3.0 EMISSIONS INVENTORY

Dispersion modeling was used to establish the current status of PSD increment consumption in HA64. Emission rates used in each of the modeled scenarios were based on the emission inventories that were compiled for the current date and the baseline date for each applicable pollutant. The following sections explain how the emission inventories were established, and describe the source types included in the inventories.

In the HA64 analysis of NDEP-regulated sources, Tetra Tech researched actual baseline emissions data and determined that the only available data were found in historical air permits. Available data were obtained from historical permit records because of the age of the information. The baseline data are from 1976 and 1977 unlike the Truckee River Corridor, which has more recent baseline dates. Therefore, the HA64 study compares permitted baseline emissions data to permitted current emissions data to determine the extent of increment consumption in HA64. When information about the startup date of a stationary source was not available, it was assumed that all the source's emissions consume increment. This method maximizes predicted increment consumption for that stationary source. Permitted emissions from 2000 and 2001 were used in developing the current date inventories for PSD triggered pollutants.

3.1 METHODOLOGY

Tetra Tech began the stationary source data search by reviewing various databases and other sources of information to gather names of facilities in HA64. Sources of information included the NDEP Paradox database and the NDEP permitting files for the major and minor baseline dates. The information gathered from the files provided a comprehensive background for stationary sources within HA64 for the emission inventories.

Tetra Tech searched for data on fugitive emissions by investigating the availability of information in EPA's NET Tier database. The NET Tier database includes information that is pertinent to the emissions study for HA64. The report provides annual area and point source emission totals for each county on a pollutant-by-pollutant basis, as well as information about the origin of the pollutant. The report organizes each source into one of 14 major Tier 1 categories, and further classifies the sources with one of 75 more detailed Tier 2 categories. Tetra Tech was able to identify railroad, vehicle, and miscellaneous fugitive emissions on a countywide basis with this information. Table 3-1 presents various data fields in the NET Tier report.

TABLE 3-1

EXAMPLE NATIONAL EMISSION TREND TIER REPORT FOR CURRENT LANDER COUNTY PM_{10} EMISSIONS

Tier-1	Tier-2	County	State	Area Source Emissions (tpy)
02-Fuel Comb. Industrial	01-Coal	Lander Co	NV	2
02-Fuel Comb. Industrial	02-Oil	Lander Co	NV	1
02-Fuel Comb. Industrial	03-Gas	Lander Co	NV	0.19
03-Fuel Comb. Other	02-Commercial/Institutional Oil	Lander Co	NV	0.03
03-Fuel Comb. Other	03-Commercial/Institutional Gas	Lander Co	NV	0.06
03-Fuel Comb. Other	05-Residential Wood	Lander Co	NV	21
03-Fuel Comb. Other	06-Residential Other	Lander Co	NV	0.46
05-Metals Processing	01-Non-Ferrous Metals Processing	Lander Co	NV	0
07-Other Industrial Processes	05-Mineral Products	Lander Co	NV	0
10-Waste Disposal & Recycling	01-Incineration	Lander Co	NV	2
10-Waste Disposal & Recycling	02-Open Burning	Lander Co	NV	10
11-Highway Vehicles	01-Light-Duty Gas Vehicles & Motorcycles	Lander Co	NV	4
11-Highway Vehicles	02-Light-Duty Gas Trucks	Lander Co	NV	3
11-Highway Vehicles	03-Heavy-Duty Gas Vehicles	Lander Co	NV	1
11-Highway Vehicles	04-Diesels	Lander Co	NV	19
12-Off-Highway	01-Non-Road Gasoline	Lander Co	NV	4
12-Off-Highway	02-Non-Road Diesel	Lander Co	NV	11
12-Off-Highway	03-Aircraft	Lander Co	NV	0.21
14-Miscellaneous	01-Agriculture & Forestry	Lander Co	NV	174
14-Miscellaneous	02-Other Combustion	Lander Co	NV	9
14-Miscellaneous	07-Fugitive Dust	Lander Co	NV	2235

The NET Tier database has been used to track fugitive emissions since 1985, when EPA promulgated the emissions reporting program (http://www.epa.gov/air/data). The NET Tier database search was completed for current SO_2 and PM_{10} emissions. The following sections present more details about stationary source and fugitive emissions.

3.2 STATIONARY SOURCE EMISSION INVENTORY

NDEP historical files, along with the NDEP Paradox database, provided lists of state-permitted facilities (NDEP 2000). Historical air quality permits for facilities in the study area at NDEP provided emission rates and source parameters for stationary sources for the baseline emission inventories. Major and minor sources were reviewed for HA64 for major and minor baseline dates. Additionally, major sources within a 50-km radius of the HA64 were reviewed for each of the inventories. Emission data gathered for the 1978 baseline year included primarily energy-generating sources and mining operations.

Emissions data for all known sources that currently exist were gathered to create the current inventory. The period for the current inventory is 2000 through 2001 because the databases used in the estimates of emissions have been largely updated with 2001 data. The current inventory is based on permitted emission rates. Tetra Tech assumed the source is increment consuming when information about the startup date of the stationary source was not available.

