APPENDIX R

RESPONSE TO COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT

To facilitate the receipt of comments, two public hearings were held concerning the Master Plan Update Draft Environmental Impact Statement (Draft EIS):

- June 1, 1995: at the SeaTac Red Lion Hotel from 1 p.m. until 10 p.m. Simultaneous with the conduct of the hearing, a workshop was conducted to assist the public with understanding the contents of the Draft EIS. Testimony was provided by 77 individuals and the workshop/hearing was attended by about 150 people.
- June 14, 1995: at the Calvary Lutheran Church in Federal Way from 6 p.m. until 10 p.m. Testimony was received from 15 individuals. This hearing was attended by about 40 people.

The hearing record remained open until August 3, 1995, representing a public and agency comment period of 90 days.

All of the comments submitted during the 90-day comment period were reviewed and responses have been prepared to address all applicable comments. In many instances, the comments resulted in additional analysis that has been included in the Final Environmental Impact Statement (Final EIS). To aid in the review of comments and the preparation of responses, the comments were grouped by issue and/or chapter of the Draft EIS. A code was then given to each unique comment to facilitate the review of the individual comment and the identification of the corresponding response. Each code corresponds to a comment in the hearing transcript or correspondence (provided in **Appendix T),** which have been annotated with brackets in the right margin. The codes represent *R-A-B*, where R indicates a response, *A is the issue group*, and *B is a sequential number within the issue group, representing a unique comment.* The following issue groups were identified:

Code	Issue Group	Page Containing Responses
R-1-B:	The Planning Process	19
R-2-B:	Executive Summary and Chapter I "Background"	24
R-3-B:	Purpose and Need	30
R-4-B:	Alternatives	48
R-5-B:	Affected Environment (Chapter III) /Existing Impacts	58
R-6-B:	Noise Impacts	64
R-7-B:	Land Use (Land use, DOT 4(f), Prime and Unique farmland)	82
R-8-B:	Social Impacts and Induced Socio-Economic	97
R-9-B:	Surface Transportation	103
R-10-B:	Air Quality	109
R-11-B:	Earth Impacts	154
R-12-B:	Construction	157
R-13-B:	Water Quality, Hydrology, Floodplains, Coastal Zone Management	165
R-14-B:	Wetlands	178
R-15-B:	Plants and Animals (Endangered Species, Biotic Communities)	181

Table R-1 provides an index to the individuals and organizations that either testified at the Public Hearing (listed as HT) or submitted written comments during the comment period. The transcripts from the hearings as well as the written comments are included in **Appendix** T "Public Comments on the Draft EIS".

A number of significant comments were received concerning two key topics:

- Aviation demand forecast relative to the Do-Nothing and "With Project" alternatives
- The assessment of air pollutant conditions

The following section presents an elaboration on these issues, while the final section of this appendix contains the individual responses to comments.

I. AIRPORT ACTIVITY LEVELS WILL BE THE SAME REGARDLESS OF THE IMPROVEMENTS AT SEA-TAC DUE TO THE REGIONAL DEMAND FOR AIR TRAVEL AND THE CAPACITY OF THE EXISTING AIRFIELD.

A number of commentors on the Draft EIS requested clarification of why the development of the proposed new parallel runway (and overall Master Plan Update improvements) would not result in a greater level of passengers and/or aircraft operations being served in the future in comparison to the Do-Nothing. In preparing the Draft EIS, three initial questions were examined:

- What is the forecast demand for air travel through the year 2020?
- How will delay affect the hourly demand levels?
- Will the capacity of Sea-Tac be exceeded as a result of the demand?

In evaluating the capability of the existing airport facilities, two terms are used: demand and capacity. Demand is the number of individuals and resulting aircraft operations that desire the use of air travel during a specific period of time. Capacity is the number of passengers or aircraft operations that can be processed during a specific period, with a corresponding level of delay based on a specific system and operational procedures. Demand for air travel is independent of capacity as long as sufficient capacity exists. If insufficient capacity exists, the level of activity accommodated by a facility would be less than the demand.

(1) Growth in demand for air travel will result from the forecast growth in the Region's population and income levels.

The Draft EIS was prepared based on the mid-range aviation demand forecast developed for the Master Plan Update which showed the following :

TABLE R-2
MASTER PLAN UPDATE FORECASTS

	Actual	Master Plan Update Forecast		
	1993	2000	2010	2020
Total Enplanements	9,400,000	11,900,000	15,300,000	19,100,000
Origin and Destination EPS	6,580,000	8,220,000	10,580,000	13,220,000
Aircraft Operations:				
Air Carrier	188,000	223,000	255,000	287,000
Air Taxi/Commuter	127,000	127,000	118,000	117,000
All-Cargo	16,000	20,000	23,000	27,000
General Aviation	8,100	8,900	9,500	10,300
Military	400	300	300	300
Total Operations	339,500	379,200	405,800	441,600

Source: 1994 Master Plan Update Technical Report No. 5 Preliminary Forecast Report, Port of Seattle. - these forecasts reflect the mid-range forecast. EPS = Enplanements

As many factors influence the growth of aviation demand, focus was placed on identifying the factors in this Region that have most affected the desire for air travel. Similar to most air carrier airports, this demand can be expressed as a function of three key factors, population, income and average air fares. As is described in *Master Plan Technical Report No. 5, Preliminary Forecast Report*, in 1993 the four county Central Puget Sound Region had a population of 2.95 million and employment of 1.58 million people. By 2020, population of the Region is expected to reach nearly 4 million people and employ about 2.3 million people. In addition, the per capita personal income (PCPI) in 1993 was approximately $15,000; the PCPI, in constant dollars, is expected to increase 36% to $20,364 by year 2020. As is described in the Draft EIS, the projected growth of the Region is nearly double that of the United States.

An aviation demand forecast model was developed for the Master Plan Update to explain the past changes in air travel demand. The model explains 99.5% of the past changes in domestic origin and destination (O&D) air travel demand in the Region. It demonstrates that the past growth in O&D enplanements at Sea-Tac is a result of changes in regional population, income and average air fares. Because population and income in the Region are expected to increase during the planning period, the number of operations are also expected to increase. In reaching its conclusions regarding the expected growth in demand, the Master Plan Update forecast made certain assumptions regarding average air fares which are not affected by either constructing or not constructing the proposed airport improvements.[1/]

(2) Capacity of Existing Facilities

As was described earlier, capacity is defined as the number of passengers or aircraft operations that can be processed during a specific period, with a corresponding level of delay based on a specific system and operational procedures. Airfield capacity is typically estimated on an hourly or annual basis. An hourly capacity is used most frequently when performing detailed

1/ It is not likely that constructing or not constructing the proposed Master Plan Update (including the proposed new parallel runway) improvements would have a significant enough impact on average air fares to affect noticeably the number of aircraft operations. Although a proportion of the costs of a new runway would be passed on to the traveling public through higher airfares, it is not expected that this cost would be great enough to affect air fares significantly. Likewise, failure to construct the improvements would increase operating costs for personnel, fuel, etc. And while these costs would be passed on to the traveling public through air fares, it is not expected to have a significant enough impact on air fares to affect noticeably the number of operations.

assessments of airfield operating performance, in studies such as the 1995 Capacity Enhancement Plan Update or airport master plan studies. Annual capacity assessments, or annual service volumes are often used in airport master plans and system plans for longer range planning. The annual service volumes or capacities were used in the 1992 Flight Plan and are most often referenced by the general public as the capacity of the Airport.

In 1991, the Flight Plan found that the annual service volume of the existing airfield at Sea-Tac is about 380,000 annual operations. This level is based on assumptions regarding the amount of delay that can be accommodated at Sea-Tac and in the national aviation system. The Flight Plan states:

> "The term average delay denotes a value for a number of aircraft within a period of time whereby one aircraft might experience only a few seconds of delay and another perhaps several minutes. Years ago, an average delay of 4 minutes was determined to be an acceptable level for airport planning. At this average, the distribution of delays during an hour are such that they range from a few seconds up to but never exceeding 20 minutes. Today, the 4 minute average is still recognized in the industry as a valid measure of tolerable delay. Numerous studies of airfield capacity and delay indicate that delays will start escalating quickly at the 4 minute average. Comparing the acceptable 4 minute average to other thresholds, average delays of from 5 to 7 minutes for air carriers over a period of time is considered a moderate level of delay, and average delays of 7 minutes and above are considered severe." [2/]

As is stated in the Draft EIS, the purpose of the proposed new parallel runway is to "Improve the poor weather operating capability in a manner that accommodates aircraft activity with an acceptable level of delay". While Sea-Tac has sufficient operating capability during good weather conditions, during poor weather today, the existing runway system produces extensive arrival delays. For instance, when weather transitions from VFR1 to VFR2, average arrival delay increases 1,040 percent (from 1.0 minute to 11.4 minutes). Delays further worsen when IFR1/2/3 conditions occur; arrival delay increases 2,070 percent over VFR1 (at 21.7 minutes in contrast to 1.0 minutes). It is important to note that average delays reflect that some flights would experience less delays, while others would experience substantially greater levels of delay.

It is theoretically possible for more than 380,000 operations to occur at Sea-Tac in a year, as evidenced in the 1992 Flight Plan EIS: "By expanding operations into the late evening and early morning hours and with increased average delay, the airport (Sea-Tac) can handle up to 460,000 operations per year."[3/] This theoretical operating capability reflects the elasticity that exists in airfield operating capability, particularly when little or no constrains exist during good weather conditions and where the Airport's passenger characteristic is dominated by origin and destination travelers, with no other efficient or viable alternative to air travel. However, it is not reasonable to accommodate that level of operations within Sea-Tac's present facilities because the delay involved in handling more than 380,000 operations would be significant, particularly during poor weather conditions, resulting in unnecessary operating costs to the airlines.

Table R-3A shows the average arrival delay, average departure delay and estimated taxi delay. Poor weather, defined as VFR2 and IFR conditions, occurs about 44 percent of the year. During such conditions, the arrival acceptance rate is reduced substantially, as only one arrival stream is permitted. Instead of an hourly arrival acceptance rate of 60, the single arrival stream limits arrivals to 36-48, and in extremely poor weather to 24 arrivals per hour. **Table R-3B** shows arrival delay during VFR and IFR conditions. As is noted, when poor weather occurs, delay at Sea-Tac increases exponentially.

2/ "*The Flight Plan Project: Draft Final Report and Technical Appendices including Draft Programmatic Environmental Impact Statement*", January 1992, Puget Sound Air Transportation Committee, Page B-57 (Working Paper 7, Page 6)

3/ *Flight Plan Final Environmental Impact Statement*, pp. 3-16. Also *The Flight Plan Project, Draft Final Report and Technical Appendices including Draft Programmatic Environmental Impact Statement*, January 1992 (p. B-90 Working Paper 7m, p. 11)

TABLE R-3A
AVERAGE ALL-WEATHER DELAY

	Average Delay (minutes) Existing Airfield			
Operations	Arrival	Departure	Estim. Taxi	Total Average Operation
345,000	7.7	1.3	0.1	4.5
425,000 *	22.2	2.6	0.2	12.4
525,000 *	63.7	11.6	0.4	37.7

TABLE R-3B
ARRIVAL DELAY

	Average **Arrival** Delay (minutes) Existing Airfield				
Operations	VFR1	VFR2	IFR1/2/3	IFR4	All-Weather
345,000	1.0	11.4	21.7	333.2	7.7
425,000 *	1.6	41.8	71.2	524.5	22.2
525,000 *	3.1	163.6	181.3	711.9	63.7

Source: FAA Capacity Enhancement Update, Data Package No. 12, June, 1995
* Assumes full implementation of the 2.5 nm separation.
Definitions of VFR1, VFR2, and IFR1/2/3/4 are provided in Table R-4.

(3) **Conclusion**

If the proposed new runway and other facility improvements are not constructed, the growth in demand for air travel would continue to occur as would the number of aircraft operations, because it is expected that the Region will continue to experience growth in population and income. It is theoretically possible for Sea-Tac to accommodate more than 380,000 aircraft operations per year, even though the accompanying delays would be significant, especially in poor weather conditions. Therefore, it is the professional judgment of the FAA, the Port and its technical consultants that it is reasonable to assume for purposes of this environmental analysis that the same number of operations would occur with and without the proposed new runway.

IF INCREASING DELAY AT SEA-TAC RESULTS IN FEWER ANNUAL OPERATIONS THAN WOULD OCCUR WITH THE PROPOSED NEW RUNWAY, THE IMPACTS OF THE "DO NOTHING" ALTERNATIVE WOULD BE DIFFERENT FROM (AND IN MOST AREAS WOULD BE LESS THAN OR OCCUR LATER THAN) THE IMPACTS OF THE "WITH PROJECT" ALTERNATIVES.

Some commentors stated that the number of operations without the proposed new runway would be less than would occur "With Project" because the increased costs and inefficiencies resulting from increased delay will cause travelers to use other airports or use alternatives to air travel. Given the lack of viable alternatives to Sea-Tac Airport for O&D passengers and the high percentage of O&D passengers at Sea-Tac, and given the lack of viable alternatives to air travel as discussed elsewhere in this EIS and on page R-6 of this appendix, it is not likely that the number of operations would decrease significantly even with the increasing delay that would occur without construction of the proposed new runway. Nevertheless, if the number of operations is less as a result of increased delay, the impacts of the "Do-Nothing" alternative would be different from the impacts of the "With Project" alternatives. In most areas of the environment, the impacts of the "Do-Nothing" alternative either would be less than the impacts of the "With Project" alternatives or would occur at a later time.

The Master Plan Update also assessed the capacity of the existing landside facilities at Sea-Tac Airport. This analysis, like the analysis conducted for the airfield, showed that the existing landside facilities are capable of accommodating the forecast growth in demand with a large amount of passenger and traffic congestion and delay. Unlike the airfield, the same service characteristics do not exist with surface travel. Passengers using Sea-Tac have several equally feasible means of accessing the Airport, through single-occupancy vehicles and private vehicles, as well as alternative surface routes. As congestion mounts on the highway system, passengers are likely to use arterials and to avoid the Airport's entrance roadway by parking at the off-site lots. The surface transportation analysis presented in the Final EIS presents an updated portrayal of how passengers would likely access Sea-Tac as a consequences of the Do-Nothing alternative. The revised assumption reflects a greater level of congestion on certain nearby roadways, which is the expected air passenger reaction to surface delays.

The following section presents a discussion of the potential environmental impacts of an alternative demand forecast. One of the alternative forecasts considered is aviation demand which is less than the Master Plan Update forecast. If there are fewer aircraft operations as a result of increased delay, the impacts of the "Do-Nothing" alternative (and the differences from the "With Project" alternatives) would be approximately as indicated in that discussion below. The discussion indicates that, if there are fewer aircraft operations as a result of increasing delay, the impacts of the "Do-Nothing" will be less than those of the "With Project" alternatives.

II. IMPACTS OF ALTERNATIVE FORECAST ASSUMPTIONS

Several commentors have suggested alternatives for how the Do-Nothing alternative would accommodate forecast activity levels:

- De-peaking of demand/flattening of the peaks
- Increased load factors and aircraft size
- Use of alternative modes of travel
- Use of alternative airports

The following sections summarize the findings of the Draft and Final EIS relative to these options.

(1) De-Peaking of Demand

One of the suggestions identified as a consequence of the high levels of delay associated with the Do-Nothing alternative is that aircraft operations would not incur delay, as the flights would be rescheduled to operate in periods with less delay. As is described in Chapter II of the Draft and Final EIS, the Do-Nothing alternative assumes that forecast levels of activity will be naturally "de-peaked" by virtue of the delay associated with higher levels of aircraft operations. Thus, actions that would be taken by air carriers to operate in non-peak periods to avoid delay, yet accommodate the forecast demand.

The primary vehicle available to airport users to avoid the delay by de-peaking is altering flight schedules. One approach to altering flight schedules would be to increase the scheduled flight duration time (also called block time). As has been shown by comparing past flight times with current flight times to the same city markets, the airlines have already gradually increased flight times to reflect increased delay in the system.[4/] As a result, airlines have incurred delays and

[4/] For instance, in 1990, the average block time for direct United Airlines flights from Sea-Tac to Los Angeles was 2 hours and 21 minutes. In 1995, the average block time was 2 hours and 34 minutes. Similarly for departures to Spokane, the average block time was one hour and 2 minutes in 1990, yet in 1994 the average block time was 3 minutes greater. To San Francisco, the average block time grew by 10 minutes between 1990 and 1995, from 1 hour and 54 minutes to 2 hours and 4 minutes. Similarly for arrivals to Sea-Tac from Spokane, the block time increased 10 minutes, while the block times increased 7 minutes when arriving from San Francisco.

inefficiency, and hidden these delays by increasing the block times. As changes in flight/block time extend the operating times of flight crews, increase fuel consumption, etc., such changes would increase operating costs to the airlines.

Another means of de-peaking would be requiring air carriers to operate in non-peak periods. Such a requirement is not feasible, as found by the Expert Panel on Demand and System Management in their December 8, 1995 final order. Instead, airlines could theoretically voluntarily re-schedule flights out of the peak periods. Theoretically, there is a point when the de-peaking of the demand through artificial means is no longer realistic, as airlines establish flight schedules in response to demand - when passengers and shippers desire air service. Airlines have some flexibility to modify schedules to account for anticipated delays, but such adjustments are typically limited to relatively small changes in scheduled arrival or departure times (i.e., less than 15-20 minutes). Substantial changes in actual flight schedules would not likely occur in large number, since such changes would result in flights being made when passengers do not wish to fly. Factors such as the desires of the traveling public, time zone limitations and flight crew scheduling are key determinants of flight schedules. If airlines choose to re-schedule flights (including an increase in the operating block times), the benefits of the proposed new parallel runway, as described by delay and delay savings, would be less than presented in this EIS. However, as capacity exists during the good weather conditions (VFR1), it is unlikely that the airlines would completely adjust their schedules to reflect the poor weather delay, due to passengers' desire to fly at specific times. Competition would continue to generate peaks in activity. Consequently, when poor weather occurs, flight delays would occur.

The assumptions of this EIS reflect the shifting of flight times, or de-peaking, as a result of delay associated with the Do-Nothing alternative. These high levels of delay automatically delay a small number of flights into hours when less activity occurs. As was assumed in the Do-Nothing alternative, the greatest shifting of flights due to delay would occur within 60 minute blocks. Thus, these shifts would not significantly alter the demand profile. Shifts greater than portrayed for the Do-Nothing alternative are not likely, until the Airport reaches its capacity, thereby forcing de-peaking. At that point, the Airport is not meeting its objective of providing efficient air transportation as demanded by the traveling public.

Logan in Boston proves otherwise

One of the arguments suggested in comments from the public is that airlines would cease or reduce service to Sea-Tac as delay increases. However, these comments do not reflect the passenger types using Sea-Tac. Enplaned passengers using Sea-Tac are dominated by origin and destination passengers (passengers wishing to access the Puget Sound Region) versus connecting passengers. Experience at other U.S. airports indicates that when an airport has a large number of connecting passengers, airlines can choose to schedule some connecting passengers through other airports or when demand is sufficient, overfly the connecting airport. However, as 70 percent of the Sea-Tac passengers are O&D, and due to the location of the Region relative to the population centers of the country, airlines would continue to serve the demand at Sea-Tac.

Whether delay occurs or flight schedules are adjusted to reflect increased operating block times, increased operating costs would accrue to the airlines. Thus, this option was considered the most realistic consequence of the demand and facilities available, and, thus was reflected as the Do-Nothing alternative assessed in the EIS. The reduced operating times associated with the implementation of a third parallel runway would result in a substantial cost savings to the airlines. As is described in the Draft and Final EIS, a new parallel runway would have saved the airlines $24 million if it had been available for use in 1994. The delays saving is expected to grow to around $59 million per year in 2000, $70 million per year in 2002 and $146 million when activity reaches 425,000 operations (near the year 2013). As a result, if the runway were available for use in year 2002, the delay savings would compensate for the cost of construction in a 5 year period. If completed later, the pay-back period would be sooner than 5 years.

(2) Increased Load Factors

Another suggestion is that passenger demand would continue during the peak periods such that airlines would increase the load factor on flights during these periods.

At Sea-Tac, higher load factors occur during the peak arrival and departure periods, especially on the longer haul non-stop flights. In general, lower load factors occur on shorter flight distances and during the non-peak periods. This peaking is a consequence of the desire of passengers to arrive and/or depart during specific windows of time. Demand for east coast service reflects time zone changes as well as the flight time due to the northwest coastal location of Sea-Tac. For instance, the earliest arrivals leave east coast cities by 7 a.m. with arrival at Sea-Tac scheduled for about 11 a.m. or later. Similarly, departures for the east coast typically leave Sea-Tac before 3 p.m. in order to arrive on the east coast before 10 p.m. While operations occur outside these windows, the associated load factors are typically less. In addition, the majority of the operations to the east coast (particularly during peak periods) are already being conducted with the larger aircraft in an airlines fleet. The forecast prepared for the Master Plan Update assumed an increase in aircraft seat size in the future, reflecting actions such as an airlines decision to replace smaller aircraft (B-737 and B-727) with larger aircraft (B-757 and B-777).

The north-south markets are currently being served by the high frequency shuttle operations (particularly in the California markets). The fleet mix servicing the north-south flights is dominated by B-737 aircraft, which facilitate quick aircraft service turnaround. Increasing the load factor or aircraft size is not likely in these markets, as during peak periods load factors are already high. In addition, to conduct the profitable quick-turn around necessary for the lower-cost, shuttle operations, airlines have found smaller aircraft more desirable.

When the options of increased load factors and/or increased aircraft sizes were considered during the Master Plan, it was found unrealistic. Delay at one airport, such as Sea-Tac, is not sufficient to influence an airline's fleet acquisitions. In addition, the power of an airline to control load factors is based on fare pricing. Average load factors can not realistically exceed 70 percent due to the law of averages. To achieve extraordinarily high average load factor, the airlines would have to set fares so low (to attract passengers to the non-peak periods) that they would be turning away substantial numbers of higher yield customers during peak periods. Yield management, in use by airlines today, is designed to match air fares, aircraft types, and demand in a manner that maximizes customer service and profit. Further increases in average load factors are not expected as a result of yield management without adverse impacts on profitability.

Similarly, current research indicates that airlines providing the greatest service frequency can attract more market share than their share of the seats in the market. The current trend toward smaller aircraft for the shorter-haul flights with greater frequency confirms the attempt by the airlines to increase load factors and profitability, while maintaining and increasing flight frequency. Thus, influences in flight scheduling were deemed more realistic and were reflected in the de-peaking alternative described previously.

See 1999 Airport Activity Report 750% international flights

(3) Alternative Modes of Travel

The Draft and Final EIS contains an extensive description of the other modes of travel and their potential as an alternative to the proposed improvements at Sea-Tac Airport. Commentors noted that if delay reaches a critical level at Sea-Tac, such as those associated with the "Do-Nothing" alternative, passengers would select another mode of travel. These alternative modes of travel could include, automobile, train, and bus and are only effective and efficient for trips within a 500 mile driving distance. Currently, less than five percent of current air passengers are traveling to cities within the 500 mile distance. In addition, the two principal state travel corridors, I-5 and I-90, are experiencing growing traffic congestion. Existing train service, and planned rail improvements do not provide competitive travel times or frequency of service to

compete with air travel. It is unlikely that air passengers would change their mode of travel to slower and more congested alternatives. Alternative modes of travel were not considered to be a reasonable option within the year 2020 planning horizon. The forecast assumptions reflect these conditions and their potential impacts on air travel demand.

(4) Use of Alternative Airports

The Draft and Final EIS also contains an extensive discussion of the analysis conducted concerning the use of alternative airports. As was discussed, this is not a reasonable alternative and is not likely in the context of the Do-Nothing alternative.

(5) Environmental Impact of an Alternative Forecast Demand Assumption

To disclose the probable impacts associated with Sea-Tac Airport accommodating less or more aviation traffic than is forecast, several theoretical scenarios were assessed, extrapolating from the assessment presented in the EIS. The following scenario's were assessed: Case 1: Aviation demand grows slower, 85 percent of the levels forecast by the Master Plan Update; Case 2: Aviation demand grows 25 percent greater than forecast by the Master Plan Update; and Case 3: Same as Case 2, except the Do-Nothing is constrained to the capacity of the existing airfield.[5/]

As a result, aviation demand in these scenarios could be as follows:

	2000	2010	2020
Master Plan Update Forecast			
Aircraft Operations	379,200	405,800	441,600
Enplaned Passengers	11,900,000	15,300,000	19,100,000
Est. total delay (min.)	12	17	24
Case 1: (15% slower growth)			
Aircraft Operations	360,240	365,220	375,360
Enplaned Passengers	11,305,000	13,770,000	16,235,000
Estimated total delay (min.)	8	9	11
Case 2: (25% greater growth)			
Aircraft Operations	398,160	466,670	552,000
Enplaned Passengers	12,495,000	17,595,000	23,875,000
Estimated total delay (min.)	16	30	53
Case 3 (25% greater growth with capacity limit)			
Aircraft Operations	398,160	460,000	460,000
Enplaned Passengers	12,495,000	17,343,500	19,895,900
Estimated total delay (min.)	16	30	30+

As is noted in this appendix, the Master Plan Update forecasts represent current professional estimates of how aviation demand will change in the future using a reliable relationship between population, income and air fares. However, to provide an estimate of the possible environmental impacts associated with different forecasts, the three cases noted above were assessed. This assessment focused on the Preferred Alternative - Alternative 3 (North Unit Terminal) with a new 8,500 foot long parallel runway and the Do-Nothing. The extrapolation from the impacts presented in the EIS was performed based on professional estimates of how the various environmental impacts would change in accordance with alternative aviation demands.

[5/] These three cases were considered as they are representative of possible variations from the current aviation demand forecast. As of September 1995, actual aviation activity levels are 20 percent higher than a linear interpolation between the forecast dates. Thus a 15% slower growth rate would appear to represent a much slower growth rate than is currently actually materializing. A 25% faster growth rate was used as it is slightly higher than the most recent trend.

Table R-4 presents a summary of the probable key impacts of these cases.

(A) Case 1: Demand Grows at a Slower Rate than Forecast

Assuming that aviation demand grows at a slower rate, the proposed improvements identified in the Master Plan Update would not be needed in the time frame presented in Chapter II of the EIS. As a result of a 15% slower demand growth, average delay would not reach the 10 minute average total level until around the year 2015. However, as is noted, current poor weather conditions create severe delay conditions, and by the year 2000, would exceed Sea-Tac's desired average delay levels. Thus, while the runway would be needed today to address the poor weather operating deficiencies, this case tested delaying the implementation of the Master Plan Update improvements by 15 years. As the airfield capacity of Sea-Tac would not be exceeded with the Case 1 demand levels, the Do-Nothing and "With Project" activity levels were assumed to be equal.

Based on these demand and timing assumptions, environmental impacts were then extrapolated:

- *Noise and Land Use: With less aviation demand, the associated noise impacts would be less.* Based on the analysis conditions presented in the EIS, the effects on the Do-Nothing and "With Project" noise and land use impacts were assessed assuming a 15 percent slower aviation demand forecast. As is shown in **Table R-4**, while the precise numbers of people and housing units affected by DNL 65 and greater sound level would be less than forecast (by up to 20 percent), all future year impacts would continue to be substantially less than current impacts. The incremental impact caused by the proposed Master Plan Update improvements would be slightly less than the impacts presented in this EIS. When comparing the Do-Nothing alternative to the "With Project" alternative in year 2020 with less demand, the proposed improvements would impact an additional 1,050 people and 400 homes by DNL 65 and greater sound levels.

- *Air Quality: A slower forecast in aviation demand would result in less total air pollution; However, CO concentrations would continue to be exceeded at the key intersections in the Airport vicinity.* Based on the forecast assumptions of this scenario, the total quantity (inventory) of air pollution emitted in the study area was estimated assuming a linear relationship between activity levels and pollutant emissions. As is shown in **Table R-4**, with a 15 percent less growth in aviation demand, the forecast emission levels would be 15 percent less. The incremental impacts caused by the Master Plan Update improvements would be the same as those presented in this EIS.

  The pollutant concentrations associated with the area roadways were also assessed using a 15 percent lower aviation demand forecast. To demonstrate a worst-case evaluation, these 8-hour concentration estimates were extrapolated assuming that half of the traffic through the intersections are airport related, and were thus reduced accordingly. As less airport related surface traffic were to occur, less pollution would be emitted. As is shown, the same incremental relationship between the "With Project" and Do-Nothing alternative would exist with a 15 percent slower growth in aviation demand.

- *Water Resources (Floodplains, Streams, Wetlands, etc.): With a lower level of aviation activity the proposed improvements would impact the resources later in time.* Virtually all of the water resource impacts that were identified in the Master Plan Update EIS are not directly dependent upon the precise aviation demand forecast. Rather, water resource impacts is a function of the types of facilities that are available to accommodate the forecast demand. Until new facilities are constructed, there would not be new impacts on floodplains, streams, wetlands, or surface water runoff. As is shown in **Table R-4**, the water resource impacts would not be incurred until after year 2010 as the major new facilities would be under development after around 2015.

- *Property Acquisition would occur later in time, yet would eventually require the same number of homes and business as presented in this EIS for the Master Plan Update improvements.*

- *Socio-Economic Impacts* - A slower aviation demand forecast would result in the same property and sales tax losses but would not occur until later in time as acquisition would occur as presented in this EIS. Total jobs created due to aviation activity at Sea-Tac would grow at a slower rate than forecast in the EIS, due to the slower growth in aviation demand.

- *Earth/Fill Requirements* - As the proposed Master Plan Update improvements are needed, they would result in the same quantity of fill required to develop the third runway embankment and runway safety areas. As the quantity of fill would be the same, the construction related truck movements would be the same as presented for the Master Plan Update forecast. However, these impacts would not occur until later in time, sometime after the year 2015, when the proposed improvements are needed.

Noise and air pollution impacts would occur in proportion to the anticipated growth in aviation demand. Other impacts to the social and natural environment would not occur until construction was initiated, about 15-17 years later than forecast by the Master Plan Update.

(B) Case 2: Demand Grows at a Faster Rate than Forecast

The second case assessed reflects a greater growth in aviation demand than is presently forecast by the Master Plan Update. To estimate a 25 percent greater growth in year 2020, somewhat slower escalated growth rates were assumed for interim years. For this test case, year 2000 activity was consider to be five percent above the year 2000 forecast, while year 2010 was assumed to be 15 percent above the associated Master Plan Update forecast. As a result of this elevated activity level assumption, aviation demand and associated delay and congestion would be substantially greater than forecast - year 2000 average delay would be approximately 16 minutes, versus the Master Plan Update Do-Nothing assumption of approximately 12 minutes. Landside improvements would also be needed earlier in time; based on these forecasts, landside improvements could be needed 5-7 years earlier than forecast.

Assuming that the existing facilities can accommodate this demand, the following analysis was performed.

- *Noise and Land Use: This case would result in nearly the same incremental impact as forecast by the EIS*: Based on the analysis conditions presented in the Environmental Impact Statement, the impact on the Do-Nothing and "With Project" noise and land use impacts were assessed assuming the greater growth in year 2020 aviation demand. As with Case 1, all future year impacts would be less than the existing impacts, whether or not improvements are undertaken at Sea-Tac. The greatest incremental impact, relative to the Do-Nothing would occur in 2020, where 550 people in about 230 homes would be newly affected by DNL 65 and greater noise exposure.
- *Air Quality: A greater forecast in aviation demand would result in more total air pollution; CO concentrations would continue to be exceeded at the key intersections in the Airport vicinity, at a rate higher than forecast by the EIS.* With a faster growth in aviation demand, the forecast emission levels would be up to 25 percent greater than presented in the EIS. However, the incremental impacts on the emissions inventory caused by the Master Plan Update improvements would be the same as those presented in the EIS.

  The pollutant concentrations associated with the area roadways were also assessed using a 25 percent year 2020 greater aviation demand forecast. If more airport related surface

traffic were to occur, higher concentrations of pollution would occur on area roads. As is shown, the same incremental relationship presented in this EIS between the "With Project" and Do-Nothing alternative would exist with a 25 percent faster year 2020 growth in aviation demand.

- *Water Resources (Floodplains, Streams, Wetlands, etc.): Water resource impacts would occur earlier in time, as the need for airport facilities would occur faster - however the impacts would be the same as shown in the EIS.* As is shown in **Table R-4,** the water resource impacts would not be before year 2000, as construction of most of the airport improvements would occur 5-7 years earlier than forecast.

- *Property Acquisition would be as projected for the Master Plan Update, and would require the same number of homes and business as presented in the EIS for the Master Plan Update improvements.*

- *Socio-Economic Impacts* - A faster aviation demand forecast would result in the same property and sales tax losses as acquisition would occur as presented in this EIS. Total jobs created due to aviation activity at Sea-Tac would grow at a faster rate than forecast in the EIS, due to the slower growth in aviation demand.

- *Earth/Fill Requirements* - As the proposed Master Plan Update improvements are needed, they would result in the same quantity of fill required to develop the third runway embankment and runway safety areas. As the quantity of fill would be the same, the construction related truck movements would be the same as presented for the Master Plan Update forecast.

Thus, as this example shows, if forecast demand grows at a rate faster than is presently forecast, the facilities would be needed earlier. Noise and air pollution impacts would occur in proportion to the anticipated growth in aviation demand.

(C) Case 3: The Theoretical Capacity Can Not Be Achieved And Assuming A Faster Growth in Aviation Demand

The final case assessed reflects a greater growth in aviation demand than is presently forecast by the Master Plan Update, yet assumes that some of the demand can not be accommodated if no airfield improvements are undertaken. Using the forecast assumptions of Case 2, the Airport's theoretical capacity of 460,000 was applied. Assuming that the theoretical capacity is exceeded in the planning horizon (in this case, the theoretical capacity would be exceeded before year 2010), the Do-Nothing level of activity would be less than the "With Project". The following activity assumptions were used:

	2000	2010	2020
Case 3: Do-Nothing (25% greater growth with capacity limit)			
Aircraft Operations	398,160	460,000	460,000
Enplaned Passengers	12,495,000	17,343,500	19,895,900
Estimated total delay (min.)	16	-30	30+
Case 3: "With Project" (25% greater growth)			
Aircraft Operations	398,160	466,670	552,000
Enplaned Passengers	12,495,000	17,595,000	23,875,000
Estimated total delay (min.)	16	30	53

Assuming that the existing facilities can not accommodate the forecast demand, the following analysis was performed.

- *Noise and Land Use: Because of unserved demand in the Do-Nothing alternative, the impact caused by the proposed improvements would be greater than forecast in the EIS.*

As is shown in **Table R-4**, all future year impacts would continue to be less than presently forecast. The greatest change between the Do-Nothing and the "With Project" would occur in 2020 when 92,000 operations would not be served by the existing airfield. The incremental impact in 2020 would be 2,460 people. Due to the insulation accomplished in the Port's Noise Remedy Program, mitigation beyond that presented for the Master Plan Update is not likely.

- *Air Quality: CO concentrations would continue to be exceeded at the key intersections in the Airport vicinity and the impact of the proposed improvements would be greater than forecast.* The pollutant concentrations associated with the area roadways were also assessed using a 25 percent year 2020 greater aviation demand forecast, assuming that the Do-Nothing is not able to accommodate the same level of activity. Because the incremental impact of the proposed improvements relative to the Do-Nothing would be greater, additional mitigation would be necessary, particularly in the longer-term period.

- *Water Resources (Floodplains, Streams, Wetlands, etc.): Water resource impacts would occur earlier in time, as the need for airport facilities would occur faster in time - however the impacts would be the same as shown in the EIS.* The water resource impacts would not be before year 2000, as construction of most of the airport improvements would occur 5-7 years earlier than forecast.

- *Property Acquisition would be as projected for the Master Plan Update, and would require the same number of homes and business as presented in the EIS for the Master Plan Update improvements.*

- *Socio-Economic Impacts* - A faster aviation demand forecast would result in the same property and sales tax losses as acquisition would occur as presented in this EIS. Total jobs created due to aviation activity at Sea-Tac would grow at a faster rate than forecast in the EIS, due to the faster growth in aviation demand. However, as the proposed improvements would accommodate a greater level of aviation demand, total jobs would be greater "With Project" than for the Do-Nothing alternative.

- *Earth/Fill Requirements* - As the proposed Master Plan Update improvements are needed, they would result in the same quantity of fill required to develop the third runway embankment and runway safety areas. As the quantity of fill would be the same, the construction related truck movements would be the same as presented for the Master Plan Update forecast.

Thus, as this example shows, if forecast demand grows at a rate faster than is presently forecast, the facilities would be needed earlier. Additional mitigation would be necessary in the later time periods if the demand exceeded the capacity. Noise and air pollution impacts would occur in proportion to the anticipated growth in aviation demand.

III. AIR QUALITY

A number of comments were raised concerning the precision of the air quality analysis and the results presented in the Draft EIS. Each of the individual comments are responded to in a later section (See response to comments R-10-1 through R-10-74). However, the following paragraphs summarize the key issues raised in the comments and how the Final EIS addresses these issues.

A number of comments were received concerning the assumptions used in the air quality analysis, particularly relative to aircraft emissions and pollutant levels. As was found in the State Implementation Plan, surface motor vehicles are the primary air pollutant generator in the Region. As is stated in the Draft and Final EIS, in King County, the largest **non-road** pollutant sources are:

- Carbon Monoxide: lawn and garden equipment,

- Volatile Organic Compounds - lawn and garden equipment
- Nitrogen Oxides - construction equipment;
- PM10 - aircraft and airport equipment.

It is important to note that other sources contribute 80 percent of the total pollutant levels in King County (non-road sources, such as airport activity, represent 20 percent of the pollutant emissions in the Region).

Residents expressed concern that the immediate Airport area should be the focus when examining pollutant levels. The EIS examined all major sources in the Airport area as part of the "Area Dispersion Analysis". As is shown on the next page, within the detailed study area used in this EIS, aircraft Carbon Monoxide contributions represent 7 percent of total CO emissions, while automobile emissions represent nearly 90 percent of these emissions. For VOC's, aircraft represent 20 percent of the area emissions. For NO_X aircraft represent nearly 38 percent of source contributions. Except for Sulfur Oxides, automobiles represent the greatest sources of pollution in the immediate airport area. Similar relationships exist for all major air carrier airports located in major urban areas.

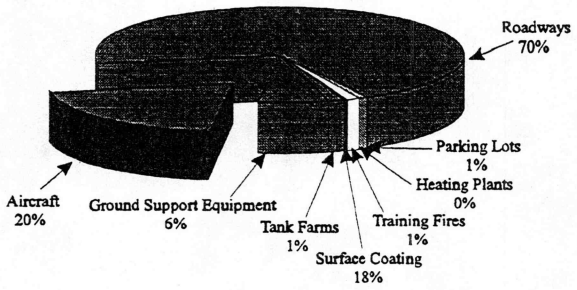
A number of comment were also received concerning the total level of airport activity assessed in the Draft EIS. To reflect the maximum hourly level of departure activity, a test case was assessed before preparing the Final EIS. This test showed that pollutant levels would be slightly greater than presented in the Draft EIS, yet would be below the National and State Ambient Air Quality Standards with a maximum hourly level of departure activity.

The Final EIS contains an updated surface transportation analysis and associated air quality assessment. As was identified during the public comment period, the Puget Sound Regional Council (the Metropolitan Planning Organization) has selected a preferred surface transportation plan for the Central Puget Sound Region. As the Draft EIS analysis was prepared prior to the finalization of the Metropolitan Transportation Plan, the Final EIS has been prepared to reflect the preferred alternative. Thus, the surface transportation analysis and air quality analysis presented in the Draft EIS were updated during the preparation of the Final EIS. During this update process, many of the comments raised concerning air quality were reviewed and changes in the modeling/analysis were conducted. Chapter IV, Section 9 "Air Quality" and the associated Appendix D have been revised accordingly.

