BIOGENIC EMISSION INVENTORY FOR CLARK COUNTY, NEVADA

Prepared for:

Department of Air Quality and Environmental Management
500 South Grand Central Parkway
Las Vegas, Nevada 89155-5210

Contract No. 5500-04
PN 070206.0001

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February 24, 2006

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EXECUTIVE SUMMARY

A biogenics air emission inventory was designed and prepared that specifically applied to the land use and vegetative types in Clark County, Nevada. Clark County is characterized by the Mojave Desert, a low-rainfall, high-desert region of the American Southwest and also by the City of Las Vegas, an irrigated urban complex. Portions of Clark County, specifically around the Las Vegas Valley area, have been designated as non-attainment for ozone. Coupled with the non-attainment designation for Clark County is the requirement for the development of a State Implementation Plan (SIP) whereby the area must prepare an emission inventory, identify culpable sources, prepare control strategies or mitigation measures, and demonstrate attainment by the dates so mandated by the U.S. Environmental Protection Agency (EPA). The purpose of this study was to use biogenic emissions estimating tools available from EPA but to replace the land-use portion of the modeling tool with data more specific to Clark County, Nevada.

This report presents the derivation of a Clark-County-specific set of land use categories that are substituted in the Biogenic Emissions Inventory System (BEIS3) to better represent the land use in the area. The land use data set that is part of the BEIS3 Model is called the Biogenic Emission Land Use Data (BELD3) format set. The classifications of land use in the EPA default BELD3 data set that conform to the desert Southwest were found to be generic and generally not applicable to those species in the southwest U.S. For this study twenty-two rural or native vegetative types were selected in the rural portions of the county along with nine urban classifications that represented the urban complex of Las Vegas. Site surveys were used to identify dominant plant species and plant areal coverage in each land-use category. These categories along with a "barren" factor category were used to account for the open spaces between vegetation in the desert and were used to assign land use and land use combinations to each of over 19,000 1.0-km^2 grids that covered the County. The BEIS3v12 Model was updated to include these land-use categories by replacing the base BELD3 data with the Clark-County-specific data set and also generating a set of associated emission factors that were derived from the BEIS3v12 emission factors from identical or similar plant species.

The BEIS3 Model was then associated with a 2002 (annualized) and 2003 (episodic) MM5 Model meteorological data set over the same grid spacing on an hourly basis. The resultant isoprene, monoterpene, NO_x, and total VOC emissions were calculated for the whole county and presented in summary fashion in this report along with a summary presented in tables, figures, and ozone episodic analyses.

The Clark County-specific resultant isoprene, monoterpene, and total VOC emissions were calculated and compared to similar results if one used the BEIS3/BELD3 system with default land-use categories and emissions factors. In general, the isoprene, monoterpene, and total VOC emissions resulting from the Clark-County-specific land use were approximately 50 percent less than the default biogenics emissions. The NO_x emissions were somewhat higher both on an annual basis as well as an episodic basis. In comparing the magnitude of the biogenic emissions estimates to other emissions categories in Clark County (i.e., industrial sources, mobile sources, area sources), it was found that the biogenic VOC related emissions represent a large portion of the overall emissions total while the NO_x emissions only represent a small

fraction. Further investigation is recommended to establish emission factors for several of the desert species where data were sparse.

SECTION 1

INTRODUCTION AND OBJECTIVES

1.1 Introduction

The purpose of this document is to present the methodologies, rationale, models, data bases, and results of generating a biogenic emission inventory specific to Clark County, Nevada. The specificity was incorporated by replacing the land-use data (Biogenic Emissions Land-Use Data – BELD3) currently included in the Biogenic Emissions Inventory System (BEIS), Version 3.12 (BEIS3 v12), with land-use characterization more specific to the Clark County area. The current BELD3 data set was determined to be too generic in terms of vegetation representation and too national in scope and did not adequately consider the vegetative species nor the open ground between vegetation (barren ground) that occur in arid lands like those of Clark County. Thus, in the preparation of emission inventories for upcoming ozone non-attainment area modeling and consideration of various emission control strategies, use of the current land-use data built into the BEIS3v12 Model would potentially result in estimations of biogenic emissions that are not characteristic of either the rural or urban land areas in Clark County. The inventory herein was generated on the basis of an annualized inventory for the year 2002 and for a specific ozone episode in 2003 and consisted of gridded, temporally varying volatile organic compound (VOC) (multiple species) and nitrogen oxide (NO_x) emissions based on surveys performed of vegetation and soils, respectively.

1.2 Background

Under the authority of the 1990 Clean Air Act Amendments (CAAA) and as a result of comparing health effects for various time periods to the National Ambient Air Quality Standard (NAAQS), the U.S. Environmental Protection Agency (EPA) proposed a revised ozone NAAQS in 1997. The previous 1-hour standard of 0.120 ppm was replaced by a new 8-hour ozone standard set at 0.08 ppm. An area is deemed to attain the new standard when the 3-year average of the annual 4^{th}-highest daily maximum 8-hour concentrations is less than or equal to 0.08 ppm at each individual monitor.

In preparation for implementation of the new 8-hour standard, Clark County, Nevada has operated up to 17 ozone-monitoring sites for the past several years. In 2003, U.S. EPA, Region 9, sought input from States and counties regarding their prepared designations (attainment, non-attainment, or unclassified) based on historical ozone monitoring data.

A June 27, 2003 letter from Ms. Christine Robinson, Director of the Department of Air Quality Environmental Management (DAQEM) to Mr. Allen Braggi (Administrator of the Nevada Division of Environmental Protection) addressed this designation. A review of the ambient monitoring data for ozone indicated that the 3-year average 4^{th}-highest 8-hour concentrations at 14 ozone monitors were less than the 0.08-ppm standard, and that Clark County should be designated attainment/unclassifiable. A response was prepared and sent by the U.S. EPA Region 9 Administrator Mr. Wayne Nastri on December 3, 2003 to the Honorable Kenny Guinn, the Governor of Nevada, that Clark County be designated as attainment/unclassifiable. Mr. Nastri went to on to say that one monitor in Clark County brings the county close to a violation of the 8-hour ozone NAAQS and will be reviewed closely throughout 2003 and beyond. A follow-up letter on April 12, 2004 from Mr. Allen Braggi of the Nevada Division of Environmental Protection to Mr. Wayne Nastri of U.S. EPA Region 9 revised the earlier designation for Clark County to non-attainment for the 8-hour ozone standard based on such a review of the 2003 monitoring data.

Coupled with the non-attainment designation for Clark County will be the requirement for the development of a State Implementation Plan (SIP). As part of the SIP, area air planners must prepare an emission inventory, select ozone episode days for modeling, select and use a modeling methodology that incorporates the diverse nature of photochemical modeling along with atmospheric dispersion and transport over gridded areas, identify culpable sources, prepare control strategies and/or mitigation measures, and demonstrate attainment by dates mandated by EPA. Clark County is in the process of setting up such modeling, preparing such data bases, and performing compliance strategy modeling activities.

Under the 1990 CAAA, the use of photochemical grid models is required for areas designated as non-attainment in the preparation of their SIP. Information and data specific to Clark County are being prepared to fulfill the model requirements for emission inventories, land-use data, meteorology, and model options that characterize the area. The emission inventories must characterize all types and levels of emissions that could contribute to ambient ozone

formation such as on-road mobile sources, non-road mobile sources, landfills, municipal waste treatment plants, combustion boilers and heaters, industrial sources, and biogenic emissions.

1.3 Project Objectives

The main purpose of this project was to characterize the biogenic component of emissions contributing to the photochemical formation of ozone in Clark County. Biogenic emissions can be characterized as:

- Emissions of VOCs that are a result of biological activity from land-based vegetative species and are a direct function of climate, ground cover, and species

- Emissions of nitrogen oxides that result from microbial activity in soil and are a direct function of barren areas.

This purpose was accomplished through the following project objectives:

1. Develop a procedure to conduct the inventory and quantify biogenic emissions.

2. Conduct field surveys to characterize land use.

3. Build Clark County-specific land use data and weighted species emission files.

4. Use the most current version of the BEIS3v12 to generate emissions for an annual base case and a specific episodic case.

5. Prepare biogenic inventory summaries and data files.

The framework for this inventory was existing inventory components (maps, vegetative studies, emission factors, etc.), the current BEIS3v12 Model, DAQEM-specified modeling grid systems, and established dispersion modeling requirements for such completed data sets. Figure 1-1 shows a map of Clark County including the urban area of Las Vegas and its surrounding communities as the metropolitan center of the county, along with major roads and mountain ranges.

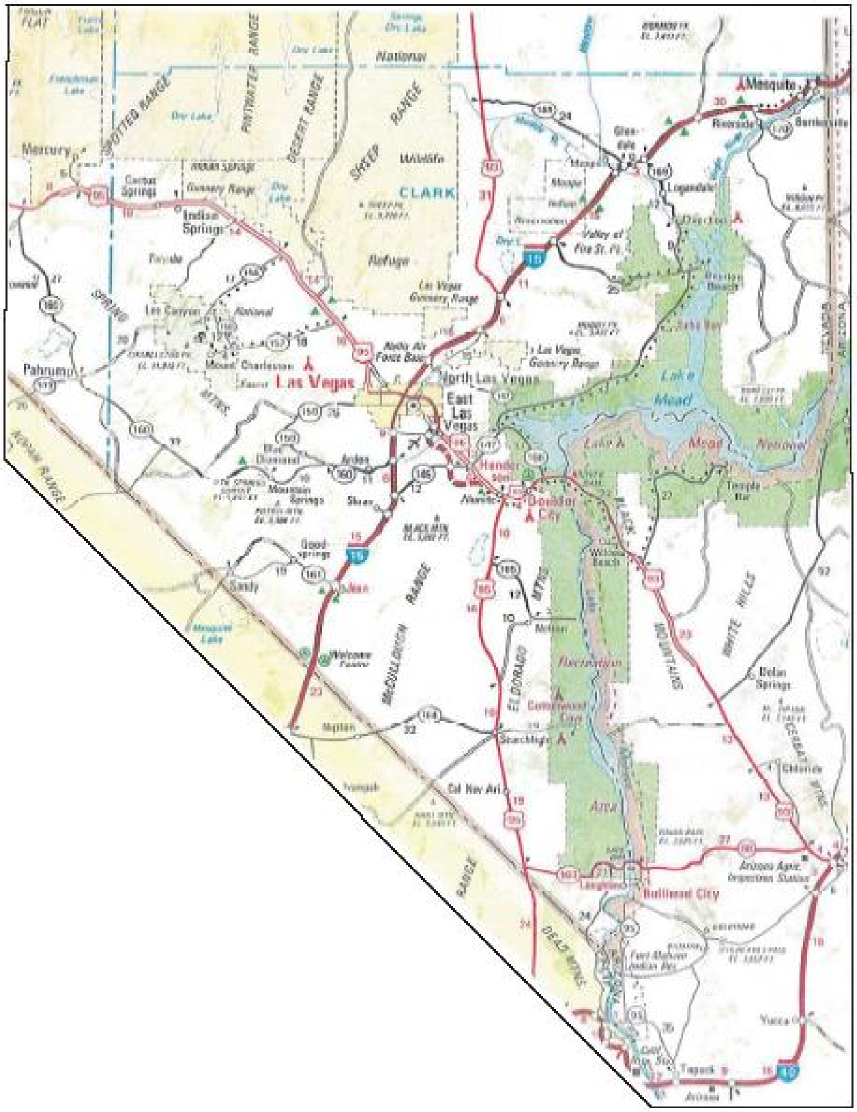

Figure 1-1. Map of Clark County Nevada

SECTION 2

METHODOLOGY

2.1 Background

The purpose of Contract No. 5500-04 for biogenic emission inventory development for Clark County was to develop an emission inventory more representative of biogenic emissions within the county than standard U.S. EPA emission estimating programs. The inventory consisted of multiple species of VOC emissions related to vegetative transpiration and other active living cycle processes as well as NO_x emissions related to soils. The main tool that was used for estimating these emissions is the BEIS3v12 Model (EPA 2004), which is available in a Linux operating system computer format. BEIS3v12 is a preferred U.S. EPA biogenic emissions estimating model that is a stand-alone module of the Sparse Matrix Operational Kernel Emissions (SMOKE) Model (Vukovich 2002). SMOKE is the primary emissions estimating tool for providing emission inventories for regional scale fine resolution modeling required to support air quality planning and photochemical modeling for ozone.

The importance of biogenic emissions has been established in other areas that are studying and attempting to meet the related current 1-hour and new 8-hour ozone NAAQS. Studies have shown biogenic emissions to be a large fraction of the potential VOC emissions in non-attainment areas. A similar large biogenic contribution to VOCs has not been confirmed for Clark County.

Biogenic emissions in the form of VOCs are reactive in the atmosphere under high temperature and high light intensity meteorological conditions, and are thus a contributor to ozone formation. Therefore, this biogenic inventory is very important in preparation for upcoming ozone modeling analyses in Clark County. This study went beyond that which could be provided using the standard current version of BEIS3v12 / BELD3. Clark-County-specific field surveying and ground truthing of vegetative species, biomass, and ground cover improved the land use data.

2.2 Overview

DAQEM had two primary objectives for this study.

- The first objective was to provide local specific and vegetative data for Clark County including all rural and urban areas for the entire county. This specific land use and vegetation data was derived from field studies and supporting documentation such as previous country wide studies, aerial photography, and botanical studies.

- The second objective was to generate a biogenic emissions inventory for all of Clark County, Nevada, for a base case and for a selected episodic event.

To accomplish these objectives, a stepwise procedure was developed using a combination of modeling and field survey tools and activities. These included:

- BEIS3v12 – Biogenic Emission Inventory System, Version 3.12 with multiple chemical species
- BELD3 – Biogenic Emissions Land-Use data, Version 3
- Mesoscale Modeling system (MM5) meteorological data sets
- Field surveys
- Revised land-use data.

2.2.1 BEIS3

The BEIS Model is a series of calculations used to estimate both VOCs that are a result of biological activity from land-based vegetative species and NO_x emissions that are a result of microbial activity from soils. BEIS3 is part of the SMOKE emissions modeling system. The first version installed as part of SMOKE was BEIS3v09, which required several primary inputs:

- Spatially and temporally resolved meteorological data including air temperatures, solar radiation, and surface pressure
- Spatially resolved, species-specific vegetation
- Species-specific or land-use-specific biogenic emission factors
- Species-specific or land-use-specific leaf area indices
- Chemical speciation profiles.

BEIS3v09 typically used the meteorological data derived from the Penn State/National Center for Atmospheric Research MM5 (Crell, et al. 1994), which consists of hourly gridded meteorological data. Emission factors in BEIS3v09 consisted of those for isoprene, monoterpene, NO_x, and other VOC (OVOC) factors. Inputs for the newest version of BEIS3, version 3.12 (BEISv12) are similar to BEIS3v09. The number of chemical species, however, has been expanded both in terms of the number of chemical species included in the emission factors and the number of species output by the model. The input emission factors used in the current

Clark County-specific modeling were derived by using those in the existing BEIS3v12 database for selected land use and vegetative species (Appendix A) and weighting them by the percentage that various species occurred in each land-use category. Appendix B contains the biogenic emissions derivation and directory setup for data transfer and use.

2.2.2 BELD3

BELD3 is a data set that consists of 1-km^2 resolution land use data for 230 different land-use types. The BELD3 data are aggregated and/or interpolated to any desired modeling domain and domain grid resolution and input into the BEIS3v12 model as a netCDF format file. This file was replaced in this project by a Clark County-specific land-use data base assembled from field surveys and existing land-use data.

The default BELD3 base case, LULC data, and comprehensive planning data plots were compared to each other. Ecosystem plots in Clark County were provided in the *Clark County Multiple Species Habitat Conservation Plan and Environmental Impact Statement* (RECON 2002). This Clark County study was a comprehensive spatial and plant-species-related study, which depended largely on the USGS Nevada GAP database that identifies 26 native plant communities in Clark County. This current study identified 22 native plant communities in Clark County; the difference of 4 communities is examined more fully in Section 4.3.24 Other Cover Types.

Electronic files with the coordinates of each polygon of aerial coverage were obtained from RECON in an ARCInfo® shape format and were used as a starting point for selecting major ecosystems/vegetative systems, characteristics, and extent. These were overlayed with a county-wide 1.0-km^2 coordinate system consistent with anticipated ozone modeling. Likewise, land-use polygon maps obtained from the Clark County Comprehensive Planning Department were used for the urban areas in Clark County. RECON polygons and land use descriptions were compared to the USGS GAP data for Nevada as well as to David Charlet's publications and field surveys. (Charlet, 2003) The assumption was made that the Nevada GAP data derived RECON polygons generally represent actual Clark County land use conditions for native plant communities and urban land use. Field surveys allowed the correction of minor discrepancies. Discrepancies in polygon areal coverage and locations were corrected and necessary polygon definitions adjusted.

The numbering of land use categories was sequential. As the reader reviews the results of the field surveys, it will become obvious that two numbers are missing in the sequential order. The R03 and R09 land use categories have been included in other major ecosystems. Land use

R03 was labeled “Blackbrush Grassland” and was combined into R08 “Mixed Scrub Grassland” as the resultant biogenic emissions and source plants were nearly identical. Thus, in modeling Clark County biogenics, R03 was dropped as a label and all R03 polygons were re-identified as R08 “Mixed Scrub Grassland”. Land use R09 was originally the “Urban” land use in RECON’s study in 2002. These areas were further divided from the original “Urban” land use into nine (9) distinct sub-category land-use types based on the Comprehensive Planning Department from the various municipalities in Clark County. Details and definitions of the nine urban land use types which replace the original R09 urban polygons are found in Section 4.4 Land Uses for Urban Areas in Clark County of this report.

2.2.3 Field Surveys

Field surveys were conducted to confirm locations and land-use types specified in more detailed ARCInfo data files provided by several sources. They were also conducted to determine and confirm the plant species in each land-use category as well as the percentage of land cover by each species.

2.2.4 MM5 Data

The MM5 data are those hourly, gridded meteorological data derived from the Penn State/National Center for Atmospheric Research Mesoscale Modeling System (MM5). For this analysis the gridded meteorological data for the annualized runs of BEIS3v12 were for a base year, 12-km^2 resolution modeling domain in which Clark County was wholly contained and for 2003 episode periods on 1.3-, 4.0-, 12.0-, and 36.0-km^2 resolutions.

2.2.5 Overall Approach

In specific terms, the overall project approach in a sequential fashion was to:

- Extract default BELD3 land-use data for categories applicable to Clark County to assess the default distribution and set of land-use categories that would be used by BEIS3v12 if specific data were not available.
- Plot this default land-use data graphically.
- Plot other land-use data sets from local studies including the RECON study of vegetative types, Clark County comprehensive planning, etc., in a similar format.
- Perform comparative reviews of the data to known observations.

- Conduct field surveys and species identification to supplement data for those regions where data are sparse (rural) or more detailed information is required (urban).
- Tabulate the field survey land use and vegetative species results and specify land-use categories by vegetative species types for Clark County.
- Use the weighting by plant species in each land-use type along with emission factors in the BEIS3v12 emission factor data base for the same or similar plant species to generate a new set of Clark County-specific emission factors.
- Implement new land-use categories and species-specific emission factor changes into BELD3 (as generated in revised netCDF files) and BEIS3 based on the surveys.
- Gather/create and implement MM5 meteorological data sets.
- Establish biogenic emissions scenarios for the base year of 2002 and for the June 28-July 6, 2003 episode period.
- Generate gridded, hourly emissions from the BEIS3v12 model.
- Plot the spatial emissions of VOC, NO, and other specific compounds for various temporal patterns and prepare graphs showing the emissions over time.

2.3 Modeling Domain

A coordinate system and a 1-km^2 resolution grid were used over all of Clark County for a total of about 19,000 cells in the county and over 63,000 cells including those outside the county to complete the overall grid. This was the base grid for the definition of the land-use data and was used throughout the analysis to both set up the land-use data as well as to convert available GIS data. This coordinate system was designed on the basis of the specification of also projecting the MM5 data onto a 1.0-km^2 grid over Clark County for the annualized emission calculations. The MM5 grid is based on a Lambert Conformal metric projection with a specified centroid in the central U.S. and specified north and south latitudes. Alternate grids were specified for the episodic modeling. Figures 2-1 shows the modeling domain with 1.3-, 4-, 12-, and 36-km^2 grid system. Figure 2-2 shows the modeling domain with the 1.3- and 4-km^2 grid systems.

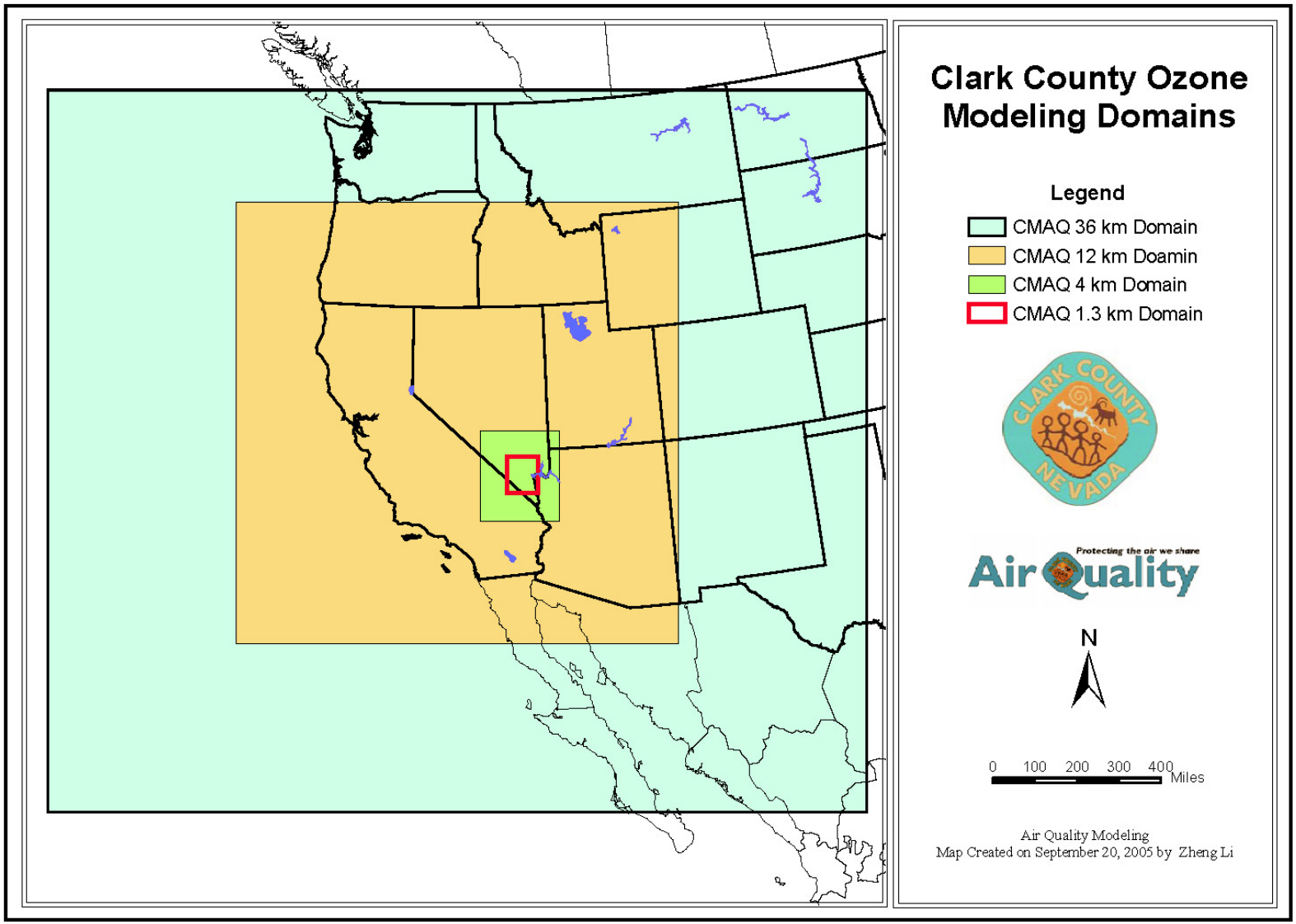

Figure 2-1. Modeling Domain Showing 1.3-, 4-, 12-, and 36-km^2 Grid Systems

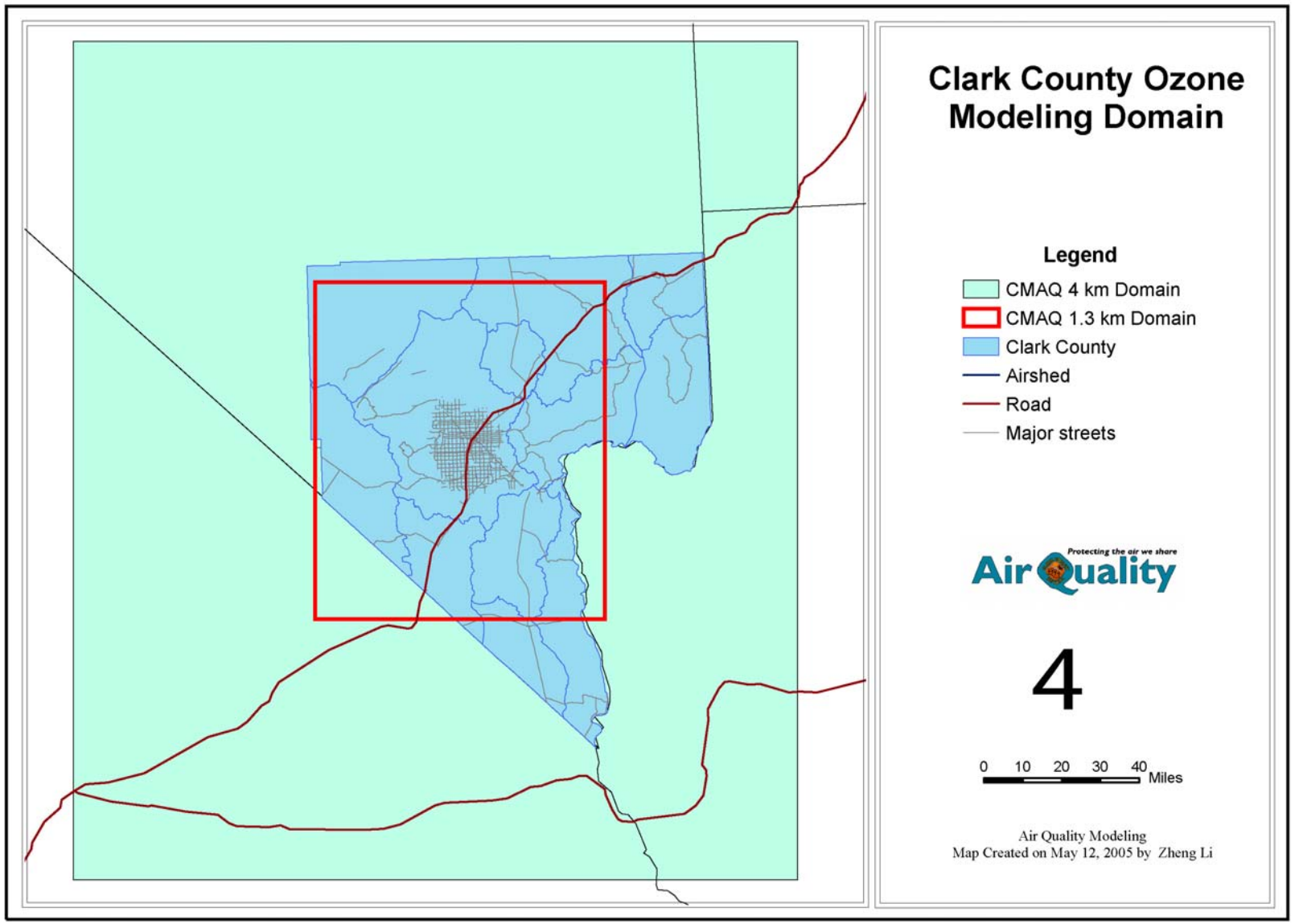

Figure 2-2. Modeling Domain Showing 1.3- and 4-km^2 Grid Systems

SECTION 3

FIELD SURVEYS

3.1 Overview

The BELD3 land use has 230 specific species or plant types that are defined, but many are for Eastern U.S. species or plant types that do not apply to the arid, desert-like climate of Clark County. Also, the urban portion of the BELD3 data does not contain the many non-native species of plants that have been introduced into the Las Vegas area. Thus, this survey included both a native land-use review component (which represents most of Clark County) and a non-native land-use review (for the urban areas).

The field surveys were conducted within the county by selecting subsets of specific ecological zones and vegetative types within the zones, as described in the RECON multi-species study. The ecosystems consist of 1) alpine, 2) bristlecone pine, 3) mixed conifer, 4) pinyon-juniper, 5) sagebrush, 6) blackbrush, 7) salt desert scrub, 8) Mojave desert scrub, 9) mesquite/catclaw, 10) desert riparian/aquatic, 11) springs, and 12) other (including agricultural and urban). The first 11 are native ecosystems where sub-delineated into a total of 25 unique plant communities or land use categories for the purposes of this project. The last is non-native species for the most part. Because these ecological zones have been previously and recently identified (RECON 2002), a certain homogeneity is assumed to persist over the geographical extent of each zone. The surveys were broken down into two components: the rural areas and the urban areas. The general surveying methodology for rural and urban was:

1. Selected the major land-use types based on previous and existing studies, planning, and data.

2. Set up spreadsheets of such categories identifying area covered, and available emission factors either by land-use type or associated plant species; compare areas of land-use types to determine those that predominate; factor in the emissions by biogenic pollutant type; and use these emissions and percent of overall area of Clark County to focus on key biogenic emission contributions.

3. Selected potential survey sites based on the use of ecosystem or urban area coverage maps (RECON polygon or comprehensive planning polygon land-use files), roadway

configurations, accessibility considerations, homogeneity of land-use types, review of aerial photographs from Fall 2003 for available areas, the knowledge of local staff and their liaison with David Charlet (Professor of Botany at the Community College of Southern Nevada), and previous windshield surveys. The number of sites reflected the variability expected in each area and the differences in climatology over similar land-use types but in different geographical regions of Clark County, and were demonstrated as statistically representative for each area and the overall area. Each potential site was marked on 1:100,000 scale map of Clark County, and UTM coordinates were assigned. These maps were used both for general location directions and for use with a Global Positioning System (GPS) unit to determine specific locations.

4. Refined the field survey techniques, and field tested the surveys prior to assembly in Clark County, and then field tested them in Clark County.

5. Prior to field team disbursement to selected sites, visually inspected potential sites from automobile and on foot over a 1- to 2-day period. Review of Clark County and U.S. roads indicated a drive through most areas was possible. Higher elevation ecological zones in the Spring Mountains (the Alpine and Bristlecone zones) were inaccessible by automobile and required visual assessment by foot path. These areas were small in comparison to other zones, and a representative evaluation was possible with limited temporal and spatial coverage.

6. Conducted a pre-survey by all field team members to confirm the tools, methods, recording, and logistics to be used. The overall field coordinator used this opportunity to address inconsistencies and differences. All participants were made aware of the Health and Safety Plan requirements and conditions. This first survey provided the "calibration" of all field crews.

7. Initiated rural field surveys. Approximately 12 days of field surveys were conducted in the rural portion of Clark County. With two three-person teams conducting the surveys, a combined survey and commute time of 2 to 3 hours per site, and approximately 10 hours of light per day, approximately 70 surveys were conducted. These surveys were allocated to various ecosystems/vegetative types on the basis of the factors described in Steps 2 and 3. Ten percent of the sites were resurveyed by the survey team leader, and differences and similarities quantified.

   At the end of each day, the field staff met to review problems, concerns, etc. At the midpoint of the surveys, a field staff meeting was held in the evening to confirm any additional problems, review the Quality Assurance (QA)/Quality Control (QC) survey comparison results, and monitor the schedule. If work was ahead of schedule, additional sites (pre-selected) were assigned. All rural field surveys were compiled daily and at the end of the surveying period. Photographs of each overall site as well as major plant communities were taken.

8. Initiated urban field surveys. Similar to its rural counterpart, two teams of three persons conducted the land-use, vegetative type surveys for up to eight urban classifications. Because commute periods over the urban area were reduced compared to its rural counterpart, the number of urban surveys that can be accomplished in an 8-day period

were greater. The number of surveys in the urban area was approximately 50, including time allocated for duplicity of 10 percent of the sites for QA/QC purposes. The same end-of-day and mid-week protocol was followed for these surveys that were done in the rural surveys.

3.2 Detailed Procedures

A series of 40-m x 40-m quadrats was established in the various vegetative ecotypes (RECON 2002) and in the urban landscape (Yarwood and Lee 1997). Quadrats will be subdivided into subquadrats according to compass directions (Dallmeier et al. 1992). Dominant species were identified and characterized according to distribution in the subquadrats. Percent land coverage of each of the dominant and co-dominant species was recorded onto field sheets based on gross ocular estimates. Appendix C contains an example of the field data sheets that were completed. Estimations of plant species' relative biomass densities were determined by the average for all quadrats surveyed within each vegetative ecotype, or Clark-County-specific land-use category.

3.2.1 Equipment

The following equipment was used during the field survey:

- Two 50-meter metric measuring tapes
- 9 stakes of flags
- Compass
- Flagging tape
- GPS hand unit
- Field data sheets
- Field data sheet quad map
- Digital camera.

3.2.2 Methodology

Rural Locations:

For most areas located within the rural landscape, the methods listed below were utilized for characterizing the landscape and determining plant distribution and relative densities (Yarwood and Lee 1997). For rural landscapes, 25 land-use categories specific for Clark County have been identified for the purposes of this field survey and the final modeling report (RECON 2002).

The rural land-use category types included: Alpine, Blackbrush, Blackbrush-Grassland, Hopsage, Bristlecone Pine, Creosote-Bursage, Mojave Mixed-Scrub, Mojave Grasslands, Agricultural, Barren, Lowland Riparian, Mesquite, Cat Claw, Mixed Mountain Scrub, Pinyon Pine, Pinyon-Juniper, Juniper, White Fir, Ponderosa Pine, Ponderosa-Mountain Scrub, Sagebrush, Pinyon-Juniper Grasslands, Sagebrush-Grasslands, Playa, and Salt Desert Scrub, and water. Four of these were later combined with other categories because they were insignificant or not confirmed. These included Blackbrush Grassland, Cat Claw, Juniper, and Pinyon-Juniper Grassland.

Each land-use category was systematically surveyed to determine an average foliar coverage or relative density based on gross ocular estimates. Key technical staff using RECON data and current GIS information predetermined the survey locations. Figure 3-1 details the predetermined land survey rural location. No surveys of water land use were performed.

To begin the survey, the center was identified and a GPS unit was used to record the location of the center point (Figure 3-2). A stake was driven into the ground at the center point. Surveying to establish subquadrat corners proceeded from the center of the plot outward to eliminate errors. Subquadrats were determined by measuring north and south 20 m from the center point, and east and west 20 m from the center, with the help of a compass. Stakes or flags were used to indicate corners.

Again from the center of the quadrat, the hypotenuse of each subquadrat was measured out at 45 degrees between the cardinal lines already measured above using a metric tape to a length of 28.3 m and stakes driven to identify quadrat corners. Figure 3-2 provides an overview of the 40 m x 40 m quadrat with 4 subquadrats marked A, B, C, and D (or NW, NE, SW, and SE, respectively).

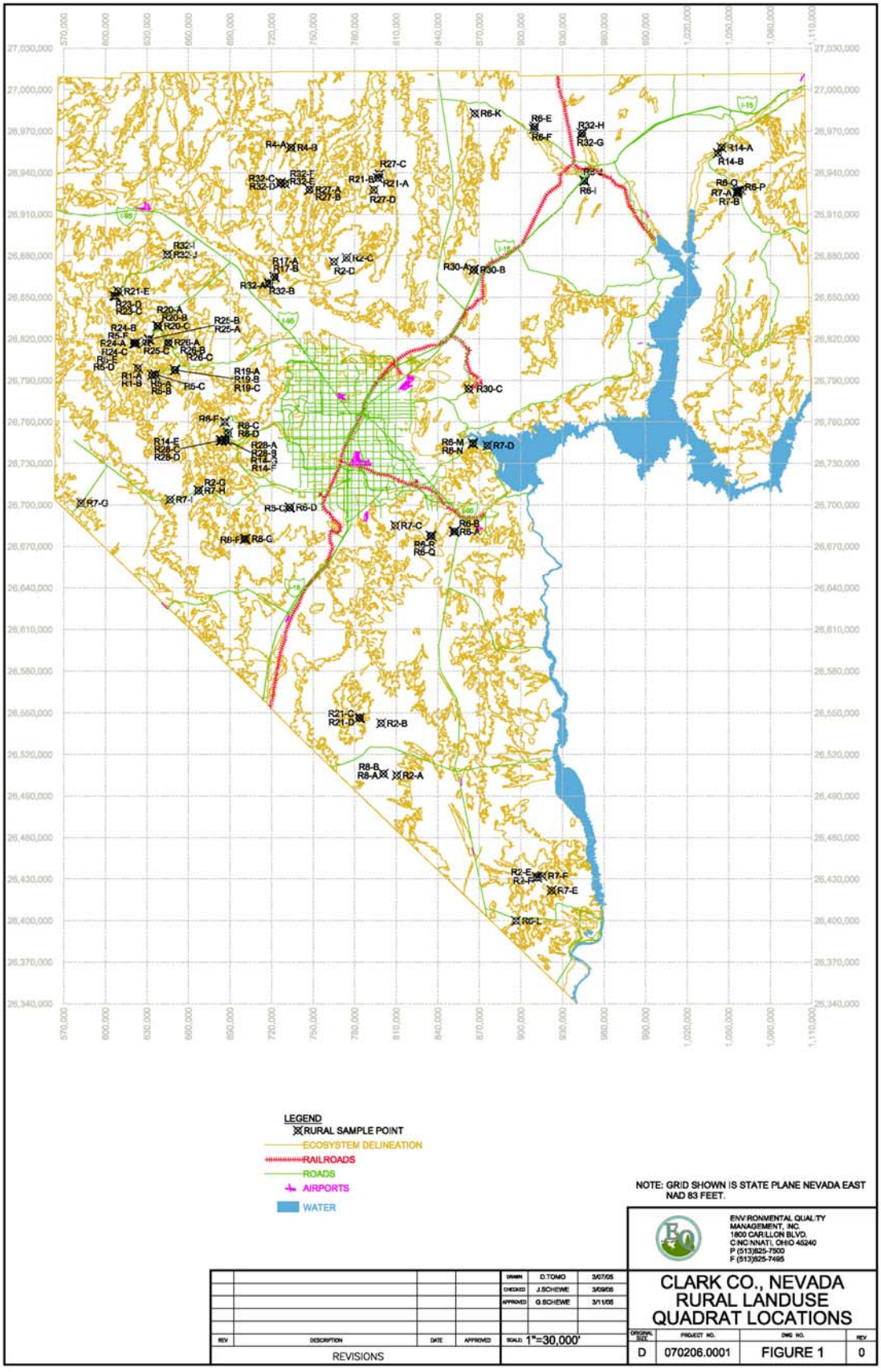

Figure 3-1. Rural Field Survey Locations

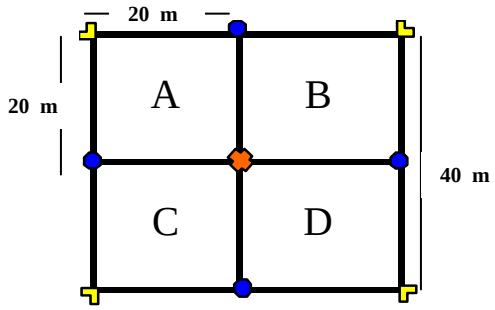

Figure 3-2. Quadrat and Subquadrat Establishment
Subquadrats are marked A, B, C, and D. Quadrat is 40 m^2.
Each Subquadrat is 20 m^2.

Urban Locations:

For most areas located within the urban landscape, the same methods listed above were used for characterizing the landscape and determining plant distribution and relative densities, except in the case of residential areas (Yarwood and Lee 1997). Land-use maps from the Fall 2003 Clark County Comprehensive Planning Department as well as other existing urban land-use maps were used to provide initial data for determining urban quadrat locations.

For urban landscapes, nine land use categories specific for Clark County were identified for the purposes of this field survey and the final modeling report. These categories included Industrial, Light Industrial/Office, Suburban Residential, Urban Residential, Rural Residential, Public Facility/Parks, Commercial, Major Development Area, and Right-of-Way.

In residential areas, the dimensions of the yards, houses, and streets within a quadrat were measured using a laser range finder. Species were identified within the subquadrats, and plant distribution was characterized and recorded on field data sheets. Quadrats were not staked or flagged in residential areas, but were quantified from the road using a remote laser measurement system (Yarwood and Lee 1997). Figure 3-3 identifies the predetermined urban field survey locations.

Data Collection:

Identification of dominant plant species' began as soon as the corner stakes of the quadrats were set. Dominant species were identified by predetermined vegetative ecotypes. A

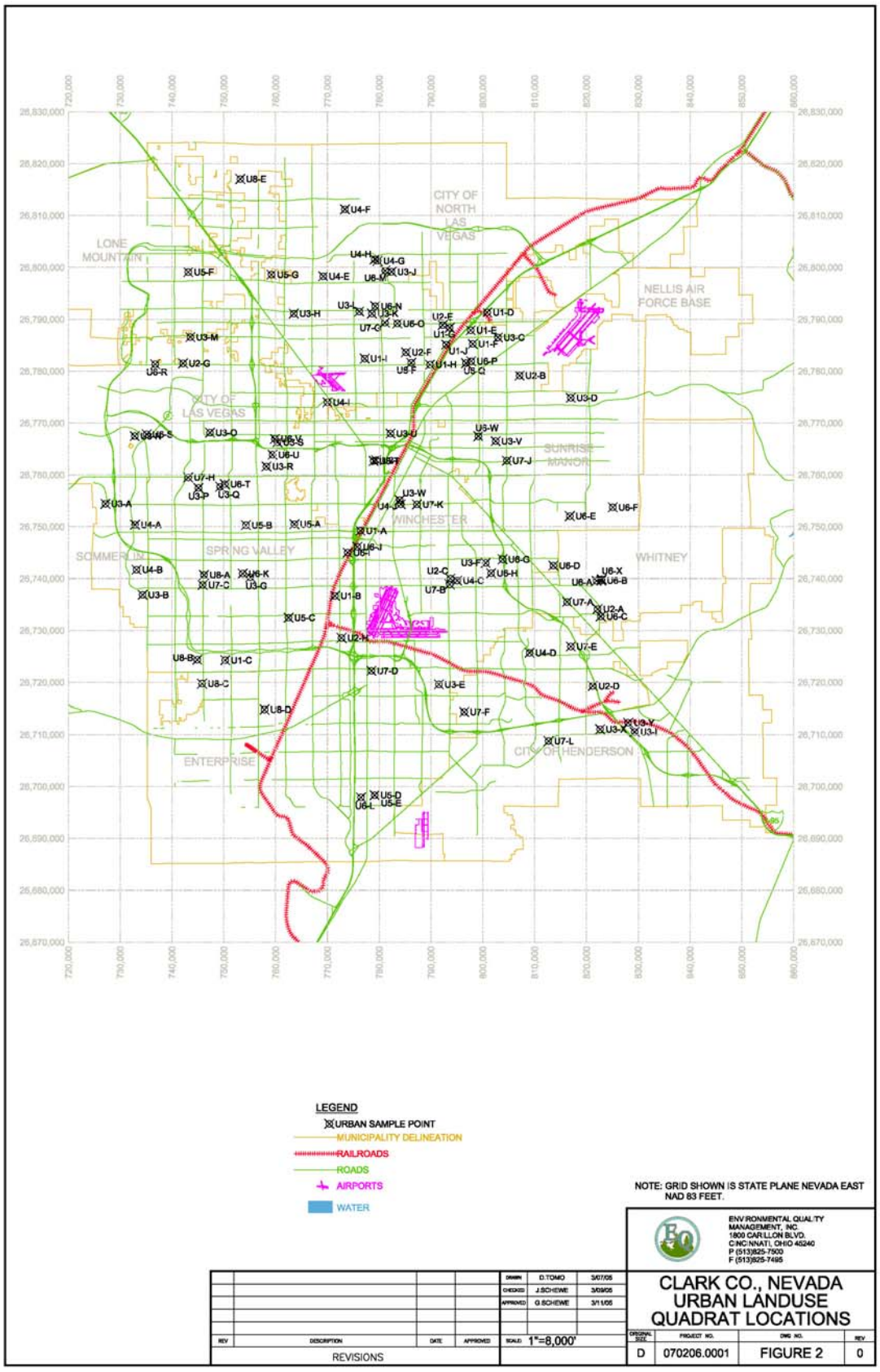

Figure 3-3. Urban Field Survey Locations

percent coverage of each of the dominant species was estimated and recorded on the field data sheet for each subquadrat, using a gross ocular percent coverage estimate of ±5 percent. For example, a field technician may estimate that subquadrat SW for quadrat #17 contains approximately 36 percent coverage by *Acer rubrum*, Red maple. The field technician then entered 30 to 40 percent coverage of the subquadrat by *A. rubrum* onto the field data sheet.

In addition to estimating percent coverage and identifying plants in the quadrats, field technicians measured diameters of the canopy of plants at the dripline, mapping each plant species on the field data sheet quad map. This helped the field survey team to quantify a two-dimensional relative biomass density for each of the dominant species of plants existing within a given vegetative ecotype. The technician visually located the positions of the plants and recorded them on the preprinted grid forms on the data sheet quad map (Figure 3-4).

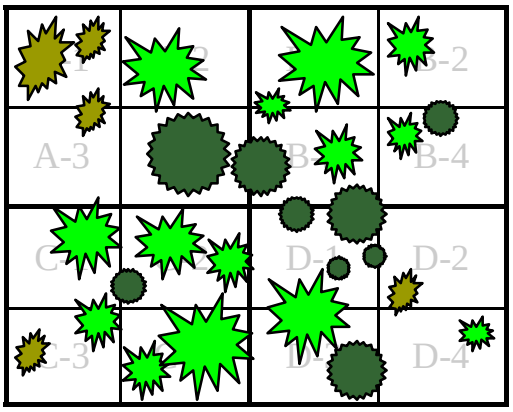

Figure 3-4. Example of Quadrat Mapping. Empty areas are barren, or otherwise noted on data sheet map. Three (3) species are indicated: a dominant ( ), and 2 co-dominant species (&).

There was one map per quadrat for all dominant and co-dominant species for the new land-use category or vegetative ecotype.

All subquadrats contained recorded data before the field technician team moved to the next quadrat location. Resultant data from surveys were checked with satellite photography for individual land-use categories and vegetation ecotypes.

SECTION 4

RESULTS OF FIELD SURVEY

4.1 Introduction

The purpose of these field surveys was to characterize plant species' distribution and plant biomass density for different geographical areas and vegetative ecotypes in Clark County, Nevada (Yarwood and Lee 1997). Data acquired from this botanical survey helped to redefine land use categories, which were used in modeling biogenic emission rates via BELD3/BEIS3. This botanical survey focused on the dominant species of trees, woody shrubs, and grasses for each vegetative ecotype and geographical location (RECON 2002), because these tended to dominate vegetative biogenic emission inventories (Yarwood and Lee 1997).

4.2 Summary of Methods

The botanical field survey of Clark County was fundamental to the approach for providing the DAQEM with Clark County-specific biogenic emissions modeling via BELD3/BEIS3. This survey was not intended to be a complete vegative study of Clark County, but was a means to redefine the land-use categories for the BEIS3 model. New land-use categories for BEIS3, specific for Clark County, were created based on RECON's 2002 EIS report on the vegetative ecosystems in the county and the field survey, herein. The data and results of the field surveys enabled a more accurate characterization of the Clark County land-use categories for the rural vegetative ecosystems as well as for the urban landscape (Geron, et al. 1994).

The field survey team identified suitable locations for performing ground surveys based on the most recent and available electronic land-use data and satellite imagery for both the rural and urban geographic locations. The field survey team traveled to the pre-identified sample locations and performed the field survey according to the methodology provided in Section 3. Data collected included species distribution and relative biomass densities (Yarwood and Lee 1997). Surveys were conducted on public property whenever possible. Private land owners and

land managers of public areas were contacted prior to the field survey in order to obtain permission to use their sites for the purposes of the survey.

A series of 40-m x 40-m quadrats were established in the various vegetative ecotypes (RECON 2002) and in the urban landscape at the pre-identified sampling locations (Yarwood and Lee 1997). Dominant species were identified and characterized according to distribution quadrats. Percent land coverage of each species was recorded onto field sheets based on gross ocular estimates. Estimations of plant species' relative biomass densities for a particular land use or vegetative ecotype were thus determined by the average for all quadrats surveyed within each of that particular vegetative ecotype, or Clark County-specific-land-use category.

This project conducted the botanical survey of Clark County's various vegetative ecotypes and land uses in two phases. The first phase of the field survey focused entirely on rural land-use coverage, or the natural plant communities of Clark County, and was conducted in November of 2004. The second phase of the field survey, conducted by EQ in late January and early February of 2005, focused largely on the urban and developed portions of Clark County, with some additional sampling in the natural plant communities of the rural areas.

The following subsections summarize the existing plant communities of Clark County as well as land use in the urban and developed areas. The natural plant communities (Plant Communities of Clark County), also referred to as vegetative ecotypes, are detailed in a separate segment of this summary than the land categorized as urban (Land Uses for Urban Areas in Clark County). Each vegetative ecotype or land use is described in detail based on existing literature. The Rural landscape represents approximately 4,848,9790 acres of Clark County, or approximately 95.88 percent of the county's land area. The Urban landscape is represented in approximately 208,690 acres of Clark County, or approximately 4.12 percent of the county's land area. The areas included in the urban landscape of Clark County for the purposes of this study include all core urban areas, rural residential developments, roads, highways, and other areas traditionally classified as urban in land management planning. For more details on the urban landscape classification, see Section 4.4 of this report. Figure 4-1 illustrates the spatial relationship between the rural and urban landscape in terms of acreage and percentage.

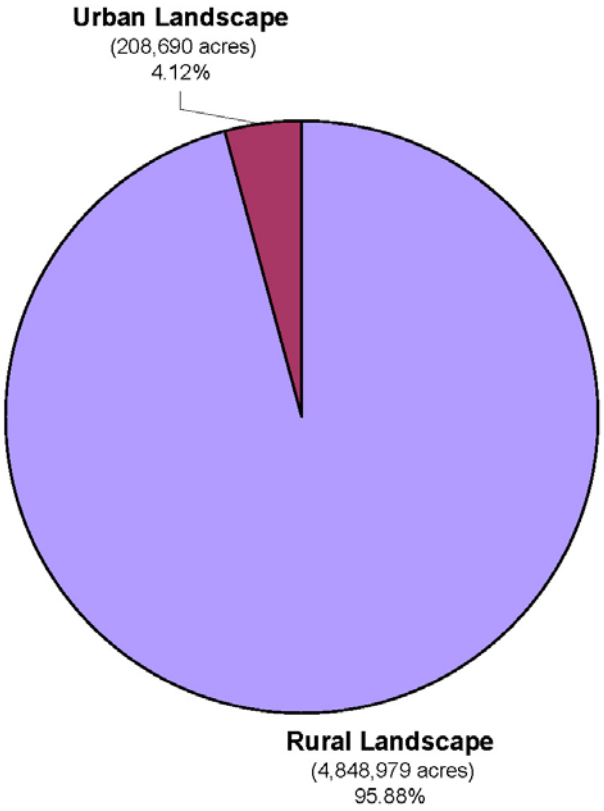

Figure 4-1. Comparison of Rural and Urban Land-use Coverage in Clark County, Nevada

The vast majority of Clark County is rural desert and mountains, and much of the county is reserved as public lands, parks, monuments, wildlife areas, and wilderness. The concentration of total quadrats sampled, however, was divided evenly between the urban and rural landscape at the request of DAQEM prior to engagement in any field studies. The rational for balancing the concentration of survey resources between rural and urban was founded in that the low atmospheric ozone monitor which flagged Clark County as non-compliant for EPA ozone standards, was located within the urban core of the Las Vegas Valley. It was therefore DAQEM's concern that sources of biogenic emissions could potentially be high in the Las Vegas Valley.

One of the purposes of this study was to quantify and qualify existing land use coverage delineations and to make adjustments in representative polygons in ArcView, where necessary. Over 200 quadrat surveys were conducted. Both the urban and rural landscapes received approximately 100 surveys each, distributed among the various Clark County-specific land use categories. The distribution of the total quadrats sampled was assigned according to pre-survey biogenic emission estimations. The project encompassed 32 land-use categories, 22 were rural,

9 were urban, and 1 consisted of all the areas outside of the Clark County limits. Figure 4-2 illustrates the approximate percent coverage of each land-use category in Clark County.

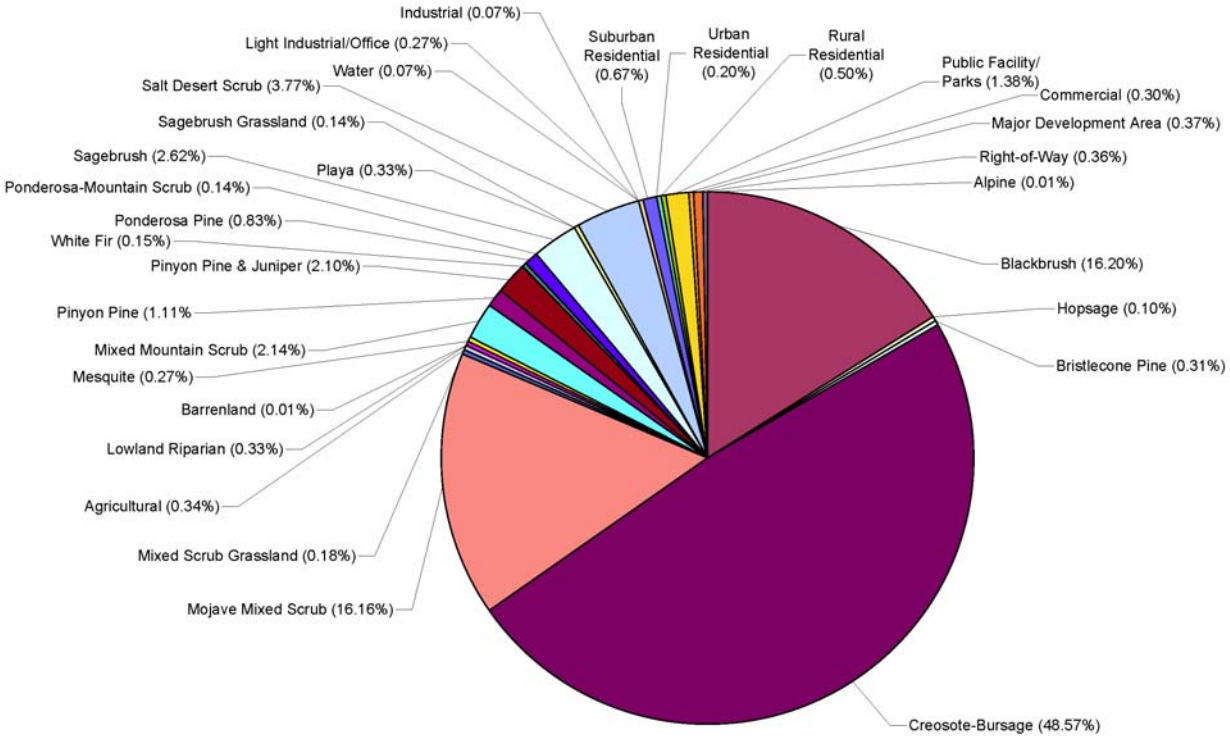

Figure 4-2. Clark County Land Use Coverage

Actual acreage and the percent of the overall county for each land use category can be found in Sections 4.3 and 4.4, which also briefly describe each of the 32 land use categories utilized in the modeling domain for Clark County's biogenic inventory.

4.3 Rural Plant Communities and Land Use Categories of Clark County

For rural landscapes, 22 land use categories specific for Clark County were identified for the purposes of this field survey and the final modeling report. The land use category types (less the urban land-use categories) include: Alpine, Blackbrush, Hopsage, Bristlecone Pine, Creosote-Bursage, Mojave Mixed Scrub, Mixed Scrub Grassland, Agricultural, Barrenland, Lowland Riparian, Mesquite, Mixed Mountain Scrub, Pinyon Pine, Pinyon Pine & Juniper, White Fir, Ponderosa Pine, Ponderosa-Mountain Scrub, Sagebrush, Sagebrush Grassland, Playa, Salt Desert Scrub, and Water. The Rural landscape represents approximately 4,848,9790 acres

of Clark County, or approximately 95.88 percent of the county's land area. Each is described in the following subsections.

4.3.1 Alpine

The distribution of the Alpine community in Clark County is found exclusively in the high elevations of the Spring Mountains, along the highest ridge from Griffith Peak in the south, through and including Charleston Peak, north and east to Mummy Mountain, above 10,000 feet in elevation. The vegetation is largely high-elevation herbaceous tundra vegetation, including forbs, sedges, grasses, and shrubs. Forb species represented include G*eum Rossii* (Ross Avens), *Silene acaulis* (Moss Campion), *Aquilegia scopulorum* (Rock Columbine), *Potentilla cryptocaulis* (Cinquefoil), *Dodecatheon jeffreyi* (Alpine Shooting-star), *Eriogonum* spp. (Buckwheats), and *Draba* spp. (Alpine Drabas). Principal shrub species include *Salix* spp. (Sedges), *Potentilla* spp. (Cinqeufoils), and *Vaccinium* spp. (Huckleberry). Associated tree species include *Pinus flexilis* (Limber Pine) and *Pinus longaeva* (Bristlecone Pine). The Alpine community, or land-use type, is represented in approximately 500 acres of Clark County, or less than 0.01 percent of the overall landscape.

4.3.2 Blackbrush

Broad swaths of the Blackbrush community type ring the entire Spring Mountains, Virgin Mountains, and Sheep Range. In addition, Blackbrush is mapped as continuous from the lower slopes of the Ivanpah Valley, west of the McCullough Range, east through Searchlight, and into most of the western slopes of the El Dorado Range and upper bajada of the Gold Butte area. Blackbrush is typically a transition vegetation community between Mojave and Great Basin shrublands between 4000 to 5000 feet, in a latitude transition area north of Creosote-Bursage, with the dominant plant species being C*oleogyne ramosissima* (Blackbrush). Primary tree species include *Juniperus osteosperma* (Utah Juniper), *Pinus monophylla* (Pinyon Pine), *Acacia greggii* (Catclaw), and *Yucca brevifolia* (Joshua-Tree). *Coleogyne ramosissima* (Blackbrush) dominates the shrub layer of this community, with other shrub species including *Grayia spinosa* (Hopsage), *Ephedra* spp. (Mormon Tea), *Atriplex confertifolia* (Shadscale), *Agave s*p. (Century Plant), *Lycium* p*allidum* (Wolfberry), *Gutierezia* spp. (Snakeweed), and *Larrea tridentata* (Creosote Bush). The Blackbrush community, or land-use type, is represented in approximately 819,500 acres of Clark County, or 16.20 percent of the overall landscape.

4.3.3 Hopsage

Hopsage communities are uncommon and small in Clark County and occur largely on the lower *bajada* of the western slope of the Sheep Range, the upper *bajada* of the north slope of the Spring Mountains, and the southern tip of the El Dorado Mountains northwest of Searchlight. Small patches are mapped, but not verified on both the east and west slopes of the southern portion of the McCullough Mountains. The Hopsage community is a transition shrubland, typically between Mojave and Great Basin ecosystems in the northern reaches of the Mojave and the southern fringe of the Great Basin. Hopsage shrubland is characterized by the occurrence of the species *Grayia spinosa* (Hopsage), typically in concert with *Lycium pallidum* (Wolfberry), C*hrysothamnus* spp. (Rabbitbrush), *Ephedra* spp. (Mormon Tea), and *Atriplex confertifolia* (Shadscale). Other shrub species typically found growing in this plant community include *Artemisia* spp. (Sagebrush), *Coleogyne ramosissima* (Blackbrush), *Krascheninnikovia lanata* (Winterfat), *Krameria parvifolia* (Ratany), *Ambrosia dumosa* (Bursage*),* and *Larrea tridentata* (Creosote Bush*)*. The Hopsage community, or land-use type, is represented in approximately 5,200 acres of Clark County, or 0.10 percent of the overall landscape.

4.3.4 Bristlecone Pine

The high elevations of the Spring Mountains and Sheep Range, from 9000 to 11,500 feet, are the only Clark County locations where Bristlecone Pine forests are mapped. In the Spring Mountains, this community is restricted to the highlands between Wheeler Pass in the north and Lovell Pass in the South. In the Sheep Range, these stands are mapped as occurring along the main ridge between Sheep Peak in the south and Hayford Peak in the north. Additional, larger stands are mapped northwest of Hayford Peak in the vicinities of Sawmill Spring and Perkins Spring. This conifer-dominated plant community largely consists of *Pinus longaeva* (Bristlecone Pine) with several other primary associated tree species including *Pinus flexilis* (Limber Pine), *Abies concolor* (White Fir), and *Pinus ponderosa* (Ponderosa Pine). Several shrub species are also found growing in association with the Bristlecone Pine community including *Juniperus communis* (Common Juniper), *Artemisia tridentata* var. *vaseyana* (Big Sagebrush), *Symphoricarpos* spp. (Snowberry), and *Ribes* spp. (Gooseberry) The Bristlecone Pine community, or land-use type, is represented in approximately 15,800 acres of Clark County, or 0.31 percent of the overall landscape.

4.3.5 Creosote-Bursage

Creosote-Bursage is the most widely distributed vegetation community in Clark County. Creosote-Bursage occurs widely within the Mojave Desert in valley bottoms, lowlands, and flatlands of mild slope, and is usually found below 3000 feet in elevation. This particular plant community is host to the largest diversity of annuals and wildflowers of any plant community in Clark County. Creosote-Bursage is a scrubland principally dominated by *Larrea tridentata* (Creosote Bush) and *Ambrosia dumosa* (Bursage). Primary shrub species associated with the Creosote-Bursage community include *Coleogyne ramosissima* (Black Brush), *Ephedra* spp. (Mormon Tea), *Atriplex confertifolia* (Shadscale), *Agave* sp. (Century Plant), *Grayia spinosa* (Hopsage), *Lycium* spp. (Wolfberry), *Krameria parvifolia* (Ratany), *Hymenoclea salsola* (Burrobush), *Prosopsis glandulosa* (Honey Mesquite), *Psorothamnus fremontii* (Indigo Bush), *Encelia farinosa* (Brittle Bush), *Opuntia* spp. (Prickly Pear), *Echinocactus* spp. (Manyheaded Barrel-cactus), *Echinocereus* spp. (Hedgehog-cactus), and *Ferocactus acanthodes* (Barrel-cactus). The Creosote-Bursage community, or land-use type, is represented in approximately 2,456,000 acres of Clark County, or 48.57 percent of the overall landscape.

4.3.6 Mojave Mixed Scrub

Mojave mixed scrub also is widely distributed across Clark County, occurring typically on slopes, washes, or upland areas within the Mojave Desert between 3000-4000 feet, with some variability. Often this plant community is the transition area between Creosote-Bursage in the valleys and Blackbrush communities on the lower slopes of mountains and is thus represented throughout the county on all slopes and aspects. The two largest areas mapped are on the low elevations of the *bajada* on the western slopes of the Sheep Range, and at the upper *bajada* of the north slope of the Spring Mountains, near the Clark/Nye County line. Mojave Mixed Scrub is characterized by the occurrence of *Larrea tridentata* (Creosote Bush), in association with several other species including *Ambrosia dumosa* (Bursage), *Lycium* spp. (Wolfberry), A*triplex confertifolia* (Shadscale), *Grayia spinosa* (Hopsage), *Krameria parvifolia* (Ratany), *Ephedra* spp. (Mormon Tea), and often *Yucca brevifolia* (Joshua Tree). Other associated shrub species include *Coleogyne ramosissima* (Blackbrush), *Agave* sp. (Century Plant), *Encelia farinossa* (Brittle Bush), *Hymenoclea salsola* (Burrobush), *Psorothamnus fremonttii* (Indigo Bush), *Echinocereus* spp. (Hedgehog-cactus), *Opuntia* spp. (Prickly Pear), and *Yucca baccata* (Datil

Yucca). The Mojave Mixed Scrub community, or land-use type, is represented in approximately 817,100 acres of Clark County, or 16.16 percent of the overall landscape.

4.3.7 Mixed Scrub Grassland

The mixed scrub grassland is a widespread, broadly defined plant community distributed mostly in central and northern Nevada, although with representation in Clark County in isolated pockets or transitioning with neighboring communities. Located at various elevations above 3000 feet, the main distribution is along the eastern flank of the central portion of the Spring Mountains and *bajada* in Red Rock State Park. The majority of this general class of grasslands is a result of seeded perennial grasslands or fire-induced grasslands. However, this class does include valley, foothill, and mountain native grasslands. The principal annual grass species is *Bromus tectorum* (Cheatgrass). The primary perennial species include *Agropyron* spp. (Wheatgrass), *Poa* spp. (Bluegrass), *Elymus cinereaus* (Wildrye), H*ilaria* spp. (Curlygrass), *Stipa* spp. (Needlegrass), *Sporobolus cryptandrus* (Sand Dropseed), *Bouteloua gracilis* (Blue Grama), *Sitanion hystrix* (Squirreltail), and *Oryzopsis hymenoides* (Ricegrass). Shrub species found in this plant community include *Artemisia* spp. (Sagebrush), *Atriplex confertifolia* (Shadscale), *Agave* sp. (Century Plant), *Sarcobatus vermiculatus* (Greasewood), and *Larrea tridentata* (Creosote Bush). Primary associated tree species include *Juniperus* spp. (Junipers) and *Yucca brevifolia* (Joshua Tree). The Mixed Scrub Grassland community, or land-use type, is represented in approximately 8,800 acres of Clark County, or 0.18 percent of the overall landscape.

4.3.8 Agriculture

Agriculture in Clark County is largely confined to riparian plant communities and springs due to absence of abundant water, or water-retaining soils in other parts of the county. The Agriculture community, or land-use type, is represented in approximately 17,400 acres of Clark County, or less than 0.34 percent of the overall landscape.

4.3.9 Barrenland

Barrenland is a fairly self-described category and due to other plant communities requiring extensive data collection, observations, and surveying, this particular community was only observed in passing. True barren land in Clark County is a rarity, because even places that may appear absent of vegetative life, often play host to seasonal herbaceous coverage. The Barrenland community, or land-use type, is represented in approximately 400 acres of Clark County, or less than 0.01 percent of the overall landscape.

4.3.10 Lowland Riparian

Lowland Riparian is defined as localized vegetation influenced by the presence of abundant water in contrast to the surrounding landscape in lowland areas. Lowland Riparian areas of Clark County generally occur lower than 4000 feet in the Mojave area and 5000 feet in the remaining areas. Specific areas of Lowland Riparian community in Clark County include the upper Las Vegas wash; along the Colorado River at Big Bend and the Mojave Indian Reservation; small units south of Black Canyon and in Cottonwood Valley; along the Virgin River; the lower Muddy River near Overton; the upper Muddy River; and the lower Meadow Valley Wash. Principal tree species include *Tamarix* spp. (Tamarisk), *Populus fremontii* (Cottonwood), *Fraxinus velutina* (Velvet Ash), *Prosopis glandulosa* (Honey Mesquite), *Prosopis pubescens* (Screwbean), *Salix gooddingii* (Black Willow), and *Pinus ponderosa* (Ponderosa Pine). Primary associated shrubs include *Baccharis emoryi* (Sticky Seepwillow) and *Pluchea sericea* (Arrowweed). The Lowland Riparian community, or land-use type, is represented in approximately 16,900 acres of Clark County, or less than 0.33 percent of the overall landscape.

