	230
13th	3/11/97	7:20 pm	WB	08:00	07:02	12430	13144	6990	225	239	230
Central	3/12/97	6:33 am	EB	02:30	02:22	338	408	497	67	82	80
Central	3/12/97	6:33 am	WB	02:30	02:25	458	408	675	91	82	80
Central	3/12/97	6:50 am	EB	04:00	03:59	2461	2242	1845	144	132	132
Central	3/12/97	6:50 am	WB	03:53	03:55	1114	1055	1359	139	132	132
Central	3/12/97	8:48 am	EB	08:48	08:44	13861	14175	20576	251	258	250
Central	3/12/97	8:48 am	WB	08:26	08:08	21572	25515	13693	217	258	250
Central	3/12/97	9:11 am	EB	05:37	05:15	4348	4327	6944	180	180	154
Central	3/12/97	9:11 am	WB	05:43	05:03	8126	8654	5575	169	180	154
Central	3/12/97	10:30 am	EB	02:58	03:11	2230	2422	2424	79	87	94
Central	3/12/97	10:30 am	WB	02:48	03:16	1816	1990	2783	78	87	94
Central	3/12/97	12:21 pm	EB	01:40	01:48	657	902	890	31	43	51
Central	3/12/97	12:21 pm	WB	01:25	01:52	588	644	1068	38	43	51
Central	3/12/97	12:51 pm	EB	01:15	01:25	272	333	550	24	30	40
Central	3/12/97	12:51 pm	WB	01:06	01:28	204	454	660	13	30	40
Central	3/12/97	1:38 pm	EB	04:40	04:50	5008	4257	6678	161	137	136
Central	3/12/97	1:38 pm	WB	05:00	04:55	8034	8240	7263	133	137	136
Central	3/12/97	6:40 pm	EB	08:39	09:11	7769	10521	16978	209	284	284
Central	3/12/97	6:40 pm	WB	08:22	08:59	8936	11090	14494	229	284	284
MacArthur	3/14/97	6:29 am	EB	05:36	05:08	8421	10139	4634	134	161	163
MacArthur	3/14/97	6:29 am	WB	04:48	04:56	3520	3862	3053	133	161	163
MacArthur	3/14/97	3:07 pm	EB	05:23	05:22	7046	7289	8686	146	152	148
MacArthur	3/14/97	3:07 pm	WB	04:45	05:43	9912	10934	11051	137	152	148
MacArthur	3/14/97	4:34 pm	EB	03:41	04:13	2610	3371	4514	92	120	123
MacArthur	3/14/97	4:34 pm	WB	03:40	04:31	2722	2528	6257	129	120	123
Pawnee	3/13/97	11:14 am	EB	01:09	01:24	469	252	617	38	31	38
Pawnee	3/13/97	11:14 am	WB	01:08	01:22	310	535	532	26	31	38
Pawnee	3/13/97	2:24 pm	EB	01:16	01:12	328	557	507	34	30	31
Pawnee	3/13/97	2:24 pm	WB	01:02	01:09	393	332	426	36	30	31
Pawnee	3/13/97	6:11 pm	EB	04:30	04:08	7916	5801	5243	154	114	113
Pawnee	3/13/97	6:11 pm	WB	04:30	04:17	8758	8872	5996	112	114	113
Pawnee	3/10/97	7:03 pm	EB	08:15	07:41	25372	19054	16512	291	219	218
Pawnee	3/10/97	7:03 pm	WB	08:50	07:39	16575	16645	16158	217	219	218
Totals				167.82	167.99	210038	218610	210354	4800	5058	5001
Percent Difference					0%[1]		4%[2]	0%[2]		5%[3]	4%[3]

[1] Comparison with sum of observed event times.
[2] Comparison with sum of observed total delays.
[3] Comparison with sum of average delays.

The last input file contained the hours of through train operation. This file, SCHEDULE.TXT, is a series of integer values 0 to 23 representing the hour of each through train. The pre-merger through trains were listed first, followed by the additional merger-related through trains.

For each crossing, the program read the crossing specific data from the XINGINFO.TXT file and the K factors from the ATTRIBS.TXT file. It then read the time for the first train and completed the equations described above. In addition, the program added the delay, event volume, and event times for each train. After the calculations for all pre-merger through trains were completed, the program repeated the calculations for the additional through trains resulting from the merger followed by the local trains. After completing calculations for the local trains, the totals for the pre-merger through trains, additional through trains, and local trains were divided by five to arrive at values for an average weekday. The program computed all data for the first crossing, then continued until it finished all crossings. The output file is an ASCII text file named by the user, with the following information:

Crossing, Pre-merger through train delay, Post-merger through train delay, Local train delay

This information was input into an Excel file to produce a formatted output table.