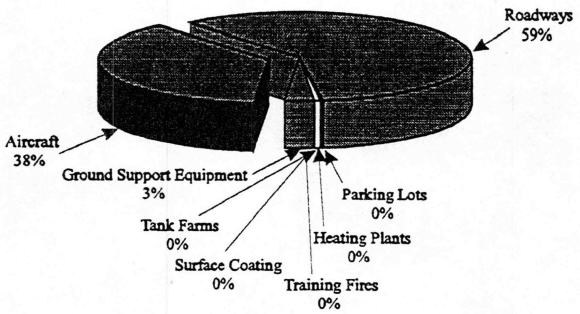
As is shown, the existing and forecast levels of surface traffic result in exceedances of the National and State Ambient Air Quality Standards in the intersections of the most severely congested roads: along International Boulevard at S. 188th Street and S. 170th Streets. Although traffic levels are expected to continue to increase in the immediate airport area regardless of the improvements proposed at Sea-Tac Airport, pollutant concentrations are expected to decline. This reduction is associated with actions associated with the Federal Clean Air Act and the Washington State Clean Air Act concerning automobile emissions reductions. The proposed airport improvements are expected to result in a slight increase in pollutant concentrations at these intersections when compared with the future Do-Nothing alternative. However, proposed mitigation would alleviate these increased concentrations.

AIRPORT AREA POLLUTANT CONTRIBUTIONS

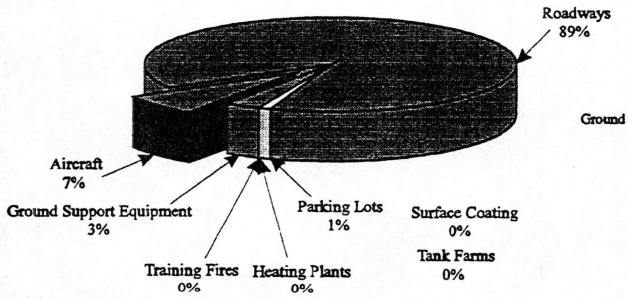
VOC'S



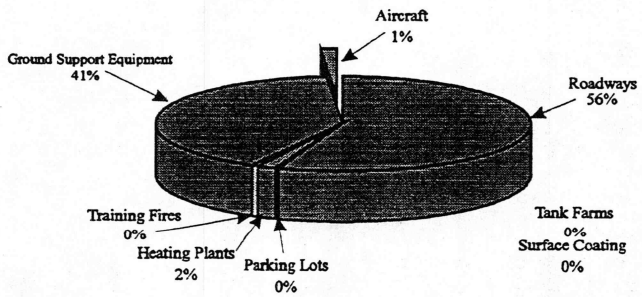
NOx



CO



PM10



SOx

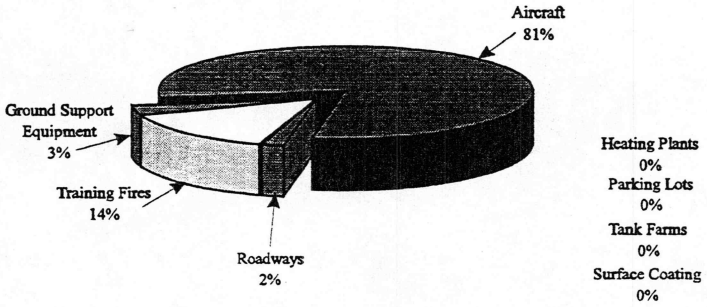


TABLE R-4

SUMMARY OF IMPACTS ASSOCIATED WITH ALTERNATIVE FORECAST ASSUMPTIONS

Aircraft Noise Impacts (65 DNL and greater noise exposure)

	Master Plan Update Draft EIS		15% Slower Forecast		25% Faster Growth		25% Faster Growth with Capacity Limit	
	Population	Housing	Population	Housing	Population	Housing	Population	Housing
1994 Existing	31,800	13,620	31,800	13,620	31,800	13,620	31,800	13,620
Alt 1 Do-Nothing								
2000	8,970	3,870	8,360	3,610	12,560	5,110	9,580	4,130
2010	9,450	4,060	8,430	3,620	13,620	5,790	10,820	4,650
2020	10,800	4,610	8,570	3,660	13,360	5,640	11,450	5,890
Alt. 3 (North Unit Terminal)								
2000	9,890	4,020	9,430	3,830	10,340	4,200	10,340	4,200
2010	9,860	4,190	8,940	3,800	11,230	4,770	11,230	4,770
2020	11,240	4,740	9,620	4,060	13,910	5,870	13,910	5,870

Emissions Inventory - Annual Tons of Pollutants Emitted

	Master Plan Update Draft EIS		15% Slower Forecast		25% Faster Growth		25% Faster Growth with Capacity Limit	
	Carbon Monoxide	Nitrogen Oxides	Carbon Monoxide	Nitrogen Oxides	Carbon Monoxide	Nitrogen Oxides	Carbon Monoxide	Nitrogen Oxides
Alt 1 (Do-Nothing)								
2000	976	1,234	927	1,172	1,025	1,296	1,025	1,295
2010	1,245	1,525	1,121	1,373	1,432	1,754	1,411	1,729
2020	1,875	2,047	1,594	1,740	2,344	2,559	1,953	2,132
Alt. 3 (North Unit)								
2000	986	1,234	937	1,172	1,035	1,296	1,035	1,296
2010	1,249	1,524	1,124	1,372	1,436	1,753	1,436	1,753
2020	1,833	2,006	1,558	1,705	2,291	2,508	2,291	2,508

Carbon Monoxide Concentrations at Receptor 2 (ppm) Note: AAQS 9 ppm)

	Master Plan Update Draft EIS		15% Slower Forecast		25% Faster Growth		25% Faster Growth with Capacity Limit	
	International Blvd./S 188th	International Blvd./S. 170th	International Blvd./S 188th	International Blvd./S. 170th	International Blvd./S 188th	International Blvd./S. 170th	International Blvd./S 188th	International Blvd./S. 170th
Alt 1 (Do-Nothing)								
2000	12.18	9.31	11.6	8.8	12.8	9.8	12.8	9.8
2010	11.55	8.96	10.4	8.1	13.3	10.3	13.1	10.2
2020	10.43	9.45	8.9	8.0	13.0	11.8	10.9	9.8
Alt. 3 (North Unit)								
2000	12.18	9.03	11.6	8.6	12.8	9.5	12.8	9.5
2010	10.57	8.96	9.5	8.1	12.2	10.3	12.2	10.3
2020	10.22	9.10	8.7	7.7	12.8	11.4	12.8	11.4

Source: Synergy Consultants, Inc. - extrapolated from materials presented in the *Draft and Final Environmental Impact Statement.*

TABLE R-4

SUMMARY OF IMPACTS ASSOCIATED WITH ALTERNATIVE FORECAST ASSUMPTIONS

Wetland Impact (Acres)

	Master Plan Update Draft EIS		15% Slower Forecast		25% Faster Growth		25% Faster Growth with Capacity Limit	
	Alt 1	Alt 3	Alt 1	Alt 3	Alt 1	Alt 3	Alt 1	Alt 3
2000	1.7	10.37	1.7	1.7	1.7	10.37	1.7	10.37
2010	1.7	10.37	1.7	1.7	1.7	10.37	1.7	10.37
2020	1.7	10.37	1.7	10.37	1.7	10.37	1.7	10.37

Stream Relocations (Linear Feet)

	Master Plan Update Draft EIS		15% Slower Forecast		25% Faster Growth		25% Faster Growth with Capacity Limit	
	Alt 1	Alt 3	Alt 1	Alt 3	Alt 1	Alt 3	Alt 1	Alt 3
2000	2,200	6,100	2,200	2,400	2,200	6,100	2,200	6,100
2010	2,200	6,100	2,200	2,400	2,200	6,100	2,200	6,100
2020	2,200	6,100	2,200	6,100	2,200	6,100	2,200	6,100

Floodplain Impacts (Acres)

	Master Plan Update Draft EIS		15% Slower Forecast		25% Faster Growth		25% Faster Growth with Capacity Limit	
	Alt 1	Alt 3	Alt 1	Alt 3	Alt 1	Alt 3	Alt 1	Alt 3
2000	0.00	7.2	0.00	0.00	0.00	7.2	0.00	7.2
2010	0.00	7.2	0.00	0.00	0.00	7.2	0.00	7.2
2020	0.00	7.2	0.00	7.2	0.00	7.2	0.00	7.2

Property Acquisition (total units of property)

	Master Plan Update Draft EIS		15% Slower Forecast		25% Faster Growth		25% Faster Growth with Capacity Limit	
	Alt 1	Alt 3	Alt 1	Alt 3	Alt 1	Alt 3	Alt 1	Alt 3
2000	0.00	7.2	0.00	0.00	0.00	7.2	0.00	7.2
2010	0.00	7.2	0.00	0.00	0.00	7.2	0.00	7.2
2020	0.00	7.2	0.00	7.2	0.00	7.2	0.00	7.2

Source: Synergy Consultants, Inc. - extrapolated from materials presented in the *Draft and Final Environmental Impact Statement*.

TABLE R-4

SUMMARY OF IMPACTS ASSOCIATED WITH ALTERNATIVE FORECAST ASSUMPTIONS

Socio-Economic Impacts (Loss of Taxes - Property taxes and Sales Taxes expressed in millions)

	Master Plan Update Draft EIS		15% Slower Forecast		25% Faster Growth		25% Faster Growth with Capacity Limit	
	Alt 1	Alt 3	Alt 1	Alt 3	Alt 1	Alt 3	Alt 1	Alt 3
Lost Taxes	0	2.4	0	2.4	0	2.4	0	2.4

Socio-Economic Impacts (Total Jobs - not including construction jobs)

	Master Plan Update Draft EIS		15% Slower Forecast		25% Faster Growth		25% Faster Growth with Capacity Limit	
	Alt 1	Alt 3	Alt 1	Alt 3	Alt 1	Alt 3	Alt 1	Alt 3
2000	205,690	205,690	195,405	195,405	215,975	215,974	215,975	215,974
2010	335,344	335,344	301,809	301,809	385,645	385,645	380,133	385,645
2020	418,632	418,632	355,837	355,837	523,290	523,290	436,075	523,290

Amount of Earth/Fill Needed (Million Cubic Yards)

	Master Plan Update Draft EIS		15% Slower Forecast		25% Faster Growth		25% Faster Growth with Capacity Limit	
	Alt 1	Alt 3	Alt 1	Alt 3	Alt 1	Alt 3	Alt 1	Alt 3
Fill Needed	2.4	23	2.4	23	2.4	23	2.4	23

Source: Synergy Consultants, Inc. - extrapolated from materials presented in the *Draft and Final Environmental Impact Statement*.

and 24 to 237 acquired affordable apartments or condominiums under the "With Project" alternatives, depending on which alternative is considered.

Comment R-8-21: *Mr. Graham suggested that the socio-economic analysis is lacking in its evaluation of the "Do-Nothing" alternative.*

Response: As described in the Draft and Final EIS, the "Do-Nothing" alternative is based on Sea-Tac Airport remaining generally as it is today, with limited improvements that have already been subject to an environmental analysis. Growth in airport operations and the number of passengers served would occur under the Do-Nothing alternative but would be accommodated by the Airport operating at less efficient levels, as is described in detail in the introduction to this appendix. No alternative that would reduce the competitiveness and level of activity of the Airport from existing conditions is proposed at this time, nor is it considered to be reasonable, given the purpose and need for the proposed action. For these reasons, evaluation of such an alternative in the EIS is not necessary. The effects of the "Do-Nothing" alternative are evaluated in detail on pages IV.8-4 and IV.8-5 in the EIS.

Comment R-8-22: *Three commentors suggested that property values could decrease adjacent to the proposed buyout areas and could result in lower property tax receipts. Commentors: Airport Communities Coalition, Ms. Brown, and Mr. Mealy.*

Response: Comments acknowledged. Please see the revisions on page IV.8-7 of the Final EIS.

Comment R-8-23: *Mr. Rohlfs (City of SeaTac) suggested that the Draft EIS does not identify the total for loss of property tax receipts of the City of SeaTac.*

Response: Comment acknowledged. The Draft and Final EIS used the 1993 Tax Year Assessed Valuation. At the time of the analysis, these data were the most current available from the King County Assessor's Office. The commentor's use of more recent property valuation assessments suggests a 0.68% difference between the potential 1995 General Fund property tax loss of 3.68% to the City of SeaTac and the 1993 General Fund property tax loss of 3% as reported in the EIS. This suggests that the value of the displaced properties and their contribution to the City's 1995 property tax receipts has increased relative to other properties in the City that are farther from the Airport and/or would not be displaced.

SURFACE TRANSPORTATION

Comment R-9-1: *Mr. Peyton (Ravenna-Bryant Community Association) reported that Appendix I indicates that it should contain a Surface Transportation report, but published copies were blank.*

Response: Appendix I was intended to be left blank to avoid confusion in the numbering between Chapter I and the appendix. Inadvertently, the table of contents was prepared noting that Appendix I would contain the report, which was also listed as Appendix O. This was corrected for the Final EIS in the Table of Contents and Appendix I.

Comment R-9-2: *Two commentors noted that the Draft EIS surface transportation analysis needs to be updated to reflect the adopted Puget Sound Regional Council's 1995 Metropolitan Transportation Plan. The following individuals made this comment: Mr. Dinndorf (PSRC), and Ms. Montgelas (WSDOT).*

Response: The Draft EIS surface transportation analysis was based on the Package 3, the Demand Management/Expansion Package, of the Puget Sound Regional Council's (PSRC) Metropolitan Transportation Plan (MTP), as described in the PSRC's December 1994 Draft Metropolitan

Transportation Plan (MTP). At the time that the Draft EIS was prepared, the PSRC was in the process of updating the MTP and a preferred alternative had not been selected. Subsequently, a preferred alternative, other than Package 3 was selected. The primary difference between the adopted MTP and Package 3 is an aggressive congestion pricing element. Package 3 included this aggressive congestion pricing element, while the adopted MTP does not include a congestion pricing element. Due to this difference, higher levels of vehicular traffic and congestion would be expected with the adopted MTP. As a result, the regional traffic volumes forecast for this analysis are about 20% higher than forecasts used in the Draft EIS analysis.

Comment R-9-3: *Several commentors stated that the Draft EIS surface transportation analysis needs to be updated now that the proposed Regional Transit Authority plan did not pass the public vote. The following individuals made this comment: Ms. Ayers, Mr. Peyton (Ravenna-Bryant Community Association), Southwest King County Community Group, Mr. Bush (METRO), and Ms. Montgelas (WSDOT).*

Response: In March, 1995, voters from King, Pierce, and Snohomish Counties did not approve the proposed Regional Transit Authority (RTA) plan. However, the RTA is considered a long-term regional transportation improvement and is included in the Puget Sound Regional Council's adopted 1995 Metropolitan Transportation Plan. In addition, a revised RTA plan will be presented to the voters in 1996. The Final EIS surface transportation analysis includes the RTA as described in Chapter IV, Section 15 "Surface Transportation". Please refer to response to comment R-5-7 for further discussion.

Comment R-9-4: *Mr. Rohlfs (City of SeaTac), and the Airport Communities Coalition commented that the Draft EIS surface transportation analysis is not consistent with the City of SeaTac Comprehensive Transportation Plan.*

Response: The Final EIS surface transportation analysis has been updated to be consistent with the City of SeaTac Comprehensive Transportation Plan as described in Chapter IV, Section 15 "Surface Transportation" and in Appendix O.

Comment R-9-5: *Two commentors noted that the Draft EIS surface transportation analysis considered the improvement of International Boulevard as a seven lane roadway. The design for International Boulevard consists of four general purpose lanes and a southbound HOV lane. The following individuals made this comment: Mr. Rohlfs (City of SeaTac), and Mr. Bush (METRO).*

Response: The Final EIS surface transportation analysis has been revised to reflect this change as described in Chapter IV, Section 15, on page IV.15-4 of the Final EIS.

Comment R-9-6: *Mr. Rohlfs (City of SeaTac) commented that the Draft EIS surface transportation analysis indicates that the intersections of Airport Expressway/Air Cargo Road and Airport Expressway/South 170th Street will need to be improved and signalized by the year 2010. The City of SeaTac Comprehensive Transportation Plan indicates that these intersections need to be signalized by the 1996/1998 time frame without consideration of a third runway. He requested that the surface transportation analysis be revised to reflect this.*

Response: The Draft EIS assumed that the intersections of Air Cargo Road/Northern Airport Expressway and South 170th Street/Northern Airport Expressway would be signalized by the year 2000 analysis. This is consistent with the City of SeaTac's Comprehensive Transportation Plan. Additional surface transportation mitigation measures, consisting of geometric and signal improvements, were recommended in the Draft EIS for Alternatives 2 (Central Terminal) and 4 (South Unit Terminal) by the year 2010.

Comment R-9-7: *Mr. Derrick (King County Department of Development and Environmental Services) questioned why Alternative 3 impacts the surface transportation system in a different manner than the other Alternatives.*

Response: The improvements defined for Alternatives 2 (Central Terminal) and 4 (South Unit Terminal) are very similar in location, size, and scope, and therefore have very similar transportation impacts. However, the improvements defined for Alternative 3 (North Unit Terminal) differ in location and size, and therefore would have different transportation patterns. The differences between the proposed improvements include the construction of the Doug Fox parking garage for Alternative 2 and 4, the relocation of and development of new aircraft maintenance facilities within the South Aviation Support Area for Alternatives 2 and 4, the construction of an Employee North Parking lot for Alternative 3, the construction of Air Cargo warehouses for Alternative 3, and the construction of a State Route 518 interchange at 20th Avenue South for Alternative 3. In addition, the Do-Nothing assumptions were revised based on growth in regional roadway traffic and congestion on the Airport roadways. These differences combine to produce different transportation patterns for Alternative 3 and for Alternatives 2 and 4.

Comment R-9-8: *Mr. Peyton (Ravenna-Bryant Community Association noted that the Draft EIS does not mention the changes in the surface transportation system that appear in Exhibits II.3-2 through II.3-5.*

Response: Exhibits II.3-2 through II.3-5 present the four Alternatives considered in the Draft EIS (Final EIS Exhibits II-6 through II-8). The Master Plan improvements that occur for the Centralized Terminal, North Unit Terminal, or South Unit Terminal Alternatives and impact the surface transportation system are defined in the Surface Transportation Report, located in Appendix O of the EIS. In addition, the Transportation Improvement Projects (TIP) that outline the proposed improvements in the surface transportation system in the vicinity of the Airport are also defined in the Appendix O.

Comment R-9-9: *Mr. Peyton (Ravenna-Bryant Community Association) and Ms. Gates (City of Federal Way) had several questions concerning the impact of constructing an underpass for South 154th Street instead of relocating the roadway around the third runway embankment. He questioned if it would effect accident rates and if it would close the street to certain types of traffic.*

Response: Generally speaking, an underpass would be more expensive than relocating the roadway because the construction of an underpass structure would be required. An underpass that is designed to current standards would not be expected to increase the accident rates on that roadway. An underpass could also limit certain types of traffic since there would be height restrictions. It may also limit future expansion or widening of the roadway.

Comment R-9-10: *Mr. Frause, the Southwest King County Community Group, and Mr. Rohlfs (City of SeaTac) requested that the Draft EIS address the issue of street vacation and relocation.*

Response: In order to construct the third runway, part of South 154th/156th Street would need to be relocated, and several streets located east of Des Moines Memorial Drive South and in the "displacement zone" would need to be vacated. In addition, with the construction of the North Unit Terminal part of South 170th Street will need to be vacated. The Port of Seattle recognizes that it will need to coordinate with the City of SeaTac in order to address the impacts associated with street relocation and vacation as part of the overall acquisition plan. Please refer to response to comment R-18-16 for further discussion.

Comment R-9-11: *The Southwest King County Chamber of Commerce commented that the assumption that the southern entrance to the Airport would remain at level of service "C" through the year 2010, when it would be located one block from an intersection that today is at level of service "F", does not seem reasonable nor accurate.*

Response: : It is not uncommon to find two intersections, located in close proximity to each other, operating under two different levels of service ratings as long as the queue from one intersection does not interfere with the operation at the other intersection. The intersection at International Boulevard and South 188th Street experiences almost two times as much traffic as the intersection at 28th Avenue South and South 188th Street. In addition, the intersection of International Boulevard and South 188th Street has significant opposing traffic movements on several approaches. In this situation it would not be uncommon to find these two intersections operating at different level of service ratings.

Comment R-9-12: *The Airport Communities Coalition, Mr. Rohlfs (City of SeaTac), Mr. Derrick (King County Department of Development and Environmental Services), Ms. Brown, Southwest King County Chamber of Commerce, Ms. Montgelas (WSDOT), and Ms. Ayres commented that the Draft EIS does not adequately address the issues regarding south access either from South 188th Street or State Route 509.*

Response: The issue of south access has been addressed in the Final EIS in Chapter IV, Section 15 and in Appendix O.

Comment R-9-13: *Several commentors stated that the Draft EIS did not adequately describe the mode choice patterns and the origin-destination patterns of Airport related traffic. The following individuals made this comment: Southwest King County Community Group, the Airport Communities Coalition, Ms. Montgelas (WSDOT), and Mr. Bush (METRO).*

Response: The Final EIS summarizes the mode choice patterns for both the Do-Nothing Alternative and the Preferred Alternative (Alternative 3) in Chapter IV, Section 15 "Surface Transportation", Table IV.15-2 of the Final EIS. The origin-destination patterns for both the local surface transportation system and the regional transportation system are defined in Exhibits IV.15-1 and IV.15-2 of the Final EIS. Further discussion of the mode choice and the origin-destination patterns for Airport related traffic are included in Section 15, and in Appendix O of the Final EIS.

Comment R-9-14: *The Airport Communities Coalition suggested that the surface transportation analysis should be for design day conditions (e.g., an average August weekday) and not annual average conditions.*

Response: During the scoping process for the EIS several reviewing public agencies were contacted to define the scope of work for the surface transportation analysis. One of the questions asked of these agencies was whether the surface transportation analysis should be performed for annual average conditions, or design day conditions. The agencies indicated that annual average conditions would be adequate for the surface transportation analysis since all significant impacts would be identified.

Comment R-9-15: *Ms. Ayres commented that the Draft EIS does not define the surface transportation impacts between the years 2000 and 2020.*

Response: The Draft and Final EIS summarizes the surface transportation impacts for the year 2020. Surface transportation impacts from year 2000 through year 2020 are defined in Appendix O.

Comment R-9-16: *Mr. Derrick (King County Department of Development and Environmental Services), Mr. Dinndorf (PSRC), and Ms. Montgelas (WSDOT) commented that the Draft EIS surface transportation analysis should analyze future conditions both with and without the State Route 509 extension and South Access projects.*

Response: The EIS surface transportation analysis includes future conditions both with and without the State Route 509 extension and South Access projects for the year 2020 as defined in Chapter IV, Section 15.

Comment R-9-17: *The Airport Communities Coalition indicated that the Draft EIS surface transportation analysis ignored the impacts of increased air cargo truck traffic and split air cargo facilities.*

1 page

Response: The Draft and Final EIS surface transportation analysis addresses the increase in air cargo truck traffic, and the impacts associated with split air cargo facilities but the analysis was not complete. The Final EIS addresses the full impacts of increased air cargo truck traffic and split cargo facilities in Chapter IV, Section 15. See also response to comment R-3-13.

Comment R-9-18: *Mr. Frause questioned how is the Port of Seattle responsible for the impacts of Airport traffic on Washington State Department of Transportation (WSDOT) highways.*

Response: The fundamental focus of the EIS surface transportation analysis was to determine if the proposed Master Plan Update improvements cause significant adverse impacts on the surface transportation system. Several WSDOT highways are located within the surface transportation analysis area and are therefore part of the surface transportation system that was analyzed. The Port of Seattle would be responsible for mitigating significant adverse impacts caused by the proposed Master Plan Update improvements.

Comment R-9-19: *Mr. Dinndorf (PSRC) commented that the transportation improvement projects included in the Draft EIS surface transportation analysis should reference which local or county plan they are part of and the year of anticipated completion.*

Response: The transportation improvement projects included in the Final EIS surface transportation analysis include references to both jurisdiction and completion date as described in Appendix O of the Final EIS.

Comment R-9-20: *Several commentors suggested mitigation measures to be included in the Final EIS surface transportation analysis. The following individuals made this comment: Southwest King County Chamber of Commerce, Southwest King County Community Group, Mr. R. Taylor, Mr. Lewis (City of Tacoma), Mr. Bush (METRO), and Mr. Dinndorf (PSRC).*

Response: The Southwest King County Chamber of Commerce suggested that the proposed south access needs to be constructed concurrently with the proposed Master Plan Update improvements. The Southwest King County Community Group suggested that the Final EIS include Transportation Demand Management (TDM) strategies to reduce the amount of Single-Occupant Vehicles (SOV) traveling to the Airport. Mr. R. Taylor suggested that the proposed State Route 518 interchange at 20th Avenue South be considered for all Master Plan Alternatives. Mr. Lewis (City of Tacoma) suggested that the construction of dual right-turn lanes at the intersection of International Boulevard and South 188th Street could be a temporary mitigation measure until south access is completed. Mr. Bush (METRO) suggested incorporating preferential employee parking for carpools or vanpools as a possible TDM strategy. Mr. Dinndorf (PSRC) suggested incorporating the use of remote terminals as a possible TDM strategy, and in particular the proposed multimodal terminals being considered at the King Street Station (Seattle) and at the Tacoma Dome. Each of these comments regarding suggested measures are addressed in the Final EIS surface transportation analysis in Chapter IV, Section 15 and Appendix O.

Comment R-9-21: *Several commentors stated that the Draft EIS is incorrect in its assumption that the "Do-Nothing" traffic volumes and the "With Project" traffic volumes are equal. The following individuals made this comment: Ms. Ayres, Mr. Newby, Mr. Peyton (Ravenna-Bryant Community Association), Ms. Hughes (Southwest King County Chamber of Commerce), and the Airport Communities Coalition.*

Response: Each of the alternatives analyzed in the Draft and Final EIS are based on the aviation demand forecasts prepared for the Master Plan Update, as described previously in the introduction to this appendix. Therefore the "Do-Nothing" traffic volumes and the "With Project" air traffic volumes are equal. However, as is discussed in the introduction to this appendix, a re-assessment of the Do-Nothing alternative surface transportation volumes was conducted. Even though total aviation demand would not be affected by the Do-Nothing, the hourly levels of aircraft operations would be spread as a result aircraft arrival delay. In addition, mode splits and individual roadway link growth rates would be different in the Do-Nothing alternative, as described in the introduction to this appendix. This difference would reflect a greater use of arterial routes to the Airport as well as increased use of off-airport park-and-ride facilities and shuttles. Appendix O-C contains a detailed discussion of the impacts of increased surface traffic demand on the airport roadway system.

Comment R-9-22: *Mr. Peyton (Ravenna-Bryant Community Association) commented that the Draft EIS surface transportation analysis does not include the impact of the traffic generated by the new parking garages.*

Response: Each of the "With Project" alternatives analyzed in the Draft and Final EIS include the expansion of the existing terminal parking garage, and the construction of new parking facilities. The EIS surface transportation analysis includes the traffic generated by these new or expanded facilities. These traffic volumes were calculated based on existing trip generation characteristics and Port of Seattle parking policies.

Comment R-9-23: *Several commentors noted that the Draft EIS does not reflect the Personal Rapid Transit (PRT) system as an option to mitigate transportation impacts. The following individuals made this comment: Mr. Rohlfs (City of SeaTac), Mr. Bush (METRO), and the Airport Communities Coalition.*

Response: The Draft and Final EIS do not include the Personal Rapid Transit (PRT) system as a possible mitigation impact since there is insufficient information available to evaluate its effectiveness. However, Chapter III summarizes the Comprehensive Transit Supportive Land Use Master Plan recommendations of the City of SeaTac, which includes the PRT and improvements to the regional bus system. The Port of Seattle has been working with METRO, the City of SeaTac and WSDOT concerning transit options and how such options could interface with Sea-Tac. However, no preferred interface has been selected. The Port of Seattle is considering various Transportation Demand Management (TDM) efforts as part of the Master Plan Update which are described in Chapter IV, Section 15, and in Appendix O of the Final EIS. Pending the results of the City of SeaTac's Feasibility Studies, the PRT system could become part of the comprehensive TDM program.

Comment R-9-24: *Mr. Rohlfs (City SeaTac), Ms. Montgelas (WSDOT), and the Airport Communities Coalition stated that the Draft EIS should address the Port of Seattle's responsibility to pay the City of SeaTac's Transportation Mitigation Impact Fees, or the Port's responsibility to make contributions to various Transportation Improvement Projects (TIP).*

Response: : The Port of Seattle will coordinate with the City of SeaTac to determine the Transportation Mitigation Impact Fees required. The Port of Seattle acknowledges its pro-rata responsibility for future transportation improvement projects, and will coordinate with the appropriate agencies to determine the appropriate contributions.

Comment R-9-25: *Ms. Montgelas (WSDOT) commented that the Draft EIS did not fully address the concerns and impacts associated with the proposed 20th Avenue South interchange on State Route 518. Mr. Taylor indicated that this interchange should be in all alternatives.*

Response: The proposed new 20th Avenue South interchange on State Route 518 would require the removal of the existing eastbound South 154th Street off-ramp. However, the removal of this off-ramp could raise some access and circulation issues since South 154th Street is a regional arterial. The City of SeaTac could require additional transportation improvements to address these access and circulation issues. Due to the proximity of other existing interchanges, the Washington State Department of Transportation (WSDOT) will require a "six point added access" evaluation, and other improvements on State Route 518. The Port of Seattle will continue to coordinate with both WSDOT and the City of SeaTac to address these issues and perform the necessary evaluations.

Comment R-9-26: *The Airport Communities Coalition commented that the Draft EIS did not include the analysis of the on-Airport surface transportation system.*

Response: The on-Airport surface transportation system was analyzed as part of the Master Plan Update study process. Inadvertently, this information was left out of the appendices of the Draft EIS. This was corrected for the Final EIS in Chapter IV, Section 15 and is included in Appendix O.

AIR QUALITY

Comment R-10-1: *Several commentors noted that one section of the Draft EIS indicates that there are no exceedances of the standards, yet the roadway intersection analysis indicates that there would be exceedances of the standards. The Southwest King County Community Group, Mr. Frause, Mr. Kircher (Puget Sound Air Pollution Control Agency), and the Regional Commission on Airport Affairs requested that this be clarified.*

Response: The results of the area dispersion analysis indicate that development of the proposed new runway would not result in any new exceedances or worsening of existing exceedances of the Ambient Air Quality Standards. The intersection "hot spot" analysis for Carbon Monoxide indicated that potential exceedances of the standards would occur with Alternatives 2 and 4 at two highly congested intersections in the vicinity of the Airport. The EIS has been revised to clarify that additional exceedances could occur due to changes in motor vehicle traffic as evaluated by the roadway intersection analysis. The introductory key findings included on Page IV.9-1 of the Final EIS have been revised to reflect the suggested changes.

Comment R-10-2: *Mr. Frause, Ms. DesMarais, Mr. Peyton (Ravenna-Bryant Community Association), the Airport Communities Coalition, the Regional Commission on Airport Affairs, and the Southwest King County Community Group commented that the State's 1990 inventory and the 1991 Ecology study showed substantially more CO, VOCs, and NO2 than for the Draft EIS. These commentors questioned why do the results and data input assumptions differ between the three studies.*

Response: As indicated in the Draft and Final EIS, there are a several reasons why the results of the air pollutant emissions inventory differ from both the State Implementation Plan (SIP) inventory and the 1991 Ecology study, including use of different assumptions concerning aircraft activity levels and the type of aircraft using the Airport; differences in time-in-mode and delay; differences in the number and variety of sources modeled; and use of different versions of the EDMS model. The following examines the key data input assumptions used in each study.

1. Aircraft Type and Activity Levels - **Tables R-8 and R-9** present the differences in aircraft types modeled for the SIP inventory, the 1991 Ecology study, and for this EIS. The tables also compare

how aircraft activity has changed at the Airport over the past five years. In 1990, approximately 28 percent of all aircraft activity occurred by the larger 3 and 4 engine jet aircraft such as the B-747, DC-10, and L-1011. By 1994, activity by these types of aircraft had decreased by over 60 percent to about 12 percent of total activity. At the same time, activity by medium sized jets (i.e., MD-80, B-737) increased 61 percent reflecting the growth in activity by high frequency, low fare/no frills airlines.

The SIP inventory is based on 1990 aircraft operations levels (336,000 annual operations) versus actual 1994 used in the Draft EIS (380,000 annual operations). In comparison to the Draft EIS, the SIP inventory considered nearly three times the level of larger, older 3-4 engine jet aircraft such as the B-747 and B-727 than occurred in 1994. The SIP inventory also considered less than one percent turboprops in comparison to approximately 30 percent in the EIS. The EIS and SIP inventory considered nearly equivalent levels of large and medium 2-engine jet activity. However, the SIP inventory also considered a large number of 4-engine, small jet aircraft which the EIS did not. Both studies considered light single and twin engine piston aircraft. In comparison to actual aircraft activity levels, the SIP inventory overestimated the level of large jet activity and underestimated the level of turboprop activity actually occurring. The effect of the SIP inventory would be expected to result in higher NO_2 levels than for the EIS.

The 1991 Ecology study used August, 1989 operations data, and considered a peak hour of 71 departures or 142 total operations. As indicated in Chapter IV, Section 9 "Air Quality", the EIS analysis evaluated an average peak hour of 43.9 departures, or about 88 total operations. Consistent with the greater level of large jet activity occurring in 1990. The 1991 Ecology study considered a higher level of activity by the large, 3-4-engine jet aircraft with over twice the level considered by the EIS. The Ecology study did consider many of the newer aircraft types, but less than what was considered in the EIS (22% of the newer aircraft versus 45% for the EIS). The Ecology study also considered aircraft no longer in use at the Airport such as the BAC-111, 2-engine medium sized jet. Both studies considered approximately the same level of turboprop activity, except that the Ecology study evaluated nearly 5 times the level of 4-engine, heavy turboprop type aircraft than did the EIS, and did not consider any use by light single and twin engine piston aircraft. In comparison to actual aircraft activity levels, the Ecology study overestimated activity by medium jets (i.e., DC-9's), and underestimated activity by turboprops and general aviation aircraft. Greater use by large, 3-4 engine jet aircraft would result in higher NO_2 levels than for the EIS, and greater use by heavy turboprops would result in higher CO levels.

While the EIS analysis considered more of the newer, more NO_2 producing aircraft, both the SIP inventory and the 1991 Ecology study considered *more jet engines* by assuming substantially greater use by 3-4 engine aircraft and less use by turboprop aircraft. These differences occurred due to actual changes in the type of aircraft using the Airport since 1990, and differences in the way aircraft were chosen to be modeled. The effect would be expected to result in higher NO_2 and CO levels than identified by the EIS.

2. Time-In-Mode and Delay - **Table R-10** identifies the time-in-mode used for each of the three studies. The EIS inventory uses Sea-Tac Airport specific taxi-idle time-in-mode and assumptions concerning aircraft delay. The EIS air quality analysis focused on the average annual peak hour departure queue delay for all weather conditions identified by the FAA's simulation modeling (SIMMOD). For the existing condition, a total taxi/idle and delay time of approximately 11 minutes was considered for each aircraft departure. The EIS analysis also resulted in slight modification of the climb-out and approach time-in-mode based on mixing height.

Table R-10

Time-In-Mode

	Taxi-In/ Taxi-Out	Departure Queue	Takeoff	Climb-out	Approach
Draft EIS	8.11	2.89	0.7	1.51	2.74
1990 SIP Inventory	-- 26 Total --		0.7	1.9	3.5
1991 Ecology	6	10	0.7	1.9	3.5

Note: Presented for large aircraft. Time-In-Mode for turboprops and general aviation not shown.

In comparison, the SIP emissions inventory relied on standard default time in mode values for taxi-idle and delay, and for takeoff, climb-out and approach for a typical airport. It also used a total taxi/idle time and departure queue of 26 minutes. Accordingly, the SIP inventory is based on a much higher taxi/idle/delay time in mode than considered for the EIS. As CO levels are highly influenced by taxi/idle/and delay, emissions for this pollutant would be expected to be much greater for the SIP 1990 inventory levels than for the EIS.

The 1991 Ecology study also relied on different time-in mode assumptions than for the EIS. The primary difference in time-in-mode between the EIS and the Ecology Study was the use of departure queue time. The Ecology study used a peak hour departure queue delay of 10 minutes in comparison to just under 3 minutes for the EIS. The total taxi/idle and delay time is 16 minutes for the Ecology study as compared to 26 minutes for the SIP inventory, and 11 minutes for the EIS. The use of a higher delay value for the Ecology study would be expected to result in higher levels of CO and VOC's due to the departure queue. Combined with the use of a greater level of activity by 3-4 engine aircraft and greater delay, the result would be higher levels of CO, VOC's and NO2.

Refer to the response to comments R-10-14 and R-10-17 which discuss peak hour aircraft activity and aircraft departure delay time.

3. Number and Variety of Sources Modeled - The EIS considered a far greater variety of sources at Sea-Tac and in the vicinity of the Airport. The 1991 Ecology study modeled aircraft operations, motor vehicles, the main terminal parking garage, boiler, training fires, and fuel farms. The EIS analysis considered these sources and others including: aircraft ground run-ups; all on and off-airport related auto parking, as well as all long-term public and private off-airport lots, employee parking and rental cars; aircraft maintenance activities; and, all on-airport fuel storage facilities.

Three types of parking facilities were modeled, including the main terminal parking garage, airport employee parking lots, and an estimated 9,500 parking spaces in off-airport remote public and private lots. Therefore, a total of 24 on-and-off airport parking lots were considered. Included were the rental car operations, metered employee parking in the terminal area, and the main taxicab and limousine staging lots. Fuel storage facilities for all airport tenants were considered as opposed to fuel tanks for just United and Northwest as evaluated by the 1991 Ecology study.

In addition to the terminal area roadways, over 20 major roads and highways represented by 84 separate roadway segments were modeled. As requested by the air quality agencies at the outset of the EIS, all major roads within a mile of the Airport were considered. The Ecology study only considered the terminal area roadways.

4. Changes and use of the EDMS Model - Technical models such as the EDMS air quality model are continually updated and improved. The EDMS model has, over time, been revised to include updated aircraft emissions data, improvements in the modeling methodologies, and been "de-bugged" to correct previously unknown problems or errors. As noted by the 1991 Ecology report on page 11 of that study, the EDMS model was "currently under development, and thus still requires fine-tuning." In fact,

during preparation of the Draft EIS air quality analysis, a problem with the EDMS model was identified by the EIS consultants concerning the manner in which parking lots were considered by the model. The EDMS model was subsequently revised. This EIS analysis used the most current edition of the EDMS Version 944 model available.

The 1991 Ecology study used one of the earliest versions of the model. In addition to the change noted above, the EDMS model has been substantially modified from the earlier version. Among other changes, the EDMS model has been revised to include emissions data for many of the newer types of aircraft engines in use today. Updates to motor vehicle emissions are also included in the most recent version of the model. Another change focused on aircraft emission particulate data. Although more particulate data was included in the earlier EDMS version, the FAA has indicated that this data was not accurate. Therefore, the aircraft emissions standards included in the EDMS for particulates was revised by the FAA to include only that data for which reliable particulate information is known. The FAA has not updated the particulate data because no reliable data on aircraft particulate emissions is available to incorporate into the model. Accordingly, the most current version of the EDMS model now includes little information on particulates in comparison to the earlier version used by Ecology.