4.3.11 Mesquite

The Mesquite community is defined as shrubland dominated by *Prosopis glandulosa* (Honey Mesquite), and is typically found in scattered clumps in washes in the western part of the Mojave Desert. Mesquite is mapped in the Mesquite, Pahrump, Las Vegas, and Moapa Valleys in Clark County. In Las Vegas Valley, large stands are indicated at the Corn Creek Headquarters of the Desert National Wildlife Refuge. The most extensive occurrences are mapped in the Pahrump Valley, along the California/Nevada border, with additional stands to the southeast in Mesquite Valley. Shrub species associated with the Mesquite community include *Atriplex lentiformis* (Saltbush), *Pluchea sericea* (Arrowweed), *Baccharis emoryi* (Sticky

Seepwillow), *Larrea tridentata* (Creosote Bush), and *Lycium torreyi* (Torrey's Lycium). The Mesquite community, or land-use type, is represented in approximately 13,900 acres of Clark County, or 0.27 percent of the overall landscape.

4.3.12 Mixed Mountain Scrub

Mixed Mountain Scrub is a fairly widespread plant community found mainly in the Spring and Virgin Mountains, with scattered occurrences in the McCullough, Sheep, and South Virgin Mountains, between 6000 to 7000 feet in elevation. Although the plant community is considered a "scrub" community, it is truly a woodland of, if anything, somewhat stunted growth due to soils and limited moisture, dominated largely by hardwood deciduous trees. The Mixed Mountain Scrub community can therefore be defined as a deciduous woodland/shrubland principally dominated by the following trees and large shrubs: Q*uercus gambelii* (Gambel Oak), *Acer* spp. (Maples), *Cercocarpus montanus* (Mountain Mahogany), *Purshia stansburiana* (Cliff Rose), *Purshia tridentata* (Bitterbrush), and *Populus tremuloides* (Quaking Aspen). Other associated trees and large shrubs include *Arctostaphylos* spp. (Manzanita & Kinnikinick), *Ribes* spp. (Gooseberry), *Cercocarpus intricatus* (Dwarf Mountain-mahogany), *Pinus monophylla* (Pinyon Pine), *Juniperus osteosperma* (Utah Juniper), *Amelanchier* spp. (Serviceberry), *Abies concolor* (White Fir), *Pinus flexilis* (Limber Pine), *Pinus ponderosa* (Ponderosa Pine), and *Pinus longaeva* (Bristlecone Pine). Primary associated shrub species include *Artemisia arbuscula* (Low Sagebrush), *Ceanothus martini* (Martin's Ceanothus), *Symphoricarpus* spp. (Snowberry), *Physocarpus alternans* (Dwarf Ninebark), *Ribes* spp. (Gooseberry), *Rhus* spp. (Sumac), *Artemisia tridentata* (Big-leaved Sagebrush), and *Chrysothamnus* spp. (Rabbitbrush). The Mountain Scrub community, or land-use type, is represented in approximately 108,400 acres of Clark County, or 2.14 percent of the overall landscape.

4.3.13 Pinyon Pine

The Pinyon Pine Community is found at elevations above the Pinyon-Juniper zone, and is largely a conifer forest dominated by *Pinus monophylla* (Pinyon Pine). The Pinyon plant community and land cover type is widely distributed in the higher mountain ranges of Clark County, including the Spring, Sheep, Virgin, McCullough, New York, and South Virgin Mountains. Primary associated tree species include *Juniperus osteosperma* (Utah Juniper), *Pinus ponderosa* (Ponderosa Pine), *Abies concolor* (White Fir), *Cercocarpus ledifolius* (Curl-

leaved Mountain-mahogany), and *Quercus gambelii* (Gambel Oak). The primary associated shrub species with the Pinyon Pine community include *Artemisia nova* (Black Sagebrush), *Artemisia tridentata* (Big-leaved Sagebrush), *Prunus fasciculata* (Desert Peach), *Chrysothamnus* spp. (Rabbitbrush), *Symphoricarpus* spp. (Snowberry), *Ribes* spp. (Gooseberry), *Echinocereus* spp. (Hedgehog Barrel-cactus), and *Opuntia* spp. (Prickly Pear). The Pinyon Pine community, or land-use type, is represented in approximately 56,200 acres of Clark County, or 1.11 percent of the overall landscape.

4.3.14 Pinyon-Juniper

Pinyon-Juniper woodlands are widely distributed in the higher mountain ranges of Clark County, including the Spring, Sheep, McCullough, Virgin, and Las Vegas Mountains. This community is conifer woodland principally co-dominated by *Pinus monophylla* (Pinyon Pine) and *Juniperus osteosperma* (Utah Juniper). The primary associated trees in the Pinyon-Juniper woodlands include *Cercocarpus ledifolius* (Curl-leaved Mountain-mahogany), *Quercus gambelii* (Gambel Oak), *Amelanchier utahensis* (Utah Serviceberry), *Purshia stansburiana* (Cliff Rose), and *Cercocarpus intricatus* (Dwarf Mountain-mahogany). Primary associated shrub species include *Fallugia paradoxa* (Apache Plume), *Artemisia* spp. (Sagebrush), *Agave* sp. (Century Plant), *Chrysothamnus* spp. (Rabbitbrush), *Arctostaphylos* spp. (Manzanita & Kinnickinick), *Garrya flavescens* (Silk-tassel Bush), *Mahonia fremontii* (Fremont's Mahonia), *Coleogyne ramosissima* (Blackbrush), *Rhus trilobata* (Squaw Bush), *Prunus fasciculata* (Desert Pear), *Echinocereus* spp. (Hedgehog Barrel-cactus), and *Opuntia* spp. (Prickly Pear). The Pinyon-Juniper community, or land-use type, is represented in approximately 106,300 acres of Clark County, or 2.10 percent of the overall landscape.

4.3.15 White Fir

The White Fir vegetation cover class is conifer forest principally dominated by *Abies concolor* (White Fir) at canopies from 30 to 60 percent. Plant communities dominated by White Fir are located primarily in the Spring Mountains and the Sheep Range between 9000 to 9850 feet. The only White Fir variety known in Clark County is *Abies concolor* var. *Concolor*. The primary associated tree species include *Pinus ponderosa* (Ponderosa Pine), *Pinus monophylla* (Pinyon Pine), *Cercocarpus ledifolius* (Curl-leaved Mountain-mahogany), *Pinus flexilis* (Limber Pine), and *Pinus longaeva* (Bristlecone Pine). The primary associated shrub species in the

White Fir community include *Artemisia* spp. (Sagebrush), *Ceanothus* spp. (Ceanothus), *Symphoricarpus* spp. (Snowberry), *Ribes* spp. (Gooseberry), and *Arctostaphylos pungens* (Mexican Manzanita). The White Fir community, or land-use type, is represented in approximately 7,500 acres of Clark County, or 0.15 percent of the overall landscape.

4.3.16 Ponderosa Pine

Pinus ponderosa (Ponderosa Pine) and its associated community can be found in the higher elevations of the Spring Mountains and the Sheep Range. The Ponderosa Pine community is typically conifer woodland principally dominated by *Pinus ponderosa* at canopies between 30 and 60 percent at elevations varying from 7000 to 9000 feet, although often found at lower or higher elevations due to slope, aspect, and soils. *Pinus ponderosa* is often found growing in pure stands, but some other associated trees can be found in this community including *Pinus monophylla* (Pinyon Pine), *Juniperus osteosperma* (Utah Juniper), *Cercocarpus ledifolius* (Curl-leaved Mountain-mahogany), *Quercus gambelii* (Gambel Oak), *Abies concolor* (White Fir), and occasionally *Pinus flexilis* (Limber Pine) and *Pinus longaeva* (Bristlecone Pine). Primary associated shrub species include *Symphoricarpus* spp. (Snowberry), *Artemisia* spp. (Sagebrush), *Arctostaphylos pungens* (Mexican Manzanita), and *Ribes* spp. (Gooseberry). The Ponderosa Pine community, or land-use type, is represented in approximately 42,000 acres of Clark County, or 0.83 percent of the overall landscape.

4.3. 17 Ponderosa-Mountain Scrub

The Ponderosa-Mountain Scrub plant community is also found predominantly in the Spring Mountains and the Sheep Range in the transition areas between Ponderosa Pine and Mountain Scrub communities. This community is described as a conifer woodland principally dominated by *Pinus ponderosa* (Ponderosa Pine) at canopies less than 30 percent, co-dominant with mountain shrubs and trees including *Quercus gambelii* (Gambel Oak), *Cercocarpus montanus* (Mountain Mahogany), *Symphoricarpus* spp. (Snowberry), *Arctostaphylos* spp. (Manzanita & Kinnickinick), and *Cercocarpus intricatus* (Dwarf Mountain-mahogany). The elevation range for this plant community in the Spring Mountains is between 8350 to 9000 feet, and these stands are restricted to north of Lovell Pass, on most of Charleston Mountain, and north to Willow Peak. In the Sheep Range, stands of Ponderosa-Mountain Scrub can be found on both sides of the main ridge from south of Sheep Peak to just northeast of Hayford Peak.

Primary associated tree species in Clark County include *Cercocarpus ledifolius* (Curl-leaved Mountain-mahogany), *Pinus monophylla* (Single-leaved Pine), *Juniperus osteosperma* (Utah Juniper), and *Amelanchier utahensis* (Utah Serviceberry). Shrub species associated with Ponderosa-Mountain Scrub include *Artemisia* spp. (Sagebrush), *Ribes* spp. (Gooseberry), and *Arctostaphylos pungens* (Mexican Manzanita). The Ponderosa-Mountain Scrub community, or land-use type, is represented in approximately 6,900 acres of Clark County, or 0.14 percent of the overall landscape.

4.3.18 Sagebrush

Sagebrush shrublands are mapped as ringing the higher elevations in the Spring, Sheep, Virgin, and McCullough Ranges at elevations from 5000 to 6000 feet. Typically this is a shrubland dominated by *Artemisia tridentata* (Big Sagebrush), *Artemisia nova* (Black Sagebrush), and/or *Artemisia arbuscula* (Low Sagebrush). Associated grass species generally make up less than 25 percent of the Sagebrush canopy. Most Sagebrush communities occur near Pinyon-Juniper stands, and are often restricted to linear communities along drainages where soils are deeper. In Clark County, the primary associated tree species include *Pinus monophylla* (Pinyon Pine), *Juniperus osteosperma* (Utah Juniper), and *Quercus gambelii* (Gambel Oak). Primary associated shrub species include *Chrysothamnus* spp. (Rabbitbrush), *Gutierrezia sarothrae* (Broom Snakeweed), *Coleogyne ramosissima* (Blackbrush), *Atriplex confertifolia* (Shadscale), *Grayia spinosa* (Hopsage), *Fallugia paradoxa* (Apache Plume), and *Purshia tridentate* (Bitterbrush). The Sagebrush community, or land-use type, is represented in approximately 132,000 acres of Clark County, or 2.62 percent of the overall landscape.

4.3.19 Sagebrush Grassland

Sagebrush Grassland is defined as a transition plant community occurring at mid-elevations where a co-dominance of *Artemisia* spp. (Sagebrush) shrubland and various perennial grasses occur at canopies of 25 percent or greater, with such species as *Agropyron* spp. (Wheatgrass), *Poa* spp. (Bluegrass), *Oryzopsis hymenoides* (Rice Grass), and *Hilaria jamesii* (Galleta). In Clark County, Sagebrush Grassland is mapped on the central eastern slopes of Lovell Canyon, immediately west of Red Rock, as well as a few small patches along the Mormon Well Road, on the eastern slopes of the Las Vegas Range, and a few other patches in the Virgin Mountains. Primary associated tree species include *Pinus monophylla* (Pinyon Pine)

and *Juniperus osteosperma* (Utah Juniper). Shrub species associated with Clark County include *Chrysothamnus* spp. (Rabbitbrush) and *Purshia tridentata* (Bitterbrush). Other associated grasses include *Bromus tectorum* (Cheatgrass) and *Elymus elymoides* (Squirreltail). The Sagebrush Grassland community, or land-use type, is represented in approximately 7,100 acres of Clark County, or 0.14 percent of the overall landscape.

4.3.20 Playa

Playas are located across Clark County on flat, low-elevation valley floors. Playas are barren internal basin floors that can occasionally be inundated by seasonal water. Playas are mapped as Jean Lake, Roach Lake, Pahrump Valley, Indian Spring Valley, feeder valleys north and east of the Indian Spring Valley, El Dorado Valley, and along Gypsum Wash. No vegetation was found in the literature as occurring in these seemingly waste places. The Playa community, or land-use type, is represented in approximately 16,800 acres of Clark County, or less than 0.33 percent of the overall landscape.

4.3.21 Salt Desert Scrub

Salt Desert Scrub communities are loosely collected as one continuous community based principally on the dominance of any one or more species of the genera *Atriplex*. Much of the urbanized Las Vegas Valley was once Salt Desert Scrub, and thriving communities are still found in the northeast part of the county on the Nellis Air Force Base and Proving Grounds. Most Salt Desert Scrub communities occur below 5000 feet, and are dominated by any one of the following species: *Atriplex canescens* (Four-winged Saltbush), *Atriplex confertifolia* (Shadescale), *A. hymenelytra* (Desert Holly), *A. lentiformis* (Saltbush), *A. polycarpa* (Desert Saltbush), and *Suaeda moquinii* (Seepweed). Other associated shrub species in Clark County include *Sarcobatus vermiculatus* (Greasewood), *Artemisia* spp. (Sagebrush), *Coleogyne ramosissima* (Blackbrush), *Lycium* spp. (Wolfberry), *Ephedra torreyana* (Torrey's Ephedra), *Tetradymia canescens* (Horsebrush), *Krasheninnikovia lanata* (Winterfat), *Hymenoclea salsola* (Burrobush), *Gutierrezia sarothrae* (Broom Snakeweed), *Allenrolfea occidentalis* (Iodine Bush), and *Larrea tridentata* (Creosote Bush). The Salt Desert Scrub community, or land-use type, is represented in approximately 190,700 acres of Clark County, or 3.77 percent of the overall landscape.

4.3.22 Water

Water is in short supply in Clark County. Major water bodies in Clark County include the Las Vegas Wash, the Virgin River, Meadow Valley Wash, Lake Meade, the Colorado River, and various springs countywide. Seasonal precipitation occasionally fills playas, washes, and arroyos. Water represents approximately 3,579 acres of Clark County, or 0.07 percent of the county.

4.3.23 Outside Clark County

All areas outside of Clark County's borders were not surveyed in the context of this study, and therefore all of these areas were assigned original default data for land use and plant communities**.**

4.3.24 Other Cover Types

A few other vegetative sub-ecosystems exist in, or are noted for Clark County in the NV-GAP data (RECON, 2002) report, including Catclaw, Blackbrush, Grassland, Pioxon-Juniper Grassland, and Juniper. Catclaw, as an independent vegetative ecotype, was found in the recent surveys to be non-existent in Clark County. This finding was also documented by the results presented in David A. Charlet's 2003, *Clark County Roads Biodiversity Project* (Charlet 2003). Areas mapped in the RECON report as Catclaw were incorporated into the Creosote-Bursage vegetative ecotype based on field survey results.

Similarly, the Blackbrush Grassland ecotype was found to be over-represented in NV-GAP data (RECON 2002) as confirmed in Charlet's biodiversity report (Charlet 2003) and current surveys. The small amounts of Blackbrush Grasslands surveyed were characterized as Mixed Scrub Grassland for the purposes of this project. Juniper and Pinyon-Juniper Grasslands reported in the NV-GOP (RECON, 2002) report were also found to be rare. A few small pure Juniper stands may exist, which was confirmed by the results presented in David A. Charlet's 2003, *Clark County Roads Biodiversity Project* (Charlet 2003). Because they are so insignificant in terms of area coverage, the areas mapped as Juniper in the NV-GAP report were incorporated into the total Pinyon-Juniper vegetative ecotype. Likewise, the Pinyon-Juniper Grassland was mapped into the Pinyon-Juniper land use.

4.4 Land Uses for Urban Areas in Clark County

For the urban landscape, nine land-use categories specific for Clark County were identified for the purposes of this project. These categories include Industrial, Light Industrial/Office, Suburban Residential, Urban Residential, Rural Residential, Public Facility/Parks, Commercial, Major Development Area, and Right of Way. All urban cover classes mentioned above were surveyed during the second phase of the field survey of Clark County. The municipalities included in the field survey of the urban areas include the City of Las Vegas, North Las Vegas, Sunrise Manor, Henderson, Whitney, Winchester and Paradise, Spring Valley, Enterprise, Summerlin South, Lone Mountain, and Boulder City. Over 100 Quadrats were located in all of the above municipalities for each of the nine land uses mentioned earlier in the text. The Urban landscape is represented in approximately 208,690 acres of Clark County, or approximately 4.12 percent of the county's land area.

4.4.1 Industrial

The industrial land-use type is loosely defined as any property zoned for or utilized currently for manufacturing, chemical processing, chemical storage, rail yard, etc. The vast majority of the industrial land-use type was found in the urban core of Las Vegas and North Las Vegas. Vast impervious surface areas and minimal pervious landscapes that would support vegetation typify industrial areas. Diversity of species is often low in this land-use type, and landscapes are minimally maintained. The Industrial land-use type is represented in 3,548 acres of Clark County, or 0.07 percent of the overall landscape.

4.4.2 Light Industrial/Office

The Light Industrial/Office land-use type is inclusive of offices, professional parks, medical facilities, warehouses, etc. Some areas of this particular land-use type can be found in the older urban core of the Las Vegas Valley and Boulder City, but for the most part these business developments are found in reclaimed urban spaces or new developments such as North Las Vegas, Whitney, Winchester and Paradise, Spring Valley, Enterprise, Summerlin South, and Lone Mountain. Overall land use for Light Industrial/Office is largely for parking and building space. Landscaped areas include lawns, crushed gravel mulch, and a variety of cacti, shrubs,

trees, and some herbaceous material. The Light Industrial/Office land-use type is represented in 13,660 acres of Clark County, or 0.27 percent of the overall landscape.

4.4.3 Suburban Residential

The Suburban Residential land-use type is defined as those areas in the urban landscape that have single-family-housing units, trailer homes, and duplexes on less than ½ acre of land. The majority of this particular land use was found in older core neighborhoods of the urban landscape, which were developed in the 1940's and 1950's, or in the perimeter of the urban core in neighborhoods and municipalities that have developed since the 1960's. Areas of the older type of Suburban Residential land-use type include North Las Vegas, Henderson, Boulder City, Glendale, and Overton. Large woody shrubs, palms, lawns, and trees, all of which require fairly consistant irrigation in order to thrive in Clark County, often dominate these neighborhoods. Newer Suburban Residential areas were found mostly in the Las Vegas Valley including Sunrise Manor, Whitney, Winchester and Paradise, Spring Valley, Enterprise, Summerlin South, and Lone Mountain. These neighborhoods are often distinctive for species that are suitable for growing in desert landscapes and therefore require less irrigation than the species in older neighborhoods. Characteristically, these newer Suburban Residential areas also maintain smaller lawns in the overall landscape. The Suburban Residential land-use type is represented in 34,083 acres of Clark County, or 0.67 percent of the overall landscape.

4.4.4 Urban Residential

The Urban Residential land-use type is defined as any multiple-family-housing units such as row houses, apartments, condominiums, and other multi-residential units. Urban Residential areas are found throughout the whole Las Vegas Valley, including Henderson and Boulder City, but are not common in other smaller urban centers such as Searchlight and Overton. Urban Residential areas most typically are found in close vicinity to commercial and business districts, or for the purposes of this study, the Light Industrial/Office and Commercial land-use types. In certain localities, this particular land-use category can be found as a transition area between Suburban Residential neighborhoods and other urban categories. The Urban Residential land-use type is represented in 10,311 acres of Clark County, or 0.20 percent of the overall landscape.

4.4.5 Rural Residential

The Rural Residential land-use type is defined as any single family-housing unit located on ½ acre or more of private land. Most of this land-use category is found on the fringes of the developed Las Vegas Valley and in the older urban parts of the Virgin River Valley. Rural Residential areas can be found in most of the urban municipalities as well, but largely in Henderson, Whitney, Spring Valley, Enterprise, Boulder City, Searchlight, Glendale, and Overton. Suburban Residential areas often absorb or surround the Rural Residential areas. The Rural Residential land-use type is represented in 25,057 acres of Clark County, or 0.50 percent of the overall landscape.

4.4.6 Public Facility/Parks

The Public Facility/Parks land-use type is the broadest category for urban land use, including all parks and public facilities such as natural parks, sports complexes, landscaped city parks, police/fire stations, government, libraries, schools, and more. The Public Facility/Parks land-use type is found in all of the municipalities listed above including the City of Las Vegas, North Las Vegas, Sunrise Manor, Henderson, Whitney, Winchester & Paradise, Spring Valley, Enterprise, Summerlin South, Lone Mountain, and Boulder City. Public Facility/Parks areas are located strategically in the urban landscape along major business routes, near core residential areas, and around natural geological features of interest to humans. The Public Facility/Parks land-use type is represented in 69,645 acres of Clark County, or 1.38 percent of the overall landscape.

4.4.7 Commercial

The Commercial land-use type can be defined as any area of retail commerce and trade, from service stations and specialty stores, to suburban shopping malls, casinos, and general stores. All municipalities have at least a few areas zoned or classified as Commercial. The core of Clark County's Commercial land use is found in the Las Vegas Valley, because the city itself is highly dependent on the service and tourism industry brought in via casinos and other entertainment industries. The Casino district of Las Vegas is almost entirely classified as Commercial, but many other areas of Commercial land use can be found in the newer development areas of Winchester and Paradise, Spring Valley, Enterprise, Summerlin South,

Lone Mountain, and Boulder City. The Commercial land-use type is represented in 15,154 acres of Clark County, or 0.30 percent of the overall landscape.

4.4.8 Major Development Area

The Major Development Area land use is defined as any area currently, or in the near future to be, developed for a major urban project such as a housing, business/office complex, hospital construction, or any other project that causes a major disturbance to the natural landscape. Largely, these Major Development Areas can be found on the periphery of the urban sprawl of Las Vegas from the center of the Valley, into the various reaches and arms of the Valley itself. Municipalities where Major Development Areas are concentrated include North Las Vegas, Henderson, Spring Valley, Enterprise, Summerlin South, and Lone Mountain. The Major Development Area land use type is represented in 18,918 acres of Clark County, or 0.37 percent of the overall landscape.

4.4.9 Right-of-Way

The Right-of-Way land-use type is defined as any area where local, State, or Federal governments have precedence for the use of the said land for roads, canals, or other modes of transportation. In Clark County, Right-of-Way is referring mostly to highway and road usage, or planned usage, and includes the highway surface areas as well as the medians and areas adjacent to the roadbed. The Right-of-Way land use type is represented in 18,314 acres of Clark County, or 0.36 percent of the overall landscape.

4.5 Results

Data collected in the quadrats of Clark County's rural and urban landscapes allowed a characterization of the various land uses for both landscape types. The results of the field survey are listed below by land use. A table presenting plant representation, barren land, and relative density follows the land use observations for each of the 32 land-use categories used in the model. The tables represent gross coverage values (% Cover) for each land use, which is the mean of all quadrat results for that particular land use. Each plant species, barren space, and/or impervious surface represented in the first table of each subsection below is followed by another column that identifies the BELD3 source code land-use classification. These classifications were used to assign emission rates for various VOC and NO_x species. Weighing by each plant species

or barren land area was performed to obtain the overall land use emission. A second table is presented, following the first, for each land-use category, defining the emissions of that particular land use. Appendix D: Species and Mixed Species Emission Factor Development, provides greater detail on these calculations.

4.5.1 Land Use Cover Results for Rural Areas in Clark County

Alpine (R01 Alpine)

The Alpine class appears to be correctly mapped, although the entire community was inaccessible due to the depths of snow at elevations above 10,000 feet. Attempts were made to access the sampling locations on two occasions while sampling other high-elevation quadrats, but insufficient daylight length and extreme weather were additional deterrents. Review of the area allowed a level of confidence to be established that the existing BELD3 land cover type for "alpine" (020 USGS_mxtundra) would be sufficient for the purposes of this project, especially considering the total area of land within Clark County characterized as alpine community (less than 0.01%). Table 4-1 illustrates the Clark County alpine plant coverage.

TABLE 4-1. R01 ALPINE (GROSS COVERAGE)

Land-Use Type	Botanical Name	Common Name	Plant Family	% Cover	BELD3 Source
Alpine	NA	NA	NA	100	020 USGS_mxtundra

With 100 percent coverage equally for the default BELD3 020 USGS_mxtundra, the emissions calculation was fairly straightforward. The emissions for Clark County's alpine region, or R01 Alpine, are illustrated in Table 4-2.

TABLE 4-2. R01 ALPINE EMISSIONS

Pollutant Species	Emission Rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission Rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission Rate ($\mu g\ m^{-2}h^{-1}$)
ISOP	1680	OCIM	0	FORM	6
MBO	0	ATHU	0	ACTAL	6
APIN	90	TRPO	0	BUTE	6
BPIN	6	GTERP	0	ETHA	3
D3CAR	3	METH	0	FORAC	3
DLIM	2	ETHE	14	ACTAC	3
CAMPH	2	PROPE	14	BUTO	3
MYRAC	2	ETHO	14	CO	45
ATERP	2	ACET	14	ORVOC	24
BPHE	0	HEXA	6	NO	5
SABI	0	HEXE	24		
PCYM	0	HEXY	24		

Blackbrush (R02 Blackbrush)

The Blackbrush community appears to be correctly mapped. A total of seven quadrats in the Blackbrush community at various locations were surveyed throughout Clark County. Some variability was observed between Blackbrush communities in the northern and southern portions of the county. According to field observations and data collection, the barren areas between plants seemed to grow larger the further south the quadrat was located. *Coleogyne ramosissima* seemed to exemplify generally a larger growth habit as one travels south as well. Northern plots tended to be more diverse in plant species than southern plots; more cacti and Yucca species become prevalent the further north a quadrat was located. Table 4-3 illustrates the Clark County Blackbrush plant coverage.

TABLE 4-3. R02 BLACKBRUSH (GROSS COVERAGE)

Land-Use Type	Botanical Name	Common Name	Plant Family	% Cover	BELD3 Source
Blackbrush	Acacia greggii	Catclaw	FABACEAE	1	039 Acacia
Blackbrush	Atriplex sp.	Saltbush	CHENOPODIACEAE	3	010 USGS_shrubgrass
Blackbrush	Barren	Barren	NA	36	018 USGS_sprsbarren
Blackbrush	Coleogyne ramosissima	Blackbrush	ROSACEAE	33	042 Apple
Blackbrush	Encelia sp.	Brittlebush	ASTERACEAE	1	010 USGS_shrubgrass
Blackbrush	Ephedra sp.	Mormon Tea	EPHEDRACEAE	3	010 USGS_shrubgrass
Blackbrush	Eriogonum sp.	Desert Trumpet	POLYGONACEAE	1	010 USGS_shrubgrass
Blackbrush	Grasses	Grasses	NA	4	008 USGS_grassland
Blackbrush	Grayia spinosa	Hopsage	CHENOPODIACEAE	2	010 USGS_shrubgrass
Blackbrush	Juniperus sp.	Juniper	CUPRESSACEAE	4	085 Juniper
Blackbrush	Krascheninnikovia lanata	Winterfat	CHENOPODIACEAE	1	010 USGS_shrubgrass
Blackbrush	Larrea tridentata	Creosote	ZYGOPHYLLACEAE	1	010 USGS_shrubgrass
Blackbrush	Opuntia sp.	Cacti	CACTACEAE	2	010 USGS_shrubgrass
Blackbrush	Pinus monophylla	Pinyon Pine	PINACEAE	1	178 Pine_pinyon
Blackbrush	Purshia sp.	Cliffrose	ROSACEAE	1	042 Apple
Blackbrush	Yucca sp.	Yucca	LILIACEAE	6	232 Yucca_Mojave

Little research is available concerning emission factors. The plant family Chenopodiaceae is not represented in BELD3 by any species for a taxonomic assignment of emission factors (Benjamin et al 1996). The BELD3 default 010 USGS_shrubgrass was utilized for species, genera, or families not represented in BELD3. The emissions for Clark County's Blackbrush community, or R02 Blackbrush, are illustrated in Table 4-4.

TABLE 4-4. R02 BLACKBRUSH EMISSIONS

Pollutant Species	Emission Rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission Rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission Rate ($\mu g\ m^{-2}h^{-1}$)
ISOP	67	OCIM	0	FORM	11
MBO	4	ATHU	0	ACTAL	11
APIN	163	TRPO	0	BUTE	11
BPIN	42	GTERP	0	ETHA	6
D3CAR	12	METH	0	FORAC	6
DLIM	15	ETHE	25	ACTAC	6
CAMPH	6	PROPE	25	BUTO	6
MYRAC	5	ETHO	25	CO	82
ATERP	5	ACET	25	ORVOC	43
BPHE	0	HEXA	11	NO	4
SABI	0	HEXE	43		
PCYM	0	HEXY	43		

Hopsage (R04 Hopsage)

Hopsage communities may be over-represented on the existing NV-GAP distribution maps. Although Hopsage may play a key role in this particular community, it can hardly be considered a dominant species in the plant matrix because it accounts for less than 20 percent of the vegetative cover. Data were gathered from a total of 2 quadrats in the Hopsage community with additional observations of other locations that were classified as Hopsage. This particular community was difficult to locate because it was over-mapped, and finding a true Hopsage community represented near the given coordinates made for a long day on the lower *bajada* of the western slope of the Sheep Range. Also restricting the field team's coverage was the fact that Air Force personnel and helicopters from neighboring Nellis Air Force Base heavily guard this particular community. Table 4-5 illustrates Clark County's Hopsage plant community coverage.

TABLE 4-5. R04 HOPSAGE (GROSS COVERAGE)

Land-Use Type	Botanical Name	Common Name	Plant Family	% Cover	BELD3 Source
Hopsage	Atriplex sp.	Saltbush	CHENOPODIACEAE	10	010 USGS_shrubgrass
Hopsage	Barren	Barren	NA	42	018 USGS_sprsbarren
Hopsage	Eriogonum sp.	Desert Trumpet	POLYGONACEAE	8	010 USGS_shrubgrass
Hopsage	Grasses	Grasses	NA	2	008 USGS_grassland
Hopsage	Grayia spinosa	Hopsage	CHENOPODIACEAE	16	010 USGS_shrubgrass
Hopsage	Larrea tridentate	Creosote	ZYGOPHYLLACEAE	16	010 USGS_shrubgrass
Hopsage	Opuntia sp.	Cacti	CACTACEAE	4	010 USGS_shrubgrass
Hopsage	Yucca sp.	Yucca	LILIACEAE	2	232 Yucca_Mojave

Little research is available concerning emission factors for most of the species found in the Hopsage community. Neither plant family Chenopodiaceae or Zygophyllaceae is represented

in BELD3 by any species for a taxonomic assignment of emission factors (Benjamin et al 1996). The BELD3 default 010 USGS_shrubgrass was utilized for species, genera, or families not represented in BELD3. The emissions for Clark County's Hopsage community, or R04 Hopsage, are illustrated in Table 4-6.

TABLE 4-6. R04 HOPSAGE EMISSIONS

Pollutant Species	Emission Rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission Rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission Rate ($\mu g\ m^{-2}h^{-1}$)
ISOP	177	OCIM	0	FORM	9
MBO	8	ATHU	0	ACTAL	9
APIN	134	TRPO	0	BUTE	9
BPIN	30	GTERP	0	ETHA	4
D3CAR	15	METH	0	FORAC	4
DLIM	8	ETHE	21	ACTAC	4
CAMPH	8	PROPE	21	BUTO	4
MYRAC	8	ETHO	21	CO	67
ATERP	8	ACET	21	ORVOC	36
BPHE	0	HEXA	9	NO	9
SABI	0	HEXE	36		
PCYM	0	HEXY	36		

Bristlecone Pine (R05 Bristlecone Pine)

This particular plant community appeared to be mapped well, though many of the quadrat locations were difficult to access due to depth of snow and elevation. Surveys of six quadrats were performed in the Bristlecone Pine community: two on the north slope of Griffith Peak and four on or near the southern ridge of McFarland Peak. In some areas, snow over 3 feet deep prevented an accurate representation of herbaceous and low-growing shrubs. Several of the quadrats were excellent representations of old-growth P*inus longaeva*. It should be noted that NV-GAP data differentiates between various canopy coverage densities for forests dominated Bristlecone Pine. These results represent the conservative higher end of canopy coverage and therefore biogenic emissions. Table 4-7 illustrates Clark County's Bristlecone Pine community plant coverage.

TABLE 4-7. R05 BRISTLECONE PINE (GROSS COVERAGE)

Land-Use Type	Botanical Name	Common Name	Plant Family	% Cover	BELD3 Source
Bristlecone Pine	Abies concolor	White Fir	PINACEAE	9	076 Fir_white
Bristlecone Pine	Barren	Barren	NA	49	018 USGS_sprsbarren
Bristlecone Pine	Chrysothamnus sp.	Rabbitbrush	ASTERACEAE	1	010 USGS_shrubgrass
Bristlecone Pine	Pinus aristata	Bristlecone Pine	PINACEAE	20	164 Pine_brstlcone
Bristlecone Pine	Pinus flexilis	Limber Pine	PINACEAE	9	173 Pine_limber
Bristlecone Pine	Pinus ponderosa	Ponderosa Pine	PINACEAE	8	183 Pine_ponderosa
Bristlecone Pine	Populus sp.	Cottonwood	SALICACEAE	3	198 Populus
Bristlecone Pine	Ribes sp.	Gooseberry	SAXIFRAGACEAE	1	010 USGS_shrubgrass

The species found to represent the Bristlecone Pine community are well represented within BELD3. The BELD3 default 010 USGS_shrubgrass was utilized for species, genera, or families not represented in BELD3. The emissions for Clark County's Bristlecone Pine community, or R05 Bristlecone Pine, are illustrated in Table 4-8.

TABLE 4-8. R05 BRISTLECONE PINE EMISSIONS

Pollutant Species	Emission Rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission Rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission Rate ($\mu g\ m^{-2}h^{-1}$)
ISOP	833	OCIM	0	FORM	17
MBO	1054	ATHU	0	ACTAL	17
APIN	262	TRPO	0	BUTE	17
BPIN	690	GTERP	10	ETHA	9
D3CAR	176	METH	1	FORAC	9
DLIM	61	ETHE	40	ACTAC	9
CAMPH	25	PROPE	40	BUTO	9
MYRAC	22	ETHO	40	CO	131
ATERP	18	ACET	40	ORVOC	70
BPHE	0	HEXA	17	NO	1
SABI	7	HEXE	70		
PCYM	36	HEXY	70		

Creosote-Bursage (R06 Creosote-Bursage)

The distribution of Creosote-Bursage is well represented in the NV-GAP data. Data were collected from 16 quadrats in this plant community. Overall the quadrat locations were easy to locate and survey throughout the entire county. During the second phase of the survey completed in early February, the field team had the benefit of experiencing the wildflowers and annuals in bloom as a result of sufficient rainfall in January. Many of the quadrats were definitely co-dominated by *Larrea tridentata* and *Ambrosia dumosa*, although barren soil seemed to represent the largest portion of this community, at least until the rains came in January and the annuals filled in the niche recorded as barren space in the first round of sampling. Table 4-9 illustrates Clark County's Creosote-Bursage community plant coverage.

TABLE 4-9. R06 CREOSOTE-BURSAGE (GROSS COVERAGE)

Land-Use Type	Botanical Name	Common Name	Plant Family	% Cover	BELD3 Source
Creosote-Bursage	Ambrosia dumosa	Bursage	ASTERACEAE	17	010 USGS_shrubgrass
Creosote-Bursage	Atriplex sp.	Saltbush	CHENOPODIACEAE	1	010 USGS_shrubgrass
Creosote-Bursage	Barren	Barren	NA	56	018 USGS_sprsbarren
Creosote-Bursage	Ephedra sp.	Mormon Tea	EPHEDRACEAE	1	010 USGS_shrubgrass
Creosote-Bursage	Eriogonum sp.	Desert Trumpet	POLYGONACEAE	1	010 USGS_shrubgrass
Creosote-Bursage	Grasses	Grasses	NA	6	008 USGS_grassland
Creosote-Bursage	Grayia spinosa	Hopsage	CHENOPODIACEAE	0	010 USGS_shrubgrass
Creosote-Bursage	Krameria sp.	Littleleaf Ratany	KRAMERIACEAE	1	010 USGS_shrubgrass
Creosote-Bursage	Larrea tridentata	Creosote	ZYGOPHYLLACEAE	15	010 USGS_shrubgrass
Creosote-Bursage	Lycium sp.	Wolfberry	SOLANACEAE	1	010 USGS_shrubgrass
Creosote-Bursage	Opuntia sp.	Cacti	CACTACEAE	1	010 USGS_shrubgrass

Little research is available concerning emission factors for most of the species found in the Creosote-Bursage community. Plant families Chenopodiaceae or Zygophyllaceae are not represented in BLED3 by any species for a taxonomic assignment of emission factors (Benjamin et al 1996). The BELC3 default 010 USGS_shrubgrass was utilized for species, genera, or families not represented in BLED3. The emissions for Clark County's Creosote-Bursage community, or R06 Creosote-Bursage, are illustrated in Table 4-10.

TABLE 4-10. R06 CREOSOTE-BURSAGE EMISSIONS

Pollutant Species	Emission Rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission Rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission Rate ($\mu g\ m^{-2}h^{-1}$)
Isop	126	Ocim	0	Form	7
Mbo	8	Athu	0	Actal	7
Apin	107	Trpo	0	Bute	7
Bpin	22	Gterp	0	Etha	4
D3car	11	Meth	0	Forac	4
Dlim	5	Ethe	17	Actac	4
Camph	5	Prope	17	Buto	4
Myrac	5	Etho	17	Co	54
Aterp	5	Acet	17	Orvoc	29
Bphe	0	Hexa	7	No	7
Sabi	0	Hexe	29		
Pcym	0	Hexy	29		

Mojave Mixed Scrub (R07 Mojave Mixed Scrub)

This plant community was well mapped, although some literature seems to disagree (Charlet 2003). Nine quadrats within the Mojave Mixed Scrub community were located fairly easily with the exception of one, which according to GPS coordinates would have put our team in Lake Meade. This plant community also was host to a large quantity of herbaceous annuals following the rains in January 2005. Many of the plots seemed as though they could be classified as Creosote-Bursage or perhaps Blackbrush communities. This was likely due to the

areas of transition between communities, although a strong line of delineation between communities was often visible. Table 4-11 illustrates Clark County's Mojave Mixed Scrub community plant coverage.

TABLE 4-11. R07 MOJAVE MIXED SCRUB (GROSS COVERAGE)

Land-Use Type	Botanical Name	Common Name	Plant Family	% Cover	BELD3 Source
Mojave Mixed Scrub	Acacia greggii	Catclaw	FABACEAE	1	039 Acacia
Mojave Mixed Scrub	Ambrosia dumosa	Bursage	ASTERACEAE	1	010 USGS_shrubgrass
Mojave Mixed Scrub	Amsinckia sp.	Fiddleneck	BORAGINACEAE	1	010 USGS_shrubgrass
Mojave Mixed Scrub	Atriplex sp.	Saltbush	CHENOPODIACEAE	8	010 USGS_shrubgrass
Mojave Mixed Scrub	Barren	Barren	NA	37	018 USGS_sprsbarren
Mojave Mixed Scrub	Encelia farinosa	Brittlebush	ASTERACEAE	5	010 USGS_shrubgrass
Mojave Mixed Scrub	Ephedra sp.	Mormon Tea	EPHEDRACEAE	3	010 USGS_shrubgrass
Mojave Mixed Scrub	Eriogonum inflatum	Desert Trumpet	POLYGONACEAE	2	010 USGS_shrubgrass
Mojave Mixed Scrub	Eurotia lanata	Winterfat	CHENOPODIACEAE	2	010 USGS_shrubgrass
Mojave Mixed Scrub	Grasses	Grasses	NA	11	008 USGS_grassland
Mojave Mixed Scrub	Grayia spinosa	Hopsage	CHENOPODIACEAE	2	010 USGS_shrubgrass
Mojave Mixed Scrub	Gutierrezia sarothrae	Snakeweed	ASTERACEAE	2	010 USGS_shrubgrass
Mojave Mixed Scrub	Juniperus sp.	Juniper	CUPRESSACEAE	1	085 Juniper
Mojave Mixed Scrub	Krameria sp.	Littleleaf Ratany	KRAMERIACEAE	5	010 USGS_shrubgrass
Mojave Mixed Scrub	Krascheninnikovia lanata	Winterfat	CHENOPODIACEAE	1	010 USGS_shrubgrass
Mojave Mixed Scrub	Larrea tridentata	Creosote	ZYGOPHYLLACEAE	12	010 USGS_shrubgrass
Mojave Mixed Scrub	Lycium pallidum	Wolfberry	SOLANACEAE	1	010 USGS_shrubgrass
Mojave Mixed Scrub	Opuntia sp.	Cacti	CACTACEAE	1	010 USGS_shrubgrass
Mojave Mixed Scrub	Salvia dorrii	Purple Sage	LAMIACEAE	1	010 USGS_shrubgrass
Mojave Mixed Scrub	Sarcobatus vermiculatus	Greasewood	CHENOPODIACEAE	1	010 USGS_shrubgrass
Mojave Mixed Scrub	Sphaeralcea sp.	Globemallow	MALVACEAE	1	010 USGS_shrubgrass
Mojave Mixed Scrub	Yucca sp.	Yucca	LILIACEAE	1	232 Yucca_Mojave

Little research is available concerning emission factors for most of the species found in the Mojave Mixed Scrub community. Plant families Chenopodiaceae, Krameriaceae, or Zygophyllaceae are not represented in BELD3 by any species for a taxonomic assignment of emission factors (Benjamin et al 1996). The BELD3 default 010 USGS_shrubgrass was utilized for species, genera, or families not represented in BELD3. The emissions for Clark County's Mojave Mixed Scrub community, or R07 Mojave Mixed Scrub are illustrated in Table 4-12.

TABLE 4-12. R07 MOJAVE MIXED SCRUB EMISSIONS

Pollutant Species	Emission Rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission Rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission Rate ($\mu g\ m^{-2}h^{-1}$)
ISOP	166	OCIM	0	FORM	10
MBO	8	ATHU	0	ACTAL	10
APIN	144	TRPO	0	BUTE	10
BPIN	45	GTERP	0	ETHA	5
D3CAR	15	METH	0	FORAC	5
DLIM	10	ETHE	22	ACTAC	5
CAMPH	8	PROPE	22	BUTO	5
MYRAC	7	ETHO	22	CO	72
ATERP	7	ACET	22	ORVOC	39
BPHE	0	HEXA	10	NO	10
SABI	0	HEXE	39		
PCYM	0	HEXY	39		

Mixed Scrub Grassland (R08 Mixed Scrub Grassland)

Many areas were classified as Grasslands within the NV-GAP data, and yet there seemed to be little evidence of true grasslands in Clark County based on survey observations as well as other reviews (Charlet 2003). It became evident in late January of 2005 after the winter rains had spawned the ample growth of annual forbs and wildflowers that the grasses too were dependent largely on the rains and were thus dormant often times for most of the year or sometimes for years at a time. Data were collected from 10 quadrats within the broad context of mixed scrub Grassland. A majority of the sites could have been classified as strictly Blackbrush Grassland, although a few sites that not exemplify a co-dominance of Blackbrush and were dominated with the perennial and annual grasses. Results indicated that the biogenic emissions between several grassland-dominated communities were very similar and thus organized all of them under the heading Mixed Scrub Grassland for the sake of modeling. Table 4-13 illustrates Clark County's Mixed Scrub Grassland community plant coverage.

TABLE 4-13. R08 MIXED SCRUB GRASSLAND (GROSS COVERAGE)

Land-Use Type	Botanical Name	Common Name	Plant Family	% Cover	BELD3 Source
Mixed Scrub Grassland	Ambrosia dumosa	Bursage	ASTERACEAE	1	010 USGS_shrubgrass
Mixed Scrub Grassland	Barren	Barren	NA	21	018 USGS_sprsbarren
Mixed Scrub Grassland	Coleogyne ramosissima	Blackbrush	ROSACEAE	27	042 Apple
Mixed Scrub Grassland	Encelia sp.	Brittlebush	ASTERACEAE	1	010 USGS_shrubgrass
Mixed Scrub Grassland	Ephedra sp.	Mormon Tea	EPHEDRACEAE	4	010 USGS_shrubgrass
Mixed Scrub Grassland	Grasses	Grasses	NA	36	008 USGS_grassland
Mixed Scrub Grassland	Gutierrezia sp.	Snakeweed	ASTERACEAE	2	010 USGS_shrubgrass
Mixed Scrub Grassland	Sphaeralcea sp.	Globemallow	MALVACEAE	1	010 USGS_shrubgrass
Mixed Scrub Grassland	Yucca sp.	Yucca	LILIACEAE	7	232 Yucca_Mojave

There is little research available concerning emission factors, for most of the species found in the Mojave Mixed Scrub community, although some species were represented taxonomically via genus or family. Plant families Chenopodiaceae, Krameriaceae, or Zygophyllaceae are not represented in BELD3 by any species for a taxonomic assignment of emission factors (Benjamin et al 1996). The BELD3 default 010 USGS_shrubgrass was utilized for species, genera, or families not represented in BELD3. The emissions for Clark County's Mojave Mixed Scrub community, or R08 Mixed Scrub Grassland are illustrated in able 4-14.

TABLE 4-14. R08 MIXED SCRUB GRASSLAND EMISSIONS

Pollutant Species	Emission Rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission Rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission Rate ($\mu g\ m^{-2}h^{-1}$)
ISOP	60	OCIM	0	FORM	11
MBO	5	ATHU	0	ACTAL	11
APIN	167	TRPO	0	BUTE	11
BPIN	12	GTERP	0	ETHA	6
D3CAR	6	METH	0	FORAC	6
DLIM	3	ETHE	25	ACTAC	6
CAMPH	3	PROPE	25	BUTO	6
MYRAC	3	ETHO	25	CO	83
ATERP	3	ACET	25	ORVOC	44
BPHE	0	HEXA	11	NO	12
SABI	0	HEXE	44		
PCYM	0	HEXY	44		

Agriculture (R10 Agriculture)

Agriculture in Clark County is largely confined to riparian plant communities and springs due to the absence of abundant water, or water-retaining soils in other parts of the county. Considerable time was spent observing several agricultural systems in Clark County while conducting the entirety of the rural plant community survey. Grass and legume farming seem to be equivalent for agricultural land use with cattle ranching in Clark County. An occasional orchard or other variable agricultural systems acclimated for this elementally intense region was also observed, especially in the Virgin River Valley and the Meadow Valley Wash. The existing BELD3 category for arid and irrigated agriculture sufficiently filled the modeling needs for Clark County due to its insignificant land-use coverage. Table 4-15 illustrates Clark County's Agriculture community plant coverage.

TABLE 4-15. R10 AGRICULTURE (GROSS COVERAGE)

Land-Use Type	Botanical Name	Common Name	Plant Family	% Cover	BELD3 Source
Agriculture	NA	NA	NA	100	005 USGS_irrcrop

With 100 percent coverage equally for the default BELD3 005 USGS_irrcrop, the emissions calculation was fairly straightforward. The emissions for Clark County's Agricultural region, or R10 Agriculture are illustrated in Table 4-16.

TABLE 4-16. R10 AGRICULTURE EMISSIONS

Pollutant Species	Emission Rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission Rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission Rate ($\mu g\ m^{-2}h^{-1}$)
ISOP	28	OCIM	0	FORM	20
MBO	8	ATHU	0	ACTAL	20
APIN	300	TRPO	0	BUTE	20
BPIN	20	GTERP	0	ETHA	10
D3CAR	10	METH	0	FORAC	10
DLIM	5	ETHE	45	ACTAC	10
CAMPH	5	PROPE	45	BUTO	10
MYRAC	5	ETHO	45	CO	150
ATERP	5	ACET	45	ORVOC	80
BPHE	0	HEXA	20	NO	34
SABI	0	HEXE	80		
PCYM	0	HEXY	80		

Barrenland (R11 Barrenland)

Barrenland is a fairly self-described category. Because other plant communities require extensive data collection, observations, and surveying, this particular community was only observed in passing. True barren land in Clark County is a rarity, because even places that may appear absent of vegetative life often play host to seasonal herbaceous coverage. Areas identified as truly barren via NV-GAP data were located just north and east of Las Vegas, and east of the Sheep Range. Barrenland is caused largely from a combination of elements including rain shadows created by mountains, slope and aspect, and soil aggregate size (large aggregates have poor potential for water retention). The absence of vegetation in Barrenland can be observed year-round. Table 4-17 illustrates Clark County's Barrenland community coverage.

TABLE 4-17. R11 BARRENLAND (GROSS COVERAGE)

Land-Use Type	Botanical Name	Common Name	Plant Family	% Cover	BELD3 Source
Barrenland	NA	NA	NA	100	018 USGS_sprsbarren

With 100 percent coverage equally for the default BELD3 005 USGS_irrcrop, the emissions calculation was fairly straightforward. The emissions for Clark County's Barrenland community, or R11 Barrenland, are illustrated in Table 4-18.

TABLE 4-18. BARRENLAND EMISSIONS

Pollutant Species	Emission Rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission Rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission Rate ($\mu g\ m^{-2}h^{-1}$)
ISOP	0	OCIM	0	FORM	2
MBO	8	ATHU	0	ACTAL	2
APIN	30	TRPO	0	BUTE	2
BPIN	1	GTERP	0	ETHA	1
D3CAR	1	METH	0	FORAC	1
DLIM	0	ETHE	5	ACTAC	1
CAMPH	0	PROPE	5	BUTO	1
MYRAC	0	ETHO	5	CO	15
ATERP	0	ACET	5	ORVOC	8
BPHE	0	HEXA	2	NO	0
SABI	0	HEXE	8		
PCYM	0	HEXY	8		

Lowland Riparian (R12 Lowland Riparian)

NV-GAP data seems to be mapped fairly well, although the absence of any Upland Riparian community data is intriguing. Observations of Upper Riparian were made although NV-GAP seems to have rolled them into other surrounding plant communities. Data were collected from a total of five Lowland Riparian quadrats in Clark County, in the Virgin River Valley, the Colorado River, and Pine Creek. Invasive plants, especially *Tamarix* spp., should be an area of serious concern for Clark County residents, farmers, and policy makers. Much of the Virgin River Valley is covered in almost 100% *Tamarix* spp., which is known for transpiring vast quantities of water in comparison with native riparian shrubs and small trees, and is thus impacting the integrity of the watershed and the source of water for much of the Southwest. Diversity of species in Tamarix spp. Infested riparian areas, as opposed to native riparian areas, was significantly lower; in many cases, the invasive plants had completely out-competed 99 percent of the native vegetation. Native riparian habitats hosted one of the most diverse plant communities surveyed in Clark County. Table 4-19 illustrates Clark County's Lowland Riparian community coverage.

TABLE 4-19. R12 LOWLAND RIPARIAN (GROSS COVERAGE)

Land-Use Type	Botanical Name	Common Name	Plant Family	% Cover	BELD3 Source
Lowland Riparian	Allenrolfea sp.	Pickelweed	CHENOPODIACEAE	5	010 USGS_shrubgrass
Lowland Riparian	Arctostaphylos uva-ursi	Manzanita	ERICACEAE	2	089 Madrone
Lowland Riparian	Artemisia sp.	Sage	ASTERACEAE	2	010 USGS_shrubgrass
Lowland Riparian	Barren	Barren	NA	9	018 USGS_sprsbarren
Lowland Riparian	Cercis sp.	Redbud	FABACEAE	1	231 Yellowwood
Lowland Riparian	Chrysothamnus sp.	Rabbitbrush	ASTERACEAE	1	010 USGS_shrubgrass
Lowland Riparian	Cytisus scoparius	Scotchbroom	FABACEAE	1	010 USGS_shrubgrass
Lowland Riparian	Encelia farinosa	Brittlebush	ASTERACEAE	5	010 USGS_shrubgrass
Lowland Riparian	Eriodictyon angustifolium	Yerba Santa	HYDROPHYLLACEAE	1	010 USGS_shrubgrass
Lowland Riparian	Fraxinus velutina	Velvet Ash	OLEACEAE	9	043 Ash
Lowland Riparian	Garrya flavescens	Silktassel	GARRYACEAE	3	010 USGS_shrubgrass
Lowland Riparian	Grasses	Grasses	NA	1	008 USGS_grassland
Lowland Riparian	H2O	Water	NA	2	016 USGS_water
Lowland Riparian	Phragmites sp.	Rushes	POACEAE	2	008 USGS_grassland
Lowland Riparian	Pinus ponderosa	Ponderosa Pine	PINACEAE	4	183 Pine_ponderosa
Lowland Riparian	Populus fremontii	Cottonwood	SALICACEAE	3	198 Populus
Lowland Riparian	Quercus turbinella	Scrub Live Oak	FAGACEAE	11	142 Oak_scrub
Lowland Riparian	Rhamnus californica	Coffeeberry	RHAMNACEAE	1	050 Cascara_buckthorn
Lowland Riparian	Rhus trilobata	Squawbush	ANACARDIACEAE	1	010 USGS_shrubgrass
Lowland Riparian	Salix sp.	Desert Willow	SALICACEAE	1	229 Willow
Lowland Riparian	Senecio sp.	Groundsel	ASTERACEAE	1	010 USGS_shrubgrass
Lowland Riparian	Solidago sp.	Goldenrod	ASTERACEAE	1	010 USGS_shrubgrass
Lowland Riparian	Tamarix pentandra	Salt Cedar	TAMARICACEAE	32	222 Tamarix
Lowland Riparian	Vitis arizonica	Canyon Grape	VITACEAE	1	010 USGS_shrubgrass

Little research is available concerning emission factors for about half of the species found in the lowland Riparian community. Some species, however, were represented taxonomically via genus or family. Plant families Chenopodiaceae, Krameriaceae, or Zygophyllaceae are not represented in BELD3 by any species for a taxonomic assignment of emission factors (Benjamin et al 1996). The BELD3 default 010 USGS_shrubgrass was utilized for species, genera, or families not represented in BELD3. About half the species identified in the Lowland Riparian plant community were directly available in BELD3, or species in the same genus or family, thus giving a fairly representative emissions factor for this plant community for Clark County. The emissions for Clark County's Lowland Riparian community, or R12 Lowland Riparian, are illustrated in Table 4-20.

TABLE 4-20. R12 LOWLAND RIPARIAN EMISSIONS

Pollutant Species	Emission Rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission Rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission Rate ($\mu g\ m^{-2}h^{-1}$)
ISOP	4041	OCIM	1	FORM	14
MBO	528	ATHU	1	ACTAL	14
APIN	206	TRPO	0	BUTE	14
BPIN	37	GTERP	1	ETHA	7
D3CAR	34	METH	0	FORAC	7
DLIM	35	ETHE	31	ACTAC	7
CAMPH	7	PROPE	31	BUTO	7
MYRAC	5	ETHO	31	CO	103
ATERP	6	ACET	31	ORVOC	55
BPHE	0	HEXA	14	NO	5
SABI	1	HEXE	55		
PCYM	0	HEXY	55		

Mesquite (R13 Mesquite)

According to Charlet (Charlet 2003), the distribution of Mesquite is underestimated, and a few fragments remain within the urban development of the Las Vegas Valley; otherwise the mapping of this class appears very good. Data were collected from two quadrat locations for this particular ecosystem near the Corn Creek Headquarters of the Desert National Wildlife Refuge. Observations were also made of Mesquite in an unnamed wash in the Pahrump Valley, which confirmed the findings in the two sample quadrats. The Mesquite community accounts for a small fraction of the whole of Clark County. Table 4-21 illustrates Clark County's Mesquite community coverage.

TABLE 4-21. R13 MESQUITE (GROSS COVERAGE)

Land-Use Type	Botanical Name	Common Name	Plant Family	% Cover	BELD3 Source
Mesquite	Ambrosia dumosa	Bursage	ASTERACEAE	8	010 USGS_shrubgrass
Mesquite	Atriplex sp.	Saltbush	CHENOPODIACEAE	21	010 USGS_shrubgrass
Mesquite	Barren	Barren	NA	29	018 USGS_sprsbarren
Mesquite	Ephedra sp.	Mormon Tea	EPHEDRACEAE	1	010 USGS_shrubgrass
Mesquite	Larrea tridentata	Creosote	ZYGOPHYLLACEAE	9	010 USGS_shrubgrass
Mesquite	Prosopsis glandulosa	Honey Mesquite	FABACEAE	19	105 Mesquite
Mesquite	Sarcobatus sp.	Greasewood	CHENOPODIACEAE	13	010 USGS_shrubgrass

Little research is available concerns emission factors for most of the species found in the Mesquite community. Some species, however, were represented taxonomically via genus or family. Plant families Chenopodiaceae, Ephedraceae, or Zygophyllaceae are not represented in BELD3 by any species for a taxonomic assignment of emission factors (Benjamin et al 1996). The BELD3 default 010 USGS_shrubgrass was utilized for species, genera, or families not

represented in BELD3. The emissions for Clark County's Mesquite community, or R13 Mesquite, are illustrated in Table 4-22.

TABLE 4-22. R13 MESQUITE EMISSIONS

Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)
ISOP	176	OCIM	0	FORM	11
MBO	7	ATHU	0	ACTAL	11
APIN	161	TRPO	0	BUTE	11
BPIN	31	GTERP	0	ETHA	5
D3CAR	16	METH	0	FORAC	5
DLIM	8	ETHE	25	ACTAC	5
CAMPH	8	PROPE	25	BUTO	5
MYRAC	8	ETHO	25	CO	80
ATERP	8	ACET	25	ORVOC	43
BPHE	0	HEXA	11	NO	8
SABI	0	HEXE	43		
PCYM	0	HEXY	43		

Mountain Scrub (R14 Mountain Scrub)

The Mixed Mountain Scrub plant community may be over mapped in the NV-GAP data, although the field team was able to locate each quadrat location according to GPS coordinates without any problems. Data were collected from a total of three quadrats for this cover type. Two of the quadrats were difficult to access in terms of the slope of the site and density of individual plant specimens to one another. An observation made by the field team was that the majority of the areas identified as Mixed Mountain Scrub are truly an impenetrable scrub of woody growth. The third and final quadrat was level, and thus easier to access, but was no less impenetrable than the first two quadrats. Table 4-23 illustrates Clark County's Mountain Scrub community coverage.

TABLE 4-23. R14 MOUNTAIN SCRUB (GROSS COVERAGE)

Land-Use Type	Botanical Name	Common Name	Plant Family	% Cover	BELD3 Source
Mountain Scrub	Arctostaphylos sp.	Manzanita	ERICACEAE	6	089 Madrone
Mountain Scrub	Artemisia sp.	Sage	ASTERACEAE	9	010 USGS_shrubgrass
Mountain Scrub	Barren	Barren	NA	11	018 USGS_sprsbarren
Mountain Scrub	Cercocarpus sp.	Mahogany	ROSACEAE	24	091 Mahogany
Mountain Scrub	Chrysothamnus sp.	Rabbitbrush	ASTERACEAE	2	010 USGS_shrubgrass
Mountain Scrub	Grasses	Grasses	NA	4	008 USGS_grassland
Mountain Scrub	Pinus monphylla	Pinyon Pine	PINACEAE	5	178 Pine_pinyon
Mountain Scrub	Pinus ponderosa	Ponderosa Pine	PINACEAE	1	183 Pine_ponderosa
Mountain Scrub	Quercus gambelli.	Gambel Oak	FAGACAEA	37	129 Oak_Gambel
Mountain Scrub	Symphoricarpos sp.	Snowberry	CAPRIFOLIACEAE	1	010 USGS_shrubgrass

Little research is available concerning emission factors for about one-third of the species found in the Mountain Scrub community. Some species, however, were represented taxonomically via genus or family. Plant families Asteraceae or Caprifoliaceae, are not represented in BELD3 by any species for a taxonomic assignment of emission factors (Benjamin et al 1996). The BELD3 default 010 USGS_shrubgrass was utilized for species, genera, or families not represented in BELD3. About two-thirds of the species identified in the Mountain Scrub plant community were directly available in BELD3, or species in the same genus or family, thus giving a fairly representative emissions factor for this plant community for Clark County. The emissions for Clark County's Mountain Scrub community, or R14 Mountain Scrub, are illustrated in Table 4-24.

TABLE 4-24. R14 MOUNTAIN SCRUB EMISSIONS

Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)
ISOP	9769	OCIM	3	FORM	14
MBO	134	ATHU	4	ACTAL	14
APIN	212	TRPO	0	BUTE	14
BPIN	60	GTERP	3	ETHA	7
D3CAR	32	METH	0	FORAC	7
DLIM	20	ETHE	32	ACTAC	7
CAMPH	16	PROPE	32	BUTO	7
MYRAC	14	ETHO	32	CO	106
ATERP	12	ACET	32	ORVOC	56
BPHE	0	HEXA	14	NO	4
SABI	0	HEXE	56		
PCYM	0	HEXY	56		

Pinyon Pine (R15 Pinyon Pine)

This plant community was accessed via the Spring Mountains on the northwest side of the Lee Canyon Road. The three quadrats sampled by EQ were located on the eastern slope of the Spring Mountains, slopes at 2:1. Pinus monophylla was definitely dominant and very little was observed in terms of herbaceous understory, although this may be only seasonal. The elevation for all three quadrats was somewhere between 7500 to 7800 feet. Table 4-25 illustrates Clark County's Pinyon Pine community coverage.

TABLE 4-25. R15 PINYON PINE (GROSS COVERAGE)

Land-Use Type	Botanical Name	Common Name	Plant Family	% Cover	BELD3 Source
Pinyon Pine	Artemisia sp.	Sage	ASTERACEAE	5	010 USGS_shrubgrass
Pinyon Pine	Barren	Barren	NA	23	018 USGS_sprsbarren
Pinyon Pine	Cercocarpus sp.	Mahogany	ROSACEAE	15	091 Mahogany
Pinyon Pine	Grasses	Grasses	NA	1	008 USGS_grassland
Pinyon Pine	Juniperus sp.	Juniper	CUPRESSACEAE	17	085 Juniper
Pinyon Pine	Opuntia sp.	Cacti	CACTACEAE	0	010 USGS_shrubgrass
Pinyon Pine	Persia sp.	Cliffrose	ROSACEAE	6	042 Apple
Pinyon Pine	Pinus monphylla	Pinyon Pine	PINACEAE	33	178 Pine_pinyon

Little research is available concerning emission factors for about half of the species found in the Pinyon Pine community. Some species, however, were represented taxonomically via genus or family. Plant families Asteraceae or Cactaceae are not represented in BELD3 by any species for a taxonomic assignment of emission factors (Benjamin et al 1996), The BELD3 default 010 USGS_shrubgrass was utilized for species, genera, or families not represented in BELD3. About half the species identified in the Pinyon Pine plant community were directly available in BELD3, or species in the same genus or family, thus giving a fairly representative emissions factor for this plant community for Clark County. The emissions for Clark County's Pinyon Pine community, or R15 Pinyon Pine, are illustrated in Table 4-26.

TABLE 4-26. R15 PINYON PINE EMISSIONS

Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)
ISOP	60	OCIM	0	FORM	18
MBO	2	ATHU	0	ACTAL	18
APIN	276	TRPO	0	BUTE	18
BPIN	271	GTERP	0	ETHA	9
D3CAR	126	METH	0	FORAC	9
DLIM	104	ETHE	42	ACTAC	9
CAMPH	62	PROPE	42	BUTO	9
MYRAC	62	ETHO	42	CO	138
ATERP	62	ACET	42	ORVOC	74
BPHE	0	HEXA	18	NO	2
SABI	0	HEXE	74		
PCYM	0	HEXY	74		

Pinyon-Juniper (R16 Pinyon-Juniper)

This particular plant community type seems well represented in the NV-GAP mapping. Data were collected from five quadrats in the Pinyon-Juniper plant community. Three quadrats were located in the Spring Mountains. The remaining quadrats were located in the eastern portion of the Sheep Range, near Mormon Pass. The quadrats in the Sheep Range exemplified a

higher percentage of *Pinus monophylla* than *Juniperus osteosperma* by a few degrees, and the reverse was observed in the Spring Mountains. These differences are likely due to elevation changes, as the sites near Mormon Pass were situated almost 1000 feet above the elevation of those quadrats located in the Spring Mountains. It should also be noted that this particular plant community was situated in a rough topographical area, and some differences were noted in plant density at various slopes and aspects. Table 4-27 illustrates Clark County's Pinyon-Juniper community coverage.

TABLE 4-27. R16 PINYON-JUNIPER (GROSS COVERAGE)

Land-Use Type	Botanical Name	Common Name	Plant Family	% Cover	BELD3 Source
Pinyon-Juniper	Amelanchier sp.	Serviceberry	ROSACEAE	2	204 Serviceberry
Pinyon-Juniper	Artemisia sp.	Sage	ASTERACEAE	9	010 USGS_shrubgrass
Pinyon-Juniper	Atriplex sp.	Saltbush	CHENOPODIACEAE	1	010 USGS_shrubgrass
Pinyon-Juniper	Barren	Barren	NA	30	018 USGS_sprsbarren
Pinyon-Juniper	Cercocarpus sp.	Mahogany	ROSACEAE	3	091 Mahogany
Pinyon-Juniper	Coleogyne ramosissima	Blackbrush	ROSACEAE	7	010 USGS_shrubgrass
Pinyon-Juniper	Ephedra sp.	Mormon Tea	EPHEDRACEAE	1	010 USGS_shrubgrass
Pinyon-Juniper	Juniperus sp.	Juniper	CUPRESSACEAE	19	085 Juniper
Pinyon-Juniper	Opuntia sp.	Cacti	CACTACEAE	2	010 USGS_shrubgrass
Pinyon-Juniper	Persia sp.	Cliffrose	ROSACEAE	4	042 Apple
Pinyon-Juniper	Pinus monphylla	Pinyon Pine	PINACEAE	21	178 Pine_pinyon
Pinyon-Juniper	Symphoricarpos sp.	Snowberry	CAPRIFOLIACEAE	1	010 USGS_shrubgrass

Little research is available concerning emission factors for about one-third of the species found in the Pinyon-Juniper community. Some species, however, were represented taxonomically via genus or family. Plant families Chenopodiaceae, Cactaceae, Ephedraceae, Asteraceae, or Caprifoliaceae are not represented in BELD3 by any species for a taxonomic assignment of emission factors (Benjamin et al 1996). The BELD3 default 010 USGS_shrubgrass was utilized for species, genera, or families not represented in BELD3.

About two-thirds of the species identified in the Pinyon-Juniper plant community were directly available in BELD3, or species in the same genus or family, thus giving a fairly representative emissions factor for this plant community for Clark County. The emissions for Clark County's Pinyon-Juniper community, or R16 Pinyon-Juniper, are illustrated in Table 4-28.

TABLE 4-28. R16 PINYON-JUNIPER EMISSIONS

Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)
ISOP	100	OCIM	0	FORM	16
MBO	4	ATHU	0	ACTAL	16
APIN	241	TRPO	0	BUTE	16
BPIN	192	GTERP	0	ETHA	8
D3CAR	85	METH	0	FORAC	8
DLIM	89	ETHE	36	ACTAC	8
CAMPH	42	PROPE	36	BUTO	8
MYRAC	42	ETHO	36	CO	121
ATERP	42	ACET	36	ORVOC	64
BPHE	0	HEXA	16	NO	4
SABI	0	HEXE	64		
PCYM	0	HEXY	64		

White Fir (R17 White Fir)

The NV-GAP data delineates the White Fir community fairly well, but this did not make accessing the quadrat locations any easier. Data were collected from three quadrats in this community. Because all plots were inundated with 3 to 4 feet of snow, little low-growing woody material could be recorded. Two of the quadrats were also located in old-growth White Fir forest, with some trees at 36-inch dbh (diameter at breast height) or greater. Although most of the observed White Fir forests were located on fairly steep slopes, this aspect did not seem to affect the distribution as observed in other plant communities. Table 4-29 illustrates Clark County's White Fir community coverage.

TABLE 4-29. R17 WHITE FIR (GROSS COVERAGE)

Land-Use Type	Botanical Name	Common Name	Plant Family	% Cover	BELD3 Source
White Fir	Abies concolor	White Fir	PINACEAE	42	076 Fir_white
White Fir	Barren	Barren	NA	20	018 USGS_sprsbarren
White Fir	Pinus aristata	Bristlecone Pine	PINACEAE	23	164 Pine_brstlcone
White Fir	Pinus flexilis	Limber Pine	PINACEAE	10	173 Pine_limber
White Fir	Ribes sp.	Gooseberry	SAXIFRAGACEAE	5	010 USGS_shrubgrass

The species found to represent the White Fir community are well represented within BELD3. The BELD3 default 010 USGS_shrubgrass was utilized for species, genera, or families not represented in BELD3. The emissions for Clark County's White Fir community, or R17 White Fir, are illustrated in Table 4-30.

