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**FINAL ENVIRONMENTAL ASSESSMENT
March 1999**

FINANCE DOCKET NO. 33652

**UNION PACIFIC RAILROAD COMPANY
—ACQUISITION AND OPERATION EXEMPTION—
MID MICHIGAN RAILROAD, INC.
(RAIL LINE BETWEEN SAINT JOSEPH, MISSOURI AND UPLAND, KANSAS)**

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SEA'S CONCLUSIONS

SEA has completed an extensive review of the potential environmental impacts of the proposed Union Pacific Railroad Company (UP) acquisition of a rail line owned by Mid-Michigan Railroad, Inc., which operates the Northeast Kansas and Missouri Railroad (NEKM). In its review, SEA identified potential adverse impacts in only four issue areas (air quality, noise, freight rail operations safety, and highway/rail at-grade crossing safety). SEA believes that it has developed comprehensive, reasonable, and practical environmental mitigation recommendations that address all potential adverse environmental impacts in the four issue areas.

Based on its extensive independent analysis of all of the available information, SEA concludes that the proposed acquisition of the NEKM rail line segment by UP would not significantly affect the quality of the human environment if the recommended mitigation measures set forth in this Final EA are imposed and implemented. Accordingly, SEA recommends that the Board impose the mitigation measures listed in Chapter 4, "Recommended Environmental Conditions," as conditions in any final decision approving the proposed Acquisition.

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EXECUTIVE SUMMARY

The Surface Transportation Board (the Board), Section of Environmental Analysis (SEA), prepared this Final Environmental Assessment (Final EA) to identify and evaluate the potential environmental impacts of the acquisition by Union Pacific Railroad (UP) of a rail line between St. Joseph, Missouri and Upland, Kansas from the Northeast Kansas and Missouri Railroad (NEKM), a subsidiary of Mid-Michigan Railroad, Inc. (hereinafter referred to as the “proposed Acquisition”).

UP (the Petitioner) filed a Petition for Exemption (Petition) with the Board on August 25, 1998, seeking exemption under 49 U.S.C. 10502 from the prior approval requirements of 49 U.S.C. 11323-25 for the acquisition and operation of an approximate 107-mile long NEKM rail line from Mid-Michigan Railroad, Inc.¹ The Board will decide whether to grant or deny UP’s petition and will address potential environmental issues associated with the proposed Acquisition. It may impose environmental conditions it deems appropriate.

The Board is required to issue an exemption if it decides that application of all or part of otherwise-applicable law (1) is not necessary to carry out the rail transportation policy of 49 U.S.C. 10101; and (2) either the transaction is of limited scope, or regulation is not necessary to protect shippers from an abuse of market power.

SEA concludes that if the Board imposes SEA’s final recommended environmental mitigation conditions, the proposed Acquisition would not have any significant adverse environmental impacts. The Board will consider the entire environmental record, the Draft EA and Final EA, all public comments, and SEA’s final environmental mitigation recommendations in making its final decision on the proposed Acquisition.

Figure ES-1, “Proposed NEKM Acquisition,” shows the rail line segment between Saint Joseph, Missouri and Upland, Kansas that UP seeks to acquire. SEA analyzed the potential environmental effects of changes in rail traffic that would occur if the Board grants the Petition. During its environmental review process, SEA considered a broad range of environmental issues that could affect communities on a regional and local level. This approach allowed SEA to identify and assess potential environmental impacts and develop reasonable environmental mitigation. During the review process, SEA sought input from agencies, elected officials, organizations, businesses, and individuals. In developing reasonable environmental mitigation to address potential adverse environmental effects of the proposed Acquisition, SEA balanced the various perspectives and

¹ Finance Docket No. 33652, *Union Pacific Railroad Company – Acquisition and Operation Exemption – Mid-Michigan Railroad, Inc. (Rail Line between Saint Joseph, Missouri and Upland, Kansas)*.

INSERT FIGURE ES-1 PROPOSED NEKM ACQUISITION

Figure ES-1 Proposed NEKM Acquisition

concerns that the public raised and the range of environmental effects and issues.

On a regional basis, SEA identified several environmental benefits to air quality, freight rail operations safety, and fuel consumption that would result from overall rail system improvements and operating efficiencies, but no adverse environmental effects. On a local or site-specific basis, SEA identified potential adverse environmental effects in four issue areas (air quality, noise, freight rail operations safety, and highway/rail at-grade crossing safety) and has recommended reasonable mitigation measures that the Board could require UP to perform as conditions of approval. SEA believes that if the Board imposes SEA's final recommended environmental mitigation conditions, the proposed Acquisition would not have any significant adverse environmental impacts.

The Final EA fully adopts and incorporates the Draft EA. SEA intends that this Final EA, which includes modifications and additions to the Draft EA, be used in conjunction with the Draft EA to provide complete documentation of SEA's environmental review process.

PURPOSE AND NEED FOR THE PROPOSED ACQUISITION

UP states that the acquisition of the NEKM rail line would be an integral part of its Service Recovery program to add additional capacity to its Central Corridor. UP would use the NEKM rail line primarily to route westbound empty coal trains from the Kansas City, Kansas area to their destination in the Powder River Basin in Wyoming. The rerouting of the empty coal trains would relieve capacity constraints on UP's mainline track between Kansas City, Topeka and Upland, Kansas—thereby reducing train delay and improving freight delivery reliability and rail operations efficiency. UP also states that the proposed Acquisition would improve market access to shippers on the NEKM rail line.

DESCRIPTION OF THE PROPOSED ACTION

The proposed Acquisition would allow UP to acquire the NEKM rail line between St. Joseph, Missouri and Upland, Kansas. NEKM currently operates approximately one train per day on its system, serving agricultural and other customers along its approximate 107-mile length. UP would use the NEKM rail line to reroute westbound empty coal trains over the NEKM rail line between Hiawatha, Kansas and Upland, Kansas. These coal trains currently use two routes to move between Kansas City, Kansas and Gibbon, Nebraska, as follows:

- Approximately 5.7 empty coal trains per day move north from Kansas City, Kansas through Hiawatha, Kansas to Omaha, Nebraska. At Omaha, these trains head west to Gibbon, Nebraska.
- Approximately 9.3 empty coal trains per day move west from Kansas City, Kansas to Topeka, Kansas. At Topeka, these trains head north through Upland and Marysville, Kansas then on to Gibbon, Nebraska.

The rerouting of the empty coal trains would increase the train traffic by approximately 9.3 trains per day on UP's existing mainline between Kansas City, Kansas and Hiawatha, Kansas. Train traffic would increase by an average 15 trains per day between Hiawatha, Kansas and Upland, Kansas. There would be no change in train traffic on the NEKM rail line between St. Joseph, Missouri and Hiawatha, Kansas. Figure ES-2, "Estimated Rail Traffic Changes from the Proposed Acquisition," shows UP's estimate for changes in freight train traffic that would occur on rail line segments that would be affected by the proposed Acquisition. Of the 16 rail line segments that the proposed Acquisition would affect, five rail line segments would experience traffic increases, 10 rail line segments would experience traffic decreases, and one rail line segment would experience no change in train traffic.

THE BOARD'S ENVIRONMENTAL REVIEW PROCESS

The Board is an independent Federal regulatory agency with jurisdiction over certain surface transportation matters, including railroad acquisitions and mergers. When it determines that a transaction is consistent with the public interest, the Board is required by statute to approve and authorize the proposed transaction.

The Board's decision is a Federal action requiring environmental review under the National Environmental Policy Act (NEPA). As part of its environmental analysis, the Board considers potential beneficial, and potential adverse environmental effects. SEA is responsible for conducting the environmental review on behalf of the Board, and making final environmental mitigation recommendations to the Board.

In imposing environmental mitigation conditions, the Board has consistently focused on the potential environmental impacts that would result directly from Acquisition-related changes in activity levels on existing rail lines and at rail facilities. The Board's practice consistently has been to mitigate only those conditions that result directly from a proposed transaction. The Board typically does not require mitigation for pre-existing environmental conditions, such as effects associated with current railroad operations.

SEA'S ACTIVITIES SINCE THE DRAFT EA

After SEA issued the Draft EA, SEA undertook several activities related to the environmental review of the proposed Acquisition. SEA requested that UP provide a Verified Statement regarding operating data and assumptions that SEA used in its environmental analysis. SEA conducted additional analyses based on additional information received from UP and the public during the

**INSERT FIGURE ES-2
ESTIMATED TRAFFIC CHANGES FROM THE PROPOSED
ACQUISITION**

Figure ES-2 Estimated Rail Traffic Changes From the Proposed Acquisition

comment period. SEA has documented its methods, analysis results, and responses to comments in this Final EA.

SUMMARY OF ENVIRONMENTAL EFFECTS

In its environmental review of the proposed Acquisition, SEA evaluated the following potential environmental impact areas:

- Freight Rail Operations Safety.
- Highway/Rail At-grade Crossing Safety.
- Highway/Rail At-grade Crossing Delay.
- Highway/Rail At-grade Crossing Emergency Vehicle Response.
- Energy.
- Air Quality.
- Noise.
- Environmental Justice.
- Cumulative Effects.

SEA also evaluated the construction of a proposed 820-foot rail line connection that UP would construct as part of the proposed Acquisition. SEA reviewed this construction project for potential adverse environmental effects that may occur outside railroad right-of-way.

SEA determined that the proposed Acquisition would have several positive effects on the environment. These benefits would occur on a regional basis, primarily through providing increased efficiency on existing routes. These potential benefits include reductions in fuel consumption, emissions, and freight rail accidents because of a reduction in train-miles traveled by trains that would use the shorter NEKM route.

SEA also concluded that several environmental issue areas may experience adverse environmental effects because of the proposed Acquisition. These include the following: (1) freight rail operations safety on the Kansas City-Atchison, Atchison-Hiawatha, and Hiawatha-Upland rail line segments that would experience the largest increases in freight rail traffic; (2) two highway/rail at-grade crossings (i.e., one in Sabetha, Kansas and one in Seneca, Kansas) that could experience adverse effects from proposed freight train increases; (3) increases in County-wide emissions in four counties (i.e., Atchison, Brown, Nemaha, and Marshall), and; (4) increased noise along the Hiawatha-Upland rail line segment.

In evaluating other environmental issue areas, SEA determined that there would be no potential adverse impacts for the following issue areas:

- Highway/Rail At-grade Crossing Emergency Vehicle Response.
- Highway/Rail At-grade Crossing Delay.

- Energy.
- Regional Air Quality.
- Environmental Justice.
- Cumulative Effects.

SEA also determined that there would be no potential adverse impacts from the construction of the proposed rail line connection at Hiawatha, Kansas.

SUMMARY OF PUBLIC COMMENTS

SEA provided a 30-day period (ending January 20, 1999) during which the public could review and comment on the Draft EA for the proposed Acquisition. Based on some initial public comment requesting more time, SEA extended the comment period to February 4, 1999. To alert potentially affected communities and individuals of SEA's environmental review and to encourage their comments, SEA conducted an extensive mail notification process. SEA encouraged all who received or reviewed the Draft EA to comment on environmental issues, SEA's technical analysis, and the scope and adequacy of SEA's preliminary recommended mitigation measures.

In preparing this Final EA, SEA carefully reviewed the comments it received. Overall, SEA received six documents and some telephone calls with comments and on potential environmental effects of the proposed Acquisition.

Most of the comments received concerned potential Acquisition-related effects on highway/rail at-grade crossing safety, potential emergency response vehicle delay, and noise. Based on the comments received, SEA refined its analysis of highway/rail at-grade crossing delay and noise for the Final EA. SEA also requested that UP provide a verified statement for some of the operating assumptions used in the analysis of potential environmental effects on the Hiawatha-Upland rail line segment, including the estimated number of additional trains that would use the rail line segment, the estimated length of the trains, and the estimated train speed.

SEA'S FINAL ENVIRONMENTAL MITIGATION RECOMMENDATIONS

In developing final environmental mitigation recommendations, SEA fully considered all public comments and conducted additional analyses where appropriate. UP also volunteered to implement several mitigation measures to address highway/rail at-grade crossing safety, emergency response vehicle delay, and noise in affected communities. As a result, SEA changed several mitigation recommendations from the Draft EA to reflect concerns of commentors. (See Chapter 3, "Summary of Comments and Responses," for more information) SEA believes that it has developed comprehensive, reasonable, and practical environmental mitigation recommendations that would address potential adverse environmental effects of the proposed Acquisition.