The EIS analysis also went beyond the Ecology study screening evaluation to the next, more detailed level of analysis. The EDMS model enables air pollutant evaluation in three levels of analysis: air pollutant emissions inventory; screening dispersion analysis; and refined dispersion analysis. The 1991 Ecology study prepared an emissions inventory and screening dispersion analysis which relied on application of worst case meteorological assumptions for wind speed, three wind directions (0, 170, 345), and other worst case input assumptions. The results of the screening analysis typically overestimates pollutant concentrations and are intended only to identify locations of potential exceedances and the need for further analysis. The EIS analysis in effect picked-up where the Ecology screening analysis ended by including a refined dispersion analysis which applied actual historic meteorological conditions. Typically, the results of the refined analysis are much lower than pollutant concentrations identified by the screening analysis (i.e., less than one-half), and reflect a more accurate portrayal of actual conditions.

In each case, the EIS analysis is based on the most recent information about actual operations and conditions at the Airport.

Table R-8

Comparison by Aircraft Type

General Aircraft Category	1995 Airport EIS	1994 Actual Activity[12/]	1990 SIP Inventory	1991 Ecology	1990 Actual Activity[1/]
Large Jet 3-4 Engines	B-747 DC-10 L1011 DC-8 B-727	B-747 DC-10 L1011 DC-8 B-727	B-747 DC10 L1011 -- B-727	B-747 DC-10 -- -- B-727	B-747 DC-10 -- DC-8 B-727
Large Jet 2 Engines	A-300 B-767	A-300 B-767	-- --	A-300 B-767	A-300 B-767
Medium Jet 2 Engines	B-757 B-737 --	B-757 B-737 A-320	B-757 B-737 --	B-757 B-737 A-320	B-757 B-737 --
Medium Jet 2 Engines	MD-80 DC-9 --	MD-80 DC-9 BAC-111	MD-80 DC-9 --	MD-80 -- BAC-111	MD-80 DC-9 BAC-111
Small Jet 4 Engines	--	--	BAE-146	--	--
Business Jet	--	--	--	--	--
Turboprop	-- C-130 DHC-6 SF-340 CNA-441	B-99 C-130 -- DASH7 --	B-99 C-130 -- --	-- -- DHC-6 DASH-7 CNA-441	B-99 C-130 -- DASH7 --
Twin Engine Piston	2-Engine Piston --	C-402 C-404	C-402 C-404	-- --	C-402 C-404
Single Engine Piston	1-Engine Piston --	-- C-172	-- C-172	-- --	-- C-172

Table R-9

Comparison By Percent Aircraft Category

General Aircraft Category	1995 Airport EIS	1994 Actual Activity[13/]	1990 SIP Inventory	1991 Ecology	1990 Actual Activity[2/]
Large Jet 3-4 Engines (B-727, B-747, L1011, DC-10)	12%	11%	35%	28%	28%
Large Jet 2 Engines (A300, B-767)	2%	2%	4%	--	2%
Medium Jet 2 Engines (B-757, A320, B-737)	26%	27%	22%	16%	16%
Medium Jet 2 Engines (MD-80, DC-9, B-111)	24%	23%	18%	24%	24%
Small Jet 4 Engines (BAE-146)	--	--	17%	--	--
Business Jet (CNA-441)	--	--	--	3%	--
Turboprops (DHC-6)	30%	32%	1%	28%	31%
Twin Engine Piston	4%	4%	2%	--	2%
Single Engine Piston	2%	1%	1%	--	1%
	100%*	100%*	100%*	100%*	100%*

* May not add to 100% due to rounding.

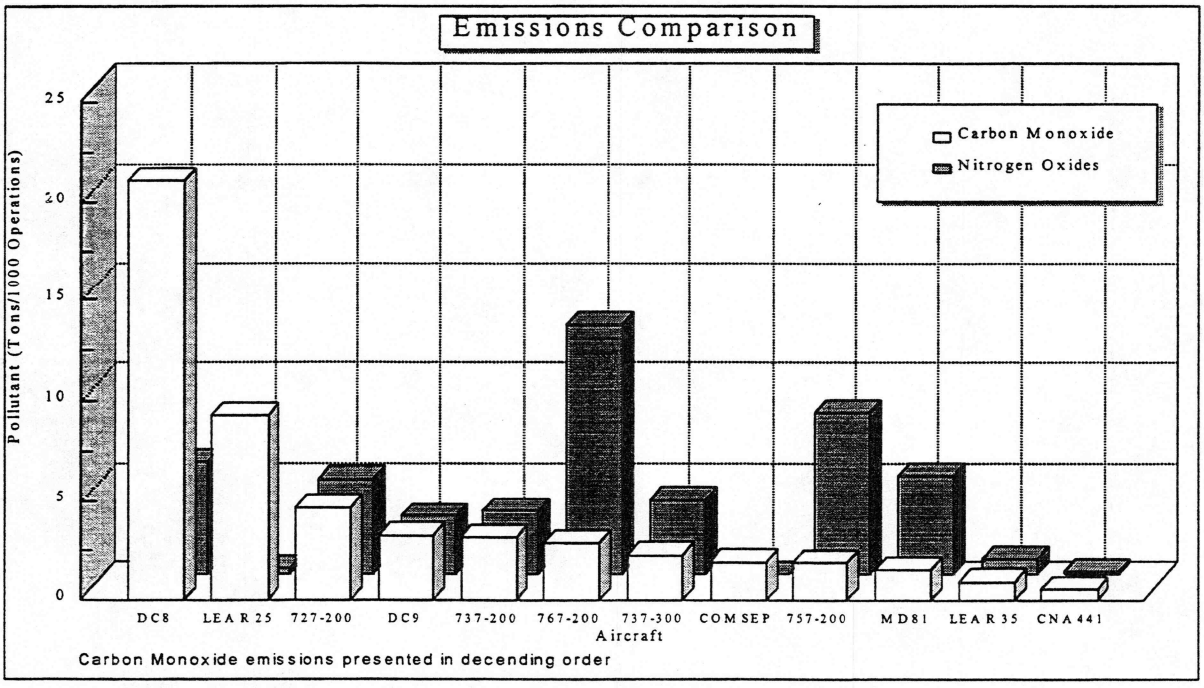
12/ Year-end total activity levels for Sea-Tac, Port-of-Seattle

13/ Year-end total activity levels for Sea-Tac, Port-of-Seattle

Comment R-10-3: *Two commentors requested that the EIS explain how different aircraft engines or fuels produce different levels of pollutants. The following individual and community group made this comment: Ms. Richter, Ms. DesMarais, Mr. Peyton (Ravenna-Bryant Community Association), and the Southwest King County Community Group.*

Response: Aircraft engine pollutant emissions are driven by a number of factors including the type of fuel burned (AVGas, JetA, JP-4, JP-8), the amount of fuel utilized, and engine design technology or efficiency. The factors that determine the quantity of pollutants emitted are the emission rates for each operating mode (i.e., take-off, climb-out, approach, taxi-in, taxi-out, and idle), the fuel consumption rate, and the duration of each operating mode. Perhaps the most important factor is the rate of fuel consumption. In designing many of the newer types of aircraft, manufacturers have placed greater emphasis on aircraft fuel efficiency and performance, which has resulted in a change in the level and type of pollutants generated. Accordingly, many of the more recently designed aircraft engines generally produce low CO emissions, while NO_2 emissions have tended to increase. In comparison, the older designed aircraft engines are far less fuel efficient, and typically emit considerably more CO and VOC's. The following illustrates the differences between many of the newer and older designed types of aircraft:

EXHIBIT R-3



For example, the DC-9 jet aircraft produces much more CO but less NO2, in comparison to its successor, the MD-81. The newer generation of aircraft such as the B-767 and B-757 produce comparatively low levels of CO and higher levels of NO_2 in comparison to the earlier aircraft. On a much smaller scale, the more recently designed small business jet aircraft, such as a Lear 35, produces five times less CO than its predecessor, the Lear 25.

The higher performance jet aircraft, with their higher rate of fuel flow during takeoff, climb-out and approach, generally contribute to higher NO2 emissions. Comparatively, the light single and multi-engine piston/propeller and turbo-prop aircraft produce high levels of Carbon Monoxide (CO) and Volatile Organic Compounds (VOC or hydrocarbons), particularly during taxi-in/taxi-out and during idle. In fact, based on the same level of operations, some light single and twin-engine piston aircraft would produce more CO than some jet aircraft such as an MD-81 or Lear 35 business jet. The differences are due primarily to engine design technology.

The type of fuel used can also influence the type of pollutants emitted. Small piston aircraft engines use AVGas fuel similar to low-lead gasoline used in cars, and are also similar in engine technology. Jet and turboprop aircraft use Jet A fuel. Jet A is similar to kerosene and is highly refined and unleaded (i.e., the same type of fuel as 'Coleman' fuel used for camping). The amount and type of particulates emitted would vary by fuel type, as might the type and amount of possible air toxic emissions. Auto fuel and AVGas may result in more Benzene and 1-3, Butadiene air toxics and leaded particulates. In comparison, Jet A fuel may result in emissions of high levels of polynuclear aromatic hydrocarbons.

To increase the octane levels for auto gasoline (to provide for a more complete combustion of the fuel), refineries in the past added lead. Because of health concerns, lead can no longer be added to auto fuels. With the regulated exclusion of lead from auto fuels, the refineries turned to other components to provide higher octane levels for the unleaded fuels. To increase octane, the 'BTX' compounds of Benzene, Toluene and Xylene are sometimes added to auto fuels to increase octane, and as a means to keep the required vapor pressure (the pressure at which gasoline would evaporate) of the fuel at a low level. Therefore, as indicated above, auto fuels may result in more Benzene emissions than do the aviation fuels. Aircraft jet engines on the other hand, do not require high octane fuels. Therefore, no BTX compounds are added to jet fuels.

As a result of the Puget Sound's status as "non-attainment" for Carbon Monoxide, auto gasoline suppliers to the Region are now required to supply "reformulated" gasoline for use between November 15 through March 1. The use of reformulated gasoline is expected to help reduce the CO emission levels that have a tendency to reach high levels during the winter months. Reformulated gasoline is defined as a gasoline for which the oxygen content has been increased by the addition of various "oxygenates". These types of fuels are considered to improve gasoline's combustion efficiency, particularly at cold temperatures, which subsequently reduces CO emissions by 10 to 20 percent. The effect on NO_2 emissions is less clear, and may actually increase. The use of reformulated gasoline is intended to accomplish similar results as the BTX compounds while also reducing CO emissions. The oxygenate compound found in reformulated gasoline used in the Seattle area is ethanol (a corn-based product). Like aircraft, emissions rates for automobiles are highly dependent on engine technology.

Comment R-10-4: *Ms. Richter and the Southwest King County Community Group suggested that the air quality analysis downplays the impact that Sea-Tac has on local air quality by contrasting such a large area or the Region with Sea-Tac.*

Response: The Draft and Final EIS considers a wide variety of air pollutant sources within the immediate vicinity of the Airport as there are many large sources in the airport vicinity that contribute to air pollution conditions. For example, the EIS considers a total of 24 on and off-airport parking lots. Included were the many private, long-term parking lots located along International Boulevard. Also included was the evaluation of over 20 major roadways and associated traffic (airport and non-airport traffic), including Interstate 5, SR 518 and SR 509. These sources were in addition to aircraft operations, terminal heating and cooling, training fires, fuel farms, maintenance activities, and terminal area traffic and parking. Appendix D provides a complete listing of the sources considered.

The evaluation of such a wide array of sources was considered partially in response to a request by the air quality agencies at the outset of the study. At that time, the U.S. Environmental Protection Agency requested that the analysis consider all major sources located within a mile of the Airport. For the most part, such sources are limited to the evaluation of motor vehicles and parking. As the EIS analysis has shown, motor vehicles are a major contributor to pollutants within the Airport area and cannot, therefore, be easily dismissed from consideration.

Airport related surface traffic occurs throughout the Airport area. With development, changes in area roadways and traffic volumes can occur. Therefore, the analysis considers the effect of such potential changes to area roadways and changes to traffic volumes with development. As Sea-Tac is just one component of an integrated transportation system serving the Puget Sound Region, the analysis considers the Airport's pollutant contribution in relation to the entire Region the Airport serves.

As indicated in the EIS, the majority of the pollutant emissions in the Region are generated by motor vehicles, and that "aircraft operating at Sea-Tac contribute less than one percent of the carbon monoxide emissions, nitrogen oxides, and volatile organic compounds for all mobile sources within the Puget Sound Region". Based on just the immediate Airport area, aircraft at Sea-Tac contribute about seven percent of the carbon monoxide, twenty percent of the nitrogen oxides, and thirty-eight percent of the volatile organic compounds. Therefore, even within the much smaller Airport study area, the majority of the pollutant emissions are generated by motor vehicles.

Comment R-10-5: *The Southwest King County Community Group, Ms. DesMarais, and Mr. Matthews suggested comparing the contribution of motor vehicle emissions to the area to aircraft emissions, by comparing the number of cars necessary to equal one aircraft operation.*

Response: Appendix D of the Draft and Final EIS presents the emissions summary for all sources for the existing conditions. As shown, emissions for motor vehicles in the immediate Airport area exceeds the pollutant levels for aircraft for all pollutants.

One operation by a DC-9 aircraft (landing-takeoff cycle - LTO) produces about 3,541 grams of CO per hour as compared to 557.4 grams CO per hour for one car traveling 30 miles per hour for one mile. Therefore, it would take approximately 6 cars traveling one mile at 30 mph to equal the CO generated by one DC-9 LTO.

Based on the total number of passengers using the airport on an annual basis, approximately 0.0002 tons per passenger of CO is generated for all aircraft operations. The average distance traveled by a passenger going to Sea-Tac is about 20 miles. Therefore, about 0.0004 tons CO are generated for each trip to the Airport (18.58 grams CO per mile times 20 miles). Therefore, the average trip to the airport to catch a flight produces more CO than the equivalent level of CO for one passenger for all operations at the Airport. Thus, the EIS appropriately concludes that automobiles are a major source of pollutants in the Puget Sound Region.

Comment R-10-6: *The Regional Commission on Airport Affairs stated that Sea-Tac should be treated as a "major stationary source" under the Washington State Clean Air Conformity Act.*

Response: As is discussed in the Draft and Final EIS, the Clean Air Act and the Washington State Clean Air Conformity Act establishes the criteria and guidance for demonstrating that transportation plans, programs, and projects located in non-attainment areas conform to the State's plan for achieving and maintaining compliance with the Ambient Air Quality Standards. Conformity applies to all roadway and transit projects to be funded or approved by the Federal Highway Administration (FHWA) or Federal Transit Administration (FTA) -- called transportation conformity. Non-roadway transportation projects, such as the proposed development at Sea-Tac are also governed by the regulations -- called general conformity.

There is no provision or identification of "stationary sources" regulated by the Washington State Clean Air Conformity Act.

The Washington Clean Air Act, however, addresses stationary sources which are broadly defined as "any building, structure, facility or installation that emits or may emit any air contaminant". Typically, stationary sources are limited in size to a single facility in comparison to the 2,500 acres at Sea-Tac. Additionally, although the Port of Seattle owns the land, many of the facilities on-airport (such as the maintenance hangars) are owned and maintained by the tenants using the Airport. These tenants have certain responsibilities and liabilities associated with their operation independent from the Port of Seattle. These facilities are issued operating permits by the Puget Sound Air Pollution Control Agency under Title V of the Clean Air Act as stationary sources. As indicated in Appendix D, there are four permitted maintenance facilities at Sea-Tac, including permitted activities by Weyerhaeuser, Delta, Northwest, and Alaska airlines. The terminal heating and cooling facility operated by the Port of Seattle is also permitted under Title V. Each of these stationary sources were considered in the air quality analysis.

Comment R-10-7: *The Southwest King County Community Group noted that Nitrogen Dioxide (NO_2) is the criteria pollutant while the Draft EIS refers to Nitrogen Oxides (NO_x). The U.S. Environmental Protection Agency suggested a new method for estimating NO_2 (instead of NO_x) for comparison with the AAQS. The Puget Sound Air Pollution Control Agency noted that the Draft EIS only refers to five criteria pollutants when there are six including lead.*

Response: The Final EIS correctly refers to the criteria pollutants as noted above. The EIS analysis was revised to reflect concentrations of NO_2 in accordance with methodology accepted by U.S. Environmental Protection Agency Region X, and outlined in the U.S. Environmental Protection Agency technical report "*Use of Ambient Ratios to Estimate Impact of NOx Sources on Annual NO_2 Concentrations.*"

Comment R-10-8: *The Southwest King County Community Group asked that the discussion in Appendix D concerning incidences of poor air quality within the Puget Sound Region be clarified.*

Response: The EIS includes a general discussion on typical conditions during which poor air quality may result within the Region. The discussion notes that high concentrations of Carbon Monoxide typically occur during November through February, during the colder winter months that are often accompanied by stable atmospheric conditions which reduce pollutant dispersion. Carbon monoxide in particular is emitted by incomplete combustion during colder weather when engines operate less efficiently. Higher concentrations typically result during peak, 'rush' hour traffic. Ozone levels are the highest on hot summer afternoons from mid-May to mid-September. Ozone occurs as a result of a chemical reaction in the ambient air between nitrogen oxides and volatile organic compounds generated over the entire Region.

Declaration of an "air pollution episode" or local "impaired air quality" may result during these months when poor dispersion persists for 24 or more hours. This information is typically summarized in the Air Quality Data Summary prepared by the Puget Sound Air Pollution Control Agency and produced annually. These summaries are typically unavailable for several months after the end of a full year to allow Puget Sound Air Pollution Control Agency time for processing and evaluation of an extensive amount of data. The most current information available at the time was utilized in completing the Draft and Final EIS air quality analysis.

The Puget Sound Air Pollution Control Agency uses the National Pollutant Standards index to report daily air quality. The values provide a way to summarize the air quality for the entire year into days of "good", "moderate", "unhealthful", and "very unhealthful" conditions. Any pollutant measurement exceeding the short-term ambient air quality standards causes the designation to be in the unhealthful or worse category. **Table R-11** presents the air quality conditions for the Seattle area over a fifteen year period. Included is the worst air quality day for each year and the pollutant of concern.

As shown, the air quality in the Seattle area has shown steady improvement since 1980 with only one "unhealthful" day designated since 1989.

Comment R-10-9: *Several individuals commented on odor's of unburned jet fuel and concerns over aircraft fuel dumping. The following individuals and organizations made this comment: Mr. Akers, Mr. Burke, Ms. Hill, Ms. Mason, Ms. Osborne, Mr. Peyton (Ravenna-Bryant Community Association), Mr. Rozdilsky, Mrs. Whitled, the Regional Commission on Airport Affairs, and the Committee on Aircraft Noise.*

Response: Fuel dumping, or the purposeful jettison or leakage of aviation fuel by aircraft as they approach or depart the Airport, is not common and is performed only in emergency situations when aircraft cannot land safely with the fuel present in the aircraft. If an aircraft must make an emergency landing before it has burned enough fuel to safely land, the pilots would have to "dump fuel" in order to reduce the aircraft's weight sufficiently enough to land. According to federal directive 7110.65J paragraph 9-6-1 through 9-6-5, aircraft may dump fuel as necessary in a declared emergency state. There are no restrictions as to where the aircraft may or may not dump fuel However, each airport has a

recommended, pre-designated fuel dumping area for instances where fuel needs to be dumped if time permits. At Sea-Tac, FAA air traffic controllers have been instructed to direct aircraft in need of fuel dumpling to fly above 5,000 feet over the Puget Sound to allow time for the fuel to evaporate before reaching the ground, and to prevent non-evaporated fuel from reaching populated areas. Because any fuel release is irregular, impacts to natural habitats would be minimal. According to Mr. Tom Davidson, Assistant Manager of the Seattle TRACON facility, there have been no instances of emergency fuel dumping at Sea-Tac within the past two and one-half years.

Residents in the immediate vicinity of the Airport may also be reporting odors from aircraft queuing - this odor typically has more of an oily smell versus an odor like one would experience when fueling an auto. The pollutants that comprise this type of smell are accounted for in the air pollutant assessment presented in the EIS for precursor pollutants -- pollutant levels where the standards exist to protect human health and welfare.

There are many different types of odorous hydrocarbon compounds in jet exhaust which may be responsible for periodic "odor episodes". Typically, the most reactive or "volatile" hydrocarbons have the most potential to cause odor (i.e., cause a detectable odor at a lower concentration). The principal odor-causing hydrocarbon species in jet exhaust are the aromatic (fuel-related) and oxygenated (partially burned) hydrocarbons. Hydrocarbon emission rates are greatest during the low-power idle and taxi modes of the LTO cycle, when the engines are not operating as efficiently. During takeoff and climbout, for example, hydrocarbon emissions are greatly reduced since the engines operate with greater efficiency.

The most recent study concerning odors from jet engine exhaust was conducted at Boston's Logan Airport ("*Identification of Odorous Compounds From Jet Engine Exhaust at Boston's Logan Airport*", December 1992). Based on air monitoring at Boston Logan, three compounds - acetaldehyde, formaldehyde, and naphthalene - were present on a consistent basis above their respective odor recognition thresholds. Each of these compounds could be generated by the incomplete combustion of jet fuel. The odor impact depends on wind speed and direction, turbulence, and distance between the source and nearby residents. The odor recognition characteristics of these compounds is generally characterized as follows: Acetaldehyde is described as sweet, "apple ripened" and pungent; Formaldehyde is described as odor like hay, straw-like, and pungent; Naphthalene is described as having odor like tar, creosote, and mothballs.

As noted by the Boston study, the results were based on the minimum detectable limits because overall concentrations for these compounds was generally small. Additionally, no specific source or activity was identified as the primary source of these compounds. Moreover, the Boston study notes that motor vehicle exhaust also contains many of these same compounds. No conclusion was drawn as to the source, concentration, or potential impact to human health.

Table R-11

Puget Sound Region Air Quality History
1980-1995*

	Number of Days in Each Air Quality Classification During Each Year															
Air Quality	**1980**	**1981**	**1982**	**1983**	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995***
Good	73	69	86	98	146	150	130	120	215	231	239	256	238	251	315	185
Moderate	275	267	268	258	218	202	226	238	146	134	126	109	127	114	50	27
Unhealthful	18	28	10	9	2	10	8	7	5	0	0	0	1	0	0	0
Very Unhealthful	0	1	1	0	0	3	1	0	0	0	0	0	0	0	0	0
Worst Air Quality																
Day for Year	Jan 23	Jan 15	Feb 6	Jan 28	Dec 6	Dec 12	Jan 7	Feb 6	Dec 3	Jan 19	Jan 16	Dec 15	Feb 3	Jan 11	Dec 23	Jan 3
Dominant Pollutant on																
Worst Air Quality Day**	PM	CO	PM	CO	PM	PM	PM	PM	CO	CO	CO	CO	CO	PM	CO	CO

* 1995 Information provided for January through July only.

** PM = Particulate Matter; CO = Carbon Monoxide

Source: Mary Hoffman, Data Specialist, Puget Sound Air Pollution Control Agency, September 1995

Comment R-10-10: *Several comments stated that the modeling does not comply with EPA guidelines which establishes the protocol for dispersion air modeling and selection of receptor locations. The following organization made this comment: Mr. Peyton (Ravenna-Bryant Community Association), and the Airport Communities Coalition. The U.S. Environmental Protection Agency submitted suggestions for selecting receptor locations and quantifying pollutant concentrations.*

Response: As indicated in the Draft and Final EIS, the selection of receptor locations was based on the initial evaluation of 200 grid point locations equally spaced at approximately 1,300 feet (410 meters) apart. An equally spaced grid was used independent of specific sensitive locations to ensure that the receptor locations were representative of the highest possible concentrations. Because there are many contributing pollutant sources located within the terminal area from traffic, parking lots, the heating and cooling plant, and even aircraft, a second more closely spaced grid of receptor locations was evaluated for the existing and future terminal areas. These receptor grids were spaced at approximately 295 feet (90 meters apart), for the existing terminal, and 131 feet (40 meters apart) for the proposed future South and North terminal alternatives.

Based on the screening analysis concentrations, the refined analysis focused on twelve receptors with the highest concentrations for representative locations on all 'sides' of the Airport. The receptors were spatially located in this manner to provide an indication of pollutant concentrations within the surrounding community areas. Included were receptor locations within McMicken Heights, Riverton Heights, the Bow Lake Trailer Park, and Angle Lake community areas in the City of SeaTac, and the Highline area of Burien. The receptor locations were located in areas where reasonable public exposure relative to the ambient air quality standards might occur. For example, the analysis indicated that the pollutant of concern off-airport relative to the ambient air quality standards is NO_2. As the NO_2 standard is based on annual concentrations, reasonable public exposure to annual conditions occurs within residential areas. Comparatively, short-term public exposure is more typically associated with the Carbon Monoxide 1-hour and 8-hour standard, and the 24-hour PM10 standard. Such exposure could occur along public access locations such as along roadways (i.e., waiting for a bus) and is more generally associated with emissions from automobiles.

Receptor locations within existing or future airport property, or along major roadways such as SR 509 were considered generally inaccessible to the general public and therefore not considered.

Not all receptor locations considered indicated possible exceedances of the air quality standards. In fact, for the existing condition, no exceedances were identified by the screening evaluation for Carbon Monoxide for the existing, future 2000 and 2010 Do-Nothing, and future 2000 "With Project" conditions. Future 2010 and 2020 "With Project" conditions indicated possible exceedances of the 8-hour Carbon Monoxide standard at only one receptor location (the Hotel receptor located in the terminal area). For NO_2, the screening analysis indicated potential exceedances of the annual standard at four receptors generally located immediately north and south of the Airport. Air pollutant concentrations in these locations are influenced by emissions from aircraft takeoffs.

To further confirm that the refined analysis had selected receptor locations at which the maximum concentrations would be found, the U.S. Environmental Protection Agency suggested performing an additional 'sensitivity' analysis for other nearby receptor locations that showed similarly high concentrations for the screening analysis. Accordingly, the refined analysis was also performed for the Draft and Final EIS for 1-2 additional receptors in the general area of the receptor selected for the refined analysis. As stated in the Draft and Final EIS, the results confirmed that the concentrations were representative of the maximum concentrations within those general areas. This methodology is consistent with the guidelines for selecting receptor locations, and was conducted in consultation with the U.S. Environmental Protection Agency.

Upon review of the Draft EIS, the U.S. Environmental Protection Agency suggested that the analysis should identify the highest concentration for all locations considered ambient air. This could include unfenced airport property, or sites located immediately adjacent to the Airport. Accordingly, for the Final EIS analysis, receptor locations modeled in the Draft EIS were moved closer to the Airport ("fenceline") and new receptor locations added. The receptor locations are based on air pollutant contours (pollutant contours or isopleths of equal concentration). The pollutant contours were created using a grid of 400 receptor locations equally spaced at approximately 300 meters apart. Appendix D of the Final EIS presents illustrations of the NO_2 and CO contours.

Although each of the revised receptor locations can be considered 'ambient' and publicly accessible, none are located in residential areas. The revised receptor locations now include commercial uses located to the northwest and southwest of the Airport, the City of SeaTac water reservoir north of the Airport, and undeveloped areas south of the Airport. At the request of the USEPA, the receptors also include new locations along South 154th Street and South 188th Street. The 154th Street receptor is located on the north side of the Airport approximately 650 feet (200 meters) north of Runway 16L. Airport property is located on either side of 154th Street along its entire length in the Airport area. South 188th Street travels through the Airport and under Runway 34R. Receptors were located on South 188th Street on either side of the entrances to the 188th Street tunnel under Runway 34R. Airport property is located on either side of the roadway in these areas.

The results indicate that moving the receptors to the "fenceline" minimally increases pollutant concentrations. For NO_2, the new receptor location at South 154th Street does indicate an exceedance of the annual NO_2 standard (0.08 ppm as compared to the 0.053 ppm NO_2. standard). It is not surprising that the highest concentrations would be located within several hundred feet from the ends of the runways. Nonetheless, prolonged public exposure at this location would not be expected relative to the longer-term annual standard. For Carbon Monoxide, concentrations increased by moving the receptors closer to the Airport, but all remained well below the 1-hour and 8-hour standard. The results of the revised analysis are presented in Appendix D of the Final EIS.

Comment R-10-11: *The Southwest King County Community Group asked that the receptor data presented in Tables D-21 and D-22 in the Draft EIS be clarified.*

Response: As indicated in response to Comment R-10-10, a screening dispersion analysis was used for the Draft and Final EIS to identify locations for conducting a more detailed, refined dispersion analysis. For the Draft EIS, the maximum pollutant concentrations were identified by 200 receptor locations in Tables D-21 through D-22. Separate tables were presented for each pollutant because it is possible that the maximum concentration for either pollutant could occur from different wind angles because the sources for each pollutant could vary. Concentrations for each of the 200-receptors modeled were shown for comparison purposes. However, the refined dispersion analysis focused only on those locations reasonably accessible to the public relative to the time periods specified by the Ambient Air Quality Standards. Accordingly, many of the receptors included in Tables D-21 and D-22 were not considered further in the Draft EIS because they were located on existing or future airport property, or within the right-of-way of major roadways generally inaccessible to the general public over a longer period of time.

Based on comments provided by the USEPA, the methodology used to select the refined dispersion analysis receptor locations has been revised for the Final EIS. Therefore the screening analysis as provided by Tables D-21 and D-22 in the Draft EIS was no longer used to identify receptor locations of maximum concentrations and are therefore not included in the Final EIS. The response to Comment R-10-10 identifies the receptor location methodology used in preparation of the Final EIS. The results and methodology are further described in Chapter IV, Section 9 and in Appendix D of the Final EIS.

Comment R-10-12: *Mr. Peyton (Ravenna-Bryant Community Association) noted that the air quality analysis does not specifically consider facilities at the ends of the runway, such as Maywood Elementary School or the Burien Adventist Church.*

Response: As indicated in response to Comment R-10-10, the analysis did not focus solely on sensitive receptor locations such as schools in search of the maximum concentrations possible. In fact, several schools such as Highline High School are located in the general vicinity of receptors for the refined dispersion analysis (Receptor 6 on Exhibit IV.9-2 of the Draft EIS). Additional school locations were indirectly modeled as part of the initial screening dispersion analysis illustrated by the receptor locations shown in Exhibit D-1. Included are the Olympic Junior High School (Receptor 0-3); North Hill School (Receptor N-3); Sylvestor Jr. High School (Receptor E-1); and the Thorndyke School (Receptor B-12).

Comment R-10-13: *The U.S. Environmental Protection Agency indicated that 12 receptors modeled for the intersection analysis may not be adequate, and that their location was not in accordance with U.S. Environmental Protection Agency Region 10 accepted guidance.*

Response: The receptors modeled for the intersection analysis were located in accordance with "Guidelines for Modeling Carbon Monoxide from Roadway Intersections", which indicates that receptors should be located where the maximum concentrations are likely to occur, and where the general public is likely to have access. The general criteria for receptor citing includes: 1) places of expected 1-hour and 8-hour maximum concentrations; 2) places where the general public has access over the time periods specified by the NAAQS, and 3) reasonableness. In general, the receptor locations were based on locations within parking lots of adjoining commercial establishments where pedestrians have continuous access, and near entrances of nearby commercial establishments. All corners of the intersections modeled include a commercial activity and structure, except for the Washington Memorial Cemetery location.

While the public could experience air pollutants at three meters (12 feet) from the roadway (i.e., waiting for a bus) for a one hour period, such exposure for eight hours would be very unusual. As the analysis shows, concentrations are well below the 1-hour CO standard, with 8-hour concentrations being the greatest at locations as close as three meters.

The modeling guidance does not specify the number of receptors to be modeled. Therefore, the number and location of receptors as modeled were located so as to uniformly locate receptors along the four corners of the intersection. More importantly, nearly all intersection receptors indicated the potential for exceedances of the AAQS.

Based on the comments of the U.S. Environmental Protection Agency, the Final EIS presents the concentrations at 3 meters from each roadway, for the maximum concentrations identified for as many as thirty-two locations.

Comment R-10-14: *Clarify the peak hour level of aircraft activity used in the air quality analysis. The following individuals and organizations made this comment: Ms. Brasher, Ms. DesMarais, Ms. Wordian, Mr. David Kircher (Puget Sound Air Pollution Control Agency), Regional Commission on Airport Affairs, the Southwest King County Community Group, and the U.S. Environmental Protection Agency.*

Response: In assessing peak levels of airport activity, three peaks occur: peak arrivals, peak departures and peak total traffic. To reflect the greatest amount of total traffic, the total operations peak hour was used (peak month average day). Accordingly, the air quality analysis evaluates a peak hour of about 88 operations (43.9 arrivals and 43.9 departures).

The ability to accommodate a large number of arrivals and departures is dependent on a number of factors including weather, type of aircraft (prop or jet, small or large), and on maintaining adequate

spacing between aircraft. The largest number of peak hour departures that can be accommodated at Sea-Tac Airport in good weather is about 60 departures with the existing runways. Additionally, during a peak departure push, no more than 32 arrivals per hour can be accepted safely. The Airport currently has a peak demand of about 81 operations (59 departures and 22 arrivals) during the peak departure hour. This means that there are currently few aircraft wanting to land at Sea-Tac during the peak departure hour. Accordingly, to accommodate the estimated maximum number of departures (60 departures) during the peak departure hour, a number of conditions must exist. These conditions include good weather and excellent pilot visibility. Also needed is an aircraft fleet mix (the type of aircraft wanting to depart) that includes few large aircraft, and a high percentage of small, quick turning single or twin-engine propeller aircraft, and some turboprop aircraft (*see below the discussion on the effect of the current noise abatement procedures on departure capacity*). Accordingly, the peak number of departures that can occur is dependent upon the type and size of the aircraft involved, among other factors.

As indicated in Chapter IV, Section 9 and Appendix D, the air quality analysis was performed using the EDMS air quality model. The EDMS model assumes an equal number of arrivals as it does departures; users are presently unable to alter the ratio of arrivals to departures. It is presumed that the model was developed in this fashion, as to depart, an aircraft must first land. Thus, if the peak departure hour of 60 departures was used, the model would assume that a total of 120 aircraft operations would occur. This total operations level exceeds the current hourly capacity of Sea-Tac's airfield under good weather conditions (VFR1) by 20 percent and is about 30 percent above the existing demand.

During June, 1995, the U.S. Environmental Protection Agency identified a peak hour of total operations of 86 operations (43 departures and 43 arrivals). During the peak arrival hour (53 arrivals), about 31 departures occurred. Similarly, during the peak departure hour (59 departures), 22 arrivals occurred. Therefore, the highest number of total operations occurred when the airport experienced an equal number of arrivals and departures and is reflected by the EIS analysis.

Hourly aircraft activity counts maintained by the FAA Air Traffic Control Tower personnel over a longer period of time were reviewed to identify the peak hour level of aircraft departures. Based on this data, a peak hour of 63 aircraft departures was identified for August 31, 1995 between the hours of 7 a.m. and 8 a.m. The second highest peak hour was also observed in August on the 30th with 61 peak hour departures, also between 7 a.m. and 8 a.m. For the entire period for which records were available (8 months), no other hour exceeded 59 departures.

To determine the aircraft type in use on those days, actual radar data available through the Port of Seattle's Airport Noise and Operations Monitoring System (ANOMS) was reviewed. This data identified that the aircraft in use during the peak departure hour included fewer of the larger 3 and 4 engine jet aircraft and more of the light single and twin engine propeller and turboprop aircraft in comparison to the Draft and Final EIS analysis. The EIS analysis was based on use by all types of aircraft currently in use at the Airport, and not just those aircraft identified during the peak hour. As a result, use of a higher peak hour (63 departures in comparison to 43.9 departures for the EIS analysis) would result in less NO_2 concentrations at every location in comparison to the EIS. The NO_2 concentrations decrease because of the differences in aircraft types occurring during the peak departure hour as compared to the EIS average annual fleet mix. The peak departure hour would result in minimally higher 1-hour Carbon Monoxide concentrations at one receptor location (154th Street) in comparison to the EIS analysis, while the 8-hour Carbon Monoxide concentrations would either not change or actually decrease. Appendix D presents a more detailed discussion on modeling of the peak departure hour level of activity.

The Effect of the Existing Noise Abatement Procedures on Departure Capacity: The existing noise abatement procedures have a tremendous impact on departure capacity. These procedures require that departing jets essentially maintain heading until the aircraft reaches five miles or 3,000 feet altitude prior to initiating any turns. The procedures are designed to keep departing aircraft in the narrowest flight path

possible to minimize the population exposed to departure noise. The procedures in turn affect departures due to the need to maintain adequate spacing (both lateral between the two runways and in-trail between aircraft) for a considerable distance from the Airport. The noise abatement procedures focus on jet aircraft departures. Departures by light single and twin-engine propeller aircraft, and some turboprops (up to a Dash-8 aircraft) can turn immediately off runway centerline as soon as sufficient altitude has been reached (at 1,000 feet altitude). With the availability of quick turns by aircraft that are not required to fly the noise abatement procedures, the required in-trail separation between departures would be reduced. Therefore, the maximum departure capacity is dependent upon a peak hour aircraft mix that includes a high percentage of the smaller, propeller aircraft.

The Effect of Poor Weather on Departure Activity: The Southwest King County Community Group and the USEPA questioned whether it may be possible that the highest level of pollutants would occur during worst case meteorology (i.e., IFR4 conditions).

During poor weather conditions the operating capacity (arrivals and departures) is reduced to 50 peak hour *landings and takeoffs*. Typically, rather than have aircraft wait at the ends of the runways waiting to depart, aircraft are generally held at the terminal gates. Therefore, it is very unlikely that a higher peak hour level of operations would occur, or that more emissions would result during poor weather. During IFR conditions when the airport cannot operate normally, arrivals are delayed, and departing aircraft are held at the gate, canceled, and/or flights are pushed back into later hours.

Generally, the possibility of a peak hour of airport activity and worse case meteorology occurring at the same time is rare if not highly unlikely. The peak hour for cars occurs during morning or afternoon rush-hours, while peak aircraft activity occurs between 11 am and 1 p.m. Additionally, meteorology associated with poor dispersion most often occurs at night. Air dispersion is typically good between 11 and 1 a.m., for example, a time period representative of peak aircraft activity. Concentrations of a pollutant are affected by turbulence of the local atmosphere. If the atmosphere is more turbulent, then there is increased mixing of pollutants, resulting in greater dilution and consequently lower pollutant levels. Greater turbulence generally occurs with poor weather conditions. Application of worst case meteorological conditions provides for minimal dilution and consequently higher pollutant levels.

The EIS air quality analysis assumes that the peak hour for aircraft, roadway and other sources occurs at the same time. The analysis also assumes that the worst case meteorological assumptions, such as cold temperature and calm wind conditions, also occur at the same time as the peak hour operational considerations. Since this is not the case, the analysis represents a worst case situation that may present an overestimation of pollutant concentrations.

Could a higher peak hour occur during a different time from the peak month (i.e., at Thanksgiving or Christmas): The Southwest King County Community Group and the USEPA also questioned whether a higher peak hour could occur outside of June, July or August (the peak months of activity), or when less than peak hour departures occur. Although holiday periods generally attract substantial passenger activity, this does not necessarily translate into more flights. As determined by the Master Plan Update and a review of historical data, operations during November represents only 83% of the August monthly operations total. Whereas August represents approximately 9.5% of the total annual operations, November represents only 7.9%. As stated in the Master Plan Update, total operations at the Airport typically peak during the summer months in July or August. Therefore, a higher peak hour level of operations would not be expected to occur outside of the summer months. In fact, FAA Tower Activity Counts over the Thanksgiving weekend (1995) confirmed that the maximum number of departures was 59. What is often experienced during the holiday periods are considerable delays (at the gate) due to poor weather which affects both arrivals and departures.