TABLE 4-30. R17 WHITE FIR EMISSIONS

Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)
ISOP	102	OCIM	0	FORM	36
MBO	2	ATHU	0	ACTAL	36
APIN	533	TRPO	0	BUTE	36
BPIN	1170	GTERP	48	ETHA	18
D3CAR	585	METH	7	FORAC	18
DLIM	1	ETHE	80	ACTAC	18
CAMPH	104	PROPE	80	BUTO	18
MYRAC	101	ETHO	80	CO	267
ATERP	71	ACET	80	ORVOC	142
BPHE	0	HEXA	36	NO	2
SABI	33	HEXE	142		
PCYM	167	HEXY	142		

Ponderosa Pine (R18 Ponderosa Pine)

The NV-GAP mapping of this plant community is fairly accurate and the field team had no trouble locating or accessing the quadrats. Data were collected from three quadrats in the Ponderosa Pine community, and the location of these plots was at the end of Lee's Canyon Road, north and east of the public camping facility located there. Although a few inches of snow were present at the time the surveys were completed, a fairly accurate representation of the dwarf woody species on the forest floor was recorded. Very little herbaceous material was recorded with the exception of a few grass species. The understory of this Ponderosa Pine community likely reflects that of other western regions, and is host to a very poor herbaceous layer. It should be noted that some samples were found of low elevation *Pinus ponderosa* around 4100 feet in elevation in the Red Rock region in Pine Creek that are growing in association with what would otherwise be considered a Lowland Riparian community. Table 4-31 illustrates Clark County's Ponderosa Pine community coverage.

TABLE 4-31. R18 PONDEROSA PINE (GROSS COVERAGE)

Land-Use Type	Botanical Name	Common Name	Plant Family	% Cover	BELD3 Source
Ponderosa Pine	Abies concolor	White Fir	PINACEAE	11	076 Fir_white
Ponderosa Pine	Artemisia sp.	Sage	ASTERACEAE	1	010 USGS_shrubgrass
Ponderosa Pine	Barren	Barren	NA	20	018 USGS_sprsbarren
Ponderosa Pine	Grasses	Grasses	NA	1	008 USGS_grassland
Ponderosa Pine	Pinus ponderosa	Ponderosa Pine	PINACEAE	51	183 Pine_ponderosa
Ponderosa Pine	Ribes sp.	Gooseberry	SAXIFRAGACEAE	3	010 USGS_shrubgrass
Ponderosa Pine	Symphoricarpos sp.	Snowberry	CAPRIFOLIACEAE	13	010 USGS_shrubgrass

Little research is available concerning emission factors for about two-thirds of the species found in the Ponderosa Pine community. Some species, however, were represented

taxonomically via genus or family. Plant families Asteraceae, Saxifragaceae, or Caprifoliaceae are not represented in BELD3 by any species for a taxonomic assignment of emission factors (Benjamin et al 1996). The BELD3 default 010 USGS_shrubgrass was utilized for species, genera, or families not represented in BELD3. About one-third of the species identified in the Ponderosa Pine plant community were directly available in BELD3, thus giving fairly representative emission factors for this plant community. The emissions for Clark County's Ponderosa Pine community, or R18 Ponderosa Pine, are illustrated in Table 4-32.

TABLE 4-32. R18 PONDEROSA PINE EMISSIONS

Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)
ISOP	108	OCIM	0	FORM	24
MBO	6697	ATHU	0	ACTAL	24
APIN	357	TRPO	0	BUTE	24
BPIN	360	GTERP	13	ETHA	12
D3CAR	472	METH	2	FORAC	12
DLIM	393	ETHE	54	ACTAC	12
CAMPH	43	PROPE	54	BUTO	12
MYRAC	29	ETHO	54	CO	178
ATERP	38	ACET	54	ORVOC	95
BPHE	1	HEXA	24	NO	4
SABI	9	HEXE	95		
PCYM	47	HEXY	95		

Ponderosa-Mountain Scrub (R19 Ponderosa-Mountain Scrub)

This classification of forest can be difficult to delineate in many areas, and thus may have been difficult to map. The NV-GAP data set allowed these areas be found, however, and the predetermined quadrats were not difficult to access. Data were collected from three quadrats for the purposes of this study near the North Fork of the Dear Creek on the eastern slope of the Spring Mountains at elevations ranging from 8250 to 8450 feet. The field team found this community to be fairly diverse woody and herbaceous species. Sites at lower elevations hosted fewer *Pinus ponderosa* and a dominance of *Cercocarpus* spp., and the reversal was recorded at higher elevation quadrats. Table 4-33 illustrates Clark County's Ponderosa-Mountain Scrub community coverage.

TABLE 4-33. R19 PONDEROSA-MOUNTAIN SCRUB (GROSS COVERAGE)

Land-Use Type	Botanical Name	Common Name	Plant Family	% Cover	BELD3 Source
Ponderosa-Mntn Scrub	Abies concolor	White Fir	PINACEAE	3	076 Fir_white
Ponderosa-Mntn Scrub	Artemisia sp.	Sage	ASTERACEAE	12	010 USGS_shrubgrass
Ponderosa-Mntn Scrub	Barren	Barren	NA	12	018 USGS_sprsbarren
Ponderosa-Mntn Scrub	Cercocarpus sp.	Mountain Mahogany	ROSACEAE	36	091 Mahogany
Ponderosa-Mntn Scrub	Chrysothamnus sp.	Rabbitbrush	ASTERACEAE	6	010 USGS_shrubgrass
Ponderosa-Mntn Scrub	Juniperus sp.	Juniper	CUPRESSACEAE	9	085 Juniper
Ponderosa-Mntn Scrub	Pinus aristata	Bristlecone Pine	PINACEAE	1	164 Pine_brstlcone
Ponderosa-Mntn Scrub	Pinus monphylla	Pinyon Pine	PINACEAE	6	178 Pine_pinyon
Ponderosa-Mntn Scrub	Pinus ponderosa	Ponderosa Pine	PINACEAE	8	183 Pine_ponderosa
Ponderosa-Mntn Scrub	Ribes sp.	Gooseberry	SAXIFRAGACEAE	2	010 USGS_shrubgrass
Ponderosa-Mntn Scrub	Symphoricarpos sp.	Snowberry	CAPRIFOLIACEAE	5	010 USGS_shrubgrass

The species found to represent the Ponderosa-Mountain Scrub community are well represented within BELD3. The BELD3 default 010 USGS_shrubgrass was utilized for species, genera, or families not represented in BELD3. The emissions for Clark County's Ponderosa-Mountain Scrub community, or R19 Ponderosa-Mountain Scrub, are illustrated in Table 4-34.

TABLE 4-34. R19 PONDEROSA-MOUNTAIN SCRUB EMISSIONS

Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)
ISOP	116	OCIM	0	FORM	18
MBO	1053	ATHU	0	ACTAL	18
APIN	265	TRPO	0	BUTE	18
BPIN	164	GTERP	3	ETHA	9
D3CAR	123	METH	0	FORAC	9
DLIM	99	ETHE	40	ACTAC	9
CAMPH	25	PROPE	40	BUTO	9
MYRAC	23	ETHO	40	CO	133
ATERP	23	ACET	40	ORVOC	71
BPHE	0	HEXA	18	NO	5
SABI	2	HEXE	71		
PCYM	12	HEXY	71		

Sagebrush (R20 Sagebrush)

According to Charlet (Charlet 2003) and the field observations, the Sagebrush community is greatly over-estimated in all parts of the county. The best development of Sagebrush in Clark County was found near Mormon Well Pass adjacent to the Mormon Well Road north of Peek-a-Boo Canyon. The Sagebrush community was a gorgeous example of this particular community. Data collected from four quadrats in this particular community; all in the Sheep Range. Two of these quadrats were located near the aforementioned Mormon Well Pass on the eastern slope of the Sheep Range. The second two quadrats were located in Dead Man Canyon, north and west of Sheep Peak. Most all of the sites were fairly level, with deep alluvial

soils with large aggregates inner dispersed through out the site. Most of the quadrats were located around 6200 to 6400 feet elevation. The proximity to Pinyon-Juniper cover type was apparent and a lone *Juniperus* spp. or *Pinus monophylla* specimen often was located in part of a quadrat. Table 4-35 illustrates Clark County's Sagebrush community coverage.

TABLE 4-35. R20 SAGEBRUSH (GROSS COVERAGE)

Land-Use Type	Botanical Name	Common Name	Plant Family	% Cover	BELD3 Source
Sagebrush	Artemisia sp.	Sage	ASTERACEAE	32	010 USGS_shrubgrass
Sagebrush	Atriplex sp.	Saltbush	CHENOPODIACEAE	10	010 USGS_shrubgrass
Sagebrush	Barren	Barren	NA	19	018 USGS_sprsbarren
Sagebrush	Chrysothamnus sp.	Rabbitbrush	ASTERACEAE	3	010 USGS_shrubgrass
Sagebrush	Coleogyne ramosissima	Blackbrush	ROSACEAE	5	042 Apple
Sagebrush	Ephedra sp.	Mormon Tea	EPHEDRACEAE	3	010 USGS_shrubgrass
Sagebrush	Eriogonum sp.	Desert Trumpet	POLYGONACEAE	1	010 USGS_shrubgrass
Sagebrush	Fallugia paradoxa	Apache Rose	ROSACEAE	1	042 Apple
Sagebrush	Grasses	Grasses	NA	2	008 USGS_grassland
Sagebrush	Gutierrezia sp.	Snakeweed	ASTERACEAE	1	010 USGS_shrubgrass
Sagebrush	Juniperus sp.	Juniper	CUPRESSACEAE	7	085 Juniper
Sagebrush	Penstemon sp.	Beardtongue	SCHROPHULARIACEAE	1	010 USGS_shrubgrass
Sagebrush	Persia sp.	Cliffrose	ROSACEAE	1	042 Apple
Sagebrush	Pinus monphylla	Pinyon Pine	PINACEAE	9	178 Pine_pinyon
Sagebrush	Salvia mohavensis	Purple Sage	LAMIACEAE	2	010 USGS_shrubgrass
Sagebrush	Suaeda sp.	Mojave Seablight	CHENOPODIACEAE	1	010 USGS_shrubgrass
Sagebrush	Thamnosma montana	Turpentine Broom	RUTACEAE	1	010 USGS_shrubgrass
Sagebrush	Yucca sp.	Yucca	LILIACEAE	1	232 Yucca_Mojave

Little research is available concerning emission factors for most of the species found in the Sagebrush community. Some species, however, were represented taxonomically via genus or family. Plant families Chenopodiaceae, Asteraceae, Schrophulariaceae, Lamiaceae, Rutaceae, Ephedraceae, Polygonaceae, or Zygophyllaceae are not represented in BELD3 by any species for a taxonomic assignment of emission factors (Benjamin et al 1996). The BELD3 default 010 USGS_shrubgrass was utilized for species, genera, or families not represented in BELD3.

Several species in the Sagebrush community were represented either directly in BELD3 or via family or genus. The emissions for Clark County's Sagebrush community, or R20 Sagebrush, are illustrated in Table 4-36.

TABLE 4-36. R20 SAGEBRUSH EMISSIONS

Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)
ISOP	194	OCIM	0	FORM	14
MBO	7	ATHU	0	ACTAL	14
APIN	210	TRPO	0	BUTE	14
BPIN	106	GTERP	0	ETHA	7
D3CAR	49	METH	0	FORAC	7
DLIM	42	ETHE	32	ACTAC	7
CAMPH	25	PROPE	32	BUTO	7
MYRAC	25	ETHO	32	CO	105
ATERP	25	ACET	32	ORVOC	56
BPHE	0	HEXA	14	NO	9
SABI	0	HEXE	56		
PCYM	0	HEXY	56		

Sagebrush Grassland (R21 Sagebrush Grassland)

This community was determined to be over-estimated in terms of geographic space in Clark County by the RECON study (RECON 2000). The areas east of Red Rock, which are noted in the RECON (2002) study as the largest stands of Sagebrush Grassland, were actually Blackbrush Grassland (Mixed Scrub Grassland for the purposes of this study); therefore, much time was spent trying to actualize this community. Several true stands of Sagebrush Grassland were surveyed east of the Sheep Range near Mormon pass, in the vicinity of the Sagebrush quadrats mentioned above. Data were collected from four quadrats for this cover class: two near Mormon Well Pass, and two in Red Rock State Park. The elevation for all sites was between 3900 and 4200 feet, and they were all located on fairly level terraces in gradual slopes with an eastern aspect. The sites in red Rock State Park were questionable in terms of classification. Several hours were spent off of the given coordinates for the two plots located therein, and data were collected from sites that exemplified Sagebrush Grassland characteristics. Overall, the Sagebrush Grassland exemplified high diversity in the herbaceous layer. Table 4-37 illustrates Clark County's Sagebrush Grassland community coverage.

TABLE 4-37. R21 SAGEBRUSH GRASSLAND (GROSS COVERAGE)

Land-Use Type	Botanical Name	Common Name	Plant Family	% Cover	BELD3 Source
Sagebrush Grassland	Arctostaphylos uva-ursi	Manzanita	ERICACEAE	1	089 Madrone
Sagebrush Grassland	Artemisia sp.	Sage	ASTERACEAE	11	010 USGS_shrubgrass
Sagebrush Grassland	Barren	Barren	NA	10	018 USGS_sprsbarren
Sagebrush Grassland	Cercocarpus sp.	Mountain Mahogany	ROSACEAE	5	091 Mahogany
Sagebrush Grassland	Chrysothamnus sp.	Rabbitbrush	ASTERACEAE	1	010 USGS_shrubgrass
Sagebrush Grassland	Coleogyne ramosissima	Blackbrush	ROSACEAE	3	042 Apple
Sagebrush Grassland	Ephedra sp.	Mormon Tea	EPHEDRACEAE	2	010 USGS_shrubgrass
Sagebrush Grassland	Eriodictyon angustifolium	Yerba Santa	HYDROPHYLLACEAE	6	010 USGS_shrubgrass
Sagebrush Grassland	Eriogonum inflatum	Desert Trumpet	POLYGONACEAE	2	010 USGS_shrubgrass
Sagebrush Grassland	Eurotia lanata	Winterfat	CHENOPODIACEAE	1	010 USGS_shrubgrass
Sagebrush Grassland	Garrya flavescens	Silktassel	GARRYACEAE	6	010 USGS_shrubgrass
Sagebrush Grassland	Grasses	Grasses	NA	31	008 USGS_grassland
Sagebrush Grassland	Gutierrezia sarothrae	Snakeweed	ASTERACEAE	2	010 USGS_shrubgrass
Sagebrush Grassland	Opuntia sp.	Cacti	CACTACEAE	4	010 USGS_shrubgrass
Sagebrush Grassland	Penstemon palmeri	Palmer's Penstemon	SCROPHULARIACEAE	1	010 USGS_shrubgrass
Sagebrush Grassland	Quercus sp.	Scrub Live Oak	FAGACEAE	11	142 Oak_scrub
Sagebrush Grassland	Rhus trilobata	Squawbush	ANACARDIACEAE	1	010 USGS_shrubgrass
Sagebrush Grassland	Sphaeralcea ambigua	Globemallow	MALVACEAE	1	010 USGS_shrubgrass
Sagebrush Grassland	Symphoricarpos sp.	Snowberry	CAPRIFOLIACEAE	1	010 USGS_shrubgrass

Little research is available concerning emission factors for most of the species found in the Sagebrush Grassland community. Some species, however, were represented taxonomically via genus or family. Plant families Chenopodiaceae, Asteraceae, Schrophulariaceae, Lamiaceae, Rutaceae, Ephedraceae, Polygonaceae, or Zygophyllaceae are not represented in BELD3 by any species for a taxonomic assignment of emission factors (Benjamin et al 1996). The BELD3 default 010 USGS_shrubgrass was utilized for species, genera, or families not represented in BELD3.

Several species in the Sagebrush Grassland community were represented either directly in BELD3 or via family or genus. The emissions for Clark County's Sagebrush Grassland community, or R21 Sagebrush Grassland, are illustrated in Table 4-38.

TABLE 4-38. R21 SAGEBRUSH GRASSLAND EMISSIONS

Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)
ISOP	3033	OCIM	1	FORM	12
MBO	7	ATHU	1	ACTAL	12
APIN	186	TRPO	0	BUTE	12
BPIN	27	GTERP	1	ETHA	6
D3CAR	13	METH	0	FORAC	6
DLIM	6	ETHE	28	ACTAC	6
CAMPH	7	PROPE	28	BUTO	6
MYRAC	7	ETHO	28	CO	93
ATERP	6	ACET	28	ORVOC	50
BPHE	0	HEXA	12	NO	15
SABI	0	HEXE	50		
PCYM	0	HEXY	50		

Playa (R22 Playa)

Data were collected from three quadrats in the Playa classification. Except for the edges of a Playa area, no vegetation was recorded. Some vegetation, including *Atriplex* spp. and Russian Thistle, was observed along the "rim" of the seasonal pooling area. Table 4-39 illustrates Clark County's Playa community coverage.

TABLE 4-39. R22 PLAYA (GROSS COVERAGE)

Land-Use Type	Botanical Name	Common Name	Plant Family	% Cover	BELD3 Source
Playa	Atriplex sp.	Saltbush	CHENOPODIACEAE	3	010 USGS_shrubgrass
Playa	Barren	Barren	NA	97	018 USGS_sprsbarren

Little research is available concerning emission factors for most of the species found in the Sagebrush Grassland community. The plant family Chenopodiaceae is not represented in BELD3 by any species for a taxonomic assignment of emission factors (Benjamin et al 1996). The BELD3 default 010 USGS_shrubgrass was utilized for Atriplex species. The emissions for Clark County's Playa community, or R22 Playa, are illustrated in Table 4-40.

TABLE 4-40. R22 PLAYA EMISSIONS

Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)
ISOP	10	OCIM	0	FORM	2
MBO	8	ATHU	0	ACTAL	2
APIN	35	TRPO	0	BUTE	2
BPIN	3	GTERP	0	ETHA	1
D3CAR	2	METH	0	FORAC	1
DLIM	0	ETHE	6	ACTAC	1
CAMPH	0	PROPE	6	BUTO	1
MYRAC	0	ETHO	6	CO	18
ATERP	0	ACET	6	ORVOC	9
BPHE	0	HEXA	2	NO	0
SABI	0	HEXE	9		
PCYM	0	HEXY	9		

Salt Desert Scrub (R23 Salt Desert Scrub)

Because the majority of this cover class in Clark County is located in the confines of Nellis AFB and Proving Grounds, all sites were selectively made to avoid Air Force activities. Data were collected from 10 quadrats in the Salt Desert Scrub cover class. With the definitions for the community loosely defined, one could probably better describe this community as a genera *Atriplex* guild. The sites varied in terms of species representation, thus exemplifying the demographics of fairly random order. Quadrats were located in various part of the county in groups of two or more per given area. Recorded elevations for this particular community ranged from 2800 to 4800 feet, with some variability in demographics. The community mostly exemplified a fairly uniform coverage, however, with significantly higher barren space than other cover class except for Playa and Barrenland. Table 4-41 illustrates Clark County's Salt Desert Scrub community coverage.

TABLE 4-41. R23 SALT DESERT SCRUB (GROSS COVERAGE)

Land-Use Type	Botanical Name	Common Name	Plant Family	% Cover	BELD3 Source
Salt Desert Scrub	Ambrosia dumosa	Bursage	ASTERACEAE	1	010 USGS_shrubgrass
Salt Desert Scrub	Artemisia sp.	Sage	ASTERACEAE	1	010 USGS_shrubgrass
Salt Desert Scrub	Atriplex sp.	Saltbush	CHENOPODIACEAE	18	010 USGS_shrubgrass
Salt Desert Scrub	Barren	Barren	NA	43	018 USGS_sprsbarren
Salt Desert Scrub	Chrysothamnus sp.	Rabbitbrush	ASTERACEAE	1	010 USGS_shrubgrass
Salt Desert Scrub	Coleogyne ramosissima	Blackbrush	ROSACEAE	1	042 Apple
Salt Desert Scrub	Ephedra sp.	Mormon Tea	EPHEDRACEAE	4	010 USGS_shrubgrass
Salt Desert Scrub	Eriogonum sp.	Desert Trumpet	POLYGONACEAE	6	010 USGS_shrubgrass
Salt Desert Scrub	Grasses	Grasses	NA	10	008 USGS_grassland
Salt Desert Scrub	Grayia spinosa	Hopsage	CHENOPODIACEAE	2	010 USGS_shrubgrass
Salt Desert Scrub	Krameria sp.	Littleleaf Ratany	KRAMERIACEAE	1	010 USGS_shrubgrass
Salt Desert Scrub	Larrea tridentata	Creosote	ZYGOPHYLLACEAE	2	010 USGS_shrubgrass
Salt Desert Scrub	Lycium pallidum	Wolfberry	SOLANACEAE	1	010 USGS_shrubgrass
Salt Desert Scrub	Opuntia sp.	Cacti	CACTACEAE	1	010 USGS_shrubgrass
Salt Desert Scrub	Potentilla sp.	Cinquefoil	ROSACEAE	1	042 Apple
Salt Desert Scrub	Sarcobatus sp.	Greasewood	CHENOPODIACEAE	1	010 USGS_shrubgrass
Salt Desert Scrub	Sphaeralcea sp.	Globemallow	MALVACEAE	1	010 USGS_shrubgrass
Salt Desert Scrub	Suaeda sp.	Mojave Seablight	CHENOPODIACEAE	2	010 USGS_shrubgrass
Salt Desert Scrub	Yucca sp.	Yucca	LILIACEAE	3	232 Yucca_Mojave

Little research is available concerning emission factors for most of the species found in the Salt Desert Scrub community. Some species, however, were represented taxonomically via genus or family. Plant families Chenopodiaceae, Asteraceae, Schrophulariaceae, Cactaceae, Solanaceae, Ephedraceae, Polygonaceae, or Zygophyllaceae are not represented in BELD3 by any species for a taxonomic assignment of emission factors (Benjamin et al 1996). The BELD3 default 010 USGS_shrubgrass was utilized for species, genera, or families not represented in BELD3.

Several species in the Salt Desert Scrub community were represented either directly in BELD3 or via family or genus. The emissions for Clark County's Salt Desert Scrub community, or R23 Salt Desert Scrub, are illustrated in Table 4-42.

TABLE 4-42. R23 SALT DESERT SCRUB EMISSIONS

Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)
ISOP	143	OCIM	0	FORM	9
MBO	8	ATHU	0	ACTAL	9
APIN	130	TRPO	0	BUTE	9
BPIN	25	GTERP	0	ETHA	4
D3CAR	13	METH	0	FORAC	4
DLIM	6	ETHE	20	ACTAC	4
CAMPH	6	PROPE	20	BUTO	4
MYRAC	6	ETHO	20	CO	65
ATERP	6	ACET	20	ORVOC	35
BPHE	0	HEXA	9	NO	9
SABI	0	HEXE	35		
PCYM	0	HEXY	35		

Water (R24 Water)

No data were collected from this cover class as no vegetation was assumed. Water land-use data from existing BELD3. Table 4-43 illustrates Clark County's Water community coverage.

TABLE 4-43. R24 WATER (GROSS COVERAGE)

Land-Use Type	Botanical Name	Common Name	Plant Family	% Cover	BELD3 Source
Water	NA	NA	NA	100	016 USGS_water

With 100 percent coverage equally for the default BELD3 016 USGS_water, the emissions calculation was fairly straightforward. The emissions for Clark County's water bodies, or R24 Water, are illustrated in Table 4-44.

TABLE 4-44. R24 WATER EMISSIONS

Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)
ISOP	0	OCIM	0	FORM	0
MBO	0	ATHU	0	ACTAL	0
APIN	0	TRPO	0	BUTE	0
BPIN	0	GTERP	0	ETHA	0
D3CAR	0	METH	0	FORAC	0
DLIM	0	ETHE	0	ACTAC	0
CAMPH	0	PROPE	0	BUTO	0
MYRAC	0	ETHO	0	CO	0
ATERP	0	ACET	0	ORVOC	0
BPHE	0	HEXA	0	NO	0
SABI	0	HEXE	0		
PCYM	0	HEXY	0		

Not Clark County (Not CC)

Default data from BELD 3 was used for areas outside of Clark County, because these areas were not surveyed/observed by the field team. Existing data for the western United States was utilized to supply biogenic source emission factors.

4.5.2 Land Use Cover Results for Urban Areas in Clark County

Industrial (1 Industrial)

Data were collected from 10 quadrats of the Industrial land use in the urban landscape. Impervious surface areas with little or no vegetation present dominate this land-use type. Diversity was low for horticultural or native species; impervious surfaces accounted for 65 to 100 percent of any given plot, with the mean around 63 percent. Many of the quadrats were centered on parking areas of industrial facilities, drainage areas, garage facilities, or in a partially landscaped area. Table 4-45 illustrates Clark County's industrial land-use coverage.

TABLE 4-45. INDUSTRIAL (GROSS COVERAGE)

Land-Use Type	Botanical Name	Common Name	Plant Family	% Cover	BELD3 Source
Industrial	Acacia sp.	Catclaw	FABACEAE	1	039 Acacia
Industrial	Ambrosia dumosa	Bursage	ASTERACEAE	1	010 USGS_shrubgrass
Industrial	Barren	Barren	NA	24	018 USGS_sprsbarren
Industrial	Euonymus sp.	Euonymus	CELASTRACEAE	1	010 USGS_shrubgrass
Industrial	Grasses	Grasses	NA	2	026 Grass
Industrial	Impervious	Impervious	NA	63	003 USGS_urban
Industrial	Juniperus sp.	Juniper	CUPRESSACEAE	1	85 Juniper
Industrial	Leucophyllum sp.	Texas Barometerbush	SCROPHULARIACEAE	1	010 USGS_shrubgrass
Industrial	Ligustrum sp.	Privet	OLEACEAE	1	043 Ash
Industrial	Pinus arizonica	Arizona Pine	PINACEAE	1	161 Pine_AZ
Industrial	Prosopis sp.	Mesquite	FABACEAE	2	105 Mesquite
Industrial	Washingtonia sp.	Palm	ARECACEAE	1	232 Yucca_Mojave
Industrial	Yucca sp.	Yucca	LILIACEAE	1	232 Yucca_Mojave

Little research is available concerning emission factors for about one-half of the species found in the industrial land use. Some species, however, were represented taxonomically via genus or family. Plant families Celastraceae, Scrophulariaceae, or Asteraceae are not represented in BELD3 by any species for a taxonomic assignment of emission factors (Benjamin et al. 1996). The BELD3 default 010 USGS_shrubgrass was utilized for species, genera, or families not represented in BELD3. About one-half of the species identified in the industrial land use were directly available in BELD3, thus giving fairly representative emission factors for this plant community. The emissions for Clark County's Industrial land use, or 1 Industrial, are illustrated in Table 4-46.

TABLE 4-46. INDUSTRIAL EMISSIONS

Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)
ISOP	21	OCIM	0	FORM	5
MBO	181	ATHU	0	ACTAL	5
APIN	79	TRPO	0	BUTE	5
BPIN	30	GTERP	0	ETHA	3
D3CAR	12	METH	0	FORAC	3
DLIM	12	ETHE	12	ACTAC	3
CAMPH	3	PROPE	12	BUTO	3
MYRAC	2	ETHO	12	CO	39
ATERP	3	ACET	12	ORVOC	21
BPHE	0	HEXA	5	NO	5
SABI	0	HEXE	21		
PCYM	0	HEXY	21		

Light Industrial/Office (2 Light Industrial/Office)

Data were collected from nine quadrats for this land-use type. Again, impervious surface areas dominate this particular land-use cover class, with more permeable areas in the form of landscapes, lawns, and drainage areas. Diversity was much higher in the Light Industrial/Office land-use type, because a concerted effort was often placed on the landscape appearance of many of these properties utilized by professionals for their business with the general public. Impervious surfaces ranged between 50 to 87 percent of the total area of any given quadrat, with the mean at 65 percent. Table 4-47 illustrates Clark County's light industrial/office land-use coverage.

TABLE 4-47. LIGHT INDUSTRIAL/OFFICE (GROSS COVERAGE)

Land-Use Type	Botanical Name	Common Name	Plant Family	% Cover	BELD3 Source
Light Industrial/Office	Barren	Barren	NA	16	018 USGS_sprsbarren
Light Industrial/Office	Grasses	Grasses	NA	3	026 Grass
Light Industrial/Office	Impervious	Impervious	NA	65	003 USGS_urban
Light Industrial/Office	Juniperus sp.	Juniper	CUPRESSACEAE	1	085 Juniper
Light Industrial/Office	Lagerstroemia indica	Crapemyrtle	LYTHRACEAE	1	010 USGS_shrubgrass
Light Industrial/Office	Leucophyllum sp.	Texas Barometerbush	SCROPHULARIACEAE	1	010 USGS_shrubgrass
Light Industrial/Office	Pinus arizonica	Arizona Pine	PINACEAE	4	161 Pine_AZ
Light Industrial/Office	Platanus wrightii	Sycamore	PLATANACEAE	1	220 Sycamore
Light Industrial/Office	Prosopis sp.	Mesquite	FABACEAE	2	105 Mesquite
Light Industrial/Office	Pyracantha sp.	Firethorn	ROSACEAE	1	042 Apple
Light Industrial/Office	Quercus sp.	Scrub Oak	FAGACEAE	1	142 Oak_scrub
Light Industrial/Office	Rhus lanceolata	Prarie Sumac	ANACARDIACEAE	1	010 USGS_shrubgrass
Light Industrial/Office	Washingtonia sp.	Palm	ARECACEAE	2	232 Yucca_Mojave
Light Industrial/Office	Yucca sp.	Yucca	LILIACEAE	1	232 Yucca_Mojave

Little research is available concerning emission factors for about one-third of the species found in the Industrial land use. Some species, however, were represented taxonomically via genus or family. Plant families Lythraceae, Scrophulariaceae, or Anacardiaceae are not represented in BELD3 by any species for a taxonomic assignment of emission factors (Benjamin et al. 1996). The BELD3 default 010 USGS_shrubgrass was utilized for species, genera, or families not represented in BELD3. About two-thirds of the species identified in the Industrial land use were directly available in BELD3, thus giving fairly representative emission factors for this plant community. The emissions for Clark County's Light Industrial/Office land use, or 2 light Industrial/Office, are illustrated in Table 4-48.

TABLE 4-48. LIGHT INDUSTRIAL/OFFICE EMISSIONS

Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)
ISOP	549	OCIM	0	FORM	6
MBO	575	ATHU	0	ACTAL	6
APIN	95	TRPO	0	BUTE	6
BPIN	27	GTERP	0	ETHA	3
D3CAR	30	METH	0	FORAC	3
DLIM	35	ETHE	14	ACTAC	3
CAMPH	3	PROPE	14	BUTO	3
MYRAC	2	ETHO	14	CO	47
ATERP	4	ACET	14	ORVOC	25
BPHE	0	HEXA	6	NO	5
SABI	0	HEXE	25		
PCYM	0	HEXY	25		

Suburban Residential (3 Suburban Residential)

Data were collected from 27 quadrats in the Suburban Residential land-use type, 13 of which were in older neighborhoods and 14 of which were located in newer neighborhoods. A fairly diverse species matrix often occupied these quadrats. Some differences were observed in landscape design and selection of species for neighborhoods built in different decades. This pattern is mirrored by the national trend. In older neighborhoods, date palms, mulberry trees, and Mock Orange were fairly common. The Mulberry tree is well known as a high source of biogenic emissions in the Southwest (Karlik et al. 1998). Due to city water-use regulations, newer Suburban Residential landscapes often are designed utilizing xeriscaping. This type of landscape requires minimal irrigation in order to thrive. Although plant specimens in the newer developments may differ from these older developments, the key difference is the grasses. Older neighborhoods tend to maintain lawns, but newer neighborhoods tend to have smaller lawns or no lawn at all. Impervious surface areas accounted for as little as 23 percent of a given quadrat, to as higher as 93 percent of a given quadrat, with the mean around 57 percent. Table 4-49 illustrates Clark County's Suburban Residential land-use coverage.

TABLE 4-49. 3 SUBURBAN RESIDENTIAL (GROSS COVERAGE)

Land-Use Type	Botanical Name	Common Name	Plant Family	% Cover	BELD3 Source
Suburban Residential	Barren	Barren	NA	10	018 USGS_sprsbarren
Suburban Residential	Euonymus sp.	Euonymus	CELASTRACEAE	1	010 USGS_shrubgrass
Suburban Residential	Fraxinus sp.	Ash	OLEACEAE	1	043 Ash
Suburban Residential	Grasses	Grasses	NA	11	026 Grass
Suburban Residential	Impervious	Impervious	NA	57	003 USGS_urban
Suburban Residential	Juniperus sp.	Juniper	CUPRESSACEAE	1	085 Juniper
Suburban Residential	Ligustrum sp.	Privet	OLEACEAE	1	043 Ash
Suburban Residential	Morus alba	White Mulberry	MORACEAE	3	109 Mulberry
Suburban Residential	Nerium oleander	Oleander	APOCYNACEAE	1	010 USGS_shrubgrass
Suburban Residential	Olea europaea	Olive	OLEACEAE	1	043 Ash
Suburban Residential	Pinus arizonica	Arizona Pine	PINACEAE	2	161 Pine_AZ
Suburban Residential	Pittosporum sp.	Cheesewood	PITTOSPORACEAE	1	090 Magnolia
Suburban Residential	Populus sp.	Cottonwood	SALICACEAE	1	198 Populus
Suburban Residential	Prosopis sp.	Mesquite	FABACEAE	1	105 Mesquite
Suburban Residential	Prunus sp.	Plum	ROSACEAE	1	199 Prunus
Suburban Residential	Pyracantha sp.	Firethorn	ROSACEAE	1	042 Apple
Suburban Residential	Rosa	Rose	ROSACEAE	1	042 Apple
Suburban Residential	Rosmarinus officinalis	Rosemary	LAMIACEAE	1	009 USGS_shrubland
Suburban Residential	Senna sp.	Senna	FABACEAE	1	105 Mesquite
Suburban Residential	Thuja plicata	Wstrn Red Cedar	CUPRESSACEAE	1	054 Cedar_thuja
Suburban Residential	Washingtonia sp.	Palm	ARECACIA	2	232 Yucca_Mojave

The species found to represent the Suburban Residential land-use type are well represented within BELD3, at least taxonomically. Many species were not readily available in terms of direct species being represented, but most species were taxonomically connected to one or several species in BELD3 via genus or family (Benjamin et al. 1996). The BELD3 default 010 USGS_shrubgrass was utilized for species, genera, or families not represented in BELD3. The emissions for Clark County's Suburban Residential land use, or 3 Suburban Residential, are illustrated in Table 4-50.

TABLE 4-50. 3 SUBURBAN RESIDENTIAL EMISSIONS

Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)
ISOP	295	OCIM	1	FORM	8
MBO	306	ATHU	0	ACTAL	8
APIN	119	TRPO	1	BUTE	8
BPIN	32	GTERP	0	ETHA	4
D3CAR	23	METH	0	FORAC	4
DLIM	21	ETHE	18	ACTAC	4
CAMPH	6	PROPE	18	BUTO	4
MYRAC	5	ETHO	18	CO	60
ATERP	5	ACET	18	ORVOC	32
BPHE	0	HEXA	8	NO	7
SABI	0	HEXE	32		
PCYM	1	HEXY	32		

Urban Residential (4 Urban Residential)

Data were collected from 10 quadrats in the Urban Residential land-use type. Less diversity was observed in these quadrats than was observed in the Suburban Residential quadrats. Species diversity more closely matched that of the Light Industrial/Office land-use type for variability and selection of species. Likely this is due to larger scale landscape planning and the cost-effectiveness of less-diverse landscapes realized through bulk plant orders at installation. Lawns were minimal in both older and newer developments of this land-use category, likely to minimize costs of irrigation. Impervious surface areas accounted for as little as 29 percent of a given quadrat, and as much as 89 percent of a given quadrat, with a mean at 61 percent. Table 4-51 illustrates Clark County's Urban Residential land-use coverage.

TABLE 4-51. 4 URBAN RESIDENTIAL (GROSS COVERAGE)

Land-Use Type	Botanical Name	Common Name	Plant Family	% Cover	BELD3 Source
Urban Residential	Acacia sp.	Catclaw	FABACEAE	1	039 Acacia
Urban Residential	Barren	Barren	NA	13	018 USGS_sprsbarren
Urban Residential	Fraxinus sp.	Ash	OLEACEAE	2	043 Ash
Urban Residential	Grasses	Grasses	NA	7	026 Grass
Urban Residential	Impervious	Impervious	NA	61	003 USGS_urban
Urban Residential	Leucophyllum sp.	TX Barometerbsh	SCROPHULARIACEAE	1	010 USGS_shrubgrass
Urban Residential	Nerium oleander	Oleander	APOCYNACEAE	1	010 USGS_shrubgrass
Urban Residential	Olea europaea	Olive	OLEACEAE	2	043 Ash
Urban Residential	Pinus arizonica	Arizona Pine	PINACEAE	1	161 Pine_AZ
Urban Residential	Pittosporum sp.	Cheesewood	PITTOSPORACEAE	1	090 Magnolia
Urban Residential	Prosopis sp.	Mesquite	FABACEAE	6	105 Mesquite
Urban Residential	Rhus lanceolata	Prairie Sumac	ANACARDIACEAE	1	010 USGS_shrubgrass
Urban Residential	Rosmarinus officinalis	Rosemary	LAMIACEAE	1	010 USGS_shrubgrass
Urban Residential	Schinus molle	Peppertree	ANACARDIACEAE	1	010 USGS_shrubgrass
Urban Residential	Washingtonia sp.	Palm	ARECACIA	1	232 Yucca_Mojave

Little research is available concerning emission factors for about one-half of the species found in the Urban Residential land use. Some species, however, were represented taxonomically via genus or family. Plant families Aponaceae, Anacardiaceae, Lamiaceae, or Scrophulariaceae are not represented in BELD3 by any species for a taxonomic assignment of emission factors (Benjamin et al. 1996). The BELD3 default 010 USGS_shrubgrass was utilized for species, genera, or families not represented in BELD3. About one-half of the species identified in the Urban Residential land use were directly available in BELD3, thus giving fairly representative emission factors for this plant community. The emissions for Clark County's Urban Residential land use, or 4 Urban Residential, are illustrated in Table 4-52.

TABLE 4-52. 4 URBAN RESIDENTIAL EMISSIONS

Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)
ISOP	32	OCIM	0	FORM	7
MBO	178	ATHU	0	ACTAL	7
APIN	99	TRPO	0	BUTE	7
BPIN	39	GTERP	0	ETHA	3
D3CAR	16	METH	0	FORAC	3
DLIM	11	ETHE	15	ACTAC	3
CAMPH	4	PROPE	15	BUTO	3
MYRAC	3	ETHO	15	CO	50
ATERP	4	ACET	15	ORVOC	26
BPHE	0	HEXA	7	NO	7
SABI	1	HEXE	26		
PCYM	0	HEXY	26		

Rural Residential (5 Rural Residential)

Data were collected from seven quadrats in the Rural Residential land-use type in Clark County. The majority of these sites were observed as older developments from the 1940's and 1950's, with appropriate landscaped specimens, or an occasional newer estate from 1960's to the present. Species include various palms, Eucalyptus, Mulberry, Mock Orange, Italian Cedar, Junipers, and others. Some areas that were classified as Rural Residential were completely undeveloped and native habitat was observable. Impervious surface areas accounted for as little as 10 percent of a given quadrat, and as much as 85 percent of a given quadrat, with a mean at 37 percent. Table 4-53 illustrates Clark County's Rural Residential land-use coverage.

TABLE 4-53. 5 RURAL RESIDENTIAL (GROSS COVERAGE)

Land-Use Type	Botanical Name	Common Name	Plant Family	% Cover	BELD3 Source
Rural Residential	Ambrosia dumosa	Bursage	ASTERACEAE	1	010 USGS_shrubgrass
Rural Residential	Artemisia sp.	Sagebrush	ASTERACEAE	3	010 USGS_shrubgrass
Rural Residential	Atriplex sp.	Saltbush	CHENOPODIACEAE	1	010 USGS_shrubgrass
Rural Residential	Barren	Barren	NA	28	018 USGS_sprsbarren
Rural Residential	Eucalyptus sp.	Eucalyptus	MYRTACEAE	1	064 Eucalyptus
Rural Residential	Fraxinus sp.	Ash	OLEACEAE	1	043 Ash
Rural Residential	Grasses	Grasses	NA	15	026 Grass
Rural Residential	Impervious	Impervious	NA	37	003 USGS_urban
Rural Residential	Juniperus sp.	Juniperus	CUPRESSACEAE	1	085 Juniper
Rural Residential	Larrea tridentate	Creosote Bush	ZYGOPHYLLACEAE	2	010 USGS_shrubgrass
Rural Residential	Morus alba	White Mulberry	MORACEAE	1	109 Mulberry
Rural Residential	Nerium oleander	Oleander	APOCYNACEAE	1	010 USGS_shrubgrass
Rural Residential	Pinus arizonica	Arizona Pine	PINACEAE	4	161 Pine_AZ
Rural Residential	Pittosporum sp.	Cheesewood	PITTOSPORACEAE	1	090 Magnolia
Rural Residential	Platanus wrightii	Sycamore	PLATANACEAE	1	220 Sycamore
Rural Residential	Populus sp.	Cottonwood	SALICACEAE	1	198 Populus
Rural Residential	Washingtonia sp.	Palm	ARECACIA	1	232 Yucca_Mojave

Little research is available concerning emission factors for about one-half of the species found in the Rural Residential land use. Some species, however, were represented taxonomically via genus or family. Plant families Asteraceae, Chenopodiaceae, Apocynaceae, or Zygophyllaceae are not represented in BELD3 by any species for a taxonomic assignment of emission factors (Benjamin et al 1996). The BELD3 default 010 USGS_shrubgrass was utilized for species, genera, or families not represented in BELD3. About one-half of the species identified in the Rural Residential land use were directly available in BELD3, thus giving fairly representative emission factors for this plant community. The emissions for Clark County's Rural Residential land use, or 5 Rural Residential, are illustrated in Table 4-54.

TABLE 4-54. 5 RURAL RESIDENTIAL EMISSIONS

Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)
ISOP	830	OCIM	0	FORM	7
MBO	556	ATHU	2	ACTAL	7
APIN	111	TRPO	0	BUTE	7
BPIN	43	GTERP	0	ETHA	4
D3CAR	37	METH	0	FORAC	4
DLIM	37	ETHE	17	ACTAC	4
CAMPH	8	PROPE	17	BUTO	4
MYRAC	4	ETHO	17	CO	56
ATERP	6	ACET	17	ORVOC	30
BPHE	0	HEXA	7	NO	8
SABI	0	HEXE	30		
PCYM	0	HEXY	30		

Public Facility/Parks (6 Public Facility/Parks)

Data were collected from 24 quadrats in the Public Facility/Parks land-use type. Variations in the vegetation were observed across the entire Las Vegas Valley. Natural parks such as the wetlands park in the Las Vegas Wash differed greatly from sports parks such as the Horseman & Dog Fancier's Park. Perhaps a better classification for this land-use type would be to further delineate it as was done with the various residential areas such as Public Facility, Urban Park, and Natural Park Area. In general, large areas of the Public Facility/Parks land use type were barren, irrigated lawns, parking areas, plantscapes, and/or natural/regenerated vegetation. Vegetation tended to lean toward the large woody species of trees and shrubs, although a few new parks exemplified the growing trend toward xeriscaping. Impervious surface areas accounted for as little as 0 percent of a given quadrat, and as much as 90 percent of

a given quadrat, with a mean at 24 percent. Table 4-55 illustrates Clark County's Public Facility/Parks land-use coverage.

TABLE 4-55. 6 PUBLIC FACILITY/PARKS (GROSS COVERAGE)

Land-Use Type	Botanical Name	Common Name	Plant Family	% Cover	BELD3 Source
Public Facility/Parks	Acacia sp.	Catclaw	FABACEAE	2	039 Acacia
Public Facility/Parks	Atriplex sp.	Saltbush	CHENOPODIACEAE	2	010 USGS_shrubgrass
Public Facility/Parks	Barren	Barren	NA	24	018 USGS_sprsbarren
Public Facility/Parks	Fraxinus sp.	Ash	OLEACEAE	1	043 Ash
Public Facility/Parks	Grasses	Grasses	NA	30	026 Grass
Public Facility/Parks	Impervious	Impervious	NA	24	003 USGS_urban
Public Facility/Parks	Krameria sp.	Ratany	KRAMERIACEAE	1	010 USGS_shrubgrass
Public Facility/Parks	Larrea tridentata	Creosote Bush	ZYGOPHYLLACEAE	2	010 USGS_shrubgrass
Public Facility/Parks	Leucophyllum sp.	Barometerbush	SCROPHULARIACEAE	1	010 USGS_shrubgrass
Public Facility/Parks	Morus alba	White Mulberry	MORACEAE	1	109 Mulberry
Public Facility/Parks	Nerium oleander	Oleander	APOCYNACEAE	1	010 USGS_shrubgrass
Public Facility/Parks	Phragmites australis	Common Reed	POACEAE	3	008 USGS_grassland
Public Facility/Parks	Pinus arizonica	Arizona Pine	PINACEAE	3	161 Pine_AZ
Public Facility/Parks	Populus sp.	Cottonwood	SALICACEAE	1	198 Populus
Public Facility/Parks	Prosopis sp.	Mesquite	FABACEAE	1	105 Mesquite
Public Facility/Parks	Rosmarinus officinalis	Rosemary	LAMIACEAE	1	010 USGS_shrubgrass
Public Facility/Parks	Tamarix sp.	Tamarisk	TAMARICACEAE	1	222 Tamarix
Public Facility/Parks	Washingtonia sp.	Palm	ARECACIA	1	232 Yucca_Mojave

Little research is available concerning emission factors for about one-half of the species found in the Public Facility/Parks land use. Some species, however, were represented taxonomically via genus or family. Plant families Asteraceae, Chenopodiaceae, Lamiaceae, Schrophulariaceae, Krameriaceae, or Zygophyllaceae are not represented in BELD3 by any species for a taxonomic assignment of emission factors (Benjamin et al 1996). The BELD3 default 010 USGS_shrubgrass was utilized for species, genera, or families not represented in BELD3. About one-half of the species identified in the Public Facility/Parks land use were directly available in BELD3, thus giving fairly representative emission factors for this plant community. The emissions for Clark County's Public Facility/Parks land use, or 6 Public Facility/Parks, are illustrated below in Table 4-56.

TABLE 4-56. PUBLIC FACILITY/PARKS EMISSIONS

Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)
ISOP	313	OCIM	0	FORM	9
MBO	415	ATHU	2	ACTAL	9
APIN	132	TRPO	0	BUTE	9
BPIN	67	GTERP	0	ETHA	4
D3CAR	33	METH	0	FORAC	4
DLIM	28	ETHE	20	ACTAC	4
CAMPH	8	PROPE	20	BUTO	4
MYRAC	5	ETHO	20	CO	66
ATERP	7	ACET	20	ORVOC	35
BPHE	0	HEXA	9	NO	12
SABI	0	HEXE	35		
PCYM	0	HEXY	35		

Commercial (7 Commercial)

Data were collected from 12 quadrats in the Commercial land-use type for Clark County. Vegetation largely mirrored the specimen selections found in Suburban Residential, Light Industry/Office, and Public Facility/Parks. Developments from 1940's, 1950's, and prior tend to demonstrate the use of high-water-absorbing trees and shrubs, and larger lawn spaces. Recent developments from the 1990's to the present begin to reflect xeriscape designs with hardier plants and minimal lawns. EQ observed high impervious surface areas in this land-use type because Commercial areas will utilize as much space as possible for auto and retail usage. Impervious surface areas accounted for as little as 35 percent of a given quadrat, and as much as 100 percent of a given quadrat, with a mean at 76 percent. Table 4-57 illustrates Clark County's Commercial land-use coverage.

TABLE 4-57. 7 COMMERCIAL (GROSS COVERAGE)

Land-Use Type	Botanical Name	Common Name	Plant Family	% Cover	BELD3 Source
Commercial	Acacia sp.	Catclaw	FABACEAE	1	039 Acacia
Commercial	Ambrosia dumosa	Bursage	ASTERACEAE	1	010 USGS_shrubgrass
Commercial	Barren	Barren	NA	12	018 USGS_sprsbarren
Commercial	Fraxinus sp.	Ash	OLEACEAE	1	043 Ash
Commercial	Grasses	Grasses	NA	3	026 Grass
Commercial	Impervious	Impervious	NA	76	003 USGS_urban
Commercial	Nerium oleander	Oleander	APOCYNACEAE	1	010 USGS_shrubgrass
Commercial	Pinus arizonica	Arizona Pine	PINACEAE	1	161 Pine_AZ
Commercial	Prosopis sp.	Mesquite	FABACEAE	1	105 Mesquite
Commercial	Quercus sp.	Scrub Oak	FAGACEAE	1	142 Oak_scrub
Commercial	Trachelospermum jasminoides	Jasmine	APOCYNACEAE	1	010 USGS_shrubgrass
Commercial	Washingtonia sp.	Palm	ARECACEAE	1	232 Yucca_Mojave

Little research is available concerning emission factors for about one-third of the species found in the Commercial land use. Although some species, however, were represented taxonomically via genus or family. Plant families Asteraceae and Apocynaceae are not represented in BELD3 by any species for a taxonomic assignment of emission factors (Benjamin et al 1996). The BELD3 default 010 USGS_shrubgrass was utilized for species, genera, or families not represented in BELD3. About one-half of the species identified in the Commercial land use were directly available in BELD3, thus giving fairly representative emission factors for this plant community. The emissions for Clark County's Commercial land use, or 7 Commercial, are illustrated in Table 4-58.

TABLE 4-58. 7 COMMERCIAL EMISSIONS

Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)
ISOP	284	OCIM	0	FORM	5
MBO	189	ATHU	0	ACTAL	5
APIN	78	TRPO	0	BUTE	5
BPIN	30	GTERP	0	ETHA	3
D3CAR	12	METH	0	FORAC	3
DLIM	10	ETHE	12	ACTAC	3
CAMPH	3	PROPE	12	BUTO	3
MYRAC	2	ETHO	12	CO	39
ATERP	3	ACET	12	ORVOC	21
BPHE	0	HEXA	5	NO	6
SABI	0	HEXE	21		
PCYM	0	HEXY	21		

Major Development Area (8 Major Development Area)

Data were collected from six quadrats in the Major Development Area land-use type. The majority of the sites were classified as barren because earth moving often dominated the landscape, leaving little native vegetation. Some sites classified as Major Development Areas were not under construction or undergoing earth moving during the time of EQ's field survey, but data was included in overall estimates for the purposes of this study in order to represent this category most effectively. Impervious areas were minimal in this land use interest is the amount of barren space recorded at each site, with barren soil accounting for as little as 10 percent of a given quadrat, and as much as 100 percent of a given quadrat, with a mean of 65 percent barren. The mean of the impervious areas for this land use was 12 percent. Table 4-59 illustrates Clark County's Major Development Area land-use coverage.

TABLE 4-59. 8 MAJOR DEVELOPMENT AREA (GROSS COVERAGE)

Land-Use Type	Botanical Name	Common Name	Plant Family	% Cover	BELD3 Source
Major Development	Ambrosia dumosa	Bursage	ASTERACEAE	1	010 USGS_shrubgrass
Major Development	Atriplex sp.	Saltbush	CHENOPODIACEAE	2	010 USGS_shrubgrass
Major Development	Barren	Barren	NA	65	018 USGS_sprsbarren
Major Development	Ephedra sp.	Mormon Tea	EPHEDRACEAE	1	010 USGS_shrubgrass
Major Development	Grasses	Grasses	NA	15	026 Grass
Major Development	Impervious	Impervious	NA	12	003 USGS_urban
Major Development	Lagerstroemia indica	Crapemyrtle	LYTHRACEAE	1	010 USGS_shrubgrass
Major Development	Larrea tridentata	Creosote Bush	ZYGOPHYLLACEAE	1	010 USGS_shrubgrass
Major Development	Pinus arizonica	Arizona Pine	PINACEAE	1	161 Pine_AZ
Major Development	Washingtonia sp.	Palm	ARECACIA	1	232 Yucca_Mojave

Little research is available concerning emission factors for about two-thirds of the species found in the Major Development Area land use. Some species, however, were represented taxonomically via genus or family. Plant families Compositeae, Chenopodiaceae, Ephedraceae, Lythraceae, and Zygophyllaceae are not represented in BELD3 by any species for a taxonomic assignment of emission factors (Benjamin et al. 1996). The BELD3 default 010 USGS_shrubgrass was utilized for species, genera, or families not represented in BELD3. About one-third of the species identified in the Major Development Area land use were directly available in BELD3. The emissions for Clark County's Major Development Area land use, or 8 Major Development Area, are illustrated in Table 4-60.

TABLE 4-60. 8 MAJOR DEVELOPMENT AREA EMISSIONS

Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)
ISOP	29	OCIM	0	FORM	5
MBO	146	ATHU	0	ACTAL	5
APIN	73	TRPO	0	BUTE	5
BPIN	17	GTERP	0	ETHA	2
D3CAR	13	METH	0	FORAC	2
DLIM	11	ETHE	11	ACTAC	2
CAMPH	3	PROPE	11	BUTO	2
MYRAC	3	ETHO	11	CO	36
ATERP	3	ACET	11	ORVOC	19
BPHE	0	HEXA	5	NO	6
SABI	0	HEXE	19		
PCYM	0	HEXY	19		

Right-of-Way (9 Right-of -Way)

This land-use type was observed while traveling from other quadrats in the urban landscape. Most road medians in Clark County are made of crushed gravel and support little if

any vegetation. The Right-of-Way land-use type most closely resembles the "Barrenland" natural community of Clark County and was classified as such. Table 4-61 illustrates Clark County's Right-of-Way land-use coverage.

TABLE 4-61. 9 RIGHT OF WAY (GROSS COVERAGE)

Land-Use Type	Botanical Name	Common Name	Plant Family	% Cover	BELD3 Source
Right of Way	NA	NA	NA	100	018 USGS_sprsbarren

With 100 percent coverage equally for the default BELD3 018 USGS_sprsbarren, the emissions calculation was fairly straightforward. The emissions for Clark County's Right-of-Way land-use, or 9 Right-of-Way, are illustrated in Table 4-62**.**

TABLE 4-62. 9 RIGHT OF WAY EMISSIONS

Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)	Pollutant Species	Emission rate ($\mu g\ m^{-2}h^{-1}$)
ISOP	0	OCIM	0	FORM	0
MBO	0	ATHU	0	ACTAL	0
APIN	0	TRPO	0	BUTE	0
BPIN	0	GTERP	0	ETHA	0
D3CAR	0	METH	0	FORAC	0
DLIM	0	ETHE	0	ACTAC	0
CAMPH	0	PROPE	0	BUTO	0
MYRAC	0	ETHO	0	CO	0
ATERP	0	ACET	0	ORVOC	0
BPHE	0	HEXA	0	NO	0
SABI	0	HEXE	0		
PCYM	0	HEXY	0		

4.6 Discussion

The results of the botanical field survey provided a more accurate representation of the species density for the above 32 land-use categories (including the NotCC default and water BELD3/BEIS3 data), 30 of which were specifically adapted for Clark County's rural and urban botanical communities. Some plant communities have higher biogenic emissions for specific VOCs, due to the morphology and anatomical characteristics of specific plant species (Charlwood 1991) and (Lamb et al 1985) The incorporation of plant density, barren space, and impervious surface areas gives a more accurate estimation of source biogenic emissions, within the limitations of the BELD/BEIS model and data sets (Guenther et al 1993). The taxonomic method for assigning biogenic emission factors to various species of plants and plant

communities depends on many assumptions (Guenther et al 1993) and (Geron et al 1994). For more accurate emissions representation in Clark County, specific species should be considered for further research, specifically plant families Chenopodiaceae, Asteraceae, and Zygophyllaceae, though the results may yield higher emissions than via the taxonomic method. The desert is an aromatic place, and this signature of the desert is a direct result of biogenic emissions (Ross and Sombrero 1991).

Despite expectations that urban biogenic sources may be higher contributors of VOC's in Clark County than rural biogenic sources, the results of this project do not support that expectation. Significant differences between the rural and urban land-use categories exist in terms of land area. Approximately 96 percent of the land use in Clark County is classifiable in one of the 22 rural land use categories, and approximately 4 percent of the land use is classifiable in one of the 9 urban land use categories. This is an urban to rural land use ratio of about 0.04. On an average monthly basis with no BEIS3v.12 adjustments, biogenic emissions from the rural and urban land use categories appear to be proportional to the land use in Clark County. Figure 4-3 shows a comparison of urban versus rural emissions as a function of land use and emission factors only (not the BEISv.12 results) for total VOC emissions.

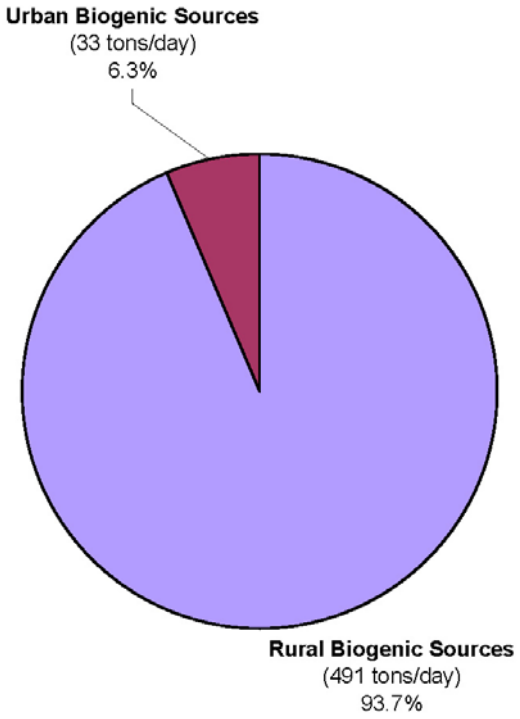

Figure 4-3. Comparison of Rural and Urban Biogenic Emissions of VOCs in Clark County, Nevada

The comparison of urban and rural land use area coverage with biogenic emissions does not indicate that the urban landscape has significantly higher emissions contributions per given area than the rural landscape. Figure 4-3 showed this on a simple basis ignoring the effects on temperature, dry leaf biomass, leaf over index, and other factors that the BEIS3v12 Model considers. When considering the BEIS3v12 Model results which do account for these variables, the ratio of urban to rural biogenic emissions is greater than the ratio of urban land use to rural land use. This indicates the urban area, as expected, has a higher density of biogenic emissions in urban land use categories where biomass and leaf indices are higher. Figure 4-4 shows the month-by-month (for year 2002 baseline emissions) ratios of urban to rural biogenic emissions. The ratios range from a low of approximately 0.07 in January to 0.105 in June. Thus, the lower urban land area coverage (approximately 0.04) is not indicative of urban emissions. Plant species, leaf indices, and biomass contribute to the urban biogenic emissions although the high land coverage by rural land uses still dominates the overall magnitude of emissions.

A comparison of Figure 4-5, land use coverage of Clark County by percentage, and Figure 4-6, biogenic emissions percent of total by land use type, reveals the influence of certain species of plants within land use types. For example, Creosote-Bursage land use accounts for approximately 49 percent of the land use in Clark County as shown in Figure 4-5. Because of the mix of plant species in the Creosote-Bursage land type and their related biogenic emission factors, Creosote-Bursage land type only accounts for approximately 26 percent of the biogenic emissions. Similarly, the urban category of Parks is 1.4 percent of the Clark County land coverage, but due to species with higher biogenic emissions, accounts for 3 percent of the emissions. Figure 4-6 was based on land coverage and emission factors and variables like temperature, leaf indices, and biomass were ignored in this simple comparison.

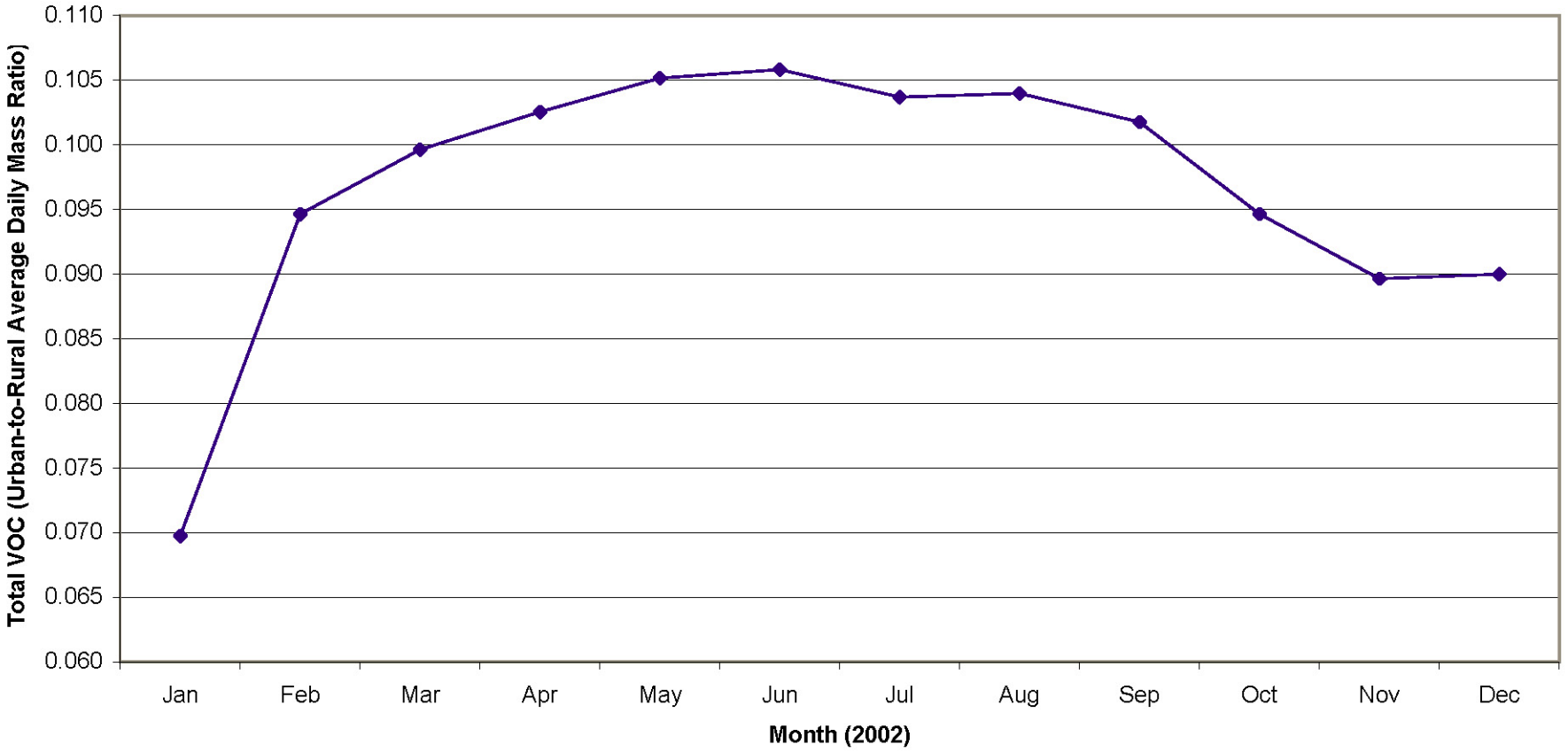

Figure 4-4. Ratio of Urban to Rural Biogenic Emissions in Clark County, Nevada

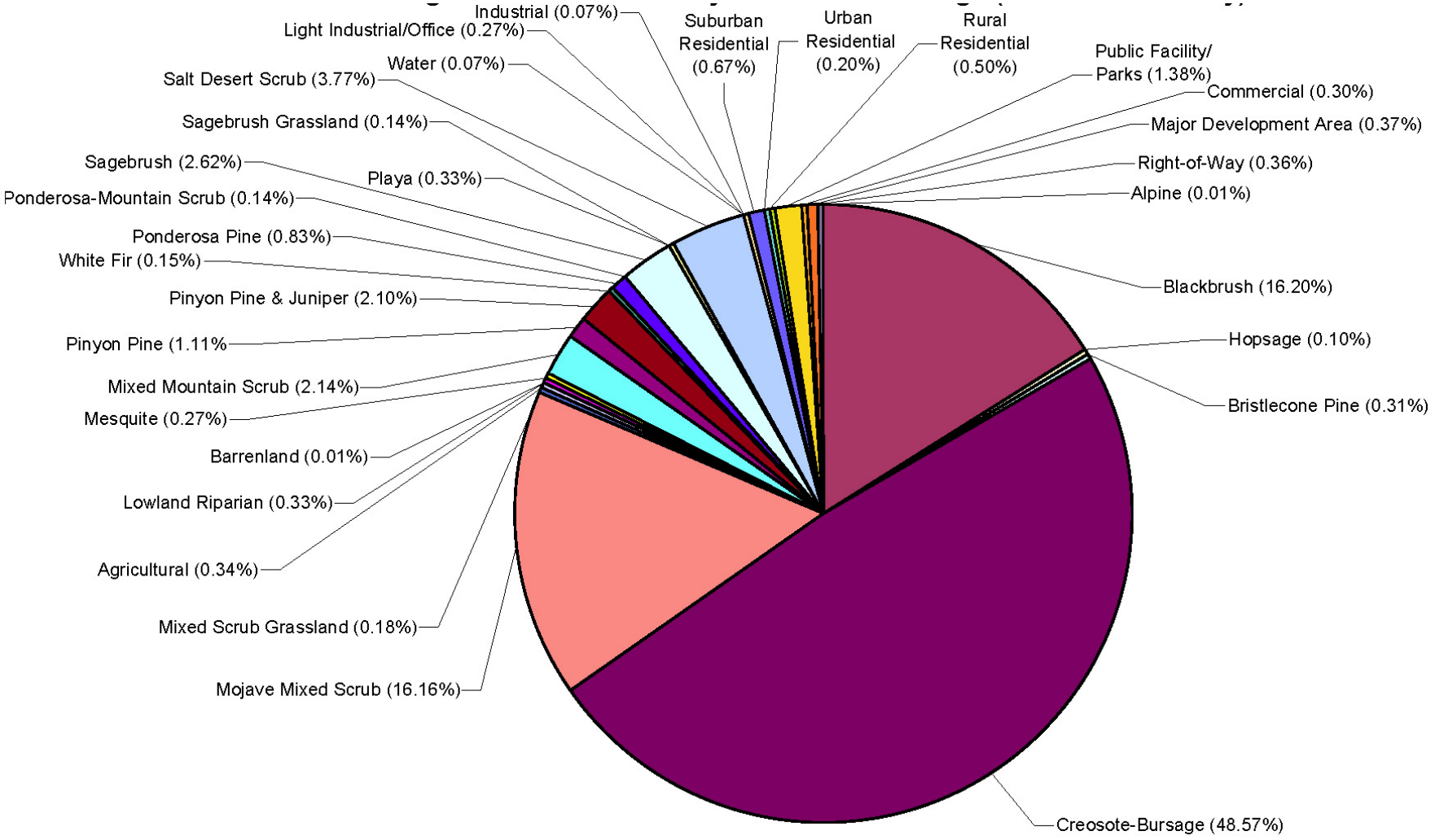

Figure 4-5. Clark County Land Use Coverage (Percent of County)

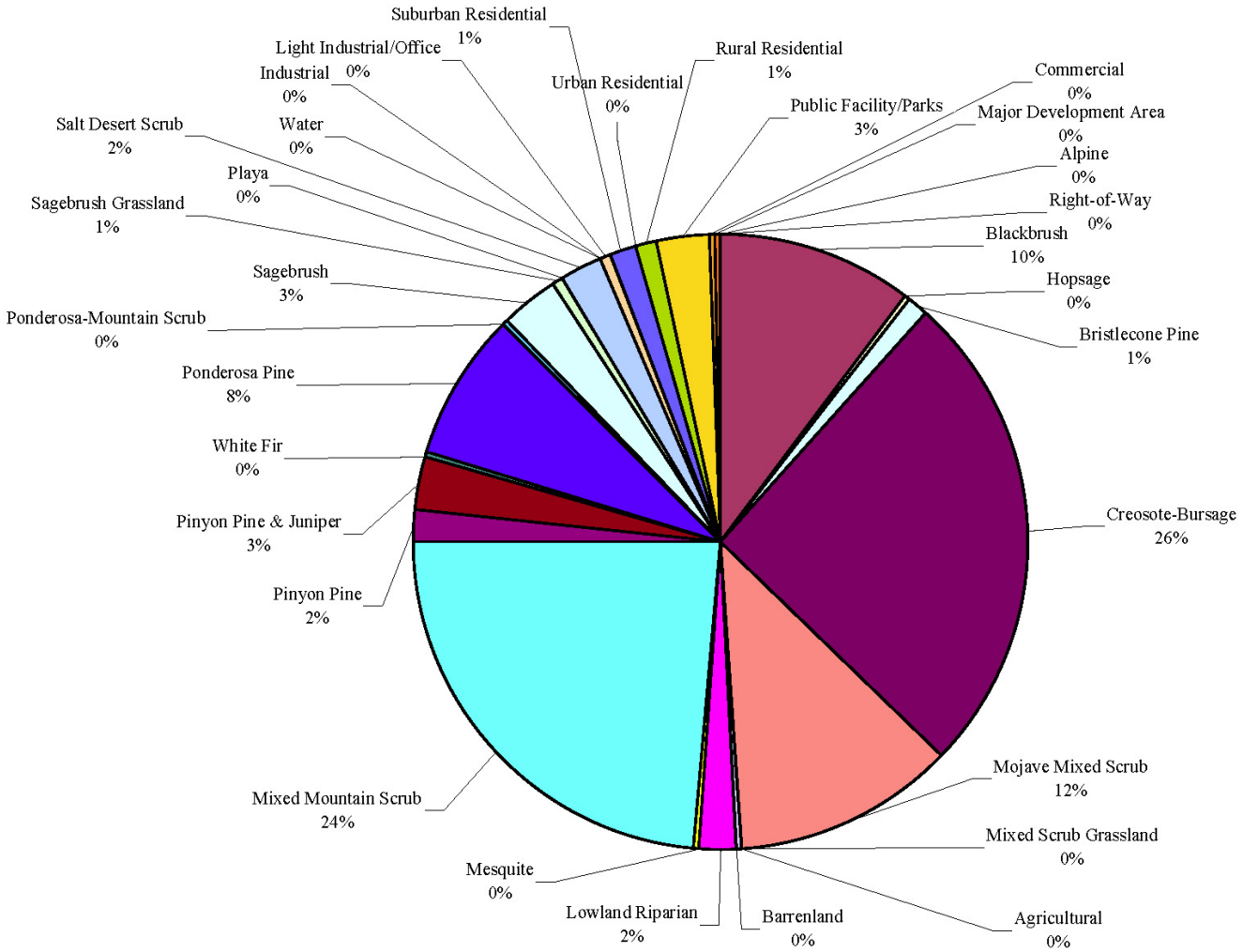

Figure 4-6. Clark County Land Use Biogenic Emissions Contributions (Percent of Total)

In order to fully grasp the actual sources of biogenic emissions in the County, emission factors for individual plant species must be composed. Some plants are high emitters of VOC's and other gases due to morphologic structure and growing conditions, such as *Pinus ponderosa* (Ponderosa Pine) and *Quercus gambelii* (Gambel Oak). Many extremely high emitters of biogenic emissions were located at higher elevations or other places in the rural environment. In the urban environment, species selection for the landscape is key, and historically many selections were sources for high VOC emissions, including *Morus alba* (White Mulberry) and many species of exotic pines and other conifers. Figure 4-7 illustrates and compares the biogenic emissions of each plant species found to have a significant role in Clark County's diverse landscape, both rural and urban, native, and introduced.