SEA encourages the negotiation of mutually acceptable solutions to site-specific issues. Indeed, by joint petition filed March 12, 1999, UP, the City of Seneca, Kansas (the City) and the Nemaha Valley Parent Teacher Association (NVPTA) requested that compliance with their jointly developed Memorandum of Understanding (MOU) entered into on March 12, 1999, be prescribed as a condition in lieu of any other environmental mitigation conditions that might be imposed with respect to UP operations through the City. The MOU indicates that the comments filed by the City and NVPTA regarding the Draft EA will be deemed to have been automatically withdrawn on the service date of a Board order imposing compliance with the MOU. SEA recommends that the Board grant the requested condition requiring that UP comply with the terms of the MOU.

Generally, negotiated agreements are more effective, and in some cases, more far reaching than environmental options the Board would impose unilaterally. Therefore, if UP and other affected communities execute any negotiated agreement after the Final EA, the parties can ask the Board to include compliance with the terms of those negotiated agreements as conditions of approval of the proposed Acquisition as an alternative to local and site-specific mitigation recommended here.

Based on its independent analysis of all the information available at this time and review of public comments received, SEA concludes that the proposed Acquisition would not significantly affect the quality of the human environment if UP implements the recommended mitigation measures set forth in this document. The final mitigation recommendations are as follows:

Safety: Freight Rail Operations

Condition 1. UP shall comply with the requirements in the Federal Railroad Administration's (FRA) Proposed Rule for "gross ton-mile based" inspections (49 CFR Part 213.237, Docket No. RST-90-1) on the following rail line segments in Kansas:

- Kansas City-Atchison.
- Atchison-Hiawatha.
- Hiawatha-Upland.

FRA's Proposed Rule includes a provision that specifically requires railroads to conduct track inspections to detect rail flaws on a rail line segment at least once every 40 million gross tons per track mile or annually, whichever is more frequent. If FRA's Final Rule imposes a different inspection standard, then UP shall comply with the standard in the Final Rule.

Safety: Highway/Rail At-grade Crossings

Condition 2. UP shall continue its consultation with the Federal Railroad Administration (FRA), the Kansas Department of Transportation (KDOT) and the communities along the Hiawatha-Upland corridor to implement the recommendations of the Corridor Review Team composed of UP, FRA, and

KDOT.

Condition 3. Subject to any agreement reached in ongoing consultations pursuant to Condition 2, UP shall upgrade the highway/rail at-grade crossing warning device at 6th Street in Sabetha, Kansas from crossbucks to flashing lights.

Condition 4. As agreed to by UP, UP shall undertake the following measures:

- a. UP will provide Operation Lifesaver programs in the future as requested by communities on the Hiawatha-Upland rail line segment.
- b. UP will install UP's standard private crossing signs and stop signs at all private highway/rail at-grade crossings which are open to public use.
- c. UP will upgrade, where necessary, all existing highway/rail at-grade crossing signal circuitry to accommodate the proposed rail operations.
- d. At all highway/rail at-grade crossings with active warning devices, UP will post a visible emergency toll free 800 number to be called if signal crossing devices malfunction.
- e. UP will provide toll free numbers to all emergency response forces in communities affected by the proposed Acquisition. These numbers will provide access to appropriate UP personnel who may be contacted by communities in emergency situations.
- f. UP will offer Grade Crossing Collision Investigation classes and emergency response training to law enforcement agencies and first responders in affected communities.
- g. To enhance highway/rail at-grade crossing safety, UP will undertake vegetation control procedures along the Hiawatha-Upland corridor.

Noise

Condition 5. UP shall consult with state and local officials to find suitable approaches for mitigating the adverse noise effects in the following communities on the Hiawatha-Upland rail line segment in Kansas:

- Hamlin
- Morrill
- Sabetha
- Oneida
- Baileyville
- Axtell

- Beattie
- Home

Mitigation for a specific community may include a combination of: (1) eliminating highway/rail at-grade crossings, (2) installing safety measures that meet future FRA requirements for no-horn quiet zones, or (3) other measures as UP and affected community may negotiate.

Negotiated Agreement

Condition 6. UP shall comply with the terms of the Memorandum of Understanding, dated March 12, 1999, executed by the UP, City of Seneca, Kansas, and the Nemaha Valley Parent Teachers Association, regarding local environmental issues associated with this transaction.

Air Quality

Condition 7. As agreed to by UP, the UP will use operating practices that are designed to reduce locomotive fuel consumption and emissions. These include throttle modulation, use of dynamic braking, increased use of pacing and coasting trains and isolating unneeded horsepower.

Monitoring and Enforcement Condition

Condition 8. If there is a material change in the facts or circumstances upon which the Board relied in imposing specific environmental mitigation conditions in this Decision, and upon petition by any party who demonstrates such material changes, the Board may review the continuing applicability of its final mitigation, if warranted.

CHAPTER 1 INTRODUCTION AND BACKGROUND

The Surface Transportation Board (the Board), Section of Environmental Analysis (SEA), prepared this Final Environmental Assessment (Final EA) to identify and evaluate the potential environmental effects of the acquisition of an approximate 107-mile long rail line of the Northeast Kansas and Missouri Railroad (NEKM) between St. Joseph, Missouri and Upland, Kansas by the Union Pacific Railroad Company (UP). Chapter 1 describes the purpose of and need for the proposed Acquisition, the environmental review process for the project, and the role of the Board and SEA in conducting the environmental review.

1.1 BACKGROUND OF THE PROPOSED ACTION

On August 25, 1998, UP filed a Petition for Exemption with the Board seeking an exemption under 49 U.S.C. 10502 from the prior approval requirements of 49 U.S.C. 11323-25 for the acquisition and operation of the NEKM rail line segment from Mid-Michigan Railroad, Inc.² The Board is required to issue an exemption if it decides that application of all or part of otherwise-applicable law (1) is not necessary to carry out the rail transportation policy of 49 U.S.C. 10101; and (2) either the transaction is of limited scope, or regulation is not necessary to protect shippers from an abuse of market power.

UP has stated that the proposed Acquisition would be part of its Service Recovery program to add additional capacity to UP's Central Corridor and to provide service to shippers served by the NEKM rail line. The proposed Acquisition would allow UP to reroute westbound empty coal trains from Kansas City, Kansas to the Powder River Basin in Wyoming over the acquired rail line. The rerouting of these empty coal trains would relieve capacity constraints on a segment of UP's Marysville Subdivision between Kansas City, Topeka, and Upland, Kansas. The Kansas City-Topeka portion of UP's Marysville Subdivision is a critical link in UP's rail corridor between the Midwest and Los Angeles, California. UP has stated that the proposed Acquisition would improve its rail operation between the Midwest and Los Angeles.

UP stated that a number of benefits relate directly to the proposed Acquisition of the NEKM, including the following:

- Reduced train delay on UP's mainline between Kansas City, Topeka, and Upland, Kansas, as a result of diverting westbound empty coal trains over the NEKM line.
- Better utilization of freight cars, locomotives, and train crews to reduce operating costs, maintenance, and delays.
- Reduced fuel consumption (and corresponding reductions in emissions) because the NEKM

² Finance Docket No. 33652, *Union Pacific Railroad Company – Acquisition and Operation Exemption – Mid-Michigan Railroad, Inc. (Rail Line between Saint Joseph, MO and Upland, Kansas)*.

route is shorter than the current routes used by the empty coal trains.

- Improved market access opportunities for shippers along the NEKM line.

Figure 1-1, “Existing NEKM and UP Rail Systems” shows the NEKM rail line that UP proposes to acquire. See Section 1.3, “The Proposed Action and Alternatives,” for a detailed discussion of the proposed action.

1.2 THE BOARD’S ENVIRONMENTAL REVIEW PROCESS

The National Environmental Policy Act (NEPA) requires that a Federal agency conduct an environmental review of a proposed action if it has the potential to cause environmental impacts. The Board determined that the proposed Acquisition warranted the preparation of an environmental assessment, based on the nature and extent of environmental issues that the proposed Acquisition would cause. NEPA requires that the Board conduct and complete this environmental review process before issuing a final decision on the proposed Acquisition.

The Board is a nonpartisan, decisionally independent adjudicatory body, which is organizationally housed within the U.S. Department of Transportation (DOT). The Board has jurisdiction over certain transportation matters such as rail rates; financial transactions, including railroad acquisitions and consolidations; rail constructions; and abandonment of rail service.³ The Interstate Commerce Commission (ICC) Termination Act of 1995⁴ established the Board to assume some of the regulatory functions that the ICC previously administered. The Act either eliminated or transferred other ICC regulatory functions to different DOT agencies.

The Board’s charge is to provide an efficient and effective forum for the resolution of disputes within its jurisdiction. In all of its decisions, the Board is committed to advancing the national transportation policy goals established by Congress.⁵

In 1920, Congress established a national policy favoring railroad consolidations in the interest of economy and efficiency. Congress reaffirmed its rail consolidation policy in subsequent

³ See 49 U.S.C. 10101 *et seq.*

⁴ Pub. L. 104-88, 109 Stat. 803 (1995).

⁵ See 49 U.S.C. 10101.

INSERT FIGURE 1-1

EXISTING NEKM AND UP RAIL SYSTEMS

Figure 1-1 Existing NEKM and UP Rail Systems

amendments to the Interstate Commerce Act, and it requires the Board, as it required the ICC, to approve rail consolidation transactions that are in the public interest.⁶ In determining the public interest, the Board's well-established and court-approved practice is to balance the gains in operating efficiency and marketing capability realized through a particular railroad consolidation against any consequent reduction in competition.

The Board licenses railroads as common carriers, requiring that railroads accept goods and materials for transport from all customers upon reasonable request. If a railroad simply wants to upgrade a portion of its system or improve service to certain shippers, it may do so without seeking the Board's permission. The Board, therefore, has no control over the level of service. It does not regulate the number of trains operating over a specific section of rail line or maintain control over general day-to-day operations of railroads. Railroads make decisions on an ongoing basis regarding which routes they will use in response to changes in market conditions, the economy, and shipper demands.

The Board considers the potential environmental effects of a transaction in its review of proposed railroad mergers and acquisitions. The Board can impose environmental conditions to offset or reduce the potential environmental impacts of the proposed action. In conducting its environmental review, the Board considers the requirements of NEPA; other related environmental laws and their implementing regulations; and the former ICC environmental regulations at 49 CFR 1105.7, which the Board has adopted. SEA is responsible for conducting the environmental review of the proposed Acquisition on behalf of the Board. The Board's environmental regulations govern SEA's environmental review process and outline SEA's procedures for preparing environmental documents.

In addition to the Environmental Report that UP submitted with its Petition, SEA requested that UP submit a Preliminary Draft Environmental Assessment (PDEA). SEA reviewed and verified all the information in UP's PDEA and prepared a Draft EA using information and analysis from the PDEA. SEA prepared this Final EA after considering all the public comments received on the Draft EA and reviewing all other available environmental information.

1.3 THE PROPOSED ACTION AND ALTERNATIVES

1.3.1 Existing NEKM System

The NEKM rail line that UP proposes to acquire operates between St. Joseph, Missouri and Upland, Kansas, a distance of approximately 107 miles. The NEKM rail line traverses the counties of Doniphan, Brown, Nemaha, and Marshall in the State of Kansas and Buchanan County in the State of Missouri. NEKM also has trackage rights on an existing UP rail line segment from Upland, Kansas to Marysville, Kansas, a distance of approximately 7 miles in Marshall County, Kansas. NEKM currently operates approximately one local train

⁶ See 49 U.S.C. 11324-25 (new), specifically 49 U.S.C. 11324(c).

per day between St. Joseph, Missouri and Marysville, Kansas⁷, providing a means for local shippers of agricultural products to interchange with UP rail lines at Hiawatha and Marysville, Kansas and St. Joseph, Missouri. NEKM's local traffic is seasonal in nature—most of the freight activity occurs in the early summer and late fall harvest periods. The NEKM train is limited to a maximum speed of 25 miles per hour on its mainline track.

1.3.2 Existing UP System

UP currently operates more than 36,000 miles of rail lines in 23 states, including about 2,618 miles of rail lines in Kansas. Approximately 15 empty coal trains leave Kansas City, Kansas each day toward the Powder River Basin in Wyoming. UP currently routes approximately 9.3 of these empty coal trains over its existing mainline track that runs west from Kansas City, Kansas through Topeka, Kansas and then north through Marysville, Kansas to Gibbon, Nebraska. (See Figure 1-1, "Existing UP and NEKM Rail Systems") This route covers a distance of about 281 miles between Kansas City, Kansas and Gibbon, Nebraska. The other approximate 5.7 empty coal trains per day use UP's existing mainline that runs from Kansas City, Kansas north to Omaha, Nebraska. From Omaha, Nebraska, these trains continue west to Gibbon, Nebraska. The northern route between Kansas City, Omaha and Gibbon, Nebraska covers a distance of approximately 365 miles.