Could higher pollutant concentrations occur with less than the peak hour level of departures? As indicated above, the Draft and Final EIS analysis clearly indicate that the highest NO_2 concentrations were identified with less than the peak departure level of activity (i.e., 43.9 departures versus 63

departures). The FAA's activity counts for the Airport clearly indicate that as aircraft activity increases in the peak hour, the number of larger aircraft operating during the peak hour decreases. The revised analysis shows that the result is less NO_2 emissions. Even if the analysis considered that the average annual fleet (i.e., all the aircraft types in use) and the highest peak hour level of departures could occur at the same time (which the Tower counts and ANOMS data indicates does not occur), the change in pollutant levels would be minimal. Carbon monoxide levels would increase one percent or less, and NO_2 would increase eight percent or less. The largest change would occur at the Draft EIS Receptor 4 (the McMicken Heights area northeast of the Airport), at which concentrations would increase 0.003 ppm, increasing from 0.037 ppm to 0.040 ppm including background. Nonetheless, all receptor locations would result in concentrations less than the Ambient Air Quality Standards.

Comment R-10-15: *Several groups questioned how a new third parallel runway would be used for arrivals and departures, and whether the effect of a new runway was adequately considered in the air quality analysis. The following organizations made this comment: Airport Communities Coalition, Regional Commission on Airport Affairs, Southwest King County Community Group, and the U.S. Environmental Protection Agency.*

Response: As proposed, a third parallel runway is needed to reduce arrival delay incurred during poor weather conditions. Aircraft arrival delay increases during poor weather conditions as the existing runways are only able to accommodate a single aircraft arrival stream. Because of the narrow spacing between the existing parallel runways at Sea-Tac, simultaneous arrivals to both existing runways are permitted only in good weather conditions. Under poor weather conditions, arriving aircraft are either held on the ground in their originating city, slowed enroute, or are placed in holding patterns awaiting clearance to land at Sea-Tac and thereby incurring substantial arrival delay.

To reduce arrival delay during poor weather, the proposed new runway separated by 2,500 feet west of existing Runway 16L/34R is proposed. Its primary purpose would be to enable two separate arrival streams to Sea-Tac, thereby substantially reducing poor weather related arrival delay. Current FAA air traffic control rules require at least a 2,500 foot separation between parallel runway centerlines for two staggered or dependent arrival streams during poor weather to maintain the required aircraft separation. Dependent runway operations refer to conditions where aircraft arriving to one runway affects arrivals to a nearby runway. Because the existing runways at Sea-Tac are only 800 feet apart, the existing airfield only allows a single arrival stream during poor weather (VFR2 and IFR conditions). Based on the 10-year weather analysis performed by the Master Plan Update, poor weather occurs about 44 percent of the time. The FAA's Capacity Enhancement Study found a substantial delay reduction by having two arrival streams during poor weather (although staggered).

As a result, airports which have three parallel runways typically operate with arrivals on the outer runways, with departures on the inner runway and the runway(s) closest to the terminal complex. This is done to afford the most efficient form of airfield operation. With the availability of a third runway at Sea-Tac, it is expected that existing Runway 16L/34R and the proposed new runway would be used for arrivals. Departures would occur on the existing runways (16R/34L and 16L/34R).

On occasion, departures would occur on the proposed new runway. Such usage is likely to be associated with periods when the existing runways are closed for repair and maintenance. The air quality analysis considers that about 3-4 percent of all departures would occur on the proposed new parallel runway, and is only slightly higher than for the average runway end utilization with the proposed third runway presented in Appendix C, Table C-20. This usage represents a reasonable worst-case condition with use by approximately 3 aircraft departures during the peak departure hour. With such limited anticipated usage for departures, overall departure delay would only be marginally reduced (about 5 percent) with the availability of the proposed third parallel runway.

The use of a new parallel runway at any length and distance from the existing runways for departures is limited by several factors, including constraints associated with increased taxiing distances and increased

runway crossings. The proposed new runway would be located 2,500 feet west of Runway 16L/34R, which is the closest runway to the terminal area. To use the proposed new runway for departures, aircraft would have to cross two active runways, resulting in added delay (time) and safety considerations. The result to the airlines would be increased fuel costs and a reduction in overall efficiency. Use of the proposed third parallel runway is further limited due to runway length. The proposed runway length of 8,500 feet does not provide sufficient runway length to be used for departure by a number of the larger aircraft including the B-747, DC-10, MD-11, L-1011, or B-767.

Lastly, departure capacity would be constrained by the existing noise abatement procedures. The current "straight-out" noise abatement departure procedures require that departing jets essentially maintain runway heading until the aircraft reaches five miles or 3,000 feet altitude prior to initiating turns. This procedure is designed to keep departing aircraft in the narrowest flight path possible to minimize the population exposed to departure noise. This in turn affects departures due to the need to maintain adequate spacing (both lateral between the two runways, and in-trail between aircraft) for a considerable distance from the Airport. In poor weather, aircraft are required to maintain an in-trail separation of 2 nautical miles compared to one-mile in good weather. Combined, the required in-trail separation and maintenance of the "straight-out" noise abatement departure procedures would greatly restrict the useful departure capacity of a third runway.

The noise abatement procedures do not restrict operations by light single and twin engine piston aircraft and some turboprops through the Dash 8. Once these types of aircraft reach 1,000 feet, they can then be turned outside of the noise abatement corridor. Accordingly, use of a new third parallel runway for departures could be used for the small, propeller engine aircraft that are able to turn quickly once sufficient altitude has been reached. The effect of the existing noise abatement procedures is further discussed in response to Comment R-10-14.

Because of the length of the computer analyses performed for the EIS, the actual output was not included in the appendix. However, these files are available in the Administrative Record; see response to comment R-1-6.

Comment R-10-16: *Four groups requested clarification of the taxi-in/taxi-out time and effect of runway crossings on the air quality analysis. The following organizations made this comment: Airport Communities Coalition, Regional Commission on Airport Affairs, Southwest King County Community Group, and the U.S. Environmental Protection Agency.*

Response: A discussion of the taxi-in/out time-in-mode used in the air quality analysis is included in Appendix D. Taxi distances were calculated for seven separate airfield operating locations to account for the fact that each location could result in aircraft using a different taxiing path. The seven operating locations included the north and south terminal satellites, Concourses A, B, C/D in the terminal area, and the general aviation apron and north cargo ramps. Taxi routings were based on observed operational patterns and discussions with the FAA Tower personnel. Different taxi routes were assigned to the various aircraft categories based on their typical operating capabilities and on information provided by the FAA. Table D-2 presents the time-in-mode by aircraft type used in the inventory analysis. This methodology was utilized for both the existing and future with and without Master Plan Update improvements.

The average taxi distance for each aircraft category, for both arrivals and departures by runway, was determined by weighting the measured taxi distances with the actual number of operations, by category of aircraft (large jet, small jet, and propeller aircraft), for each terminal area location. This was done for both day and night operations. While actual taxi distances do not vary from day to night, the number of operations by aircraft type vary at a given terminal location. The average taxi distance for arrivals and departures, both day and night for each of the aircraft categories, was calculated by applying the existing or future runway end use to the weighted-average taxi distance for each runway. From this the average taxi times were calculated based on a constant taxi speed of 15 knots.

Taxi/idle times for each alternative were calculated separately by the origination/destination location on-airfield used by each of the various airport users. The addition of the proposed South Aviation Support Area and proposed terminal improvements were modeled in combination with the proposed third parallel runway. As shown in Table D-2, taxi time is not anticipated to change drastically between each of the alternatives. This can be attributed to the very similar runway utilization and taxi/idle times used, which are only minimally affected by implementation of the proposed new runway or new terminal development option.

Crossing active runways would be expected to add to the taxi time. The results of the FAA's delay simulation modeling indicates that the additional time needed to cross the other runways with use of a third runway would result on average in the addition of approximately 40 seconds for arrivals, and about 10 seconds for departures. For the air quality analysis, the taxi distances and added time to cross two runways with a new parallel runway is weighted based on the actual number of operations expected to use that runway. As the majority of aircraft arrivals and departures are expected to continue to use the existing runways, the effect of added delay due to runway crossings for all operations is minimal relative to the use of the other runways.

Comment R-10-17: *Clarify departure delay and departure queue delay used in the air quality analysis. The following organizations made this comment: Airport Communities Coalition, Regional Commission on Airport Affairs, Southwest King County Community Group, and the U.S. Environmental Protection Agency.*

Response: The focus of the proposed third parallel runway is to reduce aircraft arrival delay experienced primarily during poor weather conditions. Nonetheless, a reduction in arrival delay would have a concurrent reduction (although small) in departure delay for aircraft waiting on the ground to depart. The availability of the proposed third parallel runway would be expected to reduce departure delay about five percent.

The air quality analysis methodology focuses on the average peak hour departure queue delay for all weather conditions identified by the FAA's simulation modeling delay analysis. For the existing condition, the average departure queue delay during the peak hour of 2.89 minutes was applied to each aircraft departure. Accordingly, the air quality analysis considered that each aircraft departure in the peak hour experienced an average 11 minutes of taxi-idle-delay time upon push-back from the gate and traveling to the end of the runway (8.11 minutes taxi time plus 2.89 minutes delay time for a total of 11 minutes).

Field observation confirmed that during the peak departure hours, aircraft queues include up to 9-10 aircraft with each aircraft in the queue waiting 6-10 minutes of more to depart. Some aircraft in the peak departure hour would experience substantially more delay, while others would proceed unimpeded from the gate to the end of the runway and departure in 5-7 minutes or less in total taxi time. The result is that not all aircraft line up in a queue waiting to depart even during the peak departure hour.

The differences in departure queue can also depend on whether the airport is operating in a south or a north flow (i.e., departures to the south or north). During south flow, aircraft queues during the peak departure hour can at times become rather long. Field observation confirmed that during south flow each aircraft departure experiences an average of 6-10 minutes in the departure queue waiting to depart. This reflects the availability of a long taxiway upon which aircraft can queue without blocking access to the terminal area gates or exit taxiways for arriving aircraft. During north flow, the space to line up aircraft is more constrained and aircraft are more often held in the terminal area apron areas. Field observation confirmed that the length and time spent in the departure queue during north flow is far less than for south flow departures (as observed, less than 3 minutes per departure).

The length of the departure queue is defined as a function of peak hour departures, runway capacity, and delay time. Departure delays result in aircraft queues which increase the time that aircraft engines must operate on the ground. With the proposed third parallel runway, the length of the departure queue would not be expected to be significantly reduced. As previously indicated, use of a new parallel runway at any length and distance from the existing runways for departures would be limited.

Nonetheless, departure delay time is expected to increase in the future with or without a new third parallel runway. This is due to the impact of weather related arrival delay on future departure procedures. With a new third parallel runway, the impact of weather related delay is expected to decrease considerably. A reduction in arrival delay has a concurrent reduction in departure delay for aircraft waiting on the ground to depart. Departure delay time and hence aircraft departure queue time would be reduced due to the ability to accommodate two separate arrival streams during poor weather conditions with a third runway. During poor weather, it is expected that arrivals would operate on existing Runway 16L/34R and the proposed new runway. Departures would occur on the existing runways, Runways 16R/34L and 16L/34R. With the ability to operate arrivals on a third runway, departure delay would decrease particularly during poor weather conditions. With a new arrival runway available, departures would not have to wait for arrivals.

Considerable interest was expressed in the what the affect would be on air pollutant emissions with peak departure activity and peak departure queue. The response to Comment R-10-14 address peak departure activity. The discussion above addresses many of the key understandings relative to departure queues. As indicated, it appears that substantial departure delay can occur during south flow with peak departure activity. Accordingly, the effect on air quality with an increased departure queue delay time over that identified by the simulation modeling was considered. As a reasonable worst case level of departure queue, the effect on air quality was examined based on a level of 10 minutes of departure queue with a peak level of departure activity. Accordingly, each aircraft departure was assigned a total of 18.11 minutes of time on the ground (8.11 taxi-idle time, and 10 minutes queue time). Based on this analysis, approximately 0.001 ppm additional NO_2 would occur at any receptor location modeled.

Therefore, tripling the departure queue delay over that identified by the simulation analysis would minimally affect NO_2 levels. Increased departure queue delay would be expected to increase the short-term 1-hour and 8-hour carbon monoxide concentrations. However, except as identified by the roadway intersection analysis, all 1 and 8-hour CO concentrations would remain well below the Ambient Air Quality Standards. Appendix D presents the results of several test case analyses, including the effects on pollutant levels of peak departure activity and peak departure queuing.

Comment R-10-18: *Are general aviation aircraft considered in the air quality analysis and will they still be in use in the future. The following organizations made this comment: Airport Communities Coalition, Regional Commission on Airport Affairs, Southwest King County Community Group, and the U.S. Environmental Protection Agency.*

Response: As shown in Table D-1, general aviation aircraft are expected to continue to use the Airport in the future. General aviation aircraft include use by single and twin engine piston aircraft, business jets, and some turboprops. In **Table R-8**, single engine piston aircraft are identified as 1-Engine-Piston; twin engine piston aircraft as 2-Engine-Piston, and turboprops include DHC6, SF340 and CNA441. Activity by general aviation aircraft is expected to remain about the same as it is today. The time-in-mode for general aviation users included in Table D-2 is represented by the PROP (propeller) aircraft type.

However, the on-airport location for general aviation users is expected to change depending on the terminal development option selected. Currently, general aviation users are predominantly located on the southeast side of the airfield, just south of the South Terminal Satellite. With development of the South Aviation Support Area (SASA), general aviation users would be relocated to SASA in the southernmost portion of the airfield. General aviation users would be relocated to this area with either the North or South Terminal options sometime after 2010. With the Central Terminal alternative,

general aviation users would be relocated to the northernmost portion of the airfield to an area between Runway 16R/34L and the proposed third runway.

Comment R-10-19: *Clarify the meteorological input assumptions used in the air quality analysis, including the prevailing wind direction and wind speed used in the refined dispersion analysis. The following organizations made this comment: Airport Communities Coalition, Regional Commission on Airport Affairs, Southwest King County Community Group, and the U.S. Environmental Protection Agency.*

Response: The meteorological input assumptions used in the air quality analysis are presented in Appendix D. Ten year historical weather data (1984-1994) summaries for Sea-Tac for wind speeds ranging from 5 to over 20 knots indicate that the predominant wind direction is from the south, which occurred over 20 percent of the time between 1984 through 1994.

The refined analysis is based on actual wind speed and wind direction, and other meteorological conditions which were observed at Sea-Tac for each year over a five year period. The historical weather data was obtained from the National Oceanic and Atmospheric Administration (NOAA) for the five most recent years from 1989 through 1993. Therefore, wind speed, wind direction and other meteorological conditions varied for each of the 8,670 hours for each year modeled for the refined dispersion analysis.

The screening dispersion analysis is based on a wind speed of 1 meter per second. The purpose of the screening analysis is to maximize the pollutant concentrations downwind from the source to identify possible locations of exceedances of the ambient air quality standards. To determine the worst case wind angle (to identify maximum concentrations), thirty-six different wind angles at ten degree increments were modeled. Use of wind speed and 10 degree wind angles for the screening evaluation was confirmed with the regional air quality agencies.

Comment R-10-20: *The Southwest King County Community Group questioned if the mixing height information used in the analysis is the most recent data available.*

Response: The mixing height determines the limits of the vertical transport and diffusion of the pollutants (upward mixing of pollutants). A mixing height of 2,050 feet was used in the analysis based on "*Mixing Heights, Wind Speed and Potential for Urban Air Pollution throughout the contiguous United States*". The information identified by the U.S. Environmental Protection Agency is the most current information available and is based on historic recorded weather data. This report has not been updated. Puget Sound Air Pollution Control Agency indicated that a mixing height of 2,650 feet was utilized in preparation of the State's 1990 inventory based on mobile source guidelines. These mixing heights are similar and would not result in an appreciable difference in the air quality analysis.

Comment R-10-21: *Mr. Peyton (Ravenna-Bryant Community Association) asked if the embankment and ground elevation in the Airport area was accounted for in the air analysis.*

Response: Variation in terrain is not accounted for by the EDMS air quality model.

Comment R-10-22: *The Airport Communities Coalition, the Regional Commission on Airport Affairs and the Southwest King County Community Group questioned how pollutants disperse from Sea-Tac.*

Response: There are two primary air pollutants of concern in the airport environs: Carbon Monoxide and nitrogen dioxides. The major source of carbon monoxide is motor vehicles along the major roadways and in the terminal area. Carbon monoxide is also produced by idling aircraft during taxiing and while waiting to depart. Within the terminal area, there are many contributing pollutant sources including traffic, parking lots, the terminal heating and cooling plant, and even aircraft sources. Carbon

monoxide concentrations, which have short-term ambient air quality standards, are typically localized and do not readily disperse.

Nitrogen dioxides are typically produced by higher vehicle speeds and fuel flow and are typical of aircraft takeoffs. As the majority of the NO_2 emissions generated at an airport are due to aircraft takeoff, it is reasonable that the higher levels of NO_2 are found at either end of the airfield (north and south ends of the airport). Accordingly, NO_2 concentrations gradually decrease away from the Airport. Therefore, the highest concentrations for NO_2 are those locations closest to the Airport. Emissions of NO_2 with use of a third runway would not be expected to differ substantially over concentrations that occur with the existing airfield. As indicated in response to comment R-10-14 above, the proposed third parallel runway is expected to be used for approximately 3-4 percent of all departures (i.e., 2-3 aircraft during the peak hour). Therefore, NO_2 concentrations from aircraft takeoffs on the proposed third parallel runway would not be expected to differ substantially over the existing condition.

To further illustrate how air pollutants disperse from the Airport, air pollutant contours or 'isopleths' were prepared (i.e., contours of equal pollutant concentrations). The isopleths were used to identify maximum pollutant concentrations and to identify receptor locations for conducting the revised air quality analysis presented in Appendix D (Exhibits D-1 through D-4 of the Final EIS). The isopleths indicate the general distribution of NO_2 and CO. The isopleths are based on the maximum concentration by worst case wind angle identified by the results of the screening dispersion analysis. As shown by the air quality analysis, the screening analysis overestimated pollutant concentrations in comparison to the results of the refined dispersion analysis which showed no exceedances of the AAQS for NO_2.

Comment R-10-23: *The Regional Commission on Airport Affairs, and the Southwest King County Community Group questioned how much nitric acid and oxides of nitrogen result from each fire fighting training exercise, and how are any associated wastes disposed.*

Response: Pollutant emissions from fire fighting training exercises were considered in the air quality analysis. Tables D-3 present the results of the emissions inventory, which includes training fires. As shown, training fires currently contribute less than 1 percent of the CO, about 1 percent for VOC's, and less than one percent for NO_2, for all sources at the Airport. The total NO_2 produced is estimated at 0.32 tons per year. In 1994, approximately 79 individual training fires occurred. The Port of Seattle has indicated that actual usage today is far less (approximately 28 training fires annually). Additionally, in 1996 the burn pit will be closed, and all fire fighting training will be conducted at Moses Lake until 1997, when a new fire fighting training center at North Bend is complete.

Based on the 1994 level of training activity, approximately 8 pounds of NO_2 are generated by each training fire. The fuels used for training include Jet A and a limited amount of unleaded gasoline. As shown in Tables D-5 and D-6, based on the screening dispersion analysis, off-airport concentrations of CO and NO_2 attributed to training fires were not detected. Therefore, it was determined that training fires are a minor source of air pollutants at the Airport.

To extinguish the training fires, the firefighters use a foaming compound called Aqueous Film Forming Foam (AFFF), which is primarily glycol and water. Nitric acid does not appear to be a by-product of the training exercises.

Comment R-10-24: *The Southwest King County Community Group noted that the 1991 Ecology study and the 1993 study for Chicago Midway Airport indicated much higher particulate concentrations due to jet aircraft operations.*

Response: Both the 1991 Ecology study for Sea-Tac and the 1993 Chicago Midway Airport study referenced in Chapter IV, Section 7 "Human Health", indicated higher particulate concentrations due to jet aircraft operations. Both studies relied on the EDMS air quality model. However, both the 1991 Ecology study and Chicago Midway studies were based on one of the earliest versions of EDMS model.

Although more particulate data was included in the earlier EDMS version, this data was not accurate. Therefore, the aircraft emissions levels included in EDMS for particulates was revised to include only that data for which reliable particulate information is known. The emissions data was not updated because reliable data on aircraft particulate emissions is not available to incorporate into the model. Accordingly, the most current version of the EDMS model now includes little information on particulates in comparison to the earlier versions used by Ecology and for Chicago Midway.

Coordination with the air quality agencies indicated that they are aware of the limited availability of particulate data for aircraft sources. To date, the U.S. Environmental Protection Agency has not revised the aircraft engine particulate data to include additional information on particulates.

Comment R-10-25: *The Regional Commission on Airport Affairs, and the Southwest King County Community Group asked why no analysis was conducted for Ozone.*

Response: Ozone is created from a complex series of atmospheric reactions when hydrocarbons and Nitrogen Oxides accumulate in the atmosphere and are exposed to sunlight. Ozone can often form miles from the pollutant sources. A comprehensive evaluation of ozone would, therefore, require consideration of all major sources within the entire Puget Sound Region. Accordingly, a proposed projects potential contribution to ozone production is typically evaluated by examining emissions of the precursor pollutants hydrocarbons and Nitrogen Oxides.

Comment R-10-26: *The Southwest King County Community Group commented on the differences in climatalogical descriptions between the air quality chapter and the health/noise chapter.*

Response: Appendix D provides a general description of the climate in the Puget Sound Region. The discussion describes the "winter" period from November through February as "relatively mild". In contrast, Chapter IV, Section 7, "Human Health", refers to the "typical cold climate home.... in the Sea-Tac vicinity". Both references accurately describe conditions within the Puget Sound Region. The air quality analysis is based on an average annual temperature of 40 degrees F. According to a review of ten year historical weather data, the average winter temperature (December, January, February) was 41 degrees.

Comment R-10-27: *Mr. Kircher (Puget Sound Air Pollution Control Agency) and Mr. Burke noted that the Tables were difficult to understand, and suggested use of graphics to better explain the results. The U.S. Environmental Protection Agency also suggested that Tables IV.9-5 through IV.9-10 present more information than is necessary, and that only the bottom line results should be presented.*

Response: Comments acknowledged. The presentation of results in the Final EIS has been simplified and makes greater use of graphics where possible.

Comment R-10-28: *Southwest King County Community Group requested clarification of Page D-26, Column 1 and 2, paragraphs 4 and 1 (of the Draft EIS) which indicates that exceedances of the AAQS may occur due to increases in vehicles in the terminal area.*

Response: This comment refers to a discussion of the future Do-Nothing, Alternative 1. As described in that section, roadway traffic in the terminal area is anticipated to increase in the future with or without the proposed improvements. Therefore, all the future conditions (including the Do-Nothing) are expected to accommodate a greater level of traffic over current conditions. The screening dispersion analysis, which takes into consideration changes in motor vehicle traffic, indicate the potential for exceedances of the 8-hour Carbon Monoxide standard for the Do-Nothing alternative in the terminal area. Therefore, the terminal area receptors were selected for a more detailed, refined dispersion analysis. The anticipated changes with implementation of the proposed Master Plan Update improvements are described for Alternatives 2, 3 and 4.

Comment R-10-29: *The Southwest King County Community Group asked why aircraft and other airport sources were not included in the roadway dispersion analysis.*

Response: The roadway dispersion analysis using CAL3QHC was performed to complement the areawide dispersion analysis performed using the EDMS model, and therefore only focuses on emissions generated by motor vehicles in the immediate vicinity of an intersection. Using the EDMS model, the area dispersion analysis was performed for all sources including roadways. Therefore, combining the results of the area dispersion with the results of the intersection analysis would result in "double counting" the motor vehicle emissions. To account for the pollutant concentrations by sources not included in various analyses, a background concentration was added for all of the dispersion analysis.

However, the screening dispersion analysis does enable the identification of the contributions by the various sources modeled. Both the screening and intersection analyses are based on worst case wind angle and meteorological conditions. Based on the screening dispersion analysis, the contribution of aircraft and other airport sources to pollutant levels at the intersections modeled can be determined. As indicated in Chapter IV, Section 9 "Air Quality", the roadway intersection dispersion analysis indicated possible exceedances of the Ambient Air Quality Standards at two intersections: South 170th and International Boulevard, and South 188th and International Boulevard. For both intersections, aircraft emissions would contribute less than 0.02 ppm of CO for both the 1-hour and 8-hour CO concentrations. Therefore, the contribution of aircraft emissions to CO concentrations at these intersections is minimal in comparison to the high levels identified for motor vehicles. Accordingly, the background concentrations used in the roadway dispersion analysis account for the contribution by aircraft and all other non-roadway sources.

Comment R-10-30: *The U.S. Environmental Protection Agency and the Airport Communities Coalition requested that the modeling assumptions used in the construction vehicle dispersion analysis be clarified.*

Response: The following summarizes several comments concerning the modeling assumptions used in preparation of the construction vehicle analysis:

1. The modeling of routes to be used by the haul trucks omits consideration of truck traffic peaks - The construction vehicle modeling is based on the peak hour of haul truck activity, and also the peak hour of airport related and non-airport related traffic. Table IV.23-2, "Summary of Expected Off-Site Borrow Source Haul Routes" identifies the haul routes and vehicle trips depending on the location of the fill material. The number of truck trips modeled is based on data presented in Chapter IV, Section 23, "Construction Impacts", and in Table D-16 of the Final EIS. The emission factors used are from MOBILE5A and PART5, both U.S. Environmental Protection Agency approved air quality models. The haul trucks construction site modeling includes the quantification of emissions associated with activities at both the construction site and at the borrow sites.

2. NO_2 was not modeled for vehicular traffic emissions - The construction vehicle dispersion analysis was conducted using the CALINE3 dispersion model. This model predicts dispersion of inert pollutants such as Carbon Monoxide and suspended particulates. Use of the CALINE3 model for NO_2 dispersion is unreliable because it is unable to adequately model the dispersion of highly reactive compounds that disperse over a wide area and for which there are no short-term ambient air standards available. Typically, the construction related haul-trucks would include large diesel-fueled dump trucks, many as large as semi-truck trailers. Accordingly, concentrations of CO and PM10 are the pollutants of primary concern with use of haul trucks.

3. Receptors were placed too far away from the haul routes - The receptors were located in accordance with "Guidelines for Modeling Carbon Monoxide from Roadway Intersections", which

indicates that receptors should be located where the maximum concentrations are likely to occur, and where the general public is likely to have access relative to the time periods specified by the Ambient Air Quality Standards. The modeled receptors were located approximately 60 feet from the route of travel, focusing on areas of residential development along the route. As the analysis indicated no potential exceedances of the short-term 1-hour CO standard, these locations represent areas where the public could be exposed over periods specified by the short-term 8-hour Carbon Monoxide, and 24-hour PM10 standards. The response to comment R-10-10 further describes how the receptors were located for the Draft EIS analysis. The USEPA subsequently indicated that all receptors should be located at three meters from the edge of the roadways, irrespective of the adjoining land uses and expected limits to public exposure. Accordingly, the receptor locations have been revised for the Final EIS.

4. The U.S. Environmental Protection Agency requested that the analysis include 'entrained dust'. The Final EIS has been revised to include emission factors for entrained dust based on use of the PART5 USEPA model. The input assumptions used in PART5 were obtained in consultation with the Department of Ecology and the USEPA. The results are presented in Section 23, "Construction Impacts" of the Final EIS.

5. Construction vehicles such as cement trucks, bulldozers, scrapers, rollers, dump trucks and diesel generators were not included in the emissions inventory, minimizing CO and PM10 concentrations - Typically, the construction related haul-trucks would include large diesel-fueled dump trucks, many as large as semi-truck trailers. Emission factors, therefore, were considered for heavy duty gasoline vehicles and heavy duty diesel vehicles typical of construction haul-truck related activity. Vehicles such scrapers, rollers, and generators typically would only operate at the borrow sources and the construction site and were considered in the calculation of fugitive dust emissions for those sites. However, rollers and scrapers would not be expected to operate along the haul routes and therefore were not considered in the construction vehicle dispersion analysis.

6. On-site fugitive dust emissions during construction and at the borrow sites were not included - Chapter IV, Section 23 of the Draft and Final EIS describes the results of the fugitive dust evaluation for both the borrow and construction site locations. The dispersion modeling focuses on the change in air pollutants that might be expected along the construction vehicle haul routes.

7. Nearby particulate non-attainment areas along the Duwamish and in south Seattle and Kent could be adversely affected - The air quality analysis indicates that off-airport particulate emissions from construction related activities would be concentrated at the construction and borrow sites. Additionally, none of the proposed borrow sources are located in either Duwamish or Kent; however, depending upon how the material is transported to Sea-Tac, these locations could serve as transfer sites (transfer from barge at the Duwamish or transfer from rail in the Kent valley). As is described in response to comment R-12-7, it is not possible to identify precisely how the material would be transported from a specific location to Sea-Tac. The location of any necessary transfer sites and subsequent permitting, would be the responsibility of the successful haul bidder.

Comment R-10-31: *The Southwest King County Community Group commented that traffic volumes used in the analysis were not presented, requesting clarification on how the number of cars used in the air quality analysis was identified in relationship to aircraft and operations levels.*

Response: The traffic volumes used in the air quality analysis are based on the information presented in Chapter IV, Section 15 "Surface Transportation" and Appendix O. As indicated in that section, peak hour conditions along all roadways were identified. The heaviest traffic conditions of the day in the airport area peaks between 5:00 p.m. and 6:00 p.m. Comparatively, aircraft activity indicates that the busiest period occurs between 11:00 a.m. and 1:00 p.m. The air quality screening dispersion analysis assumes that the peak hour for aircraft and motor vehicles occurs at the same time.

The existing traffic volume data on the area roadways was obtained from the City of Sea-Tac, the Washington State Department of Transportation, and from a series of traffic counts collected in the study area specifically for the Sea-Tac Master Plan Update. These counts were taken in August and September, 1994, and consisted of peak hour turning movements at major intersections, as well as 24 hour volumes on various roadway segments and highway ramps. Counts were conducted during each road segment's daily peak period. The actual traffic volumes used, intersection signalization, and other intersection characteristics were based on level of service (LOS) computations for each intersection similar to the data presented in Appendix O. The actual LOS calculations and traffic volumes used in the analysis are presented in the Final EIS.

Comment R-10-32: *The Southwest King County Community Group submitted numerous comments concerning the Air Quality Survey air toxics monitoring methodology and analysis of results. Several commentors also requested further explanation as to the potential implications of the toxics Air Quality Survey monitoring program. The following individuals made this comment: Ms. Christy, Ms. DesMarais, Mr. Kircher (Puget Sound Air Pollution Control Agency), Regional Commission on Airport Affairs, , and U.S. Environmental Protection Agency.*

Response: An air toxics monitoring program (known as the Air Quality Survey) was initiated by the Port of Seattle in response to public interest over a 1991 air modeling study by the Washington State Department of Ecology. The Ecology study indicated that Airport operations could be a significant source of air pollutant emissions, noting possible concerns over air toxic concentrations, particularly for Benzene. The Ecology study modeled estimated pollutant concentrations using the screening dispersion mode of the EDMS air quality model. The Air Quality Survey was initiated in 1993 and was completed in 1995. The air toxics monitoring program is summarized in Appendix D.

The objective of the Air Quality Survey, therefore, was to provide a preliminary survey particularly for VOCs (from which Benzene is derived), and to assess sampling techniques that could possibly be used in more extensive air quality surveys. The study was intended as a survey and was not intended to provide a comprehensive identification of all potential emission sources. The methodology and analysis of results as presented in the Air Quality Survey were determined independently of the EIS analysis. However, the methodology and results of that study appear to be reasonable, and are therefore included in the EIS to present a historical background on previous air quality studies and monitoring results.

Air monitoring was conducted at thirteen locations. Most of the monitoring locations were on-airport and not publicly accessible. Only two sites were monitored off-airport, with one site located along International Boulevard in the general location of South 184th Street, and another site located at a residence in Normandy Park, two miles west of the Airport. In addition to monitoring for Carbon Monoxide, the program included sampling for fifty-five air toxics.

The results indicated that Benzene was detected in every sample collected, and that other air toxics such as Freon, Toluene, Ethylbenzene, Xylene, and 1,2,4-Trimethylbenzene were found in nearly all samples as well. Benzene has been the primary toxic compound of concern as identified in the 1991 Ecology screening study. The highest average Benzene concentration collected was at a site along International Boulevard. The lowest average concentration occurred at the former Maywood School site (now the Noise Remedy Office), downwind from the Airport. The Normandy Park location had the lowest concentration of Benzene recorded, and generally had the lowest average concentrations for most of the air toxics sampled, and was the lowest for Carbon Monoxide, Benzene, Toluene, Ethyl Benzene, Xylene, and Trimethylbenzene. However, the Normandy site was also the highest for Tricloroethane and Methyl Chloride.

Accordingly, the study noted little difference in VOC concentrations based on locations upwind or downwind from the Airport. The study indicated that several key VOCs were consistent with automobile

exhaust and did not resemble the VOC profiles associated with aircraft emissions. The monitored levels for Benzene were well below the modeled values identified in the 1991 Ecology study.

Formaldehyde, Acetaldehyde, and Acrolein were also monitored, but were limited to sampling at three locations, all on-airport at the terminal gates or at the ends of the runways. No off-airport locations were sampled for these compounds. Concentrations of Formaldehyde and Acetaldehyde were found in every sample taken at each location. Formaldehyde and Acetaldehyde concentrations were highest with winds from the south. Acrolein concentrations were higher with winds from the west. Concentrations downwind were typically higher than at the upwind location, suggesting that sources for these compounds were potentially within the Airport. The study states that all Formaldehyde and Acetaldehyde concentrations were within the range reported for other similarly sized urban areas.

In addition to air toxics, the Air Quality Survey also monitored for Carbon Monoxide. The lowest average CO concentrations were at the Normandy Park site. The highest concentration was identified on-airport at Runway End 16L. All CO samples, including along International Boulevard, were below the 8-hour ambient air quality standard (5 ppm or less in comparison to the 9 ppm standard), and were far less than the maximum predictions from the Ecology screening study. Additionally, the measured CO levels did not follow any distinctive pattern that would indicate that aircraft operations were a significant source.

The monitored concentrations were compared to the WSDOE's Acceptable Source Impacts Levels (ASILs). The ASILs are not regulatory standards, and concentrations above the ASILs are allowable and typically found in urban areas. The ASILs are used to assess the risks associated with a new industrial stationary source, and were not intended to assess the health risks from a multi-source urban environment such as around an airport. As noted by Puget Sound Air Pollution Control Agency's comments, the ASILs are "overprotective" because they are designed to be used as a screening mechanism when reviewing industrial equipment. Nonetheless, predicted concentrations above the ASILs may trigger more refined health risk analyses or control technology reviews. Suspected carcinogens have risk-based annual ASILs and other toxic air pollutants have threshold-based 24-hour average criteria. The Air Quality Study found that concentrations for several air toxics were above the annual ASILs, including Benzene, Carbon Tetrachloride, and Formaldehyde. Only one air toxic (Acrolein) exceeded the 24-hour ASIL.

The Study concluded the following:

- Concentrations for several air toxics at all monitored locations were above the annual ASILs for Benzene, Carbon Tetrachloride, and Formaldehyde, and the 24-hour ASIL for Acrolein.
- Concentrations observed at Sea-Tac were within a range exhibited in other similarly sized urban areas (such as Boston, St. Louis and Houston), and that the pollutant profiles for most of the air toxics were indicative of automobile exhaust and not due to aircraft exhaust.
- Monitored concentrations for Benzene and Carbon Monoxide were considerably below the values predicted by the 1991 Ecology study modeling estimates. The highest concentrations of Benzene were found along International Boulevard.
- No significant differences in upwind versus downwind concentrations were observed for most VOCs; however, Formaldehyde concentrations downwind were typically higher than at the upwind location, suggesting that sources for this compound were potentially within the Airport. However, no off-airport locations were monitored for this compound.

The study suggests that air toxic concentrations would be high throughout the Region due particularly to the influence of automobile exhaust. The study also suggests that additional study may be warranted to further evaluate possible sources of Formaldehyde, Acetaldehyde, and Acrolein.

Mr. Burke commented that meaningful comparisons for the air toxics monitoring survey are not possible because the study presents peak measurements as compared with annual standards. As indicated, the air toxics Air Quality Survey monitoring program was a preliminary, short-term survey of air toxics over a four day period. The objective of the Air Quality Survey was to provide a preliminary survey of air toxics that could possibly be used to assess sampling techniques in a more extensive air quality survey. The study compares the results of a four-day sampling program to the annual-average Acceptable Source Impact Levels (ASILs). Accordingly, it is difficult to assign meaningful significance to short-term measurements as compared to longer-term guidelines. In other words, as the monitored data was for a limited, short-term period, it is not certain if the actual levels on an annual basis would be exceeded.

To provide additional understanding of the air toxics values measured, the study also compares the results to air toxics levels in other similarly sized urban areas and concludes that the level of air toxics identified appear to be typical of levels identified in other urban areas. The U.S. Environmental Protection Agency commented that it is difficult to conclude that the results of a short-term sampling program can be used to define ambient levels as "typical", noting that "the Port should be cautious in concluding that the .... monitoring effort is of sufficient "robustness" to draw conclusions about "typical" conditions". Nonetheless, the study results confirmed that air toxics are present throughout the Region, and that high concentrations of air toxics would continue with or without the proposed airport improvements due primarily to the contributions to air toxic levels by automobiles.

Comment R-10-33: *Five groups asked how the results of the various air monitoring programs conducted at the airport and presented in the Draft EIS compare to the results of the air pollutant modeling programs. The following individual made this comment: Mr. Kircher (Puget Sound Air Pollution Control Agency), Ms. Christy, Regional Commission on Airport Affairs, Seattle Community Council Federation, Southwest King County Community Group, and U.S. Environmental Protection Agency.*

Response: Perhaps the best comparison of air monitoring and the air modeling results is for Carbon Monoxide along the terminal curbfront in the location of the proposed Hotel. The air monitoring program was conducted November, 1994 through January, 1995; the results are presented in Appendix D. For purposes of comparing pollutant concentrations with the Hotel monitoring program, the EIS air modeling dispersion analysis included a modeled receptor location at the proposed Hotel location.

The results of the monitoring program indicated concentrations of CO well below the 1-hour and 8-hour standards. The EDMS air modeling results as presented in the Draft and Final EIS also showed levels below the standards. However, both the 1-hour and 8-hour modeled concentrations were at least a third higher than observed by the actual field monitoring data. For example, the highest monitored level was 6.0 ppm for the 1-hour concentration, and 4.5 ppm for the 8-hour concentrations. In comparison, including the addition of background concentrations, the 1-hour modeled concentration was 13 ppm and the 8-hour concentrations was about 7 ppm. Therefore, based on the actual air monitoring conducted, the air modeling analysis included in the Draft and Final EIS overestimated the pollutant levels at this location.

Several other short-term air monitoring programs that have been conducted at the Airport to ensure compliance with the Washington Industrial Safety and Health Act (WISHA). As indicated in Appendix D, the concentrations of Carbon Monoxide and Nitrogen Dioxide monitored have been well below the WISHA standards for employee exposure. The results of the WISHA monitoring are generally not directly applicable to the community and the ambient air quality standards, and are therefore not easily comparable to the modeling results presented in the EIS. Nonetheless, the results of these earlier monitoring programs are presented for information purposes, and generally confirm that pollutant levels, primarily within the terminal area curbfront, are within acceptable employee exposure limits.

Comment R-10-32 discusses the results of an air toxics monitoring program conducted at Sea-Tac Airport between 1993 and 1995 for the Port of Seattle. The air toxics monitoring program is referred to

as the Air Quality Survey, a summary of which is included in Appendix D. Air monitoring was conducted at thirteen locations over a four day period. Most of the monitoring locations were on-airport and not publicly accessible. Only two sites were monitored off-airport, with one site located along International Boulevard in the general location of South 184th Street, and another site located at a residence in Normandy Park two miles west of the airport. In addition to monitoring Carbon Monoxide concentrations, the program included sampling for fifty-five air toxics.