The plant species which are the seven highest emitters of VOC's in Clark County are: *Quercus gambelii* (Gambel Oak), *Quercus turbinella* (scrub live oak), *Salix sp.* (willow), *Poputus sp.* (cottonwood), *Pinus ponderosa* (Ponderosa Pine), *Pinus arizonica* (Arizona pine), and *Abies concolor* (white fir). All of these species have been shown to be high producers of various VOC's, but not all species predominate the land use in Clark County.

Above 5000 feet in Clark County, Juniper and Pine species dominate and many conifers (especially pines) are renowned producers of high biogenic emissions. All pine species (especially Ponderosa Pine) produce fairly high biogenic emissions due to the morphology and growth habit of the genus (Flyckt 1979). Pines are adapted to fairly strenuous growing conditions and many of the organic gases (biogenic emissions) help to reduce water loss and/or frost damage (Monson et al 1992). Arizona Pine (as well as Japanese Black Pine, Aleppo Pine, and Stone Pine) is also found planted in low-elevation urban areas in the Southwest U.S., including the Las Vegas Valley. Although the representation of Arizona Pine is approximately 1 percent or less for a given urban land use, their high emission factors increase the overall emission levels of the urban area.

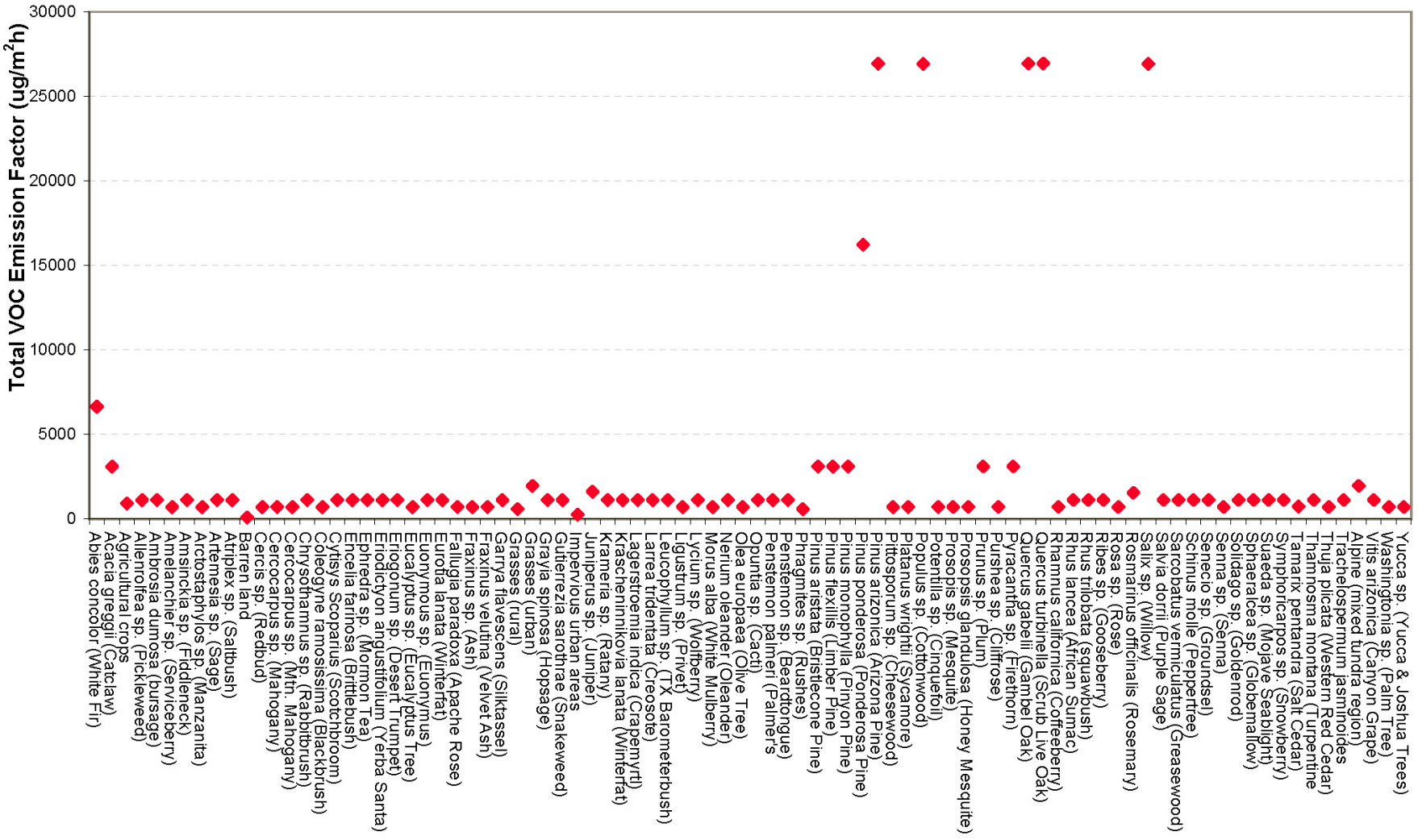

Figure 4-7. Total Biogenic VOC Emissions by Plant Species in Clark County

At elevations below 5000 feet, riparian zones and scrublands may also produce high emissions of VOCs. Many hardwood species, especially large trees, produce high levels of isoprene due to their chemical and morphologic structure (Ross and Sombrero 1991). Mountain Scrub, Mesquite, and Lowland Riparian plant communities are sources of higher biogenic emissions due to their high transpiration rates and other reasons mentioned above (Lamb et al 1985). In the extreme climates of the valleys and *bajadas* in Clark County, many of the species that have adapted to or excelled in this area help protect water resources by various means including transpiring at night when temperatures are cooler, growing waxy leaves and leaf hairs (tricomes), and emitting gases that help regulate temperature and water loss (Monson et al 1992).

Compared with existing default data for Clark County's land use and plant communities, the findings of this survey greatly improved the reliability of the BELD/BEIS model for determining the overall biogenic inventory. Through this study, greater detail to plant community densities, species demographics, barren land, and impervious surface areas has allowed for a more accurate modeling of Clark County's biogenic sources of emissions. The BELD/BEIS model takes into account the differences between winter and summer canopies, though the general measurable coverage of individual plants is relatively homogenous throughout the year. The BELD/BEIS model improved when considering findings in the field, which was the main objective of this study (Geron et al. 1994).

The taxonomic method for assigning emission factors to various plants was also based on assumptions that are not entirely without fault (Benjamin and Winer 1998). The assumption that a species of plant has the same emission factors as another plant in the same genus has only been proven to be correct up to 33 percent of the time and for a plant family, this assumption has been proven only 15 percent of the time or less (Benjamin et al. 1996). Although the method works in many cases, applying emission factors for a species in one part of the continent to the same species in to another part of the continent can be misleading. Blackbrush is a member of the Rosaceae plant family. Plant family Rosaceae is represented by BELD3 factor "042 Apple," which can be applied to Blackbrush via the taxonomic method (Benjamin et al. 1996).

Many species found in Clark County's native plant communities are not directly represented in the BELD3 database and unlike Blackbrush, which can be assigned a direct BELD3 factor via the taxonomic method, these species must be assigned a default value. The default value assigned to species in Clark County that were not represented in BELD3 by species or family, was directly drawn from the existing BELD3/BEIS3 database and model runs.

Therefore, species such as *Larrea tridentata* (Creosote Bush), *Ambrosia dumosa* (Bursage), *Atriplex* sp. (Saltbush), and other species from families not represented in the BELD3 database (Asteraceae, Chenopodiaceae, Zygophyllaceae, etc) were assigned the default emission rate of "010 USGS_shrubgrass." The default emission rate of "010 USGS_shrubgrass" was selected based on original land use assignments prior to this study (BELD3/BEIS3), assignments made in similar studies (Guenther et al. 1993, Lamb et al. 1987), and general community/plant structure (Yarwood and Lee 1997) and (Monson et al 1992). Again, the methods used are the best methods available short of actually field-testing all dominant plant species in Clark County for biogenic emissions. It is strongly urged that more research and funding be applied to projects that may provide more southwest specific data for biogenic emissions.

In Clark County, it would be especially helpful to pursue an in-depth study of biogenic emissions from plant families Asteraceae, Chenopodiaceae, and Zygophyllaceae (Lamb et al. 1987). These plant families are prevalent in most elevations below 5000 feet, and often represent individual land-use types or plant communities of up to 45 percent of the overall density. Some examples of plant communities, or land-use cover types found to host high densities of representative species from the above plant families include: Blackbrush, Hopsage, Mojave Mixed Scrub, Mesquite, and Salt Desert Scrub. Specific species that may be of interest to study for various emissions from these plant communities and land-use types in Clark County in the future include: *Coleogyne ramosissima* (Blackbrush, family Rosacea), *Grayia spinosa* (Hopsage, family Chenopodiaceae), *Ephedra* spp. (Mormon Tea, family Ephedraceae), *Atriplex* sp. (Saltbush, family Chenopodiaceae), *Larrea tridentata* (Creosote Bush, family Zygophyllaceae), *Encelia farinosa*, (Brittle Bush, family Asteraceae), *Opuntia* sp. (Prickly Pear, family Cactaceae), Ambrosia dumosa (Bursage, family Asteraceae), *Sarcobatus* sp. (Greasewood, family Chenopodiaceae), *Chrysothamnus* sp. (Rabbitbrush, family Asteraceae), and *Artemisia* sp. (Sagebrush, family Asteraceae). Emission factor studies for any of the above species would greatly improve the accuracy of Clark County's biogenic emission inventory.

All land uses found in Clark County were surveyed within the context and limitations of the project. The time to complete the surveys as well as the budget allowed the field team to complete 200+ field surveys, with a minimum of 2 to 3 surveys per land use. The field team collected data from multiple quadrats for land uses that accounted for a significant portion of Clark County's total surface area or were large contributors of biogenic emissions. For example, data was collected from 16 quadrats in the Creosote-Bursage land-use type. In many

cases, despite the higher number of quadrats sampled for a given land-use type, the number of surveys conducted was limited by the project budget. The land-use categories were thus characterized based on the amount of data collected in the surveys, which has greatly improved the overall results of the BELD/BEIS modeling domain for Clark County. With additional funding, additional field survey work could be conducted in order to more adequately characterize the individual land use categories.

SECTION 5

ANNUALIZED BASE-YEAR MODELING

The BEIS3v12 Model was used to determine the biogenic emissions for an annualized base case. The year selected was 2002 on the basis of the generated 1-km^2 grids over the whole county and the availability of the MM5-derived, hourly meteorological data set for the same modeling domain. The model was run using the BELD3 data set that was specifically developed for Clark County and described in Section 4. Figure 5-1 shows the total biogenic VOC emissions for Clark County broken down by rural and urban contributions and by average daily emissions per month of 2002. Rural emissions are higher by variable factors as dependent on the season (also shown as urban to rural ratios in Figure 4-4).

Additional figures are presented in Appendix E which compare emissions from BEIS3v12 based on default BELD3 biogenics to the Clark County specific land use. Figures are shown for the resultant biogenic isoprene, monoterpene, total VOC, and NO_x emissions. These Appendix E figures include the total urban and rural emissions. In general, the isoprene, monoterpene, and total VOC emissions resulting from the Clark Country-specific land use were approximately 50 percent less than those generated using the default biogenics emissions. The NO_x emissions using Clark County land use were higher on an annual basis than using default BELD3 data. In comparing the magnitude of the biogenic emissions estimates to other emissions categories in Clark County (i.e., industrial sources, mobile sources, area sources), it was found that the biogenic VOC related emissions represent a large portion of the overall emissions total, while the NO_x emissions only represent a small fraction.

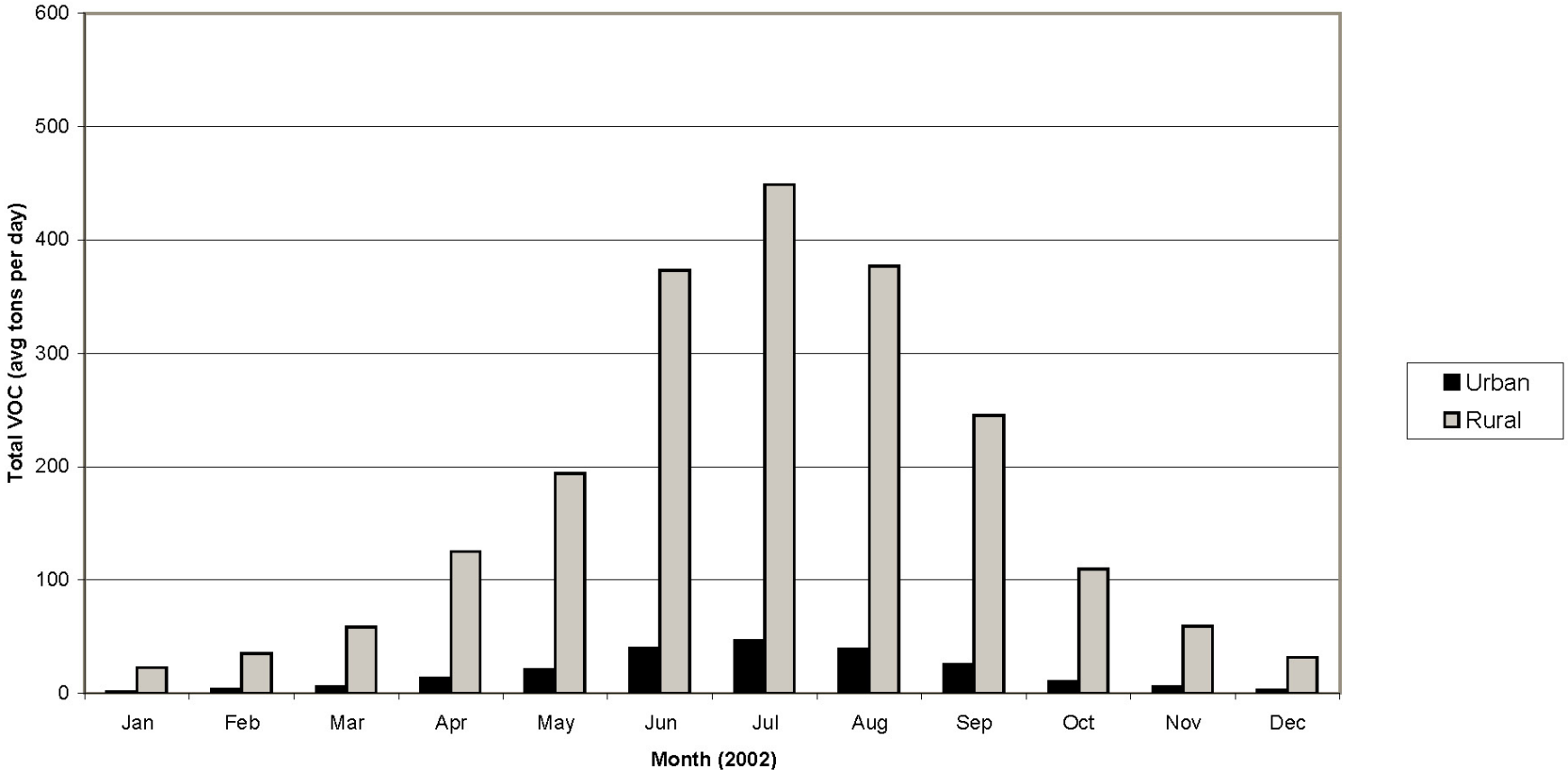

Figure 5-1. Total BEIS3v12 Estimated Biogenic VOC Emissions by Month for 2002

SECTION 6

EPISODIC MODELING

Additional analyses using the BEIS3v12 Model for an episodic ozone event were conducted. The national default BELD3 and Clark County-specific BELD3 data developed from the field survey were both used in the biogenic emissions analyses of the episode. The specific event was from June 28 to July 6, 2003. Appendix F contains the results of the episodic event for a 4-km^2 grid spacing over the whole of Clark County as well as surrounding areas in neighboring States and counties. Data for those areas outside of Clark County were always default BELD3 data. Modeling was also performed for 1.3-, 4.0-,12.0-, and 36.0-km^2 grid resolution but is not shown.

SECTION 7

UNCERTAINTIES

Based on the results of the BEIS3v12 Modeling analysis, an informal analysis was conducted of the uncertainties that may be associated with the biogenic emission estimates for Clark County. EQ along with the assistance for Alpine-Geophysics reviewed the biogenic emissions generated for Clark County. This review included consideration of the land use data collected in November 2004 and January 2005. Plant species related to rural native plants and urban native and non-native plants have been included in the derivation of land use and assignment of emission factors. Best available emission factors commensurate with the plant species were used. Although the emissions may appear to be high when compared to other areas, the reality is that many factors support the probability that such biogenic emissions may in fact be of such magnitude. The results of the review include the following:

- Field surveys seem to confirm that the land-use distributions appear to give a reasonable representation of land use in Clark County.

- Each1-km^2 grid cell in the distribution of land use contains one or more land-use types in various proportions to each other. These proportions were assigned using a combination overlay of shape files from previous studies of the various land-use types and a gridded mapping scheme of the complete set of 1-km^2 grids over an area larger that Clark County. In the case of rural grid cells, the data were supplied by previous mapping of the area. In the case of urban cells, the data were supplied by Clark County municipalities. BEIS3v12 weights the cell-by-cell emissions according to the land-use percentages in each cell.

- Land-use categories were based on an assessment of the previous work in the area and on field surveys conducted to verify vegetative species.

- Emission factors by species were obtained from BEIS3v12 data bases and used together with the weighting of each species in each land-use category.

- BEIS3v12 was executed using these land-use files and emission factors.

- The following species of vegetation in the rural cells were recognized for their high contributions to the overall emissions: Ponderosa Pine, Gamble Oak, Scrub Live Oak,

and White Fir. In the urban areas, the following species had high overall emissions: Italian Stone Pine, Aleppo Pine, Japanese Black Pine, and Arizona Pine.

- Even with a small land area, these species could contribute significantly to the biogenic emissions in the county.

- The emissions generated in this study including the refinement of the land-use categories and the consideration of the local species are less than approximately 50 percent of those generated using the off-the-shelf version of BEIS3v12/BELD3.

- Such magnitude of emissions are expected given the aromatic nature of pine and desert species, the extent of the county, and the high temperatures observed.

SECTION 8

CONCLUSION

Despite uncertainties that come with running a biogenic emission model for such a large area, and the assumptions made within the model, and the science supporting its effectiveness, it should be understood that the desert is a place of extremes where plants adapt to survive and often thrive within the harsh climates. Mechanisms for inhibiting water loss and heat damage often result in high biogenic emissions. For some species, especially oaks, pines, and in particular Ponderosa Pine being the highest emitter transpiring certain species of emissions are inherent to the life cycle and/or growth of the plant. The aroma of Ponderosa Pine, Sagebrush, Creosote, and other strongly aromatic species is a potential indicator of high biogenic emissions.

Through additional species research and continued surveying of existing plant communities in and around Clark County, the representative modeling of biogenic emissions will be more accurate. This study helped Clark County to improve upon the existing default data and modeling results by studying in great detail the plant matrix of the dominant plant communities and land uses. The field surveys depended on existing community delineations and BELD data, although the study allowed for a vast improvement in results. The results of this field survey included determining average plant densities in 32 plant communities or land-use types of Clark County, redefining the emission factors for those 32 land-use categories, and reducing the projected total annual biogenic VOC emissions from Clark County by a factor of 2 (-50%) from the original default BELD data.

REFERENCES

Benjamin, M.T., M. Sudol, L. Bloch, and A. Winer. 1996. Low-Emitting Urban Forests: A Taxonomic Methodology for Assigning Isoprene and Monoterpene Emission Rates. Atmospheric Environment, vol. 30, No. 9, pp. 1437-1452.

Benjamin M.T., and A. Winer. 1998. Estimating the Ozone Forming Potential of Urban Trees and Shrubs. Atmospheric Environment, vol. 32, pp. 58-70.

Charlet, D.A. 2003. Clark County Roads Biodiversity Project – 2001-2003 Biennium Report. Prepared for UNR-BRRC.

Charlwood, B.V., and K.A. Charlwood. 1991. Terpenoid Production in Plant Cell Cultures. Ecological Chemistry and Biochemistry of Plant Terpenoides (edited by Harborne, J.B. and Tomas-Barberan, F.A.). Oxford University Press, Cambridge, UK.

Dallmeier, F., M. Kabel, and R. Rice. 1992. Methods for Establishment and Inventory of Permanent Plots. UNESCO, Paris. pp. 11-46.

Flyckt, D.L. 1979. Seasonal Variation in the Volatile Hydrocarbon Emissions from Ponderosa Pine and Red Oak. MS thesis, Washington State University, Pullman, Washington, USA.

Geron, C., A. Guenther, and T. Pierce. 1994. An Improved Model for Estimating Emissions of Volatile Organic Compounds from Forests in the Eastern United States. Journal of Geophysical Research, vol. 99, pp. 1773-1791.

Guenther, A.B., P.R. Zimmerman, P.C. Harley, R.K. Monson, and R. Fall. 1993. Isoprene and Monoterpene Emission Rate Variability: Model Evaluations and Sensitivity Analysis. Journal of Geophysics Research, vol. 98, pp. 12,609-12,617.

Guenther, A.B., R. K. Monson, and R. Fall. 1991. Isoprene and Monoterpene Emission Rate Variability: Observations with Eucalyptus and Emission Rate Algorithm Development. Journal of Geophysics Research, vol. 96, pp. 12,799-12,808.

Karlik, J., C.H. Haas, and A.M. Winer. 1998. Isoprene Emission Factors for Twenty-five Plant Species Found in California. Paper No. 98-WPB.13P. Proceedings of the 91st Annual Meting of the Air and Waste Management Association, San Diego, CA. June 14-18.

Lamb, B., A. Guenther, D. Gay, and H. Westberg. 1987. A National Inventory of Biogenic Hydrocarbons Emissions. Atmospheric Environment, vol. 21, pp. 1695-1705.

Lamb, B., H. Westberg, and G. Allwine. 1985. Biogenic Hydrocarbons Emissions from Deciduous and Coniferous Trees in the United States. Journal of Geophysics Research, vol. 90, pp. 2380-2390.

Monson, R.K., C. H. Jaeger, W.W. Adams, III, E.M. Driggers, G.M. Silver, and R. Fall. 1992. Relationships Among Isoprene Emission Rate, Photosynthesis, and Isoprene Synthase Activity as Influenced by Temperature. Plant Physiology, vol. 98, pp. 1175-1180.

RECON. 2002. Clark County Multiple Species Habitat Conservation Plan and Environmental Impact Statement, Appendix A: Ecosystem Analysis. Prepared for the U.S. Fish and Wildlife Service & The Clark County Department of Comprehensive Planning.

Ross, J.D., and C. Sombrero. 1991. Environmental Control of Essential Oil Production in Mediterranean Plants. Ecological Chemistry and Biochemistry of Plant Terpenoides (edited by Harborne, J.B. and Tomas-Barberan, F.A.). Oxford University Press, Cambridge, UK.

Vukovich, J., and T. Pierce. 2002. The Implementation of BEIS3 within the SMOKE Modeling Framework. Presented the EPA Emission Inventory Conference, 18 April, Atlanta, GA.

Yarwood, G., and L. Keane. 1997. Leaf Biomass Density Data for North-Central Texas. Prepared for Texas Natural Resources Conservation Commission by ENVIRON International Corporation.

APPENDIX A

BEIS3 V12 EMISSION FACTORS

BEIS 3.12

DEFAULT EMISSION FACTORS

Default BEISV3.12 Emission Factors

Species	ISOP	MBO	APIN	BPIN	D3CAR	DLIM	CAMPH	MYRC	ATERP	BPHE	SABI	PCYM	OCIM	ATHU	TRPO	GTERP	METH
Acacia	70	0	420	1623	132	0	63	0	33	0	0	0	0	0	0	0	0
Ailanthus	38	0	225	13	7	3	3	3	3	0	0	0	0	0	0	0	0
Alder	38	0	225	4	15	0	7	0	0	0	0	0	1	6	1	0	0
Alfalfa	17	0	180	3	1	1	1	1	1	0	0	0	0	0	0	0	0
Apple	38	0	225	13	7	3	3	3	3	0	0	0	0	0	0	0	0
Ash	38	0	225	7	3	1	0	0	7	0	15	0	0	0	0	0	0
Barley	7	0	180	7	3	2	2	2	2	0	0	0	0	0	0	0	0
Basswood	38	0	225	13	7	3	3	3	3	0	0	0	0	0	0	0	0
Beech	38	0	225	63	24	12	48	1	3	16	0	1	24	0	1	0	0
Birch	38	0	225	19	0	0	19	14	0	0	0	0	14	0	0	0	0
Bumelia_gum	38	0	225	13	7	3	3	3	3	0	0	0	0	0	0	0	0
Cajeput	38	0	225	13	7	3	3	3	3	0	0	0	0	0	0	0	0
Califor_laurel	38	0	225	9	4	0	0	0	2	1	0	12	1	0	0	0	4
Cascara_buckthor	38	0	225	13	7	3	3	3	3	0	0	0	0	0	0	0	0
Castanea	38	0	225	13	7	3	3	3	3	0	0	0	0	0	0	0	0
Catalpa	38	0	225	13	7	3	3	3	3	0	0	0	0	0	0	0	0
Cedar_chamaecyp	150	0	900	42	170	0	52	0	0	0	0	0	0	0	0	0	0
Cedar_thuja	150	0	900	284	54	11	103	130	10	0	0	54	68	0	75	0	4
Chestnut_buckeye	38	0	225	13	7	3	3	3	3	0	0	0	0	0	0	0	0
Chinaberry	38	0	225	12	5	0	6	0	11	0	0	0	0	0	0	0	0
Corn	1	0	180	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cotton	7	0	180	7	3	2	2	2	2	0	0	0	0	0	0	0	0
Cypress_cupress	70	0	225	14	0	0	10	0	8	0	0	0	0	0	0	0	0
Cypress_taxodium	38	0	225	514	4	43	24	0	25	0	0	0	0	0	0	0	0
Dogwood	38	0	225	107	3	205	142	41	0	0	0	0	25	0	0	7	0
Douglas_fir	150	0	900	1360	449	57	112	21	53	0	2	64	0	0	0	0	0
East_hophornbean	38	0	225	7	0	0	7	13	0	0	0	0	7	0	0	0	0
Elder	38	0	225	13	7	3	3	3	3	0	0	0	0	0	0	0	0
Elm	38	0	225	3	11	0	4	0	0	0	0	14	0	0	2	0	0
Eucalyptus	26250	0	225	351	187	0	206	0	0	0	0	0	0	248	0	0	0
Fir_balsam	150	0	900	1072	1421	48	806	365	68	79	226	0	135	0	0	0	0
Fir_CA_red	150	0	900	1588	794	397	397	397	397	0	0	0	0	0	0	0	0
Fir_corkbark	150	0	900	878	552	40	1171	397	60	496	0	0	338	0	40	0	0
Fir_fraser	150	0	900	1588	794	397	397	397	397	0	0	0	0	0	0	0	0
Fir_grand	150	0	900	2251	711	28	163	397	203	0	143	52	0	0	0	24	0
Fir_noble	150	0	900	365	528	0	1211	95	397	0	1191	0	338	0	0	71	107
Fir_Pacf_silver	150	0	900	1588	794	397	397	397	397	0	0	0	0	0	0	0	0
Fir_SantaLucia	150	0	900	1588	794	397	397	397	397	0	0	0	0	0	0	0	0
Fir_Shasta_red	150	0	900	1588	794	397	397	397	397	0	0	0	0	0	0	0	0
Fir_spp	150	0	900	1588	794	397	397	397	397	0	0	0	0	0	0	0	0
Fir_subalpine	150	0	900	1588	794	397	397	397	397	0	0	0	0	0	0	0	0
Fir_white	150	0	900	1322	1390	0	246	238	167	0	79	397	0	0	0	115	16
Gleditsia_locust	38	0	225	13	7	3	3	3	3	0	0	0	0	0	0	0	0
Grass	49	0	180	50	25	12	12	12	12	0	0	0	0	0	0	0	0
Hackberry	38	0	225	1	0	0	0	0	1	0	0	0	0	64	0	0	0
Hawthorn	38	0	225	13	7	3	3	3	3	0	0	0	0	0	0	0	0
Hay	34	0	180	33	17	8	8	8	8	0	0	0	0	0	0	0	0
Hemlock	70	0	420	18	7	1	20	34	2	0	0	0	27	0	15	0	0
Hickory	38	0	225	128	38	177	102	2	37	0	0	16	0	0	1	30	1

Default BEISV3.12 Emission Factors

Species	ETHE	PROPE	ETHO	ACET	HEXA	HEXE	HEXY	FORM	ACTAL	BUTE	ETHA	FORAC	ACTAC	BUTO	CO	ORVOC	NO
Acacia	63	63	63	63	28	112	112	28	28	28	14	14	14	14	210	112	2
Ailanthus	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Alder	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Alfalfa	27	27	27	27	12	48	48	12	12	12	6	6	6	6	90	48	27
Apple	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Ash	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Barley	27	27	27	27	12	48	48	12	12	12	6	6	6	6	90	48	45
Basswood	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Beech	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Birch	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Bumelia_gum	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Cajeput	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Califor_laurel	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Cascara_buckthor	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Castanea	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Catalpa	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Cedar_chamaecyp	135	135	135	135	60	240	240	60	60	60	30	30	30	30	450	240	2
Cedar_thuja	135	135	135	135	60	240	240	60	60	60	30	30	30	30	450	240	2
Chestnut_buckeye	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Chinaberry	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Corn	27	27	27	27	12	48	48	12	12	12	6	6	6	6	90	48	68
Cotton	27	27	27	27	12	48	48	12	12	12	6	6	6	6	90	48	45
Cypress_cupress	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Cypress_taxodium	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Dogwood	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Douglas_fir	135	135	135	135	60	240	240	60	60	60	30	30	30	30	450	240	2
East_hophornbean	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Elder	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Elm	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Eucalyptus	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Fir_balsam	135	135	135	135	60	240	240	60	60	60	30	30	30	30	450	240	2
Fir_CA_red	135	135	135	135	60	240	240	60	60	60	30	30	30	30	450	240	2
Fir_corkbark	135	135	135	135	60	240	240	60	60	60	30	30	30	30	450	240	2
Fir_fraser	135	135	135	135	60	240	240	60	60	60	30	30	30	30	450	240	2
Fir_grand	135	135	135	135	60	240	240	60	60	60	30	30	30	30	450	240	2
Fir_noble	135	135	135	135	60	240	240	60	60	60	30	30	30	30	450	240	2
Fir_Pacf_silver	135	135	135	135	60	240	240	60	60	60	30	30	30	30	450	240	2
Fir_SantaLucia	135	135	135	135	60	240	240	60	60	60	30	30	30	30	450	240	2
Fir_Shasta_red	135	135	135	135	60	240	240	60	60	60	30	30	30	30	450	240	2
Fir_spp	135	135	135	135	60	240	240	60	60	60	30	30	30	30	450	240	2
Fir_subalpine	135	135	135	135	60	240	240	60	60	60	30	30	30	30	450	240	2
Fir_white	135	135	135	135	60	240	240	60	60	60	30	30	30	30	450	240	2
Gleditsia_locust	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Grass	27	27	27	27	12	48	48	12	12	12	6	6	6	6	90	48	27
Hackberry	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Hawthorn	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Hay	27	27	27	27	12	48	48	12	12	12	6	6	6	6	90	48	27
Hemlock	63	63	63	63	28	112	112	28	28	28	14	14	14	14	210	112	2
Hickory	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2

Default BEISV3.12 Emission Factors

Species	ISOP	MBO	APIN	BPIN	D3CAR	DLIM	CAMPH	MYRC	ATERP	BPHE	SABI	PCYM	OCIM	ATHU	TRPO	GTERP	METH
Holly_American	38	0	225	26	13	7	7	7	7	0	0	0	0	0	0	0	0
Hornbeam	38	0	225	149	122	115	48	48	0	0	0	0	48	0	0	0	0
Incense_cedar	70	0	900	53	26	13	13	13	13	0	0	0	0	0	0	0	0
Juniper	70	0	420	123	0	247	0	0	0	0	0	0	0	0	0	0	0
KY_coffeetree	38	0	225	13	7	3	3	3	3	0	0	0	0	0	0	0	0
Larch	38	0	225	13	7	3	3	3	3	0	0	0	0	0	0	0	0
Loblolly_bay	38	0	225	13	7	3	3	3	3	0	0	0	0	0	0	0	0
Madrone	38	0	225	13	7	3	3	3	3	0	0	0	0	0	0	0	0
Magnolia	38	0	225	602	263	16	56	6	51	0	0	0	0	0	0	0	0
Mahogany	38	0	225	13	7	3	3	3	3	0	0	0	0	0	0	0	0
Maple_bigleaf	38	0	225	112	23	132	69	27	42	3	0	114	0	0	4	0	4
Maple_bigtooth	38	0	225	112	23	132	69	27	42	3	0	114	0	0	4	0	4
Maple_black	38	0	225	112	23	132	69	27	42	3	0	114	0	0	4	0	4
Maple_boxelder	38	0	225	112	23	132	69	27	42	3	0	114	0	0	4	0	4
Maple_FL	38	0	225	112	23	132	69	27	42	3	0	114	0	0	4	0	4
Maple_mtn	38	0	225	112	23	132	69	27	42	3	0	114	0	0	4	0	4
Maple_Norway	38	0	225	112	23	132	69	27	42	3	0	114	0	0	4	0	4
Maple_red	38	0	225	112	23	132	69	27	42	3	0	114	0	0	4	0	4
Maple_RkyMtn	38	0	225	112	23	132	69	27	42	3	0	114	0	0	4	0	4
Maple_silver	38	0	225	112	23	132	69	27	42	3	0	114	0	0	4	0	4
Maple_spp	38	0	225	112	23	132	69	27	42	3	0	114	0	0	4	0	4
Maple_striped	38	0	225	112	23	132	69	27	42	3	0	114	0	0	4	0	4
Maple_sugar	38	0	225	112	23	132	69	27	42	3	0	114	0	0	4	0	4
Mesquite	38	0	225	13	7	3	3	3	3	0	0	0	0	0	0	0	0
Misc_crop	7	0	180	7	3	2	2	2	2	0	0	0	0	0	0	0	0
Misc_hardwoods	38	0	225	13	7	3	3	3	3	0	0	0	0	0	0	0	0
Mixed_conifer_sp	70	0	420	25	12	6	6	6	6	0	0	0	0	0	0	0	0
Mountain_ash	38	0	225	13	7	3	3	3	3	0	0	0	0	0	0	0	0
Mulberry	38	0	225	26	13	7	7	7	7	0	0	0	0	0	0	0	0
Nyssa	26250	0	225	43	35	18	63	13	28	0	0	0	0	0	0	0	0
Oak_AZ_white	26250	0	225	23	4	0	9	5	0	0	0	0	7	10	0	8	0
Oak_bear	26250	0	225	23	4	0	9	5	0	0	0	0	7	10	0	8	0
Oak_black	26250	0	225	23	4	0	9	5	0	0	0	0	7	10	0	8	0
Oak_blackjack	26250	0	225	23	4	0	9	5	0	0	0	0	7	10	0	8	0
Oak_blue	26250	0	225	23	4	0	9	5	0	0	0	0	7	10	0	8	0
Oak_bluejack	26250	0	225	23	4	0	9	5	0	0	0	0	7	10	0	8	0
Oak_bur	26250	0	225	23	4	0	9	5	0	0	0	0	7	10	0	8	0
Oak_CA_black	26250	0	225	23	4	0	9	5	0	0	0	0	7	10	0	8	0
Oak_CA_live	26250	0	225	23	4	0	9	5	0	0	0	0	7	10	0	8	0
Oak_CA_white	26250	0	225	23	4	0	9	5	0	0	0	0	7	10	0	8	0
Oak_canyon_live	26250	0	225	23	4	0	9	5	0	0	0	0	7	10	0	8	0
Oak_chestnut	26250	0	225	23	4	0	9	5	0	0	0	0	7	10	0	8	0
Oak_chinkapin	26250	0	225	23	4	0	9	5	0	0	0	0	7	10	0	8	0
Oak_delta_post	26250	0	225	23	4	0	9	5	0	0	0	0	7	10	0	8	0
Oak_Durand	26250	0	225	23	4	0	9	5	0	0	0	0	7	10	0	8	0
Oak_Emery	26250	0	225	23	4	0	9	5	0	0	0	0	7	10	0	8	0
Oak_Engelmann	26250	0	225	23	4	0	9	5	0	0	0	0	7	10	0	8	0
Oak_evergreen_sp	26250	0	225	23	4	0	9	5	0	0	0	0	7	10	0	8	0
Oak_Gambel	26250	0	225	23	4	0	9	5	0	0	0	0	7	10	0	8	0

Default BEISV3.12 Emission Factors

Species	ETHE	PROPE	ETHO	ACET	HEXA	HEXE	HEXY	FORM	ACTAL	BUTE	ETHA	FORAC	ACTAC	BUTO	CO	ORVOC	NO
Holly_American	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Hornbeam	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Incense_cedar	135	135	135	135	60	240	240	60	60	60	30	30	30	30	450	240	2
Juniper	63	63	63	63	28	112	112	28	28	28	14	14	14	14	210	112	2
KY_coffeetree	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Larch	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Loblolly_bay	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Madrone	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Magnolia	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Mahogany	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Maple_bigleaf	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Maple_bigtooth	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Maple_black	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Maple_boxelder	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Maple_FL	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Maple_mtn	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Maple_Norway	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Maple_red	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Maple_RkyMtn	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Maple_silver	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Maple_spp	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Maple_striped	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Maple_sugar	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Mesquite	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Misc_crop	27	27	27	27	12	48	48	12	12	12	6	6	6	6	90	48	40
Misc_hardwoods	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Mixed_conifer_sp	63	63	63	63	28	112	112	28	28	28	14	14	14	14	210	112	2
Mountain_ash	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Mulberry	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Nyssa	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Oak_AZ_white	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Oak_bear	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Oak_black	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Oak_blackjack	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Oak_blue	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Oak_bluejack	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Oak_bur	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Oak_CA_black	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Oak_CA_live	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Oak_CA_white	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Oak_canyon_live	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Oak_chestnut	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Oak_chinkapin	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Oak_delta_post	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Oak_Durand	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Oak_Emery	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Oak_Engelmann	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Oak_evergreen_sp	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Oak_Gambel	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2

Default BEISV3.12 Emission Factors

Species	ISOP	MBO	APIN	BPIN	D3CAR	DLIM	CAMPH	MYRC	ATERP	BPHE	SABI	PCYM	OCIM	ATHU	TRPO	GTERP	METH
Oak_interio_live	26250	0	225	23	4	0	9	5	0	0	0	0	7	10	0	8	0
Oak_laurel	26250	0	225	23	4	0	9	5	0	0	0	0	7	10	0	8	0
Oak_live	26250	0	225	23	4	0	9	5	0	0	0	0	7	10	0	8	0
Oak_Mexicanblue	26250	0	225	23	4	0	9	5	0	0	0	0	7	10	0	8	0
Oak_Northrn_pin	26250	0	225	23	4	0	9	5	0	0	0	0	7	10	0	8	0
Oak_Northrn_red	26250	0	225	23	4	0	9	5	0	0	0	0	7	10	0	8	0
Oak_nuttall	26250	0	225	23	4	0	9	5	0	0	0	0	7	10	0	8	0
Oak_OR_white	26250	0	225	23	4	0	9	5	0	0	0	0	7	10	0	8	0
Oak_overcup	26250	0	225	23	4	0	9	5	0	0	0	0	7	10	0	8	0
Oak_pin	26250	0	225	23	4	0	9	5	0	0	0	0	7	10	0	8	0
Oak_post	26250	0	225	23	4	0	9	5	0	0	0	0	7	10	0	8	0
Oak_scarlet	26250	0	225	23	4	0	9	5	0	0	0	0	7	10	0	8	0
Oak_scrub	26250	0	225	23	4	0	9	5	0	0	0	0	7	10	0	8	0
Oak_shingle	26250	0	225	23	4	0	9	5	0	0	0	0	7	10	0	8	0
Oak_Shumrd_red	26250	0	225	23	4	0	9	5	0	0	0	0	7	10	0	8	0
Oak_silverleaf	26250	0	225	23	4	0	9	5	0	0	0	0	7	10	0	8	0
Oak_Southrn_red	26250	0	225	23	4	0	9	5	0	0	0	0	7	10	0	8	0
Oak_spp	26250	0	225	23	4	0	9	5	0	0	0	0	7	10	0	8	0
Oak_swamp_cnut	26250	0	225	23	4	0	9	5	0	0	0	0	7	10	0	8	0
Oak_swamp_red	26250	0	225	23	4	0	9	5	0	0	0	0	7	10	0	8	0
Oak_swamp_white	26250	0	225	23	4	0	9	5	0	0	0	0	7	10	0	8	0
Oak_turkey	26250	0	225	23	4	0	9	5	0	0	0	0	7	10	0	8	0
Oak_water	26250	0	225	23	4	0	9	5	0	0	0	0	7	10	0	8	0
Oak_white	26250	0	225	23	4	0	9	5	0	0	0	0	7	10	0	8	0
Oak_willow	26250	0	225	23	4	0	9	5	0	0	0	0	7	10	0	8	0
Oats	7	0	180	7	3	2	2	2	2	0	0	0	0	0	0	0	0
Osage_orange	38	0	225	13	7	3	3	3	3	0	0	0	0	0	0	0	0
Pasture	49	0	180	50	25	12	12	12	12	0	0	0	0	0	0	0	0
Paulownia	38	0	225	13	7	3	3	3	3	0	0	0	0	0	0	0	0
Pawpaw	38	0	225	13	7	3	3	3	3	0	0	0	0	0	0	0	0
Peanuts	90	0	180	90	45	23	23	23	23	0	0	0	0	0	0	0	0
Persimmon	38	0	225	17	16	0	0	0	0	0	0	0	0	0	0	0	0
Pine_Apache	70	0	420	1279	328	0	2	63	109	0	54	2	0	0	0	4	2
Pine_Austrian	70	0	420	1801	0	0	52	0	0	0	0	0	0	0	0	0	0
Pine_AZ	70	13125	420	402	617	765	26	0	33	2	0	7	0	0	0	0	0
Pine_Bishop	70	13125	420	741	371	185	185	185	185	0	0	0	0	0	0	0	0
Pine_blackjack	70	13125	420	402	617	765	26	0	33	2	0	7	0	0	0	0	0
Pine_brstlcone	70	0	420	1853	0	0	0	0	0	0	0	0	0	0	0	0	0
Pine_chihuahua	70	0	420	1745	0	107	0	0	0	0	0	0	0	0	0	0	0
Pine_Coulter	70	36750	420	537	282	50	359	37	141	0	178	232	17	4	0	17	4
Pine_digger	70	36750	420	1117	736	0	0	0	0	0	0	0	0	0	0	0	0
Pine_Ewhite	70	0	420	469	365	2	2	263	539	0	126	15	0	0	72	0	0
Pine_foxtail	70	0	420	1829	15	0	9	0	0	0	0	0	0	0	0	0	0
Pine_jack	70	13125	420	563	463	193	111	135	233	2	32	80	2	2	0	33	0
Pine_Jeffrey	70	13125	420	826	122	0	430	126	300	0	28	56	9	6	0	4	0
Pine_knobcone	70	53	420	702	397	69	291	24	198	0	145	6	0	20	0	4	0
Pine_limber	70	0	420	1853	0	0	0	0	0	0	0	0	0	0	0	0	0
Pine_loblolly	70	53	420	1075	447	19	128	15	156	4	0	0	9	0	0	2	0
Pine_lodgepole	70	13125	420	408	367	93	335	100	180	82	195	26	30	4	0	30	6

Default BEISV3.12 Emission Factors

Species	ETHE	PROPE	ETHO	ACET	HEXA	HEXE	HEXY	FORM	ACTAL	BUTE	ETHA	FORAC	ACTAC	BUTO	CO	ORVOC	NO
Oak_interio_live	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Oak_laurel	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Oak_live	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Oak_Mexicanblue	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Oak_Northrn_pin	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Oak_Northrn_red	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Oak_nuttall	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Oak_OR_white	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Oak_overcup	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Oak_pin	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Oak_post	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Oak_scarlet	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Oak_scrub	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Oak_shingle	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Oak_Shumrd_red	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Oak_silverleaf	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Oak_Southrn_red	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Oak_spp	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Oak_swamp_cnut	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Oak_swamp_red	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Oak_swamp_white	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Oak_turkey	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Oak_water	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Oak_white	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Oak_willow	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Oats	27	27	27	27	12	48	48	12	12	12	6	6	6	6	90	48	45
Osage_orange	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Pasture	27	27	27	27	12	48	48	12	12	12	6	6	6	6	90	48	27
Paulownia	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Pawpaw	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Peanuts	27	27	27	27	12	48	48	12	12	12	6	6	6	6	90	48	27
Persimmon	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Pine_Apache	63	63	63	63	28	112	112	28	28	28	14	14	14	14	210	112	2
Pine_Austrian	63	63	63	63	28	112	112	28	28	28	14	14	14	14	210	112	2
Pine_AZ	63	63	63	63	28	112	112	28	28	28	14	14	14	14	210	112	2
Pine_Bishop	63	63	63	63	28	112	112	28	28	28	14	14	14	14	210	112	2
Pine_blackjack	63	63	63	63	28	112	112	28	28	28	14	14	14	14	210	112	2
Pine_brstlcone	63	63	63	63	28	112	112	28	28	28	14	14	14	14	210	112	2
Pine_chihuahua	63	63	63	63	28	112	112	28	28	28	14	14	14	14	210	112	2
Pine_Coulter	63	63	63	63	28	112	112	28	28	28	14	14	14	14	210	112	2
Pine_digger	63	63	63	63	28	112	112	28	28	28	14	14	14	14	210	112	2
Pine_Ewhite	63	63	63	63	28	112	112	28	28	28	14	14	14	14	210	112	2
Pine_foxtail	63	63	63	63	28	112	112	28	28	28	14	14	14	14	210	112	2
Pine_jack	63	63	63	63	28	112	112	28	28	28	14	14	14	14	210	112	2
Pine_Jeffrey	63	63	63	63	28	112	112	28	28	28	14	14	14	14	210	112	2
Pine_knobcone	63	63	63	63	28	112	112	28	28	28	14	14	14	14	210	112	2
Pine_limber	63	63	63	63	28	112	112	28	28	28	14	14	14	14	210	112	2
Pine_loblolly	63	63	63	63	28	112	112	28	28	28	14	14	14	14	210	112	2
Pine_lodgepole	63	63	63	63	28	112	112	28	28	28	14	14	14	14	210	112	2

Default BEISV3.12 Emission Factors

Species	ISOP	MBO	APIN	BPIN	D3CAR	DLIM	CAMPH	MYRC	ATERP	BPHE	SABI	PCYM	OCIM	ATHU	TRPO	GTERP	METH
Pine_longleaf	70	5250	420	778	995	50	26	0	2	0	0	0	0	0	0	0	0
Pine_Monterey	70	53	420	717	773	2	198	2	150	0	13	0	0	0	0	0	0
Pine_pinyon	70	0	420	741	371	185	185	185	185	0	0	0	0	0	0	0	0
Pine_pinyon_brdr	70	0	420	1820	0	0	33	0	0	0	0	0	0	0	0	0	0
Pine_pinyon_cmn	70	0	420	1681	76	9	0	13	0	0	0	0	0	0	0	0	0
Pine_pitch	70	53	420	1362	334	158	0	0	0	0	0	0	0	0	0	0	0
Pine_pond	70	53	420	311	387	0	1138	9	0	0	7	0	2	0	0	0	0
Pine_ponderosa	70	13125	420	402	617	765	26	0	33	2	0	7	0	0	0	0	0
Pine_red	70	0	420	182	4	33	647	358	135	85	0	0	408	0	0	0	0
Pine_sand	70	53	420	841	1001	0	2	6	0	0	2	0	2	0	0	0	0
Pine_scotch	70	0	420	384	397	565	145	7	174	35	141	4	0	0	0	2	0
Pine_shortleaf	70	0	420	1019	261	93	422	9	43	2	0	2	0	0	0	0	0
Pine_slash	70	53	420	876	699	139	106	2	9	0	20	0	0	0	0	0	0
Pine_spruce	70	53	420	926	926	0	0	0	0	0	0	0	0	0	0	0	0
Pine_sugar	70	0	420	1538	315	0	0	0	0	0	0	0	0	0	0	0	0
Pine_Swwhite	70	0	420	741	371	185	185	185	185	0	0	0	0	0	0	0	0
Pine_tablemtn	70	53	420	1395	317	143	0	0	0	0	0	0	0	0	0	0	0
Pine_VA	70	0	420	613	237	634	228	83	56	0	0	2	0	0	0	0	0
Pine_Washoe	70	13125	420	741	371	185	185	185	185	0	0	0	0	0	0	0	0
Pine_whitebark	70	0	420	710	489	41	193	54	245	0	96	17	0	0	0	9	0
Pine_Wwhite	70	0	420	550	484	602	63	0	152	0	0	0	0	0	0	0	0
Pine_yellow	70	13125	420	402	617	765	26	0	33	2	0	7	0	0	0	0	0
Populus	26250	0	225	11	2	0	9	6	1	0	0	0	4	0	0	0	0
Potatoes	9	0	180	8	4	2	2	2	2	0	0	0	0	0	0	0	0
Prunus	38	0	225	12	5	0	3	4	0	0	0	0	0	8	0	0	0
Redbay	38	0	225	13	7	3	3	3	3	0	0	0	0	0	0	0	0
Rice	90	0	180	90	45	23	23	23	23	0	0	0	0	0	0	0	0
Robinia_locust	26250	0	225	0	0	0	0	0	33	0	0	0	0	0	0	0	0
Rye	7	0	180	7	3	2	2	2	2	0	0	0	0	0	0	0	0
Sassafras	38	0	225	0	3	0	0	3	0	0	0	3	14	0	0	9	0
Sequoia	150	0	900	34	1	0	16	0	8	1	6	38	1	1	0	1	25
Serviceberry	38	0	225	13	7	3	3	3	3	0	0	0	0	0	0	0	0
Silverbell	38	0	225	13	7	3	3	3	3	0	0	0	0	0	0	0	0
Smoketree	38	0	225	13	7	3	3	3	3	0	0	0	0	0	0	0	0
Soapberry_westrn	38	0	225	13	7	3	3	3	3	0	0	0	0	0	0	0	0
Sorghum	7	0	180	7	4	2	2	2	2	0	0	0	0	0	0	0	0
Sourwood	38	0	225	78	33	26	62	0	0	0	0	0	0	0	0	0	0
Soybeans	19	0	180	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sparkleberry	38	0	225	13	7	3	3	3	3	0	0	0	0	0	0	0	0
Spruce_black	21000	0	900	961	115	1116	608	917	83	4	12	4	135	0	0	8	8
Spruce_blue	21000	0	900	1346	1096	349	778	226	107	4	32	24	4	0	0	4	4
Spruce_Brewer	21000	0	900	1588	794	397	397	397	397	0	0	0	0	0	0	0	0
Spruce_Englemann	21000	0	900	1457	532	230	322	488	345	119	206	0	266	0	0	4	0
Spruce_Norway	1500	0	900	1799	492	341	401	341	262	0	163	131	36	0	0	4	4
Spruce_red	1500	0	900	794	322	1040	222	1144	230	0	119	0	68	0	0	16	12
Spruce_Sitka	1500	0	900	687	397	0	4	87	2049	0	746	0	0	0	0	0	0
Spruce_spp	21000	0	900	1588	794	397	397	397	397	0	0	0	0	0	0	0	0
Spruce_white	21000	0	900	953	449	214	1052	719	334	4	218	16	0	0	0	8	4
Sweetgum	26250	0	225	451	68	162	160	6	37	15	31	44	18	0	1	0	0

Default BEISV3.12 Emission Factors

Species	ETHE	PROPE	ETHO	ACET	HEXA	HEXE	HEXY	FORM	ACTAL	BUTE	ETHA	FORAC	ACTAC	BUTO	CO	ORVOC	NO
Pine_longleaf	63	63	63	63	28	112	112	28	28	28	14	14	14	14	210	112	2
Pine_Monterey	63	63	63	63	28	112	112	28	28	28	14	14	14	14	210	112	2
Pine_pinyon	63	63	63	63	28	112	112	28	28	28	14	14	14	14	210	112	2
Pine_pinyon_brdr	63	63	63	63	28	112	112	28	28	28	14	14	14	14	210	112	2
Pine_pinyon_cmn	63	63	63	63	28	112	112	28	28	28	14	14	14	14	210	112	2
Pine_pitch	63	63	63	63	28	112	112	28	28	28	14	14	14	14	210	112	2
Pine_pond	63	63	63	63	28	112	112	28	28	28	14	14	14	14	210	112	2
Pine_ponderosa	63	63	63	63	28	112	112	28	28	28	14	14	14	14	210	112	2
Pine_red	63	63	63	63	28	112	112	28	28	28	14	14	14	14	210	112	2
Pine_sand	63	63	63	63	28	112	112	28	28	28	14	14	14	14	210	112	2
Pine_scotch	63	63	63	63	28	112	112	28	28	28	14	14	14	14	210	112	2
Pine_shortleaf	63	63	63	63	28	112	112	28	28	28	14	14	14	14	210	112	2
Pine_slash	63	63	63	63	28	112	112	28	28	28	14	14	14	14	210	112	2
Pine_spruce	63	63	63	63	28	112	112	28	28	28	14	14	14	14	210	112	2
Pine_sugar	63	63	63	63	28	112	112	28	28	28	14	14	14	14	210	112	2
Pine_Swwhite	63	63	63	63	28	112	112	28	28	28	14	14	14	14	210	112	2
Pine_tablemtn	63	63	63	63	28	112	112	28	28	28	14	14	14	14	210	112	2
Pine_VA	63	63	63	63	28	112	112	28	28	28	14	14	14	14	210	112	2
Pine_Washoe	63	63	63	63	28	112	112	28	28	28	14	14	14	14	210	112	2
Pine_whitebark	63	63	63	63	28	112	112	28	28	28	14	14	14	14	210	112	2
Pine_Wwhite	63	63	63	63	28	112	112	28	28	28	14	14	14	14	210	112	2
Pine_yellow	63	63	63	63	28	112	112	28	28	28	14	14	14	14	210	112	2
Populus	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Potatoes	27	27	27	27	12	48	48	12	12	12	6	6	6	6	90	48	120
Prunus	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Redbay	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Rice	27	27	27	27	12	48	48	12	12	12	6	6	6	6	90	48	0
Robinia_locust	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Rye	27	27	27	27	12	48	48	12	12	12	6	6	6	6	90	48	27
Sassafras	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Sequoia	135	135	135	135	60	240	240	60	60	60	30	30	30	30	450	240	2
Serviceberry	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Silverbell	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Smoketree	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Soapberry_westrn	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Sorghum	27	27	27	27	12	48	48	12	12	12	6	6	6	6	90	48	68
Sourwood	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Soybeans	27	27	27	27	12	48	48	12	12	12	6	6	6	6	90	48	27
Sparkleberry	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Spruce_black	135	135	135	135	60	240	240	60	60	60	30	30	30	30	450	240	2
Spruce_blue	135	135	135	135	60	240	240	60	60	60	30	30	30	30	450	240	2
Spruce_Brewer	135	135	135	135	60	240	240	60	60	60	30	30	30	30	450	240	2
Spruce_Englemann	135	135	135	135	60	240	240	60	60	60	30	30	30	30	450	240	2
Spruce_Norway	135	135	135	135	60	240	240	60	60	60	30	30	30	30	450	240	2
Spruce_red	135	135	135	135	60	240	240	60	60	60	30	30	30	30	450	240	2
Spruce_Sitka	135	135	135	135	60	240	240	60	60	60	30	30	30	30	450	240	2
Spruce_spp	135	135	135	135	60	240	240	60	60	60	30	30	30	30	450	240	2
Spruce_white	135	135	135	135	60	240	240	60	60	60	30	30	30	30	450	240	2
Sweetgum	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2

Default BEISV3.12 Emission Factors

Species	ISOP	MBO	APIN	BPIN	D3CAR	DLIM	CAMPH	MYRC	ATERP	BPHE	SABI	PCYM	OCIM	ATHU	TRPO	GTERP	METH
Sycamore	26250	0	225	13	7	3	3	3	3	0	0	0	0	0	0	0	0
Tallowtree_chins	38	0	225	13	7	3	3	3	3	0	0	0	0	0	0	0	0
Tamarix	70	0	225	13	7	3	3	3	3	0	0	0	0	0	0	0	0
Tanoak	38	0	225	13	7	3	3	3	3	0	0	0	0	0	0	0	0
Tobacco	0	0	180	21	10	5	5	5	5	0	0	0	0	0	0	0	0
Torreya	150	0	420	25	12	6	6	6	6	0	0	0	0	0	0	0	0
Tung_oil_tree	38	0	225	13	7	3	3	3	3	0	0	0	0	0	0	0	0
Unknown_tree	38	0	225	13	7	3	3	3	3	0	0	0	0	0	0	0	0
USGS_coniferfor	11383	750	330	550	275	138	138	138	138	0	0	0	0	0	0	0	0
USGS_cropgrass	28	8	240	11	6	3	3	3	3	0	0	0	0	0	0	0	0
USGS_cropwdlnd	2650	150	240	32	16	8	8	8	8	0	0	0	0	0	0	0	0
USGS_decidforest	8232	0	180	36	18	9	9	9	9	0	0	0	0	0	0	0	0
USGS_drycrop	28	8	180	8	4	2	2	2	2	0	0	0	0	0	0	0	0
USGS_evbrdleaf	7941	0	300	100	50	25	25	25	25	0	0	0	0	0	0	0	0
USGS_grassland	49	8	180	8	4	2	2	2	2	0	0	0	0	0	0	0	0
USGS_irrcrop	28	8	300	20	10	5	5	5	5	0	0	0	0	0	0	0	0
USGS_mxforest	7729	75	270	90	45	23	23	23	23	0	0	0	0	0	0	0	0
USGS_mxtundra	1680	0	90	6	3	2	2	2	2	0	0	0	0	0	0	0	0
USGS_savanna	1765	0	60	24	12	6	6	6	6	0	0	0	0	0	0	0	0
USGS_shrubgrass	325	9	210	54	27	14	14	14	14	0	0	0	0	0	0	0	0
USGS_shrubland	600	15	240	100	50	25	25	25	25	0	0	0	0	0	0	0	0
USGS_snowice	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
USGS_sprsbarren	0	8	30	1	1	0	0	0	0	0	0	0	0	0	0	0	0
USGS_urban	10	75	60	8	4	2	2	2	2	0	0	0	0	0	0	0	0
USGS_water	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
USGS_wetwoods	5816	0	240	128	64	32	32	32	32	0	0	0	0	0	0	0	0
USGS_woodtundr	3360	0	120	80	40	20	20	20	20	0	0	0	0	0	0	0	0
Walnut	38	0	225	288	512	0	128	0	65	0	0	0	0	0	0	0	0
Water_elm	38	0	225	13	7	3	3	3	3	0	0	0	0	0	0	0	0
Wheat	13	0	180	2	1	1	1	1	1	0	0	0	0	0	0	0	0
Willow	26250	0	225	4	0	0	7	0	0	0	0	0	6	16	0	0	0
Yellow_poplar	38	0	225	3	4	0	27	1	18	0	1	0	0	7	0	6	3
Yellowwood	38	0	225	13	7	3	3	3	3	0	0	0	0	0	0	0	0
Yucca_Mojave	38	0	225	13	7	3	3	3	3	0	0	0	0	0	0	0	0

Default BEISV3.12 Emission Factors

Species	ETHE	PROPE	ETHO	ACET	HEXA	HEXE	HEXY	FORM	ACTAL	BUTE	ETHA	FORAC	ACTAC	BUTO	CO	ORVOC	NO
Sycamore	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Tallowtree_chins	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Tamarix	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Tanoak	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Tobacco	27	27	27	27	12	48	48	12	12	12	6	6	6	6	90	48	45
Torreya	63	63	63	63	28	112	112	28	28	28	14	14	14	14	210	112	2
Tung_oil_tree	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Unknown_tree	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
USGS_coniferfor	50	50	50	50	22	88	88	22	22	22	11	11	11	11	165	88	2
USGS_cropgrass	36	36	36	36	16	64	64	16	16	16	8	8	8	8	120	64	34
USGS_cropwdlnd	36	36	36	36	16	64	64	16	16	16	8	8	8	8	120	64	21
USGS_decidforest	27	27	27	27	12	48	48	12	12	12	6	6	6	6	90	48	2
USGS_drycrop	27	27	27	27	12	48	48	12	12	12	6	6	6	6	90	48	34
USGS_evbrdleaf	45	45	45	45	20	80	80	20	20	20	10	10	10	10	150	80	2
USGS_grassland	27	27	27	27	12	48	48	12	12	12	6	6	6	6	90	48	27
USGS_irrcrop	45	45	45	45	20	80	80	20	20	20	10	10	10	10	150	80	34
USGS_mxforest	41	41	41	41	18	72	72	18	18	18	9	9	9	9	135	72	2
USGS_mxtundra	14	14	14	14	6	24	24	6	6	6	3	3	3	3	45	24	5
USGS_savanna	9	9	9	9	4	16	16	4	4	4	2	2	2	2	30	16	27
USGS_shrubgrass	32	32	32	32	14	56	56	14	14	14	7	7	7	7	105	56	15
USGS_shrubland	36	36	36	36	16	64	64	16	16	16	8	8	8	8	120	64	2
USGS_snowice	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
USGS_sprsbarren	5	5	5	5	2	8	8	2	2	2	1	1	1	1	15	8	0
USGS_urban	9	9	9	9	4	16	16	4	4	4	2	2	2	2	30	16	6
USGS_water	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
USGS_wetwoods	36	36	36	36	16	64	64	16	16	16	8	8	8	8	120	64	2
USGS_woodtundr	18	18	18	18	8	32	32	8	8	8	4	4	4	4	60	32	2
Walnut	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Water_elm	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Wheat	27	27	27	27	12	48	48	12	12	12	6	6	6	6	90	48	30
Willow	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Yellow_poplar	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Yellowwood	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2
Yucca_Mojave	34	34	34	34	15	60	60	15	15	15	8	8	8	8	113	60	2

WEIGHTED RURAL

EMISSION FACTORS

Weighted Rural Landuse Emission Factors
Based Upon Land Survey Results
Clark County, Nevada