Attachment A

Crossing Data Text File

The following is a description of the format of the text file containing the crossing data gathered in the field.

1st Line:	Crossing location
2nd Line:	Day, Date, Time of crossing
3rd Line:	Train number, Direction, Type, Number of cars, Speed in m.p.h.
4th Line:	Begin warning time, Train crossing time, End warning time
5th Line:	Traffic direction
6th - Line x:	Person A data (number of vehicles exiting queue during 30-second period)
Line x:	Time at end of queue
Line x+1 to Line y:	Person B data (number of vehicles entering queue during 30-second period)
Line y+1 to z:	Data for other direction of travel

The crossing data collected in the field is listed below. This information was input directly into the Qbasic program used to calculate crossing delay for the field data.

Central Avenue
Wednesday, 3/12/97, 6:40 PM
UP 3305, SB, Manifest, 112, 10.9
0:31, 7:38, 7:50
Eastbound
8
27
2
8:39
3
0
4
0
4
0
1
3
2
2
0
4
0
5

Westbound
10
38
8:30
5
0
0
2
5
2
2
1
0
5
4
2
3
1
3
1
Central Avenue
Wednesday, 3/12/97, 12:21 PM
SF 839, NB, Manifest, 23, 0
0:22, 1:03, 1:11
Eastbound
14
7
1:40
8
2
Westbound
15
1:25
4
10
1
Central Avenue
Wednesday, 3/12/97, 12:51 PM
SKOL 797, SB, Thru, 14, 0
0:18, 0:41, 0:47
Eastbound
4
7
1:15
4

Westbound
9
6
1:06
2
10
Central Avenue
Wednesday, 3/12/97, 1:38 PM
UP 2237, NB, Local, 60, 12.6
0:34, 3:36, 3:50
Eastbound
1
26
4
4:40
8
5
1
6
2
4
Westbound
17
28
15
5:00
10
10
4
10
4
5
5
5
2
Central Avenue
Wednesday, 3/12/97, 10:30 AM
BN 7895, NB, Grain, 78, 28.2
0:22, 2:14, 2:21
Eastbound
5
24
3:00
7
7
2
2

Westbound
24
2:50
8
3
2
2
4
Central Avenue
Wednesday, 3/12/97, 6:50 AM
UP 2742, SB, Local, 43, 0
0:30, 3:26, 3:38
Eastbound
13
4:00
3
3
0
4
6
1
Westbound
8
3:53
4
0
0
1
1
0
2
Central Avenue
Wednesday, 3/12/97, 8:48 AM
UP 3329, NB, Manifest, 80, 8.9
0:31, 6:45, 7:06
Eastbound
12
13
16
14
8:55
4
4
2
1
2
1
2
6

14
3
6
5
2
Westbound
22
54
25
8:30
15
4
1
4
1
13
2
6
9
5
2
9
9
1
Central Avenue
Wednesday, 3/12/97, 6:33 AM
SF 3680, SB, Local, 20, 9.9
0:34, 2:04, 2:15
Eastbound
5
2:30
1
0
2
Westbound
5
2:30
3
0
0
2

Central Avenue
Wednesday, 3/12/97, 9:11 AM
CK 2233, NB, Local, 54, 10.2
1:11, 4:43, 4:58
Eastbound
20
3
5:37
3
5
0
5
0
3
1
2
3
2
Westbound
26
20
5:42
7
3
6
6
2
3
2
2
11
6
37th Street
Monday, 3/10/97, 12:37 PM
UP 1095, NB, Unknown, 0, 0
0:47, 1:08, 1:19
Eastbound
0
1:19
0
Westbound
2
1
1:32
0
3

Pawnee Road
Thursday, 3/13/97, 6:11 PM
[illegible] 3829, SB, Manifest, 71, 18.1
0:37, 3:00, 3:08
Eastbound
14
20
17
4:30
13
12
3
12
Westbound
22
27
29
4:30
18
10
3
8
9
10
7
8
Pawnee Road
Monday, 3/10/97, 7:03 PM
CNW 5502, NB, Empty Grain, 103, 13.2
0:36, 5:55, 6:02
Eastbound
22
19
23
15
8
8:15
11
11
17
12
5
4
4
7
5
5

Westbound
20
20
23
13
7:50
8
7
5
3
7
4
11
5
5
2
2
6
2
Pawnee Road
Thursday, 3/13/97, 2:24 PM
UP 222, NB, Light, 2, 0
0:36, 0:44, 0:48
Eastbound
6
10
1:16
9
Westbound
8
1
1:02
8
1
Pawnee Road
Thursday, 3/13/97, 11:14 AM
UP 2210, SB, Local, 10, 17.1
0:24, 0:43, 0:49
Eastbound
3
5
1:09
6
Westbound
6
11
1:08
9
4