The results of the Air Quality Survey indicated that concentrations for several air toxics at all monitored locations were high, and were above the annual Acceptable Source Impact Levels (ASILs) for Benzene, Carbon Tetrachloride, and Formaldehyde, and the 24-hour ASIL for Acrolein. As the measured data was for a limited averaging period, it is not certain if the actual annual levels would be exceeded. However, a comparison of the measured averages was made of the annual ASILs.

Accordingly, the estimated annual concentrations estimated in the Draft and Final EIS are not easily comparable with the short-term measured averages observed in the Air Quality Study. The EIS analysis estimated concentrations of three air toxics: Benzene, 1,3-Butadiene, and Formaldehyde. The Air Quality Survey considered concentrations of Benzene and Formaldehyde, but not 1,3-Butadiene. Further, monitoring of Formaldehyde was limited to on-airport locations. Therefore, the comparison of air toxic concentrations between the two studies is limited. Nonetheless, both the EIS analysis and Air Quality Survey indicates possible exceedances of the ASILs. Both studies indicated that automobile exhaust emissions appeared to be the primary source of air toxics within the Region.

In addition to air toxics, the Air Quality Survey also monitored for Carbon Monoxide. The results indicate that the monitored concentrations are about one-half the modeled concentrations at its greatest difference. The Air Quality Survey included monitoring along International Boulevard in the general location of South 184th Street. All CO samples, including along International Boulevard, were below the 8-hour ambient air quality standard (5 ppm or less in comparison to the 9 ppm standard). The EIS included an analysis of roadway intersections along International Boulevard, at South 170th Street and also at South 188th Street. The Air Quality Survey recorded an 8-hour CO concentration of 4.5 ppm. This concentration is less than one-half the modeled concentration at its greatest difference. Additionally, the Air Quality Survey confirmed the low CO concentrations for locations immediately to the north and south of the Airport, with the modeled concentrations identified by the EIS dispersion analysis slightly higher (0.5 ppm greater) than the measured levels.

Comment R-10-34: *Mr. Kircher (Puget Sound Air Pollution Control Agency), Southwest King County Community Group, and the U.S. Environmental Protection Agency requested a clarification of the air toxics methodology used in the air quality analysis.*

Response: Chapter IV, Section 7 "Human Health" and Appendix D, describe the air toxics inventory modeling methodology. The response to comment R-10-35 further discusses the meaning of the risk assessment analysis results.

The air toxics modeling methodology is a screening analysis used to determine the pollutant concentrations for air toxics in the surrounding airport area. The air toxics evaluation provides two ways in which to compare changes in air toxics emissions with and without the proposed airport improvements:

- An air toxic emissions inventory in tons per year, identifying concentrations of VOCs, Benzene, 1,3-Butadiene, and Formaldehyde; and
- A comparison to the Department of Ecology's Acceptable Source Impact Levels (ASILs)

The air toxics concentrations are based on the relationships between hydrocarbons and various air toxics identified by a more detailed air toxics study conducted at Chicago Midway Airport for the U.S. Environmental Protection Agency. The Chicago Midway Study was used as it is the only known study

of possible cancer effects of an airport, and is the most current evaluation of air toxics in an Airport area. The assumptions, methodology, and conclusions for that study appear to be reasonable and acceptable for use in the determination of air toxics for other airports. However, the area around Chicago Midway is highly urbanized and congested with concentrated residential areas mixed with light industrial and commercial uses. Although the Sea-Tac area is urbanized, it is far less developed than the Midway area. Accordingly, use of the pollutant relationships established by that study would be expected to be higher than for the Sea-Tac area, and therefore, could result in an overestimation of pollutant concentrations.

To establish the hydrocarbon emissions and concentrations identified through dispersion analysis, the results of the emissions inventory and dispersion modeling presented in Chapter IV, Section 9 "Air Quality " was used. This analysis is based on use of the EDMS model, and the modeling methodology, input assumptions and sources considered are identified in Appendix D. The output of the EDMS model are an emissions inventory, as summarized in Table IV.7-2, and a dispersion analysis by modeled receptor location. Hydrocarbon emissions are an output of the EDMS model. Based on the pollutant relationships identified in the Midway study, the VOC emissions were converted to levels for Benzene, 1,3-Butadiene, and Formaldehyde. The conversion factors used in the analysis are presented on page D-64. The level of VOC emissions output from EDMS are multiplied by a factor to convert to Total Organic Gases, and then by separate factors for converting to Benzene, 1,3-Butadiene, and Formaldehyde.

The receptor locations considered in the analysis for Sea-Tac Airport are shown in Exhibit IV.9-1 of the Final EIS. These receptor locations were initially selected for further, more detailed analysis based on the screening dispersion analysis. The response to comment R-10-10 discusses the receptor location methodology. Based on the refined dispersion analysis, the VOC concentrations at each receptor was identified and converted to the three air toxics as described above.

Tables IV.7-3 and IV.7-4 compares the air toxic concentrations by receptor location to the Acceptable Source Impact Levels (ASILs). The concentrations presented in this table do not consider population. The response to Comment R-10-35 describes how to interpret comparisons to the ASILs.

Comment R-10-35: *Two commentors stated that the EIS air toxics analysis contains insufficient information to adequately evaluate the risk assessment analysis for air toxics. The following individual made this comment: Ms. Brown, Mr. Burke, and Airport Communities Coalition.*

Response: Comments noted. The commentor is correct as insufficient information exists to indicate a direct correlation between airport activity and cancer cases. As a result, the additional quantities of potential carcinogenic pollutants that a proposed project might create are usually contrasted with the ASILs. The ASILs are established for known or probable carcinogens. The ASILs apply specifically to each air toxic, not for a combination of all toxics.

Comment R-10-36: *Ms. Brown asked what mitigation efforts will be implemented if the annual levels of air toxics in the area are exceeded.*

Response: As indicated in the previous response, the Washington State Department of Ecology has established Acceptable Source Impact Levels (ASILs) for known or probable carcinogens. The ASILs are not regulatory standards, and concentrations above the ASILs are allowable and are found in urban areas. The ASILs are designed to be used as a screening mechanism, particularly for reviewing industrial stationary sources, and were not intended to assess the health risks from a multi-source urban environment such as around an airport. The ASILs are considered "overprotective". Nonetheless, predicted concentrations above the ASILs may trigger more refined health risk analyses or control technology reviews.

Chapter IV, Section 7 "Human Health", presents the air toxics evaluation including a comparison to the ASILs. The evaluation is based on the incremental change in concentrations between the Do-Nothing and "With Project" alternatives. Therefore, the proposed airport improvements would not be expected to result in an increase in the incidence of cancer cases and no mitigation would be required.

Comment R-10-37: *The Southwest King County Community Group stated that the study on which the air toxics analysis is based indicated that the major contributor to cancer risk was aircraft, which contradicts the analysis prepared for the Master Plan Update EIS.*

Response: The EIS air toxics analysis is based on the hydrocarbon and air toxic pollutant relationships defined by the U.S. Environmental Protection Agency study for Chicago Midway Airport. As stated in the executive summary (page xvii) of that study, "Cars, trucks, buses and trains are the major contributors of carcinogens accounting for about 25% of the total estimated cancer cases.....aircraft engine emissions from Midway Airport and non-road mobile sources (such as lawn mowers and snowblowers....contributes approximately 11% of the total cancer cases." Both studies (the Midway study and the Draft and Final EIS), therefore, conclude that the major contributor to cancer risk are motor vehicles.

The commentor further states that the Midway study compares air toxic emissions for aircraft and motor vehicles for which aircraft are shown to be the major source of air toxics. This would be expected since the Midway study focuses on only airport sources, and includes data on motor vehicles for only three on-airport parking lots and a short segment of the terminal area roadway. The surrounding off-airport roadways and parking lots were not considered. Accordingly, as very little information is included in the Midway study for motor vehicles in comparison to the Draft and Final EIS analysis, a large disparity in emission levels would be expected.

Comment R-10-38: *Mr. Kircher (Puget Sound Air Pollution Control Agency) requested an identification of toxic air contaminants for which information is reasonably available, showing contributions by various source types and pollutants to risk in that geographic area, and incorporating graphics to present the results.*

Response: As indicated in response to comment R-10-34, the air toxics assessment is based on the relationships between hydrocarbons and various air toxics identified for an air toxics study conducted for Chicago Midway Airport. That study evaluated the presence of three air toxics derived from levels of hydrocarbons including Benzene, 1,3-Butadiene, and Formaldehyde. The Chicago Midway study was used as it is the only known study of possible cancer effects of an airport. Because the EIS analysis is based on the relationships between pollutants identified in that study, the EIS analysis is limited to the evaluation of Benzene, 1,3-Butadiene, and Formaldehyde. Therefore, conversion factors for other air toxics are not available from that study.

Chapter IV, Section 7 "Human Health" presents the emissions inventory for the toxics considered. In comparison to contributions by motor vehicles, aircraft are a minor source of toxic emissions within the Airport environment, with motor vehicles contributing over 70 percent of the toxic emissions and aircraft about 20 percent. The analysis presented in the Final EIS was prepared to clarify the contributing sources and make greater use of graphics to present the results.

Comment R-10-39: *Ms. Richter stated that airport communities are suffering from high cancer rates and high incidences of respiratory illness caused by jet fuel in the atmosphere. Additionally, several individuals questioned if increased aircraft emissions will result in increased deaths due to cancer. The following individuals made this comment: Mr. Burke, Ms. R. Clark, Mr. Osaki, Mr. Scarvie, Ms. Thomson, and Ms. Wordian.*

Response: Chapter IV, Section 7 "Human Health", presents an air toxics emissions and concentrations of the various air toxics compared to the Washington State Department of Ecology Acceptable Source

Impact Levels (ASIL). Therefore, the proposed improvements would not be expected to result in an increase in the incidence of cancer cases. The response to comment R-10-34 and R-10-35 further discusses this topic. Additionally, the response to Comment R-10-3 discusses the various differences and components of aviation fuels.

Comment R-10-40: *Ms. Wordian requested that the EIS discuss Benzene concentrations at the Seattle Christian School.*

Response: As indicated in response to comments R-10-2, the 1991 Ecology study identified possible concerns over high concentrations of air toxics, especially Benzene. In particular, the Ecology study identified possible high Benzene levels in the location of the Seattle Christian School, and suggested that such concentrations may be due to aircraft activity. The Seattle Christian School is located approximately one-quarter mile directly south of the Airport.

The Draft and Final EIS air quality analysis did not evaluate estimated concentrations for air toxics at this location because it is now owned by the Port of Seattle and would soon be incorporated into the future airport property. With environmental approval to develop the South Aviation Support Area, the Port of Seattle acquired the Seattle Christian School in February, 1995. By mid-1997, the school will be relocated to a new facility currently under construction located northwest of the intersection of South 184th and Military Road. Therefore, this property and all adjoining properties would be included within the future airport boundary. One of the criteria used in selecting receptor locations was to exclude all existing and future airport property that is or would be inaccessible to the general public.

As noted in response to comment R-10-32, however, the monitored concentrations for Benzene were considerably below the values predicted by the 1991 Ecology study modeling estimates. The highest concentrations of Benzene were found along International Boulevard and are related to cars on that road.

Comment R-10-41: *The Regional Commission on Airport Affairs suggested that aircraft emit many different chemicals, some of them highly toxic; they commented that the Draft EIS fails to discuss these chemicals and the standards for them.*

Response: In addition to evaluating the relationship of the proposed airport improvements to the criteria pollutants defined by the Ambient Air Quality standards (listed in Table IV.9-1), an evaluation of air toxics was also prepared and is described in Chapter IV, Section 7 "Human Health". The air toxics evaluation is also presented in Appendix D, beginning on page D-63. Additionally, Appendix D summarizes the results of several previous air monitoring programs at the Airport, including an air toxics Air Quality Survey completed in January, 1995.

The U.S. Environmental Protection Agency has not established regulatory standards for air toxics. However, the Washington State Department of Ecology has adopted Acceptable Source Impact Levels (ASILs) which are typically used to assess the risks associated with a new industrial stationary source, and were not intended to assess the health risks from a multi-source urban environment such as around an airport. See response to comment R-10-34 and R-10-35.

Comment R-10-42: *The Southwest King County Community Group questioned why future growth in aircraft activity would increase air toxics by five percent while automobile-related air toxics are expected to decrease by five percent.*

Response: Chapter IV, Section 7 of the Draft and Final EIS acknowledges that aircraft activity is expected to increase in the future at Sea-Tac with or without the addition of a third runway. Based on this increase, airport related air pollutant emissions would be expected to increase. At the same time, motor vehicle traffic would grow. However, based on U.S. Environmental Protection Agency emissions data, it is anticipated that improvements in future motor vehicle emission would offset the continued growth in traffic.

Comment R-10-43: *Three commentors requested an explanation of how the sites selected for the residue sampling were selected, the sampling methodology, and why no residue was attributed to aircraft sources. The following individuals made this comment: Mr. Burke, the Airport Communities Coalition, Mr. Scarvie, and Southwest King County Community Group.*

Response: As indicated in Appendix D, beginning on page D-60, the Port of Seattle conducted a residue sampling program at three residences in the surrounding airport environment and one on-airport source as part of the EIS process. The three residential sampling sites were based on locations at which the owners had previously expressed concern over residues or fuel odors. Two of the locations were provided to the Port of Seattle by Ms. Terry Anderson, a city council person for the City of SeaTac. A third site, located in Des Moines, was provided through State Representative Greg Fischer's office. One residence sampled was located just north of SR 518 and the Airport in the Riverton Heights area of SeaTac. This site was the closest to the Airport and aircraft flight paths. A second site was located in a trailer park immediately to the east of the Airport and terminal area. A third location was located approximately 3-4 miles south of the Airport in the City of Des Moines, just west of the existing runway centerlines.

The analysis of the residue samples collected was performed by AMTest Labs located in Redmond, Washington. AMTest Labs provided the sampling containers and procedures for collecting the samples. Wearing surgical gloves, the samples were collected using a two square inch piece of gauze thoroughly wetted with methanol. Covering approximately 100 centimeters, the gauze was rubbed in a circular motion on the surface to be tested to collect the residues. The gauze was then deposited in a lidded small glass jar. The jars were then labeled and placed in a cooler until they could be brought to the lab. The areas to be sampled were identified in consultation with each resident reporting the presence of residue.

The lab performed analyses for a microscopic examination, a test for polynuclear aromatics, and a heavy metals exam. The composition at each site consisted of a variety of substances, including fungus, insect particles, minerals and soils, other unidentified particles, and soot. Although all samples collected contained soot, the percentage of the overall samples was small. Additionally, based on particle size, the soot was identified by the lab as more typical of motor vehicles or wood burning activities. Or, the *majority* of the soot identified was larger than the particle size that would be expected from aircraft engines. Although the lab could not rule out contributions by aircraft sources to these samples, the analysis indicates that contributions by aircraft at these sites are minimal at best.

In reviewing the results of the residue sampling with the lab, other types of sampling such as canister sampling (actual air sampling similar to that conducted for the Air Quality Survey air toxics monitoring) was discussed. However, the lab indicated that no additional value could be expected from a more detailed air sampling program because of the low levels of polynuclear aromatics present in the residue samples analyzed. The lab indicated that levels of these types of compounds would have been expected in much higher concentrations if aircraft sources were suspected to warrant additional evaluation.

Comment R-10-44: *Mr. Peyton (Ravenna-Bryant Community Association) stated that the analysis is deficient as levels of Benzene were not presented, and that there is no breakout of the components for particulate matter such as for lead.*

Response: As presented in the Draft and Final EIS, Chapter IV, Section 7 "Human Health", an air toxics risk assessment was performed for Benzene, 1,3-Butadiene, and Formaldehyde. Additionally, the results of the 1993 Air Quality Survey sampling program for air toxics are included in Appendix D. That study evaluated levels of fifty-five air toxics, including Benzene. The air monitoring study indicated that concentrations for Benzene would exceed the annual WSDOE Acceptable Source Impact Levels (ASILs). However, both the Air Quality Survey and the EIS analysis indicated that automobile exhaust was the primary source for Benzene in the Airport area. Therefore, high levels of Benzene and other air toxics could be expected with or without the proposed airport improvements.

High levels of lead particulates due to aircraft fuels and exhaust is unlikely because the majority of the aircraft operating at the Airport use JetA aviation fuel. JetA fuel is a highly filtered form of kerosene and does not include lead. Low lead fuel (AVGas) is utilized primarily by the single and light twin engine piston aircraft, which accounts for about six percent of all aircraft operations at Sea-Tac. Emissions data for lead particulates from general aviation aircraft is currently not available. However, as there are few operations at Sea-Tac conducted by the smaller piston aviation aircraft, it would appear that lead particulate emissions would be minimal.

Comment R-10-45: *Mr. Peyton (Ravenna-Bryant Community Association) stated that by not considering emissions above 3,000 feet, the analysis disregards aircraft pollution over Seattle and on most approaches.*

Response: The Emissions and Dispersion Modeling System (EDMS) evaluates the design and operational characteristics of an airport by modeling aircraft emissions primarily during all operational modes including takeoff, climb-out, approach and taxi/idle/delay. Emissions are calculated for climb-out and approach up to 3,500 feet. Emissions from higher altitudes cannot produce significant ground concentrations because they are discharged at altitudes that preclude any discernible impact to ground level air quality conditions.

Comment R-10-46: *Mr. Webb, Ms. Brown, and Southwest King County Community Group questioned if construction vehicles were included in the total airport air quality dispersion analysis.*

Response: The impact of the proposed improvements on air quality are addressed in two sections of the EIS. Construction related impacts are presented in Chapter IV, Section 23 "Construction Impacts". Impacts associated with the improvements, after construction is implemented in presented in Chapter IV, Section 9 "Air Quality". Air pollution levels during the construction period for all motor vehicles including construction related vehicle trips were considered in the evaluation of construction related impacts. The evaluation of construction related impacts is discussed beginning on page IV.23-9, and in Appendix D (beginning on page D-68) of the Final EIS.

Comment R-10-47: *Mr. Peyton (Ravenna-Bryant Community Association) and Mr. Frause asked if the proximity of the third runway to Des Moines Memorial Way will cause particulate drift on motorists on the highway.*

Response: It is anticipated that the potential for fugitive dust from construction impacting Des Moines Memorial Way or other areas would be minimized through use of various control measures. A fugitive dust plan would be identified which would specify the mechanisms to be used to control fugitive dust, such as watering or use of chemical stabilizers. Chapter IV, Section 23 "Construction" discusses fugitive dust emissions beginning on page IV.23-10.

Comment R-10-48: *The City of SeaTac questioned how construction related air quality impacts can be called short-term when construction will take approximately 2.5 years.*

Response: Construction impacts are typically considered short-term and temporary in nature. Construction impacts cover a specific period of time, and, upon completion, do not continue. Because construction related activity includes short but intense periods of activity, the air quality analysis focuses on air pollutants for which there are 'short-term' ambient air quality standards (AAQS). Accordingly, the air quality analysis focuses on concentrations of Carbon Monoxide (CO) and particulate matter (PM10). The AAQS for CO include standards for 1-hour and 8-hour concentrations. For particulate matter, the AAQS include both a 24-hour and longer-term annual average. Concentrations of CO and PM10 are of primary concern with use of haul trucks.

Comment R-10-49: *Mr. L. Jones, Mr. Scarvie and Ms. Feckley expressed concern that the EIS does not consider the impact of moving 23 million cubic yards of fill and resulting possible fugitive dust emissions. Mr. Frause asked where the impact of drifting dust particles discussed in the EIS and what will be the impact of fugitive dust from a "million" truck loads of soil.*

Response: Chapter IV, Section 23 and Chapter V discuss construction related impacts and mitigation requirements. To minimize the fugitive dust transport, unpaved roads and inactive portions of the construction site would need to be either watered or chemically stabilized during dry periods. Development of construction plans would include identification of a fugitive dust plan. A Construction and Earthwork Management Plan would be developed during the design phase to support haul route permit requests and regulatory agency reviews, and may include additional route mitigation. However, all pollutant levels, along each of the haul routes are well below the Ambient Air Quality Standards and Washington State standards for these pollutants. Therefore, no additional mitigation is expected for these areas. See also response to comment R-16-19

Comment R-10-50: *Three commentors requested an explanation of the relationship between air conformity, issuance of the Governor's Certificates, and issuance of the FAA's Record of Decision. The following individuals and organization made this comment: Mr. Frause, Ms. Stuhring, Southwest King County Community Group.*

Response: Chapter IV, Section 9 "Air Quality" describes the Clean Air Act Conformity process. As indicated, conformity is defined as demonstrating that a proposed improvement conforms to the State Implementation Plan's purpose of "eliminating or reducing the severity or number of violations of the national ambient air quality standards and achieving expeditious attainment of such standards." Conformity applies to Federal actions occurring in areas designated non-attainment for any of the criteria pollutants included on Table IV.9-1. The Airport is located in the Ozone and Carbon Monoxide non-attainment areas.

Although the conformity determination is a Federal responsibility, State and local air agencies are provided notification and their comments requested. The Federal agency must provide a 30-day notice of the Federal action and draft conformity determination to the appropriate U.S. Environmental Protection Agency Region, and State and local air control agencies. The Federal agency must also make the draft determination available to the public to allow opportunity for review and comments. The draft conformity determination is included in this Final EIS. While a conformity notification and determination process can be incorporated in to the National Environmental Policy Act process, it can also be a stand alone process. A final conformity statement will be issued prior to or as part of the Record of Decision.

Certification from the Washington State's Governor's Office is required for a grant for a proposed new runway indicating that the proposed Master Plan Update improvements would comply with all applicable air quality standards. Certification is issued in the form of a Governor's Air Quality Certificate. It is planned that issuance of the Governor's Air Certification would occur prior to issuance of the FAA's Record of Decision.

Comment R-10-51: *Two groups asked how commitments to air quality mitigation will be provided, and who will be responsible for implementing the mitigation measures. The following individuals made this comment: Ms. Brown, Mr. Kircher (Puget Sound Air Pollution Control Agency), and the Southwest King County Chamber of Commerce.*

Response: The Clean Air Act Conformity determination of conformity requires a commitment to mitigation, if necessary. Any mitigation measures must be identified, and the process and schedule for implementation and enforcement explicitly described. If mitigation is required to demonstrate conformity, the sponsoring Federal agency must obtain written commitments to implement mitigation

measures. Any licenses, permits or approvals must be conditioned on implementation of the mitigation measures. Therefore, the conformity determination process requires that the sponsor provide written commitments to any required mitigation plans. It is anticipated that commitments to mitigation would be included in the FAA's Record of Decision (ROD). The FAA's ROD is intended to include the appropriate assurances (commitments to mitigation), conclusions, or findings concerning a proposed action. The Record of Decision is the FAA's commitment to implement the measures necessary to mitigate adverse incremental air pollutant impacts that may occur as a result of the proposed airport improvements.

Comment R-10-52: *The Southwest King County Community Group questioned if the air quality mitigation measures identified along International Boulevard would result in increased traffic, causing more adverse environmental impacts.*

Response: Chapter IV, Section 9 "Air Quality" identifies mitigation measures associated with anticipated air quality impacts along International Boulevard and intersections at South 170th Street, and South 188th Street. The proposed roadway improvements include added left-turn lanes, dedicated high capacity right turn lanes, and reduced employee traffic and parking within the terminal area. Although a high level of traffic is anticipated along International Boulevard with or without the proposed airport improvements, the terminal alternatives would result in changes in traffic along various roadways in the airport area. The mitigation measures focus on reducing vehicle idling due to the increase in traffic at these intersections with the terminal options. The proposed mitigation measures primarily address airport related traffic, and are unlikely to result in added other traffic to an already heavily traveled thoroughfare.

Comment R-10-53: *Four commentors questioned why improvements or mitigation measures to International Boulevard are not being pursued immediately. The following individuals made this comment: Mr. Matthews, Mr. Rohlfs(City of SeaTac), Southwest King County Community Group.*

Response: Chapter IV, Section 15 "Surface Transportation" identifies several roadway improvements that are expected to occur within the area with or without the proposed airport improvements. For example, a southbound HOV (high occupancy vehicle) lane and additional improvements along International Boulevard are currently underway. The Washington State Department of Transportation (WSDOT) is responsible for maintaining and implementing improvements along SR 99. According to the WSDOT and City of SeaTac, the improvements occurring along International Boulevard are intended to address roadway traffic through the year 2003 after which planned improvements such as South Access and the SR 509 Extension would help reduce future traffic congestion along International Boulevard.

As indicated in the EIS, improvements to International Boulevard as a result of the proposed airport improvements would be needed by 2010, as the mitigation would substantially decrease the amount of time vehicles idle at the intersections with development of the terminal improvements. Improvements in addition to the HOV lane necessary to address already high traffic volumes are not planned prior to 2010 at this time. However, the Port of Seattle is committed to reducing air pollutant levels by reducing emissions from various sources at the Airport. A number of on-going considerations have focused on reducing the number of vehicles accessing the airport by providing alternatives to single-occupancy vehicle access to and from the Airport. Other actions have addressed motor vehicle idling along the terminal curbfront. Airport staff rigorously monitor access by taxi's and limousines and buses and idling within the terminal area. The Draft and Final EIS lists several additional mitigation actions that could be undertaken to further reduce air pollutant concentrations at the Airport including 1) Financial disincentives for single occupancy driving to the Airport; 2) Convenience disincentives/incentives; 3) Develop improved airport access roads that attract users off the area roadways.

Comment R-10-54: *The Airport Communities Coalition commented that the analysis did not identify the impacts on air quality that would occur when the employee parking is relocated from South 170th street to north of SR-518.*

Response: Although the future employee parking lot to be located north of SR 518 was considered in the air quality analysis, the effect of additional employee traffic for this location with mitigation was not considered because the proposed mitigation measures were subject to further review. The changes in employee traffic and parking, and proposed mitigation along International Boulevard are evaluated in the Final EIS air quality analysis.

Comment R-10-55: *Six individuals or groups reported that none of the proposed mitigation measures suggested in the past have ever been incorporated or committed to. Comments were received from: Ms. Brown, Mr. Burke, Mr. Dinndorf (Puget Sound Regional Council), Mr. Peyton (Ravenna-Bryant Community Association), Regional Commission on Airport Affairs, and the City of SeaTac.*

Response: In the past, several studies have been completed related to the Airport, including the 1993 Final EIS for the South Aviation Support Area (SASA); the 1992 Final EIS Flight Plan study; and the 1991 Ecology study on air pollutant levels. The South Aviation Support Area Final EIS did not identify air quality mitigation measures, as no significant impacts were identified associated with that project. Similarly, the Flight Plan EIS examined mitigation, but, as the EIS was programmatic in nature, implementation of mitigation is dependent upon the analysis in the site specific EIS, such as the Master Plan Update EIS. The 1991 Ecology study included several recommendations for improving air quality. The Ecology study was not a project-related evaluation, and therefore, no specific mitigation was required. The Ecology recommendations and current status are as follows:

1. Minimize queuing and engine idling for all aircraft - Although the addition of a third runway is proposed to primarily address arrival delay, a slight reduction in aircraft departure delay would also result. Therefore, the proposed third runway partially satisfies the overall objective of this recommendation. Indirectly, the Airport's existing noise abatement procedures also work to reduce aircraft idling emissions. Currently, the existing noise abatement procedures require that aircraft be pushed back from the terminal gates using tugs versus using the engines to 'power-back' from the gates. Once aircraft have been sufficiently backed away from the gates into the terminal apron areas, the aircraft engines are started and the aircraft can then proceed to taxi to the end of the runway. The result is less engine idling and emissions, particularly within the terminal area.

2. Development and implement a plan to reduce the Nitrogen Oxide emissions from takeoffs - The 40 CFR Part 87 contains engine emission standards that apply to large commercial passenger jets. The FAA is responsible for implementing the standards, and it does so through engine certification data provided by the manufacturers. Under Section 231 of the Clean Air Act, as amended, the U.S. Environmental Protection Agency is empowered to set standards for emissions from aircraft. To date, engine emission standards are not proposed for modification. Accordingly, the Port of Seattle is unable to establish alternative engine emission standards beyond those established by the U.S. Environmental Protection Agency.

3. Support a strong inspection and maintenance (I/M) program to reduce motor vehicle emissions. An I/M program is in effect in the Puget Sound Region and is the responsibility of the Washington State Department of Ecology.

4. Promote public transportation to and from Sea-Tac - The Port of Seattle remains committed to public transportation alternatives, and continues to support the proposed Regional Transit Authority (RTA) which would provide direct public rail transportation access to the Airport. Additionally, the Port of Seattle has supported a trip reduction strategy which has several components: employee shuttle bus service to remote public and employee parking to reduce vehicle trips in the terminal area; support for

the regional light-rail transit system; and limiting passenger drop-off and pickup and vehicle idling at the terminal through vigorous enforcement and by successfully providing short-term parking alternatives (i.e., metered short-term public parking within the terminal area).

5. Consider switching the ground support vehicles from gasoline to an alternate, cleaner burning fuel such as natural gas or propane. The dispersion analysis did not identify any exceedances of the Ambient Air Quality Standards, and indicated that pollutant emissions from ground service vehicles would not result in high pollutant concentrations off-airport. The use of alternative fuels for ground service vehicles would primarily reduce carbon monoxide levels. The reduction in other pollutants (i.e., NO_x, hydrocarbons) is less certain. The primary benefit in reduced emissions from ground service vehicles would be centered on the terminal area. As the dispersion analysis did identify any exceedances of the Ambient Air Quality Standards in the terminal area, the costs associated with conversion of the ground service vehicle fleet outweigh the known benefits at this time. Nonetheless, as indicated in Chapter 5, Section 9, the Port of Seattle would continue to explore ways in which to encourage the airlines to voluntarily add alternative fueled ground service vehicles as they look to replace their equipment.

6. Consider indirect source legislation/rules to control the effects of airport - Neither the U.S. Environmental Protection Agency nor the state of Washington has indirect source regulation which would apply to the proposed airport improvements. In the 1990 amendments to the Federal Clean Air Act, the regulations pertaining to aircraft or indirect sources were not changed from the 1977 provisions.

7. Conduct a refined study to determine if Benzene emissions pose a significant health risk to the adjacent communities - The Port of Study initiated an air toxics monitoring study in 1993, the results of which are summarized in Appendix D. As indicated by that study, the predominant source of Benzene emissions in the Airport area appear to be related to automobile traffic.

Mitigation measures are identified in the Draft and Final EIS concerning roadway improvements along International Boulevard. Further, the Port of Seattle has identified several additional actions that could be undertaken to further reduce air pollutant concentrations. The response to comment R-10-51 identifies the commitment to mitigation necessary as part of the Clean Air Act Conformity determination process.

Comment R-10-56: *Mr. Burke noted that the exhibit on page IV.9-19K shows the location of air modeling receptors. He expressed concern that no receptors were directly under the flight path where they would get the highest pollutant concentrations.*

Response: The criteria used to select the receptor locations to be modeled included excluding receptor locations located within existing or future airport property, or within the right-of-way for major roadways such as SR 518. The areas located directly along the runway centerlines (i.e., under the flight paths) are all located within the existing or future airport boundary. All receptor locations not included within the existing or future airport property boundary or major roadway right-of-way were evaluated for the maximum pollutant concentrations for those areas. The response to comment R-10-10 addresses receptor selection methodology.

Comment R-10-57: *The U.S. Environmental Protection Agency asked if the effect of increased emissions associated with increased approaches and landings has been addressed in the analysis.*

Response: As indicated in response to comment R-10-15, a third parallel runway is proposed to reduce arrival delay incurred during poor weather conditions. The actual number of aircraft approaches and landings would not be expected to increase over the Do-Nothing condition, but the level of arrival delay incurred would decrease appreciably. A reduction in arrival delay has a concurrent reduction in departure delay for aircraft waiting on the ground to depart.

Airports which have three parallel runways typically operate with arrivals on the outer runways, with departures on the inner runway and the runway closest to the terminal complex. It is expected that existing Runway 16L/34R and the proposed new runway would be used for arrivals. Departures would occur on the existing runways (16R/34L and 16L/34R). This change in operating configuration was considered in the air quality analysis.

Comment R-10-58: *The Southwest King County Community Group noted that the 1991 Ecology Study suggested studying the feasibility of switching the ground support vehicles at Sea-Tac from gasoline to an alternative, cleaner burning fuel such as natural gas, ethanol or methanol.*

Response: Ground service equipment (GSE's) are those vehicles owned and operated by the airlines and airport operators to service aircraft (i.e., refueling, baggage loading, food servicing, etc.). GSE's typically use either unleaded gasoline or diesel fuel, and the emissions from these vehicles is dependent upon the amount of time they are operated to service each aircraft.

Use of alternative fuels includes compressed natural gas (CNG), propane gas, methane gas (M-85), reformulated gasoline (RFG), and electricity. Certain vehicle emissions can be reduced by the use of alternative fuels, but the reductions in pollutant levels is highly dependent on the type of fuel and engine technology of each manufacturer. Propane has typically been the alternative fuel considered when considering the conversion of ground service vehicles to use of an alternative fuel. **Exhibit 1** illustrates the change in pollutant levels for carbon monoxide, nitrogen oxides, hydrocarbons, and formaldehyde for each alternative fuel in comparison to unleaded gasoline. For all alternative fuels, carbon monoxide levels are consistently reduced the greatest amount in comparison to other pollutants. However, depending on the fuel and engine manufactures, certain pollutant levels may actually increase with use of various alternative fuels. For NO_2, the pollutant levels are generally reduced, but for propane for example, NO_2 levels would be actually higher depending on the manufacturer. Propane would also result in increased emissions of hydrocarbons, and in some instances, increased emissions of formaldehyde, again depending upon the manufacturer. All of the alternative fuels would appear to result in decreased emissions of 1,3-Butadiene, benzene, and acetaldehyde.

As shown in Appendix D, Table D-3, ground support vehicles (GSE) do contribute to emissions of CO, VOC, and NO_2 at Sea-Tac. Excluding motor vehicles, GSE are the second largest contributor to these pollutants after aircraft for the on-airport sources. GSE emissions represent approximately 40 percent of the CO emissions, 8 percent of the NO_2, and 30 percent of the VOC as compared to aircraft sources. Nonetheless, the screening dispersion analysis indicated that pollutant emissions from ground service vehicles would not result in high pollutant concentrations off-airport. Generally, ground service vehicles are concentrated in the terminal area. Accordingly, pollutant concentrations within the terminal area are most affected by their use.

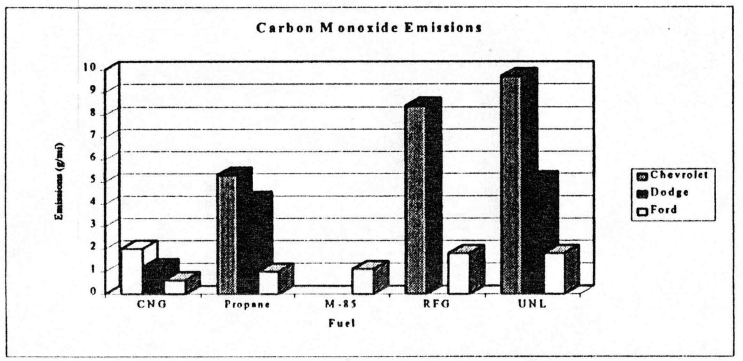
Switching to natural gas, propane or another alternative fuel would be expected to primarily reduce CO emissions at the Airport, particularly within the terminal area. As shown by the areawide dispersion analysis, no exceedances of the ambient air quality standards were identified within the terminal area.

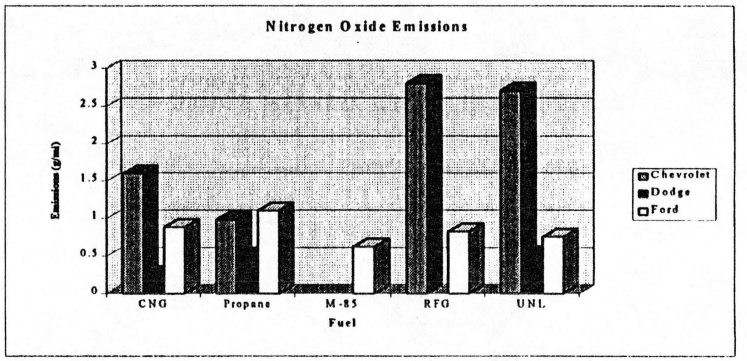
An electric ground service vehicles are classified as 'Zero Emissions Vehicle' (ZEV) due to zero tailpipe emissions. The 'zero emissions', however, is attached to a large price tag. The principal cost factors for an electric vehicle fleet include vehicle price, price of electrical consumption, battery life and replacement cost, and vehicle maintenance costs. Current electric vehicle technology prevents many airlines from considering electronic vehicles as an option. Additionally, although electric vehicles would reduce emissions on-airport, the potential for increased emissions in the Region might occur due to increased power plant emissions.

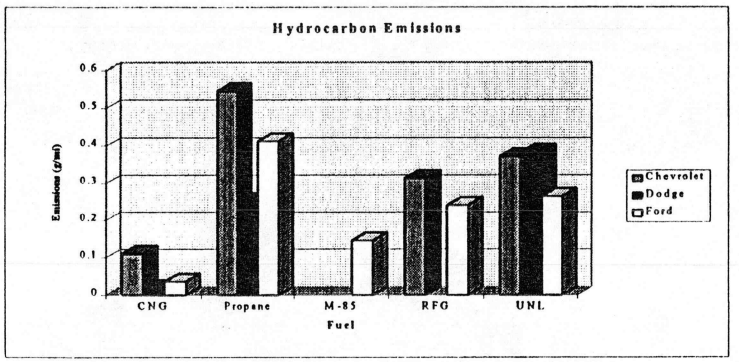
The type of ground service equipment used by each airline and the fuels used to operate such equipment is a function of number of factors including the intended use and capability of the equipment, availability

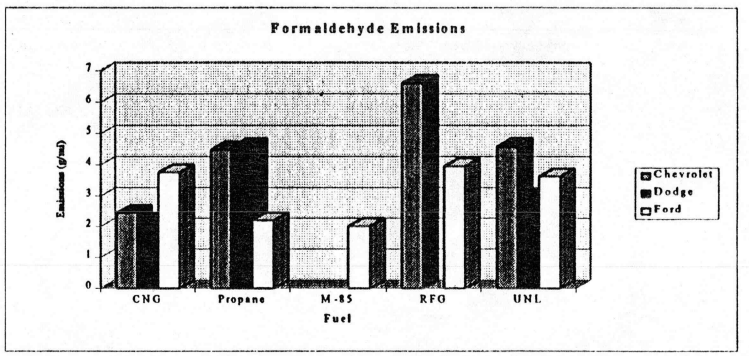
of equipment and fuel, and cost. As airlines replace their GSE equipment, their primary consideration is generally cost. In addition to the cost of retrofitting existing GSE or the cost of purchasing new equipment, added cost occurs from facility expenditures associated with the development of fueling stations and equipment. The increased costs of converting and operating with alternative fuels has prevented widespread usage of alternative use fuel vehicles. The economic considerations of GSE's using alternative fuels are generally based on vehicle operations costs, fuel costs, and maintenance costs. For example, the development of refueling stations is generally too large a cost for an airline to sustain in order to support a large fleet of GSE's used across expansive airport grounds.