Community Type	Botanical Name	Common Name	Family	%	BELD3 Source		Leaf Area Index	Dry Leaf Biomass	Winter Biomass Factor	Indicator Specific Leaf Weight	ISOP	MBO	APIN	BPIN	D3CAR	DLIM
Blackbrush	Acacia greggii	Catclaw	FABACEAE		1 039 Acacia		0.05	7	0	0.01	0.7	0	4.2	16.23	1.32	0
Blackbrush	Atriplex sp.	Saltbush	CHENOPODIACEAE		3 010 USGS_shrubgrass		0.09	10.5	0.015	0	9.75	0.27	6.3	1.62	0.81	0.42
Blackbrush	Barren	Barren	~NA~		36 018 USGS_sprsbarren		0	18	0.18	0	0	2.88	10.8	0.36	0.36	0
Blackbrush	Coleogyne ramosissima	Blackbrush	ROSACEAE		33 042 Apple		0	16.5	0.165	0	12.54	0	74.25	4.29	2.31	0.99
Blackbrush	Encelia sp.	Brittlebush	ASTERACEAE		1 010 USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Blackbrush	Ephedra sp.	Mormon Tea	EPHEDRACEAE		3 010 USGS_shrubgrass		0.09	10.5	0.015	0	9.75	0.27	6.3	1.62	0.81	0.42
Blackbrush	Eriogonum sp.	Desert Trumpet	POLYGONACEAE		1 010 USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Blackbrush	Grasses	Grasses	~NA~		4 008 USGS_grassland		0	12	0.02	0	1.96	0.32	7.2	0.32	0.16	0.08
Blackbrush	Grayia spinosa	Hopsage	CHENOPODIACEAE		2 010 USGS_shrubgrass		0.06	7	0.01	0	6.5	0.18	4.2	1.08	0.54	0.28
Blackbrush	Juniperus sp.	Juniper	CUPRESSACEAE		4 085 Juniper		0.28	28	0.04	0	2.8	0	16.8	4.92	0	9.88
Blackbrush	Krascheninnikovia lanata	Winterfat	CHENOPODIACEAE		1 010 USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Blackbrush	Larrea tridentata	Creosote	ZYGOPHYLLACEAE		1 010 USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Blackbrush	Opuntia sp.	Cacti	CACTACEAE		2 010 USGS_shrubgrass		0.06	7	0.01	0	6.5	0.18	4.2	1.08	0.54	0.28
Blackbrush	Pinus monophylla	Pinyon Pine	PINACEAE		1 178 Pine_pinyon		0.03	7	0.01	0	0.7	0	4.2	7.41	3.71	1.85
Blackbrush	Purshia sp.	Cliffrose	ROSACEAE		1 042 Apple		0	0.5	0.005	0	0.38	0	2.25	0.13	0.07	0.03
Blackbrush	Yucca sp.	Yucca	LILIACEAE		6 232 Yucca_Mojave	WEIGHTED	0.3	22.5	0.06	0	2.28	0	13.5	0.78	0.42	0.18
				100			1.08	160.5	0.55	0.01	66.86	4.46	162.6	42	12.13	14.97
							1	200	0.5	0	67	4	163	42	12	15
Blackbrush Grassland	Ambrosia dumosa	Bursage	ASTERACEAE		1 010 USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Blackbrush Grassland	Barren	Barren	*NA*		21 018 USGS_sprsbarren		0	10.5	0.105	0	0	1.68	6.3	0.21	0.21	0
Blackbrush Grassland	Coleogyne ramosissima	Blackbrush	ROSACEAE		27 042 Apple		0	13.5	0.135	0	10.26	0	60.75	3.51	1.89	0.81
Blackbrush Grassland	Encelia sp.	Brittlebush	ASTERACEAE		1 010 USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Blackbrush Grassland	Ephedra sp.	Mormon Tea	EPHEDRACEAE		4 010 USGS_shrubgrass		0.12	14	0.02	0	13	0.36	8.4	2.16	1.08	0.56
Blackbrush Grassland	Grasses	Grasses	~NA~		36 008 USGS_grassland		0	108	0.18	0	17.64	2.88	64.8	2.88	1.44	0.72
Blackbrush Grassland	Gutierrezia sp.	Snakeweed	ASTERACEAE		2 010 USGS_shrubgrass		0.06	7	0.01	0	6.5	0.18	4.2	1.08	0.54	0.28
Blackbrush Grassland	Sphaeralcea sp.	Globemallow	MALVACEAE		1 010 USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Blackbrush Grassland	Yucca sp.	Yucca	LILIACEAE		7 232 Yucca_Mojave	WEIGHTED	0.35	26.25	0.07	0	2.66	0	15.75	0.91	0.49	0.21
				100			0.62	189.75	0.535	0	59.81	5.37	166.5	12.37	6.46	3
							1	200	0.5	0	60	5	167	12	6	3
Bristlecone Pine	Abies concolor	White Fir	PINACEAE		9 076 Fir_white		0.63	135	0.09	0	13.5	0	81	118.98	125.1	0
Bristlecone Pine	Barren	Barren	*NA*		49 018 USGS_sprsbarren		0	24.5	0.245	0	0	3.92	14.7	0.49	0.49	0
Bristlecone Pine	Chrysothamnus sp.	Rabbitbrush	ASTERACEAE		1 010 USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Bristlecone Pine	Pinus aristata	Bristlecone Pine	PINACEAE		20 164 Pine_brstlcone		0.6	140	0.2	0	14	0	84	370.6	0	0
Bristlecone Pine	Pinus flexilis	Limber Pine	PINACEAE		9 173 Pine_limber		0.27	63	0.09	0	6.3	0	37.8	166.77	0	0
Bristlecone Pine	Pinus ponderosa	Ponderosa Pine	PINACEAE		8 163 Pine_ponderosa		0.24	56	0.08	0	5.6	1050	33.6	32.16	49.36	61.2
Bristlecone Pine	Populus sp.	Cottonwood	SALICACEAE		3 198 Populus		0.15	11.25	0	0.03	787.5	0	6.75	0.33	0.06	0
Bristlecone Pine	Ribes sp.	Gooseberry	SAXIFRAGACEAE		1 010 USGS_shrubgrass	WEIGHTED	0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
				100			1.95	436.75	0.715	0.03	833.4	1054.1	262.05	690.41	175.56	61.48
							2	450	1	0	933	1054	262	690	176	61
Creosote-Bursage	Ambrosia dumosa	Bursage	ASTERACEAE		17 010 USGS_shrubgrass		0.51	59.5	0.085	0	55.25	1.53	35.7	9.18	4.59	2.38
Creosote-Bursage	Atriplex sp.	Saltbush	CHENOPODIACEAE		1 010 USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Creosote-Bursage	Barren	Barren	~NA~		56 018 USGS_sprsbarren		0	28	0.28	0	0	4.48	16.8	0.56	0.56	0
Creosote-Bursage	Ephedra sp.	Mormon Tea	EPHEDRACEAE		1 010 USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Creosote-Bursage	Eriogonum sp.	Desert Trumpet	POLYGONACEAE		1 010 USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Creosote-Bursage	Grasses	Grasses	~NA~		6 008 USGS_grassland		0	18	0.03	0	2.94	0.48	10.8	0.48	0.24	0.12
Creosote-Bursage	Grayia spinosa	Hopsage	CHENOPODIACEAE		0 010 USGS_shrubgrass		0	0	0	0	0	0	0	0	0	0
Creosote-Bursage	Krameria sp.	Littleleaf Ratany	KRAMERIACEAE		1 010 USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Creosote-Bursage	Larrea tridentata	Creosote	ZYGOPHYLLACEAE		15 010 USGS_shrubgrass		0.45	52.5	0.075	0	48.75	1.35	31.5	8.1	4.05	2.1
Creosote-Bursage	Lycium sp.	Wolfberry	SOLANACEAE		1 010 USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Creosote-Bursage	Opuntia sp.	Cacti	CACTACEAE		1 010 USGS_shrubgrass	WEIGHTED	0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
				100			1.14	179	0.5	0	126.44	8.38	107.4	21.56	11.06	5.44
							1	200	0.5	0	126	8	107	22	11	5

Weighted Rural Landuse Emission Factors
Based Upon Land Survey Results
Clark County, Nevada

Community Type	Botanical Name	CAMPH	MYRC	ATERP	BPHE	SABI	PCYM	OCIM	ATHU	TRPO	GTERP	METH	ETHE	PROPE	ETHO	ACET	HEXA	HEXE
Blackbrush	Acacia greggii	0.63	0	0.33	0	0	0	0	0	0	0	0	0.63	0.63	0.63	0.63	0.28	1.12
Blackbrush	Atriplex sp.	0.42	0.42	0.42	0	0	0	0	0	0	0	0	0.96	0.96	0.96	0.96	0.42	1.68
Blackbrush	Barren	0	0	0	0	0	0	0	0	0	0	0	1.8	1.8	1.8	1.8	0.72	2.88
Blackbrush	Coleogyne ramosissima	0.99	0.99	0.99	0	0	0	0	0	0	0	0	11.22	11.22	11.22	11.22	4.95	19.8
Blackbrush	Encelia sp.	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56
Blackbrush	Ephedra sp.	0.42	0.42	0.42	0	0	0	0	0	0	0	0	0.96	0.96	0.96	0.96	0.42	1.68
Blackbrush	Eriogonum sp.	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56
Blackbrush	Grasses	0.08	0.08	0.08	0	0	0	0	0	0	0	0	1.08	1.08	1.08	1.08	0.48	1.92
Blackbrush	Grayia spinosa	0.28	0.28	0.28	0	0	0	0	0	0	0	0	0.64	0.64	0.64	0.64	0.28	1.12
Blackbrush	Juniperus sp.	0	0	0	0	0	0	0	0	0	0	0	2.52	2.52	2.52	2.52	1.12	4.48
Blackbrush	Krascheninnikovia lanata	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56
Blackbrush	Larrea tridentata	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56
Blackbrush	Opuntia sp.	0.28	0.28	0.28	0	0	0	0	0	0	0	0	0.64	0.64	0.64	0.64	0.28	1.12
Blackbrush	Pinus monophylla	1.85	1.85	1.85	0	0	0	0	0	0	0	0	0.63	0.63	0.63	0.63	0.28	1.12
Blackbrush	Purshia sp.	0.03	0.03	0.03	0	0	0	0	0	0	0	0	0.34	0.34	0.34	0.34	0.15	0.6
Blackbrush	Yucca sp.	0.18	0.18	0.18	0	0	0	0	0	0	0	0	2.04	2.04	2.04	2.04	0.9	3.6
		5.72	5.09	5.42	0	0	0	0	0	0	0	0	24.74	24.74	24.74	24.74	10.84	43.36
		6	5	5	0	0	0	0	0	0	0	0	25	25	25	25	11	43
Blackbrush Grassland	Ambrosia dumosa	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56
Blackbrush Grassland	Barren	0	0	0	0	0	0	0	0	0	0	0	1.05	1.05	1.05	1.05	0.42	1.68
Blackbrush Grassland	Coleogyne ramosissima	0.81	0.81	0.81	0	0	0	0	0	0	0	0	9.18	9.18	9.18	9.18	4.05	16.2
Blackbrush Grassland	Encelia sp.	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56
Blackbrush Grassland	Ephedra sp.	0.56	0.56	0.56	0	0	0	0	0	0	0	0	1.28	1.28	1.28	1.28	0.56	2.24
Blackbrush Grassland	Grasses	0.72	0.72	0.72	0	0	0	0	0	0	0	0	9.72	9.72	9.72	9.72	4.32	17.28
Blackbrush Grassland	Gutierrezia sp.	0.28	0.28	0.28	0	0	0	0	0	0	0	0	0.64	0.64	0.64	0.64	0.28	1.12
Blackbrush Grassland	Sphaeralcea sp.	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56
Blackbrush Grassland	Yucca sp.	0.21	0.21	0.21	0	0	0	0	0	0	0	0	2.38	2.38	2.38	2.38	1.05	4.2
		3	3	3	0	0	0	0	0	0	0	0	25.21	25.21	25.21	25.21	11.1	44.4
		3	3	3	0	0	0	0	0	0	0	0	25	25	25	25	11	44
Bristlecone Pine	Abies concolor	22.14	21.42	15.03	0	7.11	35.73	0	0	0	10.35	1.44	12.15	12.15	12.15	12.15	5.4	21.6
Bristlecone Pine	Barren	0	0	0	0	0	0	0	0	0	0	0	2.45	2.45	2.45	2.45	0.98	3.92
Bristlecone Pine	Chrysothamnus sp.	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56
Bristlecone Pine	Pinus aristata	0	0	0	0	0	0	0	0	0	0	0	12.6	12.6	12.6	12.6	5.6	22.4
Bristlecone Pine	Pinus flexilis	0	0	0	0	0	0	0	0	0	0	0	5.67	5.67	5.67	5.67	2.52	10.08
Bristlecone Pine	Pinus ponderosa	2.08	0	2.64	0.16	0	0.56	0	0	0	0	0	5.04	5.04	5.04	5.04	2.24	8.96
Bristlecone Pine	Populus sp.	0.27	0.18	0.03	0	0	0	0.12	0	0	0	0	1.02	1.02	1.02	1.02	0.45	1.8
Bristlecone Pine	Ribes sp.	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56
		24.77	21.88	17.98	0.16	7.11	36.29	0.12	0	0	10.35	1.44	39.57	39.57	39.57	39.57	17.47	69.88
		25	22	18	0	7	36	0	0	0	10	1	40	40	40	40	17	70
Creosote-Bursage	Ambrosia dumosa	2.38	2.38	2.38	0	0	0	0	0	0	0	0	5.44	5.44	5.44	5.44	2.38	9.52
Creosote-Bursage	Atriplex sp.	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56
Creosote-Bursage	Barren	0	0	0	0	0	0	0	0	0	0	0	2.8	2.8	2.8	2.8	1.12	4.48
Creosote-Bursage	Ephedra sp.	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56
Creosote-Bursage	Eriogonum sp.	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56
Creosote-Bursage	Grasses	0.12	0.12	0.12	0	0	0	0	0	0	0	0	1.62	1.62	1.62	1.62	0.72	2.88
Creosote-Bursage	Grayia spinosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Creosote-Bursage	Krameria sp.	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56
Creosote-Bursage	Larrea tridentata	2.1	2.1	2.1	0	0	0	0	0	0	0	0	4.8	4.8	4.8	4.8	2.1	8.4
Creosote-Bursage	Lycium sp.	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56
Creosote-Bursage	Opuntia sp.	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56
		5.44	5.44	5.44	0	0	0	0	0	0	0	0	16.58	16.58	16.58	16.58	7.16	28.64
		5	5	5	0	0	0	0	0	0	0	0	17	17	17	17	7	29

Weighted Rural Landuse Emission Factors
Based Upon Land Survey Results
Clark County, Nevada

Community Type	Botanical Name	HEXY	FORM	ACTAL	BUTE	ETHA	FORAC	ACTAC	BUTO	CO	ORVOC	NO
Blacktbrush	Acacia greggii	1.12	0.28	0.28	0.28	0.14	0.14	0.14	0.14	2.1	1.12	0.02
Blacktbrush	Atriplex sp.	1.68	0.42	0.42	0.42	0.21	0.21	0.21	0.21	3.15	1.68	0.45
Blacktbrush	Barren	2.88	0.72	0.72	0.72	0.36	0.36	0.36	0.36	5.4	2.88	0
Blacktbrush	Coleogyne ramosissima	19.8	4.95	4.95	4.95	2.64	2.64	2.64	2.64	37.29	19.8	0.66
Blacktbrush	Encelia sp.	0.56	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Blacktbrush	Ephedra sp.	1.68	0.42	0.42	0.42	0.21	0.21	0.21	0.21	3.15	1.68	0.45
Blacktbrush	Eriogonum sp.	0.56	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Blacktbrush	Grasses	1.92	0.48	0.48	0.48	0.24	0.24	0.24	0.24	3.6	1.92	1.08
Blacktbrush	Grayia spinosa	1.12	0.28	0.28	0.28	0.14	0.14	0.14	0.14	2.1	1.12	0.3
Blacktbrush	Juniperus sp.	4.48	1.12	1.12	1.12	0.56	0.56	0.56	0.56	8.4	4.48	0.08
Blacktbrush	Krascheninnikovia lanata	0.56	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Blacktbrush	Larrea tridentata	0.56	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Blacktbrush	Opuntia sp.	1.12	0.28	0.28	0.28	0.14	0.14	0.14	0.14	2.1	1.12	0.3
Blacktbrush	Pinus monophylla	1.12	0.28	0.28	0.28	0.14	0.14	0.14	0.14	2.1	1.12	0.02
Blacktbrush	Purshia sp.	0.6	0.15	0.15	0.15	0.08	0.08	0.08	0.08	1.13	0.6	0.02
Blacktbrush	Yucca sp.	3.6	0.9	0.9	0.9	0.48	0.48	0.48	0.48	6.78	3.6	0.12
		43.36	10.84	10.84	10.84	5.62	5.62	5.62	5.62	81.5	43.36	4.1
		43	11	11	11	6	6	6	6	82	43	4
Blacktbrush Grassland	Ambrosia dumosa	0.56	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Blacktbrush Grassland	Barren	1.68	0.42	0.42	0.42	0.21	0.21	0.21	0.21	3.15	1.68	0
Blacktbrush Grassland	Coleogyne ramosissima	16.2	4.05	4.05	4.05	2.16	2.16	2.16	2.16	30.51	16.2	0.54
Blacktbrush Grassland	Encelia sp.	0.56	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Blacktbrush Grassland	Ephedra sp.	2.24	0.56	0.56	0.56	0.28	0.28	0.28	0.28	4.2	2.24	0.6
Blacktbrush Grassland	Grasses	17.28	4.32	4.32	4.32	2.16	2.16	2.16	2.16	32.4	17.28	9.72
Blacktbrush Grassland	Gutierrezia sp.	1.12	0.28	0.28	0.28	0.14	0.14	0.14	0.14	2.1	1.12	0.3
Blacktbrush Grassland	Sphaeralcea sp.	0.56	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Blacktbrush Grassland	Yucca sp.	4.2	1.05	1.05	1.05	0.56	0.56	0.56	0.56	7.91	4.2	0.14
		44.4	11.1	11.1	11.1	5.72	5.72	5.72	5.72	83.42	44.4	11.75
		44	11	11	11	6	6	6	6	83	44	12
Bristlecone Pine	Abies concolor	21.6	5.4	5.4	5.4	2.7	2.7	2.7	2.7	40.5	21.6	0.18
Bristlecone Pine	Barren	3.92	0.98	0.98	0.98	0.49	0.49	0.49	0.49	7.35	3.92	0
Bristlecone Pine	Chrysothamnus sp.	0.56	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Bristlecone Pine	Pinus aristata	22.4	5.6	5.6	5.6	2.8	2.8	2.8	2.8	42	22.4	0.4
Bristlecone Pine	Pinus flexilis	10.08	2.52	2.52	2.52	1.26	1.26	1.26	1.26	18.9	10.08	0.18
Bristlecone Pine	Pinus ponderosa	8.96	2.24	2.24	2.24	1.12	1.12	1.12	1.12	16.8	8.96	0.16
Bristlecone Pine	Populus sp.	1.8	0.45	0.45	0.45	0.24	0.24	0.24	0.24	3.39	1.8	0.06
Bristlecone Pine	Ribes sp.	0.56	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
		69.88	17.47	17.47	17.47	8.75	8.75	8.75	8.75	131.04	69.88	1.28
		70	17	17	17	9	9	9	9	131	70	1
Creosote-Bursage	Ambrosia dumosa	9.52	2.38	2.38	2.38	1.19	1.19	1.19	1.19	17.85	9.52	2.55
Creosote-Bursage	Atriplex sp.	0.56	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Creosote-Bursage	Barren	4.48	1.12	1.12	1.12	0.56	0.56	0.56	0.56	8.4	4.48	0
Creosote-Bursage	Ephedra sp.	0.56	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Creosote-Bursage	Eriogonum sp.	0.56	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Creosote-Bursage	Grasses	2.88	0.72	0.72	0.72	0.36	0.36	0.36	0.36	5.4	2.88	1.62
Creosote-Bursage	Grayia spinosa	0	0	0	0	0	0	0	0	0	0	0
Creosote-Bursage	Krameria sp.	0.56	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Creosote-Bursage	Larrea tridentata	8.4	2.1	2.1	2.1	1.05	1.05	1.05	1.05	15.75	8.4	2.25
Creosote-Bursage	Lycium sp.	0.56	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Creosote-Bursage	Opuntia sp.	0.56	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
		28.64	7.16	7.16	7.16	3.58	3.58	3.58	3.58	53.7	28.64	7.32
		29	7	7	7	4	4	4	4	54	29	7

Weighted Rural Landuse Emission Factors
Based Upon Land Survey Results
Clark County, Nevada

Community Type	Botanical Name	Common Name	Family	%	BELD3 Source		Leaf Area Index	Dry Leaf Biomass	Winter Biomass Factor	Indicator Specific Leaf Weight	ISOP	MBO	APIN	BPIN	D3CAR	DLIM
Hopsage	Atriplex sp.	Saltbush	CHENOPODIACEAE	10	010 USGS_shrubgrass		0.3	35	0.05	0	32.5	0.9	21	5.4	2.7	1.4
Hopsage	Barren	Barren	~NA~	42	018 USGS_sprsbarren		0	21	0.21	0	0	3.36	12.6	0.42	0.42	0
Hopsage	Eriogonum sp.	Desert Trumpet	POLYGONACEAE	8	010 USGS_shrubgrass		0.24	28	0.04	0	26	0.72	16.8	4.32	2.16	1.12
Hopsage	Grasses	Grasses	~NA~	2	008 USGS_grassland		0	6	0.01	0	0.98	0.16	3.6	0.16	0.08	0.04
Hopsage	Grayia spinosa	Hopsage	CHENOPODIACEAE	16	010 USGS_shrubgrass	WEIGHTED	0.48	56	0.08	0	52	1.44	33.6	8.64	4.32	2.24
Hopsage	Larrea tridentata	Creosote	ZYGOPHYLLACEAE	16	010 USGS_shrubgrass		0.48	56	0.08	0	52	1.44	33.6	8.64	4.32	2.24
Hopsage	Opuntia sp.	Cacti	CACTACEAE	4	010 USGS_shrubgrass		0.12	14	0.02	0	13	0.36	8.4	2.16	1.08	0.56
Hopsage	Yucca sp.	Yucca	LILIACEAE	2	232 Yucca_Mojave		0.1	7.5	0.02	0	0.76	0	4.5	0.26	0.14	0.06
				100			1.72	223.5	0.51	0	177.24	8.38	134.1	30	15.22	7.66
							2	250	0.5	0	177	8	134	30	15	8
Lowland Riparian	Allenrolfea sp.	Pickelweed	CHENOPODIACEAE	5	010 USGS_shrubgrass		0.15	17.5	0.025	0	16.25	0.45	10.5	2.7	1.35	0.7
Lowland Riparian	Arctostaphylos uva-ursi	Manzanita	ERICACEAE	2	089 Madrone		0.1	7.5	0.02	0	0.76	0	4.5	0.26	0.14	0.06
Lowland Riparian	Artemisia sp.	Sage	ASTERACEAE	2	010 USGS_shrubgrass		0.06	7	0.01	0	6.5	0.18	4.2	1.08	0.54	0.28
Lowland Riparian	Barren	Barren	~NA~	9	018 USGS_sprsbarren		0	4.5	0.045	0	0	0.72	2.7	0.09	0.09	0
Lowland Riparian	Cercis sp.	Redbud	FABACEAE	1	231 Yellowwood		0.05	3.75	0	0.01	0.38	0	2.25	0.13	0.07	0.03
Lowland Riparian	Chrysothamnus sp.	Rabbitbrush	ASTERACEAE	1	010 USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Lowland Riparian	Cytisus scoparius	Scotchbroom	FABACEAE	1	010 USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Lowland Riparian	Encelia farinosa	Brittlebush	ASTERACEAE	5	010 USGS_shrubgrass		0.15	17.5	0.025	0	16.25	0.45	10.5	2.7	1.35	0.7
Lowland Riparian	Eriodictyon angustifolium	Yerba Santa	HYDROPHYLLACEAE	1	010 USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Lowland Riparian	Fraxinus velutina	Velvet Ash	OLEACEAE	9	043 Ash		0.45	33.75	0	0.09	3.42	0	20.25	0.63	0.27	0.09
Lowland Riparian	Garrya flavescens	Silktassel	GARRYACEAE	3	010 USGS_shrubgrass		0.09	10.5	0.015	0	9.75	0.27	6.3	1.62	0.81	0.42
Lowland Riparian	Grasses	Grasses	~NA~	1	008 USGS_grassland		0	3	0.005	0	0.49	0.08	1.8	0.08	0.04	0.02
Lowland Riparian	H2O	Water	~NA~	2	016 USGS_water		0	0	0	0	0	0	0	0	0	0
Lowland Riparian	Phragmites sp.	Rushes	POACEAE	2	008 USGS_grassland		0	6	0.01	0	0.98	0.16	3.6	0.16	0.08	0.04
Lowland Riparian	Pinus ponderosa	Ponderosa Pine	PINACEAE	4	183 Pine_ponderosa		0.12	28	0.04	0	2.8	525	16.8	16.08	24.68	30.6
Lowland Riparian	Populus fremontii	Cottonwood	SALICACEAE	3	198 Populus		0.15	11.25	0	0.03	787.5	0	6.75	0.33	0.06	0
Lowland Riparian	Quercus turbinella	Scrub Live Oak	FAGACEAE	11	142 Oak_scrub		0.55	41.25	0	0.11	2887.5	0	24.75	2.53	0.44	0
Lowland Riparian	Rhamnus californica	Coffeeberry	RHAMNACEAE	1	050 Cascara_buckthorn		0.05	3.75	0	0.01	0.38	0	2.25	0.13	0.07	0.03
Lowland Riparian	Rhus trilobata	Squawbush	ANACARDIACEAE	1	010 USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Lowland Riparian	Salix sp.	Desert Willow	SALICACEAE	1	229 Willow		0.05	3.75	0	0	262.5	0	2.25	0.04	0	0
Lowland Riparian	Senecio sp.	Groundsel	ASTERACEAE	1	010 USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Lowland Riparian	Solidago sp.	Goldenrod	ASTERACEAE	1	010 USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Lowland Riparian	Tamarix pentandra	Salt Cedar	TAMARICACEAE	32	222 Tamarix		0.96	120	0.32	0	22.4	0	72	4.16	2.24	0.96
Lowland Riparian	Vitis arizonica	Canyon Grape	VITACEAE	1	010 USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
				100			3.14	343.5	0.55	0.25	4040.61	527.94	206.1	36.5	34.12	34.91
							3	350	0.5	0	4041	528	206	37	34	35
Mesquite	Ambrosia dumosa	Bursage	ASTERACEAE	8	010 USGS_shrubgrass		0.24	28	0.04	0	26	0.72	16.8	4.32	2.16	1.12
Mesquite	Atriplex sp.	Saltbush	CHENOPODIACEAE	21	010 USGS_shrubgrass		0.63	73.5	0.105	0	68.25	1.89	44.1	11.34	5.67	2.94
Mesquite	Barren	Barren	~NA~	29	018 USGS_sprsbarren		0	14.5	0.145	0	0	2.32	8.7	0.29	0.29	0
Mesquite	Ephedra sp.	Mormon Tea	EPHEDRACEAE	1	010 USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Mesquite	Larrea tridentata	Creosote	ZYGOPHYLLACEAE	9	010 USGS_shrubgrass		0.27	31.5	0.045	0	29.25	0.81	18.9	4.86	2.43	1.26
Mesquite	Prosopsis glandulosa	Honey Mesquite	FABACEAE	19	105 Mesquite		0.95	71.25	0	0	7.22	0	42.75	2.47	1.33	0.57
Mesquite	Sarcobatus sp.	Greasewood	CHENOPODIACEAE	13	010 USGS_shrubgrass		0.39	45.5	0.065	0	42.25	1.17	27.3	7.02	3.51	1.82
				100			2.51	267.75	0.405	0	176.22	7	160.65	30.84	15.66	7.85
							3	300	0.5	0	176	7	161	31	16	8
Mixed Mountain Scrub	Arctostaphylos sp.	Manzanita	ERICACEAE	6	089 Madrone		0.3	22.5	0.06	0	2.28	0	13.5	0.78	0.42	0.18
Mixed Mountain Scrub	Artemisia sp.	Sage	ASTERACEAE	9	010 USGS_shrubgrass		0.27	31.5	0.045	0	29.25	0.81	18.9	4.86	2.43	1.26
Mixed Mountain Scrub	Barren	Barren	~NA~	11	018 USGS_sprsbarren		0	5.5	0.055	0	0	0.88	3.3	0.11	0.11	0
Mixed Mountain Scrub	Cercocarpus sp.	Mahogany	ROSACEAE	24	091 Mahogany		1.2	90	0.24	0	9.12	0	54	3.12	1.68	0.72
Mixed Mountain Scrub	Chrysothamnus sp.	Rabbitbrush	ASTERACEAE	2	010 USGS_shrubgrass		0.06	7	0.01	0	6.5	0.18	4.2	1.08	0.54	0.28
Mixed Mountain Scrub	Grasses	Grasses	~NA~	4	008 USGS_grassland		0	12	0.02	0	1.96	0.32	7.2	0.32	0.16	0.08
Mixed Mountain Scrub	Pinus monophylla	Pinyon Pine	PINACEAE	5	178 Pine_pinyon		0.15	35	0.05	0	3.5	0	21	37.05	18.55	9.25
Mixed Mountain Scrub	Pinus ponderosa	Ponderosa Pine	PINACEAE	1	183 Pine_ponderosa		0.03	7	0.01	0	0.7	131.25	4.2	4.02	6.17	7.65
Mixed Mountain Scrub	Quercus sp.	Oak	FAGACAEA	37	129 Oak_Gambel		1.85	138.75	0	0.37	9712.5	0	83.25	8.51	1.48	0
Mixed Mountain Scrub	Symphoricarpos sp.	Snowberry	CAPRIFOLIACEAE	1	010 USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
				100			3.89	352.75	0.495	0.37	9769.06	133.53	211.65	60.39	31.81	19.56
							4	353	0.5	0	9769	134	212	60	32	20

Weighted Rural Landuse Emission Factors
Based Upon Land Survey Results
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Community Type	Botanical Name	CAMPH	MYRC	ATERP	BPHE	SABI	PCYM	OCIM	ATHU	TRPO	GTERP	METH	ETHE	PROPE	ETHO	ACET	HEXA	HEXE
Hopsage	Atriplex sp.	1.4	1.4	1.4	0	0	0	0	0	0	0	0	3.2	3.2	3.2	3.2	1.4	5.6
Hopsage	Barren	0	0	0	0	0	0	0	0	0	0	0	2.1	2.1	2.1	2.1	0.84	3.36
Hopsage	Eriogonum sp.	1.12	1.12	1.12	0	0	0	0	0	0	0	0	2.56	2.56	2.56	2.56	1.12	4.48
Hopsage	Grasses	0.04	0.04	0.04	0	0	0	0	0	0	0	0	0.54	0.54	0.54	0.54	0.24	0.96
Hopsage	Grayia spinosa	2.24	2.24	2.24	0	0	0	0	0	0	0	0	5.12	5.12	5.12	5.12	2.24	8.96
Hopsage	Larrea tridentata	2.24	2.24	2.24	0	0	0	0	0	0	0	0	5.12	5.12	5.12	5.12	2.24	8.96
Hopsage	Opuntia sp.	0.56	0.56	0.56	0	0	0	0	0	0	0	0	1.28	1.28	1.28	1.28	0.56	2.24
Hopsage	Yucca sp.	0.06	0.06	0.06	0	0	0	0	0	0	0	0	0.68	0.68	0.68	0.68	0.3	1.2
		7.66	7.66	7.66	0	0	0	0	0	0	0	0	20.6	20.6	20.6	20.6	8.94	35.76
		8	8	8	0	0	0	0	0	0	0	0	21	21	21	21	9	36
Lowland Riparian	Allenrolfea sp.	0.7	0.7	0.7	0	0	0	0	0	0	0	0	1.6	1.6	1.6	1.6	0.7	2.8
Lowland Riparian	Arctostaphylos uva-ursi	0.06	0.06	0.06	0	0	0	0	0	0	0	0	0.68	0.68	0.68	0.68	0.3	1.2
Lowland Riparian	Artemisia sp.	0.28	0.28	0.28	0	0	0	0	0	0	0	0	0.64	0.64	0.64	0.64	0.28	1.12
Lowland Riparian	Barren	0	0	0	0	0	0	0	0	0	0	0	0.45	0.45	0.45	0.45	0.18	0.72
Lowland Riparian	Cercis sp.	0.03	0.03	0.03	0	0	0	0	0	0	0	0	0.34	0.34	0.34	0.34	0.15	0.6
Lowland Riparian	Chrysothamnus sp.	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56
Lowland Riparian	Cytisus scoparius	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56
Lowland Riparian	Encelia farinosa	0.7	0.7	0.7	0	0	0	0	0	0	0	0	1.6	1.6	1.6	1.6	0.7	2.8
Lowland Riparian	Eriodictyon angustifolium	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56
Lowland Riparian	Fraxinus velutina	0	0	0.63	0	1.35	0	0	0	0	0	0	3.06	3.06	3.06	3.06	1.35	5.4
Lowland Riparian	Garrya flavescens	0.42	0.42	0.42	0	0	0	0	0	0	0	0	0.96	0.96	0.96	0.96	0.42	1.68
Lowland Riparian	Grasses	0.02	0.02	0.02	0	0	0	0	0	0	0	0	0.27	0.27	0.27	0.27	0.12	0.48
Lowland Riparian	H2O	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lowland Riparian	Phragmites sp.	0.04	0.04	0.04	0	0	0	0	0	0	0	0	0.54	0.54	0.54	0.54	0.24	0.96
Lowland Riparian	Pinus ponderosa	1.04	0	1.32	0.08	0	0.28	0	0	0	0	0	2.52	2.52	2.52	2.52	1.12	4.48
Lowland Riparian	Populus fremontii	0.27	0.18	0.03	0	0	0	0.12	0	0	0	0	1.02	1.02	1.02	1.02	0.45	1.8
Lowland Riparian	Quercus turbinella	0.99	0.55	0	0	0	0	0.77	1.1	0	0.88	0	3.74	3.74	3.74	3.74	1.65	6.6
Lowland Riparian	Rhamnus californica	0.03	0.03	0.03	0	0	0	0	0	0	0	0	0.34	0.34	0.34	0.34	0.15	0.6
Lowland Riparian	Rhus trilobata	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56
Lowland Riparian	Salix sp.	0.07	0	0	0	0	0	0.06	0.16	0	0	0	0.34	0.34	0.34	0.34	0.15	0.6
Lowland Riparian	Senecio sp.	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56
Lowland Riparian	Solidago sp.	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56
Lowland Riparian	Tamarix pentandra	0.96	0.96	0.96	0	0	0	0	0	0	0	0	10.88	10.88	10.88	10.88	4.8	19.2
Lowland Riparian	Vitis arizonica	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56
		6.59	4.95	6.2	0.08	1.35	0.28	0.95	1.26	0	0.88	0	31.22	31.22	31.22	31.22	13.74	54.96
		7	5	6	0	1	0	1	1	0	1	0	31	31	31	31	14	55
Mesquite	Ambrosia dumosa	1.12	1.12	1.12	0	0	0	0	0	0	0	0	2.56	2.56	2.56	2.56	1.12	4.48
Mesquite	Atriplex sp.	2.94	2.94	2.94	0	0	0	0	0	0	0	0	6.72	6.72	6.72	6.72	2.94	11.76
Mesquite	Barren	0	0	0	0	0	0	0	0	0	0	0	1.45	1.45	1.45	1.45	0.58	2.32
Mesquite	Ephedra sp.	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56
Mesquite	Larrea tridentata	1.26	1.26	1.26	0	0	0	0	0	0	0	0	2.88	2.88	2.88	2.88	1.26	5.04
Mesquite	Prosopsis glandulosa	0.57	0.57	0.57	0	0	0	0	0	0	0	0	6.46	6.46	6.46	6.46	2.85	11.4
Mesquite	Sarcobatus sp.	1.82	1.82	1.82	0	0	0	0	0	0	0	0	4.16	4.16	4.16	4.16	1.82	7.28
		7.85	7.85	7.85	0	0	0	0	0	0	0	0	24.55	24.55	24.55	24.55	10.71	42.84
		8	8	8	0	0	0	0	0	0	0	0	25	25	25	25	11	43
Mixed Mountain Scrub	Arctostaphylos sp.	0.18	0.18	0.18	0	0	0	0	0	0	0	0	2.04	2.04	2.04	2.04	0.9	3.6
Mixed Mountain Scrub	Artemisia sp.	1.26	1.26	1.26	0	0	0	0	0	0	0	0	2.88	2.88	2.88	2.88	1.26	5.04
Mixed Mountain Scrub	Barren	0	0	0	0	0	0	0	0	0	0	0	0.55	0.55	0.55	0.55	0.22	0.88
Mixed Mountain Scrub	Cercocarpus sp.	0.72	0.72	0.72	0	0	0	0	0	0	0	0	8.16	8.16	8.16	8.16	3.6	14.4
Mixed Mountain Scrub	Chrysothamnus sp.	0.28	0.28	0.28	0	0	0	0	0	0	0	0	0.64	0.64	0.64	0.64	0.28	1.12
Mixed Mountain Scrub	Grasses	0.08	0.08	0.08	0	0	0	0	0	0	0	0	1.08	1.08	1.08	1.08	0.48	1.92
Mixed Mountain Scrub	Pinus monophylla	9.25	9.25	9.25	0	0	0	0	0	0	0	0	3.15	3.15	3.15	3.15	1.4	5.6
Mixed Mountain Scrub	Pinus ponderosa	0.26	0	0.33	0.02	0	0.07	0	0	0	0	0	0.63	0.63	0.63	0.63	0.28	1.12
Mixed Mountain Scrub	Quercus sp.	3.33	1.85	0	0	0	0	2.59	3.7	0	2.96	0	12.58	12.58	12.58	12.58	5.55	22.2
Mixed Mountain Scrub	Symphoricarpos sp.	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56
		15.5	13.76	12.24	0.02	0	0.07	2.59	3.7	0	2.96	0	32.03	32.03	32.03	32.03	14.11	56.44
		16	14	12	0	0	0	3	4	0	3	0	32	32	32	32	14	56

Weighted Rural Landuse Emission Factors
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Clark County, Nevada

Community Type	Botanical Name	HEXY	FORM	ACTAL	BUTE	ETHA	FORAC	ACTAC	BUTO	CO	ORVOC	NO
Hopsage	Atriplex sp.	5.6	1.4	1.4	1.4	0.7	0.7	0.7	0.7	10.5	5.6	1.5
Hopsage	Barren	3.36	0.84	0.84	0.84	0.42	0.42	0.42	0.42	6.3	3.36	0
Hopsage	Eriogonum sp.	4.48	1.12	1.12	1.12	0.56	0.56	0.56	0.56	8.4	4.48	1.2
Hopsage	Grasses	0.96	0.24	0.24	0.24	0.12	0.12	0.12	0.12	1.8	0.96	0.54
Hopsage	Grayia spinosa	8.96	2.24	2.24	2.24	1.12	1.12	1.12	1.12	16.8	8.96	2.4
Hopsage	Larrea tridentata	8.96	2.24	2.24	2.24	1.12	1.12	1.12	1.12	16.8	8.96	2.4
Hopsage	Opuntia sp.	2.24	0.56	0.56	0.56	0.28	0.28	0.28	0.28	4.2	2.24	0.6
Hopsage	Yucca sp.	1.2	0.3	0.3	0.3	0.16	0.16	0.16	0.16	2.26	1.2	0.04
		35.76	8.94	8.94	8.94	4.48	4.48	4.48	4.48	67.06	35.76	8.68
		36	9	9	9	4	4	4	4	67	36	9
Lowland Riparian	Allenrolfea sp.	2.8	0.7	0.7	0.7	0.35	0.35	0.35	0.35	5.25	2.8	0.75
Lowland Riparian	Arctostaphylos uva-ursi	1.2	0.3	0.3	0.3	0.16	0.16	0.16	0.16	2.26	1.2	0.04
Lowland Riparian	Artemisia sp.	1.12	0.28	0.28	0.28	0.14	0.14	0.14	0.14	2.1	1.12	0.3
Lowland Riparian	Barren	0.72	0.18	0.18	0.18	0.09	0.09	0.09	0.09	1.35	0.72	0
Lowland Riparian	Cercis sp.	0.6	0.15	0.15	0.15	0.08	0.08	0.08	0.08	1.13	0.6	0.02
Lowland Riparian	Chrysothamnus sp.	0.56	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Lowland Riparian	Cytisus scoparius	0.56	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Lowland Riparian	Encelia farinosa	2.8	0.7	0.7	0.7	0.35	0.35	0.35	0.35	5.25	2.8	0.75
Lowland Riparian	Eriodictyon angustifolium	0.56	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Lowland Riparian	Fraxinus velutina	5.4	1.35	1.35	1.35	0.72	0.72	0.72	0.72	10.17	5.4	0.18
Lowland Riparian	Garrya flavescens	1.68	0.42	0.42	0.42	0.21	0.21	0.21	0.21	3.15	1.68	0.45
Lowland Riparian	Grasses	0.48	0.12	0.12	0.12	0.06	0.06	0.06	0.06	0.9	0.48	0.27
Lowland Riparian	H2O	0	0	0	0	0	0	0	0	0	0	0
Lowland Riparian	Phragmites sp.	0.96	0.24	0.24	0.24	0.12	0.12	0.12	0.12	1.8	0.96	0.54
Lowland Riparian	Pinus ponderosa	4.48	1.12	1.12	1.12	0.56	0.56	0.56	0.56	8.4	4.48	0.08
Lowland Riparian	Populus fremontii	1.8	0.45	0.45	0.45	0.24	0.24	0.24	0.24	3.39	1.8	0.06
Lowland Riparian	Quercus turbinella	6.6	1.65	1.65	1.65	0.88	0.88	0.88	0.88	12.43	6.6	0.22
Lowland Riparian	Rhamnus californica	0.6	0.15	0.15	0.15	0.08	0.08	0.08	0.08	1.13	0.6	0.02
Lowland Riparian	Rhus trilobata	0.56	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Lowland Riparian	Salix sp.	0.6	0.15	0.15	0.15	0.08	0.08	0.08	0.08	1.13	0.6	0.02
Lowland Riparian	Senecio sp.	0.56	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Lowland Riparian	Solidago sp.	0.56	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Lowland Riparian	Tamarix pentandra	19.2	4.8	4.8	4.8	2.56	2.56	2.56	2.56	36.16	19.2	0.64
Lowland Riparian	Vitis arizonica	0.56	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
		54.96	13.74	13.74	13.74	7.17	7.17	7.17	7.17	103.35	54.96	5.39
		55	14	14	14	7	7	7	7	103	55	5
Mesquite	Ambrosia dumosa	4.48	1.12	1.12	1.12	0.56	0.56	0.56	0.56	8.4	4.48	1.2
Mesquite	Atriplex sp.	11.76	2.94	2.94	2.94	1.47	1.47	1.47	1.47	22.05	11.76	3.15
Mesquite	Barren	2.32	0.58	0.58	0.58	0.29	0.29	0.29	0.29	4.35	2.32	0
Mesquite	Ephedra sp.	0.56	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Mesquite	Larrea tridentata	5.04	1.26	1.26	1.26	0.63	0.63	0.63	0.63	9.45	5.04	1.35
Mesquite	Prosopsis glandulosa	11.4	2.85	2.85	2.85	1.52	1.52	1.52	1.52	21.47	11.4	0.38
Mesquite	Sarcobatus sp.	7.28	1.82	1.82	1.82	0.91	0.91	0.91	0.91	13.65	7.28	1.95
		42.84	10.71	10.71	10.71	5.45	5.45	5.45	5.45	80.42	42.84	6.18
		43	11	11	11	5	5	5	5	80	43	8
Mixed Mountain Scrub	Arctostaphylos sp.	3.6	0.9	0.9	0.9	0.48	0.48	0.48	0.48	6.78	3.6	0.12
Mixed Mountain Scrub	Artemisia sp.	5.04	1.26	1.26	1.26	0.63	0.63	0.63	0.63	9.45	5.04	1.35
Mixed Mountain Scrub	Barren	0.88	0.22	0.22	0.22	0.11	0.11	0.11	0.11	1.65	0.88	0
Mixed Mountain Scrub	Cercocarpus sp.	14.4	3.6	3.6	3.6	1.92	1.92	1.92	1.92	27.12	14.4	0.48
Mixed Mountain Scrub	Chrysothamnus sp.	1.12	0.28	0.28	0.28	0.14	0.14	0.14	0.14	2.1	1.12	0.3
Mixed Mountain Scrub	Grasses	1.92	0.48	0.48	0.48	0.24	0.24	0.24	0.24	3.6	1.92	1.08
Mixed Mountain Scrub	Pinus monophylla	5.6	1.4	1.4	1.4	0.7	0.7	0.7	0.7	10.5	5.6	0.1
Mixed Mountain Scrub	Pinus ponderosa	1.12	0.28	0.28	0.28	0.14	0.14	0.14	0.14	2.1	1.12	0.02
Mixed Mountain Scrub	Quercus sp.	22.2	5.55	5.55	5.55	2.96	2.96	2.96	2.96	41.81	22.2	0.74
Mixed Mountain Scrub	Symphoricarpos sp.	0.56	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
		56.44	14.11	14.11	14.11	7.39	7.39	7.39	7.39	106.16	56.44	4.34
		56	14	14	14	7	7	7	7	106	56	4

Weighted Rural Landuse Emission Factors
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Clark County, Nevada

Community Type	Botanical Name	Common Name	Family	%	BELD3 Source		Leaf Area Index	Dry Leaf Biomass	Winter Biomass Factor	Indicator Specific Leaf Weight	ISOP	MBO	APIN	BPIN	D3CAR	DLIM
Mojave Mixed Scrub	Acacia greggii	Catclaw	FABACEAE		1 039 Acacia		0.05	7	0	0.01	0.7	0	4.2	16.23	1.32	0
Mojave Mixed Scrub	Ambrosia dumosa	Bursage	ASTERACEAE		1 010 USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Mojave Mixed Scrub	Amsinckia sp.	Fiddleneck	BORAGINACEAE		1 010 USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Mojave Mixed Scrub	Atriplex sp.	Saltbush	CHENOPODIACEAE		8 010 USGS_shrubgrass		0.24	28	0.04	0	26	0.72	16.8	4.32	2.16	1.12
Mojave Mixed Scrub	Barren	Barren	~NA~		37 018 USGS_sprsbarren		0	18.5	0.185	0	0	2.96	11.1	0.37	0.37	0
Mojave Mixed Scrub	Encelia farinosa	Brittlebush	ASTERACEAE		5 010 USGS_shrubgrass		0.15	17.5	0.025	0	16.25	0.45	10.5	2.7	1.35	0.7
Mojave Mixed Scrub	Ephedra sp.	Mormon Tea	EPHEDRACEAE		3 010 USGS_shrubgrass		0.09	10.5	0.015	0	9.75	0.27	6.3	1.62	0.81	0.42
Mojave Mixed Scrub	Eriogonum inflatum	Desert Trumpet	POLYGONACEAE		2 010 USGS_shrubgrass		0.06	7	0.01	0	6.5	0.18	4.2	1.08	0.54	0.28
Mojave Mixed Scrub	Eurotia lanata	Winterfat	CHENOPODIACEAE		2 010 USGS_shrubgrass		0.06	7	0.01	0	6.5	0.18	4.2	1.08	0.54	0.28
Mojave Mixed Scrub	Grasses	Grasses	~NA~		11 008 USGS_grassland		0	33	0.055	0	5.39	0.88	19.8	0.88	0.44	0.22
Mojave Mixed Scrub	Grayia spinosa	Hopsage	CHENOPODIACEAE		2 010 USGS_shrubgrass		0.06	7	0.01	0	6.5	0.18	4.2	1.08	0.54	0.28
Mojave Mixed Scrub	Gutierrezia sarothrae	Snakeweed	ASTERACEAE		2 010 USGS_shrubgrass		0.06	7	0.01	0	6.5	0.18	4.2	1.08	0.54	0.28
Mojave Mixed Scrub	Juniperus sp.	Juniper	CUPRESSACEAE		1 085 Juniper		0.07	7	0.01	0	0.7	0	4.2	1.23	0	2.47
Mojave Mixed Scrub	Krameria sp.	Littleleaf Ratany	KRAMERIACEAE		5 010 USGS_shrubgrass		0.15	17.5	0.025	0	16.25	0.45	10.5	2.7	1.35	0.7
Mojave Mixed Scrub	Krascheninnikovia lanata	Winterfat	CHENOPODIACEAE		1 010 USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Mojave Mixed Scrub	Larrea tridentata	Creosote	ZYGOPHYLLACEAE		12 010 USGS_shrubgrass		0.36	42	0.06	0	39	1.08	25.2	6.48	3.24	1.68
Mojave Mixed Scrub	Lycium pallidum	Wolfberry	SOLANACEAE		1 010 USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Mojave Mixed Scrub	Opuntia sp.	Cacti	CACTACEAE		1 010 USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Mojave Mixed Scrub	Salvia dorrii	Purple Sage	LAMIACEAE		1 010 USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Mojave Mixed Scrub	Sarcobatus vermiculatus	Greasewood	CHENOPODIACEAE		1 010 USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Mojave Mixed Scrub	Sphaeralcea sp.	Globemallow	MALVACEAE		1 010 USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Mojave Mixed Scrub	Yucca sp.	Yucca	LILIACEAE		1 232 Yucca_Mojave	WEIGHTED	0.05	3.75	0.01	0	0.38	0	2.25	0.13	0.07	0.03
				100			1.64	240.75	0.505	0.01	166.42	0.25	144.45	45.3	15.43	9.58
							2	250	0.5	0	166	8	144	45	15	10
Pinyon Pine	Artemisia sp.	Sage	ASTERACEAE		5 010 USGS_shrubgrass		0.15	17.5	0.025	0	16.25	0.45	10.5	2.7	1.35	0.7
Pinyon Pine	Barren	Barren	~NA~		23 018 USGS_sprsbarren		0	11.5	0.115	0	0	1.84	6.9	0.23	0.23	0
Pinyon Pine	Cercocarpus sp.	Mahogany	ROSACEAE		15 091 Mahogany		0.75	56.25	0.15	0	5.7	0	33.75	1.95	1.05	0.45
Pinyon Pine	Grasses	Grasses	~NA~		1 008 USGS_grassland		0	3	0.005	0	0.49	0.08	1.8	0.08	0.04	0.02
Pinyon Pine	Juniperus sp.	Juniper	CUPRESSACEAE		17 085 Juniper		1.19	119	0.17	0	11.9	0	71.4	20.91	0	41.99
Pinyon Pine	Opuntia sp.	Cacti	CACTACEAE		0 010 USGS_shrubgrass		0	0	0	0	0	0	0	0	0	0
Pinyon Pine	Persia sp.	Cliffrose	ROSACEAE		6 042 Apple		0	3	0.03	0	2.28	0	13.5	0.78	0.42	0.18
Pinyon Pine	Pinus monophylla	Pinyon Pine	PINACEAE		33 178 Pine_pinyon	WEIGHTED	0.99	231	0.33	0	23.1	0	138.6	244.53	122.43	61.05
				100			3.08	441.25	0.825	0	59.72	2.37	276.45	271.18	125.52	104.39
							3	450	1	0	60	2	276	271	126	104
Pinyon Pine & Juniper	Amelanchier sp.	Serviceberry	ROSACEAE		2 204 Serviceberry		0.1	7.5	0	0.02	0.76	0	4.5	0.26	0.14	0.06
Pinyon Pine & Juniper	Artemisia sp.	Sage	ASTERACEAE		9 010 USGS_shrubgrass		0.27	31.5	0.045	0	29.25	0.81	18.9	4.86	2.43	1.26
Pinyon Pine & Juniper	Atriplex sp.	Saltbush	CHENOPODIACEAE		1 010 USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Pinyon Pine & Juniper	Barren	Barren	~NA~		30 018 USGS_sprsbarren		0	15	0.15	0	0	2.4	9	0.3	0.3	0
Pinyon Pine & Juniper	Cercocarpus sp.	Mahogany	ROSACEAE		3 091 Mahogany		0.15	11.25	0.03	0	1.14	0	6.75	0.39	0.21	0.09
Pinyon Pine & Juniper	Coleogyne ramosissima	Blackbrush	ROSACEAE		7 010 USGS_shrubgrass		0.21	24.5	0.035	0	22.75	0.63	14.7	3.78	1.89	0.98
Pinyon Pine & Juniper	Ephedra sp.	Mormon Tea	EPHEDRACEAE		1 010 USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Pinyon Pine & Juniper	Juniperus sp.	Juniper	CUPRESSACEAE		19 085 Juniper		1.33	133	0.19	0	13.3	0	79.8	23.37	0	46.93
Pinyon Pine & Juniper	Opuntia sp.	Cacti	CACTACEAE		2 010 USGS_shrubgrass		0.06	7	0.01	0	6.5	0.18	4.2	1.08	0.54	0.28
Pinyon Pine & Juniper	Persia sp.	Cliffrose	ROSACEAE		4 042 Apple		0	2	0.02	0	1.52	0	9	0.52	0.28	0.12
Pinyon Pine & Juniper	Pinus monophylla	Pinyon Pine	PINACEAE		21 178 Pine_pinyon		0.63	147	0.21	0	14.7	0	88.2	155.61	77.91	38.85
Pinyon Pine & Juniper	Symphoricarpos sp.	Snowberry	CAPRIFOLIACEAE		1 010 USGS_shrubgrass	WEIGHTED	0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
				100			2.84	389.25	0.705	0.02	99.67	4.29	241.35	191.79	84.51	88.99
							3	400	1	0	100	4	241	192	85	89

Weighted Rural Landuse Emission Factors
Based Upon Land Survey Results
Clark County, Nevada

Community Type	Botanical Name	CAMPH	MYRC	ATERP	BPHE	SABI	PCYM	OCIM	ATHU	TRPO	GTERP	METH	ETHE	PROPE	ETHO	ACET	HEXA	HEXE
Mojave Mixed Scrub	Acacia greggii	0.63	0	0.33	0	0	0	0	0	0	0	0	0.63	0.63	0.63	0.63	0.28	1.12
Mojave Mixed Scrub	Ambrosia dumosa	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56
Mojave Mixed Scrub	Amsinckia sp.	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56
Mojave Mixed Scrub	Atriplex sp.	1.12	1.12	1.12	0	0	0	0	0	0	0	0	2.56	2.56	2.56	2.56	1.12	4.48
Mojave Mixed Scrub	Barren	0	0	0	0	0	0	0	0	0	0	0	1.85	1.85	1.85	1.85	0.74	2.96
Mojave Mixed Scrub	Encelia farinosa	0.7	0.7	0.7	0	0	0	0	0	0	0	0	1.6	1.6	1.6	1.6	0.7	2.8
Mojave Mixed Scrub	Ephedra sp.	0.42	0.42	0.42	0	0	0	0	0	0	0	0	0.96	0.96	0.96	0.96	0.42	1.68
Mojave Mixed Scrub	Eriogonum inflatum	0.28	0.28	0.28	0	0	0	0	0	0	0	0	0.64	0.64	0.64	0.64	0.28	1.12
Mojave Mixed Scrub	Eurotia lanata	0.28	0.28	0.28	0	0	0	0	0	0	0	0	0.64	0.64	0.64	0.64	0.28	1.12
Mojave Mixed Scrub	Grasses	0.22	0.22	0.22	0	0	0	0	0	0	0	0	2.97	2.97	2.97	2.97	1.32	5.28
Mojave Mixed Scrub	Grayia spinosa	0.28	0.28	0.28	0	0	0	0	0	0	0	0	0.64	0.64	0.64	0.64	0.28	1.12
Mojave Mixed Scrub	Gutierrezia sarothrae	0.28	0.28	0.28	0	0	0	0	0	0	0	0	0.64	0.64	0.64	0.64	0.28	1.12
Mojave Mixed Scrub	Juniperus sp.	0	0	0	0	0	0	0	0	0	0	0	0.63	0.63	0.63	0.63	0.28	1.12
Mojave Mixed Scrub	Krameria sp.	0.7	0.7	0.7	0	0	0	0	0	0	0	0	1.6	1.6	1.6	1.6	0.7	2.8
Mojave Mixed Scrub	Krascheninnikovia lanata	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56
Mojave Mixed Scrub	Larrea tridentata	1.68	1.68	1.68	0	0	0	0	0	0	0	0	3.84	3.84	3.84	3.84	1.68	6.72
Mojave Mixed Scrub	Lycium pallidum	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56
Mojave Mixed Scrub	Opuntia sp.	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56
Mojave Mixed Scrub	Salvia dorrii	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56
Mojave Mixed Scrub	Sarcobatus vermiculatus	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56
Mojave Mixed Scrub	Sphaeralcea sp.	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56
Mojave Mixed Scrub	Yucca sp.	0.03	0.03	0.03	0	0	0	0	0	0	0	0	0.34	0.34	0.34	0.34	0.15	0.6
		7.74	7.11	7.44	0	0	0	0	0	0	0	0	22.1	22.1	22.1	22.1	9.63	38.52
		8	7	7	0	0	0	0	0	0	0	0	22	22	22	22	10	39
Pinyon Pine	Artemisia sp.	0.7	0.7	0.7	0	0	0	0	0	0	0	0	1.6	1.6	1.6	1.6	0.7	2.8
Pinyon Pine	Barren	0	0	0	0	0	0	0	0	0	0	0	1.15	1.15	1.15	1.15	0.46	1.84
Pinyon Pine	Cercocarpus sp.	0.45	0.45	0.45	0	0	0	0	0	0	0	0	5.1	5.1	5.1	5.1	2.25	9
Pinyon Pine	Grasses	0.02	0.02	0.02	0	0	0	0	0	0	0	0	0.27	0.27	0.27	0.27	0.12	0.48
Pinyon Pine	Juniperus sp.	0	0	0	0	0	0	0	0	0	0	0	10.71	10.71	10.71	10.71	4.76	19.04
Pinyon Pine	Opuntia sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pinyon Pine	Persia sp.	0.18	0.18	0.18	0	0	0	0	0	0	0	0	2.04	2.04	2.04	2.04	0.9	3.6
Pinyon Pine	Pinus monophylla	61.05	61.05	61.05	0	0	0	0	0	0	0	0	20.79	20.79	20.79	20.79	9.24	36.96
		62.4	62.4	62.4	0	0	0	0	0	0	0	0	41.66	41.66	41.66	41.66	18.43	73.72
		62	62	62	0	0	0	0	0	0	0	0	42	42	42	42	18	74
Pinyon Pine & Juniper	Amelanchier sp.	0.06	0.06	0.06	0	0	0	0	0	0	0	0	0.68	0.68	0.68	0.68	0.3	1.2
Pinyon Pine & Juniper	Artemisia sp.	1.26	1.26	1.26	0	0	0	0	0	0	0	0	2.88	2.88	2.88	2.88	1.26	5.04
Pinyon Pine & Juniper	Atriplex sp.	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56
Pinyon Pine & Juniper	Barren	0	0	0	0	0	0	0	0	0	0	0	1.5	1.5	1.5	1.5	0.6	2.4
Pinyon Pine & Juniper	Cercocarpus sp.	0.09	0.09	0.09	0	0	0	0	0	0	0	0	1.02	1.02	1.02	1.02	0.45	1.8
Pinyon Pine & Juniper	Coleogyne ramosissima	0.98	0.98	0.98	0	0	0	0	0	0	0	0	2.24	2.24	2.24	2.24	0.98	3.92
Pinyon Pine & Juniper	Ephedra sp.	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56
Pinyon Pine & Juniper	Juniperus sp.	0	0	0	0	0	0	0	0	0	0	0	11.97	11.97	11.97	11.97	5.32	21.28
Pinyon Pine & Juniper	Opuntia sp.	0.28	0.28	0.28	0	0	0	0	0	0	0	0	0.64	0.64	0.64	0.64	0.28	1.12
Pinyon Pine & Juniper	Persia sp.	0.12	0.12	0.12	0	0	0	0	0	0	0	0	1.36	1.36	1.36	1.36	0.6	2.4
Pinyon Pine & Juniper	Pinus monophylla	38.85	38.85	38.85	0	0	0	0	0	0	0	0	13.23	13.23	13.23	13.23	5.88	23.52
Pinyon Pine & Juniper	Symphoricarpos sp.	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56
		42.06	42.06	42.06	0	0	0	0	0	0	0	0	36.48	36.48	36.48	36.48	16.09	64.36
		42	42	42	0	0	0	0	0	0	0	0	36	36	36	36	16	64

Weighted Rural Landuse Emission Factors
Based Upon Land Survey Results
Clark County, Nevada

Community Type	Botanical Name	HEXY	FORM	ACTAL	BUTE	ETHA	FORAC	ACTAC	BUTO	CO	ORVOC	NO
Mojave Mixed Scrub	Acacia greggii	1.12	0.28	0.28	0.28	0.14	0.14	0.14	0.14	2.1	1.12	0.02
Mojave Mixed Scrub	Ambrosia dumosa	0.56	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Mojave Mixed Scrub	Amsinckia sp.	0.56	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Mojave Mixed Scrub	Atriplex sp.	4.48	1.12	1.12	1.12	0.56	0.56	0.56	0.56	8.4	4.48	1.2
Mojave Mixed Scrub	Barren	2.96	0.74	0.74	0.74	0.37	0.37	0.37	0.37	5.55	2.96	0
Mojave Mixed Scrub	Encelia farinosa	2.8	0.7	0.7	0.7	0.35	0.35	0.35	0.35	5.25	2.8	0.75
Mojave Mixed Scrub	Ephedra sp.	1.68	0.42	0.42	0.42	0.21	0.21	0.21	0.21	3.15	1.68	0.45
Mojave Mixed Scrub	Eriogonum inflatum	1.12	0.28	0.28	0.28	0.14	0.14	0.14	0.14	2.1	1.12	0.3
Mojave Mixed Scrub	Eurotia lanata	1.12	0.28	0.28	0.28	0.14	0.14	0.14	0.14	2.1	1.12	0.3
Mojave Mixed Scrub	Grasses	5.28	1.32	1.32	1.32	0.66	0.66	0.66	0.66	9.9	5.28	2.97
Mojave Mixed Scrub	Grayia spinosa	1.12	0.28	0.28	0.28	0.14	0.14	0.14	0.14	2.1	1.12	0.3
Mojave Mixed Scrub	Gutierrezia sarothrae	1.12	0.28	0.28	0.28	0.14	0.14	0.14	0.14	2.1	1.12	0.3
Mojave Mixed Scrub	Juniperus sp.	1.12	0.28	0.28	0.28	0.14	0.14	0.14	0.14	2.1	1.12	0.02
Mojave Mixed Scrub	Krameria sp.	2.8	0.7	0.7	0.7	0.35	0.35	0.35	0.35	5.25	2.8	0.75
Mojave Mixed Scrub	Krascheninnikovia lanata	0.56	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Mojave Mixed Scrub	Larrea tridentata	6.72	1.68	1.68	1.68	0.84	0.84	0.84	0.84	12.6	6.72	1.8
Mojave Mixed Scrub	Lycium pallidum	0.56	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Mojave Mixed Scrub	Opuntia sp.	0.56	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Mojave Mixed Scrub	Salvia dorrii	0.56	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Mojave Mixed Scrub	Sarcobatus vermiculatus	0.56	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Mojave Mixed Scrub	Sphaeralcea sp.	0.56	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Mojave Mixed Scrub	Yucca sp.	0.6	0.15	0.15	0.15	0.08	0.08	0.08	0.08	1.13	0.6	0.02
		38.52	9.63	9.63	9.63	4.82	4.82	4.82	4.82	72.23	38.52	10.38
		39	10	10	10	5	5	5	5	72	39	10
Pinyon Pine	Artemisia sp.	2.8	0.7	0.7	0.7	0.35	0.35	0.35	0.35	5.25	2.8	0.75
Pinyon Pine	Barren	1.84	0.46	0.46	0.46	0.23	0.23	0.23	0.23	3.45	1.84	0
Pinyon Pine	Cercocarpus sp.	9	2.25	2.25	2.25	1.2	1.2	1.2	1.2	16.95	9	0.3
Pinyon Pine	Grasses	0.48	0.12	0.12	0.12	0.06	0.06	0.06	0.06	0.9	0.48	0.27
Pinyon Pine	Juniperus sp.	19.04	4.76	4.76	4.76	2.38	2.38	2.38	2.38	35.7	19.04	0.34
Pinyon Pine	Opuntia sp.	0	0	0	0	0	0	0	0	0	0	0
Pinyon Pine	Persia sp.	3.6	0.9	0.9	0.9	0.48	0.48	0.48	0.48	6.78	3.6	0.12
Pinyon Pine	Pinus monophylla	36.96	9.24	9.24	9.24	4.62	4.62	4.62	4.62	69.3	36.96	0.66
		73.72	18.43	18.43	18.43	9.32	9.32	9.32	9.32	138.33	73.72	2.44
		74	18	18	18	9	9	9	9	138	74	2
Pinyon Pine & Juniper	Amelanchier sp.	1.2	0.3	0.3	0.3	0.16	0.16	0.16	0.16	2.26	1.2	0.04
Pinyon Pine & Juniper	Artemisia sp.	5.04	1.26	1.26	1.26	0.63	0.63	0.63	0.63	9.45	5.04	1.35
Pinyon Pine & Juniper	Atriplex sp.	0.56	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Pinyon Pine & Juniper	Barren	2.4	0.6	0.6	0.6	0.3	0.3	0.3	0.3	4.5	2.4	0
Pinyon Pine & Juniper	Cercocarpus sp.	1.8	0.45	0.45	0.45	0.24	0.24	0.24	0.24	3.39	1.8	0.06
Pinyon Pine & Juniper	Coleogyne ramosissima	3.92	0.98	0.98	0.98	0.49	0.49	0.49	0.49	7.35	3.92	1.05
Pinyon Pine & Juniper	Ephedra sp.	0.56	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Pinyon Pine & Juniper	Juniperus sp.	21.28	5.32	5.32	5.32	2.66	2.66	2.66	2.66	39.9	21.28	0.38
Pinyon Pine & Juniper	Opuntia sp.	1.12	0.28	0.28	0.28	0.14	0.14	0.14	0.14	2.1	1.12	0.3
Pinyon Pine & Juniper	Persia sp.	2.4	0.6	0.6	0.6	0.32	0.32	0.32	0.32	4.52	2.4	0.08
Pinyon Pine & Juniper	Pinus monophylla	23.52	5.88	5.88	5.88	2.94	2.94	2.94	2.94	44.1	23.52	0.42
Pinyon Pine & Juniper	Symphoricarpos sp.	0.56	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
		64.36	16.09	16.09	16.09	8.09	8.09	8.09	8.09	120.72	64.36	4.13
		64	16	16	16	8	8	8	8	121	64	4

Weighted Rural Landuse Emission Factors
Based Upon Land Survey Results
Clark County, Nevada