1.3.3 Combined UP/NEKM System

UP has stated that the proposed Acquisition would be part of its Service Recovery program to add additional capacity to UP's Central Corridor and to provide service to shippers served by the NEKM rail line. The proposed Acquisition would allow UP to reroute westbound empty coal trains between Kansas City, Kansas and Gibbon, Nebraska over part of the acquired NEKM rail line between Hiawatha, Kansas and Upland, Kansas. The rerouting of these empty coal trains would relieve capacity constraints on UP's mainline between Kansas City, Topeka, and Upland, Kansas. The Kansas City-Topeka rail line segment is a critical link in UP's rail corridor between the Midwest and Los Angeles, California. UP has stated that the proposed Acquisition would improve its rail operation between the Midwest and Los Angeles, California.

The rerouting of the westbound empty coal trains would increase the train traffic by approximately 9.3 trains per day on the existing UP mainline between Kansas City, Kansas and Hiawatha, Kansas. Train traffic would increase by approximately 15 trains per day between Hiawatha, Kansas and Upland, Kansas. Figure 1-2, "Estimated Traffic Changes From the Proposed Acquisition," shows the Acquisition-related change in estimated train traffic for each affected rail line segment between Kansas City, Kansas and Gibbon, Nebraska. The route between Kansas City, Kansas and Gibbon, Nebraska via the NEKM rail line covers a distance of about 293 miles. The route to Gibbon, Nebraska over the NEKM rail line would be about 12 miles longer than UP's current route via Topeka, Kansas and about 71 miles shorter than UP's current route via Omaha, Nebraska.

⁷ The NEKM local train makes a round trip between St. Joseph, Missouri and Hiawatha, Kansas every other day; the following day, the train makes a round trip between Marysville, Kansas and Hiawatha, Kansas.

UP plans to upgrade portions of the Hiawatha-Upland segment of the NEKM rail line to Class III track, which would allow trains to travel over the upgraded portions at speeds up to 40 miles per hour (versus the current maximum speed of 25 miles per hour). The upgrade work would consist of track, wood tie, and anchor replacement plus the addition of ballast along the upgraded rail line. UP also plans to evaluate and, as necessary, rebuild public and private highway/rail at-grade crossings along the Hiawatha-Upland rail line segment. The improvements at these highway/rail at-grade crossings would not include modification of existing crossing protection devices. UP does not plan to upgrade the portion of the NEKM rail line between St. Joseph, Missouri and Hiawatha, Kansas.

UP proposes to construct a connection between the existing UP mainline track and the NEKM mainline track in Hiawatha, Kansas. The proposed connection would begin approximately 900 feet north of Miami Street in Hiawatha. UP would construct the approximate 820-foot long connection entirely on existing railroad right-of-way. (See Figure 1-3, "Proposed Rail Line Connection at Hiawatha, Kansas—Area Map.")

1.3.4 Alternatives to the Proposed Action

If the proposed Acquisition is not completed, UP would continue to route its empty westbound coal trains via the Kansas City-Topeka-Gibbon corridor and the Kansas City-Omaha-Gibbon corridors. The total miles that trains would travel via the current routes would be greater than the total miles via the NEKM route and the benefits associated with a reduction in total train-miles (i.e., fuel consumption, emissions, and freight rail operations safety benefits) would not occur.

In addition, UP would have to upgrade its rail line between Kansas City and Marysville, Kansas to relieve current capacity constraints and to accommodate future growth in train volume. This would involve the construction of a second mainline track between Topeka, Kansas and Marysville, Kansas, and expansion of UP's rail yard in Topeka, Kansas.

INSERT FIGURE 1-2

ESTIMATED TRAFFIC CHANGES FROM THE PROPOSED ACQUISITION

Figure 1-2 Estimated Traffic Changes From the Proposed Acquisition

INSERT FIGURE 1-3

**PROPOSED CONNECTION AT HIAWATHA,
KANSAS- AREA MAP**

FIGURE 1-3 Proposed Rail Line Connection at Hiawatha, Kansas—Area Map

1.4 AGENCY CONSULTATION AND PUBLIC NOTIFICATION ACTIVITIES

Under NEPA, agencies undertaking Federal actions must consult with other government agencies and involve the public in preparing environmental documents. In conducting agency coordination and consultation, SEA complied with NEPA environmental review requirements and considered pertinent Federal statutes and executive orders. As with its public involvement effort, SEA conducted agency coordination and consultation activities to ensure that public agencies were aware of the proposed Acquisition and had adequate time to review and comment on the Draft EA. SEA considered all comments submitted by Federal and State agencies in preparing this Final EA.

As part of the environmental review process, SEA conducted public involvement activities to inform the public about the proposed Acquisition and encourage broad public involvement in the environmental review process. SEA's public involvement efforts included distributing an October 1998 informational fact sheet to potentially affected communities prior to publishing the Draft EA. SEA distributed the Draft EA to more than 100 agencies, communities, companies and individuals that the proposed Acquisition could potentially affect. The Draft EA provided instructions on how to submit comments.

1.5 OVERVIEW OF PUBLIC COMMENTS

SEA issued the Draft EA for the proposed Acquisition to the public on December 21, 1998. SEA encouraged all who received or reviewed the Draft EA to comment on the technical analysis and the scope and adequacy of SEA's preliminary mitigation recommendations. Comments on the Draft EA were due on January 20, 1999. On January 20, 1999, SEA received a request from the City of Seneca, Kansas (the City) to extend the comment period so that the City could conduct a more detailed review of the Draft EA. SEA granted an extension of the comment period until February 4, 1999.

In preparing the Final EA, SEA considered all comments that it received from the public. Appendix A, "Comments Received on the Draft Environmental Assessment," contains a copy of all written public comments received by February 4, 1999. SEA received six documents and some telephone calls commenting on the Draft EA from affected communities; community groups and UP.

On March 12, 1999, the City, the Nemaha Valley Parent Teachers Association (NVPTA) and UP jointly petitioned the Board to substitute compliance with their jointly negotiated Memorandum of Understanding (MOU), also dated March 12, 1999, as a condition in lieu of any other environmental mitigation conditions relating to UP operations through the City. The MOU also indicates that the comments previously submitted by the City and NVPTA regarding the Draft EA will be deemed to have been withdrawn automatically on the service date of a Board order imposing compliance with the MOU. SEA has reviewed the MOU and recommends that the Board grant the requested condition requiring that UP comply with it, as an alternative to any other mitigation for the City.

It also should be noted that SEA undertook further verification and analysis of data as a result of the comments

filed by the City and NVPTA. The analysis is in this Final EA. The further analysis based on updated data show that the preliminary conclusions reached in the Draft EA remain valid because the new data were not materially different from the data used in the Draft EA.

CHAPTER 2 SUMMARY OF ENVIRONMENTAL REVIEW

This chapter summarizes SEA's overall environmental review process, methods of analysis, additional analyses that SEA conducted since the Draft EA, and conclusions. The initial sections of Chapter 2 describe the scope of SEA's environmental review and the thresholds that SEA used in conducting this review. For each environmental issue area that SEA reviewed, this chapter summarizes the following:

- Methods of Analysis.
- Criteria of significance.
- Analysis Results and Impacts, including additional evaluation that SEA conducted since the Draft EA.
- Mitigation measures.

This chapter also describes potential impacts of acquisition-related construction projects and potential cumulative effects from changes in agency regulations or from projects identified by interested parties during the public comment period.

A more detailed discussion of SEA's environmental review of the proposed Acquisition is presented in Chapter 3, "Environmental Consequences of the Proposed Action," in the Draft EA.

2.1 THRESHOLDS FOR ENVIRONMENTAL ANALYSIS

SEA used information provided by UP to identify projected changes in rail traffic on rail line segments that could result in potential environmental effects. In response to public comment on the Draft EA, SEA requested that UP provide a verified statement to support its estimates for pre- and post-Acquisition train volumes and tonnages. (See Appendix B, "Verified Statements") UP provided information to confirm its previous estimates for train volume changes on affected rail line segments. However, UP indicated that the tonnage estimates used in the Draft EA would likely change due to its planned use of longer coal trains within the next three years. Table 2.1-1, "Pre and Post-Acquisition Estimates for Rail Traffic and Gross Ton-Miles on Affected Rail Line Segments," presents the revised figures that SEA used in the Final EA.

In its environmental rules at 49 Code of Federal Regulations (CFR) 1105.7(e) and during environmental review of previous railroad mergers and acquisitions, the Board has identified thresholds of railroad activity that warrant environmental review. SEA used these thresholds to screen proposed increases in rail activities and identify the environmental issue areas to evaluate.

Table 2.1-2, "Board's Thresholds for Environmental Analysis," lists the thresholds that SEA used in its environmental review of the proposed Acquisition.

INSERT TABLE 2.1-1 HERE

TABLE 2.1-1 Pre- and Post-Acquisition Estimates for Rail Traffic and Gross Ton-Miles on Affected Rail Line Segments

**TABLE 2.1-2
BOARD'S THRESHOLDS FOR ENVIRONMENTAL ANALYSIS**

Environmental Impact Category	Activities Evaluated for Potential Environmental Effects	
	Rail Line Segments	Constructions
Safety		
Freight Rail Operations Safety	Rail line segments with an average increase of eight or more freight trains per day.	N/A ^a
Highway/Rail At-grade Crossing Safety	All highway/rail at-grade crossings on rail line segments with an average increase of eight or more trains per day.	Highway/rail at-grade crossings created by proposed constructions, on rail segments with an average increase of eight or more trains per day.
Traffic and Transportation		
Highway/Rail At-grade Crossing Delay	Highway/rail at-grade crossings on rail line segments with an average increase of eight or more trains per day <u>and</u> with average daily traffic (ADT) of 5,000 vehicles or greater.	Highway/rail at-grade crossings created by proposed constructions on rail line segments with an average increase of eight or more trains per day.
Emergency Vehicle Response	Rail line segments with an average increase of eight or more trains per day <u>and</u> when communities provide comment about potential local impacts.	N/A ^a
Energy		
	Analysis of change in fuel consumption for all Acquisition-affected rail lines and highway/rail at-grade crossings with ADT of 5,000 vehicles or greater.	N/A ^a
Noise		
	Rail line segments with an increase of eight or more trains per day <u>or</u> at least a 100% increase in rail traffic (measured in annual gross ton-miles).	All constructions.

**TABLE 2.1-2
BOARD'S THRESHOLDS FOR ENVIRONMENTAL ANALYSIS**

Environmental Impact Category	Activities Evaluated for Potential Environmental Effects	
	Rail Line Segments	Constructions
Air Quality		
Attainment Areas	Rail line segments with an increase of eight or more trains per day <u>or</u> at least a 100% increase in rail traffic (measured in annual gross ton-miles).	All constructions.
Environmental Justice		
	Rail line segments with an increase of eight or more trains per day <u>or</u> at least a 100% increase in rail traffic (measured in annual gross ton-miles).	All constructions.

^a N/A = Not Applicable.

Based on information provided by UP, the following rail line segments would exceed the Board's thresholds for environmental analysis:

- Kansas City, Kansas to Atchison, Kansas, where UP estimates that rail traffic would increase by approximately 9.3 trains per day.
- Atchison, Kansas to Hiawatha, Kansas, where UP estimates that rail traffic would increase by approximately 9.3 trains per day.
- Hiawatha, Kansas to Upland, Kansas, where UP estimates that rail traffic would increase by approximately 15 trains per day.

UP also proposes to construct a connection between the existing UP and NEKM rail lines in Hiawatha, Kansas. The proposed connection would allow northbound empty coal trains to be rerouted west over the NEKM rail line to Upland, Kansas.

2.2 SCOPE OF ENVIRONMENTAL REVIEW

Based on the post-Acquisition operational data provided by UP and the Board's thresholds for environmental analysis listed in Table 2.1-2, SEA determined that its review of the proposed Acquisition would cover the

following environmental issue areas:

- Safety, including freight rail operations and safety at highway/rail at-grade crossings.
- Highway/rail at-grade crossings, including vehicle delay and emergency vehicle response delay.
- Energy.
- Air Quality, including operational changes on rail line segments and vehicle delay at highway/rail at-grade crossings.
- Noise.
- Environmental Justice.

SEA also evaluated the construction of a proposed rail line connection at Hiawatha, Kansas for potential effects outside of the railroad right-of-way.