EXHIBIT R-4
(Page 1 of 2)
Exhaust Emissions by Fuel Type





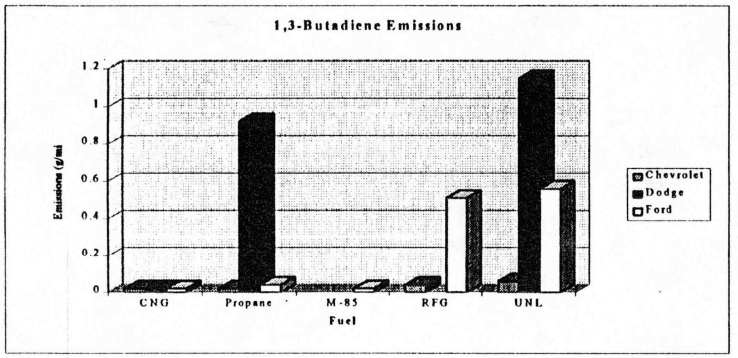


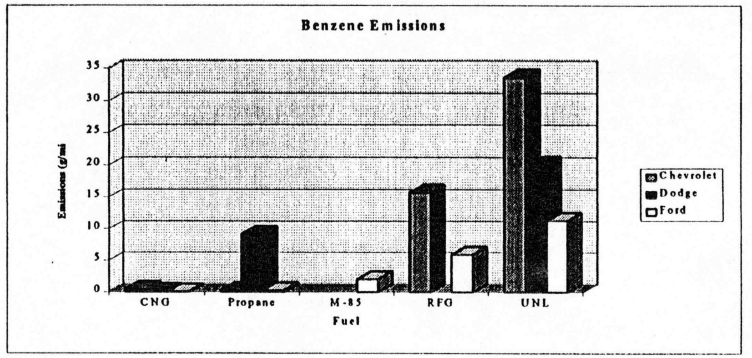


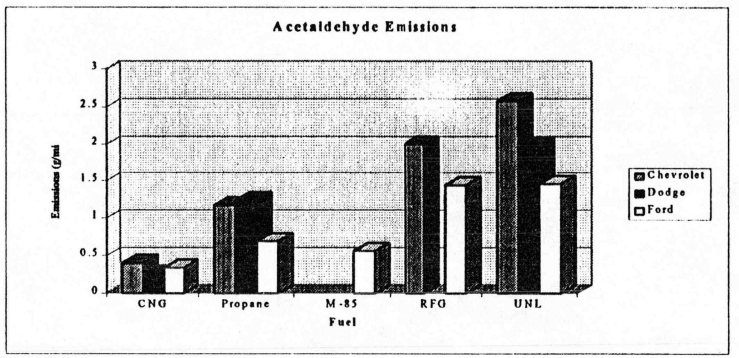
Note: CNG = Compressed Natural Gas; Propane = Propane gas; M-85 = Methanol; RFG = Reformulated Gasoline; UNL = Unleaded Gasoline

Source: Clean Fleet, South Coast Alternative Fuels Demonstration, Analysis Report No. 4: "Vehicle Exhaust Emissions-Early Mileage Results," July 1994.

EXHIBIT R-4
(Page 2 of 2)
Exhaust Emissions by Fuel Type







Note: CNG = Compressed Natural Gas; Propane = Propane gas; M-85 = Methanol; RFG = Reformulated Gasoline; UNL = Unleaded Gasoline

Source: Clean Fleet, South Coast Alternative Fuels Demonstration, Analysis Report No. 4: "Vehicle Exhaust Emissions-Early Mileage Results," July 1994.

As outlined in Chapter IV, Section 9 of the EIS, the Port of Seattle would continue to explore ways in which to reduce pollutant levels at the Airport including ways in which to reduce VOC emissions attributed to GSE equipment operated at the Airport.

Comment R-10-59: *The Southwest King County Community Group noted that it appears that the number of aircraft operations may represent only takeoffs and not include landings. The following individual made this comment: Southwest King County Community Group.*

Response: The air quality analysis considers both arrivals and departures. The Draft and Final EIS presents the analysis of total operations at 43.9 arrivals and 43.9 departures, for a total of about 88 operations during the peak hour. This level of total operations is similar to activity levels observed by the U.S. Environmental Protection Agency in June, 1995. The response to comment R-10-14 discusses use of peak hour operational levels.

Comment R-10-60: *The Southwest King County Community Group asked why the recommendations from Puget Sound Air Pollution Control Agency on background CO values was increased.*

Response: Appendix D of the Draft EIS describes the background concentrations used in the EIS air quality analysis. The background concentration used for the 8-hour CO is 3.5 ppm, and 5.0 for the 1-hour background concentration. Background values for the EIS analysis were identified in consultation with the Department of Ecology, U.S. Environmental Protection Agency, and Puget Sound Air Pollution Control Agency. The background concentrations are based on air monitoring results within the Region, and/or regionally accepted levels used in other studies.

Comment R-10-61: *The Southwest King County Community Group requested clarification of the differences in estimates of particulate matter between the 1991 Ecology study and the Draft EIS.*

Response: Response to comment R-10-2 discusses many of the differences between the 1991 Ecology study and the EIS analysis which resulted in substantial differences in estimations on pollutant levels. As noted, aircraft emissions data for particulates as included in the EDMS model has been revised since completion of the 1991 Ecology study. The Ecology study used one of the earliest versions of the model issued. The earlier versions of the EDMS model included more data on particulates which the FAA subsequently determined was inaccurate. The most current version of the EDMS model includes substantially less particulate data than the earlier versions. Currently, there is little data available on aircraft related particulate matter.

Comment R-10-62: *The Southwest King County Community Group suggested verifying the wording on page D-2, column 1, "quality" should be "quantity".*

Response: As noted, this has been corrected in the Final EIS.

Comment R-10-63: *The Southwest King County Community Group stated that the amount of pollution that is generated by aircraft engine maintenance run-ups during testing does not appear to have been factored into the inventory for SASA.*

Response: Aircraft engine maintenance checks are conducted at Sea-Tac and are included in the air quality analysis. Upon completion of engine repairs, it is routine to perform a high power engine run-up for safety purposes. These run-ups are typically conducted at 80 to 100 percent of full power for up to five minutes operating time. The frequency and duration of engine run-ups varies. Engine run-ups are conducted for all types of aircraft operating at the Airport. Information on the number, type of aircraft, average duration of run-up and location was obtained from the Port of Seattle, Run-Up Authorization Form data maintained by the Port of Seattle Noise Office. Most maintenance run-ups last less than 20

minutes at power levels ranging from idle to below 80 percent of full power. Full power run-ups usually last five minutes or less.

The air quality analysis includes the assessment of a ground run-up for a B-747 aircraft for five minutes at full takeoff power for one engine and fifteen minutes idle power. The B-747 aircraft was modeled as it produced the highest total pollutant emissions of all aircraft types conducting run-ups, and which is expected to continue to operate at the Airport through the 2020 study planning horizon. A total of nine run-ups by a B-747 per day were considered in the analysis. A review of the Port of Seattle's run-up information for the past two years indicated that the maximum number of run-ups occurring on any one day was seven in April 1, 1994. Six of the run-ups were by a B-747 and one by an MD-80. A review of the run-up data indicated that the conduct of such a large number of run-ups by a B-747 was highly unusual. For example, the next busiest day for run-ups (six on October 1, 1993), run-ups were conducted by two B-727's, three DC-8's, and one MD-80.

Accordingly, the EIS analysis represents a reasonable worst case evaluation of aircraft ground run-ups. Additionally, the EDMS model was adjusted to more accurately reflect the effect of full power takeoff thrust typically used during an aircraft ground run-up in addition to idle thrust (without adjustment, the EDMS model only considers idle thrust). Based on the Port of Seattle's run-up data, the primary run-up location today is currently at the south end of the airfield with the nose of the aircraft pointing south.

Comment R-10-64: *The Southwest King County Community Group noted that the 1991 Ecology Study indicated that CO emissions from all other sources including automobiles were just 1/6th of the contribution due to aircraft; why does the EIS analysis indicate such a large contribution by automobiles.*

Response: The EIS analysis considers a wide variety of air pollutant sources within the immediate vicinity of the Airport as there are many airport related activities in addition to aircraft that generate pollutants. Airport related traffic, for example, occurs throughout the airport area. Additionally, changes in area roadways and traffic volumes can occur with airport development. Therefore, the analysis must consider the effect of such potential changes to area roadways and changes to traffic volumes in the Airport area.

Accordingly, the EIS analysis considers all of the terminal related parking, as well as all of the off-airport long-term parking along International Boulevard. Also included was the evaluation of over 20 major roadways and associated traffic volumes, including along Interstate 5, SR 518, and SR 509. These sources were in addition to aircraft operations and other on-airport sources. The evaluation of such a wide variety of sources was partially considered in response to a request by the regional air quality agencies at the outset of the study to consider all major sources located within a mile of the Airport. For the most part, such off-airport sources focus on the evaluation of motor vehicles and parking.

The 1991 Ecology Study was a screening level evaluation that did not consider as extensive an array of sources as did the EIS analysis. For automobiles, the Ecology study only considered traffic and parking within the immediate terminal area. Accordingly, the Ecology study showed minor contributions to CO emissions by automobiles in comparison to the EIS analysis.

The response to Comment R-10-2 discusses the number and variety of sources modeled between the two studies, while the response to Comment R-10-4 describes the study area considered.

Comment R-10-65: *The Southwest King County Community Group asked why the results of the screening dispersion analysis are so much greater than for the refined dispersion analysis.*

Response: The results of the screening dispersion analysis typically overestimate pollutant concentrations, often by a considerable margin. The basis for the screening analysis is to represent worst

case conditions, which are the combinations of operational activity and meteorological conditions encountered during the year which result in the highest concentration of air pollutants. In addition, the analysis assumes that the peak hour for aircraft, roadways and other sources occurs at the same time. Since this is not the case, the evaluation represents a worst case situation that may present an overestimation of pollutant concentrations. The purpose is to identify locations were possible exceedances of the AAQS *might* occur. The modeling input assumptions are described in Appendix D.

The refined dispersion analysis is based on actual year-long weather data that includes winds from all directions and actual wind speeds and turbulence as recorded by the National Oceanic and Atmospheric Administration. In comparison to the screening analysis, the refined analysis no longer assumes that all types of activities occur at the same time. The refined analysis applies "temporal" factors that provide an indication of hourly, weekly, and monthly activity or utilization for each of the different pollutant sources. For those receptor locations which indicated possible exceedances of the Ambient Air Quality Standards during the screening dispersion analysis, a more detailed 'refined' dispersion analysis was conducted. Typically, the results of the refined analysis are less than identified initially by the screening analysis.

Comment R-10-66: *The Southwest King County Community Group noted that the Hotel location does not appear to be included in the initial screening dispersion of 200 locations.*

Response: For consistency with the evaluation of the terminal area hotel Final EIS, the hotel receptor location was added in addition to the 200 screening analysis receptors. The hotel evaluation included the conduct of air monitoring along the existing terminal curbfront. The availability of actual monitoring data enabled a comparison with the results of the modeling analysis. Therefore, the hotel location was added to the terminal area receptor locations evaluated by the grid analysis presented in Tables D-21 and D-22 in the Draft EIS. Based on the screening dispersion analysis, the concentrations for other receptor locations in the northern portion of the terminal area (where the hotel would be located) showed similar concentrations as for the specific hotel receptor location. As indicated in response to comment R-10-33, the EIS modeling for the hotel location overestimated the pollutant concentrations by approximately one-third based on the air monitoring conducted for that location.

Comment R-10-67: *The Southwest King County Community Group questioned why 350,000 aircraft yearly flying over an urban area would not contribute more air pollutants than automobiles.*

Response: As is shown in the Draft and Final EIS, aircraft do contribute to the production of air pollutants in the overall area. However, the 350,000 aircraft operations are spread out over an entire year, and are diminished in influence by the considerable volume of automobile traffic in the Region. For example, Interstate 5 handles on average over 200,000 daily vehicle trips on certain segments, while portions of SR 509 are used daily by 60,000 vehicle trips, and up to 80,000 trips along SR 518. Based on the busiest roadway segments for those major roadways located in the immediate airport area, approximately 600,000 surface vehicle trips occur on daily in the Airport area. On an annual basis, this would equal over 200 million annual vehicle trips by cars, buses, trucks, and motorcycles. This does not include the numerous smaller arterials and residential streets used within the area. Accordingly, a comparison of air pollutant levels attributed to either aircraft operations or to motor vehicle traffic is heavily influenced by the extensive non-airport related motor vehicle traffic in the airport area.

Appendix O presents the detailed surface transportation traffic levels in the Airport area, and presents the 1994 average annual daily traffic for various roadway segments evaluated.

Comment R-10-68: *The U.S. Environmental Protection Agency commented that the word "unusually" should be deleted from the discussion of stability class.*

Response: Appendix D was revised accordingly.

EARTH IMPACTS

Comment R-11-1: *Several people commented that the Draft EIS omitted information regarding erosion, landslide, and seismic hazard areas that have been identified by King County; that information regarding hazard areas was inconsistent throughout the Draft EIS, and that impacts of construction within these erosion and seismic hazard areas was not discussed in sufficient detail. These comments were made by Ms. Brown, Ms. Clark, Mr. Scarvie, and the Southwest King County Community Group.*

Response: Exhibit IV.19-2 shows all erosion, landslide, and seismic hazard areas within the study area that are identified on sensitive areas maps prepared by the King County Department of Parks, Planning, and Resources and the City of SeaTac. These hazard areas are described on pages IV.19-4 and IV.19-5 of the Draft and Final EIS.

Landslide hazard areas have been identified by King County west of the Airport, along the shore of Puget Sound. These landslide hazard areas are not shown on Exhibit IV.19-2 because they are located outside the study area. No construction would be done in these landslide areas under the proposed alternatives as defined in the EIS. Landslides identified during a stream survey along Miller Creek (Appendix F of the Draft and Final EIS) are discussed on page IV.19-4 of this Final EIS.

Erosion hazard areas within the study area north of S. 192nd Street have not been inventoried by King County or the City of SeaTac. Erosion impacts in this area are addressed on page IV.19-13 of the Final EIS. Erosion and sedimentation estimates have been completed since publication of the Draft EIS; and are discussed in Section 10 "Water Quality and Hydrology" and Section 23 "Construction" of this Final EIS. No excavation would be done within the erosion hazard area identified on Borrow Source Area 2.

Measures to stabilize subgrade material within the two seismic hazard areas located on the site of the proposed new runway are addressed on page IV.19-11 of the Draft EIS (page IV.19-12 of the Final EIS). The EIS correctly identifies seismic hazard areas at the north end of Borrow Source Area 1. The sentence on Draft EIS page IV.19-5 that states no seismic hazard areas occur in Area 1 has been corrected (see page IV.19-5 of the Final EIS). Additional information regarding seismic activity in the vicinity of the Airport and stability of the proposed Airport fill is included in the Final EIS.

Comment R-11-2: *Some commentors had questions regarding grading and excavation on the site of the proposed third runway, and design of the runway embankment. One commentor suggested the fill estimates were too high and could be reduced by leveling the site using only on-site material and using retaining walls along the west side of the embankment. Another commentor wanted to know how much wetland area would be excavated for construction of the proposed new runway. Others commented that the Draft EIS did not adequately address aesthetic impacts of the third runway on surrounding communities, and mitigation for those impacts, including landscaping an embankment design. These comments were made by Mr. Tinker, Mr. Peyton (Ravenna-Bryant Community Association), Mr. Rohlfs (City of SeaTac), and the Southwest King County Community Group.*

Response: Fill estimates shown in Table IV.19-1 include the volume of fill material that could be obtained during excavation and leveling of the runway site. On-site material would be used to the greatest extent possible. Not all on-site material would be suitable for use in embankment construction, however. Geotechnical investigations of the proposed runway site indicate approximately 3.1 million cubic yards of the material excavated on site likely would meet the required strength and compressibility criteria. Up to 17 million cubic yards of off-site fill, in addition to on-site material, could be needed to complete construction of the third runway.

Three slope options are being considered for the embankment west of the proposed third runway: an unreinforced earth embankment with slopes no steeper than 2 horizontal to 1 vertical; a reinforced earth embankment, which would allow construction of steeper slopes than the unreinforced embankment; and a reinforced earth wall. Although reinforced earth walls would require less total fill and less encroachment on adjacent lands than the other slope options, they require extensive quantities of high-quality fill material, which may preclude the use of available on-site material. Additionally, reinforced earth walls typically have a maximum height range of between 40 and 50 feet. The proposed new runway would require fill heights in excess of 100 feet. The proposed runway likely would be constructed using each of these three slope options along different segments of the embankment, depending on subsurface conditions, proximity of existing roads and buildings, and depth of fill.

Soils in wetlands areas generally are unsuitable for use as subgrade or fill material and likely would be removed from the proposed new runway site. Up to 7.5 acres of wetlands on the proposed runway site could be affected. Wetland impacts are addressed in Chapter IV, Section 11 of the Draft and Final EIS.

Aesthetic impacts of the proposed new runway have been included in Chapter IV, Section 24 "Aesthetics and Urban Design" of this Final EIS.

Comment R-11-3: *Two commentors questioned the meaning of the term "borrow source area" and wanted to know if fill material derived from these areas would eventually be returned. This comment was made by the Southwest King County Community Group, Mr. ~~Krause~~, and Mr. E. Wichert.*

Response: Fill material excavated from borrow source areas for use in construction of the Master Plan elements would not be replaced. In the geotechnical field, the term "borrow" means material excavated for use as fill in another area, and does not imply the material is returned.

Comment R-11-4: *Some commentors expressed the opinion that the Draft EIS did not adequately address construction impacts associated with borrow operations and increased truck traffic along the fill haul routes. In particular, commentors were concerned with impacts on Des Moines Creek Park, adjacent residences and businesses, and local communities. This comment was made by the Airport Communities Coalition, Mr. Rohlfs (City of SeaTac), the Southwest King County Community Group, and Mr. Gumm (Prince of Peace Lutheran Church).*

Response: Additional analysis of construction traffic impacts on local residences and businesses has been completed and is presented beginning on page IV.23-4 of this Final EIS. Air and noise impacts associated with borrow operations and transportation are presented beginning on pages IV.23-8. Social impacts associated with acquisition of residential and commercial property are addressed in Chapter IV, Section 6 "Social Impacts" in the EIS.

Comment R-11-5: *Mr. Hopkins noted that most fill material obtained from on-site borrow sources would not qualify as all-weather fill, and questioned whether or not the delays in embankment construction resulting from adverse weather conditions have been factored in to the construction schedule. The commentor also noted that all-weather material is more seismically stable than other fill material.*

Response: The comment is acknowledged. Imported select fill and on-site borrow material derived from some advance outwash units can generally be placed and compacted year-round, while avoiding periods of heavy or sustained rainfall. Most recessional outwash and other units of advance outwash can also be used during the winter months outside periods of rainfall, providing moisture content can be controlled. Some recessional outwash, weathered till, and till should be placed and compacted only during the drier months. A construction schedule representing worst-case weather conditions is included in Chapter IV, Section 23 "Construction Impacts" of this Final EIS. To reflect the effects of wea

construction, instead of 300 days construction per year, 270 days of construction were used in the Final EIS for transport of off-site material and 210 days of on-site material.

Comment R-11-6: *Ms. Brown and Mr. Frause expressed concern regarding the stability of the proposed runway embankments on portions of the site that have steep slopes or that have soils with low compressibility, such as wetlands. They also questioned the effect on embankment stability of wet weather and increased vibration associated with increased air cargo traffic.*

Response: Keying and benching would be used when placing new embankment fill along steep slopes. Benching is a construction technique that involves excavating a series of benches (wide terraces) on a hillslope to create level surfaces on which to place and compact the fill, and to prevent the fill from sliding down along the native soil/embankment fill interface. Keying involves excavating a trench along the toe of the embankment and backfilling it with compacted fill to provide a strong foundation for structural reinforcement.

The existing ground in the vicinity of the runway extension or the proposed new runway would not be affected by potential increases in vibration. Fills required in these areas would be placed to minimize post-placement settlement. Settlement of underlying native soils would occur as a result of the surcharge pressure or "weight" of the embankment fills. These settlements would be expected to be minor and would occur during placement of the embankments. Settlement would be minor especially where the underlying native soils consist of recessional outwash or glacial till. Significant post-placement settlement could occur in areas where the underlying native soils consist of soft silt or organic-rich material. These soft soils would be excavated and removed from the site, and replaced with suitable material to minimize post-placement settlement of the embankments. During construction, the embankment fill would be compacted to such a degree that post-placement settlement resulting from saturation of the fill material would be within acceptable limits.

Comment R-11-7: *Mr. Vaa asked whether the runway fill would extend to First Avenue South.*

Response: The runway fill would not extend to First Avenue S. The westernmost extent of the proposed runway fill is Tenth Avenue S. Please refer to Exhibit IV.19-1.

Comment R-11-8: *Commentor wanted to know the location of the proposed SR-509 corridor within Borrow Source Area 4, and asked if a map showing the future alignment of SR-509 was available. Comment was submitted by the Southwest King County Community Group.*

Response: The SR 509 corridor bisects Borrow Source Area 4 from the northwest to the southeast, dividing the area into two parcels; no material would be excavated from the highway corridor. Proposed alignments for SR 509 are addressed in the *SR-509/South Access Road Corridor Draft EIS and 4(f) Evaluation,* which was published in December 1995.

Comment R-11-9: *In commenting on the earth analysis in the Draft EIS, Mr. Rohlfs (City of SeaTac) noted that impacts and mitigation resulting from excavation of the on-site borrow sources are not addressed.*

Response: The Earth section of the Draft and Final EIS addresses impacts on earth resources, including topography, erosion and sedimentation, slope stability, and earth hazard areas. Other environmental impacts resulting from excavation of the borrow areas and associated mitigation are addressed under each element analyzed in the Draft and Final EIS. For example, surface and groundwater impacts and mitigation are addressed in the Chapter IV, Section 10 "Water Quality and Hydrology". Additional discussion regarding borrow source area impacts has been included on page IV.10-7 of the Water section, beginning on page IV.19-5 of the "Earth Impacts" section, and section 23 "Construction Impacts" of this Final EIS.

CONSTRUCTION IMPACTS

***Comment R-12-1**: Ms. Brown questioned if construction/construction related activities already started. Commentor questioned whether the July 1995 surveying of 192nd Street and Des Moines Way is related to third runway or other non approved Airport projects.*

Response: The specific activities described are related to a mitigation improvement imposed by the City of SeaTac on a private development and is not related to the third runway or other Airport related projects. Construction of the improvements recommended by the Master Plan Update has not been initiated.

***Comment R-12-2**: Mr. Rohlfs (City of SeaTac), the Southwest King County Community Group, and the Airport Communities Coalition questioned why construction impacts are called short-term when construction is occurring so long. Several commentors questioned the description of a multiyear activity as short-term and also raised issues regarding impacts related to air quality and health relating to the duration of construction activities.*

Response: Construction activities involving the hauling of embankment material and the construction of the third runway, the expansion of Runway Safety Areas, and the haul of fill material for South Aviation Support Area are anticipated to occur over a 3 year period between 1996 and the year 2000. In review of environmental issues, impacts are typically considered either as short-term or permanent. As construction activities are not permanent, they are considered as short-term.

***Comment R-12-3**: A comment was made by Ms. Wieting (United States Department of Commerce) requesting notice of any disturbance or removal of national geodetic survey monuments, and requesting funding be included to replace disturbed or removed monuments.*

Response: Comment acknowledged. The Washington Administrative Code, Section 332-120-030, requires that no survey monument be removed or destroyed before a permit is obtained. This section requires all government agencies to identify and replace all survey and geodetic monuments disturbed or removed by construction activities for which it is the sponsor. An application and approved permit is required by the Washington Department of Natural Resources.

During the design process, all monuments within the construction area would be located and specific provisions for replacing or relocating the monuments would be included in the construction specifications.

***Comment R-12-4**: The Southwest King County Community Group, questioning what a minor arterial was, and the use of 'satisfactory' as part of summary of access routes impact review.*

Response: A common set of terms is used by public agencies to classify roadways within their jurisdiction as to function and type of roadway for planning, design and operational purposes. Roadways are broadly classified as either arterials or local access roadways within King County. Arterial roadways are further defined as principal, minor or collector depending on access control and roadway function. Minor arterials tend to be continuous routes connecting community centers with partially controlled access to abutting properties.

The summary review represented in Table IV.23-2 of the EIS for off-site material sources and Table C-2 of Appendix J for on-site material sources was used to evaluate potential haul routes considering six criteria outlined in Sub-Appendix 2 of Appendix J. The term satisfactory was used if the review of potential haul routes found the conditions described for each of the criteria to be existing.

***Comment R-12-5**: The Airport Communities Coalition and Ms. Milne commented that the Draft EIS does not identify the need to obtain mining permits from the Department of Natural Resources and land use permits for material sites and that the Draft EIS gives inadequate consideration to impacts from mining operations.*

Response: Comment acknowledged. Contacts with the Department of Natural Resources indicate that use of the on-site sources may require either a mining permit or a mining reclamation plan depending on whether those sites are determined to be contiguous to airport property. Land use, administrative and/or grading permits from the cities of Des Moines or SeaTac could be necessary for the use of on-site sources. This EIS reviews use of on-site sources. See Final EIS page IV.23-2 for additional discussion of on-site material sources. The permit status of the off-site sources identified for potential use has been clarified and is listed in the Final EIS, Appendix J. Environmental review for use of off-site sources occurred as part of the permitting review.

***Comment R-12-6**: Several commentors requested an explanation of the 21.1 to 26.4 million cubic yard fill requirements identified in the Draft EIS and an indication of the availability of this volume of material within the Region. Several commentors raised this concern, including the Airport Community Coalition, Ms. Brown, Mr. Heavey, the Osterman family, Ms. Schreier, Mr. Schneider, the Southwest King County Community Group, and Mr. Webb.*

Response: Fill requirements for the third runway, the relocation of S. 154th Street, and improvements to the existing Runway Safety Areas (RSA) were considered in the Draft and Final EIS as occurring between 1996 and the year 2000. The fill requirements for these projects are estimated to be 21.11 million cubic yards after inflation for shrink and swell during transport. The extension of Runway 34R and the South Aviation Support Area would require an additional 5.29 million cubic yards after inflation, for a total fill requirement of 26.4 million cubic yards. The fill requirements for the South Aviation Support Area is also expected to occur by 2000, while the 34R extension is now planned to occur between 2015 and 2020. Fill requirements and schedules were re-examined in response to comments on the Draft EIS. See the Final EIS Section 23 "Construction Impacts" for additional discussion.

Eighteen potential material sites were identified and analyzed for feasibility and potential impacts in Appendix J of the EIS. Several material sites are currently operating and permitted in the Puget Sound area in addition to the 18 potential off-site sources identified in the Draft EIS that could supply some or all of this material. A combination of permitted sites may be used if these projects proceed to construction. A construction project of this size could allow new material sites to be economically developed and permitted by the time of construction. See the Final EIS page IV.23-4 for additional discussion on potential off-site material sources.

***Comment R-12-7**: Commentors questioned whether an EIS was or will be done on the off-site borrow source areas. Several commentors asked whether an EIS will be completed on the use of a specific off-site material. Comments of this nature were received by the Airport Community Coalition, Mr. Amero (City of Pacific), Mr. Booth (City of Auburn), Ms. Hansen, Mr. Heavey, Mr. Derrick (King County Department of Development and Environmental Services), Mr. Luther (City of Black Diamond), Mr. Rozdilsky, Mr. Peyton (Ravenna-Bryant Community Association), and Mr. Webb.*

Response: At this time the specific material site(s) and amounts of material from each site(s) that would be used are not known. Permitted material sites received environmental review as part of the regulatory process that granted permits and established conditions of operation. Several municipalities have recently or are in the process of adopting truck route ordinances that may impose additional conditions on operations from individual material sites. The successful construction bidder would be required to comply with local permits, operating conditions and restoration associated with the site(s) and haul routes included in his or her bid package. This is standard procedure for construction projects in the Puget Sound area.

Comment R-12-8: *The Southwest King County Community Group asked if contaminated soils in Borrow Source areas would be used as fill for the proposed new runway. Several commentors raised questions about the impacts on adjacent residential areas from use of on site material sources 1-4, impacts on the underlying aquifers from use of source 5, and the proximity of sources 1, 2 and 3 to Des Moines Creek Park. These comments were made by the Airport Communities Coalition, Mr. Grumm, and the Southwest King County Community Group.*

Response: As stated on page IV.19-6 of the EIS, a landfill is located in the north part of Borrow Source Area 5. The landfill is reported to contain 50,000 to 70,000 cubic yards of petroleum-hydrocarbon contaminated street sweeping material. The contaminated material was not included in the fill estimates for Area 5, and would not be used as construction fill. Please refer to the response to comment R-11-4 regarding impacts on residents adjacent to the on-site borrow sources and Des Moines Creek Park. Refer to the response to comment R-13-21A and R-13-21B regarding impacts on aquifers underlying the on-site borrow areas.

Comment R-12-9: *Mr. Rohlfs (City of SeaTac), Mr. Webb, the Southwest King County Community Group, and Ms. Montgelas (WSDOT) requested an explanation of possible on-site borrow locations and fill requirements for each project element. They also asked how borrow sites would be graded and reclaimed and the effect of use of the material from the on site sources on the proposed alignment of SR-509.*

Response: On-site material sources 1-8 are identified in Exhibit IV.23-1 of the Final EIS. Minimum and maximum available material quantities are identified in Chapter IV, Section 23 "Construction Impacts". Mitigation could be further established by specific conditions of permits including those that might be required by the Department of Natural Resources and the cities of Des Moines and SeaTac. The proposed alignment of SR-509 would affect borrow rates on site sources 1 and 4. If used, borrow sites 1 and 4 would be graded in such a way as to facilitate construction of SR-509.

Comment R-12-10: *Several commentors questioned the Draft EIS haul process assumptions of 300 days per year and 16 hours per day due to constraints caused by weather impacts on roadways and construction activities and also because of permit conditions including operation hours and weight restrictions established by local agencies on use of routes or material sources. They requested an explanation of the truck trip calculation Commentors raising these questions included the Airport Communities Coalition, Ms. Brown, Mr. Bartlemay, Mr. Heavey, Mr. and Mrs. McKinney, Mr. Peyton (Ravenna-Bryant Community Association), Mr. Scarvie, the Southwest King County Community Group, Mr. and Mrs. Voeller, and Mr. Webb.*

Response: See the Final EIS, Section 23 "Construction Impacts", for further discussion on the haul process. Several factors have been considered in establishing the haul assumptions. At this time the specific material sites or haul routes are not known. Expected material sites and roadways were analyzed to identify the feasibility and expected impacts from a haul process of this size and duration. The material haul process is expected to take more time than actual placement and compaction of material in the embankment. It may occur during portions of the construction process that haul material would be stockpiled, either in the embankment area or nearby. Wet weather conditions that affect construction activities would not affect the hauling of the Class A material to the stockpile area. Contacts with construction firms operating in the Puget Sound area indicate that hauling could be affected by weather conditions involving snow, ice or heavy rains. They suggest using 270 days as an estimate of days available for haul activities. Thus, the analysis contained in the Draft EIS was updated.

The material sites closest to the Airport have operating restrictions on hours, generally 10 tc day on-site activities and in some cases truck traffic. Material sites further away from t rural areas have lessor restrictions, enabling activity to occur for 16 to 24 hours. A contract

from several of the nearest sites during the restricted periods and from lessor restricted sites during other times. Sixteen hours a day, or two eight hour work shifts was selected as a reasonable assumption for use in the Final EIS.

Access to the Airport construction site could occur by several roadways and streets. Truck activity on local streets is expected to cause potential impacts to residents and at some locations increases in congestion is likely to cause restrictions on hours of truck activities. Construction truck activities in the area of the Airport could be restricted to use of the State Highway System, arterials designated as truck routes, Port roadways and properties to avoid creating these concerns. See the Final EIS, Section 23 "Construction Impacts" for details on expected access routes.

***Comment R-12-11**: Several commentors stated that the construction truck traffic will cause significant increases in congestion, particularly during the afternoon (PM) peak period and that specific impacts should be identified. Metro asked that the Final EIS address issues relating to construction caused congestion that might affect bus schedules. This comment was made by the Airport Community Coalition, Mr. Allen, Ms. Ayres, Ms. Brown, Mr. Bush (METRO), Mr. Dolvey, Mr. Lewis, Mr. Newby, Ms. Parker, Mr. Peyton (Ravenna-Bryant Community Association), Ms. Pompeo, the Southwest King County Community Group, Ms. Smith, Mr. Tate, Mr. Townsend, Mr. Vaa, Mr. and Mrs. Voeller, and Mr. Webb.*

Response: Comments acknowledged. See Final EIS, Section 23 "Construction Impacts" and Appendix J for analysis of peak hour congestion. Assumptions regarding haul volumes and duration were reexamined in response to comments on the Draft EIS and potential changes in the Master Plan Update improvements construction schedule were identified. Level of service analysis of airport area intersections and freeway ramps impacted by the anticipated hauling were performed and are included in Appendix J of the Draft and Final EIS. Expected haul routes were also re-examined for existing conditions and routes with conditions considered to be concerns were noted in Table IV.23-3 of the EIS. The Final EIS contains additional levels of service analysis regarding freeway operations near the Sea-Tac. See response to comment R-12-7.

***Comment R-12-12**: The Airport Communities Coalition commented that there is a difference between the total haul quantities listed in Appendix J, and the analysis presented in Chapter IV, Section 23 of the Draft EIS.*

Response: Comment acknowledged. At the time the Draft Surface Transportation Construction Report (presented in Appendix J) was completed, the third runway construction was scheduled to occur prior to the year 2000. The Runway Safety Area expansion and Runway 34R extension were scheduled for construction to occur after 2000. Chapter IV, Section 23 "Construction Impacts" of the Draft and Final EIS reflected changes in the Master Plan Update improvement schedule. See the Final EIS, Section 19 "Earth Impacts" and Section 23 for revised estimates of total fill required.

***Comment R-12-13**: Several commentors requested that haul routes expected to be used should be clearly identified. This comment was made by Mr. Townsend, Mr. Rohlfs (City of SeaTac), and Mr. Derrick (King County Department of Development and Environmental Services).*

Response: Comment acknowledged. Appendix J of the Final EIS identifies potential haul routes.

***Comment R-12-14**: Mr. Peyton (Ravenna-Bryant Community Association) questioned if road detours would reroute traffic onto residential streets?*

Response: Road detours may occur during the relocation of S. 154th/156th Street but others are not anticipated at this time. No detours to local residential streets are anticipated. Such detours could

require permits from Burien, Des Moines or SeaTac and would have to demonstrate need and minimal duration.

***Comment R-12-15**: Numerous commentors indicated that the Draft EIS must address specific impacts and mitigation (such as roadway destruction) associated with the use of haul routes and the requirement of local permits for use of municipal roads. These comments were made by the Airport Communities Coalition, Mr. Bartlemay, Mr. Booth (City of Auburn), Ms. Brown, Mr. Rohlfs (City of SeaTac), Mr. Frause, the Greater Federal Way Chamber of Commerce, Mr. Derrick (King County Department of Development & Environmental Services), Mr. Matthews, Ms. Milne, the Osterman family, Mr. Overholt, Mr. Peyton (Ravenna-Bryant Community Association), Mr. Tate, Mr. Vaa, Mr. and Mrs. Voeller, Ms. Montgelas (WSDOT), and Mr. Webb.*

Response: Depending on the outcome of the construction bidding process a number of permitted material sites may be used by the successful contractor to supply the required fill. The specific sites, volumes of material that may come from a site, and specific haul routes are not possible to determine at this time. It is standard procedure for construction projects in the northwest that a contractor is responsible for supplying the needed material, and for complying with all local permitting conditions. The contractor would include in the construction bid price to the Port, the expenses of fees, mitigation imposed by local agencies, and the cost of restoration. It is anticipated that the contractor may need haul route agreements from WSDOT, King County, and several municipalities.

***Comment R-12-16**: Two commentors stated that the Final EIS must consider not just the Airport construction haul traffic but the other construction activities that may be going on at the same time such as roadway improvements and the Regional Transit System. This comment was made by Ms. Pompeo and the Southwest King County Community Group.*

Response: Comment acknowledged. The Final EIS, Chapter IV, Section 23 "Construction Impacts" identifies regional projects that could affect area traffic flows.

***Comment R-12-17**: Several commentors raised concerns about erosion and sedimentation control measures, the amount of dust and control of debris from a truck haul, and the effects of truck exhaust on air quality. These comments were made by Mr. Bartlemay, and Mr. Dodge.*

Response: Chapter IV, Section 23 "Construction Impacts" and Section 10 "Water Quality and Hydrology" of the Final EIS reflect expanded discussion concerning potential erosion and sedimentation impacts from construction activities. Loss of dirt and debris from the truck haul activities could be mitigated by a requirement placed in the construction bid package requiring covered loads.

***Comment R-12-18**: Mr. Peyton (Ravenna-Bryant Community Association) requested additional information concerning the impact of construction activities on area schools.*

Response: Five schools are located near or along potential construction haul routes other than SR 509 and SR 518, and could be adversely affected: Angle Lake School, Maywood School, Normandy Christian, Sunnydale Elementary, and Sunny Terrace Elementary. Use of haul routes located exclusively on Port-owned property would help reduce effects on some of the schools listed; please see Chapter IV, Section 23 "Construction Impacts" for additional discussion concerning potential construction related impacts on local schools.

***Comment R-12-19**: Several commentors raised concern that social and economic impacts of construction are not disclosed. This comment was made by the Airport Communities Coalition, Ms. Brown, Mr. Rohlfs (City of SeaTac), Ms. Hughes (Southwest King County Chamber of Commerce), Southwest King County Community Group, and Mr. and Mrs. Voeller.*

Response: Any potential cost of unemployment benefits paid to construction workers after completion of the work is not evaluated in the EIS. It is not significant relative to the cost of the Airport improvements nor can it be assumed that the work force would be unemployed as opposed to moving on to other construction projects in the Region. The potential for residency of future permanent employees and contract labor cannot be known at this time; however, Table IV.8-2 on page IV.8-10A of the Draft and Final EIS shows the existing distribution of direct airport jobs by residence. At present, 96% of all wage and salary workers reside within the Puget Sound Region. A similar distribution would be expected to continue into the future. Please see additions on page IV.23-6 of the Final EIS concerning potential social impacts related to construction activities.

***Comment R-12-20**: The Southwest King County Community Group requested that the Stamina 2.0 assumptions (noise and construction noise) be presented in the Final EIS.*

Response: General assumptions used in the STAMINA 2.0 roadway noise analysis program are presented in the Final EIS, Chapter IV, Section 1 "Noise." The following paragraph provides a more detailed description of the STAMINA 2.0 input assumptions used in the analysis. The Sea-Tac analysis area was divided into nine regions. Each region was developed as a system of nodes and links representing all roadways that contribute to significant noise. Each region contained a number of noise sensitive receiver locations. A total of 110 noise sensitive receiver locations were tested in the study area. The roadway and receiver locations are defined by a three dimensional coordinate system established for the analysis area and based upon the forecast roadway network proposed by the Puget Sound Regional Council. Subsequent to the release of the Draft EIS, the Council revised its projected roadway network and all analyses associated with roadway noise have been re-computed for presentation in the Final EIS.

Roadway alignments were described as a series of straight line segments (links) defined by segment endpoints (nodes). Noise sensitive receiver locations are defined by nodes. The source-receiver path was also defined by alpha and shielding factors. The alpha factor enables the user to change the sound propagation rate between the source and receiver. This is necessary to model specific field conditions for hard site (pavement/hard ground) or soft site (grass covered) conditions. Both hard and soft site alpha factors were used in the Sea-Tac analysis. The use of shielding factors allows the user to apply excessive attenuation caused by shielding by buildings, houses, trees, or other terrain features. Varying shielding factors were used in the Sea-Tac analysis to describe site-specific conditions. Vehicle densities (traffic volumes) in the form of peak hour vehicles were provided for each roadway segment. Three primary vehicle types (vehicle classifications) are defined in STAMINA 2.0: cars, medium trucks and heavy trucks. Again, vehicle classifications were provided for each roadway segment. Finally, vehicle travel speeds provided for each roadway segment were entered into the STAMINA 2.0 program. The STAMINA code calculates noise emissions for each vehicle type as a function of travel speed. Generally, the greater the travel speed, the greater the acoustic intensity. Detailed computational spreadsheets are available in the Administrative Record at the FAA's Northwest Mountain Regional offices.