Community Type	Botanical Name	Common Name	Family	%	BELD3 Source		Leaf Area Index	Dry Leaf Biomass	Winter Biomass Factor	Indicator Specific Leaf Weight	ISOP	MBO	APIN	BPIN	D3CAR	DLIM
Pinyon-Juniper Grassland	Arctostaphylos uva-ursi	Manzanita	ERICACEAE		15 089 Madrone		0.75	56.25	0.15	0	5.7	0	33.75	1.95	1.05	0.45
Pinyon-Juniper Grassland	Artemisia sp.	Sage	ASTERACEAE		6 010 USGS_shrubgrass		0.18	21	0.03	0	19.5	0.54	12.6	3.24	1.62	0.84
Pinyon-Juniper Grassland	Barren	Barren	~NA~		28 018 USGS_sprsbarren		0	14	0.14	0	0	2.24	8.4	0.28	0.28	0
Pinyon-Juniper Grassland	Cercocarpus sp.	Mountain Mahogany	ROSACEAE		16 091 Mahogany		0.8	60	0.16	0	6.08	0	36	2.08	1.12	0.48
Pinyon-Juniper Grassland	Ephedra sp.	Mormon Tea	EPHEDRACEAE		2 010 USGS_shrubgrass		0.06	7	0.01	0	6.5	0.18	4.2	1.08	0.54	0.28
Pinyon-Juniper Grassland	Juniperus sp.	Juniper	CUPRESSACEAE		1 085 Juniper		0.07	7	0.01	0	0.7	0	4.2	1.23	0	2.47
Pinyon-Juniper Grassland	Pinus aristata	Bristlecone Pine	PINACEAE		10 164 Pine_brstlcone		0.3	70	0.1	0	7	0	42	185.3	0	0
Pinyon-Juniper Grassland	Pinus flexilis	Limber Pine	PINACEAE		3 173 Pine_limber		0.09	21	0.03	0	2.1	0	12.6	55.59	0	0
Pinyon-Juniper Grassland	Pinus monophylla	Pinyon Pine	PINACEAE		6 178 Pine_pinyon		0.18	42	0.06	0	4.2	0	25.2	44.46	22.26	11.1
Pinyon-Juniper Grassland	Purshia sp.	Cliffrose	ROSACEAE		10 042 Apple		0	5	0.05	0	3.8	0	22.5	1.3	0.7	0.3
Pinyon-Juniper Grassland	Ribes sp.	Gooseberry	SAXIFRAGACEAE		3 010 USGS_shrubgrass	WEIGHTED	0.09	10.5	0.015	0	9.75	0.27	6.3	1.62	0.81	0.42
				100			2.52	313.75	0.755	0	65.33	3.23	207.75	298.13	28.38	16.34
							3	350	1	0	65	3	208	298	28	16
Playa	Atriplex sp.	Saltbush	CHENOPODIACEAE		3 010 USGS_shrubgrass		0.09	10.5	0.015	0	9.75	0.27	6.3	1.62	0.81	0.42
Playa	Barren	Barren	~NA~		97 018 USGS_sprsbarren	W	0	48.5	0.485	0	0	7.76	29.1	0.97	0.97	0
				100			0.09	59	0.5	0	9.75	8.03	35.4	2.59	1.78	0.42
							0	100	0.5	0	10	8	35	3	2	0
Ponderosa Pine	Abies concolor	White Fir	PINACEAE		11 076 Fir_white		0.77	165	0.11	0	16.5	0	99	145.42	152.9	0
Ponderosa Pine	Artemisia sp.	Sage	ASTERACEAE		1 010 USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Ponderosa Pine	Barren	Barren	~NA~		20 018 USGS_sprsbarren		0	10	0.1	0	0	1.6	6	0.2	0.2	0
Ponderosa Pine	Grasses	Grasses	~NA~		1 008 USGS_grassland		0	3	0.005	0	0.49	0.08	1.8	0.08	0.04	0.02
Ponderosa Pine	Pinus ponderosa	Ponderosa Pine	PINACEAE		51 183 Pine_ponderosa		1.53	357	0.51	0	35.7	6693.75	214.2	205.02	314.67	390.15
Ponderosa Pine	Ribes sp.	Gooseberry	SAXIFRAGACEAE		3 010 USGS_shrubgrass		0.09	10.5	0.015	0	9.75	0.27	6.3	1.62	0.81	0.42
Ponderosa Pine	Symphoricarpos sp.	Snowberry	CAPRIFOLIACEAE		13 010 USGS_shrubgrass	WEIGHTED	0.39	45.5	0.065	0	42.25	1.17	27.3	7.02	3.51	1.82
				100			2.81	594.5	0.81	0	107.94	6696.96	356.7	359.9	472.4	392.55
							3	595	1	0	108	6697	357	360	472	393
Ponderosa Pine - Mountain Scrub	Abies concolor	White Fir	PINACEAE		3 076 Fir_white		0.21	45	0.03	0	4.5	0	27	39.66	41.7	0
Ponderosa Pine - Mountain Scrub	Artemisia sp.	Sage	ASTERACEAE		12 010 USGS_shrubgrass		0.36	42	0.06	0	39	1.08	25.2	6.48	3.24	1.68
Ponderosa Pine - Mountain Scrub	Barren	Barren	~NA~		12 018 USGS_sprsbarren		0	6	0.06	0	0	0.96	3.6	0.12	0.12	0
Ponderosa Pine - Mountain Scrub	Cercocarpus sp.	Mountain Mahogany	ROSACEAE		36 091 Mahogany		1.8	135	0.36	0	13.68	0	81	4.68	2.52	1.08
Ponderosa Pine - Mountain Scrub	Chrysothamnus sp.	Rabbitbrush	ASTERACEAE		6 010 USGS_shrubgrass		0.18	21	0.03	0	19.5	0.54	12.6	3.24	1.62	0.84
Ponderosa Pine - Mountain Scrub	Juniperus sp.	Juniper	CUPRESSACEAE		9 085 Juniper		0.63	63	0.09	0	6.3	0	37.8	11.07	0	22.23
Ponderosa Pine - Mountain Scrub	Pinus aristata	Bristlecone Pine	PINACEAE		1 164 Pine_brstlcone		0.03	7	0.01	0	0.7	0	4.2	18.53	0	0
Ponderosa Pine - Mountain Scrub	Pinus monophylla	Pinyon Pine	PINACEAE		6 178 Pine_pinyon		0.18	42	0.06	0	4.2	0	25.2	44.46	22.26	11.1
Ponderosa Pine - Mountain Scrub	Pinus ponderosa	Ponderosa Pine	PINACEAE		8 183 Pine_ponderosa		0.24	56	0.08	0	5.6	1050	33.6	32.16	49.36	61.2
Ponderosa Pine - Mountain Scrub	Ribes sp.	Gooseberry	SAXIFRAGACEAE		2 010 USGS_shrubgrass		0.06	7	0.01	0	6.5	0.18	4.2	1.08	0.54	0.28
Ponderosa Pine - Mountain Scrub	Symphoricarpos sp.	Snowberry	CAPRIFOLIACEAE		5 010 USGS_shrubgrass	WEIGHTED	0.15	17.5	0.025	0	16.25	0.45	10.5	2.7	1.35	0.7
				100			3.84	441.5	0.815	0	116.23	1053.21	264.9	164.18	122.71	99.11
							4	450	1	0	116	1053	265	164	123	99
Sagebrush	Artemisia sp.	Sage	ASTERACEAE		32 010 USGS_shrubgrass		0.96	112	0.16	0	104	2.88	67.2	17.28	8.64	4.48
Sagebrush	Atriplex sp.	Saltbush	CHENOPODIACEAE		10 010 USGS_shrubgrass		0.3	35	0.05	0	32.5	0.9	21	5.4	2.7	1.4
Sagebrush	Barren	Barren	~NA~		19 018 USGS_sprsbarren		0	9.5	0.095	0	0	1.52	5.7	0.19	0.19	0
Sagebrush	Chrysothamnus sp.	Rabbitbrush	ASTERACEAE		3 010 USGS_shrubgrass		0.09	10.5	0.015	0	9.75	0.27	6.3	1.62	0.81	0.42
Sagebrush	Coleogyne ramosissima	Blackbrush	ROSACEAE		5 042 Apple		0	2.5	0.025	0	1.9	0	11.25	0.65	0.35	0.15
Sagebrush	Ephedra sp.	Mormon Tea	EPHEDRACEAE		3 010 USGS_shrubgrass		0.09	10.5	0.015	0	9.75	0.27	6.3	1.62	0.81	0.42
Sagebrush	Eriogonum sp.	Desert Trumpet	POLYGONACEAE		1 010 USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Sagebrush	Fallugia paradoxa	Apache Rose	ROSACEAE		1 042 Apple		0	0.5	0.005	0	0.38	0	2.25	0.13	0.07	0.03
Sagebrush	Grasses	Grasses	~NA~		2 008 USGS_grassland		0	6	0.01	0	0.98	0.16	3.6	0.16	0.08	0.04
Sagebrush	Gutierrezia sp.	Snakeweed	ASTERACEAE		1 010 USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Sagebrush	Juniperus sp.	Juniper	CUPRESSACEAE		7 085 Juniper		0.49	49	0.07	0	4.9	0	29.4	8.61	0	17.29
Sagebrush	Penstemon sp.	Beardtongue	SCHROPHULARIACEAE		1 010 USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Sagebrush	Persia sp.	Cliffrose	ROSACEAE		1 042 Apple		0	0.5	0.005	0	0.38	0	2.25	0.13	0.07	0.03
Sagebrush	Pinus monophylla	Pinyon Pine	PINACEAE		9 178 Pine_pinyon		0.27	63	0.09	0	6.3	0	37.8	66.69	33.39	16.65
Sagebrush	Salvia mohavensis	Purple Sage	LAMIACEAE		2 010 USGS_shrubgrass		0.06	7	0.01	0	6.5	0.18	4.2	1.08	0.54	0.28
Sagebrush	Suaeda sp.	Mojave Seablight	CHENOPODIACEAE		1 010 USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Sagebrush	Thamnosma montana	Turpentine Broom	RUTACEAE		1 010 USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Sagebrush	Yucca sp.	Yucca	LILIACEAE		1 232 Yucca_Mojave	WEIGHTED	0.05	3.75	0.01	0	0.38	0	2.25	0.13	0.07	0.03
				100			2.46	327.25	0.585	0	193.97	6.63	210	106.39	49.07	41.92
							2	350	0.5	0	194	7	210	106	49	42

Weighted Rural Landuse Emission Factors
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Clark County, Nevada

Community Type	Botanical Name	CAMPH	MYRC	ATERP	BPHE	SABI	PCYM	OCIM	ATHU	TRPO	GTERP	METH	ETHE	PROPE	ETHO	ACET	HEXA	HEXE
Pinyon-Juniper Grassland	Arctostaphylos uva-ursi	0.45	0.45	0.45	0	0	0	0	0	0	0	0	5.1	5.1	5.1	5.1	2.25	9
Pinyon-Juniper Grassland	Artemisia sp.	0.84	0.84	0.84	0	0	0	0	0	0	0	0	1.92	1.92	1.92	1.92	0.84	3.36
Pinyon-Juniper Grassland	Barren	0	0	0	0	0	0	0	0	0	0	0	1.4	1.4	1.4	1.4	0.56	2.24
Pinyon-Juniper Grassland	Cercocarpus sp.	0.48	0.48	0.48	0	0	0	0	0	0	0	0	5.44	5.44	5.44	5.44	2.4	9.6
Pinyon-Juniper Grassland	Ephedra sp.	0.28	0.28	0.28	0	0	0	0	0	0	0	0	0.64	0.64	0.64	0.64	0.28	1.12
Pinyon-Juniper Grassland	Juniperus sp.	0	0	0	0	0	0	0	0	0	0	0	0.63	0.63	0.63	0.63	0.28	1.12
Pinyon-Juniper Grassland	Pinus aristata	0	0	0	0	0	0	0	0	0	0	0	6.3	6.3	6.3	6.3	2.8	11.2
Pinyon-Juniper Grassland	Pinus flexilis	0	0	0	0	0	0	0	0	0	0	0	1.89	1.89	1.89	1.89	0.84	3.36
Pinyon-Juniper Grassland	Pinus monophylla	11.1	11.1	11.1	0	0	0	0	0	0	0	0	3.78	3.78	3.78	3.78	1.68	6.72
Pinyon-Juniper Grassland	Purshia sp.	0.3	0.3	0.3	0	0	0	0	0	0	0	0	3.4	3.4	3.4	3.4	1.5	6
Pinyon-Juniper Grassland	Ribes sp.	0.42	0.42	0.42	0	0	0	0	0	0	0	0	0.96	0.96	0.96	0.96	0.42	1.68
		13.87	13.87	13.87	0	0	0	0	0	0	0	0	31.46	31.46	31.46	31.46	13.85	55.4
		14	14	14	0	0	0	0	0	0	0	0	31	31	31	31	14	55
Playa	Atriplex sp.	0.42	0.42	0.42	0	0	0	0	0	0	0	0	0.96	0.96	0.96	0.96	0.42	1.68
Playa	Barren	0	0	0	0	0	0	0	0	0	0	0	4.85	4.85	4.85	4.85	1.94	7.76
		0.42	0.42	0.42	0	0	0	0	0	0	0	0	5.81	5.81	5.81	5.81	2.36	9.44
		0	0	0	0	0	0	0	0	0	0	0	6	6	6	6	2	9
Ponderosa Pine	Abies concolor	27.06	26.18	18.37	0	8.69	43.67	0	0	0	12.65	1.76	14.85	14.85	14.85	14.85	6.6	26.4
Ponderosa Pine	Artemisia sp.	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56
Ponderosa Pine	Barren	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0.4	1.6
Ponderosa Pine	Grasses	0.02	0.02	0.02	0	0	0	0	0	0	0	0	0.27	0.27	0.27	0.27	0.12	0.48
Ponderosa Pine	Pinus ponderosa	13.26	0	16.83	1.02	0	3.57	0	0	0	0	0	32.13	32.13	32.13	32.13	14.28	57.12
Ponderosa Pine	Ribes sp.	0.42	0.42	0.42	0	0	0	0	0	0	0	0	0.96	0.96	0.96	0.96	0.42	1.68
Ponderosa Pine	Symphoricarpos sp.	1.82	1.82	1.82	0	0	0	0	0	0	0	0	4.16	4.16	4.16	4.16	1.82	7.28
		42.72	28.58	37.6	1.02	8.69	47.24	0	0	0	12.65	1.76	53.69	53.69	53.69	53.69	23.78	95.12
		43	29	38	1	9	47	0	0	0	13	2	54	54	54	54	24	95
Ponderosa Pine - Mountain Scrub	Abies concolor	7.38	7.14	5.01	0	2.37	11.91	0	0	0	3.45	0.48	4.05	4.05	4.05	4.05	1.8	7.2
Ponderosa Pine - Mountain Scrub	Artemisia sp.	1.68	1.68	1.68	0	0	0	0	0	0	0	0	3.84	3.84	3.84	3.84	1.68	6.72
Ponderosa Pine - Mountain Scrub	Barren	0	0	0	0	0	0	0	0	0	0	0	0.6	0.6	0.6	0.6	0.24	0.96
Ponderosa Pine - Mountain Scrub	Cercocarpus sp.	1.08	1.08	1.08	0	0	0	0	0	0	0	0	12.24	12.24	12.24	12.24	5.4	21.6
Ponderosa Pine - Mountain Scrub	Chrysothamnus sp.	0.84	0.84	0.84	0	0	0	0	0	0	0	0	1.92	1.92	1.92	1.92	0.84	3.36
Ponderosa Pine - Mountain Scrub	Juniperus sp.	0	0	0	0	0	0	0	0	0	0	0	5.67	5.67	5.67	5.67	2.52	10.08
Ponderosa Pine - Mountain Scrub	Pinus aristata	0	0	0	0	0	0	0	0	0	0	0	0.63	0.63	0.63	0.63	0.28	1.12
Ponderosa Pine - Mountain Scrub	Pinus monophylla	11.1	11.1	11.1	0	0	0	0	0	0	0	0	3.78	3.78	3.78	3.78	1.68	6.72
Ponderosa Pine - Mountain Scrub	Pinus ponderosa	2.08	0	2.64	0.16	0	0.56	0	0	0	0	0	5.04	5.04	5.04	5.04	2.24	8.96
Ponderosa Pine - Mountain Scrub	Ribes sp.	0.28	0.28	0.28	0	0	0	0	0	0	0	0	0.64	0.64	0.64	0.64	0.28	1.12
Ponderosa Pine - Mountain Scrub	Symphoricarpos sp.	0.7	0.7	0.7	0	0	0	0	0	0	0	0	1.6	1.6	1.6	1.6	0.7	2.8
		25.14	22.82	23.33	0.16	2.37	12.47	0	0	0	3.45	0.48	40.01	40.01	40.01	40.01	17.66	70.64
		25	23	23	0	2	12	0	0	0	3	0	40	40	40	40	18	71
Sagebrush	Artemisia sp.	4.48	4.48	4.48	0	0	0	0	0	0	0	0	10.24	10.24	10.24	10.24	4.48	17.92
Sagebrush	Atriplex sp.	1.4	1.4	1.4	0	0	0	0	0	0	0	0	3.2	3.2	3.2	3.2	1.4	5.6
Sagebrush	Barren	0	0	0	0	0	0	0	0	0	0	0	0.95	0.95	0.95	0.95	0.38	1.52
Sagebrush	Chrysothamnus sp.	0.42	0.42	0.42	0	0	0	0	0	0	0	0	0.96	0.96	0.96	0.96	0.42	1.68
Sagebrush	Coleogyne ramosissima	0.15	0.15	0.15	0	0	0	0	0	0	0	0	1.7	1.7	1.7	1.7	0.75	3
Sagebrush	Ephedra sp.	0.42	0.42	0.42	0	0	0	0	0	0	0	0	0.96	0.96	0.96	0.96	0.42	1.68
Sagebrush	Eriogonum sp.	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56
Sagebrush	Fallugia paradoxa	0.03	0.03	0.03	0	0	0	0	0	0	0	0	0.34	0.34	0.34	0.34	0.15	0.6
Sagebrush	Grasses	0.04	0.04	0.04	0	0	0	0	0	0	0	0	0.54	0.54	0.54	0.54	0.24	0.96
Sagebrush	Gutierrezia sp.	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56
Sagebrush	Juniperus sp.	0	0	0	0	0	0	0	0	0	0	0	4.41	4.41	4.41	4.41	1.96	7.84
Sagebrush	Penstemon sp.	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56
Sagebrush	Persia sp.	0.03	0.03	0.03	0	0	0	0	0	0	0	0	0.34	0.34	0.34	0.34	0.15	0.6
Sagebrush	Pinus monophylla	16.65	16.65	16.65	0	0	0	0	0	0	0	0	5.67	5.67	5.67	5.67	2.52	10.08
Sagebrush	Salvia mohavensis	0.28	0.28	0.28	0	0	0	0	0	0	0	0	0.64	0.64	0.64	0.64	0.28	1.12
Sagebrush	Suaeda sp.	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56
Sagebrush	Thamnosma montana	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56
Sagebrush	Yucca sp.	0.03	0.03	0.03	0	0	0	0	0	0	0	0	0.34	0.34	0.34	0.34	0.15	0.6
		24.63	24.63	24.63	0	0	0	0	0	0	0	0	31.89	31.89	31.89	31.89	14	56
		25	25	25	0	0	0	0	0	0	0	0	32	32	32	32	14	56

Weighted Rural Landuse Emission Factors
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Community Type	Botanical Name	HEXY	FORM	ACTAL	BUTE	ETHA	FORAC	ACTAC	BUTO	CO	ORVOC	NO
Pinyon-Juniper Grassland	Arctostaphylos uva-ursi	9	2.25	2.25	2.25	1.2	1.2	1.2	1.2	16.95	9	0.3
Pinyon-Juniper Grassland	Artemisia sp.	3.36	0.84	0.84	0.84	0.42	0.42	0.42	0.42	6.3	3.36	0.9
Pinyon-Juniper Grassland	Barren	2.24	0.56	0.56	0.56	0.28	0.28	0.28	0.28	4.2	2.24	0
Pinyon-Juniper Grassland	Cercocarpus sp.	9.6	2.4	2.4	2.4	1.28	1.28	1.28	1.28	18.08	9.6	0.32
Pinyon-Juniper Grassland	Ephedra sp.	1.12	0.28	0.28	0.28	0.14	0.14	0.14	0.14	2.1	1.12	0.3
Pinyon-Juniper Grassland	Juniperus sp.	1.12	0.28	0.28	0.28	0.14	0.14	0.14	0.14	2.1	1.12	0.02
Pinyon-Juniper Grassland	Pinus aristata	11.2	2.8	2.8	2.8	1.4	1.4	1.4	1.4	21	11.2	0.2
Pinyon-Juniper Grassland	Pinus flexilis	3.36	0.84	0.84	0.84	0.42	0.42	0.42	0.42	6.3	3.36	0.06
Pinyon-Juniper Grassland	Pinus monophylla	6.72	1.68	1.68	1.68	0.84	0.84	0.84	0.84	12.6	6.72	0.12
Pinyon-Juniper Grassland	Purshia sp.	6	1.5	1.5	1.5	0.8	0.8	0.8	0.8	11.3	6	0.2
Pinyon-Juniper Grassland	Ribes sp.	1.68	0.42	0.42	0.42	0.21	0.21	0.21	0.21	3.15	1.68	0.45
		55.4	13.85	13.85	13.85	7.13	7.13	7.13	7.13	104.08	55.4	2.87
		55	14	14	14	7	7	7	7	104	55	3
Playa	Atriplex sp.	1.68	0.42	0.42	0.42	0.21	0.21	0.21	0.21	3.15	1.68	0.45
Playa	Barren	7.76	1.94	1.94	1.94	0.97	0.97	0.97	0.97	14.55	7.76	0
		9.44	2.36	2.36	2.36	1.18	1.18	1.18	1.18	17.7	9.44	0.45
		9	2	2	2	1	1	1	1	18	9	0
Ponderosa Pine	Abies concolor	26.4	6.6	6.6	6.6	3.3	3.3	3.3	3.3	49.5	26.4	0.22
Ponderosa Pine	Artemisia sp.	0.56	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Ponderosa Pine	Barren	1.6	0.4	0.4	0.4	0.2	0.2	0.2	0.2	3	1.6	0
Ponderosa Pine	Grasses	0.48	0.12	0.12	0.12	0.06	0.06	0.06	0.06	0.9	0.48	0.27
Ponderosa Pine	Pinus ponderosa	57.12	14.28	14.28	14.28	7.14	7.14	7.14	7.14	107.1	57.12	1.02
Ponderosa Pine	Ribes sp.	1.68	0.42	0.42	0.42	0.21	0.21	0.21	0.21	3.15	1.68	0.45
Ponderosa Pine	Symphoricarpos sp.	7.28	1.82	1.82	1.82	0.91	0.91	0.91	0.91	13.65	7.28	1.95
		95.12	23.78	23.78	23.78	11.89	11.89	11.89	11.89	178.35	95.12	4.06
		95	24	24	24	12	12	12	12	178	95	4
Ponderosa Pine - Mountain Scrub	Abies concolor	7.2	1.8	1.8	1.8	0.9	0.9	0.9	0.9	13.5	7.2	0.06
Ponderosa Pine - Mountain Scrub	Artemisia sp.	6.72	1.68	1.68	1.68	0.84	0.84	0.84	0.84	12.6	6.72	1.8
Ponderosa Pine - Mountain Scrub	Barren	0.96	0.24	0.24	0.24	0.12	0.12	0.12	0.12	1.8	0.96	0
Ponderosa Pine - Mountain Scrub	Cercocarpus sp.	21.6	5.4	5.4	5.4	2.88	2.88	2.88	2.88	40.68	21.6	0.72
Ponderosa Pine - Mountain Scrub	Chrysothamnus sp.	3.36	0.84	0.84	0.84	0.42	0.42	0.42	0.42	6.3	3.36	0.9
Ponderosa Pine - Mountain Scrub	Juniperus sp.	10.08	2.52	2.52	2.52	1.26	1.26	1.26	1.26	18.9	10.08	0.18
Ponderosa Pine - Mountain Scrub	Pinus aristata	1.12	0.28	0.28	0.28	0.14	0.14	0.14	0.14	2.1	1.12	0.02
Ponderosa Pine - Mountain Scrub	Pinus monophylla	6.72	1.68	1.68	1.68	0.84	0.84	0.84	0.84	12.6	6.72	0.12
Ponderosa Pine - Mountain Scrub	Pinus ponderosa	8.96	2.24	2.24	2.24	1.12	1.12	1.12	1.12	16.8	8.96	0.16
Ponderosa Pine - Mountain Scrub	Ribes sp.	1.12	0.28	0.28	0.28	0.14	0.14	0.14	0.14	2.1	1.12	0.3
Ponderosa Pine - Mountain Scrub	Symphoricarpos sp.	2.8	0.7	0.7	0.7	0.35	0.35	0.35	0.35	5.25	2.8	0.75
		70.64	17.66	17.66	17.66	9.01	9.01	9.01	9.01	132.63	70.64	5.01
		71	18	18	18	9	9	9	9	133	71	5
Sagebrush	Artemisia sp.	17.92	4.48	4.48	4.48	2.24	2.24	2.24	2.24	33.6	17.92	4.8
Sagebrush	Atriplex sp.	5.6	1.4	1.4	1.4	0.7	0.7	0.7	0.7	10.5	5.6	1.5
Sagebrush	Barren	1.52	0.38	0.38	0.38	0.19	0.19	0.19	0.19	2.85	1.52	0
Sagebrush	Chrysothamnus sp.	1.68	0.42	0.42	0.42	0.21	0.21	0.21	0.21	3.15	1.68	0.45
Sagebrush	Coleogyne ramosissima	3	0.75	0.75	0.75	0.4	0.4	0.4	0.4	5.65	3	0.1
Sagebrush	Ephedra sp.	1.68	0.42	0.42	0.42	0.21	0.21	0.21	0.21	3.15	1.68	0.45
Sagebrush	Eriogonum sp.	0.56	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Sagebrush	Fallugia paradoxa	0.6	0.15	0.15	0.15	0.08	0.08	0.08	0.08	1.13	0.6	0.02
Sagebrush	Grasses	0.96	0.24	0.24	0.24	0.12	0.12	0.12	0.12	1.8	0.96	0.54
Sagebrush	Gutierrezia sp.	0.56	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Sagebrush	Juniperus sp.	7.84	1.96	1.96	1.96	0.98	0.98	0.98	0.98	14.7	7.84	0.14
Sagebrush	Penstemon sp.	0.56	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Sagebrush	Persia sp.	0.6	0.15	0.15	0.15	0.08	0.08	0.08	0.08	1.13	0.6	0.02
Sagebrush	Pinus monophylla	10.08	2.52	2.52	2.52	1.26	1.26	1.26	1.26	18.9	10.08	0.18
Sagebrush	Salvia mohavensis	1.12	0.28	0.28	0.28	0.14	0.14	0.14	0.14	2.1	1.12	0.3
Sagebrush	Suaeda sp.	0.56	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Sagebrush	Thamnosma montana	0.56	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Sagebrush	Yucca sp.	0.6	0.15	0.15	0.15	0.08	0.08	0.08	0.08	1.13	0.6	0.02
		56	14	14	14	7.04	7.04	7.04	7.04	105.04	56	9.27
		56	14	14	14	7	7	7	7	105	56	9

Weighted Rural Landuse Emission Factors
Based Upon Land Survey Results
Clark County, Nevada

Community Type	Botanical Name	Common Name	Family	%	BELD3 Source		Leaf Area Index	Dry Leaf Biomass	Winter Biomass Factor	Indicator Specific Leaf Weight	ISOP	MBO	APIN	BPIN	D3CAR	DLIM
Sagebrush Grasslanc	Arctostaphylos uva-ursi	Manzanita	ERICACEAE		1 089 Madrone		0.05	3.75	0.01	0	0.38	0	2.25	0.13	0.07	0.03
Sagebrush Grasslanc	Artemisia sp.	Sage	ASTERACEAE		11 010 USGS_shrubgrass		0.33	38.5	0.055	0	35.75	0.99	23.1	5.94	2.97	1.54
Sagebrush Grasslanc	Barren	Barren	~NA~		10 018 USGS_sprsbarren		0	5	0.05	0	0	0.8	3	0.1	0.1	0
Sagebrush Grasslanc	Cercocarpus sp.	Mountain Mahogany	ROSACEAE		5 091 Mahogany		0.25	18.75	0.05	0	1.9	0	11.25	0.65	0.35	0.15
Sagebrush Grasslanc	Chrysothamnus sp.	Rabbitbrush	ASTERACEAE		1 010 USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Sagebrush Grasslanc	Coleogyne ramosissima	Blackbrush	ROSACEAE		3 042 Apple		0	1.5	0.015	0	1.14	0	6.75	0.39	0.21	0.09
Sagebrush Grasslanc	Ephedra sp.	Mormon Tea	EPHEDRACEAE		2 010 USGS_shrubgrass		0.06	7	0.01	0	6.5	0.18	4.2	1.08	0.54	0.28
Sagebrush Grasslanc	Eriodictyon angustifolium	Yerba Santa	HYDROPHYLLACEAE		6 010 USGS_shrubgrass		0.18	21	0.03	0	19.5	0.54	12.6	3.24	1.62	0.84
Sagebrush Grasslanc	Eriogonum inflatum	Desert Trumpet	POLYGONACEAE		2 010 USGS_shrubgrass		0.06	7	0.01	0	6.5	0.18	4.2	1.08	0.54	0.28
Sagebrush Grasslanc	Eurotia lanata	Winterfat	CHENOPODIACEAE		1 010 USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Sagebrush Grasslanc	Garrya flavescens	Silktassel	GARRYACEAE		6 010 USGS_shrubgrass		0.18	21	0.03	0	19.5	0.54	12.6	3.24	1.62	0.84
Sagebrush Grasslanc	Grasses	Grasses	~NA~		31 008 USGS_grassland		0	93	0.155	0	15.19	2.48	55.8	2.48	1.24	0.62
Sagebrush Grasslanc	Gutierrezia sarothrae	Snakeweed	ASTERACEAE		2 010 USGS_shrubgrass		0.06	7	0.01	0	6.5	0.18	4.2	1.08	0.54	0.28
Sagebrush Grasslanc	Opuntia sp.	Cacti	CACTACEAE		4 010 USGS_shrubgrass		0.12	14	0.02	0	13	0.36	8.4	2.16	1.08	0.56
Sagebrush Grasslanc	Penstemon palmeri	Palmer's Penstemon	SCROPHULARIACEAE		1 010 USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Sagebrush Grasslanc	Quercus sp.	Scrub Live Oak	FAGACEAE		11 142 Oak_scrub	WEIGHTED	0.55	41.25	0	0.11	2887.5	0	24.75	2.53	0.44	0
Sagebrush Grasslanc	Rhus trilobata	Squawbush	ANACARDIACEAE		1 010 USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Sagebrush Grasslanc	Sphaeralcea ambigua	Globemallow	MALVACEAE		1 010 USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Sagebrush Grasslanc	Symphoricarpos sp.	Snowberry	CAPRIFOLIACEAE		1 010 USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
				100			2.02	299.75	0.475	0.11	3032.86	6.79	185.7	27.34	12.94	6.35
							2	300	0.5	0	3033	7	186	27	13	6
Salt Desert Scrub	Ambrosia dumosa	Bursage	ASTERACEAE		1 010 USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Salt Desert Scrub	Artemisia sp.	Sage	ASTERACEAE		1 010 USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Salt Desert Scrub	Atriplex sp.	Saltbush	CHENOPODIACEAE		18 010 USGS_shrubgrass		0.54	63	0.09	0	58.5	1.62	37.8	9.72	4.86	2.52
Salt Desert Scrub	Barren	Barren	~NA~		43 018 USGS_sprsbarren		0	21.5	0.215	0	0	3.44	12.9	0.43	0.43	0
Salt Desert Scrub	Chrysothamnus sp.	Rabbitbrush	ASTERACEAE		1 010 USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Salt Desert Scrub	Coleogyne ramosissima	Blackbrush	ROSACEAE		1 042 Apple		0	0.5	0.005	0	0.38	0	2.25	0.13	0.07	0.03
Salt Desert Scrub	Ephedra sp.	Mormon Tea	EPHEDRACEAE		4 010 USGS_shrubgrass		0.12	14	0.02	0	13	0.36	8.4	2.16	1.08	0.56
Salt Desert Scrub	Eriogonum sp.	Desert Trumpet	POLYGONACEAE		6 010 USGS_shrubgrass		0.18	21	0.03	0	19.5	0.54	12.6	3.24	1.62	0.84
Salt Desert Scrub	Grasses	Grasses	~NA~		10 008 USGS_grassland		0	30	0.05	0	4.9	0.8	18	0.8	0.4	0.2
Salt Desert Scrub	Grayia spinosa	Hopsage	CHENOPODIACEAE		2 010 USGS_shrubgrass		0.06	7	0.01	0	6.5	0.18	4.2	1.08	0.54	0.28
Salt Desert Scrub	Krameria sp.	Littleleaf Ratany	KRAMERIACEAE		1 010 USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Salt Desert Scrub	Larrea tridentata	Creosote	ZYGOPHYLLACEAE		2 010 USGS_shrubgrass		0.06	7	0.01	0	6.5	0.18	4.2	1.08	0.54	0.28
Salt Desert Scrub	Lycium pallidum	Wolfberry	SOLANACEAE		1 010 USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Salt Desert Scrub	Opuntia sp.	Cacti	CACTACEAE		1 010 USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Salt Desert Scrub	Potentilla sp.	Cinquefoil	ROSACEAE		1 042 Apple		0	0.5	0.005	0	0.38	0	2.25	0.13	0.07	0.03
Salt Desert Scrub	Sarcobatus sp.	Greasewood	CHENOPODIACEAE		1 010 USGS_shrubgrass	WEIGHTED	0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Salt Desert Scrub	Sphaeralcea sp.	Globemallow	MALVACEAE		1 010 USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Salt Desert Scrub	Suaeda sp.	Mojave Seablight	CHENOPODIACEAE		2 010 USGS_shrubgrass		0.06	7	0.01	0	6.5	0.18	4.2	1.08	0.54	0.28
Salt Desert Scrub	Yucca sp.	Yucca	LILIACEAE		3 232 Yucca_Mojave		0.15	11.25	0.03	0	1.14	0	6.75	0.39	0.21	0.09
				100			1.41	210.75	0.515	0	143.3	8.02	130.35	24.56	12.52	6.23
							1	250	0.5	0	143	8	130	25	13	6
White Fir	Abies concolor	White Fir	PINACEAE		42 076 Fir_white		2.94	630	0.42	0	63	0	378	555.24	583.8	0
White Fir	Barren	Barren	~NA~		20 018 USGS_sprsbarren		0	10	0.1	0	0	1.6	6	0.2	0.2	0
White Fir	Pinus aristata	Bristlecone Pine	PINACEAE		23 164 Pine_brstlcone		0.69	161	0.23	0	16.1	0	96.6	426.19	0	0
White Fir	Pinus flexilis	Limber Pine	PINACEAE		10 173 Pine_limber		0.3	70	0.1	0	7	0	42	185.3	0	0
White Fir	Ribes sp.	Gooseberry	SAXIFRAGACEAE		5 010 USGS_shrubgrass	WEIGHTED	0.15	17.5	0.025	0	16.25	0.45	10.5	2.7	1.35	0.7
				100			4.08	888.5	0.875	0	102.35	2.05	533.1	1169.63	585.35	0.7
							4	889	1	0	102	2	533	1170	585	1

Weighted Rural Landuse Emission Factors
Based Upon Land Survey Results
Clark County, Nevada

Community Type	Botanical Name	CAMPH	MYRC	ATERP	BPHE	SABI	PCYM	OCIM	ATHU	TRPO	GTERP	METH	ETHE	PROPE	ETHO	ACET	HEXA	HEXE
Sagebrush Grassland	Arctostaphylos uva-ursi	0.03	0.03	0.03	0	0	0	0	0	0	0	0	0.34	0.34	0.34	0.34	0.15	0.6
Sagebrush Grassland	Artemisia sp.	1.54	1.54	1.54	0	0	0	0	0	0	0	0	3.52	3.52	3.52	3.52	1.54	6.16
Sagebrush Grassland	Barren	0	0	0	0	0	0	0	0	0	0	0	0.5	0.5	0.5	0.5	0.2	0.8
Sagebrush Grassland	Cercocarpus sp.	0.15	0.15	0.15	0	0	0	0	0	0	0	0	1.7	1.7	1.7	1.7	0.75	3
Sagebrush Grassland	Chrysothamnus sp.	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56
Sagebrush Grassland	Coleogyne ramosissima	0.09	0.09	0.09	0	0	0	0	0	0	0	0	1.02	1.02	1.02	1.02	0.45	1.8
Sagebrush Grassland	Ephedra sp.	0.28	0.28	0.28	0	0	0	0	0	0	0	0	0.64	0.64	0.64	0.64	0.28	1.12
Sagebrush Grassland	Eriodictyon angustifolium	0.84	0.84	0.84	0	0	0	0	0	0	0	0	1.92	1.92	1.92	1.92	0.84	3.36
Sagebrush Grassland	Eriogonum inflatum	0.28	0.28	0.28	0	0	0	0	0	0	0	0	0.64	0.64	0.64	0.64	0.28	1.12
Sagebrush Grassland	Eurotia lanata	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56
Sagebrush Grassland	Garrya flavescens	0.84	0.84	0.84	0	0	0	0	0	0	0	0	1.92	1.92	1.92	1.92	0.84	3.36
Sagebrush Grassland	Grasses	0.62	0.62	0.62	0	0	0	0	0	0	0	0	8.37	8.37	8.37	8.37	3.72	14.88
Sagebrush Grassland	Gutierrezia sarothrae	0.28	0.28	0.28	0	0	0	0	0	0	0	0	0.64	0.64	0.64	0.64	0.28	1.12
Sagebrush Grassland	Opuntia sp.	0.56	0.56	0.56	0	0	0	0	0	0	0	0	1.28	1.28	1.28	1.28	0.56	2.24
Sagebrush Grassland	Penstemon palmeri	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56
Sagebrush Grassland	Quercus sp.	0.99	0.55	0	0	0	0	0.77	1.1	0	0.88	0	3.74	3.74	3.74	3.74	1.65	6.6
Sagebrush Grassland	Rhus trilobata	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56
Sagebrush Grassland	Sphaeralcea ambigua	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56
Sagebrush Grassland	Symphoricarpos sp.	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56
		7.34	6.9	6.35	0	0	0	0.77	1.1	0	0.88	0	28.15	28.15	28.15	28.15	12.38	49.52
		7	7	6	0	0	0	1	1	0	1	0	28	28	28	28	12	50
Salt Desert Scrub	Ambrosia dumosa	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56
Salt Desert Scrub	Artemisia sp.	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56
Salt Desert Scrub	Atriplex sp.	2.52	2.52	2.52	0	0	0	0	0	0	0	0	5.76	5.76	5.76	5.76	2.52	10.08
Salt Desert Scrub	Barren	0	0	0	0	0	0	0	0	0	0	0	2.15	2.15	2.15	2.15	0.86	3.44
Salt Desert Scrub	Chrysothamnus sp.	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56
Salt Desert Scrub	Coleogyne ramosissima	0.03	0.03	0.03	0	0	0	0	0	0	0	0	0.34	0.34	0.34	0.34	0.15	0.6
Salt Desert Scrub	Ephedra sp.	0.56	0.56	0.56	0	0	0	0	0	0	0	0	1.28	1.28	1.28	1.28	0.56	2.24
Salt Desert Scrub	Eriogonum sp.	0.84	0.84	0.84	0	0	0	0	0	0	0	0	1.92	1.92	1.92	1.92	0.84	3.36
Salt Desert Scrub	Grasses	0.2	0.2	0.2	0	0	0	0	0	0	0	0	2.7	2.7	2.7	2.7	1.2	4.8
Salt Desert Scrub	Grayia spinosa	0.28	0.28	0.28	0	0	0	0	0	0	0	0	0.64	0.64	0.64	0.64	0.28	1.12
Salt Desert Scrub	Krameria sp.	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56
Salt Desert Scrub	Larrea tridentata	0.28	0.28	0.28	0	0	0	0	0	0	0	0	0.64	0.64	0.64	0.64	0.28	1.12
Salt Desert Scrub	Lycium pallidum	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56
Salt Desert Scrub	Opuntia sp.	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56
Salt Desert Scrub	Potentilla sp.	0.03	0.03	0.03	0	0	0	0	0	0	0	0	0.34	0.34	0.34	0.34	0.15	0.6
Salt Desert Scrub	Sarcobatus sp.	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56
Salt Desert Scrub	Sphaeralcea sp.	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56
Salt Desert Scrub	Suaeda sp.	0.28	0.28	0.28	0	0	0	0	0	0	0	0	0.64	0.64	0.64	0.64	0.28	1.12
Salt Desert Scrub	Yucca sp.	0.09	0.09	0.09	0	0	0	0	0	0	0	0	1.02	1.02	1.02	1.02	0.45	1.8
		6.23	6.23	6.23	0	0	0	0	0	0	0	0	19.99	19.99	19.99	19.99	8.69	34.76
		6	6	6	0	0	0	0	0	0	0	0	20	20	20	20	9	35
White Fir	Abies concolor	103.32	99.96	70.14	0	33.18	166.74	0	0	0	48.3	6.72	56.7	56.7	56.7	56.7	25.2	100.8
White Fir	Barren	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0.4	1.6
White Fir	Pinus aristata	0	0	0	0	0	0	0	0	0	0	0	14.49	14.49	14.49	14.49	6.44	25.76
White Fir	Pinus flexilis	0	0	0	0	0	0	0	0	0	0	0	6.3	6.3	6.3	6.3	2.8	11.2
White Fir	Ribes sp.	0.7	0.7	0.7	0	0	0	0	0	0	0	0	1.6	1.6	1.6	1.6	0.7	2.8
		104.02	100.66	70.84	0	33.18	166.74	0	0	0	48.3	6.72	80.09	80.09	80.09	80.09	35.54	142.16
		104	101	71	0	33	167	0	0	0	48	7	80	80	80	80	36	142

Weighted Rural Landuse Emission Factors
Based Upon Land Survey Results
Clark County, Nevada

Community Type	Botanical Name	HEXY	FORM	ACTAL	BUTE	ETHA	FORAC	ACTAC	BUTO	CO	ORVOC	NO
Sagebrush Grasslanc	Arctostaphylos uva-ursi	0.6	0.15	0.15	0.15	0.08	0.08	0.08	0.08	1.13	0.6	0.02
Sagebrush Grasslanc	Artemisia sp.	6.16	1.54	1.54	1.54	0.77	0.77	0.77	0.77	11.55	6.16	1.65
Sagebrush Grasslanc	Barren	0.8	0.2	0.2	0.2	0.1	0.1	0.1	0.1	1.5	0.8	0
Sagebrush Grasslanc	Cercocarpus sp.	3	0.75	0.75	0.75	0.4	0.4	0.4	0.4	5.65	3	0.1
Sagebrush Grasslanc	Chrysothamnius sp.	0.56	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Sagebrush Grasslanc	Coleogyne ramosissima	1.8	0.45	0.45	0.45	0.24	0.24	0.24	0.24	3.39	1.8	0.06
Sagebrush Grasslanc	Ephedra sp.	1.12	0.28	0.28	0.28	0.14	0.14	0.14	0.14	2.1	1.12	0.3
Sagebrush Grasslanc	Eriodictyon angustifolium	3.36	0.84	0.84	0.84	0.42	0.42	0.42	0.42	6.3	3.36	0.9
Sagebrush Grasslanc	Eriogonum inflatum	1.12	0.28	0.28	0.28	0.14	0.14	0.14	0.14	2.1	1.12	0.3
Sagebrush Grasslanc	Eurotia lanata	0.56	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Sagebrush Grasslanc	Garrya flavescens	3.36	0.84	0.84	0.84	0.42	0.42	0.42	0.42	6.3	3.36	0.9
Sagebrush Grasslanc	Grasses	14.88	3.72	3.72	3.72	1.86	1.86	1.86	1.86	27.9	14.88	8.37
Sagebrush Grasslanc	Gutierrezia sarothrae	1.12	0.28	0.28	0.28	0.14	0.14	0.14	0.14	2.1	1.12	0.3
Sagebrush Grasslanc	Opuntia sp.	2.24	0.56	0.56	0.56	0.28	0.28	0.28	0.28	4.2	2.24	0.6
Sagebrush Grasslanc	Penstemon palmeri	0.56	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Sagebrush Grasslanc	Quercus sp.	6.6	1.65	1.65	1.65	0.88	0.88	0.88	0.88	12.43	6.6	0.22
Sagebrush Grasslanc	Rhus trilobata	0.56	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Sagebrush Grasslanc	Sphaeralcea ambigua	0.56	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Sagebrush Grasslanc	Symphoricarpos sp.	0.56	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
		49.52	12.38	12.38	12.38	6.29	6.29	6.29	6.29	92.95	49.52	14.62
		50	12	12	12	6	6	6	6	93	50	15
Salt Desert Scrub	Ambrosia dumosa	0.56	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Salt Desert Scrub	Artemisia sp.	0.56	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Salt Desert Scrub	Atriplex sp.	10.08	2.52	2.52	2.52	1.26	1.26	1.26	1.26	18.9	10.08	2.7
Salt Desert Scrub	Barren	3.44	0.86	0.86	0.86	0.43	0.43	0.43	0.43	6.45	3.44	0
Salt Desert Scrub	Chrysothamnius sp.	0.56	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Salt Desert Scrub	Coleogyne ramosissima	0.6	0.15	0.15	0.15	0.08	0.08	0.08	0.08	1.13	0.6	0.02
Salt Desert Scrub	Ephedra sp.	2.24	0.56	0.56	0.56	0.28	0.28	0.28	0.28	4.2	2.24	0.6
Salt Desert Scrub	Eriogonum sp.	3.36	0.84	0.84	0.84	0.42	0.42	0.42	0.42	6.3	3.36	0.9
Salt Desert Scrub	Grasses	4.8	1.2	1.2	1.2	0.6	0.6	0.6	0.6	9	4.8	2.7
Salt Desert Scrub	Grayia spinosa	1.12	0.28	0.28	0.28	0.14	0.14	0.14	0.14	2.1	1.12	0.3
Salt Desert Scrub	Krameria sp.	0.56	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Salt Desert Scrub	Larrea tridentata	1.12	0.28	0.28	0.28	0.14	0.14	0.14	0.14	2.1	1.12	0.3
Salt Desert Scrub	Lycium pallidum	0.56	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Salt Desert Scrub	Opuntia sp.	0.56	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Salt Desert Scrub	Potentilla sp.	0.6	0.15	0.15	0.15	0.08	0.08	0.08	0.08	1.13	0.6	0.02
Salt Desert Scrub	Sarcobatus sp.	0.56	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Salt Desert Scrub	Sphaeralcea sp.	0.56	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Salt Desert Scrub	Suaeda sp.	1.12	0.28	0.28	0.28	0.14	0.14	0.14	0.14	2.1	1.12	0.3
Salt Desert Scrub	Yucca sp.	1.8	0.45	0.45	0.45	0.24	0.24	0.24	0.24	3.39	1.8	0.06
		34.76	8.69	8.69	8.69	4.37	4.37	4.37	4.37	65.2	34.76	9.1
		35	9	9	9	4	4	4	4	65	35	9
White Fir	Abies concolor	100.8	25.2	25.2	25.2	12.6	12.6	12.6	12.6	189	100.8	0.84
White Fir	Barren	1.6	0.4	0.4	0.4	0.2	0.2	0.2	0.2	3	1.6	0
White Fir	Pinus aristata	25.76	6.44	6.44	6.44	3.22	3.22	3.22	3.22	48.3	25.76	0.46
White Fir	Pinus flexilis	11.2	2.8	2.8	2.8	1.4	1.4	1.4	1.4	21	11.2	0.2
White Fir	Ribes sp.	2.8	0.7	0.7	0.7	0.35	0.35	0.35	0.35	5.25	2.8	0.75
		142.16	35.54	35.54	35.54	17.77	17.77	17.77	17.77	266.55	142.16	2.25
		142	36	36	36	18	18	18	18	267	142	2

WEIGHTED URBAN

EMISSION FACTORS

Weighted Urban Landuse Emission Factors
Based Upon Land Survey Results
Clark County, Nevada

LandUse	Botanical	Family	%Cover	BELD3 Source	BELD3 Species		Leaf Area Index	Dry Leaf Biomass	Winter Biomass Factor	Indicator Specific Leaf Weight	ISOP	MBO	APIN	BPIN	D3CAR	DLIM
Commercial	Acacia sp.	FABACEAE	1	039 Acacia	Acacia		0.05	7	0	0.01	0.7	0	4.2	16.23	1.32	0
Commercial	Ambrosia dumosa	COMPOSITEAE	1	010 USGS_shrubgrass	USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Commercial	Barren	~NA~	12	018 USGS_sprsbarren	USGS_sprsbarren		0	6	0.06	0	0	0.96	3.6	0.12	0.12	0
Commercial	Fraxinus sp.	OLEACEAE	1	043 Ash	Ash		0.05	3.75	0	0.01	0.38	0	2.25	0.07	0.03	0.01
Commercial	Grasses	~NA~	3	026 Grass	Grass	WEIGHTED	0	9	0.015	0	1.47	0	5.4	1.5	0.75	0.36
Commercial	Impervious	~NA~	76	003 USGS_urban	USGS_urban		0	76	0.38	0	7.6	57	45.6	6.08	3.04	1.52
Commercial	Nerium oleander	APOCYNACEAE	1	010 USGS_shrubgrass	USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Commercial	Pinus sp.	PINACEAE	1	161 Pine_AZ	Pine_AZ		0.03	7	0.01	0	0.7	131.25	4.2	4.02	6.17	7.65
Commercial	Prosopis sp.	FABACEAE	1	105 Mesquite	Mesquite		0.05	3.75	0	0	0.38	0	2.25	0.13	0.07	0.03
Commercial	Quercus sp.	FAGACEAE	1	142 Oak_scrub	Oak_scrub		0.05	3.75	0	0.01	262.5	0	2.25	0.23	0.04	0
Commercial	Trachelospermum jasminoides	APOCYNACEAE	1	010 USGS_shrubgrass	USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Commercial	Washingtonia sp.	ARECACEAE	1	232 Yucca_Mojave	Yucca_Mojave		0.05	3.75	0.01	0	0.38	0	2.25	0.13	0.07	0.03
			100				0.37	130.5	0.49	0.03	283.86	189.48	78.3	30.13	12.42	10.02
							1	150	0.5	0	204	169	70	30	12	10
Industrial	Acacia sp.	FABACEAE	1	039 Acacia	Acacia		0.05	7	0	0.01	0.7	0	4.2	16.23	1.32	0
Industrial	Ambrosia dumosa	COMPOSITEAE	1	010 USGS_shrubgrass	USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Industrial	Barren	~NA~	24	018 USGS_sprsbarren	USGS_sprsbarren		0	12	0.12	0	0	1.92	7.2	0.24	0.24	0
Industrial	Euonymus sp.	CELASTRACEAE	1	010 USGS_shrubgrass	USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Industrial	Grasses	~NA~	2	026 Grass	Grass		0	6	0.01	0	0.90	0	3.6	1	0.5	0.24
Industrial	Impervious	~NA~	63	003 USGS_urban	USGS_urban	WEIGHTED	0	63	0.315	0	6.3	47.25	37.8	5.04	2.52	1.26
Industrial	Juniperus sp.	CUPRESSACEAE	1	85 Juniper	Juniper		0.07	7	0.01	0	0.7	0	4.2	1.23	0	2.47
Industrial	Leucophyllum sp.	SCROPHULARIACEAE	1	010 USGS_shrubgrass	USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Industrial	Ligustrum sp.	OLEACEAE	1	043 Ash	Ash		0.05	3.75	0	0.01	0.38	0	2.25	0.07	0.03	0.01
Industrial	Pinus sp.	PINACEAE	1	161 Pine_AZ	Pine_AZ		0.03	7	0.01	0	0.7	131.25	4.2	4.02	6.17	7.65
Industrial	Prosopis sp.	FABACEAE	2	105 Mesquite	Mesquite		0.1	7.5	0	0	0.76	0	4.5	0.26	0.14	0.06
Industrial	Washingtonia sp.	ARECACEAE	1	232 Yucca_Mojave	Yucca_Mojave		0.05	3.75	0.01	0	0.38	0	2.25	0.13	0.07	0.03
Industrial	Yucca sp.	LILIACEAE	1	232 Yucca_Mojave	Yucca_Mojave		0.05	3.75	0.01	0	0.38	0	2.25	0.13	0.07	0.03
			100				0.49	131.25	0.5	0.02	21.03	100.69	76.75	29.97	11.87	12.17
							1	150	0.5	0	21	181	79	30	12	12
Light Industrial	Barren	~NA~	16	018 USGS_sprsbarren	USGS_sprsbarren		0	8	0.08	0	0	1.28	4.8	0.16	0.16	0
Light Industrial	Grasses	~NA~	3	026 Grass	Grass		0	9	0.015	0	1.47	0	5.4	1.5	0.75	0.36
Light Industrial	Impervious	~NA~	65	003 USGS_urban	USGS_urban		0	65	0.325	0	6.5	48.75	39	5.2	2.6	1.3
Light Industrial	Juniperus sp.	CUPRESSACEAE	1	085 Juniper	Juniper		0.07	7	0.01	0	0.7	0	4.2	1.23	0	2.47
Light Industrial	Lagerstroemia indica	LYTHRACEAE	1	010 USGS_shrubgrass	USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Light Industrial	Leucophyllum sp.	SCROPHULARIACEAE	1	010 USGS_shrubgrass	USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Light Industrial	Pinus sp.	PINACEAE	4	161 Pine_AZ	Pine_AZ		0.12	28	0.04	0	2.8	525	16.8	16.08	24.68	30.6
Light Industrial	Platanus wrightii	PLATANACEAE	1	220 Sycamore	Sycamore	WEIGHTED	0.05	3.75	0	0.01	262.5	0	2.25	0.13	0.07	0.03
Light Industrial	Prosopis sp.	FABACEAE	2	105 Mesquite	Mesquite		0.1	7.5	0	0	0.76	0	4.5	0.26	0.14	0.06
Light Industrial	Pyracantha sp.	ROSACEAE	1	042 Apple	Apple		0.05	3.75	0	0.01	0.38	0	2.25	0.13	0.07	0.03
Light Industrial	Quercus sp.	FAGACEAE	1	142 Oak_scrub	Oak_scrub		0.05	3.75	0	0.01	262.5	0	2.25	0.23	0.04	0
Light Industrial	Rhus lancea	ANACARDIACEAE	1	010 USGS_shrubgrass	USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Light Industrial	Washingtonia sp.	ARECACEAE	2	232 Yucca_Mojave	Yucca_Mojave		0.1	7.5	0.02	0	0.76	0	4.5	0.26	0.14	0.06
Light Industrial	Yucca sp.	LILIACEAE	1	232 Yucca_Mojave	Yucca_Mojave		0.05	3.75	0.01	0	0.38	0	2.25	0.13	0.07	0.03
			100				0.68	157.5	0.515	0.03	548.5	575.3	94.5	26.93	29.53	35.36
							1	200	0.5	0	649	575	95	27	30	35
Major Development	Ambrosia dumosa	COMPOSITEAE	1	010 USGS_shrubgrass	USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Major Development	Atriplex sp.	CHENOPODIACEAE	2	010 USGS_shrubgrass	USGS_shrubgrass		0.06	7	0.01	0	6.5	0.18	4.2	1.08	0.54	0.28
Major Development	Barren	~NA~	65	018 USGS_sprsbarren	USGS_sprsbarren		0	32.5	0.325	0	0	5.2	19.5	0.65	0.65	0
Major Development	Ephedra sp.	EPHEDRACEAE	1	010 USGS_shrubgrass	USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Major Development	Grasses	~NA~	15	026 Grass	Grass	WEIGHTED	0	45	0.075	0	7.35	0	27	7.5	3.75	1.8
Major Development	Impervious	~NA~	12	003 USGS_urban	USGS_urban		0	12	0.06	0	1.2	9	7.2	0.96	0.48	0.24
Major Development	Lagerstroemia indica	LYTHRACEAE	1	010 USGS_shrubgrass	USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Major Development	Larrea tridentata	ZYGOPHYLLACEAE	1	010 USGS_shrubgrass	USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Major Development	Pinus sp.	PINACEAE	1	161 Pine_AZ	Pine_AZ		0.03	7	0.01	0	0.7	131.25	4.2	4.02	6.17	7.65
Major Development	Washingtonia sp.	ARECACIA	1	232 Yucca_Mojave	Yucca_Mojave		0.05	3.75	0.01	0	0.38	0	2.25	0.13	0.07	0.03
			100				0.26	121.25	0.51	0	29.13	145.99	72.75	16.5	12.74	10.56
							1	150	0.5	0	29	146	73	17	13	11

Weighted Urban Landuse Emission Factors
Based Upon Land Survey Results
Clark County, Nevada

LandUse	Botanical	CAMPH	MYRC	ATERP	BPHE	SABI	PCYM	OCIM	ATHU	TRPO	GTERP	METH	ETHE	PROPE	ETHO	ACET	HEXA	HEXE	HEXY
Commercial	Acacia sp.	0.63	0	0.33	0	0	0	0	0	0	0	0	0.63	0.63	0.63	0.63	0.28	1.12	1.12
Commercial	Ambrosia dumosa	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56	0.56
Commercial	Barren	0	0	0	0	0	0	0	0	0	0	0	0.6	0.6	0.6	0.6	0.24	0.96	0.96
Commercial	Fraxinus sp.	0	0	0.07	0	0.15	0	0	0	0	0	0	0.34	0.34	0.34	0.34	0.15	0.6	0.6
Commercial	Grasses	0.36	0.36	0.36	0	0	0	0	0	0	0	0	0.81	0.81	0.81	0.81	0.36	1.44	1.44
Commercial	Impervious	1.52	1.52	1.52	0	0	0	0	0	0	0	0	6.84	6.84	6.84	6.84	3.04	12.16	12.16
Commercial	Nerium oleander	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56	0.56
Commercial	Pinus sp.	0.26	0	0.33	0.02	0	0.07	0	0	0	0	0	0.63	0.63	0.63	0.63	0.28	1.12	1.12
Commercial	Prosopis sp.	0.03	0.03	0.03	0	0	0	0	0	0	0	0	0.34	0.34	0.34	0.34	0.15	0.6	0.6
Commercial	Quercus sp.	0.09	0.05	0	0	0	0	0.07	0.1	0	0.08	0	0.34	0.34	0.34	0.34	0.15	0.6	0.6
Commercial	Trachelospermum jasminoides	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56	0.56
Commercial	Washingtonia sp.	0.03	0.03	0.03	0	0	0	0	0	0	0	0	0.34	0.34	0.34	0.34	0.15	0.6	0.6
		3.34	2.41	3.09	0.02	0.15	0.07	0.07	0.1	0	0.08	0	11.83	11.83	11.83	11.83	5.22	20.88	20.88
		3	2	3	0	0	0	0	0	0	0	0	12	12	12	12	5	21	21
Industrial	Acacia sp.	0.63	0	0.33	0	0	0	0	0	0	0	0	0.63	0.63	0.63	0.63	0.28	1.12	1.12
Industrial	Ambrosia dumosa	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56	0.56
Industrial	Barren	0	0	0	0	0	0	0	0	0	0	0	1.2	1.2	1.2	1.2	0.48	1.92	1.92
Industrial	Euonymus sp.	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56	0.56
Industrial	Grasses	0.24	0.24	0.24	0	0	0	0	0	0	0	0	0.54	0.54	0.54	0.54	0.24	0.96	0.96
Industrial	Impervious	1.26	1.26	1.26	0	0	0	0	0	0	0	0	5.67	5.67	5.67	5.67	2.52	10.08	10.08
Industrial	Juniperus sp.	0	0	0	0	0	0	0	0	0	0	0	0.63	0.63	0.63	0.63	0.28	1.12	1.12
Industrial	Leucophyllum sp.	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56	0.56
Industrial	Ligustrum sp.	0	0	0.07	0	0.15	0	0	0	0	0	0	0.34	0.34	0.34	0.34	0.15	0.6	0.6
Industrial	Pinus sp.	0.26	0	0.33	0.02	0	0.07	0	0	0	0	0	0.63	0.63	0.63	0.63	0.28	1.12	1.12
Industrial	Prosopis sp.	0.06	0.06	0.06	0	0	0	0	0	0	0	0	0.68	0.68	0.68	0.68	0.3	1.2	1.2
Industrial	Washingtonia sp.	0.03	0.03	0.03	0	0	0	0	0	0	0	0	0.34	0.34	0.34	0.34	0.15	0.6	0.6
Industrial	Yucca sp.	0.03	0.03	0.03	0	0	0	0	0	0	0	0	0.34	0.34	0.34	0.34	0.15	0.6	0.6
		2.93	2.04	2.77	0.02	0.15	0.07	0	0	0	0	0	11.96	11.96	11.96	11.96	5.25	21	21
		3	2	3	0	0	0	0	0	0	0	0	12	12	12	12	5	21	21
Light Industrial	Barren	0	0	0	0	0	0	0	0	0	0	0	0.8	0.8	0.8	0.8	0.32	1.28	1.28
Light Industrial	Grasses	0.36	0.36	0.36	0	0	0	0	0	0	0	0	0.81	0.81	0.81	0.81	0.36	1.44	1.44
Light Industrial	Impervious	1.3	1.3	1.3	0	0	0	0	0	0	0	0	5.05	5.05	5.05	5.05	2.6	10.4	10.4
Light Industrial	Juniperus sp.	0	0	0	0	0	0	0	0	0	0	0	0.63	0.63	0.63	0.63	0.28	1.12	1.12
Light Industrial	Lagerstroemia indica	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56	0.56
Light Industrial	Leucophyllum sp.	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56	0.56
Light Industrial	Pinus sp.	1.04	0	1.32	0.08	0	0.28	0	0	0	0	0	2.52	2.52	2.52	2.52	1.12	4.48	4.48
Light Industrial	Platanus wrightii	0.03	0.03	0.03	0	0	0	0	0	0	0	0	0.34	0.34	0.34	0.34	0.15	0.6	0.6
Light Industrial	Prosopis sp.	0.06	0.06	0.06	0	0	0	0	0	0	0	0	0.68	0.68	0.68	0.68	0.3	1.2	1.2
Light Industrial	Pyracantha sp.	0.03	0.03	0.03	0	0	0	0	0	0	0	0	0.34	0.34	0.34	0.34	0.15	0.6	0.6
Light Industrial	Quercus sp.	0.09	0.05	0	0	0	0	0.07	0.1	0	0.08	0	0.34	0.34	0.34	0.34	0.15	0.6	0.6
Light Industrial	Rhus lancea	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56	0.56
Light Industrial	Washingtonia sp.	0.06	0.06	0.06	0	0	0	0	0	0	0	0	0.68	0.68	0.68	0.68	0.3	1.2	1.2
Light Industrial	Yucca sp.	0.03	0.03	0.03	0	0	0	0	0	0	0	0	0.34	0.34	0.34	0.34	0.15	0.6	0.6
		3.42	2.34	3.61	0.08	0	0.28	0.07	0.1	0	0.08	0	14.29	14.29	14.29	14.29	6.3	25.2	25.2
		3	2	4	0	0	0	0	0	0	0	0	14	14	14	14	6	25	25
Major Development	Ambrosia dumosa	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56	0.56
Major Development	Atriplex sp.	0.28	0.28	0.28	0	0	0	0	0	0	0	0	0.64	0.64	0.64	0.64	0.28	1.12	1.12
Major Development	Barren	0	0	0	0	0	0	0	0	0	0	0	3.25	3.25	3.25	3.25	1.3	5.2	5.2
Major Development	Ephedra sp.	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56	0.56
Major Development	Grasses	1.8	1.8	1.8	0	0	0	0	0	0	0	0	4.05	4.05	4.05	4.05	1.8	7.2	7.2
Major Development	Impervious	0.24	0.24	0.24	0	0	0	0	0	0	0	0	1.08	1.08	1.08	1.08	0.48	1.92	1.92
Major Development	Lagerstroemia indica	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56	0.56
Major Development	Larrea tridentata	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56	0.56
Major Development	Pinus sp.	0.26	0	0.33	0.02	0	0.07	0	0	0	0	0	0.63	0.63	0.63	0.63	0.28	1.12	1.12
Major Development	Washingtonia sp.	0.03	0.03	0.03	0	0	0	0	0	0	0	0	0.34	0.34	0.34	0.34	0.15	0.6	0.6
		3.17	2.91	3.24	0.02	0	0.07	0	0	0	0	0	11.27	11.27	11.27	11.27	4.85	19.4	19.4
		3	3	3	0	0	0	0	0	0	0	0	11	11	11	11	5	19	19

Weighted Urban Landuse Emission Factors
Based Upon Land Survey Results
Clark County, Nevada

LandUse	Botanical	FORM	ACTAL	BUTE	ETHA	FORAC	ACTAC	BUTO	CO	ORVOC	NO
Commercial	Acacia sp.	0.28	0.28	0.28	0.14	0.14	0.14	0.14	2.1	1.12	0.02
Commercial	Ambrosia dumosa	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Commercial	Barren	0.24	0.24	0.24	0.12	0.12	0.12	0.12	1.8	0.96	0
Commercial	Fraxinus sp.	0.15	0.15	0.15	0.08	0.08	0.08	0.08	1.13	0.6	0.02
Commercial	Grasses	0.36	0.36	0.36	0.18	0.18	0.18	0.18	2.7	1.44	0.81
Commercial	Impervious	3.04	3.04	3.04	1.52	1.52	1.52	1.52	22.8	12.16	4.56
Commercial	Nerium oleander	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Commercial	Pinus sp.	0.28	0.28	0.28	0.14	0.14	0.14	0.14	2.1	1.12	0.02
Commercial	Prosopis sp.	0.15	0.15	0.15	0.08	0.08	0.08	0.08	1.13	0.6	0.02
Commercial	Quercus sp.	0.15	0.15	0.15	0.08	0.08	0.08	0.08	1.13	0.6	0.02
Commercial	Trachelospermum jasminoides	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Commercial	Washingtonia sp.	0.15	0.15	0.15	0.08	0.08	0.08	0.08	1.13	0.6	0.02
		5.22	5.22	5.22	2.63	2.63	2.63	2.63	39.17	20.88	5.94
		5	5	5	3	3	3	3	39	21	6
Industrial	Acacia sp.	0.28	0.28	0.28	0.14	0.14	0.14	0.14	2.1	1.12	0.02
Industrial	Ambrosia dumosa	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Industrial	Barren	0.48	0.48	0.48	0.24	0.24	0.24	0.24	3.6	1.92	0
Industrial	Euonymus sp.	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Industrial	Grasses	0.24	0.24	0.24	0.12	0.12	0.12	0.12	1.8	0.96	0.54
Industrial	Impervious	2.52	2.52	2.52	1.26	1.26	1.26	1.26	18.9	10.08	3.78
Industrial	Juniperus sp.	0.28	0.28	0.28	0.14	0.14	0.14	0.14	2.1	1.12	0.02
Industrial	Leucophyllum sp.	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Industrial	Ligustrum sp.	0.15	0.15	0.15	0.08	0.08	0.08	0.08	1.13	0.6	0.02
Industrial	Pinus sp.	0.28	0.28	0.28	0.14	0.14	0.14	0.14	2.1	1.12	0.02
Industrial	Prosopis sp.	0.3	0.3	0.3	0.16	0.16	0.16	0.16	2.26	1.2	0.04
Industrial	Washingtonia sp.	0.15	0.15	0.15	0.08	0.08	0.08	0.08	1.13	0.6	0.02
Industrial	Yucca sp.	0.15	0.15	0.15	0.08	0.08	0.08	0.08	1.13	0.6	0.02
		5.25	5.25	5.25	2.65	2.65	2.65	2.65	39.4	21	4.93
		5	5	5	3	3	3	3	39	21	5
Light Industrial	Barren	0.32	0.32	0.32	0.16	0.16	0.16	0.16	2.4	1.28	0
Light Industrial	Grasses	0.36	0.36	0.36	0.18	0.18	0.18	0.18	2.7	1.44	0.81
Light Industrial	Impervious	2.6	2.6	2.6	1.3	1.3	1.3	1.3	19.5	10.4	3.9
Light Industrial	Juniperus sp.	0.28	0.28	0.28	0.14	0.14	0.14	0.14	2.1	1.12	0.02
Light Industrial	Lagerstroemia indica	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Light Industrial	Leucophyllum sp.	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Light Industrial	Pinus sp.	1.12	1.12	1.12	0.56	0.56	0.56	0.56	8.4	4.48	0.08
Light Industrial	Platanus wrightii	0.15	0.15	0.15	0.08	0.08	0.08	0.08	1.13	0.6	0.02
Light Industrial	Prosopis sp.	0.3	0.3	0.3	0.16	0.16	0.16	0.16	2.26	1.2	0.04
Light Industrial	Pyracantha sp.	0.15	0.15	0.15	0.08	0.08	0.08	0.08	1.13	0.6	0.02
Light Industrial	Quercus sp.	0.15	0.15	0.15	0.08	0.08	0.08	0.08	1.13	0.6	0.02
Light Industrial	Rhus lancea	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Light Industrial	Washingtonia sp.	0.3	0.3	0.3	0.16	0.16	0.16	0.16	2.26	1.2	0.04
Light Industrial	Yucca sp.	0.15	0.15	0.15	0.08	0.08	0.08	0.08	1.13	0.6	0.02
		6.3	6.3	6.3	3.19	3.19	3.19	3.19	47.29	25.2	5.42
		6	6	6	3	3	3	3	47	25	5
Major Development	Ambrosia dumosa	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Major Development	Atriplex sp.	0.28	0.28	0.28	0.14	0.14	0.14	0.14	2.1	1.12	0.3
Major Development	Barren	1.3	1.3	1.3	0.65	0.65	0.65	0.65	9.75	5.2	0
Major Development	Ephedra sp.	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Major Development	Grasses	1.8	1.8	1.8	0.9	0.9	0.9	0.9	13.5	7.2	4.05
Major Development	Impervious	0.48	0.48	0.48	0.24	0.24	0.24	0.24	3.6	1.92	0.72
Major Development	Lagerstroemia indica	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Major Development	Larrea tridentata	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Major Development	Pinus sp.	0.28	0.28	0.28	0.14	0.14	0.14	0.14	2.1	1.12	0.02
Major Development	Washingtonia sp.	0.15	0.15	0.15	0.08	0.08	0.08	0.08	1.13	0.6	0.02
		4.85	4.85	4.85	2.43	2.43	2.43	2.43	36.38	19.4	5.71
		5	5	5	2	2	2	2	36	19	6

Weighted Urban Landuse Emission Factors
Based Upon Land Survey Results
Clark County, Nevada