13th Street
Tuesday, 3/11/97, 10:20 AM
UP 2210, NB, Local, 19, 13.5
0:40, 1:38, 1:44
Eastbound
9
8
2:13
3
6
4
Westbound
6
1:48
5
1
0
13th Street
Tuesday, 3/11/97, 6:35 AM
UP 2742, SB, Local, 18, 0
0:31, 1:16, 1:22
Eastbound
9
1:30
6
2
1
Westbound
4
4
1:40
4
2
2
13th Street
Tuesday, 3/11/97, 9:57 AM
UP 2237, NB, Local, 59, 17.0
0:40, 2:46, 2:52
Eastbound
4
21
3:30
0
6
2
2
4
10

Westbound
7
13
3:30
7
5
3
2
13th Street
Tuesday, 3/11/97, 7:20 PM
SP 8017, SB, Manifest, 94, 11.6
0:54, 6:27, 6:36
Eastbound
16
18
11
7:45
6
0
1
2
1
6
2
2
4
2
7
5
1
Westbound
16
21
18
8:00
6
3
4
3
6
3
4
1
5
2
4
5
3

MacArthur Avenue
Friday, 3/14/97, 3:07 PM
UP 259, NB, Manifest, 94, 17.6
0:48, 4:10, 4:11
Eastbound
16
23
9
5:23
4
9
1
4
10
5
5
Westbound
24
15
4:45
6
9
5
6
13
13
10
8
2
MacArthur Avenue
Friday, 3/14/97, 4:34 PM
UP 9402, NB, Empty Grain, 78, 19.8
0:36, 3:15, 3:17
Eastbound
12
29
3:54
4
5
1
5
2
3

Westbound
15
6
3:40
7
2
4
1
MacArthur Avenue
Friday, 3/14/97, 6:29 AM
UP 9020, SB, Grain, 100, 18.7
0:40, 4:24, 4:25
Eastbound
3
32
24
4
5:36
4
6
7
8
7
3
4
6
Westbound
25
4:50
1
7
3
0
2
5
1
2
-1

QBasic Data Summary Program

A QBasic program was written to summarize the information contained in the text file xingdata.txt. The program reads the information contained in the text file and outputs a summary file with information on each crossing event. The summary file is organized in groups of 8 lines for each event as follows:

Line 1: Crossing Location, Day, Date, Time
Line 3: Engine Number, Train Direction, Train Type, Number of Cars, Train Speed
Line 5: Beginning of Train Crossing, End of Train Crossing, End of Warning Period
Lines 7,8: Traffic Direction, Total Vehicle Delay (Seconds), Total Vehicles Affected, Maximum Queue, Average Vehicle Delay

The full output summary file is listed below and on the following pages.

```
_________________
Central Avenue                Wednesday     3/12/97       6:40 AM
Engine          Direction     Type          # cars        speed
UP 3305         SB            Manifest       112           10.9  mph
Beginning       End           End Warning
0:31            7:38          7:50
Direction       Total Delay   Total Vehs.   Max Queue     Av. Veh. Delay
Eastbound        7616 secs     37            30            3  min 25  secs
Westbound        8923 secs     48            35            3  min 5  secs
_________________
Central Avenue                Wednesday     3/12/97       12:21 PM
Engine          Direction     Type          # cars        speed
SF 839          NB            Manifest       23            0  mph
Beginning       End           End Warning
0:22            1:03          1:11
Direction       Total Delay   Total Vehs.   Max Queue     Av. Veh. Delay
Eastbound        637 secs      21            10            0  min 30  secs
Westbound        588 secs      15            14            0  min 38  secs
_________________
Central Avenue                Wednesday     3/12/97       12:51 PM
Engine          Direction     Type          # cars        speed
SKOL 797        SB            Thru           14            0  mph
Beginning       End           End Warning
0:18            0:41          0:47
Direction       Total Delay   Total Vehs.   Max Queue     Av. Veh. Delay
Eastbound        244 secs      11            4             0  min 21  secs
Westbound        191 secs      15            3             0  min 12  secs
_________________
Central Avenue                Wednesday     3/12/97       1:38 PM
Engine          Direction     Type          # cars        speed
UP 2237         NB            Local          60            12.6  mph
Beginning       End           End Warning
0:34            3:36          3:50
Direction       Total Delay   Total Vehs.   Max Queue     Av. Veh. Delay
Eastbound        5007 secs     31            30            2  min 41  secs
Westbound        8060 secs     60            48            2  min 13  secs
```