STAMINA 2.0 produces two separate forms of output: hourly A-weighted energy equivalent sound levels for each receiver (hourly Leq), and "acoustics" information related to the effectiveness and dimensions of tested noise barriers. The A-weighted sound level, Leq(h), considers the loudness of events and the number of single noise events which occur over the period of an hour. The Leq(h) levels were subsequently extrapolated to estimated annual DNL levels and combined with aircraft noise levels to provide total noise energy estimates for the existing case and each future alternative.

Construction noise levels were computed by adding expected construction traffic levels to the forecast surface traffic levels along designated haul routes. This construction traffic included 57 hourly heavy vehicles on Des Moines Memorial Drive from S. 200th Street to SR 509 to the Airport property; 14 heavy vehicles per hour were added to 24th Street to 156th Street to the Airport property; and 95 hourly heavy vehicles were added from the off ramp of SR 509 to 160th Street to Airport property.

***Comment R-12-21**: Mr. Peyton (Ravenna-Bryant Community Association), and Mr. Rohlfs (City of SeaTac) commented that construction traffic from other airport construction vehicles was not assessed.*

Response: Comment noted. The Final EIS considers traffic from other concurrent construction activities; see Chapter IV, Section 15 "Surface Transportation".

***Comment R-12-22**: Several commentors suggested that EIS should consider alternative construction techniques as a way to mitigate impacts of construction truck activities. Suggested were use of a barge/conveyor system, the use of rail as potential transport alternatives, and the use of alternative material sources such as river dredging for flood control. A temporary access should be built off SR 518 to reduce impacts on residential areas. These comments were made by Mr. Anderson, Mr. Clifford, Mr. Ferullo, Mr. Hopkins, Ms. Kittilsby, Mr. Mehlhoff, Mr. Miles, Mr. Riggs, Mr. Wozniak, Mr. Vaa, and Mr. Yanez (City of Snoqualmie).*

Response: Comment noted. The use of alternative haul methods, alternative material sources and alternative haul routes would be considered and discussed in the Final EIS. The use of a conveyor belt system offers considerable mitigation opportunities related to truck haul activities but has several potential environmental concerns. Several routes for establishing a conveyor system were considered: up SR 509 from the Duwamish, to the east in to the Kent Valley, and from Puget Sound on the west. The later was the only alternative that is believed to be physically and financially feasible. To use the conveyor belt system, it would be necessary to construct a temporary off-loading facility near the Des Moines Marina. Relocation or reconstruction of a nearby Senior Center Hall could be required. The corridor of the conveyor belt system lies within or near the Des Moines Beach Park. Shoreline, land use, and other permits would be expected to be necessary. The rail alternative would require a rail spur line and truck hauling from the spur(s). Material supply by rail may not be sufficient to meet a contractor's needs due to other railroad operations which could limit haul trains to one per day. As a result, trucks are considered as the most likely conveyance method.

***Comment R-12-23**: Ms. Brown commented that demolition would result in asbestos impacts and cost to remediate.*

Response: Cost estimates for removal and disposal of asbestos-containing materials associated with facilities demolition would be assessed on a site-by-site basis after a full characterization at the site is completed. This level of analysis is beyond the scope of this EIS and would be conducted at the design and development phase of the Master Plan project actions. Removal and disposal of asbestos-containing material is discussed in the Draft and Final EIS on page IV.21-8.

***Comment R-12-24**: Ms. Brown and Ms. Bitenec commented that contamination tests should be conducted for fill used in construction.*

Response: Contaminant testing of on-site fill would be conducted as required by applicable permits for excavation and removal of fill from the on-site borrow source areas.

***Comment R-12-25**: Mr. and Mrs. Matthews commented that the Final EIS should consider that these improvements will exhaust area material sites and increase the cost of fill material, increasing the cost of future regional construction projects.*

Response: There are several permitted sites within the Puget Sound area that could supply some or all of the required material. There are ample amounts of material available. A construction project of this size could allow new material sites to be economically developed and permitted by the time of construction, creating additional sources and supplies.

***Comment R-12-26**: Several commentors requested specific plans be developed and mitigation costs be identified to repair haul roads. Mitigation measures need to be permanent to withstand the construction duration. South 188th Street should not be used as a haul route. There should be independent monitor of construction mitigation efforts. Construction activities and mitigation should be coordinated with WSDOT's Construction Coordination office. These comments were made by the Airport Communities Coalition, Mr. Rohlfs (City of SeaTac), Mr. Matthews, Mr. A. Miller (Trout Unlimited), the Southwest King County Chamber of Commerce, the Southwest King County Community Group, Mr. Tate, and Ms. Montgelas (WSDOT).*

Response: Comment acknowledged. Impacts related to Airport construction activities would be mitigated as needed and as possible. See response to comment R-12-15. The contractor awarded the construction contract would be required to comply with all local permits, conditions and mitigation requirements for use of material sites, and haul roads. The contractor would haul during permitted hours and carrying legal loads. Mitigation requirements for use of the specific off site source(s) and routes the contractor chooses to use and the haul process he proposes for use would be the responsibility of the contractor to negotiate and establish with the appropriate agencies. The Port anticipates that the contractor awarded Airport construction projects would include as part of his bid price the expenses of fees, the effects of mitigation conditions, and the cost of restoration. See response to comment R-12-9. Construction access roads in the area of the Airport to be used by the Contractor would be specified. All contractors would have the option of seeking permits for use of other routes from the appropriate jurisdictions. This is standard for construction projects in the Northwest.

***Comment R-12-27**: The analysis of congestion impacts from truck traffic was inadequate and inaccurate. Truck volumes should have been increased by a Passenger Car Equivalency Factor of 3.0 to account for increased impacts of heavy trucks on intersections, arterials, and freeways. A peak hour factor of 1.5 should be used to account for "bunching" of trucks. Several commentors expressed this concern, including the Airport Communities Coalition, the Greater Federal Way Chamber of Commerce, Mr. Hopkins, and Ms. Brown.*

Response: Comment acknowledged. Levels of service (LOS) analysis of Airport area intersections and freeway ramps, impacted by the anticipated truck hauling, were performed and are included in Appendix J of the Draft and Final EIS. The Final EIS contains additional construction-related surface transportation analysis, including a freeway operation assessment. The LOS analysis for Airport area signalized intersections assumes a Passenger Car Equivalency (PCE) factor of 1.5 in order to calculate an adjustment factor for heavy vehicles, which is in conformance with the requirements of the 1985 and 1994 Highway Capacity Manual. The suggested PCE value of 3.0 is only appropriate for freeway operational analysis and is not a direct multiplier as suggested by the commentor. A peak hour bunching factor is included in the construction surface traffic impact analysis performed for the Final EIS.

Comment R-12-28: *Ms. Brown commented that the Final EIS should consider that the intersection of S. 188th Street and Pacific Highway and southbound ramp of SR 518 and SR 509 are high accident locations.*

Response: Construction haul traffic is not anticipated to use S. 188th Street between Pacific Highway South (International Boulevard) and I-5. The City of SeaTac provided comments on the Draft EIS requesting that section of S. 188th not be considered as a haul route. See response to comment R-12-10. Washington State Department of Transportation (WSDOT) records indicate 20 accidents occurring at the intersection of State Route 509 and State Route 518 between July of 1992 and June of 1995. The majority of these accidents involved red light violations by either westbound through or southbound left turning vehicles. Only 2 accidents during this 3-year period involve the westbound left turn movement. Increased truck traffic on any leg does not impose any increased safety risk.

Comment R-12-29: *Mr. Rohlfs (City of SeaTac) commented that the Draft EIS does not provide sufficient information to address the specifics of construction of the individual airport projects. Individual EIS's will be required for the relocation of S. 154th/156th Street, filling and grading activities for the third runway, creek relocation, and terminal projects.*

Response: The Final EIS contains information needed to evaluate the range of impacts and needed mitigation associated with constructing the third runway, and with the roadway and creek relocations associated with the relocation of S. 154th/156th Street; see Chapter IV, Section 23 "Construction Impacts". The Draft EIS analysis, and the analysis that was completed for the Final EIS, comply with the spirit and intent of the National Environmental Policy Act (NEPA) and the Washington State Environmental Policy Act (SEPA) for disclosure of likely impacts associated with a proposed project. The successful bid contractor would establish their preferred haul routes and supply mechanisms/off-site sources and seek the necessary permits to complete the hauling of materials. This is standard practice within the Pacific Northwest to require the successful bid contractor to obtain the necessary permits for hauling.

WATER QUALITY, HYDROLOGY, FLOODPLAINS AND COASTAL ZONE MANAGEMENT

Comment R-13-1: *Mr. Peyton (Ravenna-Bryant Community Association) requested identification of the cumulative impact of the Master Plan Update and induced long-term development on flooding and wetland functions.*

Response: As discussed in the cumulative impacts and mitigation sections of Chapter IV, Sections 10 "Water Quality and Hydrology", Section 11 "Wetlands", and Section 12 "Floodplains" of the Draft and Final EIS, all of the Airport improvements must meet existing development standards, including floodplain development, stormwater management, and sensitive areas protection measures. City of SeaTac and Washington floodplain development standards and City of SeaTac sensitive areas regulations prohibit reductions in 100-year flood storage capacity and require control of stormwater runoff rates at or below the existing flow rates for the 2-, 10-, and 100-year design storm events. These regulations are designed to prevent flooding problems and maintain flood flows at or below existing levels in order to protect human life and property. Development can change the timing and duration of flows in a watershed and subsequently change wetland hydrology and associated wetland functions and values (e.g., flood attenuation and wildlife habitat). The EIS presents the impacts and discusses the likely impacts from other known induced development.

Comment R-13-2: *Commentors asked if the discussion of streamflow stabilization, control of streamflow, and subdrains in Chapter IV, Section 19 (Earth) of the Draft EIS refers to relocation of Miller Creek. Commentors also requests definition of the term "dewatering" and that a discussion be provided of the third historic fuel spill. These comments were received from the Southwest King County Community Group and Mr. Derrick (King County Department of Development and Environmental Services).*

Response: In Chapter IV, Section 19 "Earth Impacts", the discussion of streamflow refers to stormwater runoff within two large swales that cross the site of the proposed runway. During rainfall events, these swales collect surface water from the surrounding uplands and drain westward to Miller Creek. These swales are not streams, however, and are not part of the Miller Creek stream channel. Where these swales would be filled to construct the runway embankment, streamflow within the swales would be intercepted and controlled to protect embankment fill stability. Subdrains would be installed to drain seeps beneath the embankment fill.

As used in Chapter IV, Section 19, dewatering is the removal of shallow, perched groundwater encountered during excavation by using pumps or digging trenches that drain the water away from the area of excavation.

Please refer to the additions in Chapter IV, Section 10 of the Final EIS (page IV.10-6) which addresses the nature of the third historic fuel spill at the Airport.

Comment R-13-3: *A commentor requested clarification of the apparent conflict in lines 12 and 21 on page IV.10-8 on the amount of area being impacted by construction activities. Include disturbances in borrow site areas in the construction impact area estimates. This comment was received from Mr. Derrick (King County Department of Development and Environmental Services).*

Response: As indicated in Chapter IV, Section 10 of the Draft and Final EIS, potential temporary increases in suspended solids or other pollutants in Miller and Des Moines Creeks from construction depend on several factors including the size of the construction area, proximity of potential receiving waters, soil type, slope, cover, and effectiveness of erosion and sediment controls (i.e., potential delivery of sediments). There is no conflict in the numbers identified on page IV.10-8 of the Draft EIS in lines 12 and 21. The apparent confusion between these numbers is that the first number refers to phase 1 construction activities, which would result in the disturbance of an estimated 193 acres. By contrast, the number on line 21 (249 acres) was the preliminary estimate of the total runway construction area. Revised estimated impact areas in each basin are presented in Table IV.10-7.

The discussion of potential construction impacts on water quality in Chapter IV, Section 23 of the Final EIS (Page IV.23-10) has been expanded to include potential impacts on surface water quality from activities at borrow source areas. Sediment yield estimates from sheet and rill erosion of fillslopes and cutslopes at construction and borrow sources area sites are presented in Table IV.23-6 of the Final EIS. Estimated sediment yields do not necessarily represent actual additional sediment loading received by Miller and Des Moines Creeks, but represent the total amount of material eroded from fillslopes and cutslopes. Only a portion of the sediments would actually reach the creeks. Actual loading to the creeks depends on the surface topography and the effectiveness of erosion and stormwater controls. Such controls would reduce erosion and the amount of eroded material delivered to Miller and Des Moines Creeks.

Estimated total annual sediment yields from borrow source areas and fill embankments combined, during, and up to one year after construction would range from between about 142 to 357 tons per year in the Miller Creek basin and about 120 to 300 tons per year in the Des Moines Creek basin, depending on the effectiveness of erosion controls. The range in estimated sediment yields depends in the effectiveness of erosion controls; lower values assume higher erosion control and higher values assume lower erosion control. As vegetation becomes established on fillslopes and cutslopes following

the regional light-rail transit system; and limiting passenger drop-off and pickup and vehicle idling at the terminal through vigorous enforcement and by successfully providing short-term parking alternatives (i.e., metered short-term public parking within the terminal area).

5. Consider switching the ground support vehicles from gasoline to an alternate, cleaner burning fuel such as natural gas or propane. The dispersion analysis did not identify any exceedances of the Ambient Air Quality Standards, and indicated that pollutant emissions from ground service vehicles would not result in high pollutant concentrations off-airport. The use of alternative fuels for ground service vehicles would primarily reduce carbon monoxide levels. The reduction in other pollutants (i.e., NO_x, hydrocarbons) is less certain. The primary benefit in reduced emissions from ground service vehicles would be centered on the terminal area. As the dispersion analysis did identify any exceedances of the Ambient Air Quality Standards in the terminal area, the costs associated with conversion of the ground service vehicle fleet outweigh the known benefits at this time. Nonetheless, as indicated in Chapter 5, Section 9, the Port of Seattle would continue to explore ways in which to encourage the airlines to voluntarily add alternative fueled ground service vehicles as they look to replace their equipment.

6. Consider indirect source legislation/rules to control the effects of airport - Neither the U.S. Environmental Protection Agency nor the state of Washington has indirect source regulation which would apply to the proposed airport improvements. In the 1990 amendments to the Federal Clean Air Act, the regulations pertaining to aircraft or indirect sources were not changed from the 1977 provisions.

7. Conduct a refined study to determine if Benzene emissions pose a significant health risk to the adjacent communities - The Port of Study initiated an air toxics monitoring study in 1993, the results of which are summarized in Appendix D. As indicated by that study, the predominant source of Benzene emissions in the Airport area appear to be related to automobile traffic.

Mitigation measures are identified in the Draft and Final EIS concerning roadway improvements along International Boulevard. Further, the Port of Seattle has identified several additional actions that could be undertaken to further reduce air pollutant concentrations. The response to comment R-10-51 identifies the commitment to mitigation necessary as part of the Clean Air Act Conformity determination process.

Comment R-10-56: *Mr. Burke noted that the exhibit on page IV.9-19K shows the location of air modeling receptors. He expressed concern that no receptors were directly under the flight path where they would get the highest pollutant concentrations.*

Response: The criteria used to select the receptor locations to be modeled included excluding receptor locations located within existing or future airport property, or within the right-of-way for major roadways such as SR 518. The areas located directly along the runway centerlines (i.e., under the flight paths) are all located within the existing or future airport boundary. All receptor locations not included within the existing or future airport property boundary or major roadway right-of-way were evaluated for the maximum pollutant concentrations for those areas. The response to comment R-10-10 addresses receptor selection methodology.

Comment R-10-57: *The U.S. Environmental Protection Agency asked if the effect of increased emissions associated with increased approaches and landings has been addressed in the analysis.*

Response: As indicated in response to comment R-10-15, a third parallel runway is proposed to reduce arrival delay incurred during poor weather conditions. The actual number of aircraft approaches and landings would not be expected to increase over the Do-Nothing condition, but the level of arrival delay incurred would decrease appreciably. A reduction in arrival delay has a concurrent reduction in departure delay for aircraft waiting on the ground to depart.

Airports which have three parallel runways typically operate with arrivals on the outer runways, with departures on the inner runway and the runway closest to the terminal complex. It is expected that existing Runway 16L/34R and the proposed new runway would be used for arrivals. Departures would occur on the existing runways (16R/34L and 16L/34R). This change in operating configuration was considered in the air quality analysis.

Comment R-10-58: *The Southwest King County Community Group noted that the 1991 Ecology Study suggested studying the feasibility of switching the ground support vehicles at Sea-Tac from gasoline to an alternative, cleaner burning fuel such as natural gas, ethanol or methanol.*

Response: Ground service equipment (GSE's) are those vehicles owned and operated by the airlines and airport operators to service aircraft (i.e., refueling, baggage loading, food servicing, etc.). GSE's typically use either unleaded gasoline or diesel fuel, and the emissions from these vehicles is dependent upon the amount of time they are operated to service each aircraft.

Use of alternative fuels includes compressed natural gas (CNG), propane gas, methane gas (M-85), reformulated gasoline (RFG), and electricity. Certain vehicle emissions can be reduced by the use of alternative fuels, but the reductions in pollutant levels is highly dependent on the type of fuel and engine technology of each manufacturer. Propane has typically been the alternative fuel considered when considering the conversion of ground service vehicles to use of an alternative fuel. **Exhibit 1** illustrates the change in pollutant levels for carbon monoxide, nitrogen oxides, hydrocarbons, and formaldehyde for each alternative fuel in comparison to unleaded gasoline. For all alternative fuels, carbon monoxide levels are consistently reduced the greatest amount in comparison to other pollutants. However, depending on the fuel and engine manufactures, certain pollutant levels may actually increase with use of various alternative fuels. For NO_2, the pollutant levels are generally reduced, but for propane for example, NO_2 levels would be actually higher depending on the manufacturer. Propane would also result in increased emissions of hydrocarbons, and in some instances, increased emissions of formaldehyde, again depending upon the manufacturer. All of the alternative fuels would appear to result in decreased emissions of 1,3-Butadiene, benzene, and acetaldehyde.

As shown in Appendix D, Table D-3, ground support vehicles (GSE) do contribute to emissions of CO, VOC, and NO_2 at Sea-Tac. Excluding motor vehicles, GSE are the second largest contributor to these pollutants after aircraft for the on-airport sources. GSE emissions represent approximately 40 percent of the CO emissions, 8 percent of the NO_2, and 30 percent of the VOC as compared to aircraft sources. Nonetheless, the screening dispersion analysis indicated that pollutant emissions from ground service vehicles would not result in high pollutant concentrations off-airport. Generally, ground service vehicles are concentrated in the terminal area. Accordingly, pollutant concentrations within the terminal area are most affected by their use.

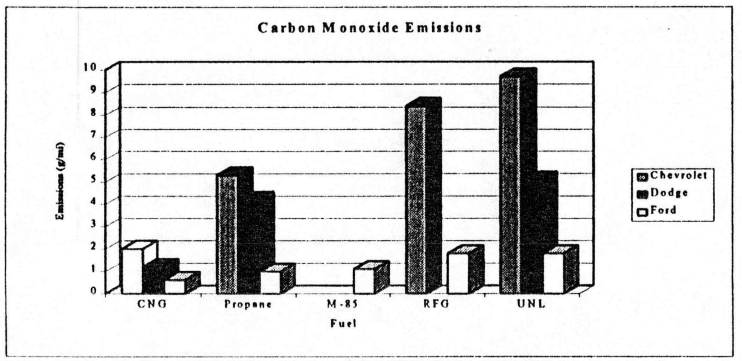
Switching to natural gas, propane or another alternative fuel would be expected to primarily reduce CO emissions at the Airport, particularly within the terminal area. As shown by the areawide dispersion analysis, no exceedances of the ambient air quality standards were identified within the terminal area.

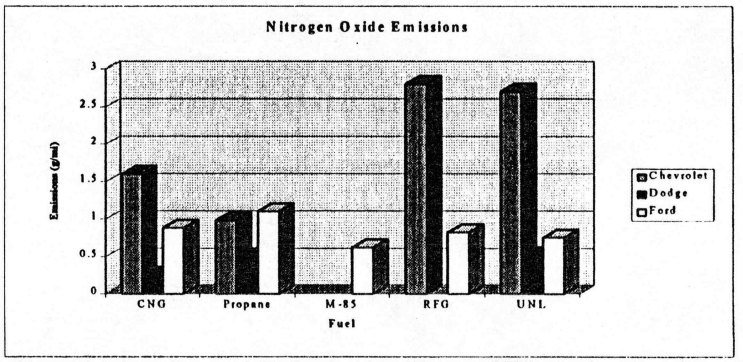
An electric ground service vehicles are classified as 'Zero Emissions Vehicle' (ZEV) due to zero tailpipe emissions. The 'zero emissions', however, is attached to a large price tag. The principal cost factors for an electric vehicle fleet include vehicle price, price of electrical consumption, battery life and replacement cost, and vehicle maintenance costs. Current electric vehicle technology prevents many airlines from considering electronic vehicles as an option. Additionally, although electric vehicles would reduce emissions on-airport, the potential for increased emissions in the Region might occur due to increased power plant emissions.

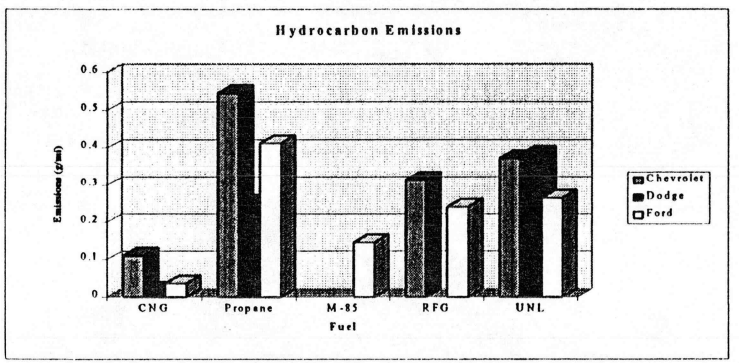
The type of ground service equipment used by each airline and the fuels used to operate such equipment is a function of number of factors including the intended use and capability of the equipment, availability

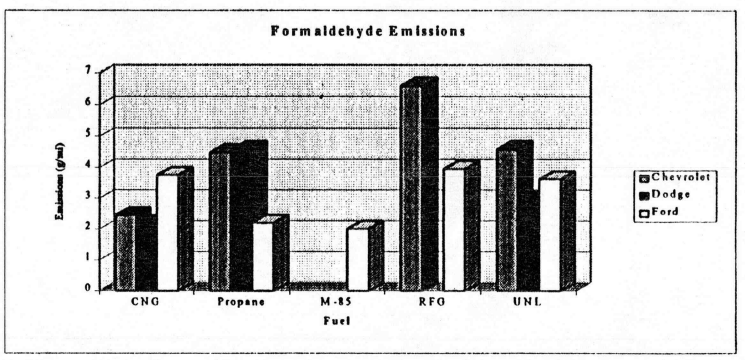
of equipment and fuel, and cost. As airlines replace their GSE equipment, their primary consideration is generally cost. In addition to the cost of retrofitting existing GSE or the cost of purchasing new equipment, added cost occurs from facility expenditures associated with the development of fueling stations and equipment. The increased costs of converting and operating with alternative fuels has prevented widespread usage of alternative use fuel vehicles. The economic considerations of GSE's using alternative fuels are generally based on vehicle operations costs, fuel costs, and maintenance costs. For example, the development of refueling stations is generally too large a cost for an airline to sustain in order to support a large fleet of GSE's used across expansive airport grounds.

EXHIBIT R-4
(Page 1 of 2)
Exhibit Emissions by Fuel Type





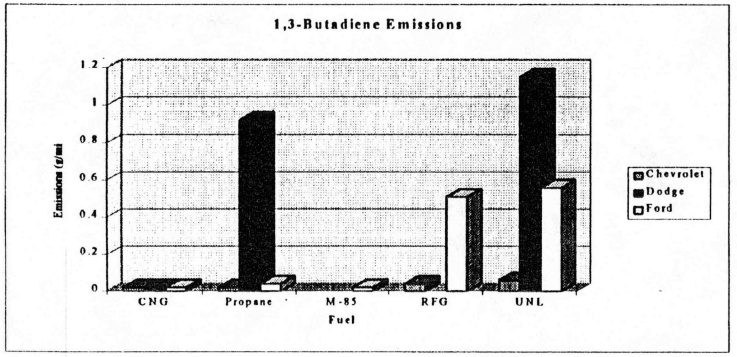


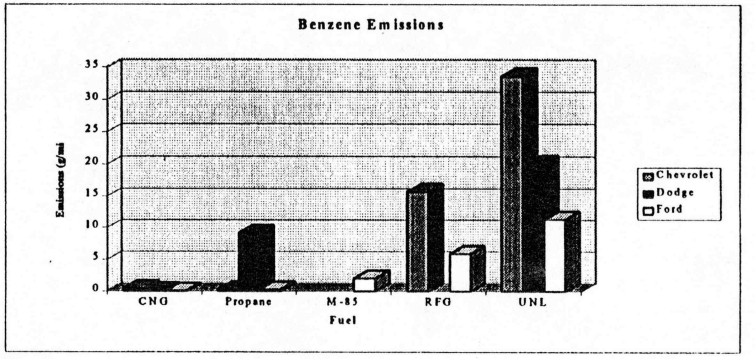


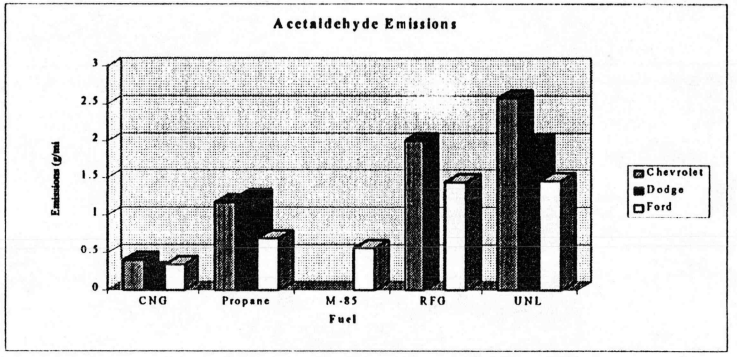
Note: CNG = Compressed Natural Gas; Propane = Propane gas; M-85 = Methanol; RFG = Reformulated Gasoline; UNL = Unleaded Gasoline

Source: Clean Fleet, South Coast Alternative Fuels Demonstration, Analysis Report No. 4: "Vehicle Exhaust Emissions-Early Mileage Results," July 1994.

EXHIBIT R-4
(Page 2 of 2)
Exhaust Emissions by Fuel Type







Note: CNG = Compressed Natural Gas; Propane = Propane gas; M-85 = Methanol; RFG = Reformulated Gasoline; UNL = Unleaded Gasoline

Source: Clean Fleet, South Coast Alternative Fuels Demonstration, Analysis Report No. 4: "Vehicle Exhaust Emissions-Early Mileage Results," July 1994.

As outlined in Chapter IV, Section 9 of the EIS, the Port of Seattle would continue to explore ways in which to reduce pollutant levels at the Airport including ways in which to reduce VOC emissions attributed to GSE equipment operated at the Airport.

Comment R-10-59: *The Southwest King County Community Group noted that it appears that the number of aircraft operations may represent only takeoffs and not include landings. The following individual made this comment: Southwest King County Community Group.*

Response: The air quality analysis considers both arrivals and departures. The Draft and Final EIS presents the analysis of total operations at 43.9 arrivals and 43.9 departures, for a total of about 88 operations during the peak hour. This level of total operations is similar to activity levels observed by the U.S. Environmental Protection Agency in June, 1995. The response to comment R-10-14 discusses use of peak hour operational levels.

Comment R-10-60: *The Southwest King County Community Group asked why the recommendations from Puget Sound Air Pollution Control Agency on background CO values was increased.*

Response: Appendix D of the Draft EIS describes the background concentrations used in the EIS air quality analysis. The background concentration used for the 8-hour CO is 3.5 ppm, and 5.0 for the 1-hour background concentration. Background values for the EIS analysis were identified in consultation with the Department of Ecology, U.S. Environmental Protection Agency, and Puget Sound Air Pollution Control Agency. The background concentrations are based on air monitoring results within the Region, and/or regionally accepted levels used in other studies.

Comment R-10-61: *The Southwest King County Community Group requested clarification of the differences in estimates of particulate matter between the 1991 Ecology study and the Draft EIS.*

Response: Response to comment R-10-2 discusses many of the differences between the 1991 Ecology study and the EIS analysis which resulted in substantial differences in estimations on pollutant levels. As noted, aircraft emissions data for particulates as included in the EDMS model has been revised since completion of the 1991 Ecology study. The Ecology study used one of the earliest versions of the model issued. The earlier versions of the EDMS model included more data on particulates which the FAA subsequently determined was inaccurate. The most current version of the EDMS model includes substantially less particulate data than the earlier versions. Currently, there is little data available on aircraft related particulate matter.

Comment R-10-62: *The Southwest King County Community Group suggested verifying the wording on page D-2, column 1, "quality" should be "quantity".*

Response: As noted, this has been corrected in the Final EIS.

Comment R-10-63: *The Southwest King County Community Group stated that the amount of pollution that is generated by aircraft engine maintenance run-ups during testing does not appear to have been factored into the inventory for SASA.*

Response: Aircraft engine maintenance checks are conducted at Sea-Tac and are included in the air quality analysis. Upon completion of engine repairs, it is routine to perform a high power engine run-up for safety purposes. These run-ups are typically conducted at 80 to 100 percent of full power for up to five minutes operating time. The frequency and duration of engine run-ups varies. Engine run-ups are conducted for all types of aircraft operating at the Airport. Information on the number, type of aircraft, average duration of run-up and location was obtained from the Port of Seattle, Run-Up Authorization Form data maintained by the Port of Seattle Noise Office. Most maintenance run-ups last less than 20

minutes at power levels ranging from idle to below 80 percent of full power. Full power run-ups usually last five minutes or less.

The air quality analysis includes the assessment of a ground run-up for a B-747 aircraft for five minutes at full takeoff power for one engine and fifteen minutes idle power. The B-747 aircraft was modeled as it produced the highest total pollutant emissions of all aircraft types conducting run-ups, and which is expected to continue to operate at the Airport through the 2020 study planning horizon. A total of nine run-ups by a B-747 per day were considered in the analysis. A review of the Port of Seattle's run-up information for the past two years indicated that the maximum number of run-ups occurring on any one day was seven in April 1, 1994. Six of the run-ups were by a B-747 and one by an MD-80. A review of the run-up data indicated that the conduct of such a large number of run-ups by a B-747 was highly unusual. For example, the next busiest day for run-ups (six on October 1, 1993), run-ups were conducted by two B-727's, three DC-8's, and one MD-80.

Accordingly, the EIS analysis represents a reasonable worst case evaluation of aircraft ground run-ups. Additionally, the EDMS model was adjusted to more accurately reflect the effect of full power takeoff thrust typically used during an aircraft ground run-up in addition to idle thrust (without adjustment, the EDMS model only considers idle thrust). Based on the Port of Seattle's run-up data, the primary run-up location today is currently at the south end of the airfield with the nose of the aircraft pointing south.

Comment R-10-64: *The Southwest King County Community Group noted that the 1991 Ecology Study indicated that CO emissions from all other sources including automobiles were just 1/6th of the contribution due to aircraft; why does the EIS analysis indicate such a large contribution by automobiles.*

Response: The EIS analysis considers a wide variety of air pollutant sources within the immediate vicinity of the Airport as there are many airport related activities in addition to aircraft that generate pollutants. Airport related traffic, for example, occurs throughout the airport area. Additionally, changes in area roadways and traffic volumes can occur with airport development. Therefore, the analysis must consider the effect of such potential changes to area roadways and changes to traffic volumes in the Airport area.

Accordingly, the EIS analysis considers all of the terminal related parking, as well as all of the off-airport long-term parking along International Boulevard. Also included was the evaluation of over 20 major roadways and associated traffic volumes, including along Interstate 5, SR 518, and SR 509. These sources were in addition to aircraft operations and other on-airport sources. The evaluation of such a wide variety of sources was partially considered in response to a request by the regional air quality agencies at the outset of the study to consider all major sources located within a mile of the Airport. For the most part, such off-airport sources focus on the evaluation of motor vehicles and parking.

The 1991 Ecology Study was a screening level evaluation that did not consider as extensive an array of sources as did the EIS analysis. For automobiles, the Ecology study only considered traffic and parking within the immediate terminal area. Accordingly, the Ecology study showed minor contributions to CO emissions by automobiles in comparison to the EIS analysis.

The response to Comment R-10-2 discusses the number and variety of sources modeled between the two studies, while the response to Comment R-10-4 describes the study area considered.

Comment R-10-65: *The Southwest King County Community Group asked why the results of the screening dispersion analysis are so much greater than for the refined dispersion analysis.*

Response: The results of the screening dispersion analysis typically overestimate pollutant concentrations, often by a considerable margin. The basis for the screening analysis is to represent worst

case conditions, which are the combinations of operational activity and meteorological conditions encountered during the year which result in the highest concentration of air pollutants. In addition, the analysis assumes that the peak hour for aircraft, roadways and other sources occurs at the same time. Since this is not the case, the evaluation represents a worst case situation that may present an overestimation of pollutant concentrations. The purpose is to identify locations were possible exceedances of the AAQS *might* occur. The modeling input assumptions are described in Appendix D.

The refined dispersion analysis is based on actual year-long weather data that includes winds from all directions and actual wind speeds and turbulence as recorded by the National Oceanic and Atmospheric Administration. In comparison to the screening analysis, the refined analysis no longer assumes that all types of activities occur at the same time. The refined analysis applies "temporal" factors that provide an indication of hourly, weekly, and monthly activity or utilization for each of the different pollutant sources. For those receptor locations which indicated possible exceedances of the Ambient Air Quality Standards during the screening dispersion analysis, a more detailed 'refined' dispersion analysis was conducted. Typically, the results of the refined analysis are less than identified initially by the screening analysis.

Comment R-10-66: *The Southwest King County Community Group noted that the Hotel location does not appear to be included in the initial screening dispersion of 200 locations.*

Response: For consistency with the evaluation of the terminal area hotel Final EIS, the hotel receptor location was added in addition to the 200 screening analysis receptors. The hotel evaluation included the conduct of air monitoring along the existing terminal curbfront. The availability of actual monitoring data enabled a comparison with the results of the modeling analysis. Therefore, the hotel location was added to the terminal area receptor locations evaluated by the grid analysis presented in Tables D-21 and D-22 in the Draft EIS. Based on the screening dispersion analysis, the concentrations for other receptor locations in the northern portion of the terminal area (where the hotel would be located) showed similar concentrations as for the specific hotel receptor location. As indicated in response to comment R-10-33, the EIS modeling for the hotel location overestimated the pollutant concentrations by approximately one-third based on the air monitoring conducted for that location.

Comment R-10-67: *The Southwest King County Community Group questioned why 350,000 aircraft yearly flying over an urban area would not contribute more air pollutants than automobiles.*

Response: As is shown in the Draft and Final EIS, aircraft do contribute to the production of air pollutants in the overall area. However, the 350,000 aircraft operations are spread out over an entire year, and are diminished in influence by the considerable volume of automobile traffic in the Region. For example, Interstate 5 handles on average over 200,000 daily vehicle trips on certain segments, while portions of SR 509 are used daily by 60,000 vehicle trips, and up to 80,000 trips along SR 518. Based on the busiest roadway segments for those major roadways located in the immediate airport area, approximately 600,000 surface vehicle trips occur on daily in the Airport area. On an annual basis, this would equal over 200 million annual vehicle trips by cars, buses, trucks, and motorcycles. This does not include the numerous smaller arterials and residential streets used within the area. Accordingly, a comparison of air pollutant levels attributed to either aircraft operations or to motor vehicle traffic is heavily influenced by the extensive non-airport related motor vehicle traffic in the airport area.

Appendix O presents the detailed surface transportation traffic levels in the Airport area, and presents the 1994 average annual daily traffic for various roadway segments evaluated.

Comment R-10-68: *The U.S. Environmental Protection Agency commented that the word "unusually" should be deleted from the discussion of stability class.*

Response: Appendix D was revised accordingly.

EARTH IMPACTS

Comment R-11-1: *Several people commented that the Draft EIS omitted information regarding erosion, landslide, and seismic hazard areas that have been identified by King County; that information regarding hazard areas was inconsistent throughout the Draft EIS, and that impacts of construction within these erosion and seismic hazard areas was not discussed in sufficient detail. These comments were made by Ms. Brown, Ms. Clark, Mr. Scarvie, and the Southwest King County Community Group.*

Response: Exhibit IV.19-2 shows all erosion, landslide, and seismic hazard areas within the study area that are identified on sensitive areas maps prepared by the King County Department of Parks, Planning, and Resources and the City of SeaTac. These hazard areas are described on pages IV.19-4 and IV.19-5 of the Draft and Final EIS.

Landslide hazard areas have been identified by King County west of the Airport, along the shore of Puget Sound. These landslide hazard areas are not shown on Exhibit IV.19-2 because they are located outside the study area. No construction would be done in these landslide areas under the proposed alternatives as defined in the EIS. Landslides identified during a stream survey along Miller Creek (Appendix F of the Draft and Final EIS) are discussed on page IV.19-4 of this Final EIS.

Erosion hazard areas within the study area north of S. 192nd Street have not been inventoried by King County or the City of SeaTac. Erosion impacts in this area are addressed on page IV.19-13 of the Final EIS. Erosion and sedimentation estimates have been completed since publication of the Draft EIS; and are discussed in Section 10 "Water Quality and Hydrology" and Section 23 "Construction" of this Final EIS. No excavation would be done within the erosion hazard area identified on Borrow Source Area 2.

Measures to stabilize subgrade material within the two seismic hazard areas located on the site of the proposed new runway are addressed on page IV.19-11 of the Draft EIS (page IV.19-12 of the Final EIS). The EIS correctly identifies seismic hazard areas at the north end of Borrow Source Area 1. The sentence on Draft EIS page IV.19-5 that states no seismic hazard areas occur in Area 1 has been corrected (see page IV.19-5 of the Final EIS). Additional information regarding seismic activity in the vicinity of the Airport and stability of the proposed Airport fill is included in the Final EIS.

Comment R-11-2: *Some commentors had questions regarding grading and excavation on the site of the proposed third runway, and design of the runway embankment. One commentor suggested the fill estimates were too high and could be reduced by leveling the site using only on-site material and using retaining walls along the west side of the embankment. Another commentor wanted to know how much wetland area would be excavated for construction of the proposed new runway. Others commented that the Draft EIS did not adequately address aesthetic impacts of the third runway on surrounding communities, and mitigation for those impacts, including landscaping an embankment design. These comments were made by Mr. Tinker, Mr. Peyton (Ravenna-Bryant Community Association), Mr. Rohlfs (City of SeaTac), and the Southwest King County Community Group.*

Response: Fill estimates shown in Table IV.19-1 include the volume of fill material that could be obtained during excavation and leveling of the runway site. On-site material would be used to the greatest extent possible. Not all on-site material would be suitable for use in embankment construction, however. Geotechnical investigations of the proposed runway site indicate approximately 3.1 million cubic yards of the material excavated on site likely would meet the required strength and compressibility criteria. Up to 17 million cubic yards of off-site fill, in addition to on-site material, could be needed to complete construction of the third runway.

Three slope options are being considered for the embankment west of the proposed third runway: an unreinforced earth embankment with slopes no steeper than 2 horizontal to 1 vertical; a reinforced earth embankment, which would allow construction of steeper slopes than the unreinforced embankment; and a reinforced earth wall. Although reinforced earth walls would require less total fill and less encroachment on adjacent lands than the other slope options, they require extensive quantities of high-quality fill material, which may preclude the use of available on-site material. Additionally, reinforced earth walls typically have a maximum height range of between 40 and 50 feet. The proposed new runway would require fill heights in excess of 100 feet. The proposed runway likely would be constructed using each of these three slope options along different segments of the embankment, depending on subsurface conditions, proximity of existing roads and buildings, and depth of fill.