LandUse	Botanical	Family	%Cover	BELD3 Source	BELD3 Species		Leaf Area Index	Dry Leaf Biomass	Winter Biomass Factor	Indicator Specific Leaf Weight	ISOP	MBO	APIN	BPIN	D3CAR	DLIM
Public Facility	Acacia sp.	FABACEAE	2	039 Acacia	Acacia		0.1	14	0	0.02	1.4	0	8.4	32.46	2.64	0
Public Facility	Atriplex sp.	CHENOPODIACEAE	2	010 USGS_shrubgrass	USGS_shrubgrass		0.06	7	0.01	0	6.5	0.18	4.2	1.08	0.54	0.28
Public Facility	Barren	~NA~	24	018 USGS_sprsbarren	USGS_sprsbarren		0	12	0.12	0	0	1.92	7.2	0.24	0.24	0
Public Facility	Fraxinus sp.	OLEACEAE	1	043 Ash	Ash		0.05	3.75	0	0.01	0.38	0	2.25	0.07	0.03	0.01
Public Facility	Grasses	~NA~	30	026 Grass	Grass	WEIGHTED	0	90	0.15	0	14.7	0	54	15	7.5	3.6
Public Facility	Impervious	~NA~	24	003 USGS_urban	USGS_urban		0	24	0.12	0	2.4	18	14.4	1.92	0.96	0.48
Public Facility	Krameria sp.	KRAMERIACEAE	1	010 USGS_shrubgrass	USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Public Facility	Larrea tridentata	ZYGOPHYLLACEAE	2	010 USGS_shrubgrass	USGS_shrubgrass		0.06	7	0.01	0	6.5	0.18	4.2	1.08	0.54	0.28
Public Facility	Leucophyllum sp.	SCROPHULARIACEAE	1	010 USGS_shrubgrass	USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Public Facility	Morus alba	MORACEAE	1	109 Mulberry	Mulberry		0.05	3.75	0	0.01	0.38	0	2.25	0.26	0.13	0.07
Public Facility	Nerium oleander	APOCYNACEAE	1	010 USGS_shrubgrass	USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Public Facility	Phragmites australis	POACEAE	3	008 USGS_grassland	USGS_grassland		0	9	0.015	0	1.47	0.24	5.4	0.24	0.12	0.06
Public Facility	Pinus sp.	PINACEAE	3	161 Pine_AZ	Pine_AZ		0.09	21	0.03	0	2.1	393.75	12.6	12.06	18.51	22.95
Public Facility	Populus sp.	SALICACEAE	1	198 Populus	Populus		0.05	3.75	0	0.01	262.5	0	2.25	0.11	0.02	0
Public Facility	Prosopis sp.	FABACEAE	1	105 Mesquite	Mesquite		0.05	3.75	0	0	0.38	0	2.25	0.13	0.07	0.03
Public Facility	Rosmarinus officinalis	LAMIACEAE	1	010 USGS_shrubgrass	USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Public Facility	Tamarix sp.	TAMARICACEAE	1	222 Tamarix	Tamarix		0.03	3.75	0.01	0	0.7	0	2.25	0.13	0.07	0.03
Public Facility	Washingtonia sp.	ARECACIA	1	232 Yucca_Mojave	Yucca_Mojave		0.05	3.75	0.01	0	0.38	0	2.25	0.13	0.07	0.03
			100				0.71	220.5	0.495	0.05	312.79	414.63	132.3	67.07	32.52	28.36
							1	250	0.5	0	313	415	132	67	33	28
Rural Residential	Ambrosia dumosa	COMPOSITEAE	1	010 USGS_shrubgrass	USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Rural Residential	Artemisia sp.	ASTERACEAE	3	010 USGS_shrubgrass	USGS_shrubgrass		0.09	10.5	0.015	0	9.75	0.27	6.3	1.62	0.81	0.42
Rural Residential	Atriplex sp.	CHENOPODIACEAE	1	010 USGS_shrubgrass	USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Rural Residential	Barren	~NA~	28	018 USGS_sprsbarren	USGS_sprsbarren		0	14	0.14	0	0	2.24	8.4	0.28	0.28	0
Rural Residential	Eucalyptus sp.	MYRTACEAE	1	064 Eucalyptus	Eucalyptus		0.05	3.75	0.01	0	262.5	0	2.25	3.51	1.87	0
Rural Residential	Fraxinus sp.	OLEACEAE	1	043 Ash	Ash		0.05	3.75	0	0.01	0.38	0	2.25	0.07	0.03	0.01
Rural Residential	Grasses	~NA~	15	026 Grass	Grass	WEIGHTED	0	45	0.075	0	7.35	0	27	7.5	3.75	1.8
Rural Residential	Impervious	~NA~	37	003 USGS_urban	USGS_urban		0	37	0.185	0	3.7	27.75	22.2	2.96	1.48	0.74
Rural Residential	Juniperus sp.	CUPRESSACEAE	1	085 Juniper	Juniper		0.07	7	0.01	0	0.7	0	4.2	1.23	0	2.47
Rural Residential	Larrea tridentata	ZYGOPHYLLACEAE	2	010 USGS_shrubgrass	USGS_shrubgrass		0.06	7	0.01	0	6.5	0.18	4.2	1.08	0.54	0.28
Rural Residential	Morus alba	MORACEAE	1	109 Mulberry	Mulberry		0.05	3.75	0	0.01	0.38	0	2.25	0.26	0.13	0.07
Rural Residential	Nerium oleander	APOCYNACEAE	1	010 USGS_shrubgrass	USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Rural Residential	Pinus sp.	PINACEAE	4	161 Pine_AZ	Pine_AZ		0.12	28	0.04	0	2.8	525	16.8	16.08	24.68	30.6
Rural Residential	Pittosporum sp.	PITTOSPORACEAE	1	090 Magnolia	Magnolia		0.05	3.75	0.01	0	0.38	0	2.25	6.02	2.63	0.16
Rural Residential	Platanus wrightii	PLATANACEAE	1	220 Sycamore	Sycamore		0.05	3.75	0	0.01	262.5	0	2.25	0.13	0.07	0.03
Rural Residential	Populus sp.	SALICACEAE	1	198 Populus	Populus		0.05	3.75	0	0.01	262.5	0	2.25	0.11	0.02	0
Rural Residential	Washingtonia sp.	ARECACIA	1	232 Yucca_Mojave	Yucca_Mojave		0.05	3.75	0.01	0	0.38	0	2.25	0.13	0.07	0.03
			100				0.78	185.25	0.52	0.04	829.57	555.71	111.15	42.6	37.17	37.03
							1	200	0.5	0	830	556	111	43	37	37

Weighted Urban Landuse Emission Factors
Based Upon Land Survey Results
Clark County, Nevada

LandUse	Botanical	CAMPH	MYRC	ATERP	BPHE	SABI	PCYM	OCIM	ATHU	TRPO	GTERP	METH	ETHE	PROPE	ETHO	ACET	HEXA	HEXE	HEXY
Public Facility	Acacia sp.	1.26	0	0.66	0	0	0	0	0	0	0	0	1.26	1.26	1.26	1.26	0.56	2.24	2.24
Public Facility	Atriplex sp.	0.28	0.28	0.28	0	0	0	0	0	0	0	0	0.64	0.64	0.64	0.64	0.28	1.12	1.12
Public Facility	Barren	0	0	0	0	0	0	0	0	0	0	0	1.2	1.2	1.2	1.2	0.48	1.92	1.92
Public Facility	Fraxinus sp.	0	0	0.07	0	0.15	0	0	0	0	0	0	0.34	0.34	0.34	0.34	0.15	0.6	0.6
Public Facility	Grasses	3.6	3.6	3.6	0	0	0	0	0	0	0	0	8.1	8.1	8.1	8.1	3.6	14.4	14.4
Public Facility	Impervious	0.48	0.48	0.48	0	0	0	0	0	0	0	0	2.16	2.16	2.16	2.16	0.96	3.84	3.84
Public Facility	Krameria sp.	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56	0.56
Public Facility	Larrea tridentata	0.28	0.28	0.28	0	0	0	0	0	0	0	0	0.64	0.64	0.64	0.64	0.28	1.12	1.12
Public Facility	Leucophyllum sp.	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56	0.56
Public Facility	Morus alba	0.07	0.07	0.07	0	0	0	0	0	0	0	0	0.34	0.34	0.34	0.34	0.15	0.6	0.6
Public Facility	Nerium oleander	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56	0.56
Public Facility	Phragmites australis	0.06	0.06	0.06	0	0	0	0	0	0	0	0	0.81	0.81	0.81	0.81	0.36	1.44	1.44
Public Facility	Pinus sp.	0.78	0	0.99	0.06	0	0.21	0	0	0	0	0	1.89	1.89	1.89	1.89	0.84	3.36	3.36
Public Facility	Populus sp.	0.09	0.06	0.01	0	0	0	0.04	0	0	0	0	0.34	0.34	0.34	0.34	0.15	0.6	0.6
Public Facility	Prosopis sp.	0.03	0.03	0.03	0	0	0	0	0	0	0	0	0.34	0.34	0.34	0.34	0.15	0.6	0.6
Public Facility	Rosmarinus officinalis	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56	0.56
Public Facility	Tamarix sp.	0.03	0.03	0.03	0	0	0	0	0	0	0	0	0.34	0.34	0.34	0.34	0.15	0.6	0.6
Public Facility	Washingtonia sp.	0.03	0.03	0.03	0	0	0	0	0	0	0	0	0.34	0.34	0.34	0.34	0.15	0.6	0.6
		7.55	5.48	7.15	0.06	0.15	0.21	0.04	0	0	0	0	20.02	20.02	20.02	20.02	8.02	35.28	35.28
		8	5	7	0	0	0	0	0	0	0	0	20	20	20	20	9	35	35
Rural Residential	Ambrosia dumosa	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56	0.56
Rural Residential	Artemisia sp.	0.42	0.42	0.42	0	0	0	0	0	0	0	0	0.96	0.96	0.96	0.96	0.42	1.68	1.68
Rural Residential	Atriplex sp.	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56	0.56
Rural Residential	Barren	0	0	0	0	0	0	0	0	0	0	0	1.4	1.4	1.4	1.4	0.56	2.24	2.24
Rural Residential	Eucalyptus sp.	2.06	0	0	0	0	0	0	2.48	0	0	0	0.34	0.34	0.34	0.34	0.15	0.6	0.6
Rural Residential	Fraxinus sp.	0	0	0.07	0	0.15	0	0	0	0	0	0	0.34	0.34	0.34	0.34	0.15	0.6	0.6
Rural Residential	Grasses	1.8	1.8	1.8	0	0	0	0	0	0	0	0	4.05	4.05	4.05	4.05	1.8	7.2	7.2
Rural Residential	Impervious	0.74	0.74	0.74	0	0	0	0	0	0	0	0	3.33	3.33	3.33	3.33	1.48	5.92	5.92
Rural Residential	Juniperus sp.	0	0	0	0	0	0	0	0	0	0	0	0.63	0.63	0.63	0.63	0.28	1.12	1.12
Rural Residential	Larrea tridentata	0.28	0.28	0.28	0	0	0	0	0	0	0	0	0.64	0.64	0.64	0.64	0.28	1.12	1.12
Rural Residential	Morus alba	0.07	0.07	0.07	0	0	0	0	0	0	0	0	0.34	0.34	0.34	0.34	0.15	0.6	0.6
Rural Residential	Nerium oleander	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56	0.56
Rural Residential	Pinus sp.	1.04	0	1.32	0.08	0	0.28	0	0	0	0	0	2.52	2.52	2.52	2.52	1.12	4.48	4.48
Rural Residential	Pittosporum sp.	0.56	0.06	0.51	0	0	0	0	0	0	0	0	0.34	0.34	0.34	0.34	0.15	0.6	0.6
Rural Residential	Platanus wrightii	0.03	0.03	0.03	0	0	0	0	0	0	0	0	0.34	0.34	0.34	0.34	0.15	0.6	0.6
Rural Residential	Populus sp.	0.09	0.06	0.01	0	0	0	0.04	0	0	0	0	0.34	0.34	0.34	0.34	0.15	0.6	0.6
Rural Residential	Washingtonia sp.	0.03	0.03	0.03	0	0	0	0	0	0	0	0	0.34	0.34	0.34	0.34	0.15	0.6	0.6
		7.54	3.91	5.7	0.08	0.15	0.28	0.04	2.48	0	0	0	16.87	16.87	16.87	16.87	7.41	29.64	29.64
		8	4	6	0	0	0	0	2	0	0	0	17	17	17	17	7	30	30

Weighted Urban Landuse Emission Factors
Based Upon Land Survey Results
Clark County, Nevada

LandUse	Botanical	FORM	ACTAL	BUTE	ETHA	FORAC	ACTAC	BUTO	CO	ORVOC	NO
Public Facility	Acacia sp.	0.56	0.56	0.56	0.28	0.28	0.28	0.28	4.2	2.24	0.04
Public Facility	Atriplex sp.	0.28	0.28	0.28	0.14	0.14	0.14	0.14	2.1	1.12	0.3
Public Facility	Barren	0.48	0.48	0.48	0.24	0.24	0.24	0.24	3.6	1.92	0
Public Facility	Fraxinus sp.	0.15	0.15	0.15	0.08	0.08	0.08	0.08	1.13	0.6	0.02
Public Facility	Grasses	3.6	3.6	3.6	1.8	1.8	1.8	1.8	27	14.4	0.1
Public Facility	Impervious	0.96	0.96	0.96	0.48	0.48	0.48	0.48	7.2	3.84	1.44
Public Facility	Krameria sp.	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Public Facility	Larrea tridentata	0.28	0.28	0.28	0.14	0.14	0.14	0.14	2.1	1.12	0.3
Public Facility	Leucophyllum sp.	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Public Facility	Morus alba	0.15	0.15	0.15	0.08	0.08	0.08	0.08	1.13	0.6	0.02
Public Facility	Nerium oleander	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Public Facility	Phragmites australis	0.36	0.36	0.36	0.18	0.18	0.18	0.18	2.7	1.44	0.81
Public Facility	Pinus sp.	0.84	0.84	0.84	0.42	0.42	0.42	0.42	6.3	3.36	0.06
Public Facility	Populus sp.	0.15	0.15	0.15	0.08	0.08	0.08	0.08	1.13	0.6	0.02
Public Facility	Prosopis sp.	0.15	0.15	0.15	0.08	0.08	0.08	0.08	1.13	0.6	0.02
Public Facility	Rosmarinus officinalis	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Public Facility	Tamarix sp.	0.15	0.15	0.15	0.08	0.08	0.08	0.08	1.13	0.6	0.02
Public Facility	Washingtonia sp.	0.15	0.15	0.15	0.08	0.08	0.08	0.08	1.13	0.6	0.02
		8.82	8.82	8.82	4.44	4.44	4.44	4.44	66.18	35.28	11.77
		9	9	9	4	4	4	4	66	35	12
Rural Residential	Ambrosia dumosa	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Rural Residential	Artemisia sp.	0.42	0.42	0.42	0.21	0.21	0.21	0.21	3.15	1.68	0.45
Rural Residential	Atriplex sp.	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Rural Residential	Barren	0.56	0.56	0.56	0.28	0.28	0.28	0.28	4.2	2.24	0
Rural Residential	Eucalyptus sp.	0.15	0.15	0.15	0.08	0.08	0.08	0.08	1.13	0.6	0.02
Rural Residential	Fraxinus sp.	0.15	0.15	0.15	0.08	0.08	0.08	0.08	1.13	0.6	0.02
Rural Residential	Grasses	1.8	1.8	1.8	0.9	0.9	0.9	0.9	13.5	7.2	4.05
Rural Residential	Impervious	1.48	1.48	1.48	0.74	0.74	0.74	0.74	11.1	5.92	2.22
Rural Residential	Juniperus sp.	0.28	0.28	0.28	0.14	0.14	0.14	0.14	2.1	1.12	0.02
Rural Residential	Larrea tridentata	0.28	0.28	0.28	0.14	0.14	0.14	0.14	2.1	1.12	0.3
Rural Residential	Morus alba	0.15	0.15	0.15	0.08	0.08	0.08	0.08	1.13	0.6	0.02
Rural Residential	Nerium oleander	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Rural Residential	Pinus sp.	1.12	1.12	1.12	0.56	0.56	0.56	0.56	8.4	4.48	0.08
Rural Residential	Pittosporum sp.	0.15	0.15	0.15	0.08	0.08	0.08	0.08	1.13	0.6	0.02
Rural Residential	Platanus wrightii	0.15	0.15	0.15	0.08	0.08	0.08	0.08	1.13	0.6	0.02
Rural Residential	Populus sp.	0.15	0.15	0.15	0.08	0.08	0.08	0.08	1.13	0.6	0.02
Rural Residential	Washingtonia sp.	0.15	0.15	0.15	0.08	0.08	0.08	0.08	1.13	0.6	0.02
		7.41	7.41	7.41	3.74	3.74	3.74	3.74	56.61	29.64	7.71
		7	7	7	4	4	4	4	56	30	8

Weighted Urban Landuse Emission Factors
Based Upon Land Survey Results
Clark County, Nevada

LandUse	Botanical	Family	%Cover	BELD3 Source	BELD3 Species		Leaf Area Index	Dry Leaf Biomass	Winter Biomass Factor	Indicator Specific Leaf Weight	ISOP	MBO	APIN	BPIN	D3CAR	DLIM
Suburban Residential	Barren	~NA~	10	018 USGS_sprsbarren	USGS_sprsbarren		0	5	0.05	0	0	0.8	3	0.1	0.1	0
Suburban Residential	Euonymus sp.	CELASTRACEAE	1	010 USGS_shrubgrass	USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Suburban Residential	Fraxinus sp.	OLEACEAE	1	043 Ash	Ash		0.05	3.75	0	0.01	0.38	0	2.25	0.07	0.03	0.01
Suburban Residential	Grasses	~NA~	11	026 Grass	Grass		0	33	0.055	0	5.39	0	19.8	5.5	2.75	1.32
Suburban Residential	Impervious	~NA~	57	003 USGS_urban	USGS_urban		0	57	0.285	0	5.7	42.75	34.2	4.56	2.28	1.14
Suburban Residential	Juniperus sp.	CUPRESSACEAE	1	085 Juniper	Juniper		0.07	7	0.01	0	0.7	0	4.2	1.23	0	2.47
Suburban Residential	Ligustrum sp.	OLEACEAE	1	043 Ash	Ash		0.05	3.75	0	0.01	0.38	0	2.25	0.07	0.03	0.01
Suburban Residential	Morus alba	MORACEAE	3	109 Mulberry	Mulberry	WEIGHTED	0.15	11.25	0	0.03	1.14	0	6.75	0.78	0.39	0.21
Suburban Residential	Nerium oleander	APOCYNACEAE	1	010 USGS_shrubgrass	USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Suburban Residential	Olea europaea	OLEACEAE	1	043 Ash	Ash		0.05	3.75	0	0.01	0.38	0	2.25	0.07	0.03	0.01
Suburban Residential	Pinus sp.	PINACEAE	2	161 Pine_AZ	Pine_AZ		0.06	14	0.02	0	1.4	262.5	8.4	8.04	12.34	15.3
Suburban Residential	Pittosporum sp.	PITTOSPORACEAE	1	090 Magnolia	Magnolia		0.05	3.75	0.01	0	0.38	0	2.25	6.02	2.63	0.16
Suburban Residential	Populus sp.	SALICACEAE	1	198 Populus	Populus		0.05	3.75	0	0.01	262.5	0	2.25	0.11	0.02	0
Suburban Residential	Prosopis sp.	FABACEAE	1	105 Mesquite	Mesquite		0.05	3.75	0	0	0.38	0	2.25	0.13	0.07	0.03
Suburban Residential	Prunus sp.	ROSACEAE	1	199 Prunus	Prunus		0.05	3.75	0	0.01	0.38	0	2.25	0.12	0.05	0
Suburban Residential	Pyracantha sp.	ROSACEAE	1	042 Apple	Apple		0.05	3.75	0	0.01	0.38	0	2.25	0.13	0.07	0.03
Suburban Residential	Rosa	ROSACEAE	1	042 Apple	Apple		0.05	3.75	0	0.01	0.38	0	2.25	0.13	0.07	0.03
Suburban Residential	Rosmarinus officinalis	LAMIACEAE	1	009 USGS_shrubland	USGS_shrubland		0.03	4	0.005	0	6	0.15	2.4	1	0.5	0.25
Suburban Residential	Senna sp.	FABACEAE	1	105 Mesquite	Mesquite		0.05	3.75	0	0	0.38	0	2.25	0.13	0.07	0.03
Suburban Residential	Thuja plicata	CUPRESSACEAE	1	054 Cedar_thuja	Cedar_thuja		0.07	15	0.01	0	1.5	0	9	2.64	0.54	0.11
Suburban Residential	Washingtonia sp.	ARECACIA	2	232 Yucca_Mojave	Yucca_Mojave		0.1	7.5	0.02	0	0.76	0	4.5	0.26	0.14	0.06
			100				1.04	198.25	0.475	0.1	295.01	306.38	118.95	32.37	22.65	21.45
							1	200	0.5	0	295	306	119	32	23	21
Urban Residential	Acacia sp.	FABACEAE	1	039 Acacia	Acacia		0.05	7	0	0.01	0.7	0	4.2	16.23	1.32	0
Urban Residential	Barren	~NA~	13	018 USGS_sprsbarren	USGS_sprsbarren		0	6.5	0.065	0	0	1.04	3.9	0.13	0.13	0
Urban Residential	Fraxinus sp.	OLEACEAE	2	043 Ash	Ash		0.1	7.5	0	0.02	0.76	0	4.5	0.14	0.06	0.02
Urban Residential	Grasses	~NA~	7	026 Grass	Grass		0	21	0.035	0	3.43	0	12.6	3.5	1.75	0.84
Urban Residential	Impervious	~NA~	61	003 USGS_urban	USGS_urban		0	61	0.305	0	6.1	45.75	36.6	4.88	2.44	1.22
Urban Residential	Leucophyllum sp.	SCROPHULARIACEAE	1	010 USGS_shrubgrass	USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Urban Residential	Nerium oleander	APOCYNACEAE	1	010 USGS_shrubgrass	USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Urban Residential	Olea europaea	OLEACEAE	2	043 Ash	Ash	WEIGHTED	0.1	7.5	0	0.02	0.76	0	4.5	0.14	0.06	0.02
Urban Residential	Pinus sp.	PINACEAE	1	161 Pine_AZ	Pine_AZ		0.03	7	0.01	0	0.7	131.25	4.2	4.02	6.17	7.65
Urban Residential	Pittosporum sp.	PITTOSPORACEAE	1	090 Magnolia	Magnolia		0.05	3.75	0.01	0	0.38	0	2.25	6.02	2.63	0.16
Urban Residential	Prosopis sp.	FABACEAE	6	105 Mesquite	Mesquite		0.3	22.5	0	0	2.25	0	13.5	0.78	0.42	0.18
Urban Residential	Rhus lanicea	ANACARDIACEAE	1	010 USGS_shrubgrass	USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Urban Residential	Rosmarinus officinalis	LAMIACEAE	1	010 USGS_shrubgrass	USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Urban Residential	Schinus molle	ANACARDIACEAE	1	010 USGS_shrubgrass	USGS_shrubgrass		0.03	3.5	0.005	0	3.25	0.09	2.1	0.54	0.27	0.14
Urban Residential	Washingtonia sp.	ARECACIA	1	232 Yucca_Mojave	Yucca_Mojave		0.05	3.75	0.01	0	0.38	0	2.25	0.13	0.07	0.03
			100				0.83	165	0.46	0.05	31.74	178.49	99	38.67	16.4	10.82
							1	200	0.5	0	32	178	99	39	16	11

Weighted Urban Landuse Emission Factors
Based Upon Land Survey Results
Clark County, Nevada

LandUse	Botanical	CAMPH	MYRC	ATERP	BPHE	SABI	PCYM	OCIM	ATHU	TRPO	GTERP	METH	ETHE	PROPE	ETHO	ACET	HEXA	HEXE	HEXY
Suburban Residential	Barren	0	0	0	0	0	0	0	0	0	0	0	0.5	0.5	0.5	0.5	0.2	0.8	0.8
Suburban Residential	Euonymus sp.	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56	0.56
Suburban Residential	Fraxinus sp.	0	0	0.07	0	0.15	0	0	0	0	0	0	0.34	0.34	0.34	0.34	0.15	0.6	0.6
Suburban Residential	Grasses	1.32	1.32	1.32	0	0	0	0	0	0	0	0	2.97	2.97	2.97	2.97	1.32	5.28	5.28
Suburban Residential	Impervious	1.14	1.14	1.14	0	0	0	0	0	0	0	0	5.13	5.13	5.13	5.13	2.28	9.12	9.12
Suburban Residential	Juniperus sp.	0	0	0	0	0	0	0	0	0	0	0	0.63	0.63	0.63	0.63	0.28	1.12	1.12
Suburban Residential	Ligustrum sp.	0	0	0.07	0	0.15	0	0	0	0	0	0	0.34	0.34	0.34	0.34	0.15	0.6	0.6
Suburban Residential	Morus alba	0.21	0.21	0.21	0	0	0	0	0	0	0	0	1.02	1.02	1.02	1.02	0.45	1.8	1.8
Suburban Residential	Nerium oleander	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56	0.56
Suburban Residential	Olea europaea	0	0	0.07	0	0.15	0	0	0	0	0	0	0.34	0.34	0.34	0.34	0.15	0.6	0.6
Suburban Residential	Pinus sp.	0.52	0	0.66	0.04	0	0.14	0	0	0	0	0	1.26	1.26	1.26	1.26	0.56	2.24	2.24
Suburban Residential	Pittosporum sp.	0.56	0.06	0.51	0	0	0	0	0	0	0	0	0.34	0.34	0.34	0.34	0.15	0.6	0.6
Suburban Residential	Populus sp.	0.09	0.06	0.01	0	0	0	0.04	0	0	0	0	0.34	0.34	0.34	0.34	0.15	0.6	0.6
Suburban Residential	Prosopis sp.	0.03	0.03	0.03	0	0	0	0	0	0	0	0	0.34	0.34	0.34	0.34	0.15	0.6	0.6
Suburban Residential	Prunus sp.	0.03	0.04	0	0	0	0	0	0.08	0	0	0	0.34	0.34	0.34	0.34	0.15	0.6	0.6
Suburban Residential	Pyracantha sp.	0.03	0.03	0.03	0	0	0	0	0	0	0	0	0.34	0.34	0.34	0.34	0.15	0.6	0.6
Suburban Residential	Rosa	0.03	0.03	0.03	0	0	0	0	0	0	0	0	0.34	0.34	0.34	0.34	0.15	0.6	0.6
Suburban Residential	Rosmarinus officinalis	0.25	0.25	0.25	0	0	0	0	0	0	0	0	0.36	0.36	0.36	0.36	0.16	0.64	0.64
Suburban Residential	Senna sp.	0.03	0.03	0.03	0	0	0	0	0	0	0	0	0.34	0.34	0.34	0.34	0.15	0.6	0.6
Suburban Residential	Thuja plicata	1.03	1.3	0.1	0	0	0.54	0.68	0	0.75	0	0.04	1.35	1.35	1.35	1.35	0.6	2.4	2.4
Suburban Residential	Washingtonia sp.	0.06	0.06	0.06	0	0	0	0	0	0	0	0	0.68	0.68	0.68	0.68	0.3	1.2	1.2
		5.61	4.84	4.87	0.04	0.45	0.68	0.72	0.08	0.75	0	0.04	17.94	17.94	17.94	17.94	7.93	31.72	31.72
		6	5	5	0	0	1	1	0	1	0	0	18	18	18	18	8	32	32
Urban Residential	Acacia sp.	0.63	0	0.33	0	0	0	0	0	0	0	0	0.63	0.63	0.63	0.63	0.28	1.12	1.12
Urban Residential	Barren	0	0	0	0	0	0	0	0	0	0	0	0.65	0.65	0.65	0.65	0.26	1.04	1.04
Urban Residential	Fraxinus sp.	0	0	0.14	0	0.3	0	0	0	0	0	0	0.68	0.68	0.68	0.68	0.3	1.2	1.2
Urban Residential	Grasses	0.84	0.84	0.84	0	0	0	0	0	0	0	0	1.89	1.89	1.89	1.89	0.84	3.36	3.36
Urban Residential	Impervious	1.22	1.22	1.22	0	0	0	0	0	0	0	0	5.49	5.49	5.49	5.49	2.44	9.76	9.76
Urban Residential	Leucophyllum sp.	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56	0.56
Urban Residential	Nerium oleander	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56	0.56
Urban Residential	Olea europaea	0	0	0.14	0	0.3	0	0	0	0	0	0	0.68	0.68	0.68	0.68	0.3	1.2	1.2
Urban Residential	Pinus sp.	0.26	0	0.33	0.02	0	0.07	0	0	0	0	0	0.63	0.63	0.63	0.63	0.28	1.12	1.12
Urban Residential	Pittosporum sp.	0.56	0.06	0.51	0	0	0	0	0	0	0	0	0.34	0.34	0.34	0.34	0.15	0.6	0.6
Urban Residential	Prosopis sp.	0.18	0.18	0.18	0	0	0	0	0	0	0	0	2.04	2.04	2.04	2.04	0.9	3.6	3.6
Urban Residential	Rhus lancea	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56	0.56
Urban Residential	Rosmarinus officinalis	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56	0.56
Urban Residential	Schinus molle	0.14	0.14	0.14	0	0	0	0	0	0	0	0	0.32	0.32	0.32	0.32	0.14	0.56	0.56
Urban Residential	Washingtonia sp.	0.03	0.03	0.03	0	0	0	0	0	0	0	0	0.34	0.34	0.34	0.34	0.15	0.6	0.6
		4.42	3.03	4.42	0.02	0.6	0.07	0	0	0	0	0	14.97	14.97	14.97	14.97	6.6	26.4	26.4
		4	3	4	0	1	0	0	0	0	0	0	15	15	15	15	7	26	26

Weighted Urban Landuse Emission Factors
Based Upon Land Survey Results
Clark County, Nevada

LandUse	Botanical	FORM	ACTAL	BUTE	ETHA	FORAC	ACTAC	BUTO	CO	ORVOC	NO
Suburban Residential	Barren	0.2	0.2	0.2	0.1	0.1	0.1	0.1	1.5	0.8	0
Suburban Residential	Euonymus sp.	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Suburban Residential	Fraxinus sp.	0.15	0.15	0.15	0.08	0.08	0.08	0.08	1.13	0.6	0.02
Suburban Residential	Grasses	1.32	1.32	1.32	0.66	0.66	0.66	0.66	9.9	5.28	2.97
Suburban Residential	Impervious	2.28	2.28	2.28	1.14	1.14	1.14	1.14	17.1	9.12	3.42
Suburban Residential	Juniperus sp.	0.28	0.28	0.28	0.14	0.14	0.14	0.14	2.1	1.12	0.02
Suburban Residential	Ligustrum sp.	0.15	0.15	0.15	0.08	0.08	0.08	0.08	1.13	0.6	0.02
Suburban Residential	Morus alba	0.45	0.45	0.45	0.24	0.24	0.24	0.24	3.39	1.8	0.06
Suburban Residential	Nerium oleander	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Suburban Residential	Olea europaea	0.15	0.15	0.15	0.08	0.08	0.08	0.08	1.13	0.6	0.02
Suburban Residential	Pinus sp.	0.56	0.56	0.56	0.28	0.28	0.28	0.28	4.2	2.24	0.04
Suburban Residential	Pittosporum sp.	0.15	0.15	0.15	0.08	0.08	0.08	0.08	1.13	0.6	0.02
Suburban Residential	Populus sp.	0.15	0.15	0.15	0.08	0.08	0.08	0.08	1.13	0.6	0.02
Suburban Residential	Prosopis sp.	0.15	0.15	0.15	0.08	0.08	0.08	0.08	1.13	0.6	0.02
Suburban Residential	Prunus sp.	0.15	0.15	0.15	0.08	0.08	0.08	0.08	1.13	0.6	0.02
Suburban Residential	Pyracantha sp.	0.15	0.15	0.15	0.08	0.08	0.08	0.08	1.13	0.6	0.02
Suburban Residential	Rosa	0.15	0.15	0.15	0.08	0.08	0.08	0.08	1.13	0.6	0.02
Suburban Residential	Rosmarinus officinalis	0.16	0.16	0.16	0.08	0.08	0.08	0.08	1.2	0.64	0.02
Suburban Residential	Senna sp.	0.15	0.15	0.15	0.08	0.08	0.08	0.08	1.13	0.6	0.02
Suburban Residential	Thuja plicata	0.6	0.6	0.6	0.3	0.3	0.3	0.3	4.5	2.4	0.02
Suburban Residential	Washingtonia sp.	0.3	0.3	0.3	0.16	0.16	0.16	0.16	2.26	1.2	0.04
		7.93	7.93	7.93	4.04	4.04	4.04	4.04	59.55	31.72	7.09
		8	8	8	4	4	4	4	60	32	7
Urban Residential	Acacia sp.	0.28	0.28	0.28	0.14	0.14	0.14	0.14	2.1	1.12	0.02
Urban Residential	Barren	0.26	0.26	0.26	0.13	0.13	0.13	0.13	1.95	1.04	0
Urban Residential	Fraxinus sp.	0.3	0.3	0.3	0.16	0.16	0.16	0.16	2.26	1.2	0.04
Urban Residential	Grasses	0.84	0.84	0.84	0.42	0.42	0.42	0.42	6.3	3.36	1.89
Urban Residential	Impervious	2.44	2.44	2.44	1.22	1.22	1.22	1.22	18.3	9.76	3.66
Urban Residential	Leucophyllum sp.	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Urban Residential	Nerium oleander	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Urban Residential	Olea europaea	0.3	0.3	0.3	0.16	0.16	0.16	0.16	2.26	1.2	0.04
Urban Residential	Pinus sp.	0.28	0.28	0.28	0.14	0.14	0.14	0.14	2.1	1.12	0.02
Urban Residential	Pittosporum sp.	0.15	0.15	0.15	0.08	0.08	0.08	0.08	1.13	0.6	0.02
Urban Residential	Prosopis sp.	0.9	0.9	0.9	0.48	0.48	0.48	0.48	6.78	3.6	0.12
Urban Residential	Rhus lancea	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Urban Residential	Rosmarinus officinalis	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Urban Residential	Schinus molle	0.14	0.14	0.14	0.07	0.07	0.07	0.07	1.05	0.56	0.15
Urban Residential	Washingtonia sp.	0.15	0.15	0.15	0.08	0.08	0.08	0.08	1.13	0.6	0.02
		6.6	6.6	6.6	3.36	3.36	3.36	3.36	49.56	26.4	6.58
		7	7	7	3	3	3	3	50	26	7

APPENDIX B

BIOGENIC EMISSIONS DERIVATION AND DIRECTORY SETUP FOR DATA TRANSFER AND USE

README File for Biogenics data for Las Vegas

A README file was submitted to The Clark Co. Department of Air Quality and Environmental Management (DAQEM) on October 20, 2005 which contained a description of the data, scripts, and programs that were used to develop the Las Vegas SMOKE/BEIS3 compatible data sets. The following text describes the information in the README file and includes the directory structure of the hard drive that contained the biogenics data (submitted to DAQEM) as well as an overview of the processing steps to integrate the land use data specific for Clark Co. into the BEIS Model emission estimates.

Directory Structure:

The directory structure of the Las Vegas biogenics data is as follows:

```
--biogenics_vegas
  |
  |--build*aml          (ARC AML scripts to build Las Vegas grid structures)
  |
  |--beld3mas           (ARC coverage of outlines of BELD3 tiles [useful in determining
  |                      which BELD3 tiles need to be used in study])
  |--veg??kmbox         (ARC coverages of outlines of Las Vegas grid structures in
  |                      the Las Vegas map projection created by build*.aml where ?? is
  |                      13, 04, 12, or 36)
  |--veg??kmboxprj      (ARC coverages of outlines of Las Vegas grid structures in
  |                      the BELD3 map projection created by build*.amlwhere ?? is 13,
  |                      04, 12, or 36)
  |--vegas??km          (ARC coverages of full Las Vegas grid structures in
  |                      the Las Vegas map projection created by build*.aml where ?? is
  |                      13, 04, 12, or 36)
  |--vegas??kmprj       (ARC coverages of full Las Vegas grid structures in
  |                      the BELD3 map projection created by build*.aml where ?? is 13,
  |                      04, 12, or 36)
  |--info               (internal ARC/Info data files)
  |
  |--beld3_01_to_06     (BELD3 tiles 01 through 06 in native BELD3 map projection)
  |  |
  |  |--grid??          (ARC coverages of BELD3 grids in native BELD3 map projection
  |  |                   created by build_grids.aml where ?? is 02-03)
  |  |--lv36grd??       (ARC coverages of intersected BELD3 grids and 36 km Las Vegas
  |  |                   grid structure created by identity*.aml where ?? is 02-03)
  |  |--lv36grd??.dat   (results of intersection of BELD3 grids and 36 km Las Vegas
  |  |                   grid structure created by identity*.aml where ?? is 02-03)
  |  |--build_grids.aml (ARC AML script to build BELD3 grid structures)
  |  |
  |  |--identity*.aml   (ARC AML script to intesect BELD3 grids with Las Vegas grids)
  |  |
  |  |--info            (internal ARC/Info data files)
  |
  |--beld3_07_to_12     (BELD3 tiles 07 through 12 in native BELD3 map projection)
  |  |
  |  |--grid??          (ARC coverages of BELD3 grids in native BELD3 map projection
  |  |                   created by build_grids.aml where ?? is 07-09)
  |  |--lv$$grd??       (ARC coverages of intersected BELD3 grids and Las Vegas
  |  |                   grid structures created by identity*.aml where $$ is 13, 04,
  |  |                   12, or 36 and ?? is 07-09)
  |  |--lv$$grd??.dat   (results of intersection of BELD3 grids and Las Vegas
  |  |                   grid structures created by identity*.aml where $$ is 13, 04,
  |  |                   12, or 36 and ?? is 07-09)
  |  |--build_grids.aml (ARC AML script to build BELD3 grid structures)
  |  |
```

```
|  |--identity*.aml   (ARC AML scripts to intesect BELD3 grids with Las Vegas grids)
|  |
|  |--info            (internal ARC/Info data files)
|
|--beld3_13_to_18     (BELD3 tiles 13 through 18 in native BELD3 map projection
|  |
|  |--grid??          (ARC coverages of BELD3 grids in native BELD3 map projection
|  |                   created by build_grids.aml where ?? is 13-15)
|  |--lv$$grd??       (ARC coverages of intersected BELD3 grids and Las Vegas
|  |                   grid structures created by identity*.aml where $$ is 13, 04,
|  |                   12, or 36 and ?? is 13-15)
|  |--lv$$grd??.dat   (results of intersection of BELD3 grids and Las Vegas
|  |                   grid structures created by identity*.aml where $$ is 13, 04,
|  |                   12, or 36 and ?? is 13-15)
|  |--build_grids.aml (ARC AML script to build BELD3 grid structures)
|  |
|  |--identity*.aml   (ARC AML scripts to intesect BELD3 grids with Las Vegas grids)
|  |
|  |--info            (internal ARC/Info data files)
|
|--beld3_19_to_24     (BELD3 tiles 19 through 024in native BELD3 map projection
|  |
|  |--grid??          (ARC coverages of BELD3 grids in native BELD3 map projection
|  |                   created by build_grids.aml where ?? is 19-20)
|  |--lv36grd??       (ARC coverages of intersected BELD3 grids and 36 km Las Vegas
|  |                   grid structure created by identity*.aml where ?? is 19-20)
|  |--lv36grd??.dat   (results of intersection of BELD3 grids and 36 km Las Vegas
|  |                   grid structure created by identity*.aml where ?? is 19-20)
|  |--build_grids.aml (ARC AML script to build BELD3 grid structures)
|  |
|  |--identity*.aml   (ARC AML script to intesect BELD3 grids with Las Vegas grids)
|  |
|  |--info            (internal ARC/Info data files)
|
|--bioseason          (contains FORTRAN code and shell scripts to build an annual
|  |                   temperature netCDF and to build the SMOKE/BEIS3 BIOSEASON
                      netCDF)
|  |--*.EXT           (FORTRAN include files)
|  |
|  |--create*.f       (FORTRAN program to read temperature data stored in multiple
|  |                   netCDFs and construct a single netCDF of the annual, hourly
|  |                   temperatures)
|  |--Makefile        (unix makefile to compile FORTRAN code [must be modified for the
|  |                   user's system])
|  |--create_annual_temperature_file.csh
|  |                  (C-shell script to run FORTRAN program [must be modified for the
|  |                   user's system])
|  |--create_bioseason.csh
|  |                  (C-shell script to create a SMOKE/BEIS3 BIOSEASON netCDF [must
                      be modified for the user's system])
|
|--fortran_processing (contains the FORTRAN code and csh scripts necessary to create
|  |                   the IO-API compatible SMOKE/BEIS3 data sets)
|  |--*.EXT           (FORTRAN include files)
|  |
|  |--create_BEIS3_BELD3.f
|  |                  (FORTRAN program to create the SMOKE/BEIS3 BELDA and BELDB
                      netCDF)
|  |
|  |--create_BEIS3_FIA.f
|  |                  (FORTRAN program to create the SMOKE/BEIS3 BELD_TOT netCDF)
|  |--makefile_BEIS3_BELD3
|  |                  (unix makefile to compile FORTRAN code [must be modified for the
```

```
|  |                    user's system])
|  |--makefile_BEIS3_FIA
|  |                   (unix makefile to compile FORTRAN code [must be modified for the
|  |                    user's system])
|  |--run*             (C-shell scripts to run FORTRAN programs [must be modified for
|                       the user's system])
|  |--BELD_@_VEGAS??_xxxXyyy.ncf
|  |                   (SMOKE/BEIS3 netCDFs of BELD3-only data where @ is A, B, or T;
|  |                    ?? is 13, 04, 12, or 36; xxx and yyy are the x-cell and y-cell
|  |                    specifications for the particular grid strucutre)
|  |--BELD_@_VEGAS??_xxxXyyy_blended.ncf
|  |                   (SMOKE/BEIS3 netCDFs of the blended Clark County and BELD3 data
|  |                    where @ is A, B, or T; ?? is 13, 04, 12, or 36; xxx and yyy are
|  |                    the x-cell and y-cell specifications for the particular grid
|  |                    strucutre)
|
|--sas_processing     (contains the SAS scripts, BEIS3 emissions factors, and BELD3
|  |                    data that are used to generate data sets suitable for pro-
|  |                    cessing into IO-API compatible data sets)
|  |--BEIS3*.dat      (old BEIS3 emissions factors data sets [used only to extract
|  |                    proper BELD3 plant species names)
|  |--load_efact.sas  (SAS script to read the BEIS3*.dat data and generate a SAS data
|                       set)
|  |
|  |--create_blended_Clark_County_and_BELD3_*km_for_SMOKE.sas
|  |                   (SAS scripts that blend BELD3 data and Clark County data into
|  |                    a consistent land use data set where * is 1.3, 04, 12, or 36)
|  |--create_vegas_*km_BELD3_for_SMOKE.sas
|  |                   (SAS scripts that use BELD3-only to create a consistent land use
|  |                    data set where * is 1.3, 04, 12, or 36)
|  |--create_vegas_*km_to_BELD3_grid_cell_cross_reference.sas
|  |                   (SAS scripts that estimates the fraction of each BELD3 grid cell
|  |                    in the Las Vegas AQ modeling grid cells where * is 1.3, 04, 12,
|  |                    or 36)
|  |--create_vegas_*km_to_Clark_County_LU_grid_cell_cross_reference.sas
|  |                   (SAS scripts that estimates the fraction of each Clark County
|  |                    01 km grid cell in the Las Vegas AQ modeling grid cells where
|  |                    * is 1.3, 04, 12, or 36)
|  |--xref_v??.sas7bdat
|  |                   (SAS data sets created by
|  |                    create_vegas_*km_to_BELD3_grid_cell_cross_reference.sas where
|  |                    ?? is 13, 04, 12, or 36)
|  |--xref_cc_v??.sas7bdat
|  |                   (SAS data sets created by
|                       create_vegas_*km_to_Clark_County_LU_grid_cell_cross_reference.s
|                       as where ?? is 13, 04, 12, or 36)
|  |--beld3_for_vegas_??km.pave
|  |                   (ASCII data file of BELD3-only land use data created by
|  |                    create_vegas_*km_BELD3_for_SMOKE.sas where ?? is 13, 04, 12, or
|                       36)
|  |--beld3_for_vegas_??km_cc.pave
|  |                   (ASCII data file of blended BELD3 and Clark County land use data
|  |                    created by
|                       create_blended_Clark_County_and_BELD3_*km_for_SMOKE.sas
|  |                    where ?? is 13, 04, 12, or 36)
|  |--fia_for_vegas_??km.pave
|  |                   (ASCII data file of summary BELD3-only land use data created by
|  |                    create_vegas_*km_BELD3_for_SMOKE.sas where ?? is 13, 04, 12, or
|                       36)
|  |--fia_for_vegas_??km_cc.pave
|  |                   (ASCII data file of summary blended BELD3 and Clark County land
|                       use data created by
|                       create_blended_Clark_County_and_BELD3_*km_for_SMOKE.sas
```

```
|  |                    where ?? is 13, 04, 12, or 36)
|  |--bgpro_for_vegas_??km.txt
|  |                   (SMOKE-ready ASCII data file of biogenic landuse surrogates
|  |                    created by
|  |                    create_vegas_*km_BELD3_for_SMOKE.sas where ?? is 13, 04, 12, or
                       36)
|  |--bgpro_for_vegas_??km_cc.txt
|  |                   (SMOKE-ready ASCII data file of biogenic landuse surrogates
|  |                    created by
                       create_blended_Clark_County_and_BELD3_*km_for_SMOKE.sas
|  |                    where ?? is 13, 04, 12, or 36)
|  |--beld3v??.sas7bdat
|  |                   (SAS data set of BELD3-only land use data created by
|  |                    create_vegas_*km_BELD3_for_SMOKE.sas where ?? is 13, 04, 12, or
                       36)
|  |--beld3v??_cc.sas7bdat
|  |                   (SAS data set of blended BELD3 and Clark County land use data
|  |                    created by
                       create_blended_Clark_County_and_BELD3_*km_for_SMOKE.sas
|  |                    where ?? is 13, 04, 12, or 36)
|  |--beld3            (directory contains the raw BELD3 data)
|
|--clark_county_landuse
|  |                   (directory contains the summary Clark County land use data)
|  |
|  |--CrossTab*.ncf    (the 01 km and 1.33 km land use netCDF data sets for Clark
                       County)
|  |
|  |--dump_las_vegas_lv.csh
|  |                   (C-shell script that uses PAVE to dump the land use data sets
                       from
|  |                    CrossTab*.ncf to ASCII data files)
|  |--identity_clarklu_01km_grid_to_vegas??km_grid.aml
|  |                   (ARC AML script to intersect the 01 km Clark County grid to the
|  |                    Las Vegas AQ modeling grids where ?? is 13, 04, 12, or 36)
|  |--build_rpo_01km_grid.aml
|  |                   (ARC AML script to build the 01 km Clark County grid)
|  |--rpo01km, rpo01km_prj
|  |                   (ARC coverages of the 01 km Clark County grid in RPO map
                       projection
|  |                    and Las Vegas map projection)
|  |--LU_*.dat         (ASCII dumps from PAVE of the Clark County land use created by
|  |                    dump_las_vegas_lv.csh)
|  |--lv??rpo01km      (ARC coverages of intersected Las Vegas AQ modeling grids and
                       the 01 km Clark County grid structure created by identity*.aml
                       where
|  |                    ?? is 13, 04, 12, or 36)
|  |--lv??rpo01km.dat  (results of intersection of Las Vegas AQ modeling grids and the
|  |                    01 km Clark County grid structure created by identity*.aml
                       where ?? is 13, 04, 12, or 36)
|  |--info             (internal ARC/Info data files)
|
|--smoke               (root directory for SMOKE/BEIS3)
|  |
|  |--assigns_vegas    (SMOKE 'assigns' files)
|  |
|  |--data_vegas
|  |  |
|  |  |--ge_dat        (general data files used during SMOKE processing)
|  |  |
|  |  |--inventory
|  |  |  |
|  |  |  |--vegas      (contains data files generated during SMOKE processing)
```

```
|   |   |   |   |  |
|   |   |   |   |  |--area   (dummy directory created during SMOKE/BEIS3 processing)
|   |   |   |   |  |
|   |   |   |   |  |--biog   (dummy directory created during SMOKE/BEIS3 processing)
|   |   |   |   |  |
|   |   |   |   |  |--mobile (dummy directory created during SMOKE/BEIS3 processing)
|   |   |   |   |  |
|   |   |   |   |  |--nonroad(dummy directory created during SMOKE/BEIS3 processing)
|   |   |   |   |  |
|   |   |   |   |  |--other  (dummy directory created during SMOKE/BEIS3 processing)
|   |   |   |   |  |
|   |   |   |   |  |--point  (dummy directory created during SMOKE/BEIS3 processing)
|   |   |   |   |
|   |   |   |   |--beld3     (contains static BELD3 data sets specific to the Las Vegas air
|   |   |   |                 quality modeling domains)
|   |   |   |--reports      (repository for SMOKE reports)
|   |   |   |   |
|   |   |   |   |--scenario
|   |   |   |   |
|   |   |   |   |--static
|   |   |   |
|   |   |   |--run_vegas    (SMOKE outputs for the BELD3-only case)
|   |   |   |   |
|   |   |   |   |--output    (SMOKE outputs)
|   |   |   |   |  |
|   |   |   |   |  |--cmaq.cb4p25 (IO-API compatible AQM-ready biogenic emissions files)
|   |   |   |   |  |
|   |   |   |   |  |--merge  (dummy directory created during SMOKE/BEIS3 processing)
|   |   |   |   |
|   |   |   |   |--scenario
|   |   |   |   |
|   |   |   |   |--static
|   |   |   |   |  |
|   |   |   |   |  |--logs   (log files created during SMOKE processing)
|   |   |   |   |  |
|   |   |   |   |  |--m6     (dummy directory created during SMOKE/BEIS3 processing)
|   |   |   |   |  |
|   |   |   |   |  |--m6emfac(dummy directory created during SMOKE/BEIS3 processing)
|   |   |   |   |  |
|   |   |   |   |  |--m6met  (dummy directory created during SMOKE/BEIS3 processing)
|   |   |   |   |  |
|   |   |   |   |  |--m6spd  (dummy directory created during SMOKE/BEIS3 processing)
|   |   |   |   |  |
|   |   |   |   |  |--tmp    (dummy directory created during SMOKE/BEIS3 processing)
|   |   |   |
|   |   |   |--run_vegas_blended
|   |   |   |   |            (SMOKE outputs for the blended Clark County and BELD3 data case)
|   |   |   |   |
|   |   |   |   |--output    (SMOKE outputs)
|   |   |   |   |  |
|   |   |   |   |  |--cmaq.cb4p25 (IO-API compatible AQM-ready biogenic emissions files)
|   |   |   |   |  |
|   |   |   |   |  |--merge  (dummy directory created during SMOKE/BEIS3 processing)
|   |   |   |   |
|   |   |   |   |--scenario
|   |   |   |   |
|   |   |   |   |--static
|   |   |   |   |  |
|   |   |   |   |  |--logs   (log files created during SMOKE processing)
|   |   |   |   |  |
|   |   |   |   |  |--m6     (dummy directory created during SMOKE/BEIS3 processing)
|   |   |   |   |  |
|   |   |   |   |  |--m6emfac(dummy directory created during SMOKE/BEIS3 processing)
```

```
|  |  |  |  |
|  |  |  |  |--m6met  (dummy directory created during SMOKE/BEIS3 processing)
|  |  |  |  |
|  |  |  |  |--m6spd  (dummy directory created during SMOKE/BEIS3 processing)
|  |  |  |  |
|  |  |  |  |--tmp    (dummy directory created during SMOKE/BEIS3 processing)
|  |
|  |--scripts
|  |  |
|  |  |--run_vegas    (script files to drive SMOKE/BEIS3 processing)
```

Synopsis of BEIS Model Calculations:

Step 1 -- Construct the Las Vegas 1.3 km, 04 km, 12 km, and 36 km grid structures
in Las Vegas map projection and BELD3 map projection (ARC/Info)
Step 2 -- Determine which BELD3 tiles are needed (ARC/Info)
Step 3 -- Build BELD3 tiles (ARC/Info)
Step 4 -- Intersect the AQM grid structure with the BELD3 tiles (ARC/Info)
Step 5 -- Intersect the AQM grid structure with the Clark County landuse data (ARC/Info)
Step 6 -- Load an emissions factors data set (SAS)
Step 7 -- Regrid the BELD3 data to the AQM grid structures (SAS)
Step 8 -- Blend the Clark County data and BELD3 data (SAS)
Step 9 -- Create the IO-API compatible SMOKE/BEIS3 data sets (FORTRAN)
Step 10 -- Run SMOKE/BEIS3

Discussion of BEIS Model Calculations:

Step 1 -- Construct the Las Vegas 1.3 km, 04 km, 12 km, and 36 km grid structures in Las Vegas map projection and BELD3 map projection (ARC/Info)

In order to grid the BELD3 data, it is necessary to have the four Las Vegas grid structures in ARC coverages. Four ARC AML scripts are provided to create ARC coverages of the Las Vegas grid structures. The names of the scripts and how
to run them are as follows:

```
% cd biogenics_vegas
% arc '&r build_vegas_1.3km_grid.aml'
% arc '&r build_vegas_04km_grid.aml'
% arc '&r build_vegas_12km_grid.aml'
% arc '&r build_vegas_36km_grid.aml'
```

When run, the ARC AML scripts create four ARC coverages per script: vegas??km; vegas??km_prj; vegas??boxkm; and vegas??boxprj (where ?? is 13, 04, 12 or 36). The ARC coverages vegas??km and vegas??km_prj are the full grid strucutres whereas
vegas??box; and vegas??boxprj are simply the outlines of the grids. The map projections of the vegas??km and vegas??box are that of the Las Vegas AQ modeling
domain:

Projection: Lambert Conformal Conic
Units: meters
Spheroid: sphere
Datum: none

1st standard parallel: 33.0 degrees
2nd standard parallel: 45.0 degrees
central merdian: -118.0 degrees
latitude of origin: 37.0 degrees

The map projections of the vegas??km_prj and vegas??boxprj are that of the BELD3 domain:

Projection: Lambert Conformal Conic
Units: meters
Spheroid: sphere
Datum: none
1st standard parallel: 30.0 degrees
2nd standard parallel: 60.0 degrees
central merdian: -90.0 degrees
latitude of origin: 40.0 degrees

The ARC AML scripts are reasonably well documented should changes be necessary to
build similar grid structures.

Step 2 -- Determine which BELD3 tiles are needed (ARC/Info)

In ARC, plot the BELD3MAS coverage and the vegas??boxprj coverages. For example,
you can issue the following ARC commands:

```
% arc
Arc: display 9999
Arc: arcplot
Arcplot: mape beld3mas
Arcplot: polys beld3mas
Arcplot: linecolor 2
Arcplot: polys vegas04boxprj
```

The graphic that results will indicate that the 04 km Las Vegas grid structure overlaps BELD3 tiles 8 and 14. This needs to be performed for each grid structure.
For the current Las Vegas grid definitions, the following BELD3 tiles are required:

36 km -- BELD3 tiles 2, 3, 7, 8, 9, 13, 14, 15, 19, 20
12 km -- BELD3 tiles 7, 8, 13, 14, 15
04 km -- BELD3 tiles 8, 14
1.33 km -- BELD3 tiles 8, 14

Step 3 -- Build BELD3 tiles (ARC/Info)

In order to regrid the BELD3 data, it is necessary to construct the BELD3 tiles. Four directories exist for managing this effort:

beld3_01_to_06 (BELD3 tiles 01 through 06);
beld3_07_to_12 (BELD3 tiles 07 through 12);
beld3_13_to_18 (BELD3 tiles 13 through 18); and
beld3_19_to_24 (BELD3 tiles 19 through 24).

The ARC AML script 'build_grids.aml' exists in each of the aforementioned

directories. This script contains the parameters necessary to build the one kilometer resolved BELD3 tiles. The ARC AML script is run as follows:

```
% cd biogenics_vegas/beld3_01_to_06
% arc '&r build_grids.aml'
```

This script can be modified (line 27) to selectively build BELD3 grids. This creates the ARC coverages biogenics_vegas/beld3_01_to_06/grid?? and biogenics_vegas/beld3_01_to_06/grid??_prj where ?? is from 01 to 06. Similarly, running the script 'build_grids.aml' in the other directories will create similar ARC coverages.

All coverages in these directories have the following map projection parameters:

Projection: Lambert Conformal Conic
Units: meters
Spheroid: sphere
Datum: none
1st standard parallel: 30.0 degrees
2nd standard parallel: 60.0 degrees
central merdian: -90.0 degrees
latitude of origin: 40.0 degrees

Step 4 -- Intersect the AQM grid structure with the BELD3 tiles (ARC/Info)

We are now ready to intersect the BELD3 tiles with the air quality modeling domain grid structure. The results of the intersection will be used to extract the BELD3 data and regrid them to the Las Vegas AQM grid structures. The same four directories that were used in Step 3 are used here to perform this effort:

beld3_01_to_06 (BELD3 tiles 01 through 06);
beld3_07_to_12 (BELD3 tiles 07 through 12);
beld3_13_to_18 (BELD3 tiles 13 through 18); and
beld3_19_to_24 (BELD3 tiles 19 through 24).

The following ARC AML scripts may be in the directories:

identity_beld3_grid_to_vegas1.3km_grid.aml;
identity_beld3_grid_to_vegas04km_grid.aml;
identity_beld3_grid_to_vegas12km_grid.aml; and
identity_beld3_grid_to_vegas36km_grid.aml.

'May' is the keyword here. If one or more of the BELD3 tiles from the respective directory has the potential to intersect the AQM grid structure, an ARC AML script will exist. The ARC AML scripts are run as follows:

```
% cd biogenics_vegas/beld3_07_to_12
% arc '&r identity_beld3_grid_to_vegas1.3km_grid.aml'
% arc '&r identity_beld3_grid_to_vegas04km_grid.aml'
% arc '&r identity_beld3_grid_to_vegas12km_grid.aml'
% arc '&r identity_beld3_grid_to_vegas36km_grid.aml'
```

Again, if an ARC AML script does not exist in the directory, it has been predetermined that the AQM grid does not have the potential to intersect the BELD3 tiles in the respective directory. This was done by examining a simple overlay of the coverages (Step 2) with the AQM grid structures

The ARC AML scripts will create ARC coverages of the form 'lv$$grd??' where $$ is either 36, 12, 04, or 13 and ?? is 01 through 24. Further, the ARC AML scripts
will create ASCII files of the form 'lv$$grd??.dat' where $$ is either 36, 12, 04, or 13 and ?? is 01 through 24.

Step 5 -- Intersect the AQM grid structure with the Clark County landuse data (ARC/Info)

Prior to intersecting the AQM grid structures with the Clark County 01 km grid, it
is necessary to dump the land use data contained in the netCDFs (i.e., biogenics_vegas/clark_county_landuse/Cross*ncf). A simple C-shell script,
dump_las_vegas_lv.csh, has been provided to perform this function. The C-shell script uses PAVE (www.cmascenter.org/html/models.html) to export the data from the
netCDFs. Run the script as follows:

```
% dump_las_vegas_lv.csh
```

You will need to modify the C-shell script to change the name of the netCDF to dump. The C-shell script will create ASCII data files of the form LU_*_$km.dat where * species the land use code (1 - 9 and R01-R23) and $ is either 01 or 1.33.

We also must build the 01 km RPO grid structure upon which the Clark County data resides. This is done by running the following ARC AML script:

```
% cd biogenics_vegas/clark_county_landuse
% arc '&r build_rpo_01km_grid.aml'
```

The ARC AML script will create the following ARC coverages:

rpo01km; and
rpo01km_prj

The rpo01km coverage is in the standard RPO coverage:

Projection: Lambert Conformal Conic
Units: meters
Spheroid: GRD1980
Datum: NAD83
1st standard parallel: 33.0 degrees
2nd standard parallel: 45.0 degrees
central merdian: -97.0 degrees
latitude of origin: 40.0 degrees

The rpo01km_prj coverage is in the Las Vegas AQ modeling domain map projection:

Projection: Lambert Conformal Conic
Units: meters
Spheroid: sphere
Datum: none
1st standard parallel: 33.0 degrees
2nd standard parallel: 45.0 degrees

central merdian: -118.0 degrees
latitude of origin: 37.0 degrees

We are now ready to intersect the Clark County data with the air quality modeling
domain grid structure. The following ARC AML scripts may be in the directories:

```
identity_clarklu_01km_grid_to_vegas13km_grid.aml;
identity_clarklu_01km_grid_to_vegas04km_grid.aml;
identity_clarklu_01km_grid_to_vegas12km_grid.aml; and
identity_clarklu_01km_grid_to_vegas36km_grid.aml.
```

The ARC AML scripts are run as follows:

```
% cd biogenics_vegas/clark_county_landuse
% arc '&r identity_clarklu_01km_grid_to_vegas13km_grid.aml'
% arc '&r identity_clarklu_01km_grid_to_vegas04km_grid.aml'
% arc '&r identity_clarklu_01km_grid_to_vegas12km_grid.aml'
% arc '&r identity_clarklu_01km_grid_to_vegas36km_grid.aml'
```

The ARC AML scripts will create ARC coverages of the form 'lv??rpo01km' where ?? is either 36, 12, 04, or 13. Further, the ARC AML scripts will create ASCII files
of the form 'lv$$rpo01km.dat' where $$ is either 36, 12, 04, or 13.

Step 6 -- Load an emissions factors data set (SAS)

In order to prepare SMOKE/BEIS3 data sets, the proper plant names must be used. These names are maintained in an ASCII file that must be loaded into a SAS data set. The program to read the third generation of the biogenic emissions
factors is 'load_efact.sas.' The SAS script is run as follows:

```
% cd biogenics_vegas/sas_processing
% sas -sysparm "??" load_efact.sas
```

where ?? is V1, V2, or V3. It does not matter which V? is used as these data are only used to return a proper plant species name and all versions of the data sets have the same plant species names.

Step 7 -- Regrid the BELD3 data to the AQM grid structures (SAS)

The effort to regrid the BELD3 data to the AQM grid strcutures is performed in two
stages. In the first stage, the ASCII files created in Step 4 are read and a SAS
data set is created that represents the fraction of each BELD3 grid cell that resides in each grid cell of the AQM grid structures. In the second stage, the actual BELD3 data are combined with the results of the first stage and results from
Step 6 to create ASCII data files. These ASCII data files contain the areal extent
of each BELD3 plant species that reside in the grid cells of each AQM grid strucutre.

Stage one processing is performed using the following SAS scripts:

```
sas_processing/create_vegas_1.3km_to_BELD3_grid_cell_cross_reference.sas;
        sas_processing/create_vegas_04km_to_BELD3_grid_cell_cross_reference.sas
        sas_processing/create_vegas_12km_to_BELD3_grid_cell_cross_reference.sas;
and
        sas_processing/create_vegas_36km_to_BELD3_grid_cell_cross_reference.sas.

The SAS scripts are run as follows:

        % cd biogenics_vegas/sas_processing
        % sas create_vegas_1.3km_to_BELD3_grid_cell_cross_reference.sas
        % sas create_vegas_04km_to_BELD3_grid_cell_cross_reference.sas
        % sas create_vegas_12km_to_BELD3_grid_cell_cross_reference.sas
        % sas create_vegas_36km_to_BELD3_grid_cell_cross_reference.sas

Once run, the SAS scripts will create the following SAS data sets:

        xref_v13.sas7bdat;
        xref_v04.sas7bdat;
        xref_v12.sas7bdat; and
        xref_v36.sas7bdat.

Stage two processing is performed using the following SAS scripts:


        sas_processing/create_vegas_1.3km_BELD3_for_SMOKE.sas
        sas_processing/create_vegas_04km_BELD3_for_SMOKE.sas
        sas_processing/create_vegas_12km_BELD3_for_SMOKE.sas
        sas_processing/create_vegas_36km_BELD3_for_SMOKE.sas

The SAS scripts are run as follows:

        % cd biogenics_vegas/sas_processing
        % sas create_vegas_1.3km_BELD3_for_SMOKE.sas
        % sas create_vegas_04km_BELD3_for_SMOKE.sas
        % sas create_vegas_12km_BELD3_for_SMOKE.sas
        % sas create_vegas_36km_BELD3_for_SMOKE.sas

Once run, the SAS scripts will create the following SAS data sets:

        beld3v13.sas7bdat;
        beld3v04.sas7bdat;
        beld3v12.sas7bdat; and
        beld3v36.sas7bdat.

Further, the SAS scripts will create the following ASCII data files:

        beld3_for_vegas_13km.pave;
        beld3_for_vegas_04km.pave;
        beld3_for_vegas_12km.pave;
        beld3_for_vegas_36km.pave;
        fia_for_vegas_13km.pave;
        fia_for_vegas_04km.pave;

        fia_for_vegas_12km.pave;
        fia_for_vegas_36km.pave;
        bgpro_for_vegas_13km.pave;
```

bgpro_for_vegas_04km.pave;
bgpro_for_vegas_12km.pave; and
bgpro_for_vegas_36km.pave.

Step 8 -- Blend the Clark County data and BELD3 data (SAS)

As in Step 7, the effort to regrid the BELD3 data to the AQM grid structures is performed in two stages. In the first stage, the ASCII files created in Step 5 are read and a SAS data set is created that represents the fraction of each Clark
County 01 km grid cell that resides in each grid cell of the AQM grid structures.
In the second stage, the actual BELD3 (Step 4) and Clark County (Step 5) data are
combined with the results of the first stage and results from Step 6 to create ASCII data files. These ASCII data files contain the areal extent of each BELD3 plant species outside of Clark County and the areal extent of the Clark County land use categories that reside in the grid cells of each AQM grid strucutre.

Stage one processing is performed using the following SAS scripts:

sas_processing/create_vegas_04km_to_Clark_County_LU_grid_cell_cross_reference.sas;

sas_processing/create_vegas_12km_to_Clark_County_LU_grid_cell_cross_reference.sas; and

sas_processing/create_vegas_36km_to_Clark_County_LU_grid_cell_cross_reference.sas.

The SAS scripts are run as follows:

```
% cd biogenics_vegas/sas_processing
% sas
create_vegas_04km_to_Clark_County_LU_grid_cell_cross_reference.sas;
% sas
create_vegas_12km_to_Clark_County_LU_grid_cell_cross_reference.sas; and
% sas
create_vegas_36km_to_Clark_County_LU_grid_cell_cross_reference.sas.
```

Once run, the SAS scripts will create the following SAS data sets:

xref_cc_v04.sas7bdat;
xref_cc_v12.sas7bdat; and
xref_cc_v36.sas7bdat.

Stage two processing is performed using the following SAS scripts:

sas_processing/create_blended_Clark_County_and_BELD3_1.3km_for_SMOKE.sas
sas_processing/create_blended_Clark_County_and_BELD3_04km_for_SMOKE.sas
sas_processing/create_blended_Clark_County_and_BELD3_12km_for_SMOKE.sas
sas_processing/create_blended_Clark_County_and_BELD3_36km_for_SMOKE.sas

The SAS scripts are run as follows:

```
% cd biogenics_vegas/sas_processing
```

```
% sas create_blended_Clark_County_and_BELD3_1.3km_for_SMOKE.sas
% sas create_blended_Clark_County_and_BELD3_04km_for_SMOKE.sas
% sas create_blended_Clark_County_and_BELD3_12km_for_SMOKE.sas
% sas create_blended_Clark_County_and_BELD3_36km_for_SMOKE.sas
```

Once run, the SAS scripts will create the following SAS data sets:

```
beld3v13_cc.sas7bdat;
beld3v04_cc.sas7bdat;
beld3v12_cc.sas7bdat; and
beld3v36_cc.sas7bdat.
```

Further, the SAS scripts will create the following ASCII data files:

```
beld3_for_vegas_13km_cc.pave;
beld3_for_vegas_04km_cc.pave;
beld3_for_vegas_12km_cc.pave;
beld3_for_vegas_36km_cc.pave;
fia_for_vegas_13km_cc.pave;
fia_for_vegas_04km_cc.pave;
fia_for_vegas_12km_cc.pave;
fia_for_vegas_36km.pave;
bgpro_for_vegas_13km_cc.pave;
bgpro_for_vegas_04km_cc.pave;
bgpro_for_vegas_12km_cc.pave; and
bgpro_for_vegas_36km_cc.pave.
```

Step 9 -- Create the IO-API compatible SMOKE/BEIS3 data sets (FORTRAN)

We are now ready to create the IO-API SMOKE/BEIS3 data sets. All work in this step is performed in the directory 'fortran_processing.' Firstly, the FORTRAN programs must be compiled. This is accomplished by the following commands:

```
% cd biogenics_vegas/fortran_processing
% make -f makefile_BEIS3_BELD3
% make -f makefile_BEIS3_FIA
```

In all liklihood, the makefiles will need to be modified to suit your particular installation. The current makefiles are configured for a Portland Group FORTRAN 90 compiler running the Red Hat Linux operating system. You will need to have access to the following SMOKE, IO-API, netCDF, and EDSS libraries: libsmoke.a; libedsstools.a; libioapi.a; and libnetcdf.a.