SEA did not evaluate the following issue areas because the proposed Acquisition would not affect these issue areas:

- Rail line abandonment.
- Operational changes at rail yards, intermodal facilities, or other railroad facilities.
- Freight diversion to or from other modes of transportation.
- Transportation of recyclable commodities, energy resources, and ozone depleting materials.
- Transportation of hazardous materials.
- Effects on navigation from changes in rail operation over movable bridges.

2.3 FREIGHT RAIL OPERATIONS SAFETY

SEA evaluated potential changes in freight train accidents that could occur as a result of the proposed Acquisition at a regional level and on individual rail line segments. SEA used accident data from Kansas Department of Transportation (Kansas DOT), Federal Railroad Administration (FRA), Association of American Railroads (AAR), and UP to analyze potential freight rail safety issues.

Methods of Analysis

This section summarizes SEA's freight rail safety analysis methods. Section 3.1, "Freight Rail Operations Safety," of the Draft EA describes the methods in detail. SEA's analysis methods and significance criteria remain unchanged from the Draft EA.

Regional Analysis. To evaluate potential regional freight rail safety effects in the Draft EA, SEA calculated the probability of accidents occurring before and after the proposed Acquisition, based on estimated train mile data provided by UP.

Individual Rail Line Segment Analysis. SEA evaluated the potential change in the risk of freight train accidents for the three rail line segments that would have an increase of 8 or more trains per day following the proposed Acquisition. SEA estimated the average annual accident rate for each rail line segment, based on FRA train accident/incident database for freight operations before and after the proposed Acquisition, and estimated train data provided by UP.

Criteria of Significance. SEA developed a criterion of significance for freight rail safety on individual rail line segments based on recent historical accident data for UP. SEA determined that Acquisition-related increases in rail activity could potentially create adverse safety effects if the post-Acquisition accident rate was more frequent than one accident every 150 years per track-mile; in which case SEA considered mitigation measures for those safety effects.

Analysis Results and Impacts

Regional Results. SEA estimated that the overall accident rate would decrease slightly on the 14 rail line segments that changes in Acquisition-related rail traffic would affect. Based on the analysis, SEA concluded that the proposed Acquisition would not adversely affect freight rail operations safety on a regional basis. SEA did not revise its regional analysis of freight rail operations safety for the Final EA.

Individual Rail Segment Results. For the Final EA, UP provided SEA with updated information about the length of coal trains that it plans to route over the NEKM rail line. (See the verified statement of Robert M. Scoggins in Appendix B, "Verified Statements") UP estimates that post-acquisition coal trains will average 127 cars in length, versus the 117-car length that SEA used in its analysis for the Draft EA. For the Final EA, SEA calculated new estimates for individual rail line segment accident rate frequency based on the updated coal train length. Table 2.3-1, "Mainline Freight Accident Analysis," presents SEA's revised estimates.

**TABLE 2.3-1
MAINLINE FREIGHT ACCIDENT ANALYSIS**

Segment	Segment Miles	Draft EA		Final EA	
		Pre-Acquisition Accident Interval Per Track-Mile (Years)	Post-Acquisition Accident Interval Per Track-Mile (Years)	Pre-Acquisition Accident Interval Per Track-Mile (Years)	Post-Acquisition Accident Interval Per Track-Mile (Years)
Kansas City-Atchison	44.6	152	86	148	82
Atchison-Hiawatha	38.2	164	90	160	86
Hiawatha-Upland	64.7	1,218	35	1,218	32

SEA estimated that the post-Acquisition accident frequency would exceed the criterion of significance for individual rail line segment freight accidents for each of the three rail line segments in Kansas listed in Table 2.3-1.

Mitigation

In the Draft EA, SEA recommended that UP comply with the requirement in FRA's final rule for "ton-mile" based inspections on the three rail line segments that exceeded SEA's criterion of significance for individual rail line segment freight accidents. In its comments on the Draft EA, UP volunteered additional mitigation strategies to help reduce potential freight train safety risk impacts. In the Final EA, SEA recommends that the Board require UP to implement the FRA's gross ton-mile based inspection standard and the additional voluntary mitigation measures proposed by UP. (See Chapter 4, "Recommended Environmental Conditions")

2.4 HIGHWAY/RAIL AT-GRADE CROSSING SAFETY

SEA analyzed potential effects on roadway users from Acquisition-related increases in train traffic at highway/rail at-grade crossings. SEA conducted its safety analysis of highway/rail at-grade crossings by estimating the pre- and post-Acquisition accident frequency at each affected highway/rail at-grade crossing.

Methods of Analysis

This section summarizes SEA's highway/rail at-grade crossing safety analysis methods. Section 3.2, "Highway/Rail At-grade Crossing Safety," of the Draft EA describes the methods in detail. SEA's analysis methods and significance criteria remain unchanged from the Draft EA.

Accident Frequency Calculation. SEA used databases maintained by FRA containing information about train-vehicle accidents at highway/rail at-grade crossings. Using pre- and post-Acquisition freight train traffic estimates provided by UP and standard FRA methods and formulas, SEA calculated the pre- and post-Acquisition accident frequency for each public highway/rail at-grade crossing on rail line segments that exceeded the Board's threshold for environmental analysis. SEA's analysis considered crossing-specific factors such as the type of warning device, the accident history at the highway/rail at-grade crossing, the daily number of trains, average train speed, and the roadway average daily traffic volume. SEA obtained the most recent roadway average daily traffic volume from the Kansas DOT.

Criteria of Significance. SEA established two levels of increases in accident frequency likely to result in a potential adverse effect on highway/rail at-grade crossing safety. For highway/rail at-grade crossings that are considered "high accident frequency" crossings, SEA considered an increase of at least 0.01 accidents per year (or one additional accident every 100 years) to be potentially significant. For all other highway/rail at-grade crossings, SEA considered an increase of at least 0.05 accidents per year (or one additional accident every 20 years) to be potentially significant.

Analysis Results and Impacts

In the Draft EA, SEA estimated that the Acquisition-related increase in accident frequency would exceed the significance criteria for highway/rail at-grade crossing safety at two highway/rail at-grade crossings in Nemaha County, Kansas. These crossings are:

- 6th Street in Sabetha, Kansas
- 5th Street in Seneca, Kansas.

SEA determined that the predicted increase in accident frequency at all other highway/rail at-grade crossings on Acquisition-affected rail line segments would be below the criteria of significance. SEA did not revise its analysis of highway/rail at-grade crossing safety for the Final EA.

Mitigation

In the Draft EA, SEA recommended that the warning devices at 6th Street in Sabetha, Kansas and 5th Street in Seneca, Kansas be upgraded from cross bucks to flashing lights. These upgrades would reduce the predicted increase in accident frequency at these two locations to levels below SEA's criteria of significance. The City of Seneca, as previously noted, has reached an agreement with UP which now substitutes for the Draft EA recommendation for the City. Therefore, SEA's final recommended condition deletes 5th Street in Seneca.

Moreover, following publication of the Draft EA, the Kansas DOT, FRA and UP jointly conducted a corridor-based review of highway/rail at-grade crossing safety between Hiawatha, Kansas and Upland, Kansas. SEA

understands that Kansas DOT has developed recommendations for highway/rail at-grade crossing improvements and/or closure in several communities along this rail corridor. UP has also volunteered to implement additional mitigation measures to enhance highway/rail at-grade crossing safety awareness for residents in affected communities.

For the Final EA, SEA therefore recommends that the Board require UP to upgrade the highway/rail at-grade crossing warning device at 6th Street in Sabetha, Kansas from crossbucks to flashing lights, subject to any alternative mitigation which may be developed in on-going negotiations by UP, the Federal Railroad Administration, and Kansas Department of Transportation and affected communities on the Hiawatha-Upland line. In addition, UP voluntarily agreed to undertake additional mitigation measures regarding highway/rail at-grade crossing safety involving this project. SEA recommends that the additional measures be required of UP, namely:

- UP will provide Operation Lifesaver programs in the future as requested by communities on the Hiawatha-Upland rail line segment.
- UP will install UP's standard private crossing signs and stop signs at all private highway/rail at-grade crossings which are open to public use.
- UP will upgrade, where necessary, all existing highway/rail at-grade crossing signal circuitry to accommodate the proposed rail operations.
- At all highway/rail at-grade crossings with active warning devices, UP will post a visible emergency toll free 800 number to be called if signal crossing devices malfunction.
- UP will provide toll free numbers to all emergency response forces in communities affected by the proposed Acquisition. These numbers will provide access to appropriate UP personnel who may be contacted by communities in emergency situations.
- UP will offer Grade Crossing Collision Investigation classes and emergency response training to law enforcement agencies and first responders in affected communities.
- To enhance highway/rail at-grade crossing safety, UP will undertake vegetation control procedures along the Hiawatha-Upland corridor.

2.5 HIGHWAY/RAIL AT-GRADE CROSSING DELAY

SEA evaluated changes in vehicle traffic delays that would result from increased train traffic on Acquisition-affected rail line segments. SEA limited its assessment of vehicle delay to highway/rail at-grade crossings on rail line segments that would have an Acquisition-related increase in train traffic of eight trains per day or greater.

Methods of Analysis

This section summarizes SEA's highway/rail at-grade crossing vehicle delay analysis methods. Section 3.3, "Highway/Rail At-grade Crossing Delay," of the Draft EA describes the methods in detail. SEA's analysis methods and significance criteria remain unchanged from the Draft EA.

In the Draft EA, SEA identified public highway/rail at-grade crossings on rail line segments that would meet or exceed the Board's thresholds for environmental analysis. SEA analyzed potential changes in vehicle delay at all highway/rail at-grade crossings with an average daily traffic (ADT) volume of 5,000 vehicles or greater. SEA believes that its use of this traffic volume threshold is reasonable and conservative and that the effects of vehicle delay at highway/rail at-grade crossings with lower traffic volume would be minimal.

SEA used two methods to compare vehicle delay before and after the proposed Acquisition. These methods are: (1) crossing delay per stopped vehicle; and (2) traffic level of service (LOS).

In the Verified Statement of Robert M. Scoggins (see Appendix B, "Verified Statements"), UP provided updated information for projected average train length of its coal trains that would use the rail line segments affected by the proposed Acquisition. For the Final EA, SEA used the updated train length estimate to revise its analysis of potential affects on vehicle delay at individual highway/rail at-grade crossings, using the same analysis methods from the Draft EA.

Criteria of Significance. SEA considered the increase in vehicle delay caused by Acquisition-related changes in train traffic to be significant if any of the following would occur:

- The crossing delay per stopped vehicle increased by 30 seconds or more. SEA considered the 30-second increment to represent a driver's threshold for perception of increased delay.
- The post-Acquisition LOS decreased to a level of D from a pre-Acquisition level of C or better or the post-Acquisition LOS decreased to E or F, regardless of the pre-Acquisition LOS.

Analysis Results and Impacts

SEA identified two highway/rail at-grade crossings in Atchison County, Kansas that have an ADT greater than 5,000 vehicles per day and that would experience an increase in train traffic in excess of the Board's threshold for environmental analysis. Using the updated average train length information provided by UP, SEA revised its analysis for potential vehicle delay at these two highway/rail at-grade crossings. Table 2.5-1, "Individual Highway/Rail At-grade Crossing Delay," presents the results of SEA's revised analysis. For these two highway/rail at-grade crossings, SEA determined that post-Acquisition vehicle delay would not exceed its criteria of significance for crossing delay per stopped vehicle or traffic LOS. SEA concluded that the proposed Acquisition would not adversely affect vehicle delay.

Mitigation

SEA concluded that the proposed Acquisition would not adversely affect vehicle delay at individual highway/rail at-grade crossings; therefore, mitigation is not warranted for potential vehicle delay effects.

**TABLE 2.5-1
INDIVIDUAL HIGHWAY/RAIL AT-GRADE CROSSING DELAY**

City	Street Name	ADT	Pre-Acquisition				Post-Acquisition				Change in Average Delay for all Vehicles (Seconds)
			Trains per Day	Crossing Delay per Stopped Vehicle (Minutes)	Average Delay for All Vehicles (Seconds)	Level of Service	Trains per Day	Crossing Delay per Stopped Vehicle (Minutes)	Average Delay for All Vehicles (Seconds)	Level of Service	
Atchison County											
Atchison	4 th St.	5,950	12.8	1.96	7.80	B	22.1	2.13	15.98	C	8.18
Atchison	10 th St.	6,035	12.8	1.96	7.80	B	22.1	2.13	15.99	C	8.19

2.6 HIGHWAY/RAIL AT-GRADE CROSSING EMERGENCY VEHICLE RESPONSE

In the Draft EA, SEA conducted a general analysis of potential effects on emergency vehicle response from increases in freight train traffic at highway/rail at-grade crossings. SEA determined that a detailed analysis would have to consider site-specific conditions as well as input from local communities about potential local impacts. This section summarizes SEA's general analysis of potential effects on emergency vehicle response.