3.2.1 Nevada Division of Environmental Protection Stationary Source Data Collection

The Nevada State Legislature has full BAPC jurisdiction over all counties in the State of Nevada except for Washoe and Clark Counties but maintains jurisdiction over fossil fuel-fired steam generating electric plants in Washoe and Clark Counties. HA64 falls under the jurisdiction of BAPC. HA64 contains one major source, Sierra Pacific Power Company's Valmy Generating Station (Valmy). The only other major stationary source within a 50-km radius of HA64 is Coastal Chem Inc. There are several smaller stationary sources inside HA64 that were also included in the emission inventory and modeling analysis for this study.

To establish the stationary source inventory, BAPC emission source data, historical air quality permits, and recent annual emission inventories for SO_2 and PM_{10} were reviewed. Stationary sources located in HA64 were ranked according to permitted facility-wide annual emissions of SO_2 and PM_{10}. This procedure allowed Tetra Tech to identify the stationary sources that were major sources of a particular

pollutant. Source histories from the Title V operating permit program were also reviewed to determine permitted emissions for facilities. For Class II sources, available permits were reviewed for approval dates to identify facilities that should be included in a baseline inventory. For current scenario emissions, permitted emission rates for all stationary facilities that emit SO_2 and PM_{10} that were in operation during 2000 and 2001 were used.

After all stationary sources were accounted for and emission inventories for baseline and current scenarios were established, modeling-related source parameter data were gathered for each stationary source. The modeling parameters include emission rates for each point source, Universal Transverse Mercator (UTM) Zone 11 coordinates for emission points, stationary source fencelines, building locations, stack heights, stack diameters, stack gas exist velocities, and stack gas exit temperatures. Appendix C shows the stationary emission sources and parameters included in each baseline and current modeling scenario.

3.3 FUGITIVE SOURCE INVENTORY

Fugitive sources in HA64 were assigned to one of three categories: railroad, vehicle, and miscellaneous sources. Railroad emissions were apportioned into 1-km by 1-km grid cells based on the proportion of county railroad miles in the HAs and the total railroad miles traveled annually. Vehicle emissions were apportioned into the same grid cells based on the proportion of road miles in each grid cell and the total vehicle miles traveled annually in each grid cell. Miscellaneous fugitive emissions were distributed into the grid cells according to population density. Emissions from railroads, vehicles, and miscellaneous sources were then totaled to give a single emission rate for each 1-km by 1-km grid cell.

EPA's NET Tier database provided most of the data for the area source analysis. However, NET Tier only has data back to 1985. Because the baseline date for HA64 occurs in 1978, data representing the actual baseline date were not available. As a conservative screening level analysis, only current area sources were modeled, which maximized increment consumption predictions. The results showed that area sources do not contribute significantly to PSD increment consumption. If current area source emissions had contributed significantly, a more complete inventory of baseline emissions would have been developed and modeled. This refined analysis would be a less conservative and more accurate representation of how area sources contribute to the PSD increments. This step was not necessary for the HA64 area source analysis. The following sections explain the calculations of fugitive source emissions in more detail.

3.3.1 Railroad Source Analysis

Tetra Tech used a two-step process to calculate railroad emissions for each grid cell of HA64. The first step was to calculate emissions in the fraction of each county that makes up HA64. HA64 encompasses portions of 3 different counties. It is important to identify the counties through which railroads pass in HA64 because the emissions data available from the NET Tier database are organized by county. Railroad tracks in HA64 span portions of Elko, Humboldt, and Lander counties. The second step was to break down the emissions from the portion of each county that makes up HA64 even further by apportioning the emissions into 1-km by 1-km grid cells.

To accomplish the first step and calculate emissions in the fraction of each county that makes up HA64 ($RE_{countyfraction}$), Tetra Tech determined the total rail length in each county (RL_{county}), the length of railroad in the fraction of each county that makes up HA64 ($RL_{countyfraction}$), and the total railroad emissions for each county (RE_{county}). Spatial census data from the year 2000 was used to estimate RL_{county}. Next, $RL_{countyfraction}$ was computed for HA64 using GIS applications. Tetra Tech downloaded RE_{county} from the NET Tier database, and data for each pollutant and baseline date were extracted. The following equation shows how $RE_{countyfraction}$ for HA64 were calculated. The calculation was repeated for each county in HA64.

$$RE_{countyfraction} = RE_{county} \frac{RL_{countyfraction}}{RL_{county}}$$

The second step, apportioning $RE_{countyfraction}$ into the 1-km by 1-km grid cells in HA64 ($RE_{gridcell}$), required Tetra Tech to use $RL_{countyfraction}$, $RE_{countyfraction}$, and the rail length in each grid cell ($RL_{gridcell}$) in a calculation similar to that of the first step. $RL_{countyfraction}$, for each county area were determined for the first step, $RE_{countyfraction}$ for each county area were the results of the first calculation, and $RL_{gridcell}$ were determined using GIS applications. The equation below demonstrates how $RE_{gridcell}$ were calculated.

$$RE_{gridcell} = RE_{countyfraction} \frac{RL_{gridcell}}{RL_{countyfraction}}$$

Railroad source emissions calculations for the study area can be found in Appendix D.