Once compiled, you can run the csh scripts to create the IO-API SMOKE/BEIS3 data sets, for example:

```
% cd biogenics_vegas/fortran_processing
% source run_it_BEIS3_BELD3_VEGAS_04
% source run_it_BEIS3_FIA_VEGAS_04
% source run_it_blended_BEIS3_BELD3_VEGAS_12
% source run_it_blended_BEIS3_FIA_VEGAS_12
```

The results of these runs will be a set of IO-API files as named in the csh scripts. The structure of the csh scripts is simple. An annotated copy of one of the scripts (run_it_BEIS3_BELD3_VEGAS_04) is as follows:

****

```
#

# inputs
#
setenv ASCBELD   ../sas_processing/beld3_for_vegas_04km.pave (from Step 7 or
Step 8)
setenv ICELLS     90  (number of cells in the east-west direction)
setenv JCELLS    105  (number of cells in the north-south direction)
setenv GRDNM     VEGAS_04 (arbitrary name of the AQM grid)

setenv LOGFILE   LOG (name of LOG file...must be erased prior to running script)
#
# outputs
#
setenv NETBELDA  BELD_A_VEGAS04_090X105.ncf (name of the output IO-API data set)
setenv NETBELDB  BELD_B_VEGAS04_090X105.ncf (name of the output IO-API data set)

#
# set for no prompting
#
setenv PROMPTFLAG F (always F for batch processing)

#
# run the coversion
#
create_BEIS3_BELD3 (run the FORTRAN program)
*******************************************************************************
```

Step 10 -- Run SMOKE/BEIS3

A discussion on how to run SMOKE/BEIS3 is beyond the scope of this document. The reader is referred to the SMOKE documentation for a description of how to run SMOKE/BEIS3.

However, here are a few simple notes. All the SMOKE compatible data and scripts are contained in the directory 'smoke.' All of the SMOKE assigns files can be found in the directory 'smoke/assigns_vegas.' The SMOKE assigns files take the form of 'ASSIGNS.vegas$$.cmaq.cb4p25.bio_YYYYMMDD_yyyymmdd' where $$ is either 1.3, 04, 12, or 36; YYYYMMDD is the begin date of the episode and yyyymmdd is the
end date of the episode.

The SMOKE run scripts are located in the directory 'smoke/scripts/run_vegas' and take the form of 'smk_bg_vegas$$_YYYYMMDD_yyyymmdd' where $$ is either 1.3, 04, 12,
or 36; YYYYMMDD is the begin date of the episode and yyyymmdd is the end date of the episode. The SMOKE run scripts are executed as follows:

```
% cd biogenics_vegas/smoke/scripts/run_vegas
% source run_vegas$$_bio_YYYYMMDD_yyyymmdd.bat
```

where $$ is either 1.3, 04, 12, or 36; YYYYMMDD is the begin date of the episode and yyyymmdd is the end date of the episode

APPENDIX C

EXAMPLE OF FIELD DATA SHEETS

Vegetation Survey: Clark County, Nevada

Field Data Sheet

Location 115 **Coordinates** E 675562 **Datum** NAD83
Quadrat # 2-A N 3925608 **Name** Jeremy
Vegetation Ecotype Blackbrush **Date** 11/15/04

Subquadrat Indentification[a]	Species Name	Abundance	Comments
NW	✓Blackbrush	35%	
	Yucca E.	5%	
	Yucca Brev.		
	Creosote	10%	
	Barren	50%	
NE	✓Blackbrush	35%	
	Yucca	5%	
	Creosote	5%	
	Opuntia + Cholla	1%	
	Ephedra	1%	
SW	Barren	60%	
	✓ Blackbrush	24%	
	Creosote	6%	
	Yucca	10%	
SE	Barren	50%	
	✓ Blackbrush	37%	
	Yucca	6%	
	Creosote	2%	
	Cacti	1%	
	-	2%	
	Ephedra	2%	

Photos Taken	
N	53
S	55
E	54
W	56
O	57, 58

Abundance Cover Classes
0 –10%
10 – 20%
20 – 30%
30 – 40%
40 – 50%
50 – 60%
60 –70%
70 – 80%
80 – 90%
90 – 95%

General Comments for this Quadrat
elevation
4190'

[a] *Subquadrat identifiers are NW, NE, SW & SE*

Vegetation Survey: Clark County, Nevada

Field Data Sheet

Location 11-5 **Coordinates** E 671944 **Datum** NAD83

Quadrat # 2-B N 3937030 **Name** Jeremy

Vegetation Ecotype Blackbrush **Date** 11/15/04

Subquadrat Indentification[a]	Species Name	Abundance	Comments
NW	Barren	55%	
	Blackbrush	36%	
	GRASS Yucca	1% 2%	
	Ephedra	3%	
	Cacti	2%	
	SAGE	1%	
NE	Barren	50%	① Some grasses live as well in conjunction w/ blackbrush
	Blackbrush	40%	
	Yucca	5%	
	Ephedra	3%	
	Cacti	1%	
	Sage	2%	② blackbrush very dominant throughout
SW	Barren	60% [illegible]	
	blackbrush	25% [illegible]	
	GRASS Yucca	5% [illegible]	
	SAGE Ephedra	8% [illegible]	
	Cacti	2% [illegible]	
SE	Barren	65% [illegible]	
	Blackbrush	20% [illegible]	
	Yucca	5%	
	Ephedra	6%	
	Cacti	1%	
	GRASSES	3%	

Photos Taken	
N	77
S	79
E	78
W	80
O	75, 76

Abundance Cover Classes
0 – 10%
10 – 20%
20 – 30%
30 – 40%
40 – 50%
50 – 60%
60 – 70%
70 – 80%
80 – 90%
90 – 95%

General Comments for this Quadrat
4646'
elevation

[a] *Subquadrat identifiers are NW, NE, SW & SE*

Chrysothamnus teretifolius

Vegetation Survey: Clark County, Nevada

Field Data Sheet

Location 115 **Coordinates** E 662846 **Datum** NAD83
Quadrat # 2-C N 4039281 **Name** Jeremy
Vegetation Ecotype Blackbrush **Date** 11/19/04

Andy Roll

Subquadrat Indentification[a]	Species Name	Abundance	Comments
	Ephedra	1%	
NE	Blackbrush	30%	
	Atriplex	15%	
	HORSAGE	5%	(1) west facing
	TRUMPET	5%	
	Yucca	7%	
	BARREN	20%	(2) wanted a
	GRASS	2%	higher elevation
	CACTI	1%	blackbrush
	BRITTLE BUSH	5%	
NW	Blackbrush	25%	community
	Atriplex	10%	which is
	Yucca	5%	why this plot
	TRUMPET	5%	is a bit
	HORSAGE	7%	north on
	BARREN	39%	the Northing
	GRASS	2%	from the original
	CACTI	1%	cut
	Lycium	1%	
	Ephedra	2%	
	Brittle Bush	3%	
SE	Blackbrush	27%	
	HORSAGE	8%	
	Atriplex	11%	
	Yucca	10%	
	Ephedra	10%	
	TRUMPET	2%	
	GRASS	1%	
	CACTI	1%	
	BARREN	30%	
SW	Blackbrush	33%	
	HORSAGE	12%	
	Atriplex	8%	
	Yucca	14%	
	Ephedra	6%	
	TRUMPET	1%	
	GRASS	3%	
	CACTI	1%	
	BARREN	22%	

[a] *Subquadrat identifiers are NW, NE, SW & SE*

Photos Taken	
N	2717
S	2719
E	2718
W	2720
0	2721-27

Abundance Cover Classes
0 –10%
10 – 20%
20 – 30%
30 – 40%
40 – 50%
50 – 60%
60 –70%
70 – 80%
80 – 90%
90 – 95%

General Comments for this Quadrat
4999' elevation

Vegetation Survey: Clark County, Nevada

Field Data Sheet

Location 11-5 Coordinates E 6660079 Datum NAD83

Quadrat # 2-D N 4038371 Name Jeremy

Vegetation Ecotype Blackbrush Date 11/19/04

Subquadrat Indentification[a]	Species Name	Abundance	Comments
~~NW~~ SW	Blackbrush	20%	
	Ephedra	8%	
	Atriplex	5%	
	Yucca	10%	
	WINTER FAT	12%	
	TRUMPET	2%	
	Brittle Bush	1%	
	GRASS	2%	
	BARREN	25%	
NE	Blackbrush	35%	
	Yucca	15%	
	Barren	15%	
	HORSAGE	5%	
	WINTER FAT	7%	
	BRITTLE BUSH	3%	
	Ephedra	10%	
	Composite	5%	
	Atriplex	3%	
	Turpentine	2%	
~~SW~~ NW	Blackbrush	34%	
	Ephedra	7%	
	Atriplex	8%	
	Barren	30%	
	HORSAGE	5%	
	Yucca	10%	
	BRITTLE BUSH	5%	
	WINTER FAT	5%	
	CACTI	1%	
SE	Blackbrush	25%	
	Ephedra	8%	
	Atriplex	6%	
	Yucca	7%	
	G, Mallow	2%	
	TRUMPET	1%	
	BRITTLE BUSH	4%	
	GRASS	1%	
	CACTI	1%	
	BARREN	31%	

Photos Taken	
N	-2724
S	-2726
E	-2725
W	-2727
O	-2728-2729

Andy CAM

Abundance Cover Classes
0 –10%
10 – 20%
20 – 30%
30 – 40%
40 – 50%
50 – 60%
60 –70%
70 – 80%
80 – 90%
90 – 95%

General Comments for this Quadrat
elevation 4871'

[a] *Subquadrat identifiers are NW, NE, SW & SE*

Vegetation Survey: Clark County, Nevada

Field Data Sheet

Location 115 **Coordinates** *E* 706724 **Datum** NAD83

Quadrat # 2-E *N* 3903549 **Name** Jeremy

Vegetation Ecotype Blackbrush **Date** 2/1/05

Subquadrat Indentification[a]	Species Name	Abundance	Comments
NW	Blackbrush	45%	
	Juniper	10%	
	Yucca	4%	① gorgeous bowl
	CACTI	5%	eastern view
	Ephedra	1%	of Colorado
	Eriogonum	2%	River
	BARREN	26%	
	GRASS	7%	
	ACACIA		
NE	Blackbrush	40%	
	Barren	20%	
	JUNIPER	5%	
	QUERCUS	5%	
	YUCCA	3%	
	CACTI	7%	
	PINYON PINE	3%	
	EPHEDRA	2%	
	ERIOGONUM	5%	
	~~BARREN~~		
	GRASS	7%	
SW	Blackbrush	30%	
	JUNIPER	7%	
	YUCCA	5%	
	CACTI	5%	
	GRASS	6%	
	BARREN	47%	
SE	Blackbrush	30%	
	JUNIPER	15%	
	YUCCA	3%	
	CACTI	3	
	GRASS	6	
	BARREN	43%	

Photos Taken	
N	40
E	41
W	43
S	42
O	44-45

Abundance Cover Classes
0 –10%
10 – 20%
20 – 30%
30 – 40%
40 – 50%
50 – 60%
60 –70%
70 – 80%
80 – 90%
90 – 95%

General Comments for this Quadrat
elevation: 3705'
time: 3:47 pm

[a] *Subquadrat identifiers are NW, NE, SW & SE*

Vegetation Survey: Clark County, Nevada

Field Data Sheet

Location 115 **Coordinates** E 7068095 **Datum** NAD83

Quadrat # 2-F N 3903306 **Name** Jeremy

Vegetation Ecotype Blackbrush **Date** 2/1/05

D·3

Subquadrat Indentification[a]	Species Name	Abundance	Comments
NW	Blackbrush	30	
	JUNIPER	15	
	CACTI	7	
	YUCCA	4	
	GRASS	10	
	ERIOGONUM	5	① ATRIPLEX
	MISTLE TOE	4	
	WINTER FAT	3	presence
	Barren	22	
NE	Blackbrush	30	
	JUNIPER	12	
	CACTI	5	
	YUCCA	7	
	GRASS	5	
	ERIOGONUM	2	
	ACACIA	4	
	SYMPHOCARPUS	2	
	EPHEDRA	2	
	BARREN	34	
SW	Blackbrush	43%	
	CACTI	5%	
	YUCCA	5%	
	JUNIPER	5%	
	CREOSOTE	5%	
	GRASS	10%	
	BARREN	25%	
	GUTIERREZIA	2%	
SE	Blackbrush	32%	
	JUNIPER	15%	
	YUCCA	10%	
	CREOSOTE	5%	
	GRASS	7%	
	CUCUMBER THING	1%	
	CACTI	6%	
	BARREN	20%	
	ACACIA	3%	
	Rubber Rabbit	1%	

Photos Taken	
N	52
E	53
W	55
S	54
O	55-56

Abundance Cover Classes
0 – 10%
10 – 20%
20 – 30%
30 – 40%
40 – 50%
50 – 60%
60 – 70%
70 – 80%
80 – 90%
90 – 95%

General Comments for this Quadrat
elevation:
3656'
time:
5:09 pm

[a] *Subquadrat identifiers are NW, NE, SW & SE*

Field Data Sheet

Location 115 Coordinates E 631120 Datum NAD83

Quadrat # 2-G N 3987362 Name Jeremy

Vegetation Ecotype Blackbrush Date 2/2/05

Subquadrat Indentification[a]	Species Name	Abundance	Comments
	Blackbrush	38%	(1) SW slope changing to other ecotype on opposing slope/grade
	~~Cheatgrass~~	~~2%~~	
	Pursia	3%	
	Yucca	5%	
	Juniper	7%	
	Grass	8%	
	Ephedra	3%	
	Pinyon Pine	5%	
	Atriplex	2%	
	Barren	28%	
	Turpentine Broom	1%	

DISC 3

Photos Taken
57+
58

Abundance Cover Classes
0 –10%
10 – 20%
20 – 30%
30 – 40%
40 – 50%
50 – 60%
60 –70%
70 – 80%
80 – 90%
90 – 95%

General Comments for this Quadrat
elevation: 4870'
time: 8:30 am

[a] *Subquadrat identifiers are NW, NE, SW & SE*

APPENDIX D

SPECIES & MIXED SPECIES BIOGENIC EMISSION FACTOR AND LAND USE CATEGORY DEVELOPMENT FOR CLARK COUNTY, NEVADA

SPECIES & MIXED SPECIES
BIOGENIC EMISSION FACTOR AND LAND USE CATEGORY DEVELOPMENT FOR CLARK COUNTY, NEVADA

D.1 Introduction

This appendix describes the methodology whereby new land use categories were derived for use in the biogenic emissions modeling for Clark County, Nevada. The new categories allow Clark County-specific land use categories by vegetation type rather than BEIS3/BELD3 default categories. For the extent of coverage of Clark County-specific land use categories, this work relied upon existing plant community spatial coverage (expressed in terms of areal polygons in ARCInfo shapefiles) and descriptions generated by RECON (RECON 2002); other fieldwork published by Professor David Charlet at the Community College of Southern Nevada (Charlet 2003); and other related, peer-reviewed publications (referenced later, herein).

In 1996, Arthur M. Winer of the University of California, in conjunction with representatives from the U.S. Army Corps of Engineers, the U.S. Environmental Protection Agency, and the California Air Resources Board, published a taxonomic method for assigning isoprene and monoterpene emission rates for woody shrub and tree species (Benjamin *et al.* 1996). Winer's methodology suggests that species of the same genus often exhibit similar biogenic emission rates (Benjamin *et al.* 1996). Although this assumption is not entirely well founded for every species, the above methodology or other similar principals have derived the majority of the existing land use categories and associated emissions utilized in the current BEIS3/BELD3 modeling system.

The resources and time required for measuring and determining biogenic emissions on a species by species basis was entirely out of the scope of this project, as individual species research is very time consuming and resource intensive (Karlik *et al.* 1998). A more specific and focused study would be required to consider biogenic emissions for specific families or genera of plants to provide the best understanding and most representative modeling capabilities in the future. Clark County would benefit directly from emissions studies of the botanical family CHENOPODIACEAE, which is a common high-desert family. Otherwise, such an expenditure of resources may not be warranted given the sparse nature of most plant communities and therefore potential biogenic emissions in Clark County, unless the expenditure was distributed through multiple agencies, universities, or states.

D.2 Methodology Overview

1. RECON data (RECON 2002), compared with Charlet's plant community surveys (Charlet 2003), were used to establish first-cut land use cover types for Clark County, Nevada. Modeling values for all necessary fields were derived from peer-reviewed literature (see Citations) and existing modeling data sets for BEIS3/BELD3, and combined to form initial plant community values.

2. Field surveys were performed. Relative plant densities, barren space, and species demographics were determined and quantified, along with soils and elevation.

3. Data collected in the field was compiled on a quadrat-by-quadrat basis for each ecosystem, or land use cover type. For example, quadrats 4-A, 4-B, 4-C, and 4-D were all considered representatives of the Hopsage ecosystem. Data was collected and averaged computed for each individual quadrat.

4. Data was transferred from field sheets into Excel® spreadsheets and eventually into the Access® data base program for processing. All quadrats of similar plant communities (e.g. Hopsage) were combined in order to determine mean percent coverage densities of individual plants represented in the community. For example, the average density of Creosote Bush in the Hopsage community (land use type) was 20% overall.

5. Resulting average values were then transferred back into Excel®. All land use cover percent density averages were rounded to the nearest whole number. These values equated the overall percent of land covered in a given series of quadrats, and imply the general coverage of the plant community, or land use type.

6. BEIS3/BELD3 land use data values for all necessary fields were assigned to species represented in the existing BELD3 database (e.g. survey species White Fir was assigned the field value of BELD3 category *76 Fir_white*); alternate information from a literature review was also compiled and used where pertinent. (Benjamin *et al.* 1996)

7. For species that were observed in the field survey, which are not represented in the existing BELD3 by species, genus, or family (such as all observed species in family CHENOPODIACEAE), a default data set was assigned for that species via BELD3 category *10 USGS_shrubgrass*, combined with conversions of isoprene, monoterpene, OVOC's, and NO_x levels from BELD2. See section D.3 for details on these calculations and sources for data.

8. Percent land coverage per species was then multiplied by plant species emission factors in Excel® to yield weighted values on all fields and emissions. For example, in plant community Ponderosa Pine (land use R18), the Ponderosa Pine trees accounted for 32% of the land coverage as an average for the entire community. So 32% was multiplied by each of the required modeling fields[1] for BEIS3/BELD3 to yield a weighted[2] value that reflects the true plant communities' densities.

Species	% Coverage	BEIS3/BELD3 Modeling Fields[a]							
		A	B	C	D	E	F	G	H
Ponderosa Pine	32	3	300	1	0	3	50	650	2
Total Weighted[2]	--	1	100	.32	0	1	16	200	.75

[a] See Attachment A for specific definitions of the 8 BEIS3/BELD3 modeling fields

9. All species that were present in each plant community were weighted in this manner, and then each plant community's individual species' total weighted[2] values were then rolled together to generate all the required fields for the community in total[3].

Species	% Coverage	BEIS3/BELD3 Modeling Fields (Weighted[a])							
		A	B	C	D	E	F	G	H
Ponderosa Pine	32	1	100	.32	0	1	16	200	.75
White Fir	20	1	50	.38	0	1	14	150	.25
Pinyon Pine	10	1	50	.30	0	1	5	100	1
Barren Ground	38	0	0	0	0	0	0	0	0
Community Ttl[3]	100	3	200	1	0	1	35	450	2

[a] Weighted modeling fields based on step 8 above
[b] Clark County specific factors for modeling field for this land use type

10. For Columns A-D (See Attachment A for definitions), an integer of the resultant Summation of all community species was assigned based on BELD3 field requirements. This was accomplished in Excel® (e.g. 0.95 becomes 1).

11. Final Field values for each plant community, or land use type, were then extracted from the Excel® spreadsheet. The resultant data fields replaced the arbitrary values for each plant community based on existing data from step 1 of this methodology. (RECON 2002, Charlet 2003) For example, Blackbrush community density data was replaced with field survey resultant community density data.

12. The final step in this methodology was assigning Clark County specific names for each of the newly calculated land use types. The Clark County specific names include the following land use types for use in BEIS3/BELD3:

Land Use ID	Land Use Description
R01	Alpine
R02	Blackbrush
R04	Hopsage
R05	Bristlecone Pine
R06	Creosote-Bursage
R07	Mojave Mixed Scrub
R08	Mixed Scrub Grassland
R10	Agriculture
R11	Barrenland
R12	Lowland Riparian
R13	Mesquite
R14	Mixed Mountain Scrub
R15	Pinyon Pine
R16	Pinyon Pine & Juniper
R17	White Fir
R18	Ponderosa Pine
R19	Ponderosa Pine - Mountain Scrub
R20	Sagebrush
R21	Sagebrush Grassland
R22	Playa
R23	Salt Desert Scrub
R24	Water
1	Industrial
2	Light Industrial
3	Suburban Residential
4	Urban Residential
5	Rural Residential
6	Public Facility / Park
7	Commercial
8	Major Development
9	Right of Way
NotCC	Not Clark County

D.3 Details on Non-BELD3 Species Assignments

Some species did not have any genus or family representation in the BEIS3/BELD3 database for land use categories. A default series of data was therefore necessary to determine for these species. This default data was extracted from the general USGS cover types that exist in the BELD3 data and updated with remnants from BEIS2, which had specific land use coverage for "desert scrub". In the case of this study, the family CHENOPODIACEAE was not represented and "desert scrub" from BELD2, and category "shrub grassland" from BELD3 are the closest land use

cover types that would represent the emissions of the CHENOPODIACEAE with the rigorous emissions testing required to determine all 8 of the BELD3 data fields. (Karlik *et al.* 1998)

The following methods were necessary to obtain the default data:

1. Convert BELD2 to BELD3 data:

   Column E $42.5 * e = 38$
   $e = 0.89$

   Column F $85 * f = 66$
   $f = 0.78$

   Column G $693.7 * g = 408$
   $g = 0.58$

   Column H $4.5 * h = 2$
   $h = 0.44$

   All lower case letters above (*e*-*h*) are the conversion factors for each of the final four columns, or the VOC emissions, in the BELD2 land use database to convert the data to appropriate BELD3 data equivalents. The conversion was checked against multiple land use types that were represented in both BELD2 and BELD3.

2. Check conversions from BELD2 to BELD3:

   Data conversion from BELD2 tom BELD3 with conversion factors from above

BELD2 land use type	E	F	G	H
Abie (white fir)	170	5100	2775	4.5
Conversion factor	0.89	0.78	0.58	0.44
Resultant BELD3 value	151.9	3978	1610	1.98

   Compare with existent BELD3 data for same land use

BELD3 land use type	E	F	G	H
76 Fir_white	150	3971	1620	2
Resultant BELD3 from above	151.9	3978	1610	1.98

   Conversions are accurate and held true across the board through other conversion checks between BELD2 and BELD3 data. Other specific conversion calculations checks included:

BELD2	Jugl (Juglans nigra)	to	BELD3	227 Walnut (Juglans nigra)
BELD2	Liri (Liriodendron)	to	BELD3	231 Yellow wood (Liriondendron)

3. Convert BELD2 data to BELD3 data:

Using the conversion factors determined in steps 1 and 2 of Section D.2 above, these factors are used here to convert BELD2 desert scrub category into a BELD3 data set.

BELD2 land use type	E	F	G	H
Desh (desert scrub)	65	94.5	56.7	57.8
Conversion factor	0.89	0.78	0.58	0.44
Resultant BELD3 conversion	57.0	73.71	32.86	25.43

The resultant BELD3 conversion is not a whole number and is rounded to a whole number as shown below. Conversions are conservative highs.

BELD3 conversion	E	F	G	H
Desert Scrub	60	75	33	26

4. Utilize conversion as default for all unknown species identified in quads:

Data conversion from step 3 in Attachment A is utilized as the data default for any unknown species in the various desert communities defining the new land use coverage categories. Isoprene, Monoterpene, Other VOC's, and NO_x (BELD3 field columns E-H) are all represented by the converted data in the table below:

BELD3 conversion	E	F	G	H
Desert Scrub	60	75	33	26

In addition, the Leaf Area Index, Dry Leaf Biomass, Winter Biomass, and Indicator of Specific Leaf Weight (BELD3 modeling field columns A-D) for unknown categories are drawn from default BELD3 land use category *10 USGS_shrubgrass*[b]. This category accounts for mostly woody growth in a given plant community with some grass and herbaceous coverage, much like the desert ecosystem. The data for these fields (A-D) are represented below:

BELD3 *10 USGS_shrubgrass*[b]	A	B	C	D
Desert Scrub	3	350	0.5	0

5. Default data entry for all unknown species:

For all species represented in a given plant community (e.g. Blackbrush Grassland) that do not have existing representation within the BELD3 modeling database[c], the following default field values are utilized in the calculation in step 7 of the methodology found in Section D.2 for determining weighted values for all plant communities.

Default Land Use	BELD3 Modeling Fields							
	A	B	C	D	E	F	G	H

(Species not represented[c])	3	350	0.5	0	60	75	33	26

D.4 LITERATURE CITED

Benjamin, Michael T., Mark Sudol, Laura Bloch, and Arthur M. Winer. 1996. *Low-Emitting Urban Forests: A Taxonomic Methodology for Assigning Isoprene and Monoterpene Emission Rates*. Atmospheric Environment, vol. 30, No. 9. pp 1437-1452.

Charlet, David A. 2003. *Clark County Roads Biodiversity Project – 2001-2003 Biennium Report.* Prepared for UNR-BRRC.

Dallmeier, F., M. Kabel and R. Rice. 1992. *Methods for establishment and inventory of permanent plots*. UNESCO, Paris. pp. 11-46.

Geron, C., A. Guenther, and T. Pierce. 1994. *An improved model for estimating emissions of volatile organic compounds from forests in the eastern United States*. Journal of Geophysical Research, vol. 99, pp. 1773-1791.

Karlik, John, Charles H. Haas, and Arthur M. Winer. 1998. *Isoprene Emission Factors for Twenty-five Plant Species Found in California*. Contract No. 98-WPB.13P, prepared for the California Air Resources Board, Riverside, California, USA.

RECON. 2002. *Clark County Multiple Species Habitat Conservation Plan and Environmental Impact Statement, Appendix A: Ecosystem Analysis.* Prepared for the U.S. Fish and Wildlife Service & The Clark County Department of Comprehensive Planning.

Yarwood, Dr. G., and Keane Lee. 1997. *Leaf Biomass Density Data for North-Central Texas*. Prepared for Texas Natural Resources Conservation Commission by ENVIRON International Corporation.

8.9.1.1 B3FAC: BEIS3 emissions factors file

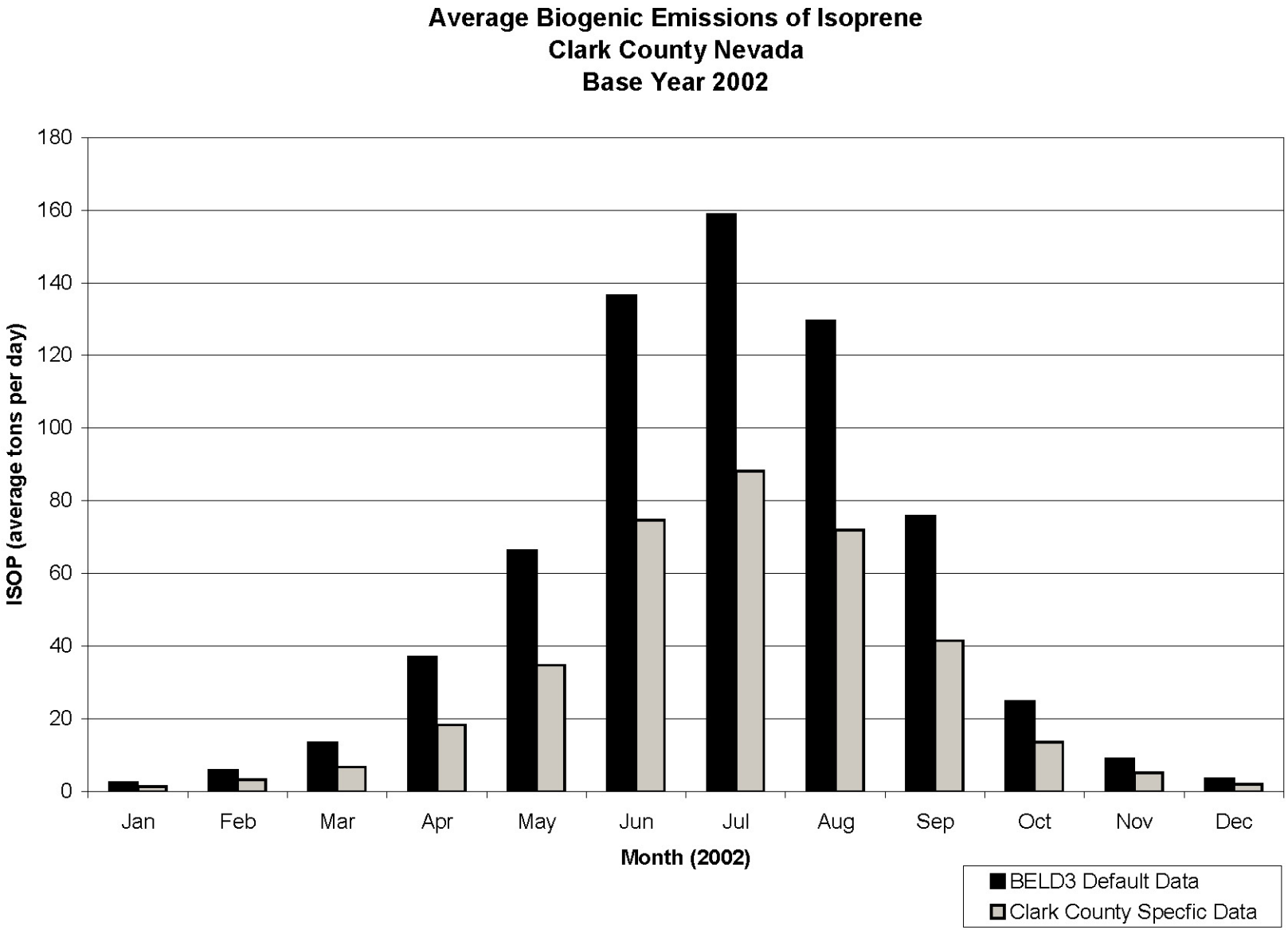
This file contains a LAI, dry leaf biomass, winter biomass factor, indicator of specific leaf weight, and normalized emission fluxes for four different species/compounds (ISOP, OVOC, MONO, and NO). This ASCII file has the following structure:

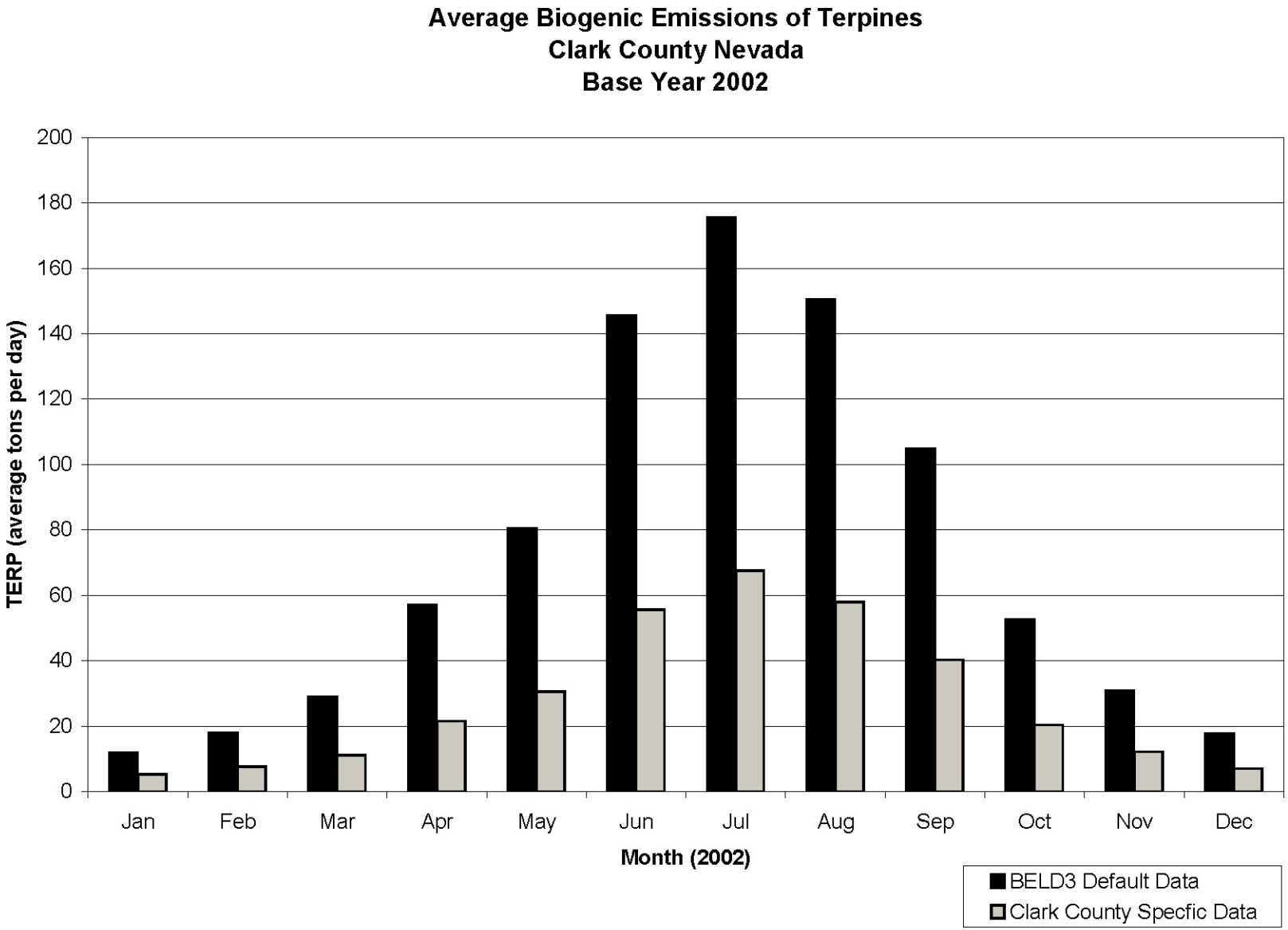
Line	Columns	Description
1+	9-24	Abbreviated name for land use type (Character*16)
	A	Leaf area index (m^2/m^2) (Integer)
	B	Dry leaf biomass (g/m^2) (Integer)
	C	Winter biomass factor (Real)
	D	Indicator of specific leaf weight (Integer)
	E	Normalized emissions flux for ISOP (Real)
	F	Normalized emissions flux for MONO (Real)
	G	Normalized emissions flux for OVOC (Real)
	H	Normalized emissions flux for NO (Real)

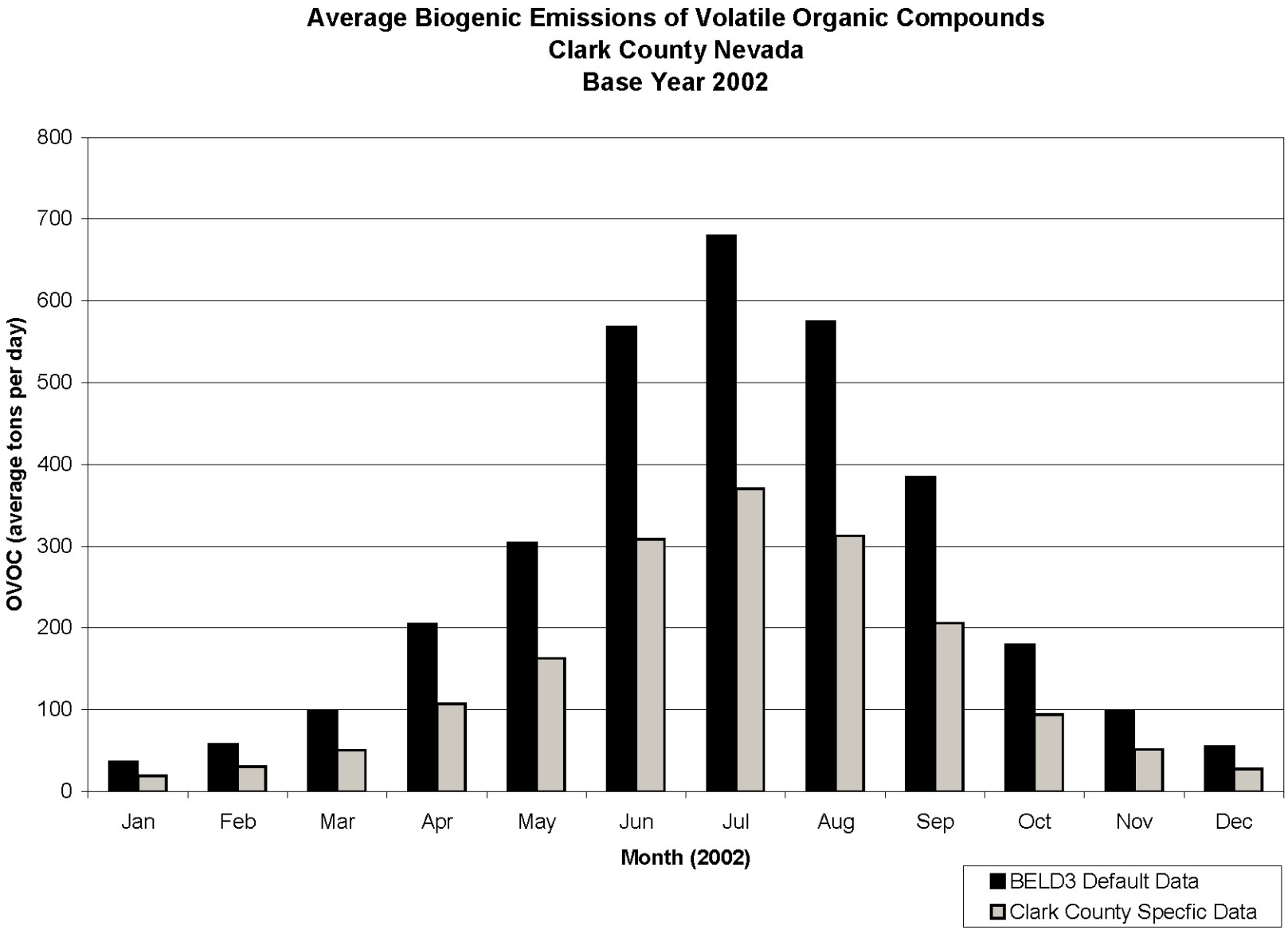
Columns E-H are normalized emissions, or emission rates, measured in $\mu g\ m^{-2}h^{-1}$.

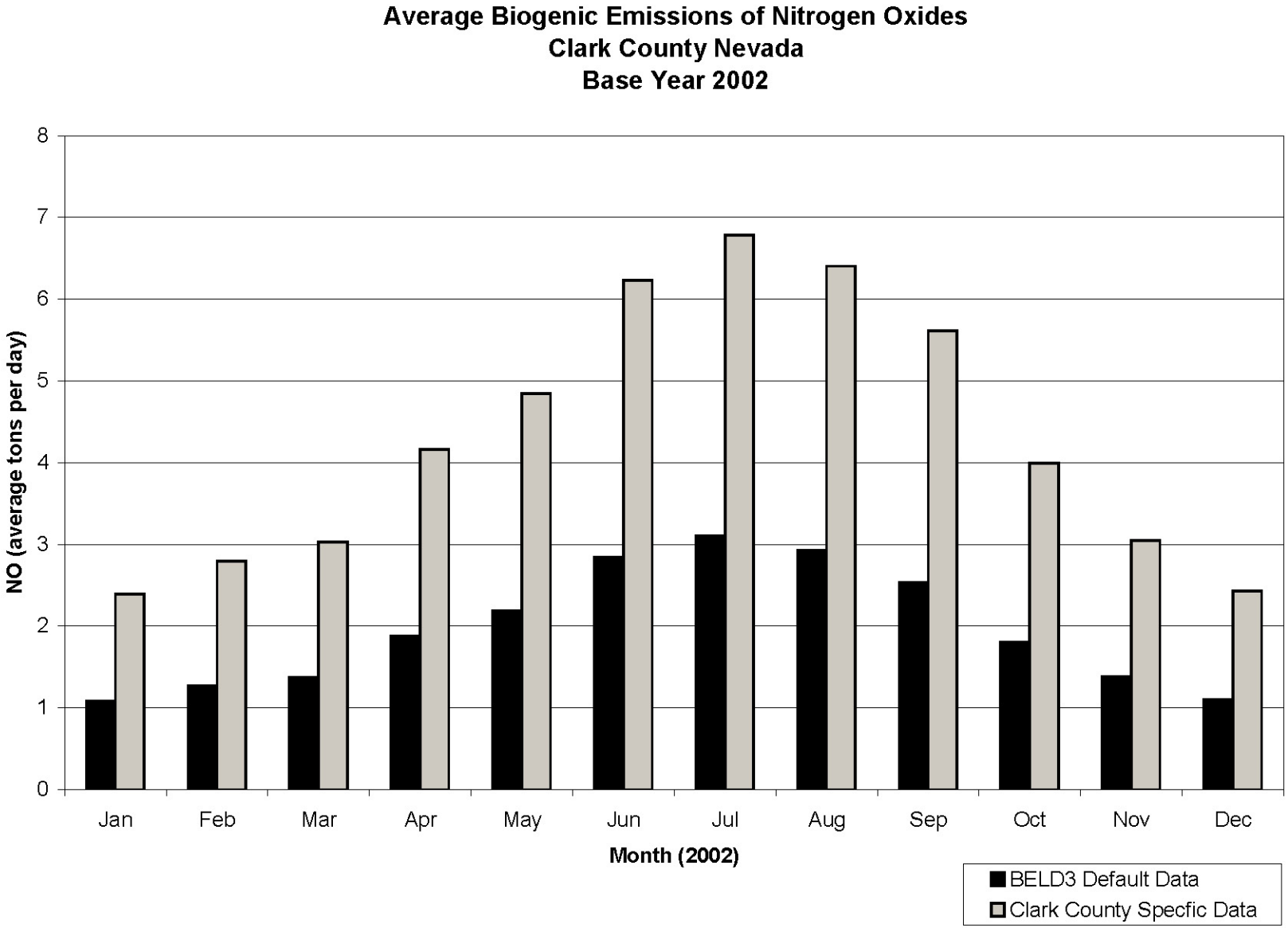
APPENDIX E

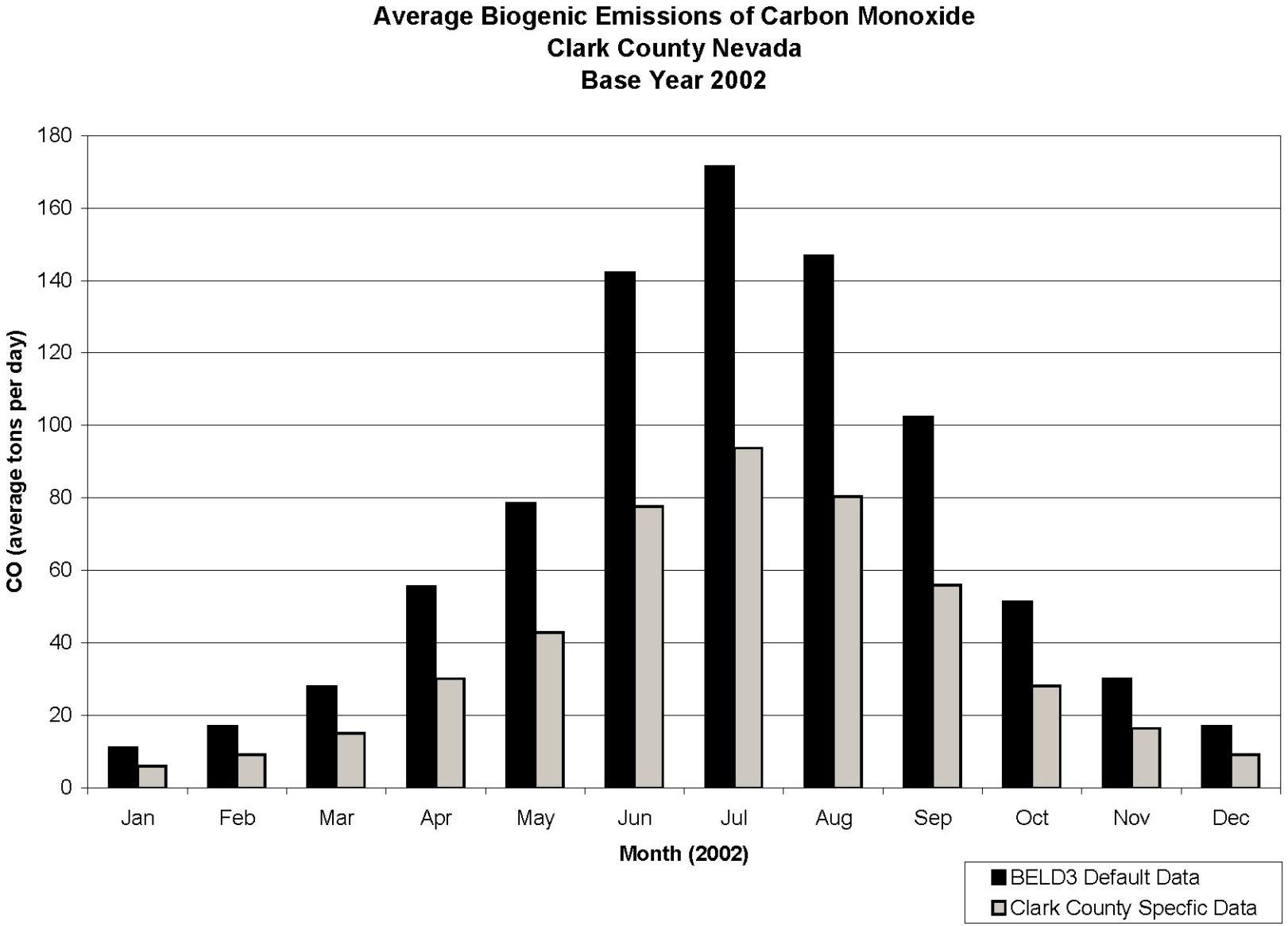
ANNUALIZED BEIS3 V12 RESULTS


Average Biogenic Emissions of Isoprene
Clark County Nevada
Base Year 2002
ISOP (average tons per day)
180
160
140
120
100
80
60
40
20
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month (2002)
BELD3 Default Data
Clark County Specfic Data


Average Biogenic Emissions of Terpines
Clark County Nevada
Base Year 2002
TERP (average tons per day)
200
180
160
140
120
100
80
60
40
20
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month (2002)
BELD3 Default Data
Clark County Specfic Data

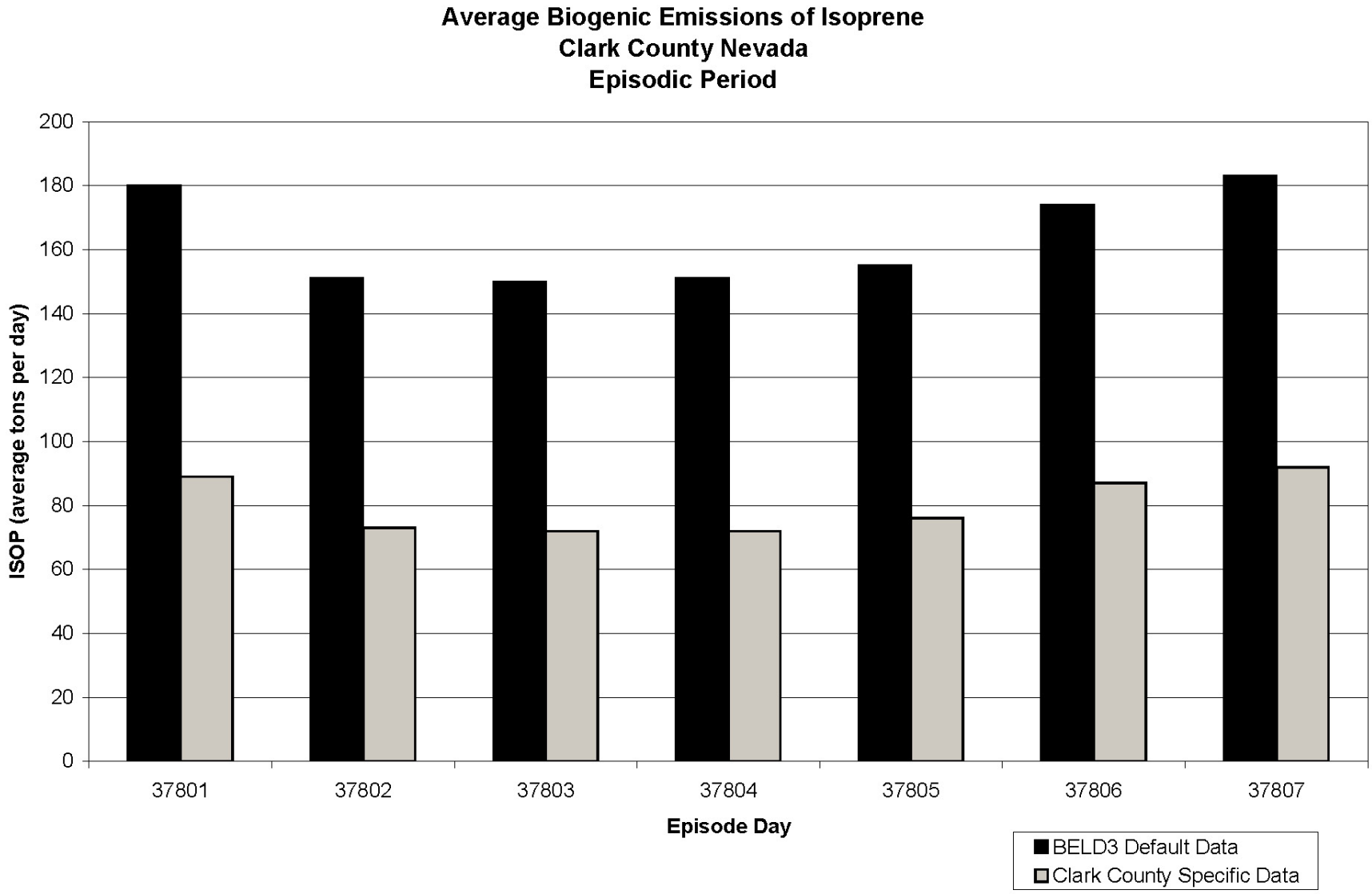

Average Biogenic Emissions of Volatile Organic Compounds
Clark County Nevada
Base Year 2002
OVOC (average tons per day)
800
700
600
500
400
300
200
100
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month (2002)
BELD3 Default Data
Clark County Specfic Data

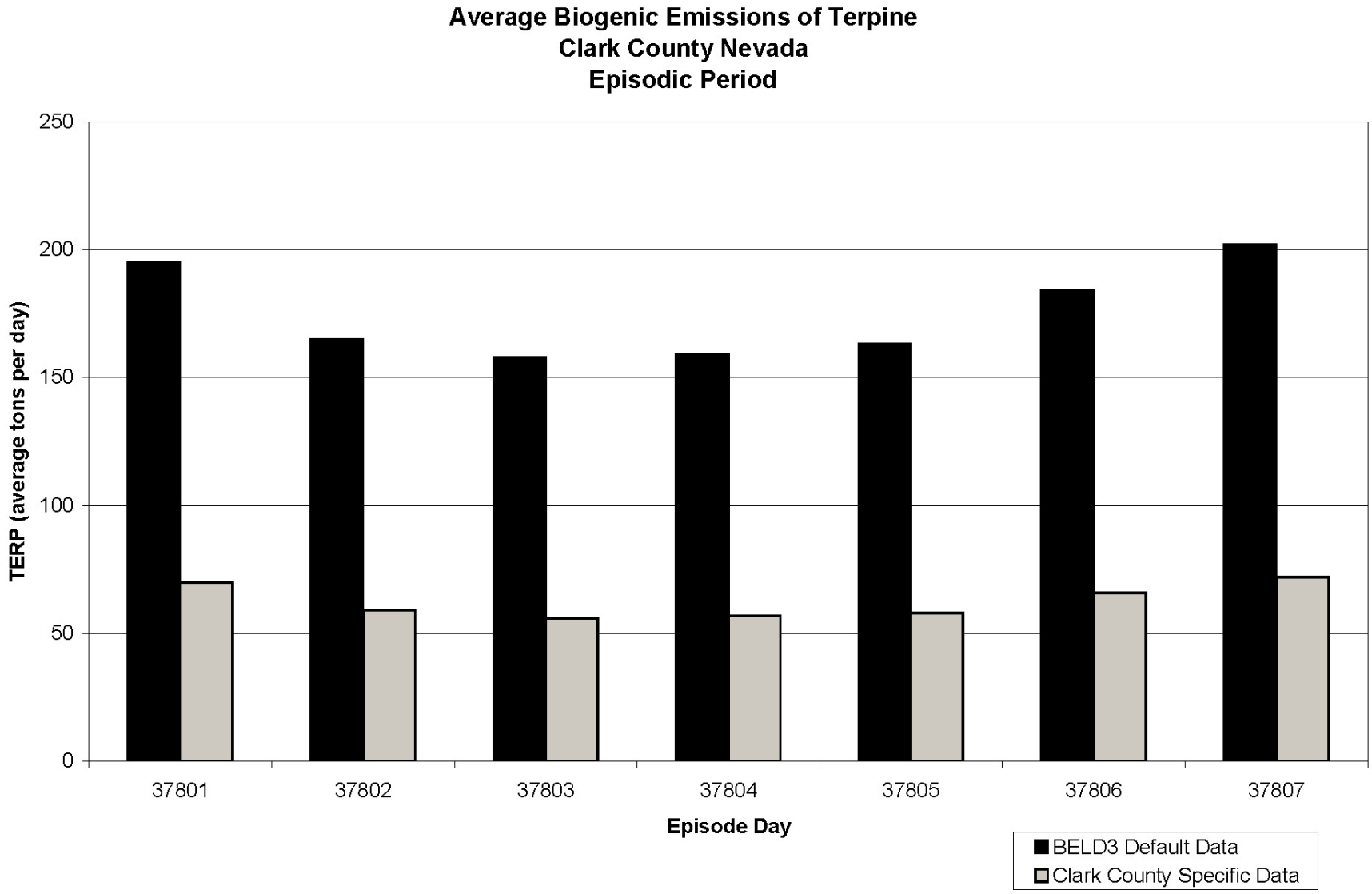

Average Biogenic Emissions of Nitrogen Oxides
Clark County Nevada
Base Year 2002
NO (average tons per day)
0
1
2
3
4
5
6
7
8
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month (2002)
BELD3 Default Data
Clark County Specfic Data

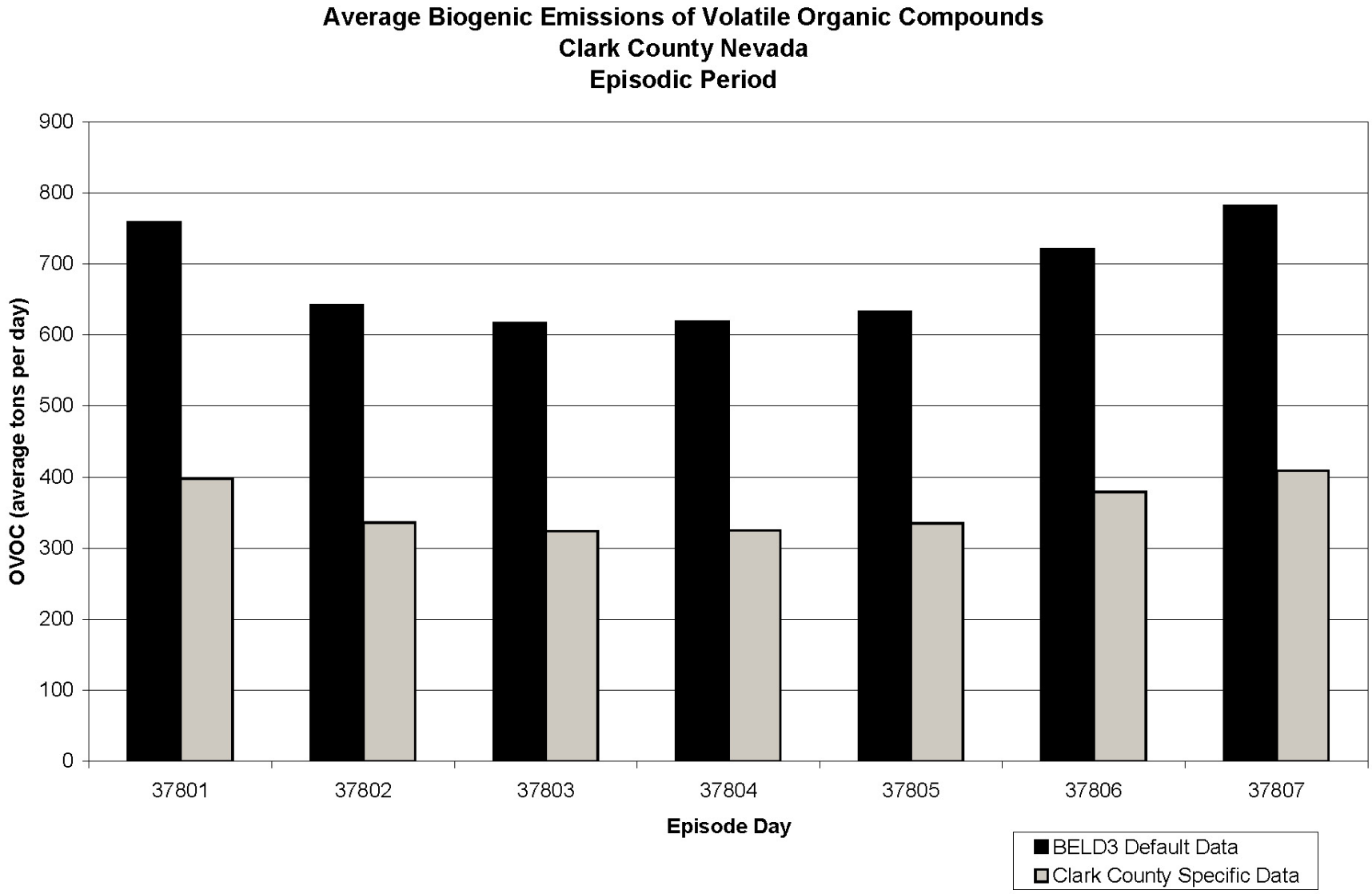

Average Biogenic Emissions of Carbon Monoxide
Clark County Nevada
Base Year 2002
CO (average tons per day)
180
160
140
120
100
80
60
40
20
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month (2002)
BELD3 Default Data
Clark County Specfic Data

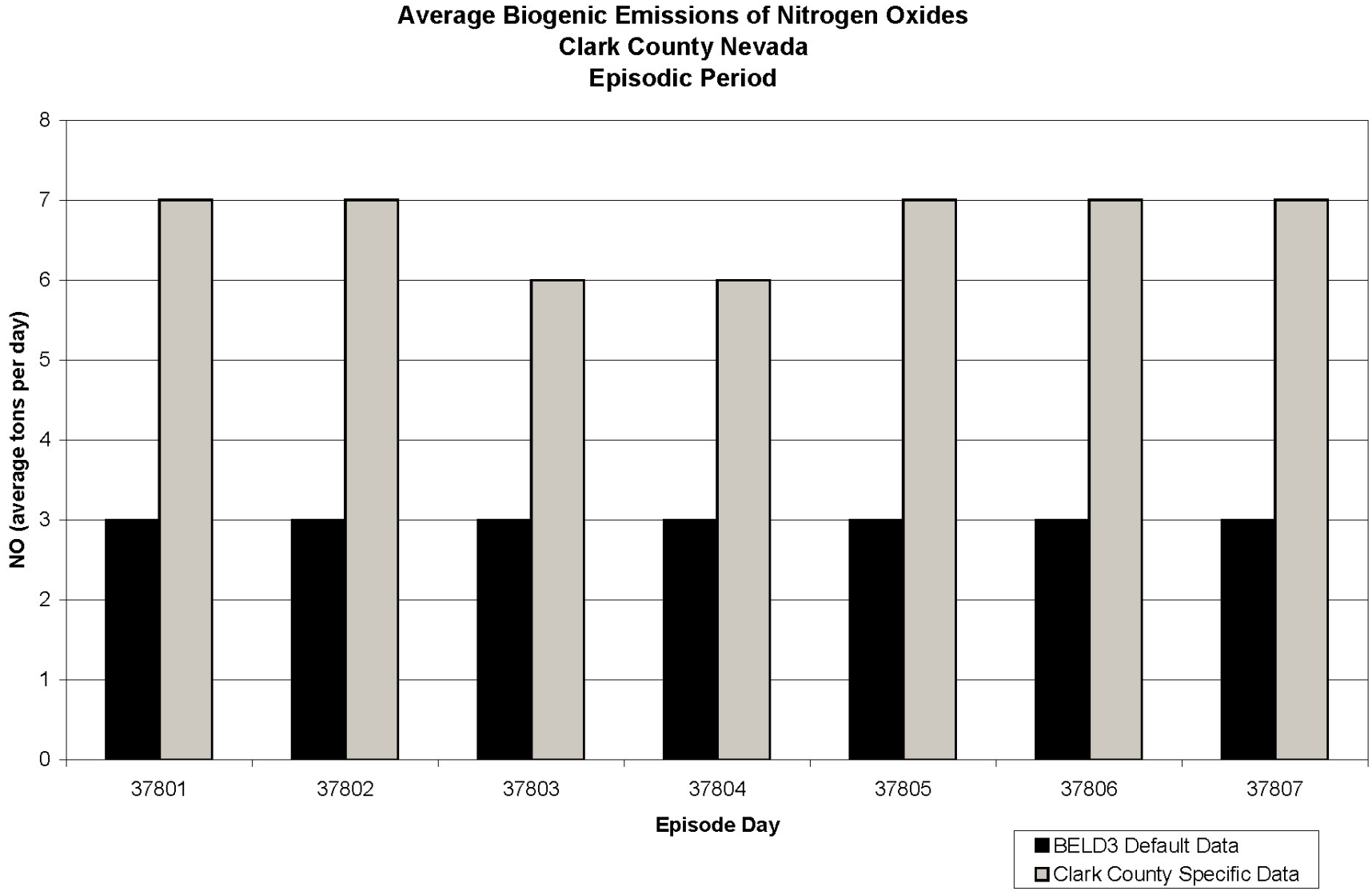
APPENDIX F

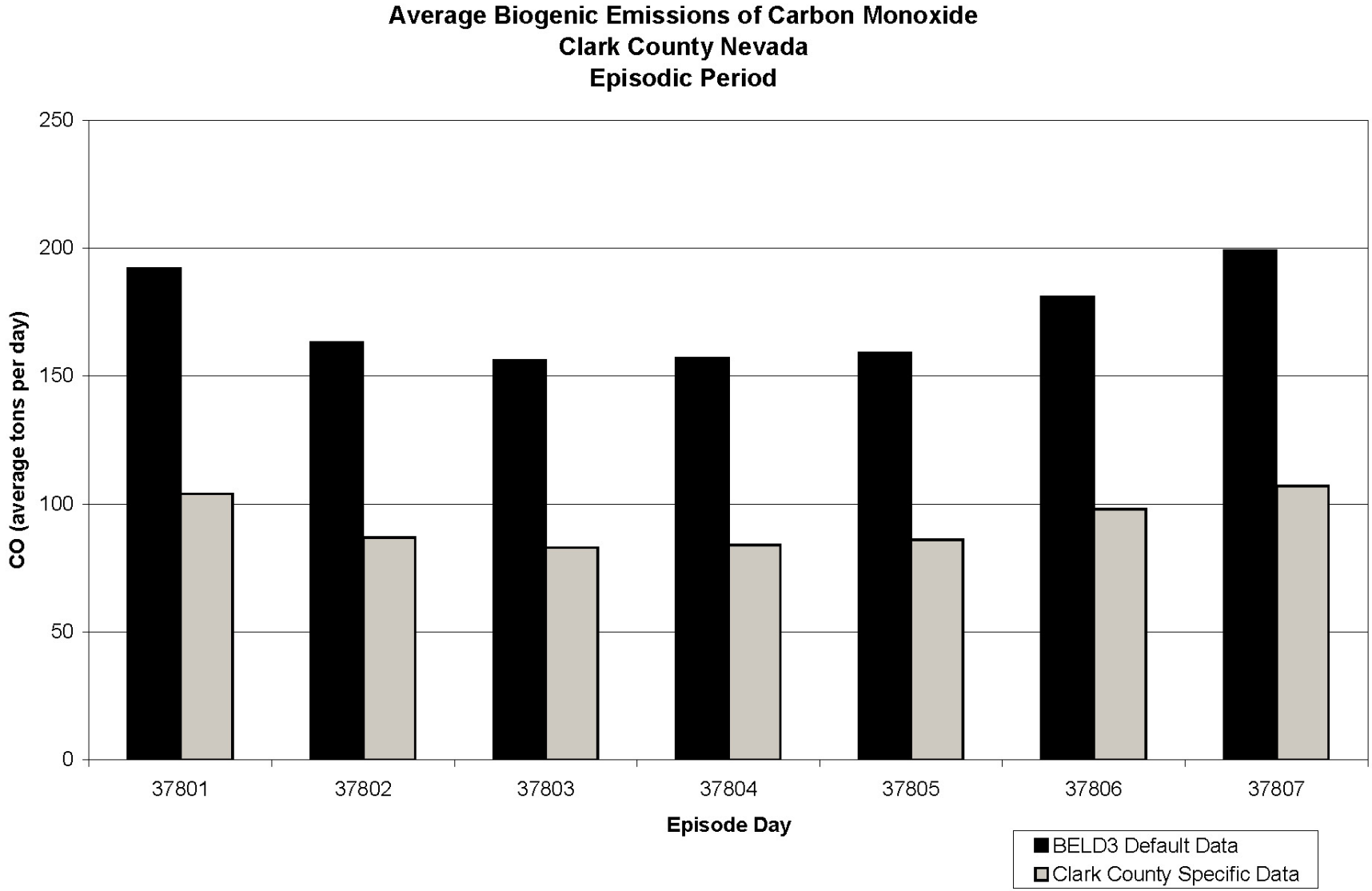
BEIS3 V12 RESULTS FOR EPISODE SELECTED BY CLARK COUNTY


Average Biogenic Emissions of Isoprene
Clark County Nevada
Episodic Period
ISOP (average tons per day)
200
180
160
140
120
100
80
60
40
20
0
37801
37802
37803
37804
37805
37806
37807
Episode Day
BELD3 Default Data
Clark County Specific Data


Average Biogenic Emissions of Terpine
Clark County Nevada
Episodic Period
TERP (average tons per day)
250
200
150
100
50
0
37801
37802
37803
37804
37805
37806
37807
Episode Day
BELD3 Default Data
Clark County Specific Data


Average Biogenic Emissions of Volatile Organic Compounds
Clark County Nevada
Episodic Period
OVOC (average tons per day)
900
800
700
600
500
400
300
200
100
0
37801
37802
37803
37804
37805
37806
37807
Episode Day
BELD3 Default Data
Clark County Specific Data


Average Biogenic Emissions of Nitrogen Oxides
Clark County Nevada
Episodic Period
NO (average tons per day)
0
1
2
3
4
5
6
7
8
37801
37802
37803
37804
37805
37806
37807
Episode Day
BELD3 Default Data
Clark County Specific Data


Average Biogenic Emissions of Carbon Monoxide
Clark County Nevada
Episodic Period
CO (average tons per day)
250
200
150
100
50
0
37801
37802
37803
37804
37805
37806
37807
Episode Day
BELD3 Default Data
Clark County Specific Data