Methods of Analysis

For the Draft EA, SEA estimated the change crossing delay per stopped vehicle, total daily blocked time, and average delay for all vehicles for various combinations of roadway lanes, train speeds, and ADT volume. SEA developed general estimates for 2-lane and 4-lane roads with ADT volumes of 500 and 1,000 vehicles per day and train speeds that would represent pre-Acquisition and post-Acquisition conditions. SEA also determined the pre- and post-Acquisition level of service for these highway/rail at-grade crossings.

In the Verified Statement of Robert M. Scoggins (see Appendix B, "Verified Statements"), UP provided updated information for projected average train length of its coal trains that would use the rail line segments affected by the proposed Acquisition. For the Final EA, SEA used the updated train length estimate to revise its general analysis of potential affects on emergency vehicle response time, using the same analysis methods from the Draft EA.

Analysis Results and Impacts

For the Final EA, SEA revised its analysis based on the updated average train length provided by UP. Table 2.6-1, "General Analysis of Highway/Rail At-grade Crossing Delay," presents the results of SEA's revised general analysis.

**TABLE 2.6-1
GENERAL ANALYSIS OF HIGHWAY/RAIL AT-GRADE CROSSING DELAY**

Roadway Lanes	Train Speed	ADT	Pre-Acquisition				Post-Acquisition			
			Crossing Delay per Stopped Vehicle (Minutes)	Total Daily Blocked Time (Minutes)	Average Delay for All Vehicles (Seconds)	Level of Service	Crossing Delay per Stopped Vehicle (Minutes)	Total Daily Blocked Time (Minutes)	Average Delay for All Vehicles (Seconds)	Level of Service
Kansas City-Atchison										
2	20	500	1.86	51.57	7.97	B	2.03	93.74	15.83	C
		1000	1.87	51.57	8.03	B	2.04	93.74	15.95	C
2	40	500	1.05	29.28	2.57	A	1.14	52.70	5.00	B
		1000	1.06	29.28	2.59	A	1.15	52.70	5.04	B
4	20	500	1.85	51.57	7.94	B	2.02	93.74	15.77	C
		1000	1.86	51.57	7.97	B	2.03	93.74	15.83	C
4	40	500	1.05	29.28	2.56	A	1.14	52.70	4.98	A
		1000	1.05	29.28	2.57	A	1.14	52.70	5.00	B
Atchison-Hiawatha										
2	20	500	1.88	47.85	7.51	B	2.05	90.02	15.39	C
		1000	1.90	47.85	7.56	B	2.07	90.02	15.50	C
2	40	500	1.07	27.12	2.41	A	1.15	50.53	4.85	A
		1000	1.08	27.12	2.43	A	1.16	50.53	4.89	A

**TABLE 2.6-1
GENERAL ANALYSIS OF HIGHWAY/RAIL AT-GRADE CROSSING DELAY**

Roadway Lanes	Train Speed	ADT	Pre-Acquisition				Post-Acquisition			
			Crossing Delay per Stopped Vehicle (Minutes)	Total Daily Blocked Time (Minutes)	Average Delay for All Vehicles (Seconds)	Level of Service	Crossing Delay per Stopped Vehicle (Minutes)	Total Daily Blocked Time (Minutes)	Average Delay for All Vehicles (Seconds)	Level of Service
Atchison-Hiawatha (continued)										
4	20	500	1.88	47.85	7.48	B	2.04	90.02	15.33	C
		1000	1.88	47.85	7.51	B	2.05	90.02	15.39	C
4	40	500	1.06	27.12	2.40	A	1.15	50.53	4.83	A
		1000	1.07	27.12	2.41	A	1.15	50.53	4.85	A
Hiawatha-Upland										
2	25	500	0.47	0.93	0.04	A	1.79	56.84	8.47	B
		1000	0.47	0.93	0.04	A	1.80	56.84	8.54	B
2	35	500	N/A ^a	N/A	N/A	N/A	1.35	42.88	4.82	A
		1000	N/A	N/A	N/A	N/A	1.36	42.88	4.86	A
4	25	500	0.47	0.93	0.04	A	1.78	56.84	8.44	B
		1000	0.47	0.93	0.04	A	1.79	56.84	8.47	B
4	35	500	N/A	N/A	N/A	N/A	1.35	42.88	4.80	A
		1000	N/A	N/A	N/A	N/A	1.35	42.88	4.82	A

^a Not Applicable. Pre-Acquisition maximum train speed on the NEKM rail line is 25 miles per hour.

SEA concluded the following, based on its revised analysis of potential emergency response vehicle delay effects:

- The level of service at highway/rail at-grade crossings on the Kansas City-Atchison rail line segment would be A or B where the train speed is 40 miles per hour for both pre- and post-Acquisition conditions. The level of service would drop from B to C at highway/rail at-grade crossings in the City of Atchison where the train speed is 20 miles per hour.
- For the Atchison-Hiawatha rail line segment, the level of service would be A under both pre- and post-Acquisition conditions at highway/rail at-grade crossings where the train speed is 40 miles per hour. The level of service would drop from B to C at highway/rail at-grade crossings where the train speed is 20 miles per hour.
- For the Hiawatha-Upland rail line segment, the level of service would be A under both pre- and post-Acquisition conditions, assuming an average train speed of 25 miles per hour for pre-Acquisition and 35 miles per hour for post-Acquisition.

Based on the level of service criteria for highway/rail at-grade crossings, SEA concluded that the proposed Acquisition would not adversely affect emergency response vehicle delay.

Mitigation

In the Draft EA, SEA concluded that the proposed Acquisition would not adversely affect emergency response vehicle delay; therefore, it did not recommend mitigation measures. SEA requested public comment about community-specific conditions that might affect emergency vehicle response.

The City of Seneca submitted comments on the Draft EA requesting that SEA conduct a more detailed site-specific analysis of Acquisition-related emergency response vehicle effects in Seneca. (See Section 3.3, "Emergency Vehicle Response,") However, the MOU negotiated by UP, the City, and NVPTA covers this issue. Therefore, SEA is not recommending specific emergency vehicle response delay mitigation.

2.7 ENERGY

SEA evaluated the potential effects of the proposed Acquisition on diesel fuel consumption due to Acquisition-related changes in freight train traffic and from potential vehicle delays at public highway/rail at-grade crossings.

Methods of Analysis

SEA estimated the overall change in freight train diesel fuel consumption using UP's estimates for changes in freight train gross-ton miles on Acquisition-affected rail line segments and rail line segment-specific fuel efficiency factors. For fuel consumption from vehicle delays at highway/rail at-grade crossings, SEA determined the pre-Acquisition and post-Acquisition number of vehicles delayed per day and the crossing delay per stopped vehicle for highway/rail at-grade crossings that SEA analyzed for potential vehicle delay effects. (See Section 2.5, "Highway/Rail At-grade Crossing Vehicle Delay") SEA used a fuel consumption factor for idling vehicles to obtain its estimate of annual change in fuel consumption from vehicle delays.

As detailed in the Verified Statement of Robert M. Scoggins, UP revised its estimate of average train length for coal trains that would use the rail line segments affected by the proposed Acquisition. (see Appendix B, "Verified Statements") UP also updated its estimate of post-Acquisition annual gross ton-miles on Acquisition-affected rail line segments, as a result of the revised coal train length. (See Table 2.1-1, "Pre- and Post-Acquisition Estimates for Rail Traffic and Gross Ton-Miles on Affected Rail Segments") SEA used the revised gross ton-mile estimates to update its estimate for fuel consumption effects of the proposed Acquisition.

Criteria of Significance. SEA considered an increase in overall net fuel consumption to be significant.

Analysis Results and Impacts

Table 2.7-1, "Summary of Fuel Consumption Changes," presents SEA's estimate for annual fuel savings from the proposed Acquisition. SEA's revised estimate shows an annual savings of about 1.1 million gallons of fuel. UP would achieve this fuel savings because the proposed Acquisition would allow UP to reduce the total train miles on its rail system.

**TABLE 2.7-1
SUMMARY OF FUEL CONSUMPTION CHANGES**

Activity	Change in Fuel Consumption (Gallons per Year)	
	Draft EA	Final EA
Rail Traffic Changes	-1,034,354	-1,117,387
Vehicle Delays at Highway/rail At-grade Crossings	2,835	3,275
Total	-1,031,519	-1,114,112

Mitigation

Because there would be a net savings in annual fuel consumption, SEA concludes that no mitigation for energy effects is warranted. UP, however, has volunteered mitigation to address this issue, and SEA therefore recommends adoption of UP's proposed mitigation.

2.8 AIR QUALITY

SEA estimated the potential effects of the proposed Acquisition on air quality at a regional and County-wide level. SEA's analysis focused on emissions from diesel locomotives and idling vehicles delayed at highway/rail at-grade crossings, because these are the major sources of emissions that the proposed Acquisition would affect.

Methods of Analysis

In conducting its air quality analysis, SEA used the Board's thresholds for air quality analysis and EPA-recommended emissions guidelines to estimate emissions. Since EPA considers all counties affected by the proposed Acquisition to be in attainment with ambient air quality standards, the applicable Board threshold for environmental analysis is an increase of eight or more trains per day on any Acquisition-affected rail line segment. Section 3.6, "Air Quality," of the Draft EA presents a detailed description of the methods of analysis. SEA's methods of analysis in the Final EA are unchanged from the Draft EA.

In the Verified Statement of Robert M. Scoggins, UP revised its estimate of average train length for coal trains that would use the rail line segments affected by the proposed Acquisition. (see Appendix B, "Verified Statements") UP also updated its estimate of post-Acquisition annual gross ton-miles on Acquisition-affected rail line segments, as a result of the revised coal train length. (See Table 2.1-1, "Pre- and Post-Acquisition Estimates for Rail Traffic and Gross Ton-Miles on Affected Rail Segments") SEA used the revised gross ton-mile estimates to update its estimate for air quality effects of the proposed Acquisition.

Regional Analysis. For its regional analysis, SEA estimated the change in emissions for rail line segments that would experience both increases and decreases in freight train activity as a result of the proposed Acquisition. UP provided SEA with route-specific fuel efficiency factors for its line-haul locomotives and estimates for the change in gross ton-miles for each Acquisition-affected rail line segment. In its analysis, SEA used EPA emissions factors representative of the 1998 locomotive fleet for all U.S. railroads. SEA also estimated emissions for idling vehicles at highway/rail at-grade crossings with an ADT of 5,000 vehicles per day or greater.

County-wide Analysis. If rail activity in a specific county would exceed the Board's threshold for environmental analysis, SEA estimated the change in emissions from these rail activities within the county. SEA used a phased approach to conduct this analysis as follows:

- SEA estimated emissions increases on the rail line segments that would exceed the Board's

threshold for environmental analysis.

- SEA compared the estimated emissions increases with screening levels SEA developed based on EPA emissions levels for stationary source permitting.
- If the estimated emissions increases exceeded the screening level, SEA conducted a more detailed analysis that considered all potential Acquisition-related emissions changes (i.e., increases and decreases).

Criteria of Significance. SEA’s analysis indicated that overall regional emissions would decrease as a result of the proposed Acquisition; therefore SEA did not establish a criteria of significance for regional air quality impacts. For the County-wide analysis, SEA considered emissions to be potentially significant if the total Acquisition-related emissions for a county exceeded 1.6 percent of the total emissions inventory for that county.

Analysis Results and Impacts

Regional Results. SEA determined that the proposed Acquisition would result in an overall regional decrease in emissions for all pollutants. The estimated decrease in emissions would have a beneficial effect on regional air quality. SEA’s revised estimate of regional air emissions is presented in Table 2.8-1, “Summary of Regional Emissions Estimates.”

**TABLE 2.8-1
SUMMARY OF REGIONAL EMISSIONS ESTIMATES**

Emissions Source	Estimated Emissions Changes (Tons/Year)				
	VOCs	NO _x	CO	SO ₂	PM ₁₀
Rail Line Segments Activity ^a	-12.3	-332.8	-32.8	-20.6	-8.2
Idling Vehicles Delayed at Highway/Rail At-grade Crossings ^b	0.2	0.1	2.2	0.002	0.001
Total Change	-12.1	-332.7	-30.6	-20.6	-8.2

^a SEA based this emissions estimate on analysis of all Acquisition-related rail line segments, using updated post-Acquisition gross ton-mile estimates provide by UP.