3.3.2 Mobile Sources Analysis

The mobile source analysis for the increment study was a four-step process, including a data collection phase and three sets of calculations. The result of this process allowed vehicle emissions for each pollutant to be apportioned into the 1-km by 1-km grid cells used in the railroad analysis.

Data on vehicle miles traveled (VMT) and countywide vehicle emissions data for each pollutant were both needed for this analysis. First, Tetra Tech acquired annual VMT for Nevada from the 2000 Federal Highway Administration Highway Statistics publication (most recent publication) from the U.S. Department of Transportation (DOT 2000). VMT data were divided into three road types to account for their differing contributions to mobile source emissions: interstate, highway, and arterial street. Next, countywide vehicle emissions data for each pollutant were gathered from the NET Tier database for the year 1999 (most recent year in NET Tier).

The first set of calculations broke down VMT into road miles per county, HA, and grid cell. The VMT were also broken down into the three different road types. GIS techniques were used to apportion VMT data collected for Nevada into these area and road type categories. This set of calculations resulted in numeric values for:

- Interstate VMT for each county
- Highway VMT for each county
- Arterial Street VMT for each county
- Interstate VMT for each HA
- Highway VMT for each HA
- Arterial Street VMT for each HA
- Interstate VMT for each grid cell
- Highway VMT for each grid cell
- Arterial Street VMT for each grid cell

The second set of calculations broke down countywide vehicle emissions into HA-wide emissions for each road type using ratios. The ratio of HA VMT to county VMT for each road type was multiplied by the ratio of HA VMT per road type to total HA VMT. The product of these two ratios was then multiplied by countywide emissions to give HA-wide emissions per road type (Equation 1).

$$(1)\quad \frac{TotalHAVMT}{TotalCountyVMT} * \frac{HARoadTypeVMT}{TotalHAVMT} * CountyEmissions = HARoadTypeEmissions$$

The third set of calculations resulted in the final apportionment of all vehicle emissions into the 1-km by 1-km grid cells. A ratio of grid cell VMT to HA VMT was calculated for each grid cell and road type using the numeric values from the first set of calculations. These ratios were then multiplied by the HA-wide emissions for each road type derived from the second set of calculations to yield grid cell emissions for each road type (Equation 2). The emissions values in each grid cell for interstate, highway, and arterial streets were summed to calculate the total vehicle emissions present in each grid cell (Equation 3).

$$(2)\quad \frac{GridCellInterstateVMT}{HAInterstateVMT} * HAInterstateEmissions = InterstateGridCellEmissions$$

$$\frac{GridCellHighwayVMT}{HAHighwayVMT} * HAHighwayEmissions = HighwayGridCellEmissions$$

$$\frac{GridCellArterialVMT}{HAArterialVMT} * HAArterialEmissions = ArterialGridCellEmissions$$

$$(3)\quad \begin{array}{ll} & InterstateGridCellEmissions \\ & HighwayGridCellEmissions \\ + & \underline{ArterialStreetGridCellEmissions} \\ & TotalEmissionsForEachGridCell \end{array}$$

Mobile source emissions data tables and calculations are available in Appendix E.

3.3.3 Miscellaneous Sources Analysis

The miscellaneous source analysis for the increment study was a four-step process, including one data collection initiative and two sets of calculations, and GIS techniques. The result of this process allowed miscellaneous emissions for each pollutant to be apportioned into 1-km by 1-km grid cells.

Data for population density and countywide miscellaneous emissions for each pollutant were used in this analysis. To calculate emissions from miscellaneous sources for the 1-km by 1-km grid cells, Tetra Tech

first acquired countywide miscellaneous emissions data for each pollutant from the NET Tier database for the years 1999, the most recent data set available.

To apportion these emissions by population density, Tetra Tech collected census population data from the U.S. Census Bureau for HA64 (USCB 2001). Census block data were used to calculate population density because census blocks are the smallest unit of census geography. Using census block data, Tetra Tech was able to calculate population density in the study area.

The calculations distributed countywide miscellaneous emissions into each census block for the current emission inventory. Because countywide miscellaneous emissions were apportioned based on population density, a ratio of census block population to county population was needed. This ratio was then multiplied by the county emissions to apportioned them to each census block (Equation 4).

$$(4) \quad \frac{BlockPopulation}{CountyPopulation} * CountyEmissions = BlockEmissions$$

Using GIS techniques, the 1-km by 1-km grid cells were overlaid onto a map displaying population and emissions for each census block. Each grid cell was intersected with a specific census block, and the corresponding percentage of population was allocated to the grid cell. Emissions from miscellaneous sources were then distributed according to population density for each grid cell using GIS methods. Miscellaneous source emission calculations are shown in Appendix F.