Soils in wetlands areas generally are unsuitable for use as subgrade or fill material and likely would be removed from the proposed new runway site. Up to 7.5 acres of wetlands on the proposed runway site could be affected. Wetland impacts are addressed in Chapter IV, Section 11 of the Draft and Final EIS.

Aesthetic impacts of the proposed new runway have been included in Chapter IV, Section 24 "Aesthetics and Urban Design" of this Final EIS.

Comment R-11-3: *Two commentors questioned the meaning of the term "borrow source area" and wanted to know if fill material derived from these areas would eventually be returned. This comment was made by the Southwest King County Community Group, Mr. ~~Krause~~, and Mr. E. Wichert.*

Response: Fill material excavated from borrow source areas for use in construction of the Master Plan elements would not be replaced. In the geotechnical field, the term "borrow" means material excavated for use as fill in another area, and does not imply the material is returned.

Comment R-11-4: *Some commentors expressed the opinion that the Draft EIS did not adequately address construction impacts associated with borrow operations and increased truck traffic along the fill haul routes. In particular, commentors were concerned with impacts on Des Moines Creek Park, adjacent residences and businesses, and local communities. This comment was made by the Airport Communities Coalition, Mr. Rohlfs (City of SeaTac), the Southwest King County Community Group, and Mr. Gumm (Prince of Peace Lutheran Church).*

Response: Additional analysis of construction traffic impacts on local residences and businesses has been completed and is presented beginning on page IV.23-4 of this Final EIS. Air and noise impacts associated with borrow operations and transportation are presented beginning on pages IV.23-8. Social impacts associated with acquisition of residential and commercial property are addressed in Chapter IV, Section 6 "Social Impacts" in the EIS.

Comment R-11-5: *Mr. Hopkins noted that most fill material obtained from on-site borrow sources would not qualify as all-weather fill, and questioned whether or not the delays in embankment construction resulting from adverse weather conditions have been factored in to the construction schedule. The commentor also noted that all-weather material is more seismically stable than other fill material.*

Response: The comment is acknowledged. Imported select fill and on-site borrow material derived from some advance outwash units can generally be placed and compacted year-round, while avoiding periods of heavy or sustained rainfall. Most recessional outwash and other units of advance outwash can also be used during the winter months outside periods of rainfall, providing moisture content can be controlled. Some recessional outwash, weathered till, and till should be placed and compacted only during the drier months. A construction schedule representing worst-case weather conditions is included in Chapter IV, Section 23 "Construction Impacts" of this Final EIS. To reflect the effects of wea

construction, instead of 300 days construction per year, 270 days of construction were used in the Final EIS for transport of off-site material and 210 days of on-site material.

Comment R-11-6: *Ms. Brown and Mr. Frause expressed concern regarding the stability of the proposed runway embankments on portions of the site that have steep slopes or that have soils with low compressibility, such as wetlands. They also questioned the effect on embankment stability of wet weather and increased vibration associated with increased air cargo traffic.*

Response: Keying and benching would be used when placing new embankment fill along steep slopes. Benching is a construction technique that involves excavating a series of benches (wide terraces) on a hillslope to create level surfaces on which to place and compact the fill, and to prevent the fill from sliding down along the native soil/embankment fill interface. Keying involves excavating a trench along the toe of the embankment and backfilling it with compacted fill to provide a strong foundation for structural reinforcement.

The existing ground in the vicinity of the runway extension or the proposed new runway would not be affected by potential increases in vibration. Fills required in these areas would be placed to minimize post-placement settlement. Settlement of underlying native soils would occur as a result of the surcharge pressure or "weight" of the embankment fills. These settlements would be expected to be minor and would occur during placement of the embankments. Settlement would be minor especially where the underlying native soils consist of recessional outwash or glacial till. Significant post-placement settlement could occur in areas where the underlying native soils consist of soft silt or organic-rich material. These soft soils would be excavated and removed from the site, and replaced with suitable material to minimize post-placement settlement of the embankments. During construction, the embankment fill would be compacted to such a degree that post-placement settlement resulting from saturation of the fill material would be within acceptable limits.

Comment R-11-7: *Mr. Vaa asked whether the runway fill would extend to First Avenue South.*

Response: The runway fill would not extend to First Avenue S. The westernmost extent of the proposed runway fill is Tenth Avenue S. Please refer to Exhibit IV.19-1.

Comment R-11-8: *Commentor wanted to know the location of the proposed SR-509 corridor within Borrow Source Area 4, and asked if a map showing the future alignment of SR-509 was available. Comment was submitted by the Southwest King County Community Group.*

Response: The SR 509 corridor bisects Borrow Source Area 4 from the northwest to the southeast, dividing the area into two parcels; no material would be excavated from the highway corridor. Proposed alignments for SR 509 are addressed in the *SR-509/South Access Road Corridor Draft EIS and 4(f) Evaluation,* which was published in December 1995.

Comment R-11-9: *In commenting on the earth analysis in the Draft EIS, Mr. Rohlfs (City of SeaTac) noted that impacts and mitigation resulting from excavation of the on-site borrow sources are not addressed.*

Response: The Earth section of the Draft and Final EIS addresses impacts on earth resources, including topography, erosion and sedimentation, slope stability, and earth hazard areas. Other environmental impacts resulting from excavation of the borrow areas and associated mitigation are addressed under each element analyzed in the Draft and Final EIS. For example, surface and groundwater impacts and mitigation are addressed in the Chapter IV, Section 10 "Water Quality and Hydrology". Additional discussion regarding borrow source area impacts has been included on page IV.10-7 of the Water section, beginning on page IV.19-5 of the "Earth Impacts" section, and section 23 "Construction Impacts" of this Final EIS.

CONSTRUCTION IMPACTS

***Comment R-12-1**: Ms. Brown questioned if construction/construction related activities already started. Commentor questioned whether the July 1995 surveying of 192nd Street and Des Moines Way is related to third runway or other non approved Airport projects.*

Response: The specific activities described are related to a mitigation improvement imposed by the City of SeaTac on a private development and is not related to the third runway or other Airport related projects. Construction of the improvements recommended by the Master Plan Update has not been initiated.

***Comment R-12-2**: Mr. Rohlfs (City of SeaTac), the Southwest King County Community Group, and the Airport Communities Coalition questioned why construction impacts are called short-term when construction is occurring so long. Several commentors questioned the description of a multiyear activity as short-term and also raised issues regarding impacts related to air quality and health relating to the duration of construction activities.*

Response: Construction activities involving the hauling of embankment material and the construction of the third runway, the expansion of Runway Safety Areas, and the haul of fill material for South Aviation Support Area are anticipated to occur over a 3 year period between 1996 and the year 2000. In review of environmental issues, impacts are typically considered either as short-term or permanent. As construction activities are not permanent, they are considered as short-term.

***Comment R-12-3**: A comment was made by Ms. Wieting (United States Department of Commerce) requesting notice of any disturbance or removal of national geodetic survey monuments, and requesting funding be included to replace disturbed or removed monuments.*

Response: Comment acknowledged. The Washington Administrative Code, Section 332-120-030, requires that no survey monument be removed or destroyed before a permit is obtained. This section requires all government agencies to identify and replace all survey and geodetic monuments disturbed or removed by construction activities for which it is the sponsor. An application and approved permit is required by the Washington Department of Natural Resources.

During the design process, all monuments within the construction area would be located and specific provisions for replacing or relocating the monuments would be included in the construction specifications.

***Comment R-12-4**: The Southwest King County Community Group, questioning what a minor arterial was, and the use of 'satisfactory' as part of summary of access routes impact review.*

Response: A common set of terms is used by public agencies to classify roadways within their jurisdiction as to function and type of roadway for planning, design and operational purposes. Roadways are broadly classified as either arterials or local access roadways within King County. Arterial roadways are further defined as principal, minor or collector depending on access control and roadway function. Minor arterials tend to be continuous routes connecting community centers with partially controlled access to abutting properties.

The summary review represented in Table IV.23-2 of the EIS for off-site material sources and Table C-2 of Appendix J for on-site material sources was used to evaluate potential haul routes considering six criteria outlined in Sub-Appendix 2 of Appendix J. The term satisfactory was used if the review of potential haul routes found the conditions described for each of the criteria to be existing.

***Comment R-12-5**: The Airport Communities Coalition and Ms. Milne commented that the Draft EIS does not identify the need to obtain mining permits from the Department of Natural Resources and land use permits for material sites and that the Draft EIS gives inadequate consideration to impacts from mining operations.*

Response: Comment acknowledged. Contacts with the Department of Natural Resources indicate that use of the on-site sources may require either a mining permit or a mining reclamation plan depending on whether those sites are determined to be contiguous to airport property. Land use, administrative and/or grading permits from the cities of Des Moines or SeaTac could be necessary for the use of on-site sources. This EIS reviews use of on-site sources. See Final EIS page IV.23-2 for additional discussion of on-site material sources. The permit status of the off-site sources identified for potential use has been clarified and is listed in the Final EIS, Appendix J. Environmental review for use of off-site sources occurred as part of the permitting review.

***Comment R-12-6**: Several commentors requested an explanation of the 21.1 to 26.4 million cubic yard fill requirements identified in the Draft EIS and an indication of the availability of this volume of material within the Region. Several commentors raised this concern, including the Airport Community Coalition, Ms. Brown, Mr. Heavey, the Osterman family, Ms. Schreier, Mr. Schneider, the Southwest King County Community Group, and Mr. Webb.*

Response: Fill requirements for the third runway, the relocation of S. 154th Street, and improvements to the existing Runway Safety Areas (RSA) were considered in the Draft and Final EIS as occurring between 1996 and the year 2000. The fill requirements for these projects are estimated to be 21.11 million cubic yards after inflation for shrink and swell during transport. The extension of Runway 34R and the South Aviation Support Area would require an additional 5.29 million cubic yards after inflation, for a total fill requirement of 26.4 million cubic yards. The fill requirements for the South Aviation Support Area is also expected to occur by 2000, while the 34R extension is now planned to occur between 2015 and 2020. Fill requirements and schedules were re-examined in response to comments on the Draft EIS. See the Final EIS Section 23 "Construction Impacts" for additional discussion.

Eighteen potential material sites were identified and analyzed for feasibility and potential impacts in Appendix J of the EIS. Several material sites are currently operating and permitted in the Puget Sound area in addition to the 18 potential off-site sources identified in the Draft EIS that could supply some or all of this material. A combination of permitted sites may be used if these projects proceed to construction. A construction project of this size could allow new material sites to be economically developed and permitted by the time of construction. See the Final EIS page IV.23-4 for additional discussion on potential off-site material sources.

***Comment R-12-7**: Commentors questioned whether an EIS was or will be done on the off-site borrow source areas. Several commentors asked whether an EIS will be completed on the use of a specific off-site material. Comments of this nature were received by the Airport Community Coalition, Mr. Amero (City of Pacific), Mr. Booth (City of Auburn), Ms. Hansen, Mr. Heavey, Mr. Derrick (King County Department of Development and Environmental Services), Mr. Luther (City of Black Diamond), Mr. Rozdilsky, Mr. Peyton (Ravenna-Bryant Community Association), and Mr. Webb.*

Response: At this time the specific material site(s) and amounts of material from each site(s) that would be used are not known. Permitted material sites received environmental review as part of the regulatory process that granted permits and established conditions of operation. Several municipalities have recently or are in the process of adopting truck route ordinances that may impose additional conditions on operations from individual material sites. The successful construction bidder would be required to comply with local permits, operating conditions and restoration associated with the site(s) and haul routes included in his or her bid package. This is standard procedure for construction projects in the Puget Sound area.

***Comment R-12-8**: The Southwest King County Community Group asked if contaminated soils in Borrow Source areas would be used as fill for the proposed new runway. Several commentors raised questions about the impacts on adjacent residential areas from use of on site material sources 1-4, impacts on the underlying aquifers from use of source 5, and the proximity of sources 1, 2 and 3 to Des Moines Creek Park. These comments were made by the Airport Communities Coalition, Mr. Grumm, and the Southwest King County Community Group.*

Response: As stated on page IV.19-6 of the EIS, a landfill is located in the north part of Borrow Source Area 5. The landfill is reported to contain 50,000 to 70,000 cubic yards of petroleum-hydrocarbon contaminated street sweeping material. The contaminated material was not included in the fill estimates for Area 5, and would not be used as construction fill. Please refer to the response to comment R-11-4 regarding impacts on residents adjacent to the on-site borrow sources and Des Moines Creek Park. Refer to the response to comment R-13-21A and R-13-21B regarding impacts on aquifers underlying the on-site borrow areas.

***Comment R-12-9**: Mr. Rohlfs (City of SeaTac), Mr. Webb, the Southwest King County Community Group, and Ms. Montgelas (WSDOT) requested an explanation of possible on-site borrow locations and fill requirements for each project element. They also asked how borrow sites would be graded and reclaimed and the effect of use of the material from the on site sources on the proposed alignment of SR-509.*

Response: On-site material sources 1-8 are identified in Exhibit IV.23-1 of the Final EIS. Minimum and maximum available material quantities are identified in Chapter IV, Section 23 "Construction Impacts". Mitigation could be further established by specific conditions of permits including those that might be required by the Department of Natural Resources and the cities of Des Moines and SeaTac. The proposed alignment of SR-509 would affect borrow rates on site sources 1 and 4. If used, borrow sites 1 and 4 would be graded in such a way as to facilitate construction of SR-509.

***Comment R-12-10**: Several commentors questioned the Draft EIS haul process assumptions of 300 days per year and 16 hours per day due to constraints caused by weather impacts on roadways and construction activities and also because of permit conditions including operation hours and weight restrictions established by local agencies on use of routes or material sources. They requested an explanation of the truck trip calculation Commentors raising these questions included the Airport Communities Coalition, Ms. Brown, Mr. Bartlemay, Mr. Heavey, Mr. and Mrs. McKinney, Mr. Peyton (Ravenna-Bryant Community Association), Mr. Scarvie, the Southwest King County Community Group, Mr. and Mrs. Voeller, and Mr. Webb.*

Response: See the Final EIS, Section 23 "Construction Impacts", for further discussion on the haul process. Several factors have been considered in establishing the haul assumptions. At this time the specific material sites or haul routes are not known. Expected material sites and roadways were analyzed to identify the feasibility and expected impacts from a haul process of this size and duration. The material haul process is expected to take more time than actual placement and compaction of material in the embankment. It may occur during portions of the construction process that haul material would be stockpiled, either in the embankment area or nearby. Wet weather conditions that affect construction activities would not affect the hauling of the Class A material to the stockpile area. Contacts with construction firms operating in the Puget Sound area indicate that hauling could be affected by weather conditions involving snow, ice or heavy rains. They suggest using 270 days as an estimate of days available for haul activities. Thus, the analysis contained in the Draft EIS was updated.

The material sites closest to the Airport have operating restrictions on hours, generally 10 tc day on-site activities and in some cases truck traffic. Material sites further away from t rural areas have lessor restrictions, enabling activity to occur for 16 to 24 hours. A contract

from several of the nearest sites during the restricted periods and from lessor restricted sites during other times. Sixteen hours a day, or two eight hour work shifts was selected as a reasonable assumption for use in the Final EIS.

Access to the Airport construction site could occur by several roadways and streets. Truck activity on local streets is expected to cause potential impacts to residents and at some locations increases in congestion is likely to cause restrictions on hours of truck activities. Construction truck activities in the area of the Airport could be restricted to use of the State Highway System, arterials designated as truck routes, Port roadways and properties to avoid creating these concerns. See the Final EIS, Section 23 "Construction Impacts" for details on expected access routes.

***Comment R-12-11**: Several commentors stated that the construction truck traffic will cause significant increases in congestion, particularly during the afternoon (PM) peak period and that specific impacts should be identified. Metro asked that the Final EIS address issues relating to construction caused congestion that might affect bus schedules. This comment was made by the Airport Community Coalition, Mr. Allen, Ms. Ayres, Ms. Brown, Mr. Bush (METRO), Mr. Dolvey, Mr. Lewis, Mr. Newby, Ms. Parker, Mr. Peyton (Ravenna-Bryant Community Association), Ms. Pompeo, the Southwest King County Community Group, Ms. Smith, Mr. Tate, Mr. Townsend, Mr. Vaa, Mr. and Mrs. Voeller, and Mr. Webb.*

Response: Comments acknowledged. See Final EIS, Section 23 "Construction Impacts" and Appendix J for analysis of peak hour congestion. Assumptions regarding haul volumes and duration were reexamined in response to comments on the Draft EIS and potential changes in the Master Plan Update improvements construction schedule were identified. Level of service analysis of airport area intersections and freeway ramps impacted by the anticipated hauling were performed and are included in Appendix J of the Draft and Final EIS. Expected haul routes were also re-examined for existing conditions and routes with conditions considered to be concerns were noted in Table IV.23-3 of the EIS. The Final EIS contains additional levels of service analysis regarding freeway operations near the Sea-Tac. See response to comment R-12-7.

***Comment R-12-12**: The Airport Communities Coalition commented that there is a difference between the total haul quantities listed in Appendix J, and the analysis presented in Chapter IV, Section 23 of the Draft EIS.*

Response: Comment acknowledged. At the time the Draft Surface Transportation Construction Report (presented in Appendix J) was completed, the third runway construction was scheduled to occur prior to the year 2000. The Runway Safety Area expansion and Runway 34R extension were scheduled for construction to occur after 2000. Chapter IV, Section 23 "Construction Impacts" of the Draft and Final EIS reflected changes in the Master Plan Update improvement schedule. See the Final EIS, Section 19 "Earth Impacts" and Section 23 for revised estimates of total fill required.

***Comment R-12-13**: Several commentors requested that haul routes expected to be used should be clearly identified. This comment was made by Mr. Townsend, Mr. Rohlfs (City of SeaTac), and Mr. Derrick (King County Department of Development and Environmental Services).*

Response: Comment acknowledged. Appendix J of the Final EIS identifies potential haul routes.

***Comment R-12-14**: Mr. Peyton (Ravenna-Bryant Community Association) questioned if road detours would reroute traffic onto residential streets?*

Response: Road detours may occur during the relocation of S. 154th/156th Street but others are not anticipated at this time. No detours to local residential streets are anticipated. Such detours could

require permits from Burien, Des Moines or SeaTac and would have to demonstrate need and minimal duration.

***Comment R-12-15**: Numerous commentors indicated that the Draft EIS must address specific impacts and mitigation (such as roadway destruction) associated with the use of haul routes and the requirement of local permits for use of municipal roads. These comments were made by the Airport Communities Coalition, Mr. Bartlemay, Mr. Booth (City of Auburn), Ms. Brown, Mr. Rohlfs (City of SeaTac), Mr. Frause, the Greater Federal Way Chamber of Commerce, Mr. Derrick (King County Department of Development & Environmental Services), Mr. Matthews, Ms. Milne, the Osterman family, Mr. Overholt, Mr. Peyton (Ravenna-Bryant Community Association), Mr. Tate, Mr. Vaa, Mr. and Mrs. Voeller, Ms. Montgelas (WSDOT), and Mr. Webb.*

Response: Depending on the outcome of the construction bidding process a number of permitted material sites may be used by the successful contractor to supply the required fill. The specific sites, volumes of material that may come from a site, and specific haul routes are not possible to determine at this time. It is standard procedure for construction projects in the northwest that a contractor is responsible for supplying the needed material, and for complying with all local permitting conditions. The contractor would include in the construction bid price to the Port, the expenses of fees, mitigation imposed by local agencies, and the cost of restoration. It is anticipated that the contractor may need haul route agreements from WSDOT, King County, and several municipalities.

***Comment R-12-16**: Two commentors stated that the Final EIS must consider not just the Airport construction haul traffic but the other construction activities that may be going on at the same time such as roadway improvements and the Regional Transit System. This comment was made by Ms. Pompeo and the Southwest King County Community Group.*

Response: Comment acknowledged. The Final EIS, Chapter IV, Section 23 "Construction Impacts" identifies regional projects that could affect area traffic flows.

***Comment R-12-17**: Several commentors raised concerns about erosion and sedimentation control measures, the amount of dust and control of debris from a truck haul, and the effects of truck exhaust on air quality. These comments were made by Mr. Bartlemay, and Mr. Dodge.*

Response: Chapter IV, Section 23 "Construction Impacts" and Section 10 "Water Quality and Hydrology" of the Final EIS reflect expanded discussion concerning potential erosion and sedimentation impacts from construction activities. Loss of dirt and debris from the truck haul activities could be mitigated by a requirement placed in the construction bid package requiring covered loads.

***Comment R-12-18**: Mr. Peyton (Ravenna-Bryant Community Association) requested additional information concerning the impact of construction activities on area schools.*

Response: Five schools are located near or along potential construction haul routes other than SR 509 and SR 518, and could be adversely affected: Angle Lake School, Maywood School, Normandy Christian, Sunnydale Elementary, and Sunny Terrace Elementary. Use of haul routes located exclusively on Port-owned property would help reduce effects on some of the schools listed; please see Chapter IV, Section 23 "Construction Impacts" for additional discussion concerning potential construction related impacts on local schools.

***Comment R-12-19**: Several commentors raised concern that social and economic impacts of construction are not disclosed. This comment was made by the Airport Communities Coalition, Ms. Brown, Mr. Rohlfs (City of SeaTac), Ms. Hughes (Southwest King County Chamber of Commerce), Southwest King County Community Group, and Mr. and Mrs. Voeller.*

Response: Any potential cost of unemployment benefits paid to construction workers after completion of the work is not evaluated in the EIS. It is not significant relative to the cost of the Airport improvements nor can it be assumed that the work force would be unemployed as opposed to moving on to other construction projects in the Region. The potential for residency of future permanent employees and contract labor cannot be known at this time; however, Table IV.8-2 on page IV.8-10A of the Draft and Final EIS shows the existing distribution of direct airport jobs by residence. At present, 96% of all wage and salary workers reside within the Puget Sound Region. A similar distribution would be expected to continue into the future. Please see additions on page IV.23-6 of the Final EIS concerning potential social impacts related to construction activities.

***Comment R-12-20**: The Southwest King County Community Group requested that the Stamina 2.0 assumptions (noise and construction noise) be presented in the Final EIS.*

Response: General assumptions used in the STAMINA 2.0 roadway noise analysis program are presented in the Final EIS, Chapter IV, Section 1 "Noise." The following paragraph provides a more detailed description of the STAMINA 2.0 input assumptions used in the analysis. The Sea-Tac analysis area was divided into nine regions. Each region was developed as a system of nodes and links representing all roadways that contribute to significant noise. Each region contained a number of noise sensitive receiver locations. A total of 110 noise sensitive receiver locations were tested in the study area. The roadway and receiver locations are defined by a three dimensional coordinate system established for the analysis area and based upon the forecast roadway network proposed by the Puget Sound Regional Council. Subsequent to the release of the Draft EIS, the Council revised its projected roadway network and all analyses associated with roadway noise have been re-computed for presentation in the Final EIS.

Roadway alignments were described as a series of straight line segments (links) defined by segment endpoints (nodes). Noise sensitive receiver locations are defined by nodes. The source-receiver path was also defined by alpha and shielding factors. The alpha factor enables the user to change the sound propagation rate between the source and receiver. This is necessary to model specific field conditions for hard site (pavement/hard ground) or soft site (grass covered) conditions. Both hard and soft site alpha factors were used in the Sea-Tac analysis. The use of shielding factors allows the user to apply excessive attenuation caused by shielding by buildings, houses, trees, or other terrain features. Varying shielding factors were used in the Sea-Tac analysis to describe site-specific conditions. Vehicle densities (traffic volumes) in the form of peak hour vehicles were provided for each roadway segment. Three primary vehicle types (vehicle classifications) are defined in STAMINA 2.0: cars, medium trucks and heavy trucks. Again, vehicle classifications were provided for each roadway segment. Finally, vehicle travel speeds provided for each roadway segment were entered into the STAMINA 2.0 program. The STAMINA code calculates noise emissions for each vehicle type as a function of travel speed. Generally, the greater the travel speed, the greater the acoustic intensity. Detailed computational spreadsheets are available in the Administrative Record at the FAA's Northwest Mountain Regional offices.

STAMINA 2.0 produces two separate forms of output: hourly A-weighted energy equivalent sound levels for each receiver (hourly Leq), and "acoustics" information related to the effectiveness and dimensions of tested noise barriers. The A-weighted sound level, Leq(h), considers the loudness of events and the number of single noise events which occur over the period of an hour. The Leq(h) levels were subsequently extrapolated to estimated annual DNL levels and combined with aircraft noise levels to provide total noise energy estimates for the existing case and each future alternative.

Construction noise levels were computed by adding expected construction traffic levels to the forecast surface traffic levels along designated haul routes. This construction traffic included 57 hourly heavy vehicles on Des Moines Memorial Drive from S. 200th Street to SR 509 to the Airport property; 14 heavy vehicles per hour were added to 24th Street to 156th Street to the Airport property; and 95 hourly heavy vehicles were added from the off ramp of SR 509 to 160th Street to Airport property.

***Comment R-12-21**: Mr. Peyton (Ravenna-Bryant Community Association), and Mr. Rohlfs (City of SeaTac) commented that construction traffic from other airport construction vehicles was not assessed.*

Response: Comment noted. The Final EIS considers traffic from other concurrent construction activities; see Chapter IV, Section 15 "Surface Transportation".

***Comment R-12-22**: Several commentors suggested that EIS should consider alternative construction techniques as a way to mitigate impacts of construction truck activities. Suggested were use of a barge/conveyor system, the use of rail as potential transport alternatives, and the use of alternative material sources such as river dredging for flood control. A temporary access should be built off SR 518 to reduce impacts on residential areas. These comments were made by Mr. Anderson, Mr. Clifford, Mr. Ferullo, Mr. Hopkins, Ms. Kittilsby, Mr. Mehlhoff, Mr. Miles, Mr. Riggs, Mr. Wozniak, Mr. Vaa, and Mr. Yanez (City of Snoqualmie).*

Response: Comment noted. The use of alternative haul methods, alternative material sources and alternative haul routes would be considered and discussed in the Final EIS. The use of a conveyor belt system offers considerable mitigation opportunities related to truck haul activities but has several potential environmental concerns. Several routes for establishing a conveyor system were considered: up SR 509 from the Duwamish, to the east in to the Kent Valley, and from Puget Sound on the west. The later was the only alternative that is believed to be physically and financially feasible. To use the conveyor belt system, it would be necessary to construct a temporary off-loading facility near the Des Moines Marina. Relocation or reconstruction of a nearby Senior Center Hall could be required. The corridor of the conveyor belt system lies within or near the Des Moines Beach Park. Shoreline, land use, and other permits would be expected to be necessary. The rail alternative would require a rail spur line and truck hauling from the spur(s). Material supply by rail may not be sufficient to meet a contractor's needs due to other railroad operations which could limit haul trains to one per day. As a result, trucks are considered as the most likely conveyance method.

***Comment R-12-23**: Ms. Brown commented that demolition would result in asbestos impacts and cost to remediate.*

Response: Cost estimates for removal and disposal of asbestos-containing materials associated with facilities demolition would be assessed on a site-by-site basis after a full characterization at the site is completed. This level of analysis is beyond the scope of this EIS and would be conducted at the design and development phase of the Master Plan project actions. Removal and disposal of asbestos-containing material is discussed in the Draft and Final EIS on page IV.21-8.

***Comment R-12-24**: Ms. Brown and Ms. Bitenec commented that contamination tests should be conducted for fill used in construction.*

Response: Contaminant testing of on-site fill would be conducted as required by applicable permits for excavation and removal of fill from the on-site borrow source areas.

***Comment R-12-25**: Mr. and Mrs. Matthews commented that the Final EIS should consider that these improvements will exhaust area material sites and increase the cost of fill material, increasing the cost of future regional construction projects.*

Response: There are several permitted sites within the Puget Sound area that could supply some or all of the required material. There are ample amounts of material available. A construction project of this size could allow new material sites to be economically developed and permitted by the time of construction, creating additional sources and supplies.

***Comment R-12-26**: Several commentors requested specific plans be developed and mitigation costs be identified to repair haul roads. Mitigation measures need to be permanent to withstand the construction duration. South 188th Street should not be used as a haul route. There should be independent monitor of construction mitigation efforts. Construction activities and mitigation should be coordinated with WSDOT's Construction Coordination office. These comments were made by the Airport Communities Coalition, Mr. Rohlfs (City of SeaTac), Mr. Matthews, Mr. A. Miller (Trout Unlimited), the Southwest King County Chamber of Commerce, the Southwest King County Community Group, Mr. Tate, and Ms. Montgelas (WSDOT).*

Response: Comment acknowledged. Impacts related to Airport construction activities would be mitigated as needed and as possible. See response to comment R-12-15. The contractor awarded the construction contract would be required to comply with all local permits, conditions and mitigation requirements for use of material sites, and haul roads. The contractor would haul during permitted hours and carrying legal loads. Mitigation requirements for use of the specific off site source(s) and routes the contractor chooses to use and the haul process he proposes for use would be the responsibility of the contractor to negotiate and establish with the appropriate agencies. The Port anticipates that the contractor awarded Airport construction projects would include as part of his bid price the expenses of fees, the effects of mitigation conditions, and the cost of restoration. See response to comment R-12-9. Construction access roads in the area of the Airport to be used by the Contractor would be specified. All contractors would have the option of seeking permits for use of other routes from the appropriate jurisdictions. This is standard for construction projects in the Northwest.

***Comment R-12-27**: The analysis of congestion impacts from truck traffic was inadequate and inaccurate. Truck volumes should have been increased by a Passenger Car Equivalency Factor of 3.0 to account for increased impacts of heavy trucks on intersections, arterials, and freeways. A peak hour factor of 1.5 should be used to account for "bunching" of trucks. Several commentors expressed this concern, including the Airport Communities Coalition, the Greater Federal Way Chamber of Commerce, Mr. Hopkins, and Ms. Brown.*

Response: Comment acknowledged. Levels of service (LOS) analysis of Airport area intersections and freeway ramps, impacted by the anticipated truck hauling, were performed and are included in Appendix J of the Draft and Final EIS. The Final EIS contains additional construction-related surface transportation analysis, including a freeway operation assessment. The LOS analysis for Airport area signalized intersections assumes a Passenger Car Equivalency (PCE) factor of 1.5 in order to calculate an adjustment factor for heavy vehicles, which is in conformance with the requirements of the 1985 and 1994 Highway Capacity Manual. The suggested PCE value of 3.0 is only appropriate for freeway operational analysis and is not a direct multiplier as suggested by the commentor. A peak hour bunching factor is included in the construction surface traffic impact analysis performed for the Final EIS.

Comment R-12-28: *Ms. Brown commented that the Final EIS should consider that the intersection of S. 188th Street and Pacific Highway and southbound ramp of SR 518 and SR 509 are high accident locations.*

Response: Construction haul traffic is not anticipated to use S. 188th Street between Pacific Highway South (International Boulevard) and I-5. The City of SeaTac provided comments on the Draft EIS requesting that section of S. 188th not be considered as a haul route. See response to comment R-12-10. Washington State Department of Transportation (WSDOT) records indicate 20 accidents occurring at the intersection of State Route 509 and State Route 518 between July of 1992 and June of 1995. The majority of these accidents involved red light violations by either westbound through or southbound left turning vehicles. Only 2 accidents during this 3-year period involve the westbound left turn movement. Increased truck traffic on any leg does not impose any increased safety risk.

Comment R-12-29: *Mr. Rohlfs (City of SeaTac) commented that the Draft EIS does not provide sufficient information to address the specifics of construction of the individual airport projects. Individual EIS's will be required for the relocation of S. 154th/156th Street, filling and grading activities for the third runway, creek relocation, and terminal projects.*

Response: The Final EIS contains information needed to evaluate the range of impacts and needed mitigation associated with constructing the third runway, and with the roadway and creek relocations associated with the relocation of S. 154th/156th Street; see Chapter IV, Section 23 "Construction Impacts". The Draft EIS analysis, and the analysis that was completed for the Final EIS, comply with the spirit and intent of the National Environmental Policy Act (NEPA) and the Washington State Environmental Policy Act (SEPA) for disclosure of likely impacts associated with a proposed project. The successful bid contractor would establish their preferred haul routes and supply mechanisms/off-site sources and seek the necessary permits to complete the hauling of materials. This is standard practice within the Pacific Northwest to require the successful bid contractor to obtain the necessary permits for hauling.

WATER QUALITY, HYDROLOGY, FLOODPLAINS AND COASTAL ZONE MANAGEMENT

Comment R-13-1: *Mr. Peyton (Ravenna-Bryant Community Association) requested identification of the cumulative impact of the Master Plan Update and induced long-term development on flooding and wetland functions.*

Response: As discussed in the cumulative impacts and mitigation sections of Chapter IV, Sections 10 "Water Quality and Hydrology", Section 11 "Wetlands", and Section 12 "Floodplains" of the Draft and Final EIS, all of the Airport improvements must meet existing development standards, including floodplain development, stormwater management, and sensitive areas protection measures. City of SeaTac and Washington floodplain development standards and City of SeaTac sensitive areas regulations prohibit reductions in 100-year flood storage capacity and require control of stormwater runoff rates at or below the existing flow rates for the 2-, 10-, and 100-year design storm events. These regulations are designed to prevent flooding problems and maintain flood flows at or below existing levels in order to protect human life and property. Development can change the timing and duration of flows in a watershed and subsequently change wetland hydrology and associated wetland functions and values (e.g., flood attenuation and wildlife habitat). The EIS presents the impacts and discusses the likely impacts from other known induced development.

Comment R-13-2: *Commentors asked if the discussion of streamflow stabilization, control of streamflow, and subdrains in Chapter IV, Section 19 (Earth) of the Draft EIS refers to relocation of Miller Creek. Commentors also requests definition of the term "dewatering" and that a discussion be provided of the third historic fuel spill. These comments were received from the Southwest King County Community Group and Mr. Derrick (King County Department of Development and Environmental Services).*

Response: In Chapter IV, Section 19 "Earth Impacts", the discussion of streamflow refers to stormwater runoff within two large swales that cross the site of the proposed runway. During rainfall events, these swales collect surface water from the surrounding uplands and drain westward to Miller Creek. These swales are not streams, however, and are not part of the Miller Creek stream channel. Where these swales would be filled to construct the runway embankment, streamflow within the swales would be intercepted and controlled to protect embankment fill stability. Subdrains would be installed to drain seeps beneath the embankment fill.

As used in Chapter IV, Section 19, dewatering is the removal of shallow, perched groundwater encountered during excavation by using pumps or digging trenches that drain the water away from the area of excavation.

Please refer to the additions in Chapter IV, Section 10 of the Final EIS (page IV.10-6) which addresses the nature of the third historic fuel spill at the Airport.

Comment R-13-3: *A commentor requested clarification of the apparent conflict in lines 12 and 21 on page IV.10-8 on the amount of area being impacted by construction activities. Include disturbances in borrow site areas in the construction impact area estimates. This comment was received from Mr. Derrick (King County Department of Development and Environmental Services).*

Response: As indicated in Chapter IV, Section 10 of the Draft and Final EIS, potential temporary increases in suspended solids or other pollutants in Miller and Des Moines Creeks from construction depend on several factors including the size of the construction area, proximity of potential receiving waters, soil type, slope, cover, and effectiveness of erosion and sediment controls (i.e., potential delivery of sediments). There is no conflict in the numbers identified on page IV.10-8 of the Draft EIS in lines 12 and 21. The apparent confusion between these numbers is that the first number refers to phase 1 construction activities, which would result in the disturbance of an estimated 193 acres. By contrast, the number on line 21 (249 acres) was the preliminary estimate of the total runway construction area. Revised estimated impact areas in each basin are presented in Table IV.10-7.

The discussion of potential construction impacts on water quality in Chapter IV, Section 23 of the Final EIS (Page IV.23-10) has been expanded to include potential impacts on surface water quality from activities at borrow source areas. Sediment yield estimates from sheet and rill erosion of fillslopes and cutslopes at construction and borrow sources area sites are presented in Table IV.23-6 of the Final EIS. Estimated sediment yields do not necessarily represent actual additional sediment loading received by Miller and Des Moines Creeks, but represent the total amount of material eroded from fillslopes and cutslopes. Only a portion of the sediments would actually reach the creeks. Actual loading to the creeks depends on the surface topography and the effectiveness of erosion and stormwater controls. Such controls would reduce erosion and the amount of eroded material delivered to Miller and Des Moines Creeks.

Estimated total annual sediment yields from borrow source areas and fill embankments combined, during, and up to one year after construction would range from between about 142 to 357 tons per year in the Miller Creek basin and about 120 to 300 tons per year in the Des Moines Creek basin, depending on the effectiveness of erosion controls. The range in estimated sediment yields depends in the effectiveness of erosion controls; lower values assume higher erosion control and higher values assume lower erosion control. As vegetation becomes established on fillslopes and cutslopes following

Comment R-18-13: *The Southwest King County Community Group asked if all applicable rules and guidelines would be followed for wetlands, creeks, aquifer and Underground Storage Tank impact.*

Response: All applicable Federal, state and local regulations and guidelines related to wetlands, creek headwater relocation, creek basin relocation, aquifer protection, and underground storage tanks would be followed. Currently, the Port of Seattle is negotiating an interlocal agreement with the City of SeaTac which would clarify the application and implementation of the Port versus the City regulatory provisions relative to the Master Plan Update improvements. See also response to comment R-7-28 concerning compliance with local critical areas protection policies.

Comments R-18-14: *The Southwest King County Community Group requested that the Draft EIS discuss minor impacts on public services and utilities and identify the water source for the projected increase in use. Also, the Draft EIS should address building a water reuse facility to satisfy the projected increase in demand, identify the completion date for construction of the domestic pumping system, and discuss sanitary sewer impacts under each alternative.*

Response: Minor impacts on public services and utilities are discussed on page IV.18-4 of the Draft and Final EIS. Public services and utilities provided by nearby cities and others would be affected slightly by changing airport demands. There would be little impact, either from displacement or interruption, on off-airport services provided by jurisdictions. No significant impacts are anticipated; therefore, further analysis of public services and utilities is not necessary.

The discussion of existing conditions for water usage discussed on page IV.18-1 of the Final EIS shows less increase in projected water use. Please see the revisions on page IV.18-2 of the Final EIS showing the estimated completion date for construction of the domestic pumping system.

Comment R-18-15: *A commentor notes concern that the Draft EIS does not mention that the Port will coordinate with the Seattle Water Department regarding implementation of a water conservation plan and relocation of the 36-inch Bow Lake water line. Comment was received from Ms. Batayola (Seattle Water Department).*

Response: The Final EIS was prepared to state that "the Port of Seattle would coordinate with Seattle Water Department for relocation of the 36-inch Bow Lake line. Relocation of the pipeline would comply with Seattle Water Department design requirements. Port of Seattle would reimburse Seattle Water Department for all costs associated with relocation, including staff time, construction coordination, and other costs directly associated with the relocation. In addition, Port of Seattle would coordinate with Seattle Water Department to implement a water conservation plan. Please see the new text on page IV.18-6 of the Final EIS.

Comment R-18-16: *Several commentors expressed concern that the Draft EIS does not discuss the issue of necessary street vacations west of the Airport or the extent to which the Port would abandon both off-site and on-site public services and utilities. Also, the Draft EIS does not identify the source for the projected increase in water use. Comments received from the Southwest King County Community Group, Mr. Frause, and Mr. Rohlfs (City of SeaTac).*

Response: The City of SeaTac and Port of Seattle recognize that implementation of the proposed improvements at the Airport would from time to time require that some street right-of-way be vacated and acquired by Port of Seattle. As a result, the City and the Port of Seattle executed a Memorandum of Understanding on May 26, 1993, which states that the City would exchange 42.7 acres of vacated street right-of-way for a 6-acre parcel owned by Port of Seattle. Currently, the City and the Port of Seattle are negotiating vacations on approximately 25 acres of right-of-way that provide access to property already owned by the Port.