^b This estimate represents emissions from highway/rail at-grade crossings with an ADT volume of 5,000 or greater on rail line segments that would meet or exceed the Board’s thresholds for environmental analysis.

County-wide Results. SEA’s County-wide analysis for the Draft EA showed that some counties would experience emissions increases even though overall regional emissions would decrease. These County-wide increases exceeded SEA’s emission screening levels for NO_x in six counties in Kansas. To further evaluate the potential for a significant adverse effect on air quality, SEA conducted a more detailed analysis of NO_x emissions, which included emissions estimates for all Acquisition-related activity in each county. In its detailed analysis, SEA determined that without taking into account EPA’s new emission standards for locomotives, estimated emissions increases would be potentially significant for Atchison, Brown, Marshall, and Nemaha counties, when compared with the existing level of NO_x emissions in these counties. The remaining two counties—Leavenworth and Wyandotte—would not exceed the level of potential significance for NO_x. For the Final EA, SEA updated its County-wide analysis using the revised post-Acquisition gross ton-mile estimates provided by UP. Table 2.8-2, “NO_x Emissions Changes for All Acquisition-Related Emissions Sources by County,” presents the results of SEA’s revised analysis.

**TABLE 2.8-2
NO_x EMISSIONS CHANGES FOR ALL
ACQUISITION-RELATED EMISSIONS SOURCES BY COUNTY**

County	Emissions Source	Estimated NO_x Emissions Change (Tons/Year)
Atchison	Rail Line Segments ^a	326.0
	Vehicle Delays at Highway/Rail At-grade Crossings ^b	0.1
	Total Net Emissions	326.1
	Level of Potential Significance (1.6% of total County-wide NO _x emissions)	35.5
Brown	Rail Line Segments ^a	459.6
	Vehicle Delays at Highway/Rail At-grade Crossings ^b	0.02
	Total Net Emissions	459.6
	Level of Potential Significance (1.6% of total County-wide NO _x emissions)	16.4

**TABLE 2.8-2
NO_x EMISSIONS CHANGES FOR ALL
ACQUISITION-RELATED EMISSIONS SOURCES BY COUNTY**

County	Emissions Source	Estimated NO_x Emissions Change (Tons/Year)
Leavenworth	Rail Line Segments ^a	35.2
	Vehicle Delays at Highway/Rail At-grade Crossings ^b	0.002
	Total Net Emissions	35.2
	Level of Potential Significance (1.6% of total County-wide NO _x emissions)	69.8
Marshall	Rail Line Segments ^a	186.8
	Vehicle Delays at Highway/Rail At-grade Crossings ^b	0.02
	Total Net Emissions	186.8
	Level of Potential Significance (1.6% of total County-wide NO _x emissions)	17.4
Nemaha	Rail Line Segments ^a	455.9
	Vehicle Delays at Highway/Rail At-grade Crossings ^b	0.05
	Total Net Emissions	455.95
	Level of Potential Significance (1.6% of total County-wide NO _x emissions)	20.8
Wyandotte	Rail Line Segments ^a	-66.11
	Vehicle Delays at Highway/Rail At-grade Crossings ^b	0.01
	Total Net Emissions	-66.1
	Level of Potential Significance (1.6% of total County-wide NO _x emissions)	382.2

^a Emissions changes are from all Acquisition-related rail line segments within the county.

^b Emissions increases are from vehicle delays at all highway/rail at-grade crossings for rail line segments that would meet or exceed the Board's thresholds for environmental analysis.

In the Draft EA, SEA concluded that the combined Acquisition-related increases in NO_x emissions for Atchison, Brown, Nemaha, and Marshall counties would be comparable to the annual level of emissions from small stationary industrial sources. SEA also concluded that the proposed Acquisition would not significantly increase the total NO_x emission inventories of these four counties, relative to other counties in Kansas. SEA has not changed its conclusion for the Final EA.

Mitigation

In the Draft EA, SEA did not recommend mitigation of regional or County-wide emissions for the following reasons:

- EPA's new emission standards for locomotives will effectively mitigate the level of Acquisition-related NO_x emissions in Atchison, Brown and Wyandotte Counties, beginning in the year 2000.
- In Nemaha County, the new emissions standards for locomotives will reduce NO_x emissions by approximately 50%. The remaining emissions (i.e., about 228 tons per year) are small, in absolute terms, compared with other potential industrial sources of NO_x and to the overall emissions inventory of the region.
- The proposed Acquisition would result in an overall reduction of emissions of air pollutants on a regional basis.

For the Final EA, SEA reaffirms its conclusion that the proposed Acquisition would not adversely affect air quality on a regional or County-wide basis because of the new emission standards. In its comments on the Draft EA, UP also volunteered to implement certain operating practices designed to reduce locomotive fuel consumption and emissions. SEA recommends that the Board require UP to implement these voluntary operating practices. (See Chapter 4, "Recommended Environmental Conditions") This should further reduce emissions.

2.9 NOISE

In the Draft EA, SEA evaluated potential increased noise for three rail line segments that exceeded the Board's threshold for environmental analysis. This section presents a summary of SEA's analysis of potential noise effects.

Methods of Analysis

In the Draft EA, SEA quantified the number of sensitive receptors (such as schools, hospitals, residences, and churches) that would experience noise levels above 65 dBA L_{dn}⁸ before and after the

⁸ A dBA is an A-weighted decibel, a single-number measure of sound intensity that accounts for the various frequency components in a way that approximates human hearing. L_{dn} is the day-night average noise level, which is the receptor's cumulative noise exposure from all noise events over a 24 hour period, adjusted to

proposed Acquisition. SEA based its noise analysis on baseline train operations, estimated post-Acquisition train activity, field noise measurements of typical UP coal trains, and site visits to count potentially sensitive noise receptors. SEA used a noise model developed by FRA to predict noise levels at different distances from the rail line under a variety of operating conditions. Section 3.7, “Noise,” of the Draft EA presents a detailed description of SEA’s methods of analysis.

In the Final EA, SEA continued to use the same noise analysis methods it had used for the Draft EA. SEA updated its analysis of potential noise effects to account for a change in estimated average train length for coal trains on the affected rail line segments and an adjustment to the reference sound level for the noise model. SEA also reviewed its count of potentially sensitive noise receptors near affected rail line segments and conducted additional consultation with the City of Seneca, based on the City’s comment that SEA undercounted the number of sensitive receptors in the City. SEA conducted additional noise analysis in Seneca to estimate the number of sensitive receptors that train wayside noise would affect if Seneca had a train whistle ban area in place.

Criteria of Significance. SEA considered Acquisition-related noise effects on a sensitive receptor to be potentially significant if the post-Acquisition noise level was at least 65 dBA L_{dn} and the Acquisition-related increase in noise was at least 3 dBA L_{dn} .

Analysis Results and Impacts

In the Draft EA, SEA identified three rail line segments in Kansas that exceeded the Board’s threshold for noise analysis. SEA determined that approximately 1,483 noise sensitive receptors would be in the post-Acquisition 65 dBA L_{dn} contours for these three rail line segments, an increase of 998 sensitive receptors from pre-Acquisition conditions. Of the 1,483 sensitive receptors, SEA determined that approximately 648 sensitive receptors located in 10 communities on the Hiawatha-Upland rail line segment would experience a post-Acquisition noise level of 65 dBA L_{dn} or greater, and an increase of 3 dBA L_{dn} or greater. SEA evaluated the Hiawatha-Upland rail line segment for noise mitigation.

For the Final EA, SEA determined that there would be 1,425 noise sensitive receptors in the post-Acquisition 65 dBA L_{dn} contour and 648 sensitive receptors within the 65 dBA L_{dn} contour that would experience an increase of 3 dBA L_{dn} or greater. All 648 sensitive receptors that would experience a 3 dBA L_{dn} or greater increase in noise are located on the Hiawatha-Upland rail line segment.

Tables 2.9-1, “Increase in L_{dn} and Distance to 65 dBA L_{dn} Contour,” and 2.9-2, “Noise Analysis Results,” present SEA’s updated noise analysis for Acquisition-affected rail line segments.

Mitigation

In the Draft EA, SEA considered and compared several strategies to mitigate potential noise impacts.

account for the perception that a noise event at night is more bothersome than the same noise during the day.

Some of these strategies mitigate train horn noise at highway/rail at-grade crossings by implementing enhanced safety measures and eliminating the need to sound train horns. These strategies include upgraded warning devices at highway/rail at-grade crossings, closing highway/rail at-grade crossings or constructing grade-separated crossings, constructing noise barriers, and establishing train whistle ban areas within affected communities. SEA ultimately concluded that the forthcoming rulemaking by FRA to establish procedures for community train whistle ban areas would be the most effective noise mitigation strategy for communities along the Hiawatha-Upland rail corridor. However, SEA did not recommend implementation of train whistle ban areas because FRA has not issued these rules. Rather, SEA recommended a condition requiring that UP consult with state and local officials in specified communities to find suitable approaches for mitigating adverse noise effects.

For the Final EA, SEA has considered the comments submitted by the City of Seneca and UP relating to noise. The previously discussed MOU agreed to by the City, the NVPTA, and UP addresses the noise issue in the City.⁹ The Final EA also retains (for communities other than Seneca) the consultation condition proposed in the Draft EA.

⁹ UP will install continuous welded rail within the City during 1999. The City and UP have agreed to develop a “Quiet Zone” and a program of closing highway/rail at-grade crossings (to be selected by the City).

**TABLE 2.9-1
DAY-NIGHT AVERAGE NOISE LEVEL IN L_{dn} AND DISTANCE TO 65 dBA L_{dn} CONTOUR**

Line Segment	Average Number of Trains Per Day				Day-Night Average Noise Level (L_{dn}) in dBA					
	Pre-Acquisition		Post-Acquisition		Rail Line Segment ^c		At-grade Crossings ^d			
	EB ^a	WB ^b	EB ^a	WB ^b			East of Crossings		West of Crossings	
					Pre-Acquisition	Post-Acquisition	Pre-Acquisition	Post-Acquisition	Pre-Acquisition	Post-Acquisition
Kansas City-to-Atchison	2.7	11.3	2.7	20.6	57.1	59.5	68.8	71.4	63.5	64.2
Kansas City-to-Atchison (within Atchison city limits)	2.7	11.3	2.7	20.6	53.8	56.0	68.7	71.3	62.9	63.2
Atchison-to-Hiawatha	3.1	9.7	3.1	19.0	56.7	59.3	68.2	71.1	63.9	64.5
Atchison-to-Hiawatha (within Atchison city limits)	3.1	9.7	3.1	19.0	53.5	55.8	68.0	70.9	63.4	63.7
Hiawatha-to-Upland	0.5	0.5	0.5	15.5	31.2	48.7	48.7	70.0	48.7	57.3
					Distance to 65 dBA L_{dn} Contour (Feet)					
Kansas City-to-Atchison					130	185	720	1,075	320	355
Kansas City-to-Atchison (within Atchison city limits)					80	110	705	1,055	290	305
Atchison-to-Hiawatha					125	180	655	1,020	340	375
Atchison-to-Hiawatha (within Atchison city limits)					75	105	635	995	315	330
Hiawatha-to-Upland					5	120	35	865	35	135

^a Eastbound trains.

^b Westbound trains.

^c The increase in L_{dn} from train wayside noise is on the portions of rail line segments located more than one-quarter mile from a highway/rail at-grade crossing.

^d The increase in L_{dn} within one-quarter mile of highway/rail at-grade crossings where train horns sound as a warning to motorists and pedestrians. The increase is substantially greater east of the crossings since the increased train volume would all be westbound empty coal trains. These westbound trains would only sound their horns east of the highway/rail at-grade crossings.

**TABLE 2.9-2
NOISE ANALYSIS RESULTS**

Rail Line Segment/Community	Number of Noise-sensitive Receptors within 65 dBA L _{dn} Contour						Number of Noise-sensitive Receptors that would meet the Board's Thresholds
	Pre-Acquisition			Post-Acquisition			
	Resid.	School	Church	Resid.	School	Church	
Kansas City-to-Atchison							
Kansas City	205	0	0	359	0	0	0
Leavenworth	8	0	0	32	0	0	0
Fort Leavenworth	6	0	0	7	0	0	0
Atchison	0	0	0	0	0	0	0
Total	219	0	0	398	0	0	0
Atchison-to-Hiawatha							
Atchison	9	0	0	24	0	0	0
Shannon	0	0	0	0	0	0	0
Lancaster	31	0	0	41	0	2	0
Huron	19	0	0	30	0	0	0
Everest	75	1	1	112	0	0	0
Willis	11	0	1	29	0	0	0
Baker	2	0	0	2	0	0	0
Hiawatha	64	0	2	139	0	0	0
Total	211	1	4	377	0	2	0
Hiawatha-to-Upland							
Hiawatha	0	0	0	0	0	0	0
Hamlin	0	0	0	25	0	1	26
Morrill	0	0	0	54 (1)	0	1 (1)	55
Sabetha	0	0	0	170	1	1	172
Oneida	0	0	0	23	0	0	23
Seneca	0	0	0	138	0	1	139
Baileyville	0	0	0	20	1	1	22
Axtell	2	0	0	153	1	3	157
Beattie	0	0	0	24 (2)	0	0	24
Home	0	0	0	29 (1)	0	1	30
Total	2	0	0	636 (4)	3	9 (1)	648
Total	432	1	4	1411 (4)	3	11 (1)	648

2.10 ENVIRONMENTAL JUSTICE

This section describes how SEA identified and evaluated the potential for disproportionately high and adverse impacts on minority and low-income populations as a result of the proposed Acquisition. SEA conducted its analysis on three rail line segments that exceeded the Board's thresholds for environmental analysis.

Methods of Analysis

In the Draft EA, SEA developed a six-step process to analyze potential significant impacts on minority and low-income populations from the proposed Acquisition. SEA defined a population as minority and low-income (i.e., an environmental justice population) within an area of potential effect if the minority and low-income population exceeds 50 percent of the total population or if the minority and low-income population is more than 10 percent of the county population. After identifying environmental justice populations, SEA evaluated whether Acquisition-related effects would be high and adverse on these environmental justice populations. Using statistical methods, SEA determined whether potentially high and adverse effects could disproportionately affect the environmental justice populations. If SEA determined that there would be disproportionate impacts on environmental justice populations, SEA evaluated potential mitigation strategies. Section 3.8, "Environmental Justice," of the Draft EA presents a detailed description of SEA's methods of analysis. SEA's methods of analysis are unchanged from the Draft EA.

Criteria of Significance. SEA determined that potential environmental justice impacts would be significant if the statistical analysis of disproportionate impact showed that environmental justice and environmental resource variables are not independent and that environmental justice populations would bear statistically significant disproportionate impacts.

Analysis Results and Impacts

In the Draft EA, SEA evaluated a broad range of potential Acquisition-related environmental and health effects for potential environmental justice impacts, including effects on safety, vehicle delay, emergency vehicle response delay, energy, air quality, and noise. SEA identified three rail line segments in Kansas that would exceed the Board's thresholds for environmental analysis and have environmental justice populations within the areas potentially affected by Acquisition-related rail activities. SEA concluded that noise and highway/rail at-grade crossing safety could result in potential adverse environmental justice impacts, but only noise impacts would potentially affect an environmental justice population. SEA performed a statistical evaluation of potential adverse noise impacts and concluded that these impacts would not disproportionately impact environmental justice populations. SEA did not revise its analysis of potential environmental justice effects in the Final EA.

Mitigation

SEA concludes that the proposed Acquisition would not result in disproportionate high and adverse impacts on minority or low-income populations and that mitigation measures to address environmental justice are not warranted.

2.11 ACQUISITION-RELATED CONSTRUCTION PROJECTS

UP proposes to construct a new rail line connection that would join the UP and NEKM rail lines at Hiawatha, Kansas. UP would construct the new rail line connection entirely within the existing railroad right-of-way. SEA reviewed the project's potential to individually or cumulatively affect the environment beyond the existing right-of-way.

UP would construct the proposed 820-foot connection between the UP rail line on the east and the NEKM rail line on the west. The connection would begin approximately 900 feet north of Miami Street on the north side of Hiawatha, Kansas. Approximately 375 feet of the connection would be located within the Hiawatha city limits and the remainder located north of the city boundary. UP estimates that construction of the proposed connection would require approximately 6 weeks to complete.

SEA also reviewed two alternatives to the proposed connection including: (1) a no-action where UP's coal trains would continue to operate on their current routes between Kansas City, Kansas and Gibbon, Nebraska; and (2) an alternative location for the proposed connection at the southern end of Hiawatha, Kansas. SEA concluded that neither the no-action nor build alternative were preferable to the proposed connection at the northern end of Hiawatha, Kansas.

Methods of Analysis

SEA reviewed the following issues to determine if construction of the proposed connection would result in adverse environmental effects outside of the railroad right-of-way:

- Surrounding land use.
- Natural resources, including potential effects on threatened or endangered species.
- Air quality.
- Noise.
- Disturbance of nearby hazardous waste sites.
- Cultural resources.
- Construction or modification of highway/rail at-grade crossings.
- Environmental Justice.

For its evaluation, SEA used a variety of information sources including U.S. Geological Survey topographic maps, local zoning maps, aerial photographs, National Wetland Inventory maps, historic meteorological data, and government environmental databases. SEA also conducted a site visit. As part

of this review, SEA consulted with the Kansas Department of Wildlife and Parks, Kansas Department of Health and Environment, Kansas State Historic Preservation Office, and the U.S. Fish and Wildlife Service.

Section 3.9, “Acquisition-related Construction Projects,” of the Draft EA presents a detailed description of SEA’s methods. SEA’s methods of analysis in the Final EA are unchanged from the Draft EA.

Analysis Results and Impacts

In the Draft EA, SEA concluded that construction of the proposed connection at Hiawatha, Kansas would not have potentially adverse environmental effects outside of the railroad right-of-way. SEA did not revise its analysis in the Final EA.

Mitigation

SEA did not identify potential adverse effects of construction outside of existing railroad right-of-way; therefore, mitigation is not warranted.

2.12 CUMULATIVE EFFECTS

NEPA guidelines require an assessment of potential cumulative effects of the proposed Acquisition. NEPA defines a cumulative effect as “the impact on the environment that results from the incremental consequences of an action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions.”¹⁰ Although certain actions may not directly relate to UP’s proposed acquisition of the NEKM rail line, their environmental effects, when added to or in interaction with the proposed Acquisition, constitute cumulative effects that may be potentially adverse.

SEA evaluated activities that, when combined with the potential impacts of the proposed Acquisition, could result in potentially adverse cumulative environmental impacts on air quality, energy, and transportation systems. SEA evaluated two types of activities that could result in cumulative effects:

- Regulations that agencies have approved but have not implemented as of publication of the Final EA.
- Other projects or activities, which potentially have cumulative effects, that agencies and the public brought to SEA’s attention during the public comment period.

¹⁰ 40 CFR 1508.7

Agency Regulations

In the Draft EA, SEA identified and analyzed a U.S. Environmental Protection Agency (EPA) regulation for new standards for emissions from locomotives that EPA has approved but that has not yet become effective for potential contributions to cumulative effects. This rule will take effect in the year 2000 and will ultimately result in more than a 60 percent reduction in nitrogen oxide (NO_x) emissions from locomotives. SEA evaluated the potential cumulative effects of this new rule as part of the review of potential mitigation alternatives for County-wide air quality effects of the proposed Acquisition. (See Section 3.6.2, "County-wide Air Quality Analysis," of the Draft EA) SEA concluded that the new rule would mitigate the level of Acquisition-related NO_x emissions in Atchison, Brown and Wyandotte counties and would reduce the NO_x emissions in Nemaha County by about 50%. SEA's analysis of potential cumulative effects from changes in agency regulations is unchanged for the Final EA.

Public Input

In the Draft EA, SEA requested local communities; local, regional, state or Federal officials; or other interested parties to provide information to the Board about potential projects or activities related to the proposed Acquisition that may result in cumulative effects. SEA did not receive any public comment about specific projects or activities that could result in cumulative effects.

2.13 SEA'S CONCLUSIONS

Based on its independent review of potential environmental effects that could result from the proposed Acquisition, SEA has reached the following conclusions:

- On a regional basis, SEA identified several environmental benefits that would result from overall improvement in UP's operating efficiency. These benefits include reduced emissions, reduced energy consumption, and reduced likelihood of mainline freight rail accidents. Of the 16 rail line segments that the proposed Acquisition would affect, 10 would experience reduced train traffic and one would experience no change in train traffic.
- SEA identified potential adverse environmental effects in certain communities that would experience increased train traffic as a result of the proposed Acquisition. SEA identified these potential effects in the areas of freight rail safety, highway/rail at-grade crossing safety, noise, and County-wide emissions. SEA identified reasonable and appropriate environmental mitigation to address each of these issue areas in the affected communities.

SEA also reviewed the Memorandum of Understanding UP entered into with the City of Seneca, and the NVPTA regarding environmental issues associated with the transaction and now recommends that the Board impose a condition requiring UP to comply with the terms of the MOU as an alternative to any environmental mitigation for the City that the Board might otherwise impose.

CHAPTER 3 SUMMARY OF COMMENTS AND RESPONSES

Chapter 3 summarizes the comments that SEA received on the Draft EA. SEA issued the Draft EA for public review and comment on December 21, 1998. SEA encouraged all recipients and reviewers to comment on its technical analyses and preliminary recommended mitigation measures in the Draft EA. The 30-day comment period expired on January 20, 1999.

SEA received a request from the City of Seneca, Kansas for an extension of the public comment period so that the City could conduct a more detailed analysis of the Draft EA. On the basis of Seneca's request, SEA granted an extension until February 4, 1999 for filing supplemental comments on the proposed Acquisition.

SEA received a total of six comment documents on the Draft EA, as well as some telephone inquiries and comments. With the exception of UP, all the comments related solely to the City of Seneca. SEA received comments from the City of Seneca, the NVPTA, Sts. Peter and Paul School, Union Pacific Railroad Company and private citizens in Seneca and Nemaha County affected by the proposed Acquisition.

As noted, shortly before this Final EA was prepared, Seneca, NVPTA, and UP jointly advised the Board that they had negotiated a mutually acceptable Memorandum of Understanding (MOU), executed March 12, 1999, addressing specific local environmental concerns regarding Seneca. The parties jointly asked that the Board impose a condition requiring UP to comply with the terms of the MOU, as an alternative to any other environmental mitigation for Seneca that might otherwise be imposed. In view of the MOU, SEA in this Final EA also modified the local recommended conditions in the Draft EA to eliminate Seneca from the list of communities for which the conditions apply.

The MOU further indicates that, if the Board imposes a condition requiring UP to comply with the terms of the MOU, the comments that the City and NVPTA filed on the Draft EA "will be deemed to have been automatically withdrawn effective on the service date of the [Board's] order." In these circumstances, a detailed response to the comments regarding Seneca is unnecessary. SEA will, however, briefly set out below the nature of the concerns that were raised by the commenters regarding Seneca. It also should be noted that because the parties did not execute the MOU until late in the environmental review process, SEA undertook further verification and analysis of data as a result of the comments related to Seneca. Also, in response to Seneca's concerns, SEA directed UP to file a verified statement containing updated information on anticipated train traffic, train length, and train speed. As discussed below, SEA's further analysis based on the updated data shows that the preliminary conclusions reached in the Draft EA remain valid because the new data were not materially different from the data used in the Draft EA.

Finally, in addition to submitting a verified statement, UP filed comments proposing voluntary mitigation that UP agreed to implement regarding highway/rail at-grade crossing safety and emergency response for communities along the Hiawatha-Upland line. UP's comment is described below.

3.1 COMMENTS RELATED TO SENECA

In their comments on the Draft EA, the City of Seneca, NVPTA, the Sts. Peter and Paul School, and private citizens in Seneca and Nemaha County argued that SEA should have done more to study potential localized environmental impacts on Seneca (such as noise and emergency vehicle response delay) and the Nemaha River and that the Draft EA had understated potential environmental impacts on the City by using incorrect assumptions for potential train traffic, train speeds, and length of trains. In addition, the commenters questioned SEA's statistical approach for analyzing certain environmental issue areas with potential impacts on Seneca, such as highway/rail at-grade crossing safety, and asked for additional environmental mitigation for Seneca. Seneca also asked that UP be required to implement all mitigation conditions before its trains can use the NEKM rail line. Two private citizens who filed comments (James and Mary Jane Boding of Seneca) expressed concerns that the proposed Acquisition would seriously affect the quality of life for residents living along the right-of-way in Seneca.

Response: SEA reviewed its technical analysis. To respond to Seneca's concerns that the Draft EA may have understated potential environmental impacts on Seneca by basing its analysis on incorrect assumptions, SEA directed UP to provide a verified statement providing additional information on estimated train traffic, average train speed, and average train length over the Hiawatha-Upland rail line segment, which UP did. Based on SEA's further analysis and UP's verified statement, SEA concludes that the 15 train per day average increase over the Hiawatha-Upland rail line segment used in the Draft EA was appropriate.¹¹ SEA also believes it was reasonable to use a 35 mile per hour train speed for the Hiawatha-Upland rail line segment, given the UP's verified statement explaining that UP has already rehabilitated the Hiawatha-Upland rail line segment to accommodate train speeds up to 40 miles per hour, and that there are no speed restrictions on that segment, including the bridge over the Nemaha River.

In the Draft EA, SEA used a 6,218 foot average train length for post-Acquisition train operations on the Hiawatha-Upland rail line segment. The average train length was based on a weighted average of 15 coal trains at approximately 6,569 feet each (i.e., an average 117-car trains) and one local train at approximately 950 feet. UP indicated in its verified statement that its revised post-Acquisition coal train operations on the Hiawatha-Upland rail line segment would consist of 127-car trains on average. The revised coal train estimate is due to UP's conversion of its coal trains to Distributed Power operation, which allows for longer trains. Therefore, for the Final EA, SEA used an average train length of 6,715 feet on the Hiawatha-

¹¹ UP stated in its verified statement that the capacity of this rail line segment is limited because of the need to maintain local train service and to provide time for maintenance work on the rail line. In addition, UP would operate this rail line segment under Track Warrant Control, which is a time-consuming dispatching method that limits track capacity.

Upland rail line segment.¹² SEA notes that the train length estimate primarily affects the analysis of highway/rail at-grade crossing delay, emergency vehicle response delay, and predicted accident intervals on individual rail line segments.¹³ In the Draft EA, SEA did not analyze any individual highway/rail at-grade crossings on the Hiawatha-Upland rail line segment because there were no highway/rail at-grade crossings with average daily traffic volume greater than 5,000 vehicles per day (the Board's threshold for analysis of highway/rail at-grade crossing delay). SEA used the revised average train length in its general analysis of emergency response vehicle delay and freight rail operations safety for individual rail line segments. (See Section 2.6, "Highway/Rail At-grade Crossing Emergency Vehicle Response," and Section 2.3, "Freight Rail Operations Safety")

3.2 HIGHWAY/RAIL AT-GRADE CROSSING SAFETY

In addition to providing the requested verified statement, UP submitted comments volunteering to implement the following additional mitigation to address potential highway/rail at-grade crossing safety issues at communities along the Hiawatha-Upland rail line: (1) install private crossing signs and stop signs at all private highway/rail at-grade crossings that are open to public use; (2) upgrade, where necessary, all existing highway/rail at-grade crossing signal circuitry to accommodate the proposed operation; (3) post a visible emergency toll free 800 number at all highway/rail at-grade crossings with active warning devices; (4) provide toll free numbers to emergency response forces in communities affected by the proposed Acquisition; (5) offer grade crossing collision investigation classes and emergency response training to law enforcement agencies and first responders in communities affected by the proposed Acquisition; and (6) implement vegetation control procedures along the NEKM rail line. SEA has included these items in its mitigation condition recommendations in the Final EA.

UP also commented that it participated in a corridor review of all public highway/rail at-grade crossings on the NEKM rail line, in conjunction with Kansas DOT and FRA. UP explains that Kansas DOT has submitted recommendations for highway/rail at-grade crossing signalization, improvements or closure to communities along the NEKM rail line. UP supports Kansas DOT's recommendations and offered to work with affected communities, Kansas DOT and FRA in implementing the recommendations.

Response: The recommended highway/rail at-grade crossing safety mitigation in the Final EA reflects the possibility that Kansas DOT may implement alternative safety improvements, with the concurrence of UP and affected communities, based on the corridor-based analysis.

¹² The average train length of 6,715 feet is based on an average 15 coal trains at 7,100 feet each and one local train at 950 feet.

¹³ Train length indirectly affects the analysis of air quality and energy, which are based on changes in train tonnages. A change in average train length also has a slight affect on wayside noise effects, but Acquisition-related noise effects along the Hiawatha-Upland rail line segment are mainly a factor of train horns.

Chapter 3: Summary of Comments and Responses

CHAPTER 4 RECOMMENDED ENVIRONMENTAL CONDITIONS

This Chapter describes the final mitigation measures SEA recommends that the Board impose as environmental conditions for the proposed Acquisition. SEA developed these recommendations after completing an independent analysis of the potential environmental effects. SEA's analysis included the following steps:

- Careful and thorough review of all public comments, including the Memorandum of Understanding (MOU) dated March 12, 1999, by UP, Seneca, and the NVPTA.
- Consultation with Federal and state agencies.
- Consideration of environmental and UP operating information.
- Site visits.
- Public notification activities.

After careful analysis, SEA developed reasonable and practical environmental mitigation recommendations to address potential adverse environmental effects. The mitigation recommendations fall within the scope of the Board's jurisdiction and are consistent with the Board's practice of mitigating only those environmental effects that directly result from the proposed Acquisition and giving effect to privately negotiated solutions whenever possible. In addition, UP volunteered to undertake several mitigation measures which are included in the Final EA to address specific community concerns. Throughout its environmental review process, SEA sought public input. SEA had to balance the various perspectives and concerns the public raised with the limits of the Board's jurisdiction and the range of environmental effects and issues.

During the environmental review process, SEA encouraged UP to consult with potentially affected communities to develop agreements to address special local environmental concerns related to railroad operations. These agreements often can be more effective and far reaching than the environmental mitigation conditions the Board may impose unilaterally. As of the publication of this Final EA, UP has executed a negotiated agreement with Seneca and the NVPTA. The parties have asked that the Board impose a condition requiring that UP comply with the terms of the March 12, 1999 MOU in lieu of any other environmental mitigation conditions that might otherwise be imposed relating to UP operations through Seneca. SEA has reviewed the MOU and recommends that the requested condition be imposed. Therefore, SEA has modified the local environmental conditions it recommended in the Draft EA to eliminate Seneca from the list of affected communities.

If UP and an affected community complete a negotiated agreement after SEA issues the Final EA, SEA further recommends that the terms of those agreements be deemed an acceptable alternative for any local and site-specific mitigation that the Board would otherwise impose. To the extent that a negotiated agreement is inconsistent or incompatible with a SEA recommended condition, SEA recommends that the SEA condition prevail.

Based on its independent environmental analysis and review of all public comments, SEA recommends that the Board require UP to implement the following environmental mitigation measures as conditions

in any decision approving the proposed Acquisition. SEA concludes that, with these mitigation measures, the proposed Acquisition would not result in adverse environmental effects on the natural or human environment.

Safety: Freight Rail Operations

Condition 1. UP shall comply with the requirements in the Federal Railroad Administration's (FRA) Proposed Rule for "gross ton-mile based" inspections (49 CFR Part 213.237, Docket No. RST-90-1) on the following rail line segments in Kansas:

- Kansas City-Atchison.
- Atchison-Hiawatha.
- Hiawatha-Upland.

FRA's Proposed Rule includes a provision that specifically requires railroads to conduct track inspections to detect rail flaws on a rail line segment at least once every 40 million gross tons per track mile or annually, whichever is more frequent. If FRA's Final Rule imposes a different inspection standard, then UP shall comply with the standard in the Final Rule.

Safety: Highway/Rail At-grade Crossings

Condition 2. UP shall continue its consultation with the Federal Railroad Administration (FRA), the Kansas Department of Transportation (KDOT) and the communities along the Hiawatha-Upland corridor to implement the recommendations of the Corridor Review Team composed of UP, FRA, and KDOT.

Condition 3. Subject to any agreement reached in ongoing consultations pursuant to Condition 2, UP shall upgrade the highway/rail at-grade crossing warning device at 6th Street in Sabetha, Kansas from crossbucks to flashing lights.

Condition 4. As agreed to by UP, UP shall undertake the following measures:

- a. UP will provide Operation Lifesaver programs in the future as requested by communities on the Hiawatha-Upland rail line segment.
- b. UP will install UP's standard private crossing signs and stop signs at all private highway/rail at-grade crossings which are open to public use.
- c. UP will upgrade, where necessary, all existing highway/rail at-grade crossing signal circuitry to accommodate the proposed rail operations.
- d. At all highway/rail at-grade crossings with active warning devices, UP will post a

visible emergency toll free 800 number to be called if signal crossing devices malfunction.

- e. UP will provide toll free numbers to all emergency response forces in communities affected by the proposed Acquisition. These numbers will provide access to appropriate UP personnel who may be contacted by communities in emergency situations.
- f. UP will offer Grade Crossing Collision Investigation classes and emergency response training to law enforcement agencies and first responders in affected communities.
- g. To enhance highway/rail at-grade crossing safety, UP will undertake vegetation control procedures along the Hiawatha-Upland corridor.

Noise

Condition 5. UP shall consult with state and local officials to find suitable approaches for mitigating the adverse noise effects in the following communities on the Hiawatha-Upland rail line segment in Kansas:

- Hamlin
- Morrill
- Sabetha
- Oneida
- Baileyville
- Axtell
- Beattie
- Home

Mitigation for a specific community may include a combination of: (1) eliminating highway/rail at-grade crossings, (2) installing safety measures that meet future FRA requirements for no-horn quiet zones, or (3) other measures as UP and affected community may negotiate.

Negotiated Agreement

Condition 6. UP shall comply with the terms of the Memorandum of Understanding, dated March 12, 1999, executed by the UP, City of Seneca, Kansas, and the Nemaha Valley Parent Teachers Association, regarding local environmental issues associated with this transaction.

Air Quality

Condition 7. As agreed to by UP, the UP will use operating practices that are designed to reduce locomotive fuel consumption and emissions. These include throttle modulation, use of dynamic braking, increased use of pacing and coasting trains and isolating unneeded horsepower.

Monitoring and Enforcement Condition

Condition 8. If there is a material change in the facts or circumstances upon which the Board relied in imposing specific environmental mitigation conditions in this Decision, and upon petition by any party who demonstrates such material changes, the Board may review the continuing applicability of its final mitigation, if warranted.

APPENDIX A LIST OF PREPARERS

Surface Transportation Board Section of Environmental Analysis

Elaine K. Kaiser	Chief, Section of Environmental Analysis, Legal Counsel
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Victoria J. Rutson	Staff Attorney / Legal Review, Section of Environmental Analysis

Prime Contractor

The prime contractor, Dames & Moore, Inc., was responsible for project management, technical analyses, quality assurance, agency and public consultation, and document production. In addition, subcontractors provided technical analysis on noise (Harris, Miller, Miller, and Hanson) and environmental justice (Radian International).

Juanita Feigenbaum, J.D. B.A; 18 years experience in legal and environmental consulting. Ms. Feigenbaum served as Dames & Moore's Project Director and Senior Advisor.

Robert J. Parker, B.S. Environmental Engineering, M.B.A. Quantitative Business Analysis; 18 years of experience in environmental impact analysis and studies. Mr. Parker served as the Project Manager for Dames & Moore and managed the technical analyses of transportation and energy issues.

Beata M. Rozanska, M.S. Sanitary and Water Engineering, M.S., Environmental Engineering; seven years of environmental engineering and air permitting experience. Ms. Rozanska served as the Air Quality Specialist and Assistant Project Manager for Dames & Moore. Ms. Rozanska conducted the air quality analysis and quality assurance review for the project.

Shankar Subramanian, B.S. Chemical Engineering, M.S. Environmental Pollution Control; Mr. Subramanian conducted the analysis of mainline freight rail safety and highway/rail at-grade crossing safety.

Kimberly D. Farley, B.S. Political Science, M.P.A. Environmental and Natural Resources Management, Ph.D. Political Science, Public Administration, and Environmental and Energy Policy; 12 years of experience in regulatory compliance and environmental impact analysis and studies. Dr. Farley

conducted the technical analysis of construction issues and coordinated agency consultation activities.

Subcontractors

Jason T. Sheeley (Radian International), B.S. Geography, M.A. Geography; 4 years experience conducting environmental justice analyses and studies. Mr. Sheeley served as the technical lead for the environmental justice analysis.

Hugh J. Saurenman (Harris, Miller, Miller and Hanson), Ph.D. Mechanical Engineering; Registered Professional Engineer in California and Florida; 25 years experience in environmental noise assessments. Mr. Saurenman served as the Project Manager for HMMH and managed the noise assessment.

Lance D. Meister (Harris, Miller, Miller and Hanson), B.S. Civil Engineering; 3.5 years of experience in environmental noise assessments. Mr. Meister served as the Assistant Project Manager for HMMH and conducted the site visits and field noise measurements for the noise analysis.